LEGAL MEDICINE

PART II.

LEGITIMACY AND PATERNITY.
PREGNANCY. ABORTION.
RAPE—INDECENT EXPOSURE.
SODOMY—BESTIALITY.

LIVE BIRTH. INFANTICIDE.
ASPHYXIA. DROWNING.
HANGING. STRANGULATION
SUFFOCATION.

BY

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PREFACE.

THIS Volume contains the notes prepared for my Lectures on Legal Medicine, delivered at the London Hospital during the Summer Session of 1882. The earlier part deals with the medico-legal aspects of sexual relationships, and the latter with the various forms of death by asphyxia.

I desire to acknowledge the assistance I have received from a large circle of medical friends. To some I am indebted for records of personal experience; to some, for affording me facilities at their hospitals for the detailed observation of special cases; and to others, for criticisms of what I had written.

I have endeavoured personally to investigate each subject from the point of view of the medical-jurist. With this object I have searched the original memoirs (at least, in every instance where I could gain access to them, or was able to understand the language in which they were written) in order to learn directly the views held by authorities, and the cases upon which their opinions were based. Want of space has rendered it impossible for me to do more than select for publication some eight hundred of these illustrative cases—a number barely one-third of those I have abstracted.

As in the previous volume, I have avoided the detailed statement of cases whilst discussing principles. The illustrative cases have therefore been placed at the end of the several chapters, reference being made to them in the text by

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LEGAL MEDICINE.

CHAPTER I.

LEGITIMACY AND PATERNITY.

General Facts Relating to Legitimacy—Impotence and Sterility in the Male and Female—Causes of Impotence and Sterility in the Male—Causes in the Female—Menstruation and Childbearing—The duties of the Medical Jurist in cases of Impotence and Sterility—The Normal Period of Utero-gestation—Methods of Calculation—Shortened Utero-gestation—Signs of Maturity in a New Born Child—Development of Fœtus at Various Periods of Uterine Life—Lengthened Utero-gestation—Affiliation Cases—Supposititious Children—Notes for the Examination of Patients in cases of Impotence and Sterility.

(ILLUSTRATIVE CASES, Page 75.)

IT will be convenient to summarise briefly certain facts relating to the subject of legitimacy :—

1. Every child born in wedlock is regarded, *primâ facie*, to be legitimate, *i.e.*, to have the mother's husband for its father (*Cases* 1, 2, 4), *unless impossibility of access* (*Case* 5) *or impossibility of intercourse* can be proved. In other words, if the legitimacy of a child born in wedlock be questioned, it is for the opponents to prove the impossibility of legitimacy, and not for those who contend for its being legitimate to prove the same.

2. Non-access cannot be proved by the parties interested (viz., by the husband or wife), but must be determined by other evidence (*Cases* 1, 2) ; in other words, married persons are not allowed to give evidence against the legitimacy of their children.

3. If a husband have access to his wife (*i.e.*, if they cohabit), or if there exist between them the slightest possible description of intercourse, all children born of her are regarded as children of her lawful husband, and that although the woman be living

in adultery at the time (*Cases* 3, 4). On the other hand, if husband and wife live separately (*i.e.*, if they do not cohabit), she living in adultery during the period of their separation, the legitimacy of the children born to her under such circumstances cannot be maintained (*Cases* 1, 2), although the husband might have opportunities of access, of which "it would be monstrous to suppose he would avail himself."

4. A child is legitimate if born during wedlock, although its conception may have occurred before wedlock. The justice of this is manifest, seeing that the time and date of birth is definite, whilst the time of conception is indefinite.

5. A child born before wedlock is illegitimate by English law, although the parents afterwards marry. In Scotland, a child born before marriage becomes legitimate by the after marriage of its parents.

6. If a man marries a woman (whether single or a widow) who has children of whom he is not the father, he is bound to maintain those children, although they do not thereby become legitimate.

7. If man and wife be legally divorced (*a mensâ et thoro*), any children thereafter born of such persons, are deemed illegitimate.

8. A child born after the death of its mother (*e.g.*, by Cæsarian section) is legitimate, and at majority may claim the estate of which the mother was seized. The husband, however, in such case, cannot claim, because his wife was dead, and the marriage therefore legally dissolved at the time of the birth.

9. A posthumous child is considered legitimate, unless non-access, or impotence, or sterility on the part of the husband can be proved. A case of difficulty might occur as to paternity, if a woman married immediately after the death of her first husband, and a child was born on or about the 280th day of the second marriage.

Such a case would however be treated as a question of fact only, *viz.*, of which husband was it the child? And it is submitted, that in such case the evidence of the mother and of the second husband would be admissible to decide the question of paternity.

The following curious statement *re* doubtful paternity is worthy of quotation (I. Inst., 8, 1236) :—

"If a man hath a wife and dyeth, and within a very short time after, the wife marrieth again, and within 9 months hath a child, so as it may be the child of one or the other, some have said that in this case the child may choose his father."

Enquiries involving medical questions relating to disputed paternity, may arise as follows :—

(A.) In cases where a child is born after the husband's death (*posthumous*), or a little before his death, his health having failed some time previous to his decease.

In such cases the following questions may arise :—

(1.) Was the supposed father in such a state of health as to be capable of begetting a child within the period named ?

(2.) Do the size, the weight, and the development of the child, agree with the possible period of gestation ?

(B.) In cases where a woman has a child either very shortly after marriage, or after the prolonged absence of her husband.

In such cases two questions may arise :—

(1.) Does the period of gestation, inferred from the size and development of the child, support the statements as to the possibility of marital access ?

(2.) What is the earliest period at which a child is *viable*—in other words, capable of living—if due care be taken of it ?

(C.) In cases where a woman having borne one child, gives birth after a short interval to a second.

In such cases two questions may arise :—

(1.) Is the case in question one of *superfœtation ?* or,

(2.) Were both children the issue of a single *coitus ?*

(D.) In cases where a woman marries immediately either after the death of her husband or after a divorce, and a child is born soon after the second marriage.

In such cases the following question may arise:—

Whether is this the child of the deceased or divorced husband (as the case may be), or of the living or existing one?

(E.) In cases where a woman during the life-time of her husband, pretends to have given birth to a child, and it is suspected that she is palming off, for the purpose of deception, the child of somebody else.

In such cases the following questions will probably arise:—

(1.) Has the woman ever given birth to a child?

(2.) Is her age and physical conformation consistent with her having given birth to the child in question?

(3.) Is it probable that a man so old or so feeble as the husband would be the father of a child?

(4.) Has the child any peculiar marks by which its parentage may be identified.

(F.) In cases where a decree of nullity of marriage is sought on the ground that one of the parties is incapable of sexual intercourse.

For practical purposes, these many questions may be considered under the two following heads:—

I. Impotence and sterility in the male and female.

Under this division we shall discuss the limits of fruitfulness defined by the extremes of age.

II. The normal period, and abnormalities in the duration, of pregnancy.

Under this division we shall consider—

(α.) *Infant viability;* in other words, the earliest period of utero-gestation at which a child born into the world can live.

(β.) *Infant maturity;* in other words, the evidence as to its probable uterine age deducible from the size, the weight, and the development of a fœtus at birth.

[The general question of likeness has been already discussed (Part I., page 173).]

I. IMPOTENCE AND STERILITY IN THE MALE AND FEMALE.

Fruitfulness results when an ovum, discharged by the female from the ovary, meets and becomes incorporated with the spermatozoa contained in the seminal fluid of the male. This incorporation is called impregnation, and may take place, either in the ovaries, or in the Fallopian tubes, or in the uterus. The discharge of the ovum ordinarily takes place at some time or another during the menstrual period. The frequent occurrence of fruitful intercourse, however, during the interval between two menstruations, or rather for some days after menstruation has ceased, is abundant proof of the prolonged vitality of the ovum; nevertheless, the cause is plain, why (as is undoubtedly the case), intercourse is more likely to be fruitful at or about the menstrual period, than at any other time. But in spite of this prolonged vitality, there can be but little doubt that the reason why certain abnormal conditions (such as profuse uterine discharges, etc.) may interfere with fruitfulness, is that they remove the ovum from the possibility of impregnation, or otherwise destroy its power of fructification.

The essential condition of semen being prolific, is the presence of spermatozoa. (Newport in "*Phil. Transac.*," 1853, vol. cxliii., Part 2, p. 234.) Given the absence of spermatozoa, sterility may be assumed. Further, these spermatozoa must be living and capable of free motion, their power of impregnation apparently being dependent on their *activity* of movement as well as on their *quantity* in the seminal fluid. And yet again it is to be noted that the fluid emitted in certain cases, as in those exhausted by disease, early excesses, etc., may be simply the secretions of the vesiculæ and prostate, and not that of the testicles. And this of itself may be one cause of sterility, in the diagnosis of which the microscope will assist. (*Case* 147, *o* to *x*.)

It will be seen, therefore, that impregnation depends on many conditions. Given the absence of one of these, sterility is the result. And here note, that whilst intercourse favours im-

pregnation, impregnation may be altogether independent of intercourse.*

By "*impotence*" we mean inability for sexual intercourse. A male having no penis, or a female no vagina, would, respectively, be impotent.

By "*sterility*" we mean inability to conceive and to procreate their kind. A male whose semen contained no spermatozoa, or a female without ovaries, would, respectively, be sterile.

We adopt both terms as applicable to each sex. Many medical jurists have seen fit to limit the term "impotence" to the male, and "sterility" to the female. In both male and female, however, we may have either impotence or sterility, or a combination of both impotence and sterility. It is to be remarked that given impotence, sterility practically is, although theoretically is not, a sequitur; but that given sterility, impotence in no sense necessarily follows. (See Curling *Diseases of Testes*, p. 216, and instances under *Case* 147.)

On this question of impotence and sterility there are three subjects calling for special investigation—

I. The circumstances under which questions of impotence and sterility may become subject matters of enquiry for the medical jurist.

II. The causes of impotence and of sterility in the male and female respectively.

III. The duties of the medical jurist in determining questions relating to impotence and sterility.

I. The Circumstances under which Questions of Impotence and Sterility may become subjects of Medico-legal Enquiry.

(1.) A husband may be accused by his wife of being impotent, as a ground for a decree of nullity of marriage. (*Cases* 141 to 146.)

Marriage, though regarded in law as a contract, is, on account

* Note the experiments on artificial fecundation by Marion Sims, and by Roubaud, of Paris.

of its peculiar character, subject to certain modifications of the rules that apply to contracts generally. Thus, the contract of marriage having been entered into, the parties are unable to release one another at will, such release being only possible under certain conditions, and by the sanction of the Court. Again, in ordinary contracts, if certain objects of the contract cannot be performed by either party, such an incapacity would release the other, and, *ipso facto*, annul the contract; yet in the case of marriage, this can only be effected by the court passing a decree of nullity.

The law views the intercourse (coitus) of man and wife, as one of the material considerations of the contract. If, therefore, one of the parties *cannot* (not, be it observed, *will not*), (*Case* 146), perform his or her share of that consideration, the Court will then decree that the objects of the contract cannot be carried out, and accordingly grant a release.

It is only necessary to remark that the lack of perfect sexual gratification on the part of the woman, caused by the emission of non-fertilized semen only in coitus, could scarcely be entertained as a ground for divorcing a marriage.

Where the wife is the petitioner for a decree of nullity of marriage on the ground of the husband's impotence, the law requires (*a*) that the impotence should have existed *ab initio* (that is, from the date of the marriage); and (*β*) that it should be of an incurable nature. (*Case* 136.) The latter rule has, however, of late been subject to some modification. Thus in the case of *Williams* v. *Homfray* (*Case* 137), it was held that when the result of the medical evidence is that although the malformation might possibly, at a great risk to life, and with doubtful success be removed, the petitioner was not bound to call upon the respondent to submit to such a risk; and further, that this state of things is to be deemed equivalent to a permanent and immovable malformation.

In a converse case (*Case* 138), where the husband was the petitioner, the Court has lately gone further, and held that where the woman was impotent, but might probably be cured if she submitted to an operation involving no great risk of life, and which operation she refused to undergo, the husband was

entitled to a decree. Very nearly akin to reasons that governed the two preceding cases, are those where the wife refuses to consummate from nervous causes, the attempt at coitus on the part of the husband producing symptoms of hysteria on her part. (*G.* v. *G.*, L. R., 2 P. and Div. 287.) (*Case* 139). (*H.* v. *P.*, L. R., 3 P. and Div., 126.) (*Case* 140.) The reason the Court assigned in granting the decree in these cases was the practical impossibility of consummation. These two cases do, however, seem to approach very closely indeed to wilful refusal, which is undoubtedly no ground for granting a decree of nullity. (*Case* 146.) Under this head of wilful refusal to consummate we must place those cases (*Case* 141) where masturbation is the cause of non-consummation, and where restraint would effect a cure. In such cases, it has been held, there are no grounds for a divorce or decree of nullity.

From *Case* 142 it will be seen that *partial* malformation may be a ground for a decree, but that what the limit is between complete and incomplete copulation, must depend upon the facts of each individual case.

One fact may be mentioned here, although bearing on the purely legal side of this question, viz., that there must be no undue delay in petitioning the Court in these cases. Hence a decree of nullity must be sought during the lifetime of both parties, though questions of inheritance have induced persons to seek a decree after the death of one party. In a late case (*Case* 143), a woman who was married in 1849 sought a decree of nullity of marriage in 1875; and although there was evidence that the woman was a *virgo intacta*, and that the respondent was incurably impotent, the petition was dismissed, partly on the ground of the delay, and partly because it appeared that the decree was sought on account of certain disagreements and quarrels between the parties concerned. On the other hand, in *Case* 144, the House of Lords indirectly held that fourteen years was not to be considered unreasonable delay (!).

As to the nature and amount of the evidence required in such cases, it has been held that the unsupported testimony of the petitioner is insufficient. (*Case* 145.) Nevertheless in *Case* 144, just cited, the House of Lords held that the lapse of time, to-

gether with the petitioner's evidence, raised a presumption against the husband, and that unless he rebutted that presumption by substantive evidence, the petitioner was entitled to a decree.

In Scotland it seems that the law is much wider in its scope. "Mr. Fraser says the question is yet undetermined in Scotland whether the husband's want of power [to emit seminal fluid] constitutes impotence, while he has the *potentia copulandi;* and on the other hand, whether a woman with the latter power, but utterly barren, is to be held as impotent. (1 Fras. Dom., Rel. 53.) But the burden of the complaint in most of the cases he refers to, is the inability to beget children." (Bishop, Morn. and Dis., Vol. I., p. 325.)

In the female, sterility is not, it has been decided, a sufficient ground for annulling a marriage, unless it can be shown that the woman is irremediably incapable of sexual intercourse; and, *mutatis mutandis*, we may fairly conclude that in the male, similar conditions would have to be proved for a like purpose.

In the reign of James I. the Earl of Essex was sued by his countess for a divorce on the ground that he was impotent. She claimed to be a *virgo intacta*, but is said at the medical examination to have substituted one of her maids for herself. The earl appears to have admitted the charge as regards the countess, although he denied it *quoad* others. The case is complicated by her guilty passion for Rochester.—(Hargreave's "*State Trials*," I., p. 315; Howard's "*State Trials*," II., p. 786.)

And here, dangerous as the admission may be, it must be conceded, that a male capable of procreation in the case of one female, may be sterile in the case of a second, and, *mutatis mutandis*. (See *Cases* 11, 19.) Many cases, however, in the lower animals bear out this statement, although its true physiological interpretation is unknown. Certain it is, that neither desire, nor mutual accord, nor considerations of a moral nature, are the directly influencing conditions.

(2.) A man accused of rape, or of an indecent assault, may allege that he is sexually incapable, and that, therefore, the charge is groundless. Such defence is usually false.

(3.) Mothers, whose daughters suffer from some real or

fancied malformation of the sexual organs, may seek advice as to whether their daughters should, or should not, marry.

(4.) The medical man may be consulted as to the possibility or probability of an heir being born to an estate, when husband and wife are advanced in life.

(5.) Impotence in a husband may be urged as proof of the bastardy or illegitimacy of a child, and simultaneously, as a proof of unchastity on the part of the wife.

II. The Causes of Impotence and of Sterility in the Male and Female respectively.

I may here remark that the following question must in every such case be carefully considered, viz., Is the existing cause of impotence or of sterility remediable or irremediable?

In considering the causes of impotence and sterility, we shall discuss the following four influencing conditions in the case of both sexes :—

1. Extremes of age.
2. Congenital malformations.
3. Diseased conditions.
4. The action of poisons and drugs.

A.—Impotence and Sterility in the Male.

(1.) Impotence and sterility arising from extremes of Age.

Extreme youth, or in other words, the non-arrival of puberty, must be regarded as one cause of impotence. Sexual functions greatly depend on sexual development. Our law recognises fourteen in the male and twelve in the female, as the earliest ages at which marriage may be contracted. [It has been held that a boy under fourteen cannot commit a rape.] The age of fourteen for both sexes, is the Ecclesiastical law of the Eastern Church as well as of the Western. Eighteen for males, and fifteen for females, was fixed by the Code Napoléon. Twenty and sixteen years for males and females respectively, has been fixed by the New German Civil Marriage Bill.

Although puberty may be taken to commence somewhere about fourteen in both sexes, physiologists know that excep-

tions to this general rule are not uncommon, and that these exceptions depend partly on climate, partly on strength of constitution, but especially on the character and moral tone of early acquaintanceships.

(*α.*) Puberty is often *deferred.* Thus a case is recorded of infantile genitals and an absence of spermatozoa in the seminal secretions of a man æt. 42. (See *Case* 8.) *Case* 9 is one of a similar nature, but the rapid development of the genital organs after marriage is noteworthy. Nevertheless in a case where the genitals are undeveloped, it is open to question how far marriage could be recommended on the chance of this development taking place. Recorded cases are certainly against it.

(*β.*) Again, puberty may be *anticipated. Case* 10 is a remarkable illustration of precocious puberty in a boy æt. 4½. It is rare, no doubt, to find boys of such tender age as this attempting intercourse with children of the opposite sex, nevertheless cases of very early masturbation, almost from birth upwards, indicative of extreme precocity, have occurred in the experience of most physicians. (See "*Med. Chir. Transactions,*" i., pp. 276-285 ; "*Amer. Journ. of Med. Sci.,*" Oct. 1852, p. 561.) Notwithstanding this, however, it is true that we have no definitely recorded instance where a boy under fourteen has proved prolific. The absence of accurate records on this point, whatever may be the facts, is not surprising, seeing that every effort in such cases will necessarily be made to obscure rather than to enlighten. And so far therefore as the question of youth in its relation to impotence is concerned, the notion that a boy under fourteen cannot commit a rape, is incorrect. Although judges have directed an acquittal because lads have not been fourteen, still, cases where convictions have been sustained against boys of fifteen are recorded (*R.* v. *King*, 1853), and there is no physiological reason why if a lad of fifteen may commit such an offence, that one of fourteen should not. As medical jurists we must not in such cases attach overmuch importance to age *per se.* If unequivocal signs of puberty be present, no matter how young the boy, it is our duty to regard him virile. On the other hand, if signs of puberty are absent, notwithstanding that the person be of adult age, we have no grounds for

affirming the possession of a power that fails to manifest itself in the usual manner.

The question whether the power of coition does or does not precede the age of fruitfulness, is one that scarcely concerns us in considering a charge of rape, seeing that the crime is complete if mere vulval penetration (without emission) can be proved. Nevertheless, that the ability to copulate invariably precedes the age when intercourse is likely to prove fruitful, recorded facts abundantly prove.

Hence, the real questions in such cases are :—(Not, what is the age of the boy or man, but) :—(1.) Are the sexual organs developed or undeveloped :—and (2.) are the general signs of virility (voice, growth of hair, general conformation, etc.), present or absent ?

Nor, on the other hand, can *old age* be regarded as involving sexual unfruitfulness, much less sexual incapacity. Facts abundantly prove that old men may be fruitful (*Cases* 6, 7, 92). The law has placed no limit to the age when old men may marry, thereby admitting no limit to the power of sexual intercourse. "The law," said Sir S. Romilly, in the Banbury Peerage Case, *Case* 6, "places no limits on the powers and faculties of men in respect of procreation." Admitting this, it is certain all the same, that old age does render the occurrence of paternity less probable. Thus, M. Dieu, of the Invalides, states that in 105 autopsies on men between 64 and 107, no spermatozoa were found in as many as 61 per cent. ("*Amer. Jour. of Med. Sciences*," April, 1868.) And this is the most that can be said relating to the unfruitfulness of men of advanced years.

But here again the real question for the medical jurist is, not so much the age of the individual as, Does or does not the seminal fluid contain spermatozoa ? On what ground Duplay states, that spermatozoa may be present in the seminal secretion when a man is too old for fruitful intercourse, is far from evident. ("*Med. Times and Gazette*," i., 1853, p. 581.) We contend that if spermatozoa be present, we are bound to regard the man as capable of fruitful intercourse.* Although the zoosperms cer-

* Debrou, arguing from *Case* 147*n*, considers that spermatozoa are not necessary for the fertility of semen.

tainly decline both in number and activity with advancing old age, it is equally certain that they may be found in the seminal secretions at very advanced periods of life. The author has detected them more than once in the semen of men over 90. Casper records that he once found them in a man æt. 96 (Vol. iii., p. 258, and p. 291). (See cases where spermatozoa were discovered by Curling in a male æt. 87, and by Wagner in males aged from 70 to 80, and by Rayer ("*Gaz. Méd.*," June 2, 1849), in a male æt. 82.)

Another most important consideration presents itself. A male may be fruitful at one time and sterile at another:—in other words, there is evidence to show that the seminal secretion of the same individual changes from time to time. Thus, an absence of spermatozoa is by itself to be regarded as proof neither of previous sterility, nor of the impossibility of subsequent fruitful intercourse.

(2.) IMPOTENCY AND STERILITY ARISING FROM DEFECTS CONGENITAL OR OTHERWISE.

(*a.*) *General Defects or Malformations of the Sexual Organs* (*Hermaphrodism*). We have already said, that most Hermaphrodites are sterile and very many impotent (Part I., p. 331). The law, however, allows them to marry, an action for a decree of nullity of marriage commonly resulting from such permission. There exist, however, certain "sexless things," in whom no organs of generation whatsoever, properly so called, are to be found.

It is not easy to lay down precise rules as to the degree of non-development or of injury short of the entire destruction or absence of the genitals, that would result in absolute sterility. There are undoubted cases of non-development where sterility exists (*Case* 8); nevertheless it would be difficult to say that such cases were irremediable (*Case* 9).

(*β.*) *Absence and Malformations of the Penis.* The entire absence of a penis, whether such absence be congenital or the result of disease or accident, would certainly be a cause of impotence, although not necessarily of sterility;—in other words, although such condition would render copulation im-

possible, it does not necessarily interfere with venereal desires nor with the development of fruitful secretions. (Ogston, *Med. Juris.*, p. 77.)

In the presence of any intromittent organ, however small, we should be extremely cautious in pronouncing a man impotent. (*Case* 12.) Given the existence of an organ, although so short as only to be capable of depositing semen within the vulva (for impregnation may occur with an unbroken hymen), such condition must be admitted as sufficient for fecundation. Even in animals, impregnation has occurred where the semen has been artificially injected into the vagina with a syringe. (Spallanzani and Rossi.)

On the other hand, it is quite conceivable that an enormous development of penis might hinder connection. Seeing, however, that the mere spurting of semen into the vagina is sufficient for impregnation, it follows that such abnormal development must be excessive indeed, to justify the medical jurist in deciding a man impotent on this ground.

Hence, to justify a charge of impotence founded on abnormal conditions of the male organ, nothing less would be necessary than the absolute and complete loss of the penis, or its most extraordinary development. And even in some cases, the possibility of effecting impregnation altogether apart from coitus must not be lost sight of.

(γ.) *Extreme Degrees of Hypospadias and Epispadias.* As regards minor degrees of these defects, particularly of hypospadias, there are numerous instances recorded of procreation, with transmission of the abnormality. Dr. Woodman had a case brought to him at the N. E. Children's Hospital, in which, for four generations, there had been hypospadias. The defect descended on the male side only, the male children of the *sisters* being well formed. (See also Belloc, *Cours de Médecine Légale*, &c., p. 5.)

In *Case* 13, where a boy pleaded impotence because he was a hypospadiac, the paternity was affirmed.

Epispadias is so often mixed up with an absence of the anterior wall of the bladder, that disgust on the part of the female might probably be a cause of incapacity. It would, however, be im-

possible to state positively that an epispadian was sterile or even impotent. Dr. Ogston (*Med. Juris.*, p. 80) records having treated a patient afflicted with this malformation for gonorrhœa.

In all these cases, the question involved being one of degree, the medical jurist should consider two points specially:—

(i.) *Does a Canal exist of such a nature that the Urine can pass?* Because if there be such a canal, it may safely be inferred that the same canal would permit of the passage of the seminal fluid. (See the remarks on Urethral Stricture, p. 20 *infra.*)

(ii.) *Is the Canal* (urethra) *so placed, that in copulation the opening (wherever it may be) might come into contact with any part of the vagina?* Because if so, independently of any other condition, impregnation may result. On the other hand, if the opening of the urethra was (for instance) in the perinæum, it is difficult to conceive how fruitfulness could occur, unless the semen was artificially introduced into the vagina.

(δ.) *Absence of one or both Testicles.* In the case of *Monorchids* (*i.e.* where there is only one testicle, or where only one testicle has descended into the scrotum), the fact of fruitful intercourse has been well established. Further, spermatozoa in these cases have been detected in the fluid of the descended testicle, although absent in that of the one which had not descended. (*Case* 147 *c, e, f, g.*) (*Case* 19.)

Although the non-descent of a testicle is not uncommon, Dr. Gruber, of St. Petersburg ("*Brit. Med. Journ.*," April 4, 1868), finds that in the literature of 300 years, there have been but 22 genuine cases recorded of congenital absence of one testicle, and then most often on the right side. As a rule the subjects have been well developed, and long lived. Further, the scrotum, genital organs, and seminal apparatus on the normal side have usually been well formed. Although the vesicula seminalis may be present and act as a secreting gland on the side upon which the testicle is absent, nevertheless spermatozoa are invariably absent, whilst on the normal side, spermatozoa may be abundant, and the power of procreation consequently perfect.

Similarly, neither atrophy of one testicle on the one hand, nor supernumerary testicles on the other (of which, however, scarcely an authentic instance has been recorded in modern times in the human subject), could possibly be regarded as fatal to fruitful connection.

It is worth recording that the Parliament of Paris, in 1665, decided that no marriage contract was binding, unless the male could produce evidence of the existence of two testicles.

In *Case* 20, where one testicle was removed for carcinoma, it is recorded that the other testicle shrank, and virility disappeared. In this case, however, it would appear that the loss of sexual desires was to be traced to the abnormal conditions of health, rather than to the extirpation of the gland.

In the very rare cases of *Cryptorchids* (*i.e.* where both testicles retain their abdominal or lumbar position), it is undoubted that such beings are not necessarily impotent. But the question is, Are they sterile? In favour of their sterility, we have the authority of John Hunter, who held that non-descent implied imperfect structure. Mr. Partridge, in a male æt. 25 ("*Lancet*," Jan. 1860, p. 66), and Mr. Curling, in other cases, record the absence of spermatozoa in the secretions of undescended testicles.* (*Case* 147, *a*, *b*, *h*, *i*, *k*.) On the other hand, in support of cryptorchids being fruitful (with which view Professor Owen agrees), not only are cases of undisputed virility recorded (*Cases* 14 to 16, and *Case* 147, *m* and *n*), but Casper states that he has actually found spermatozoa in the seminal secretion. Our belief is that as a rule a retained testicle does not secrete prolific semen, but we hesitate to admit the rule to be without exception. (Consult instances under *Case* 147.) Our own experience, we should add, is entirely on the side of the sterility of cryptorchids.

* Consult M. Godard's "*Etudes sur la Monorchidie et la Cryptorchidie chez l'Homme*," 8vo., p. 164, Paris, 1857; also, Review of ditto in "*American Journal of Medical Sciences*," Jan., 1859; also Messrs. Goubaux and Follin's Memoir, "*Sur la Cryptorchidie chez l'Homme et les principaux Animaux domestiques*;" and "*Observations on Sterility in Man*," by T. B. Curling, F.R.S. Also "*British and Foreign Medico-Chirurgical Review*," April, 1864.

There remains to be considered, cases where the testicles have been removed by operation (castrates) :—*

Although castration unquestionably causes sterility, there seems a general consent amongst medical jurists as to the possibility of fruitful intercourse within a limited period of such emasculation. This opinion is a very ancient one, and is supported by a few facts observed in animals, and by one or two cases said to have been noted in human beings. [Varro, *De Re Rusticâ*, Vol. II., p. 5, says, "Exemptis testiculis, si statim admiseris, concipere (vaccas)." See also Sir Astley Cooper's *Observations on the Structure and Diseases of the Testes*, London, 1830.] A case of impregnation after the husband had lost both testes by a gunshot wound, is reported (Dr. Krügelstein, in Henke's "*Zeitschrift*," 1842, vol. i., pp. 348 and 352, quoted by Dr. Taylor). But we confess the evidence on this question seems to us very imperfect. Some semen, it must be admitted in all cases of extirpation, may be retained in the seminal vesicles and ducts. Again, if a small portion of secreting structure (seminal tubes) remains intact and in communication with the ducts, it is quite clear that spermatozoa may be formed. We think, however, that the power of copulation has been often confounded with the fecundative act. That eunuchs, or at least some eunuchs, possess the former to a great degree, seems generally admitted.† As we have already

* The method of making Chinese eunuchs (the operators being called "knifers") is described as follows :—The patient is placed in a semi-supine position on a broad bench, and firmly held ; the genitals being three times bathed with a hot decoction of pepper pods. The parts are then swept away by one stroke of a small sickle-shaped knife. A pewter plug is then inserted into the urethra, and the wound covered with linen soaked in cold water, and firmly bound up. The patient is then kept for two or three hours walking about the room, supported by two men, after which he is permitted to lie down. For three days he is allowed nothing to drink, nor is he allowed to pass water (!). At the end of this time, the dressings and plug are removed. The healing process is usually complete in one hundred days. About two per cent. of the cases prove fatal, some by hæmorrhage, some by extravasation. For some time after the operation there is nocturnal incontinence of urine. ("*Lancet*," July 28, 1877, Mr. Jamieson, of Shanghai.)

† The effects of castration in males, and of the removal of the ovaries in females, vary according to the age at which the operation is performed, *i.e.*

noted, impotence and sterility are by no means correlative terms.

If in a case submitted for the opinion of the medical jurist, there be found to be an entire absence of testicles in the scrotum, three questions suggest themselves for his consideration:—

1. Are the testicles congenitally absent?
2. Or, is it that they have not descended?
3. Or, have they been removed by operation?

The question of extirpation may be immediately disposed of, by the presence or absence of a cicatrix in some position that would allow of their removal.

The medical jurist should in the first instance carefully note the *general appearances* presented by the individual:—

1. Given a *congenital absence of testicles*, the person will invariably be found to be of languid disposition, slenderly formed, and beardless, having a shrill voice, undeveloped (boyish) genitals, and an absence of sexual desires.
2. Given *non-descended testicles*, the development has in some cases been found to be in all respects manly and complete, whilst in others a more or less womanly character has been recorded.
3. Given *extirpated testicles*, we must distinguish two cases:—
   (α.) *If the testicles have been removed in infancy*, the result will be much the same as that described above under Congenital Absence of Testicles.
   (β.) *If the testicles be removed after puberty*, the general masculine character, is, as a rule, retained, although exceptional instances of the reverse are recorded.

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whether before or after puberty. A boy, if emasculated, grows fat; his muscles become soft, his voice and appearance feminine, whilst the larynx never enlarges as in the adult male. The growth of the beard is hindered or prevented, and there is an absence of manliness of character. In addition to sterility, there is usually an absence of sexual desire, general loss of power, and a squeaky voice. In women, who have lost the ovaries, there is in most cases a loss of sexual appetite, the growth of a beard, harshness o voice, and general manly appearance. The breasts usually waste, and the body becomes thinner.

Regarding all the recorded cases, and the facts known respecting fruitfulness in the lower animals, it appears certain :—

(i.) That in the case of monorchids, their capability of connection and of procreation is beyond all question.*

(ii.) That in the case of cryptorchids, admitting that the majority are sterile, although not necessarily impotent, there seem to be recorded instances where perfect virility has co-existed with this condition. It follows therefore that the *mere* fact of a man being a cryptorchid, is in our opinion, no absolute bar to marriage (however much it should be discountenanced, seeing that the health of the wife so often suffers from ungratified intercourse), no proper ground for divorce, and no infallible evidence of non-paternity, unless sterility can be established by other means, such as the actual absence of spermatozoa in the seminal fluid.

(iii.) That in cases where the testicles, although atrophied and apparently inert, are present (*Case* 147*d*), it must be remembered that, permanent sterility is not necessarily the result of such condition, even admitting the man to be sterile at the time of the examination. (*Case* 147 *r*, *x*.)

(iv.) That given the absolute absence of both testicles, sterility may be inferred. Nevertheless, the medical examiner must remember that there are great difficulties in pronouncing a positive opinion during life whether the testicles are congenitally absent, or merely undescended, in which latter case they may afterwards descend. In the case of castrates, fruitfulness has undoubtedly followed copulation a short time after the removal of the testicles.

(3.) IMPOTENCY AND STERILITY CAUSED BY DISEASE.

(*a*.) *Diseases of the Sexual Organs. Advanced disease of the testicles or of the penis*, whether syphilitic, cancerous, tuberculous, etc., may not only be a bar to sexual intercourse, but an actual cause of sterility.

The action of the testicles, however, is not easily impaired. If there be but a small piece of healthy gland, it would be dangerous to assume sterility, from whatever cause the in-

* It is worth noticing that the removal of one ovary does not prevent a woman becoming pregnant. (*Case* 104.)

activity of the larger portion might be due. As a rule, the removal of one testicle on account of disease, does not impair the action of the other testicle; but to this general statement there are exceptions. (*Case* 20.)

Again, diseases involving obstruction such as might result in the excretory ducts from double epididymitis following gonorrhœa, or cold (*Case* 147, *o* to *s*), or from diseases (such as tubercular deposits) or congenital malformations interfering with the escape of the spermatic fluid (*Case* 147, *t*, *u*, *v*), or again urethral stricture where in ejaculation the seminal fluid is disposed to regurgitate into the bladder and so mix with the urine, etc., may induce sterility. During life, however, many of these abnormal conditions could at best only be inferred. (*Case* 147, *o* to *x*.)

(β.) *Lithotomy has been known to induce Sterility.* Thus, Mr. W. F. Teevan (*Case* 23) narrates four cases of lateral lithotomy, resulting, so far as could be judged, in sterility. He explains this absence of fruitfulness by "laceration of the floor of the prostatic urethra, the ejaculatory ducts being torn across, or getting plugged in the healing process." It is possible that other surgical operations (such as those for hernia or hydrocele) may also lead to sterility or impotence.

(γ.) *Certain General Diseases. Paralysis* has been a subject matter of dispute as a cause of sterility in a case of paternity. (*Case* 21.) It is quite conceivable that *paraplegia* might hinder sexual intercourse, or if the disease was of long standing and accompanied with atrophy of the testicles, prevent such intercourse proving fruitful, even supposing it to be possible.

Cases, however, are recorded of patients suffering both from paraplegia and hemiplegia, having had fruitful intercourse within a short time of the attack. (*Case* 22.)

Mumps (*Cynanche parotidea*), on the authority of Foderé, Lang, and Sir Astley Cooper, has been said to induce sterility in both sexes, by causing wasting of the testicles and ovaries. Although cases of orchitis or epididymitis following measles and mumps are not very rare, nevertheless, such an extreme atrophy of these organs, in this country at least, as would cause sterility must be regarded as exceedingly uncommon in such cases.

—(See Henke's "*Zeitschrift*," 1842, vol. ii., p. 354. Casper's "*Wochenschr.*," Sept., 1851, pp. 568, 577.)

Dr. Laroyenne ("*Lyon Méd.*," Jan. 24, 1875) contends that *syphilis* in the male may induce sterility, without any lesion either of testes or cord. The facts and cases quoted, seem to bear out this statement. Certainly, however, many syphilitics are unfortunately very fruitful. (*Case* 147, *r*, *s*.)

Speaking of general diseases, we may note that any cause which decreases bodily vigour, probably decreases sexual power. Thus, advanced disease of almost any kind, or the extreme physical weakness resulting from fevers, etc., may induce both impotency and sterility. (*Case* 147, *x*.) Thus diabetes is usually accompanied with impotency. On the other hand the author knows of cases of advanced heart and lung disease (phthisis),* in which coitus (followed by the birth of a child resembling the father) took place only a few hours before death.

We have not deemed it necessary to discuss such malformations or complaints as the abnormal direction of the penis, its attachment to the abdomen, phymosis (*Case* 24), paraphymosis, scrotal hernia, hydrocele, and numerous other occasionally claimed causes of impotence or incompetency. They do not even, for the most part (so purely mechanical are they), belong to the category of *doubtful* causes of sterility; whilst in the few valid cases, where impotence may appear to be caused by such conditions, a surgical operation has righted the matter.

Nor again is it possible to discuss with advantage the many cases of temporary incompetency resulting from a highly worked up imagination, or emotional feelings, or mental intensity, or fear, or aspermatism (*Case* 25), etc. All these are causes of temporary trouble, remediable by wise advice and assuring counsels. *Moral* causes not being recognised by law, have no definite place in legal medicine.

Masturbation may be a cause both of sterility and impotence, and that it is often practically incurable, is certain (page 8). In such cases, the mental power of the man needs to be fully considered. (*Case* 141.)

* Spermatozoa were deficient in twelve cases of phthisis examined by Mr. Curling.

(δ.) *Injuries to the Head or Spine are said to have produced Impotency, but not necessarily Sterility.* (See Curling on *Diseases of the Testes*, 2nd edit., p. 362.)

(4.) IMPOTENCE AND STERILITY ARISING FROM THE ACTION OF DRUGS AND POISONS.

Certain poisons, notably *alcohol, opium, tobacco, lead*, and the *gonorrhœal virus*, are said to induce sterility. The former may be supposed to act by causing general debility, or loss of nerve power, or wasting of the testes or ovaria; and the latter by producing stricture of the urethra, or blocking of the seminal ducts (page 20). A similarly temporary effect has been ascribed to *camphor, nitre*, and *coffee*, but apparently on very insufficient grounds. [" Camphora per nares, castrat odore mares." (" *Schol. Salerno*," confirmed by Trousseau and Pidoux.)] *Iodine* and the *iodides* are said to cause wasting of the testes in the male, and of the breasts in the female.

My own experience of chronic lead poisoning, even where the disease has been of long duration and reached an advanced stage, does not support the statement of certain authorities as to its inducing sterility. Indeed facts, if anything, seem rather to point in an opposite direction. With regard to the other poisons mentioned, we shall discuss their action in this respect hereafter, but we believe that in the majority of cases it is at most problematical.

B.—IMPOTENCE AND STERILITY IN THE FEMALE.

Permanent sexual incapacity or impotence in the female is extremely rare. The only likely cause of such condition existing *ab initio*, is the *entire absence of a vagina.* There are several instances, moreover, known in which a vagina has been constructed by surgical art. As regards a uterus (*propter uterum est mulier*), extra-uterine fœtation shows that this organ is not even essential to pregnancy, still less can its absence be a cause of impotence.

(1.) STERILITY ARISING FROM THE EXTREMES OF AGE.—" Man is man for a longer period than woman is woman. With

him, it is a life-time matter; with her, it is but for a score of years or so. Her child-bearing period is less than half her (usual) life."

The power of procreation in the female is commonly supposed to begin with the appearance, and to end with the disappearance, of menstruation. As a rule, this is true. It is important, therefore, to consider the usual time when this periodic flow commences and disappears.

The "catamenia," "menses," "monthlies," or "poorly times," occur, in the vast majority of females, during the period dating from the advent of puberty to the cessation of active sexual life, at fairly regular intervals of one lunar month, or 28 days, reckoned from the beginning of one such hæmorrhage to the commencement of the next. These hæmorrhages coincide physiologically with the discharge of unimpregnated ova from ripened Graafian follicles. The catamenial flow is for the most part blood, little altered in its normal composition. Dr. Letheby and others supposed that the fibrin is absent or greatly lessened in menstrual blood, by which they have accounted for the rarity with which it forms a firm coagulum. It is, however, generally altered in colour, from its admixture with the secretions of the vagina. There will also be found in the menstrual discharge epithelial scales, and other matters from the uterus, vagina, and external parts. In some women, there is at these times a complete "moult" from the whole of the urino-genital tract. The flow may vary from a few drops to many ounces, the usual quantity being from four to six ounces. It may last only a few hours or several days, from three to four and a-half days being a common "period." Thus the apparent *interval* may be 25, 20, or even less days. Many causes may retard this flow by a day or two, or may cause it to be anticipated. Some women have an interval, apparently in their case normal, of 35 or 36 days. In Lapland and cold regions it is said that the interval is usually much longer than it is in warmer parts.

Mr. Robertson's researches have shown that the average age for the commencement of menstruation is 15·204 years. Our own experience in London gives 14·36 years, whilst Mr. White-

head found that in a large number of cases observed in Manchester, it was not established until the sixteenth year.

M. Brière de Boismont found the mean age of first menstruations in Paris, to be 14 years and 6 months, whilst in small towns it was 14 years 9 months, and in the country 14 years 10 months.

Without, therefore, fixing an absolute age (which is impossible), it is evident that girls in this country usually menstruate for the first time somewhere between 14 and 16, the average of a very large number of ordinary cases giving 9 as the earliest, and 22 as the latest age for primary menstruation.* ("*Obstetrical Transactions*," 1870, ii., p. 243; "*Lancet*," Nov. 30th, 1844, p. 283.) As a fact, primary menstruation after 20 (although a case is recorded of primary menstruation as late as 47) and before 9 years of age, is exceedingly uncommon.

At the same time exceptional cases both of early and of retarded menstruation are not infrequent, and depend upon a variety of conditions. Thus, as regards temperament, the nervo-bilious temperament is always in this respect ahead of the lymphatic or phlegmatic, whilst brunettes develop sooner than blondes.

Again, primary menstruation occurs earlier amongst the inhabitants of warm than of temperate climates,† and latest of all amongst those of cold countries. It is to be remarked

* A series of observations respecting the age when menstruation first took place in 2,000 women is recorded in the "*Med. Times and Gazette*," Nov. 4, 1871, p. 555, (the age at which menstruation ceased in 57 women is also added,) as follows :—

Menstruation commenced.		Menstruation ceased.	
In 1 at 9	In 270 at 16	In 1 at 23	In 3 at 44
6 at 10	157 at 17	1 at 34	5 at 45
59 at 11	97 at 18	1 at 35	3 at 46
146 at 12	45 at 19	2 at 37	9 at 47
253 at 13	19 at 20	5 at 38	2 at 48
437 at 14	4 at 21	10 at 40	3 at 49
502 at 15	1 at 22	2 at 41	2 at 50
at 30 [absence of menstruation;		6 at 42	2 at 53
fers monthly from otorrhœa].			

† Dr. Norman Chevers, however, does not hold this to be generally true as regards India, except when the sexual passion has been unduly stimulated at an early age.—(*Med. Juris. of India*, 1856, p. 461.)

that, in hot climates, where puberty is early, a few years only elapse before the girl becomes the faded old woman. In the cold regions of the far North, where puberty is commonly as late as the eighteenth or nineteenth year, the women retain their vigour and good looks to a ripe old age. Nor can we omit to take cognizance of the influence on primary menstruation of the many circumstances that stimulate the emotions. Girls in towns as we have said) menstruate earlier than those who live in the country. The conditions and associations of our work-rooms in the case of the poorer classes, and that atmosphere of ripe years too frequently thrown around childhood in the drawing-rooms of the upper ten thousand, undoubtedly have a tendency to induce early puberty.

Although cases of so-called menstruation, or rather of a discharge of blood from the genitals, from birth upwards, are recorded in great number (*Cases* 37, 38, 40 to 44, 50, 52), it is worthy of note, that the earliest case of recorded pregnancy is in a girl between 8 and 9 (*Case* 52; also *Cases* under 53). (See "*Med. and Chir. Transactions*," vol. ii., p. 116.)

In a paper in the "*Liverpool and Manchester Medical and Surgical Reports*" for 1876, Mr. Charles Cullingworth has discussed in much detail these cases of hæmorrhage from the genital organs in recently born female children, and contends that this discharge of blood cannot be regarded as precocious menstruation (although in many respects resembling it), on account of the absence in most of the recorded cases of any excessive development of the generative organs. The paper referred to, contains a record of 32 cases where early menstruation (as it is commonly called) is reported, and he notes that in four only was any swelling of the mammæ noted. But the difficulty is to determine the source of the blood. It certainly does not come from the external organs of generation. Billard considers its source to be the lining membrane of the uterus. Others explain it with some reason, as resulting from the ligature applied to the cord at birth, forcing the blood (which up to that time had passed through the cord from the iliacs) downwards into the pelvis, causing a local plethora, the superabundant blood finding its outlet in the generative organs. The outlet in the

male, it has been contended, is found in a discharge of blood from the bowels, which he states is not infrequent in male new-borns. In this view other observers, as Rilliet, Barthez, and Bednar, seem for the most part to agree, the former remarking on the circumstance that boys are more subject to melæna than girls.

It is evident, therefore, that a mere discharge of blood from the genital organs of a female child, is not to be regarded offhand as menstrual, unless actual signs of puberty and of precocity present themselves. And this being so, we can scarcely say the sign is a healthy one, seeing that hard work and vigorous muscular exertion appear never to anticipate, but rather to retard, the epoch of primary menstruation.

The catamenia usually cease between 42 and 48; but the exceptions to this rule are numberless. (*Cases* 72 to 79, etc.) Generally those who develop early, fade early. A short childhood portends a premature old age, and often a feeble middle life. Further cases are recorded where, after "the change of life" seems complete, menstruation has reappeared and then continued to a very late period. (*Cases* 74 to 77.) Moral shocks may cause this reappearance, as in a case recorded by Dr. Crichton Browne, where the menses reappeared in an old woman, from the efforts made to expel a supposed child with which she believed herself pregnant. These conditions are not necessarily associated with bad health. In *Case* 75, however, menstruation reappeared after an illness, and in *Case* 79 a curious instance is recorded of vicarious menstruation from the breasts of a female aged 56, after the disappearance of the ordinary catamenia.

With the advent of female puberty, which has its climax in the monthly discharge of blood, come certain definite changes. Of these we may mention—(1) A deposit of fat in the loose subcutaneous cellular tissue, first observable by a slight swelling in the groins (Buffon), from which it extends over the whole body, and more particularly to the breasts, resulting in a general development of bust. (2) Alterations in the growth of hair;—some parts, such as the genitals and armpits, becoming more or less covered with hair, where before puberty

there was little or none, whilst on other parts, such as on the head, the hair assumes a manifestly darker and more glossy appearance. (3) Alterations in the voice;—passing from a slender childish articulation, to the rich and melodious voice of the woman. These are some of the more manifest changes. But with them are the no less real, though less manifest, alterations of internal organs, due to their assuming new functions and new powers, and those marked mental changes characterised by fresh ideas and perhaps strange desires, indicating how profound is the alteration taking place in this transition stage of life, during which the girl is becoming a woman. (See Dr. Braxton Hicks on Puberty, "*British Med. Journ.*," March 24, 1877, p. 348.)

We have now to consider the connection between menstruation and childbearing.

Admitting that, as a rule, the fruitful period is limited to the interval between the first and last menstruations, it must be evident that the real question is not so much the relationship of menstruation to childbearing, as the relationship between childbearing and ovulation;—or, to put the same fact in another way, the connection between menstruation and ovulation.

(*a.*) The fact that menstruation may occur without ovulation, is incontestable. Early [so-called] menstruations from birth are recorded, but the earliest age at which pregnancy has occurred is between 8 and 9 years.

M. de Sinéty, in a paper read before the Société de Biologie, December 2, 1876, refers to the case of a girl where menstruation had been regular, but where no corpora lutea or cicatrices were found in the ovaries at the post mortem. He considers this to be an instance of menstruation without ovulation. ("*Med. Times and Gazette*," Dec. 16, 1876.) M. Bouchut, again, remarking on *Case* 40, asks, Was there in this case ovulation as well as menstruation? and answers it in the negative. He notes that in many cases of women who had died during or a few days after their periods, no trace of a Graafian vesicle could be found. Again, in *Case* 35, the fact that menstruation and ovulation were not necessarily connected, appears evident; whilst

in *Case* 36, where a large part of the uterus was removed by operation, and its connection with the ovaries severed, menstruation took place regularly from the stump of womb preserved. Under *Case* 36, moreover, a case is mentioned by Tillaux, where regular menstruation occurred after both ovaries had been excised. In twenty-seven similar cases of double ovariotomy, Goodman cites three in which the menstrual functions were not interrupted. (See Bouchut "*Paris Médicale*," Dec. 22, 1878.)

(*β.*) But admitting that menstruation may occur without ovulation, the important question arises whether ovulation may occur without menstruation?

In support of this being possible, it is urged that there are cases on record, where women who have never menstruated have conceived. (*Case* 66.) (Confer "*Edin. Monthly Journ.*," July, 1850, p. 73.) But in reply it is said: True, but they would have menstruated if they had not conceived;—in other words, conception hindered menstruation. M. de Sinéty has shown in the case of a woman who had never menstruated at 38, that ovulation had nevertheless been active, the ovaries presenting many false corpora lutea.

Again, many cases are recorded where women have menstruated regularly before marriage, and not at all, or at most but irregularly, during their child-bearing life. (*Cases* 67, 68.) And yet again, women have been known to conceive (although the cases in illustration are comparatively rare), after the change of life, and when menstruation had ceased. (*Cases* 69, 70, 83.)

From a study of these cases, it is abundantly evident that ovarian changes, resulting in the expulsion of an ovum, are altogether independent of that which is the most evident sign of menstruation, viz., a discharge of blood from the uterus. (See "*Med. Times and Gazette*," April 8, 1854, p. 354.)

Admitting that the rule is for ovulation and menstruation to occur more or less together, it is a vexed question at what part of the monthly period the human ovary discharges its products. It was for a long time the common belief that the ova were thrown off either towards the end of the menstrual flow, or immediately after its cessation. Reichert, however, from

the examination of twenty-three cases, thinks that rupture of the Graafian follicle takes place at an early stage of the menstrual flow. Dr. John Williams brings forward a number of cases in support of the view he entertains, that the discharge of the ova occurs before the appearance of the catamenia. ("*Proceedings of R. S.*," No. 162.)

With respect to *early pregnancies*, the instances recorded under the Illustrative Cases 53 supply information. Under the age of 12, cases of pregnancy are comparatively rare. *Case* 53 (1) (more fully reported under *Case* 52) is perhaps the earliest age on record (8 years) where a girl has become pregnant, the pregnancy, however, in this case terminating merely in the expulsion of a mole. In *Case* 53 (2) a case of pregnancy at 8 years and 10 months is recorded, the girl in due course giving birth to a well-developed child. Dr. Goodeve, of Calcutta, states that "the earliest age at which he has known a Hindoo woman to bear a child was 10 years, but that he had heard of one at 9."

It is worth noting that in these cases of very early pregnancy, menstruation did not commence at any extremely unusual age, such as when the child was a year or so old. Very early menstruation is mentioned in *Case* 53 (4), but in the majority of the cases recorded, the pregnancy succeeded almost the first menstrual flow.

With respect to *late pregnancies*, it is neither safe nor is it possible to fix an age beyond which we should be justified in saying that impregnation could not occur. More than one Vice-Chancellor has decided that ladies of 55 and 53 may be regarded as having exceeded the child-bearing age (*Case* 97), although in *Case* 98 another Vice-Chancellor declined a similar responsibility in an almost identical case. No doubt the limit is variable in different women, and just as we may have cases where women cease to menstruate very early in life (*Case* 71), so we may have fruitful women who early in life cease to bear children, and *vice versâ*.

Certainly cases of pregnancy up to 50 are not very uncommon, and have occurred to most medical men with large practices. (See *Cases* 80 [*Douglass Peerage Case*], 83.) Between the

ages of 50 and 60, the cases are very uncommon, nevertheless it must be admitted that well authenticated instances are on record. (*Cases* 78, 82, 91 [(1) and (2)], 94, 95, 96.) Above the age of 60, it is true that cases of pregnancy are recorded (*Cases* 81, 92, 93 [a case of triplets]), but there is a want in the details, which renders them scarcely so worthy of confidence as one could wish.* In *Case* 81, a pregnancy is mentioned at the age of 70! It is worthy of note how often in these cases of late pregnancies, the child-bearing period had for some reason or another not commenced until very late in life Thus in *Case* 78, the first child was born when the woman was 47, and the last when she was 60. Lady Jane Douglass (*Case* 80) was 50 years old when she became pregnant for the first time, respecting which pregnancy so much litigation ensued. Similarly, in *Case* 83, the first pregnancy was at 50. Again, in *Case* 96, the first child was born when the woman was 40, and the last (the fourth) when she was 56. We may also note, that from the interval of unfruitfulness that preceded some of these cases of late pregnancy, it would appear as though the conception was a final effort of nature. Thus in *Case* 91, seven and nine years respectively are recorded as having elapsed since the birth of the previous child. As regards the relation of menstruation to pregnancy in these cases, the catamenia in some ceased for a greater or less time previously to the conception (*Case* 83), whilst in others the monthly

* The following table is from Névermann, and relates to 436 children selected from 10,000 births. The ages of the mothers respectively were as follows :—

At 41	years,	101	children.	At 48	years	8	children.
„ 42	„	113	„	„ 49	„	6	„
„ 43	„	70	„	„ 50	„	9	„
„ 44	„	58	„	„ 52	„	1	„
„ 45	„	43	„	„ 53	„	1	„
„ 46	„	12	„	„ 54	„	1	„
„ 47	„	13	„				

The Registrar-General for Scotland (February, 1862), reports two women becoming mothers at 51 years of age, four at 52 years, whilst one woman was registered as being in her 57th year when she gave birth to a child.

discharge continued more or less regularly up to the time of delivery. (*Cases* 82, 91.)

And this conclusion the facts warrant:—Every case must be considered by itself, and, that as medical jurists, we are not in a position to fix any age, before or after which we should be justified in stating pregnancy to be impossible.

And here a few general facts bearing on the relation between age and fertility are worth recording, for the chief of which we are indebted to Dr. Naphey's remarkable book on "*The Physical Life of Woman.*" If a woman have no children within the first three years of married life, the chances are 13 to 1 against her having any at all. About 1 in 14 of the marriages where the women are between the ages of 15 and 19, are without offspring. Almost all marriages where the women are from 20 to 24 years of age are fertile, whilst after 24 the chances of a woman having no children, gradually increase with her greater age at the time of marriage.

The older a woman is at the time of her marriage, the longer deferred is the age at which she becomes sterile. The younger married have a longer era of fertility, but it ceases at an earlier age than in the case of late marriages.

A wife who, having had children, has ceased to conceive for three years, will probably bear no more, and the probability increases as the time becomes greater.

The stimulus of novelty to matrimonial intercourse, imparted by a short separation of husband and wife, is often salutary in its influence upon fertility.

Some women are sterile for a certain period of their lives, after which a change occurring in their temperament with advancing age, they become fruitful. (Examples—birth of Louis XIV. of France; Catherine de Medicis, wife of Henry II.)

As regards the possible number of children born of one woman, it is not easy to fix limits. (*Case* 99.) A nurse at the London Hospital, known to the author, had 20 children in 19 years, viz., eight single births, three times twins, twice triplets. ("*Lond. Hosp. Reports*," vol. i., p. 208.) The late Mr. Guthrie states that he knew a lady who had 28 living children during

the first 12 years of her married life. The Glasgow records tell of a girl of 18 who had had 4 children; one of 22 who had had 7; one of 34 who had had 13; and a second of the same age who had had 14.

Gaetan Delaunay ("*Le Progrès Méd.*," May 31, 1879) states that recorded facts show fertility to diminish with civilisation. The intellectual have fewer children than the labouring class. Fertility is greater amongst the badly fed than amongst the well-to-do, and the birth-rate is higher in summer and in warm climates, than it is in winter and in cold regions. The lower races, he states, produce more females, and the higher more males. Numerous other statements bearing on sexuality are also made, but the records and the conclusions do not always appear to correspond.

Women are more apt to have twins at their first pregnancy than at any other, but after a second confinement, the bearing of twins increases in frequency with the number of the pregnancy. A case of twins at 50 is on record, this being a first pregnancy. (*Case* 80.) The birth of triplets is a great curiosity at a first confinement, or in a woman under 30. A case of triplets in a woman æt. 62 is on record. (*Case* 93.) Instances of quadruplets are recorded, but they are very rare, whilst the birth of five living children is exceptional in the extreme. Still, cases are recorded of five living children being born at one time. Beyond this, the records are as marvellous as they are incredible.* (Dr. Ruttell's case, Henke's "*Zeitschrift*," 1844, p. 226. See also other cases reported by Dr. Taylor, *loc. cit.*, p. 224, &c.)

(2.) IMPOTENCY AND STERILITY ARISING FROM CONGENITAL AND OTHER DEFECTS.

(*a.*) *Entire absence of Ovaries.* This abnormality could scarcely be detected during life. It is, however, usually asso-

* A writer called Goftr ("Hegenetii Itinerarum," etc., 1630) says he saw a tablet in the church at Leusdon (Lausdunum) about five miles from the Hague, with an inscription to the following effect:—That in the year 1276, a certain illustrious countess, in the fortieth year of her age, brought forth at one birth, 365 infants! all of whom were baptised by Guido, the suffragan, who called the males "John," and the females "Elizabeth."—(Ryan's *Midwifery*, pp. 115, 116.)

ciated, as post-mortem records show, with irregularities in other of the genital organs. Thus, in *Cases* 26 and 32, it co-existed with an absence of uterus. *Case* 32 is remarkable, as showing the hereditary nature of genital malformations.

We have laid it down that the genital gland is histologically the test of sex (Part I., page 322). Given an absence of ovaries, the absence of ovulation is a necessary consequence. Such a being is sexless, and must be sterile. But a single ovary is sufficient for fertility, whether the second is congenitally absent or has been removed by operation. (*Case* 104.) *Case* 105 is one where three ovaries were found at the post mortem.

(β.) *Absence of Vulva and of External Genital Organs.* In its complete form, this malformation is very rare, and is usually associated with an absence of vagina and uterus. (*Cases* 27, 28.)

(γ.) *Absence of Vagina.* With this abnormality there commonly exists an absence of uterus, although this rule is not without exception. In *Case* 26 the vagina was present, but the uterus absent. In *Case* 27 neither uterus nor vagina were present. A divorce in the latter case was granted, the external genital organs being also wanting. In *Case* 27*a* the vagina was absent, the urethra taking its place in copulation. In 27*b* the vagina was wanting. In *Case* 30 there was an absence of vagina, a divorce in this case being obtained. The questions in all such cases will be:—(1) Is the vagina absent, or merely diminutive or closed? And, (2) How far are existing abnormalities remediable by operation? As a rule, the attempt to form an artificial vagina by operation where none exists, can scarcely be said to have proved successful. (*Case* 27*b*.) In cases of atresia vaginæ, however, we should scarcely be justified in assuming either impotence or sterility. (*Cases* 27*c*, 29.)

(δ.) *Absence of Uterus.* This may or may not, coexist with an absence of vagina. In *Case* 27, neither uterus nor vagina existed. In *Case* 26 there was no uterus, but the vagina was present. In *Case* 27*a* and 27*b*, there was no reason to doubt the presence of a uterus, although the vagina was practically wanting. If there be no uterus, the vagina terminates in a *cul de sac.* Of course, the entire absence of uterus necessarily implies absence of menstruation, the health not suffering as a

consequence. (*Case* 32.) An absence of uterus, however, does not necessarily imply an absence of sexual instincts, nor if there be ovaries, an absence of ovulation. ("*Assoc. Med. Journ.*," July 29, 1853, p. 672.) (*Case* 142.)

Hyrtl refers to instances where sterility has resulted from the neck of the uterus projecting over-much into the vagina. In such cases the difficulty of the spermatozoa finding access to the uterus must be the cause of the want of fruitfulness, and a cause, it would seem, remediable by operation. (*Case* 103.)

In cases of congenital defects, the question, whether marriage is admissible, must be decided on the merits of each case. Certainly, where there is an absence, or practical absence of vagina, the physician, would be justified in discouraging, if not altogether in forbidding it, and that for a treble reason :—*First*, that copulation is rendered impossible, or if not impossible, most difficult ; *secondly*, that if impregnation should occur, a child could not be born *per vias naturales ;* and, *thirdly*, that marriage, in such cases, has invariably proved the first step to the divorce court, with all its pains and penalties. (*Cases* 27, 27*b*, 30.) Nevertheless, no such recommendation would be admissible where mere atresia exists. (*Case* 29.) Defects and abnormalities are not to be hastily regarded as barriers to married life. (*Case* 28.)

In the case of the married, the real question (as we have said) for the physician to consider, is the possibility of remedying the defect by operation. In the matter of divorce, it is not enough to prove the woman incapable of sexual intercourse, but it must also be shown that the condition which renders her incapable is irremediable.

(3.) STERILITY CAUSED BY DISEASE.

In a valuable paper on "Some remediable causes of Sterility," Mr. Spencer Wells gives the following as causes of barrenness. Many it will be observed belong to the class of congenital defects :—

"1. The ovaries not performing their normal function of periodical ovulation :—in other words, an absence of ova prepared for impregnation.

" 2. Alterations in the coverings of the ovary, interfering with the escape of the ovum.

" 3. The ovum escaping from the ovary, but failing to be grasped by the fimbriæ. In such case either the ovum perishes, or if it be impregnated, extra-uterine fœtation results.

" 4. Alterations in the Fallopian tubes, obstructing the passage of the ovum. (*Case* 34.)

" 5. Alterations in the uterus, or in the vagina, or in the external organs, preventing impregnation of the ovum, either (*a*) by preventing access of the spermatozoa to the ovum; or (*β*) by the destructive action of unhealthy fluids on the spermatozoa,* or (*γ*) from some other interference with the physical conditions of fecundation."

Under this fifth heading he enumerates, *inter aliis*—

Occlusion of vagina { By adhesion of labia; † / By imperforate hymen.
Diseases of the vulva (eczema, herpes, etc.).
Hyperæsthesia and anæsthesia of the vagina.
Diseases of the rectum, urethra, or bladder.
Ruptured perinæum.
Vaginal and uterine leucorrhœa.‡

* On the subject of sterility due to an acid condition of the utero-vaginal secretions, and the destruction of the spermatozoa by immersion in an acid medium, see Dr. Charrier in "*Bulletin de Thérapeutique*," of June 15, 1880. The facts stated by Charrier are confirmed by Prof. Pajot in "*Bulletin*" of June 30th, who states that this acid condition is common in fair women with red complexions. In such cases, he advises as an injection, the white of one egg and 59 grms. of phosphate of soda dissolved in 1,000 grms. of water, in which solution he states spermatozoa will live at 36° C. for 12 days.

See also a paper on "Dysmenorrhœa and Sterility" by Dr. Protheroe Smith, "*British Med. Journ.*," 1871, ii., p. 694. (See *Case* 102.)

† See *Case* 100, where sterility was dependent on the existence of a congenital anomalous membrane.

‡ Any circumstance producing imperviousness of the os uteri and flexions, must induce sterility by obstructing the passage of the fluid upwards, and altering the conditions of the lining of the body of the uterus by the retained secretions, which in an unhealthy condition undoubtedly damage the products of conception. Further, an irritated mucous membrane cannot be a proper surface for the attachment and growth of the ovum even if impregnated. (See on this point, Dr. Graily Hewitt, "*Med. Press and Circ.*," Oct. 23, 1878, p. 325.)

Diseases and displacements of the uterus.*
Contraction of the os and cervical canal. (*Case* 101.)
Foreign bodies and tumours in the uterine cavity, including cancers, polypi, fibroids, etc. (*Case* 34.)
[Paraplegia in the female does not always prevent either impregnation or delivery.]

Experience is against the notion that women during lactation, or when suffering from leucorrhœa, are necessarily sterile. Further, although no doubt frequent promiscuous intercourse renders impregnation less likely to occur, from the inflammatory condition of the Fallopian tubes continuously induced, nevertheless prostitutes do at times conceive, whilst if they marry and become continent, they frequently prove fruitful.

Dr. Després contends that the barrenness of prostitutes is not so much due to absolute sterility as the result of frequent abortion about the second month, the women themselves being unaware of their condition at such an early period of pregnancy, and medical men unable to detect it. ("*British Med. Journ.*," 1877, ii., p. 709.)

In all cases of sterility, three questions, Marion Sims suggests ("*New York Med. Jour.*," Jan. 1869), must be settled at the outset, and in these investigations he regards the microscope as a most important instrument of research. These questions are :—

* See "*British Med. Journ.*," 1878, I., p. 717, paper by Dr. Edis "On Chronic Cervical Endometritis as a Cause of Sterility."

"*Med. Times and Gazette*," March 16, 1872, p. 325, Dr. E. G. Bantock on "Inflammation of the Uterus, a bar to Impregnation."

On the influence of alterations in the position of the uterus as a cause of sterility, see Dr. Herman Beigel in "*Weiner Medicin Wochens.*," No. 12, 1873. See also Viewieg, Brunswick, 1878, on the pathological anatomy of sterility in women. Viewieg believes that these versions and flexions play a very important part in inducing sterility, although their influence is exclusively mechanical, *i.e.*, by hindering the passage of the spermatozoa.

Anteflexion, Dr. Protheroe Smith remarks ("*British Med. Journ.*," 1871, ii., p. 694), is, of all causes of sterility due to uterine misplacements, the most frequent. (See *Case* 101.) In such cases the dysmenorrhœa is the active symptom for which the patient seeks advice. For a paper on the influence of uterine displacements in sterility, see Marion Sims, "*New York Med. Journ.*," Oct., 1865, p. 72.

(1.) Does the semen contain spermatozoa?

(2.) Do the spermatozoa enter the utero-cervical canal?

(3.) Are the secretions of the canal favourable or not to the vitality of the spermatozoa?

From some of the opinions expressed by Marion Sims on these three questions, Scanzoni differs materially. ("*Brit. and For. Med. Chir. Review*," July, 1871.) He asserts that Marion Sims attaches far too great importance to the meeting of the ova and semen. As regards morbid conditions, he points out that we know very little respecting the effects of discharges on the fertility of the ova and the life of the seminal spermatozoa. Further, as regards the meeting of the semen and the ovum, Scanzoni calls attention to the frequency with which conception occurs, in cases where there is a difficulty in passing a sound through, or even into, the cervical canal. As a fact, he states, that he has never been able to satisfy himself in a single case that has come before him, that sterility was solely due to an obstruction to the passage of the semen through the cervical canal.

The causes of sterility have been dealt with in great detail by Dr. O. von Grünewald of St. Petersburg. ("*Archiv für Gynäkologie*." See also "*Med. Times and Gazette*," July 29, 1876, p. 118.) From an examination of 500 cases of sterility, he also considers impermeability of the cervix to be a very rare factor, and that nothing short of actual atresia would be sufficient to constitute a mechanical obstacle to the progress of the spermatozoa. Further, he considers the chief cause of sterility in the female, to be the inability of the uterus to bring an impregnated ovum to maturity. In his judgment more than 50 per cent. of cases of sterility are dependent on some inflammatory condition of the uterine tissue, 30 per cent. to various anomalies of the sexual organs complicated with inflammatory processes, 20 per cent. only occurring without any inflammation to be detected.

Dr. Grünewald considers that inflammation of the body of the uterus often results in sterility. In this way he explains why women who suffer from it have become sterile after a single pregnancy, such condition being a frequent result of parturition,

Dr. Grünewald's two axioms are :—

(1.) That conception is only one link in the chain of phenomena involved in propagation, and that its importance is relatively much less than that of many other vital processes that occur during pregnancy.

(2.) That woman's capability of maturing the impregnated ovum is the important element of her reproductive power, and that this capability depends for the most part on a certain integrity in the tissues of the uterus.

Examining the generative organs of 150 sterile women dying at a sexually mature age, F. Winckel ("*Lancet*," Aug. 3, 1878) finds that, apart from conditions such as vaginismus, the causes of sterility may be classified as follows :—

1. Mechanical obstructions,
2. Chemically destructive influences,
3. Disturbance in the nutrition of the ovaries.

In almost all instances, two or all three of these conditions were recorded as being present at the same time. For example, in atresia of the Fallopian tubes, firm adhesions of the ovaries were found to exist; in myomata, there were abnormal positions, or diseases of the mucous membrane, ovarian tumours, etc. He only admits stenosis of the os uteri to be a cause of sterility when follicular catarrh is present together with an accumulation of mucus in the cervix.

Dr. Mayer, of Berlin, ("*Lancet*," March 25, 1871,) gives particulars of 272 cases of sterility in the female. In 2 the uterus was absent; in 60, there was anteflexion; in 37, reflexion; in 35, anteversion; in 3, retroversion; in 45, vulvitis (among which were 14 cases where the hymen was entire after several years of married life); in 51, chronic endometritis; in 25, oophoritis; in 23, ovarian tumours; in 12, uterine polypi; in 6, fibroid tumours of the uterus; and in 1, elephantiasis of the external genitals. In 6 cases, no pathological conditions could be found to account for the sterility.

On the subject of sterility, Dr. Kammerer contributes a research of great learning. ("*Transactions of the New York Academy of Med.*," Vol. iii., Part vii.) He insists on the importance of observing functional derangements as well as actual lesions,

and also of paying attention to subjective symptoms. In 408 cases the subjective symptoms which led sterile women to seek advice, were as follows:—Dysmenorrhœa 69; menorrhagia and metrorrhagia 57; scanty menses 41; premature cessation of menses, 4; complete absence of menstruation, 2; retarded menses, 8; habitual miscarriage, 3; hysteria, 16; nervous headache, 3; vaginismus, 2; intercostal neuralgia, 1. The anatomical conditions found were as follows:—

1. *Anomalies of position:—*

Retroversion	20
Anteversion	18
Dextroversion	10
Sinistroversion	10
Descensus	8
Prolapsus	1

2. *Anomalies of Uterine Tissue:—*

Anteflexion	83
Retroflexion	71
Uterine hypertrophy	65
„ atrophy	3
Atrophy of cervix	1
Infantile uterus	2
Stenosis of cervical canal	11
Tumours (fibrous, cancer, &c.)	12
Stricture of internal orifice	35
Small os	24

3. *Uterine catarrh:—*

Present in 342 of the 408 cases, but generally limited to the cervical canal.

4. *Affections of organs in proximity to the uterus:—*

Perimetritis or peritonitis	12
Adhesions from previous peritonitis	83
Ovarian tumours	14
Peri-uterine tumours	7
Gonorrhœa	2
Acute colpitis	1
Pelvic abscess	1

5. *General conditions and accidental diseases:—*

Secondary syphilis	8
Cardiac diseases	5
Tuberculosis	4

Out of 201 private cases, 25 after treatment gave birth to full grown children, the most favourable cases being retroflexion and cervical catarrh. The cases least amenable to treatment were anteflexion, and those where there were extensive adhesions, or an exceedingly small external orifice only.

Without expressing any opinion at the moment, either in favour of, or adverse to, the marriage of cousins, we remark that it has been stated, that in such marriages the woman is apt to be sterile. Records show, however, this to be a mistake. For whereas in the average of marriages one woman in eight is barren, in those between relatives one in ten only is so.

As regards the mixture of races, *e.g.*, the union of a black and a white, there is no evidence to prove universal sterility, but there is ample evidence to show that the children of such marriages are sickly and shortlived. This latter statement, however, does not apply to a mixture of the black and red races.

(III.) The Duties of the Medical Jurist in Determining Impotence or Sterility.

In examining males supposed to be impotent, it is as unnecessary as it is indecent, to attempt any testing of the virile powers by manipulation of the genital organs. If these are well-formed and healthy, and the general health good, we ought to assume that there is capacity for sexual intercourse, with the usual limit of age. "*The possession*," says Casper, "*of virile and procreative power, neither requires to be, nor can be, proved to exist by any physician*," but is rather (we would add), like every other normal function, to be *supposed* to exist. On the other hand, if there be an absence of genital development, the penis and testicles being infantile, and no indications generally existing to prove the due arrival of puberty, we should scarcely be justified in assuming either the desire or the proper ability for coitus. If the question then be put by counsel, "Does the man possess the power of copulation?" the medical jurist should reply, "My examination has revealed nothing which would justify the supposition that the individual is incapable (or capable, as the case may be) of completing the act of intercourse."

In the case of females, provided all the passages be free and natural, little difficulty will be experienced in forming a just conclusion respecting the capability of the woman for copulation. Special notice should be taken whether the parts exhibit extreme tenderness or irritability, or contractility on being touched, (hysteria, in fact,) such as might render the act of intercourse difficult. (*Cases* 139 and 140.) Hence, the effects produced when the external genital organs are first touched need to be very carefully noted.

As regards impotence, the medical jurist should draw a distinct line between absolutely irremediable causes, and doubtfully remediable ones.

Given *absolute* impotence, *sterility* may inferentially be admitted.

As regards *sterility* "per se," the causes in both male and female are as a rule internal, and therefore not subject to ocular proof. Hence during life any opinion expressed by the medical jurist should be of the most guarded nature, the difficulties being clearly stated for the consideration of the Court.

There are certain post-mortem appearances (such as an absolute absence of ovaries, etc.) that might enable the medical jurist to form conclusions which during life would be impossible.

II. THE NORMAL PERIOD OF, AND ABNORMALITIES IN, THE DURATION OF UTERO-GESTATION.

Three questions have to be considered :—

I. What is the normal period of utero-gestation ?

II. To what extent may this normal period be shortened, and yet birth be given to a living child (Viability) ?

III. To what extent may the normal period be protracted ?

Before considering these questions in detail, we must carefully note the difficulties surrounding them, and particularly the chief cause of those difficulties, arising from the hopeless impossibility of fixing the date of conception. For sowing the seed (insemination) does not mean fertilization. Dismissing entirely the notion that certain "peculiar feelings" described by some women, indicate conception, there remain three methods by which the date of conception has been fixed, or rather conjectured. These need consideration :—

(1.) *The cessation of the catamenia.*
(2.) *The date of coitus.*
(3.) *The time of quickening.*

(1.) *The Cessation of the Catamenia.*

Most women calculate the date of their confinement (and as a rule correctly), from the cessation of the catamenia. Accoucheurs of eminence adopt a like system. Dr. Matthews Duncan, who has given great attention to this subject, gives the following rule:—"Add 275 days to the day on which the catamenia disappear—then add three days more, and this 278th day will be the day of delivery." In common language, any nine calendar months added to the date of insemination, *plus* three days (or if February intervene, *plus* five days) will give, according to Dr. Duncan, the date of delivery—or at least the *middle day of the fortnight,* during which delivery is almost certain to take place.

The theory of Cederschjöld respecting the duration of pregnancy is, that in any given case, it may be found by ascertaining the patient's usual menstrual period *plus* the interval (*i.e.*, the time elapsing from the beginning of one catamenial flow to the beginning of the next), and multiplying the number of days by 10. This view is of very doubtful accuracy. (See Dr. Herman, "*Med. Times and Gazette,*" Dec. 4, 1880, p. 644.)

Naegele's method of calculating was somewhat peculiar. He added twelve calendar months to the time when menstruation ought to have occurred, and from this deducted three months

and eight days. Thus, supposing a woman should have been poorly on July 1st, 1874, add twelve months (= July 1st, 1875). Deduct from this three months and eight days. This would fix March 23rd, 1875, as the probable date of delivery. This gives, however, 266 days only, as the time of utero-gestation—a period undoubtedly too little.

But it must be remembered that the catamenia may stop from causes other than pregnancy, or may continue after conception. Thus supposing the menses stopped a month before conception, or continued one month after, a woman would under ordinary circumstances be a month too soon or too late in her calculations. Further, the menstrual interval is not invariable. Thus in some women it is two months, in some six weeks, whilst in others it is only a fortnight, all of which irregularities are consistent with health. And inasmuch as *conception* may occur at the menstrual period, or at any time during the menstrual interval, and moreover is not necessarily coincident with *coitus*, it is evident that a very considerable error may result in reckoning the period of utero-gestation from any data founded on the occurrence, or cessation, of menstruation.

Allowing the accuracy of Dr. Merriman's opinion ("*Med. Chir. Transactions*," Vol. xiii.), that impregnation is more common the day *after* menstruation has ceased, than the day *before* menstruation commenced, (in support of which view he has shown that, regarding 280 days as the normal period, the calculations made on this datum as to the time of birth will in the majority of cases prove true,) this only represents what is usual, but does not deal with the true difficulty, viz., that impregnation is possible at any time between the menstrual periods. And it must be remembered that in legal medicine, the exceptional cases are the most important.

(2.) *The Date of Coitus.*

Greater accuracy in estimating the period of utero-gestation is attainable, where impregnation has *resulted from a single coitus*. But here again, seeing that the spermatozoa retain life for many days after the emission of the seminal fluid, and that

so long as they do so, they are capable of impregnating an ovum—and further, seeing that the ovum may be impregnated several days after its discharge, it follows that the day of coitus is by no means necessarily the day of conception. Thus we must carefully, and in all cases, remember the distinction between "insemination," or sowing the seed, and "impregnation" or the fertilization of the ovum. It is probable that the semen or spermatozoa may remain inactive some time before the concourse of the male and female atoms is effected. (*Dr. Barnes.*)

The uncertainty of the interval between intercourse and impregnation is very evident, when we consider that the birth of the ovum is in the ovary, from which it is transferred to the uterus through the Fallopian tube. Thus an over-deep ovum, an indurated ovary, a contracted Fallopian tube, or preparatory changes in the mucous membrane of the uterus not having taken place, may all prove causes of delay (see Montgomery, p. 534); whilst it is not unlikely, as some suppose, that advanced age, repeated impregnation, and male children, may act in a similar manner.

(3.) *The Time of Quickening.*

Quickening was stated by Dr. Conquest to occur as an invariable rule during the period intervening between the 16th and 20th week of utero-gestation. But on this authorities differ, and no wonder, seeing that cases are recorded where quickening has occurred at the third month. In Dr. Conquest's opinion, when a woman has quickened at a certain time in one pregnancy, she invariably quickens at precisely the same period in after pregnancies. The author remembers the late Dr. Dyce (Professor of Midwifery at Aberdeen University) stating, that in his experience the interval between quickening and the birth of the child, was the same to an hour in the repeated pregnancies of the same woman. But authorities are far from agreed even on this point, and medico-legally it is of little value.

It is evident, therefore, that to fix a precise time for utero-gestation applicable to all women, or even to the same woman

in different pregnancies, is absolutely impossible, and it is further open to doubt whether such precise time exists or not.

We must of necessity limit ourselves to cases of healthy utero-gestation, both in discussing normal and abnormal periods. At the same time, it is a question of some interest, how far normal pregnancy may be interfered with by certain diseased conditions of the system. This matter is referred to in Dewees' *Midwifery*, (3rd Edition, p. 130), but as yet there are no facts that enable us to form a positive opinion on the subject. It does not seem, however, that diseases of organs other than those of the genitals have much effect on the period of utero-gestation, whilst so far as diseased conditions of the genital viscera are concerned, their tendency is rather to bring about abortion, than a prolonged pregnancy.

Nor are we in a position, from want of facts, to discuss how far the period of utero-gestation may be influenced by other conditions, such for instance as the state of health and the age of the male, or a difference in the relative ages of male and female. It is interesting to note the fact recorded by Lord Spencer, that of 75 cows covered by an *aged* bull, the average period of gestation was 288½ days. Of 764 cows, however, 185 went less than 281 days, but not a single cow covered by the aged bull was included in this 185.

I. The Normal Period of Utero-Gestation.

To fix a definite period of utero-gestation is, we hold, impossible. Nor, indeed, judging from known facts in the human species as well as in the lower animals, is there any reason to believe that the normal period is of absolutely invariable duration. Not only may it be different in different women, but different at different times in the same woman. Nor, indeed, seeing that most other functions are more or less irregular, is it easy to understand why pregnancy should not partake somewhat of the general irregularity of other functions.

Britton des Gardes (quoted by Montgomery) states, that the old English code specified forty weeks as the limit of pregnancy. Our statute-books now, however, content themselves by referring

to "the usual period of gestation," "the course of nature," "the laws of nature," and similarly vague phrases. Blackstone says: "From what has been said, it appears that all children born before matrimony are bastards by our law; and so it is of all children born so long after the death of the husband, that by the *usual course of gestation* they could not be begotten by him. But this being a matter of some uncertainty, the law is not exact as to a few days." ("*Commentaries*," Vol. I., p. 456.) The consequence is, that whenever a question of legitimacy arises, the matter becomes a subject for discussion and opposing evidence.

But although the law may have laid down no definite time, it commonly regards forty weeks* as the period of pregnancy (*legitimum tempus pariendi*), and we believe rightly. Forty weeks equal 280 days, but it should be noted that nine calendar months may consist either of 273, 274, 275 or 276 days, whilst in no case can they exactly equal 280 days or ten lunar months.

The illustrious Harvey states "that unquestionably the ordinary term of utero-gestation is that which we believe was kept in the womb of His Mother by our Saviour Christ, of men the most perfect; counting, viz., from the festival of the Annunciation in March, to the day of the Nativity, which we celebrate in December." ("Works," Syd. Soc. ed., p. 529.) This is a period, however, of only 275 days. "Prudent matrons," he says, "calculating after this rule, as long so they note the day of the month on which the catamenia usually appear, are rarely out of their reckoning, but after ten lunar months have elapsed, fall in labour, and reap the fruit of their womb the very day on which the catamenia would have appeared had impregnation not taken place." Dr. Montgomery, quoting several classical authors, including Hippocrates and Herodotus, finds that they all agree in their common reckoning of 280 days.

* In the celebrated Mordaunt divorce case, the counsel for the petitioner appeared to take it for granted that from 274 to 280 days was the average period of pregnancy. In Lady Mordaunt's diary, against the date 27th of June, there was an entry "3rd of April = 280 days; and this was deemed an evidence of her guilt!

Dr. Wm. Hunter speaks of nine calendar months as the *usual* term. Sir James Simpson speaks of the normal duration as being "between 274 and 280 days."

Dr. Robert Barnes, whose authority in these matters is deservedly very high, states that from 273 to 278 days is the most common period—275 being, he thinks, normal.

In Dr. Montgomery's table (Montgomery, p. 564) of thirteen cases calculated from the day of marriage, ten (or nearly 77 per cent.) were in the thirty-ninth or fortieth week, whilst in twelve of them the average interval was 270⅓ days only. In Dr. Montgomery's fifty-six cases where pregnancy resulted from a single coitus (Montgomery, p. 566), delivery took place in ten of them (17·84 per cent.) in the thirty-ninth week, in twenty-two (39·28 per cent.) in the fortieth week, and in nine (16·07 per cent.) in the forty-first week. Dr. Montgomery himself is very strong in regarding 280 days as the *usual* period—although, as will be seen, his cases do not do more than render this time probable.

In Dr. Reid's twenty-five cases dating from a single coitus, delivery occurred in 56 per cent. in the fortieth week (Montgomery, p. 565).

The author has collected eight cases, in which the date of coitus was fixed by remarkable circumstances. They all agree in the 278th day being, as nearly as possible, the day of delivery. (See *Cases* 106 to 108.)

Dr. Charles Bell considers 275 days as the normal period of gestation. He does not believe that true menstruation ever takes place during pregnancy.

Dr. A. Stadfeldt of Copenhagen, has published a memoir on the duration of pregnancy, his results giving in 65 cases a mean of 271·8 days, the extent of variation ranging from 250 to 293 days. ("*Brit. Med. Jour.*," 1877, ii., p. 599.)

Schroeder fixes 271 days as the normal period of pregnancy.

Dr. Helen Idelson, in a paper on the duration of pregnancy ("*Petersburg Med. Woch.*," April 28, 1881), sums up her experience of 4,370 cases as follows:—

1. The normal duration of pregnancy is on an average 278·8 days.

2. The duration is longer when the woman is pregnant with a female, than with a male child.
3. The heavier the child, the longer the duration of the pregnancy.
4. The duration is longer in multiparæ, than in primiparæ.
5. The younger the woman, the longer the duration of the pregnancy.
6. The duration is longer in the married than in the unmarried.
7. The first movements are felt on or about the 135th day, but they occur later in primiparæ than in multiparæ.

The duration of pregnancy has been examined with great care by Dr. Ahlfeld. ("*Brit. and For. Med. Chir. Rev.*," July, 1870.) In 219 cases he found that on an average, conception took place 9·72 days after the *first day* of menstruation, whilst on an average of 161 cases, it occurred 5·28 days from the *last day* of menstruation. It most frequently, however, took place within three days of the last day of the monthly period. Conception, in his judgment, occurs at much the same time whether the os be virginal or gaping, as in the case of women who have borne children. In 425 cases, where the children seemed mature, the average duration of gestation, reckoning from the day of conception, was 269·91 days (Hecker gives 273·52 days). But seeing that Ahlfeld's range is from 231 to 329 days, it is probable that he is in fault (as one would expect) in determining the day of conception.

Ahlfeld gives 30 cases of presumed single or well-defined coitus, in which gestation varied from 233 to 287 days. Excepting one case, which was said to be 313 days, the greater number of his cases ranged from 270 to 275 days. The average of the whole of the cases give 269·17 days.

Ahlfeld states that in 43 cases where it was observed, the the first sensation of the child's movements occurred between the 108th and the 134th day, the average being 132·77 days.

Dr. Tyler Smith sums up the result of his and of others' experience thus:—"In a practical point of view, we may consider that the average duration of pregnancy is about 280 days from the date of the last catamenia, or about 274 or 275 days

from the time of coitus, when this can be ascertained." There is, therefore, a general consent amongst the best obstetricians as to the duration of pregnancy—the extremes being from 266 days or thirty-eight weeks, to 280 days or forty weeks.

II. To what extent may the normal period of utero-gestation be shortened, and birth notwithstanding be given to a living child (VIABILITY).

This question involves matters of grave importance, affecting not only the legitimacy of children, but the honour of parents, and sometimes even the interests of nationalities.

The earliest actual period at which a child is viable—that is, capable of extra-uterine life—must be determined by a careful study, not only of the cases generally reported, but more particularly of those where no possible object was to be served by untruthfulness or confusion of facts;—and such cases are admittedly very rare.

In all questions of this nature, the two points requiring the special consideration of the medical jurist, are as follows:—

(1.) *Is a child of the age stated, or estimated, viable?* That is,—not whether it be mature or immature, nor whether it be diseased or healthy, nor whether it be likely or unlikely to be reared, but—was the child of such an age as to be capable of showing some indication of live birth after it was completely external to the mother? Such an inquiry will be of importance in cases of tenancy by courtesy. The question whether these life indications were exhibited before or after the separation of the cord, is for legal purposes immaterial.

(2.) *Granting it to be alive when born, is it probable that a child of the age stated or estimated could be reared?*—This question may be of importance in certain cases involving legal rights, as, *e.g.*, where a child is born shortly after marriage.

In the tabular statement, under the heading of *Case* 84, will be found the chief recorded cases where children have been born alive at early periods of utero-gestation.

It may here be mentioned that the Parliament of Paris, in the

case of Cardinal Richelieu, decided "that an infant at five months possessed that capability of living to the ordinary period of human existence, which the law of France required for establishing its title to inheritance." (*Case* 89.) The Code Napoléon, however, mentions 180 days, or six calendar months, as the earliest period of utero-gestation when a child may be live-born. The Scotch law allows an infant to be viable at six lunar months, or 168 days.

The practical conclusions to be drawn from the large number of recorded cases of abnormally shortened utero-gestation, are as follows:—

1. Allowing that from the first moment of impregnation the ovum is truly alive, and, further, that mere motion of limbs, or evidence of circulation, without active respiration, are sufficient to constitute live-birth, nevertheless there is no evidence to show that a fœtus, born at an earlier period than between the fourth and fifth month of uterine existence, can in any sense be said to be born alive, much less lead an independent life, *i.e.*, a life apart from its mother.

2. That living children have been born between the fourth and fifth month of uterine life. As a rule, however, the only sign of life exhibited by children born at this early period, is a slight motion of the limbs, although cases of somewhat more active vitality have been recorded. There is, however, no well authenticated case where less than a five months' child has lived beyond twenty-four hours after its birth,* and but one where it has lived for twenty-four hours.

3. That children born alive at the fifth or between the fifth and sixth months of utero-gestation, mostly die after a few hours. (*Case* 90.) Nevertheless there are a limited number of recorded cases, where such children have been reared, and have even reached adult age. (*Case* 84 (13, 19, etc.).)

Thus in two out of the three illustrative cases recorded, in one the child born on the 174th day (calculated from the date of marriage) lived for seven months, the Court deciding against the accusation of incontinency (*Case* 86), whilst in the second,

* See (*Case* 84 (7),) in which a 4½ months' child is said to have lived to 80. The case, however, is exceedingly doubtful.

where the child reached maturity, there was an interval of 182 days only between its birth and the birth of the previous child (*Case* 88). In this latter case, assuming the prolific coitus to have taken place fourteen days after the first confinement, the uterine age of the child could not have exceeded 168 days. The question arises, however, whether the child may not have been a product of superfœtation (see Superfœtation). At any rate, this is not so in *Case* 86, where the time was estimated from the day of marriage, the good character of the parents being admitted by the Court. (*Case* 87.)

4. That several well authenticated cases exist where children born between the sixth and seventh month, and even at the sixth month, have reached adult age, but that in such cases more than ordinary care and attention have been needed to maintain life, at least for some time after birth. Dr. Bonnar ("*A Critical Enquiry regarding Superfœtation, with Cases*," 1865) has collected eleven cases where children born about the 180th day of utero-gestation, survived their birth for periods varying between eight days and fifteen years.

5. That in all cases of early birth, beyond the facts indicated by well authenticated records, the question of the character of the parents, the conditions of the accouchement (such as its concealment and certain other general considerations), must of necessity constitute important evidence on which a jury should rely to decide the question of legitimacy.

To the medical jurist, the sound words of advice and warning of a learned obstetrician may not be out of place :—

"Take care not to be deceived. I have known many remarkable cases of fully developed and mature children being born within seven months of marriage. They are commonly regarded as marvels; but in my experience they are marvels limited to first pregnancies!"

In all cases where legitimacy is contested on the ground of shortened utero-gestation, there is one most pertinent question that the medical jurist will be called upon to answer, and that is — Did the appearances presented by the child at birth, correspond or not with its alleged shortened term of uterine life? It is unfortunate that, as a rule, discussions respecting the

legitimacy of children, occur after they are grown up, when it becomes necessary to rely for evidence on the memory of the accoucheur, or of the nurse in attendance, as to their condition and precise state of development at the time of birth. It is however certain—

(α.) That although a child born at full time may vary in size, weight, and the like, nevertheless that it always has about it the general signs of what is called "development":—that is, of full maturity.

(β.) Nevertheless it must be admitted, that it would be difficult in the majority of cases to decide with unerring precision, whether a child at birth was an eight months' or a nine months' child.

(γ.) It is however scarcely possible to suppose that a fully developed child could be mistaken for a seven months' child, it being a generally accepted fact, that the changes the fœtus undergoes during the last two months of uterine life, are more marked than those occurring during any other period. Nevertheless, seeing that exceptional cases occur, where children born at full term are enormously in excess of average size and weight, it is manifest that the medical jurist would scarcely be justified in pronouncing a positive opinion that a seven months' child might not be as well developed as an eight or nine months' child under ordinary circumstances.

(δ.) That supposing a child be born *mature* and fully developed, and further supposing it proved that to be the child of the husband it could not be more than a six months' child, the medical jurist need have no hesitation in pronouncing it illegitimate.

Here then two questions suggest themselves:—

I.—*What are the signs of maturity in a new-born child?*

II.—*What are the indications whereby the development of the fœtus may be ascertained?*

I.—*What are the Signs of Maturity in a New-born Child?*

Casper relies on the following details:—

(1.) A certain general *habitus* familiar to experts.

(2.) *The colour of the skin.*—In the case of a mature child, the skin is of a paler colour than in one less mature, whilst the down (lanugo) to a great extent disappears with maturity. It has been pointed out that certain white points, due to dilatation of the excretory ducts of the sebaceous follicles found in many cases on the alæ of the nose, cheeks, and forehead, but especially on the chin and under lip, are abundant in proportion to the immaturity of the fœtus, decreasing in number as full term approaches. At full term, they are only to be found on the tip of the nose. (Küstner, see "*London Med. Rec.*," Nov. 15, 1877, p. 461.)

(3.) The presence of more or less hair on the head.

(4.) Immovability of the skull bones, the anterior fontanelle averaging ¾ to 1 inch in length.

(5.) A certain *height and weight.**

(*a.*) As regards the average *height* of children it has been noted that:—

The average length of	247	mature children	(both sexes)	=18¼	inches.
Ditto,	ditto	130	ditto	(males) =19⅔	„
Ditto,	ditto	117	ditto	(females) =18⅛	„

The *maximum* length recorded was 22 inches, and the *minimum* length 16 inches.†

(*β.*) As regards the average *weight* it has been noted that:—

The average weight of	247	mature children	(both sexes)	=7 1/20	pounds.
Ditto,	ditto	130	ditto	(males) =7⅓	„
Ditto,	ditto	117	ditto	(females) =6⅔	„

* Dr. Wernich ("*Beitrag zur Geburtshülfe*," I., 3—16) based upon 1,899 observations, and Hecker, based upon 4,449 observations, give as their opinion, (1) that the weight of the child increases with the age of the mother up to her 39th year, and its length up to her 44th year. (2.) That each product of a subsequent pregnancy, exceeds that of a preceding pregnancy in weight and length, especially when the regular series of conceptions after the first is unbroken.

† Dr. Delabost, of Rouen, says that the length of the fœtus for the first 6 months is indicated in centimètres by the square of the number of the corresponding month. That at 1 month the fœtus measures 1 centimètre, at 2 months 4 centimètres, etc. During the last 3 months, the monthly rate of growth is 4 or 5 centimètres.

The *maximum* weight recorded was 10 lbs., and the *minimum* weight 4½ lbs.

This subject has already been discussed in detail (Part I., p. 162.)

With respect to the length of the mature child, Quételet, in his "Anthropométrie," gives the following table :—

Height of New-born Children.

	Boys.	Girls.
	Millimètres. = Inches.	Millimètres. = Inches.
Maximum.	532·68 = 20·97	554·93 = 21·87
Minimum.	437·63 = 17·24	437·63 = 17·24
Average.	500·66 = 19·72	490·56 = 19·34

Quételet also gives the average *weight* at birth as 3·1 kilogrammes (or 6·8 pounds) for boys, and 3 kilogrammes (or 6·6 pounds) for girls. *Taylor* gives 16 to 21 inches for the average length, and 5 to 9 pounds for the average weight of mature children. *Tardieu's* averages are 18 to 20 inches for the length, and 6 to 7 pounds for the weight. Of 4,104 infants born at the Maternité, *Madame Alliott* found that 2,142 weighed between 6·6 and 7·7 pounds.

Some details respecting the dimensions of the bones of a mature child are worth notice. The following table is quoted by Casper from Günz ("Der Leichnam des Neugeboren," Leipzig, 1827, p. 82).

Dimensions of the Bones of a Mature Child.

Height of the frontal part of the frontal bone	2	inches	3	lines
Breadth of the same	1	„	10	„
Length of the *pars orbitalis*	1	„		
Breadth of the same	1	„		
Parietal bone from anterior superior angle to inferior posterior one	3	„	3	„
Ditto from anterior inferior angle to superior posterior one	3	„	3	„
Height of *pars occipitalis* of os occipitis	2	„		
Breadth of the same	1	„	10	„
Height of squamous portion of temporal bone from upper edge of auditory foramen	1	„	—	„

Height of malar bone	—	inches	6 lines.
Breadth of the same	1	„	— „
Height of nasal bone	—	„	5 „
Breadth of the same	—	„	3 „
Height of the superior maxillary bone, from the *processus alveolaris* to the apex of the *processus nasalis*... ...	1	„	— „
Length of superior maxillary bone, from the *anterior nasal spine* to the apex of the *processus zygomaticus*	1	„	1 „
Length of each half of the lower jaw...	1	„	10 „
Breadth of lower jaw	—	„	7 „
Length of the seven cervical vertebræ	1	„	3 „
„ „ twelve dorsal „	3	„	9 „
„ „ five lumbar „	2	„	3 „
„ „ sacrum and coccyx	2	„	3 „
„ „ collar bone	1	„	7 „
„ „ shoulder blade	1	„	6 „
Breadth of the shoulder blade	1	„	2 „
Length of the humerus...	3	„	— „
„ „ ulna	2	„	10 „
„ „ radius	2	„	8 „
„ „ femur	3	„	6 „
„ „ patella	—	„	9 „
Breadth of the patella	—	„	8 „
Length of the tibia	3	„	2 „
„ „ fibula	3	„	1 „

Tardieu gives the following as the weight of the viscera of mature infants at term :—

Brain (including cerebellum, etc.) ...	10½ ounces.
Right Lung	509·52 grains.
Left „	440·04 „
Heart	231·6 „
Thymus gland	131·24 „
Liver	1412·26 „
Spleen	131·24 „
Kidneys each...	169·84 „

These are, however, to be regarded as merely normal averages, and are subject to infinite variety. In many cases they have not been approached (*Case* 121), whilst in others they have been greatly exceeded (see *Cases* 122 to 127), weights up to 23¾ lbs. and lengths up to 30 inches being recorded. (*Case* 124.)

Dr. Matthews Duncan is of opinion that the length and weight

Reference.	Weight.	Length.	Period of Life.
Case 84 (8)	Under 2 lbs.	12 inches.	12 hours.
„ 84 (12)	20½ ozs.	12 „	30 minutes.
„ 84 (15)	1 lb. 3½ ozs.	11½ „	20 „
„ 84	1 lb.	11 „	15 „
„ 84 (18)	1¼ lb.	11 „	44 hours.
„ 84 (19)	1 lb.	11 „	Reared.
„ 90	1 lb. 6 oz.	12 „	21 hours.
„ 84 (27)	1½ lbs.	9 „	Reared.
„ 84 (31)	2 lbs. 13 ozs.	—	—
„ 84 (34)	1½ lbs. (on 7th day).	—	4 months 8 days.
„ 84 (48)	1½ lbs.	13½ „	Reared.
„ 85 (1)	9 ozs.	8 „	75 minutes.
„ 120	1¾ lbs.	—	—
„ 119	—	8 „	Reared.
„ 119	—	6 „	1 hour 40 minutes.

of the child, bear some relationship to the age of the mother, being greatest when the mother's age is from twenty-five to twenty-nine. (See also Ellsässer in Henke's "*Zeitschrift*," 1841, vol. ii., p. 235.)

In all cases where the weight of the newly born child is important, it is desirable that it should be weighed as soon as possible, seeing that for a short time after birth the weight materially diminishes. (Part I., p. 164.)

It is popularly supposed that heavy and tall children have been retained longer than usual in utero. As a general rule, *still-borns are heavier and longer than those born alive, males than females, single children (cæteris paribus) than twins, and twins than triplets.*

But, on the other hand, children have lived and been reared whose weights and measurements in no respect approach the average stated. The following cases of abnormally short weights and measurements are recorded:—

Thus, a fœtus measuring only 6 inches is said to have lived 1 hour and 40 minutes, and one of 8 inches to have been reared. A case of live birth where the child weighed only 1 lb. is recorded, and several cases are on record where children have been reared whose weight did not exceed 1½ lbs.

(6.) *The diameter of the head, and the measurements across*

the shoulders and hips.—These, in Casper's opinion, afford valuable indications of maturity. Thus he found that in 207 mature children, the *average diameter of the head* was $3\frac{1}{8}$ inches transversely, $4\frac{7}{8}$ inches longitudinally, and $4\frac{7}{8}$ inches diagonally. Tardieu, however, gives the occipito-frontal diameter as from $4\frac{1}{3}$ to $4\frac{1}{2}$ inches, and the bi-parietal as from $3\frac{5}{8}$ to $3\frac{3}{4}$ inches.

According to Casper, the average diameter *across the shoulders* in 117 mature children was $4\frac{15}{16}$ inches, and the average diameter *across the hips* $3\frac{5}{8}$ inches.

(7.) *Condition of the nails.*—In mature children the nails feel horny, and reach the tips in the case of the fingers, although not necessarily so in the toes.

(8.) *Condition of the cartilages of the ears and nose.*—In mature children, the cartilages of the ears and nose feel cartilaginous.

(9.) *Condition of the genitals.*—In mature *male* children, the *testicles* will probably be in the scrotum, and the scrotum itself appear corrugated. The descent of the testicles may occur as early as the thirtieth week. In the author's experience, the cases where one of the testicles remains undescended at birth number at least 3 or 4 per cent. It is rare, however, to find both testicles undescended.

In mature *female* children the *labia majora* should cover the vagina and clitoris, the latter being no longer prominent. The exceptions to this rule are, however, very numerous.

(10.) *Position of the umbilicus.*—In mature children, the navel is usually in the centre of the body. Nevertheless, the exceptions to this rule are in the author's experience so numerous, as to deprive it of any forensic value as a sign of maturity.

(11.) *The length of the cord and the weight of the placenta.*—The placenta at term commonly presents a diameter of from 8 to 10 inches and weighs from 15 to 19 ounces. Négrier ("*Annales d'Hyg. et de Méd. Lég.*," 1re série, t. xxv., p. 126), gives the following as the length of the cord in 166 cases at full term:—In 28, he found it less than $17\frac{1}{2}$ inches; in 112, from $17\frac{1}{2}$ inches to $26\frac{3}{4}$ inches; in 24, a little less than 27 inches; and in 2, more than $39\frac{1}{8}$ inches. In the author's experience, the length of the cord at full term varies from 18 to 21 inches, *i.e.*, about the same length as the child's body.

(12.) We have to record a sign of maturity which we are convinced is of great value, but one that, unfortunately, can only be applied when the child born is dead. It is—

That, in the second half of the tenth (lunar) month, the centre of ossification of the inferior femoral epiphysis makes its appearance. (Béclard: Ollivier: Wildner.)

To find this centre of ossification, a horizontal incision is to be made through the skin and superficial tissues over the knee-joint down to the cartilages. After removing the patella the end of the femur is to be made to protrude. Horizontal sections are now to be carefully sliced off from the cartilaginous epiphysis, layer by layer, until a coloured point is observed, the greatest diameter of which osseous nucleus is to be measured. This nucleus appears to the naked eye as a more or less circular blood-red spot in the midst of milk-white cartilage, in which vascular convolutions may be distinctly recognised.

Casper has made numerous observations bearing on this osseous nucleus, the results being as follows:—

	No. of children observed.	Size of osseous nucleus.
In the 7th and 8th month ...	31	0
„ 9th „ „	9	0 to 2 lines
In mature children	52	$\frac{3}{4}$ to 4 „

Ollivier d'Angers has given the following measurements of this osseous nucleus in the case of 50 infants, at ages varying from the day of birth to one year old:—

At term	from	$\frac{1}{25}$ to $\frac{2}{25} \times \frac{1}{6}$ or $\frac{1}{3}$ of an inch.
13 to 20 days		$\frac{1}{4} \times \frac{1}{3}$ of an inch.
Above 20 days		$\frac{7}{25} \times \frac{1}{3}$ „
„ 8 months		$\frac{1}{2} \times \frac{1}{4}$ „
„ 9 „		$\frac{3}{8} \times \frac{1}{2}$ „
„ 11 „		$\frac{3}{8} \times \frac{13}{25}$ „

Summarising the facts observed by ourselves and others, it would seem that:—(*a*) If there be no visible trace of this osseous nucleus, the fœtus cannot be more than from 36 to 37 weeks old. (*β*) If it be the size of a hempseed, or the head of an ordinary fly (*i.e.*, about half a line), it corresponds to 37 or 38 weeks,

if still-born. (γ) When from ¾ to 3 lines, it indicates a uterine age of about 40 weeks. (δ) If it measures more than 3 lines, the child has probably survived its birth. (See *Cases* 11, 14, and 17, under "Infanticide.")

Table showing the Character of the Fœtus at different Ages of Intra-Uterine Life.

Age.	General Development of Body.		State of the Skin, &c.	Degree to which Ossification has advanced.
	Height.	Weight.		
From 1 month to 1½ month.	⅛ to ⅝ inch.	15 to 46 grs.	Skin quite transparent, of a purplish red colour, with no trace of hair on it.	Centres of ossification for clavicles, and lower jaw. Appearance of dental papillæ in the furrow of the lower jaw.
From 1½ to 2 months.	⅝ to 2 inches.	77 to 155 ,,		
From the 2nd to the 3rd month.	2 to 4 ,,	ʒvj to 1½ oz.		
From the 3rd to the 4th month.	4 to 6 ,,	1½ oz. to 4½ ozs.	Development of nails. Appearance of matrix of nail. Sex distinct.	Centre of ossification in ischium.
From the 4th to the 5th month.	6 to 8 ,,	6 to 8 ,,	Hair-germs appear on the forehead and eyebrows.	Ossification of os calcis.
From the 5th to the 6th month.	10 to 12 ,,	8 to 12 ,,	Hairs appear on the limbs.	Osseous centres for astragalus and os pubis.
From the 6th to the 7th month.	12 to 14 ,,	15 to 32 ,,	Hairs on hands and feet. Membrana pupillaris begins to disappear.	Three or four osseous centres in sternum.
From the 7th to the 8th month.	14 to 16 ,,	2 to 3 pounds.	Skin has lost its transparency. Epidermis distinct. Colour pale pink.	Ossification of lower vertebræ of sacrum.
From the 8th to the 9th month.	16 to 18 ,,	3 to 5 ,,	Skin is covered with sebaceous materials. [Vernix caseosa.] The nails do not reach tips of fingers.	
At term (mature).	18 to 20 ,,	6 to 7 ,,	Sebaceous covering still thicker. Nails overlap fingers. Membrana pupillaris has quite disappeared. Navel a little below middle of entire length of body.	An osseous nucleus in the condyloid epiphysis of femur. The alveolar processes of the lower jaw are perfectly distinct.

II.—*What are the Indications whereby the Development of the Fœtus may be ascertained?*

This is important, seeing that it may be necessary in certain medico-legal cases to fix the age of a fœtus. The subjoined table, from Tardieu, contrasts the fœtus at various periods of

uterine life. Nearly all modern writers, it may be mentioned, agree in the main facts.

The following statement of the development of the fœtus has been drawn from a great variety of sources:—

End of second week.—Formation of the amnion and umbilical vesicle. Chorda dorsalis, and medullary groove. Heart.

Beginning of third week.—The vitelline membrane has entirely disappeared. Protovertebral discs. First pharyngeal arch. Buccal depression. Primitive circulation.

End of third week.—The allantois and Wolffian body appear. The amnion is closed. Cerebral vesicles. Primitive ocular and auditory vesicles. Coalescence of the inferior maxillary protuberances. Liver. Formation of the three last pharyngeal arches.

Embryo of three to four weeks, has the form of a serpent; is three to five lines in length; its head is indicated by a swelling; its caudal extremity (in which is seen a white line, indicating the continuation of the medulla spinalis) slender, and terminating in the umbilical cord; the mouth indicated by a cleft, and the eyes by two black points; members begin to appear as nipple-like protuberances: liver occupies the whole abdomen; the bladder is very large; the chorion is villous, but its villosities are still diffused over the whole surface.

Fifth week.—The primitive aorta divides into primitive aorta and pulmonary artery. Conduit of Miller and genital gland. Ossification of clavicle, and lower jaw. Cartilage of Meckel (from which the malleus and incus are formed).

Embryo of six weeks.—Length from 7 to 10 lines: weight from 40 to 75 grains; face distinct from cranium; apertures of nose, mouth, eyes, and ears, perceptible; head distinct from thorax; hands and forearms in the middle of the length, fingers distinct; legs and feet situated near the anus; clavicle and inferior maxillary bone present a point of ossification; distinct umbilicus for attachment of cord, which, at this time, consists of the omphalo-meseraic vessels, of a portion of the urachus, of a part of the intestinal tube, and of filaments which represent the umbilical vessels. The placenta begins to be formed; the chorion still separated from the amnion; the umbilical vesicle

very large. In the sixth week the pharyngeal clefts disappear. The vertebral column, primitive cranium, and ribs assume a cartilaginous condition. Posterior roots of the nerves. Membranes of the nervous centres. Bladder. Kidneys. Tongue. Larynx. Thyroid Gland. Germs of teeth. Genital tubercle and folds.

In the seventh week the muscles begin to be perceptible. Points of ossification of the ribs, scapula, shafts of humerus, femur, tibia, intermaxillary bone, palate, upper jaw (its first four points).

Embryo of two months (eight weeks).—Length from 16 to 19 lines; weight 150 to 300 grains; elbows and arms detached from the trunk; heels and knees also isolated; rudiments of the nose and of the lips; palpebral circle beginning to show itself; clitoris or penis apparent; anus marked by a dark spot; rudiments of lungs, spleen and supra-renal capsules; cæcum placed behind the umbilicus; digestive canal withdrawn into the abdomen; urachus visible; osseous points in the frontal bone and in the ribs. Chorion commencing to touch the amnion at the point opposite the insertion of the placenta; placenta begins to assume its regular form; umbilical vessels commence twisting. *In the eighth and ninth weeks*, according to Beaunis and Bouchard, there is an appearance of inter-digital clefts; the capsule of the lens, and pupillary membrane; completion of the interventricular, and commencement of the inter-auricular, septum. Salivary glands; the larynx begins to become cartilaginous. All the vertebral bodies are cartilaginous. Points of ossification from the ulna, radius, fibula, and ilium. The two halves of the bony palate unite; sympathetic nerve; corpus striatum; pericardium; distinction between the ovary and testicle (?). Osseous nuclei of vertebral bodies and arches, malar bone, shafts of metacarpal and metatarsal bones, and phalanges; gall-bladder.

Embryo of three months.—Length 2 to 2½ inches; weight 1 to 1½ oz. troy=480 to 720 grains; head voluminous; eyelids in contact by their free margin; membrana pupillaris visible; mouth closed; fingers completely separated; inferior extremities of greater length than rudimentary tail; clitoris and penis very long; thymus, as well as supra-renal capsules, present; cæcum

placed below the umbilicus; cerebrum 5 lines, cerebellum 4 lines; medulla oblongata 1½ lines, and medulla spinalis ¾ of a line in diameter; two ventricles of heart distinct. The decidua reflexa and uterina in contact; funis contains umbilical vessels, and a little of the gelatine of Wharton; placenta completely isolated; umbilical vesicle, allantois and omphalo-meseraic vessels have disappeared. *In the third month*, the cartilaginous arches on the dorsal region of the spine close. Points of ossification for the occipital, sphenoid, os unguis, nasal bones squamous portion of temporal, and ischium. Orbital centre of superior maxillary bone. Commencement of formation of maxillary sinus; pons Varolii; fissure of Sylvius; mammary gland; epiglottis; union of testicle with the canals of the Wolffian body. Prostate.

Fœtus of four months.—Length 5 to 6 inches; weight 2½ to 3 oz.; skin rosy, tolerably dense; mouth very large and open; membrana pupillaris very evident; nails begin to appear; genital organs and sex distinct; cæcum placed near the right kidney; gall-bladder appearing; meconium in duodenum; cæcal valve visible; umbilicus placed near pubis; ossicles of ears ossified; points of ossification in superior part of sacrum and pubis; membrane forming at point of insertion of placenta or uterus; complete contact of chorion with amnion. [*In the fourth month.* "Corpus callosum; membranous lamina spiralis; cartilage of Eustachian tube; tympanic ring; fat in subcutaneous cellular tissue; tonsils; closure of genital furrow; formation of scrotum and prepuce." Beaunis and Bouchard.]

Fœtus of five months.—Length 6 to 7 inches; weight 5 to 7 oz.; volume of head still comparatively great; nails very distinct; hair beginning to appear; skin without sebaceous covering; white substance in cerebellum; heart and kidneys very voluminous; cæcum situated at inferior part of right kidney; gall-bladder distinct; germs of permanent teeth appear; points of ossification in pubis and calcaneum; meconium has a yellowish green tint, and occupies commencement of large intestine. [*In the fifth month.* "Osseous nuclei of axis and odontoid process; lateral points of first sacral vertebra; median points of second. Osseous points of lateral masses of ethmoid.

Ossification of stapes and petrous bone. Sudoriferous glands. Glands of Brunner. Lymphatic glands. Commencement of limitation of uterus and vagina." Beaunis and Bouchard.]

Fœtus of six months.—Length 9 to 10 inches; weight 1 lb. Skin presents some appearance of fibrous structure; eyelids still agglutinated, and membrana pupillaris remains; sacculi begin to appear in the colon; funis inserted a little above pubis; face of a purplish red; hair white or silvery; sebaceous covering (vernix caseosa) begins to present itself; meconium in large intestine; liver dark red; gall-bladder contains serous fluid, destitute of bitterness; testes near kidneys; points of ossification in four divisions of sternum; middle point at lower end of sternum. [*In the sixth month.* "Points of ossification for anterior root of transverse process of seventh cervical vertebra; lateral points of second sacral vertebra; median points of third; the sacro-vertebral angle forms. Osseous points of the manubrium sterni, and of os calcis. The cerebral hemisphere covers the cerebellum. Papillæ of the skin. The free border of the nails project from the corium of the dermis. Peyer's patches. The walls of the uterus thicken." Beaunis and Bouchard.]

Fœtus of seven months.—Length 13 to 15 inches; weight 3 to 4 lbs.; skin rosy, thick and fibrous; sebaceous covering appears; nails do not yet reach extremities of fingers; eyelids no longer adherent; membrana pupillaris disappearing; a point of ossification in the astragalus; meconium occupies nearly the whole of large intestine; valvulæ conniventes appearing; cæcum in right iliac fossa; left lobe of liver nearly as large as the right; gall-bladder contains bile; brain firmer; testicles further off kidneys; middle point at a little below end of sternum. [*In the seventh month.* "Additional osseous points of first sacral vertebra; lateral points of third, median ditto of fourth. First osseous point of body of sternum; Meckel's cartilage disappears; cerebral convolutions; island of Reil; tubercula quadrigemina. Testicle passes into vaginal process of peritoneum." Beaunis and Bouchard.]

Fœtus of eight months.—Length 14 to 16 inches; weight 4 or 5 lbs. Vernix caseosa all over skin; nails reach extremities of fingers; membrana pupillaris becomes invisible during the

month; a point of ossification in last vertebra of sacrum; no centre of ossification yet in cartilage of inferior extremity of femur; convolutions begin to appear in brain; testicles descend into internal ring; the middle point is nearer the umbilicus than the sternum. Additional points for the second sacral vertebra, and lateral points for the fifth.

Fœtus of nine months (full term).—Length from 17 to 21 inches; weight from 5 to 9 lb.; the average probably about 6½ lb.; head more or less covered with hair, of from 9 to 12 lines in length; skin, especially at heads of joints, still covered with sebaceous matter; membrana pupillaris gone; external auditory meatus still cartilaginous; four portions of occipital bone still remain distinct; os hyoides not ossified yet; point of ossification in the centre of cartilage at lower extremity of femur; white and grey matter of brain become distinct; liver reaches umbilicus; the testes have passed the inguinal ring, and are often found in the scrotum; meconium in rectum or at least sigmoid flexure; the middle point of the body at umbilicus or a little below it. [*In the ninth month.* "Additional points for the third sacral vertebra; lateral points for the fifth. Osseous point for the middle turbinated bone; for body and great cornu of the hyoid; for the second and third pieces of the body of the sternum; ossification of the bony lamina spiralis and axis of the cochlea. Opening of the eyelids." Beaunis and Bouchard.]

The exceptions that occur to the general facts detailed (and these we shall have to mention in the chapter on Infanticide) will usually be found to consist in backwardness, rather than in forwardness of development.

The following measurements of the fœtus are on the authority of Percy Boulton, ("*Brit. Med. Journ.*," Jan. 18, 1879):—

Weeks.	Inches.	Weight.
12 to 16	3	2 ounces.
16 to 20	5½	4 „
20 to 24	8	8 „
24 to 28	10½	1 pound.
28 to 32	13	2 pounds
32 to 36	15½	4 „
36 to 40	18	6 „
40 —	20½	8 „

Lastly we may quote the following measurements of the fœtus at different ages given by Mr. G. W. Callender, in his lectures at the Royal College of Surgeons :—

Length of Fœtus in inches.	Age in weeks.	Age in days.
·12	3	7 to 21
·4	6	35 to 42
·5	7	42 to 49
·7	8	49 to 56
·9, 1·1	9	56 to 63
1·5	10	63 to 70
2·3, 3·, 3·5, 3·7, 3·8	12 to 16	84 to 112
4·, 4·3, 4·7, 6·5, 6·7, 7·	16 to 20	112 to 140
9·, 10·	22 to 24	154 to 163

III.—To what Extent may the Normal Period of Utero-Gestation be lengthened?

Here the primary matter for evidence must always be the *latest possible date of access*. And this, in the majority of the cases that become matters of legal enquiry, is usually fixed by the day of the husband's death, or the day on which he left home to go abroad, or such like circumstance.

This date being determined, the medical jurist will be called upon to give his opinion whether the interval between the date of access and that of the child's birth is within the possible period to which utero-gestation may be protracted.

In such a case, individual experience is comparatively of limited value. The "I know of no case beyond 280 days" of

a witness, however great an authority, is worth little or nothing if well-observed cases far exceeding the period that has come within his experience are recorded. It is, therefore, a subject upon which it is important to consider—not only the opinions of authorities, but—all recorded instances, and to gauge as far as possible their intrinsic worth.

(1.) And first of all, it appears certain, judging by analogous instances in the case of the lower animals, that the period of pregnancy may be protracted beyond the normal limit.

Thus, M. Tessier ("*Memoires de l'Académie Royale des Sciences*," 1817, Tom. ii., p. 1), found that of 577 cows (whose natural period of gestation is 285 days), 6 calved on the 298th day, 4 on the 299th, and 10 from the 300th to the 321st, whilst there was a period of 81 days between the shortest and the longest gestation. Similar results are recorded by Lord Spencer. In the case of 764 cows, six calved from the 301st to the 308th day, and one as late as the 313th day after it had been covered by the bull. ("*Brit. and For. Med. Review*," Jan., 1841). Out of 547 mares (whose natural period is 335 days), 35 foaled from the 359th to the 377th day, and 7 from the 377th to the 419th; the difference between the extremes was 129 days. Out of 1,012 sheep (whose natural period is 153 days), 7 yeaned on the 156th, and 5 on the 157th day, 11 days being the extreme limits. Out of 161 rabbits (whose natural period is 30 days), 25 littered from the 32nd to the 35th day, 8 days being the difference between the extremes. Like facts have been noted with respect to pigs and certain domestic animals.

It is evident, therefore, that in the lower animals the period of utero-gestation is a variable one, and liable to considerable protraction.

(2.) And similarly in the human subject there is considerable evidence to show that 41, 42, and 43 weeks may elapse between coitus and labour. (See instances given under heading of *Case* 109, and *Cases* 110 to 117.)

As regards authorities on this subject, we may note that the Committee of Privileges who conducted the Gardner Peerage investigation (*Case* 110), called sixteen of the most eminent

obstetricians in London. Five of these, viz., Drs. Gooch, Blegborough, Davis, Sir C. M. Clark, and Mr. Pennington, discredited protracted gestation, and maintained that the period of utero-gestation ranged between 270 and 280 days. On the other hand, eleven (including Drs. Granville, Conquest, Blundell, Merriman, Power, Hopkins, and Sabine), maintained the possibility of protracted gestation. We might also name Dr. Dewees, Professor Hamilton, M. Velpeau, Dr. Lee, Dr. W. F. Montgomery, the illustrious Harvey, Smellie, Dr. Ashwell, Dr. James Reid, Sir James Simpson, and other eminent authorities as holding similar views.

Both Dr. Tyler Smith and Dr. Robert Barnes, being asked in the case of Renouf *v.* Eden (*Case* 113) respecting the probable legitimacy of a child born 307 days (*i.e.*, nearly 44 weeks) after the departure of the defendant, stated that they believed it to be highly improbable that the period of gestation should extend even to 300 days, although they were not prepared to declare it impossible. Drs. Tanner and Clark deposed, that they had themselves known of cases where it had been prolonged to 297 and 300 days.

We have again and again pointed out, that all statements as to periods of gestation, whether in the lower animals or in man, lack substantial accuracy, from the circumstance that the day of insemination is not necessarily the day of impregnation. In the following tabulated statement, we have given in Column 1 the periods of gestation in the case of 114 pregnancies recorded by Dr. Merriman, calculated from the last day on which the women menstruated; in Column 2, the periods of 182 pregnancies recorded by Dr. Murphy, and in Column 3, the periods of 155 protracted cases recorded by Hunter, Lee, Montgomery, and Power, calculated in a similar manner. In all of these the calculations were made from the last day of the last menstruation. Seeing, however, that conception may have occurred a day or two before the time when the next menstrual periods should have set in, the interval of menstruation, at least, should be deducted from the total period. Seeing, however, that menstruation may continue during an entire pregnancy, or that conception may take place when a woman is not men-

struating, we believe that neither the normal period, nor abnormal periods of pregnancy, can for forensic purposes be calculated with anything approaching accuracy by the disappearance of the menses. (See "*Lancet*," Sept. 3 and 10, 1853, pp. 205 and 235.) In Column 4, several cases of prolonged gestation, calculated from the date of a single coitus, are recorded, on the authority of Raciborski, Rigby, Merriman, Dewees, and others.

	Calculated from the last day of menstruation.			Calculated from the date of a single coitus.
	1. MERRIMAN.	2. MURPHY.	3. HUNTER, ETC.	4. RACIBORSKI, ETC.
33rd week		5		
34th „		3		
35th „				
36th „		6		
37th „	3	11		
38th „	13	12		
39th „	14	24		
40th „	33	25		
41st „	22	32	55	8
42nd „	15	25	42	7
43rd „	10	19	30	3
44th „	4	9	13	—
45th „	—	11	12	—
47th „ (322-325 dys.)	—	—	3	—

(3.) Although it is impossible to state that 44 weeks, or even longer periods of gestation may not occur, it must be conceded that there are no well recorded cases of such protraction, except where the time has been determined by the cessation of the catamenia.

Dr. Reid considers there is an absence of any accurate proof of gestation being prolonged beyond 293 days, and that the Code Napoléon, which fixes 300 days, is liberal. ("*Lancet*," Sept. 3 and 10, 1853.) Dr. Duncan, who fixes 275 and 278 days as the normal, admits gestation may be protracted for 4 weeks, *i.e.*, to 306 days, or 43 weeks 5 days. ("*Edin. Monthly Jour.*," 1854, Vol. ix., p. 230.) Dr. Ogston considers that there is sufficient evidence to show that gestation may be extended

to the 44th, or even to the 46th week. *Case* 118 is remarkable as an illustration of three prolonged pregnancies (stated respectively at 285, 300, and 325 days) occurring in the same woman.

(4.) Considering the extreme and practically hopeless difficulties in the way of an absolute settlement of this question, arising from the impossibility of determining the day of impregnation, it is manifest that in the practice of the law, there should (as is usual) be a somewhat elastic limit.

Thus legitimacy was admitted in *Case* 112, at 294 days; in *Case* 114, at 299 days; in *Case* 111*a* at 301 days; in *Case* 116, at 313 days; and in *Case* 115, at 317 days.

Legitimacy, on the other hand, was not allowed in *Case* 117 at 336 days, nor in *Case* 111 at 12 months. In *Cases* 110 and 113, the decisions depended on facts other than medical.

(5.) It is manifest that moral considerations, such as the character of the parents, the probability or possibility of sexual access, etc., are matters of primary importance for the Court to consider, the medical evidence in such cases necessarily occupying a subsidiary position.

(6.) That although the development of the fœtus after the normal period of utero-gestation, is more or less arrested—in other words, the development of a fœtus in utero may be regarded at nine months as having reached nearly its maximum —nevertheless we should naturally expect (and in the most credible cases it has proved to be so) that over-mature infants would exhibit unusual size and weight.

(7.) That in all cases where pregnancy is greatly prolonged beyond the expected period, as well as in doubtful cases of suspected pregnancy, the possibility of extra-uterine fœtation must not be overlooked.

We mean by extra-uterine fœtation, the development of a fœtus out of the uterus. Thus an ovum may undergo more or less complete development in one of the following situations:—(1) In the ovary; (2) in the Fallopian tube; (3) in the walls of the uterus; or (4) in the peritoneal cavity, a favorite situation being the pouch of Douglass. The pregnancy can hardly, in any of the first three of these varieties, proceed further than the first half of the usual period, if indeed so far,

without causing either the death of the fœtus, or the death of the mother. On the contrary, in the peritoneal cavity (abdominal pregnancy), the ovum may proceed to its full development, and, if not excised, become encysted, and remain dormant for years.

Thus, in one recorded instance, a dead fœtus has been carried as long as forty-three years ("*Obstetrical Society's Transactions*," Vol. viii., p. 106), and in a second, the pregnancy was said to have lasted thirty-one years. In this latter case, a full-grown male infant, in a state of partial calcification, was found at the post mortem. (Dr. Housset's "Observations Historiques sur quelques écarts ou jeux de la Nature, etc.," Neuchatel, 1785, pp. 26—73.)

Affiliation Cases.

The evidence in these cases must be chiefly circumstantial. *Access* being proved, the following questions arise—(α) Is the period, intervening between the time when access was possible and the birth (supposing the child to be mature) the normal period of utero-gestation? (β) If the period be protracted beyond 280 days, is it within the possible range of protraction, as laid down by authorities and proved by cases? (γ) If the period be of short duration, does the appearance of the child correspond with its asserted uterine age, and is the period one within which according to authorities and recorded cases, a living child might possibly be born? (δ) If the child be immature, what is its probable age?

Affiliation cases at times occur where the mother has had intercourse within the prescribed limits, with more than one male. (*Case* 128.) And here it must be admitted that the medical jurist can offer very little assistance as to paternity. *Likeness* may prove important, but this is a matter of general, rather than of medical evidence. (Part I., p. 173.) Thus at Appenzel, in Switzerland, a question arose in a bastardy case, which of two men, both of whom had had intercourse with the mother within seventeen days, should be considered the father! The Court postponed the case, in order that *likeness to the*

father might develop itself! Dr. Taylor justly says, that both should have been required to contribute to the child's support.

The fact that a child may bear a more striking likeness to its grandparents or to other relations, or what is more astonishing, to some very remote ancestor, is well known.

We cannot in these cases altogether put on one side the question of heredity. Inheritance is a strange subject. Mental influences, or the accidents of pregnancy, are not to be confounded with inheritance. Good looks are characteristic of certain families, and irregularities of features are often perpetuated. Tall children not unfrequently come of tall parents, whilst blondes ordinarily procreate blondes, and brunettes brunettes. Temperament too is not disobedient to the law of inheritance, and the wise in these matters regard the crossing of temperaments as advantageous. An aptitude for procreation too is hereditary, prolific parents procreating children that become prolific. Longevity is the privileged possession of certain lineages, and deformities the affliction of others. Personal peculiarities of gait, gesture, voice, and general bearing pass from parent to child, and in the matter of the beautiful, like begets like. Nor is this true of the body only, for the effects of inheritance are even still more marked in the case of the mind. Nor can we omit to notice the transmission of disease. All these points may need consideration in an affiliation case.

But to one point in the matter of inheritance in its relation to paternity, considerable importance is to be attached, viz., the transmission of colour.* A white woman, *e.g.*, has a black child. This pre-supposes that the father was a man of colour Thus in the case of Stothard *v.* Aldridge [Bail Court, January 1856], the plaintiff sued the defendant for damages for the

* "Peace, tawny slave, half me, and half thy dam!
Did not thy hue betray whose brat thou art,
Had nature lent thee but thy mother's look,
Villain, thou mightst have been an emperor!
But where the bull and cow are both milk-white,
They never do beget a coal-black calf."

Titus Andronicus, Act V., Sc. 1.

seduction of his wife. Defendant was a man of colour. The child born of the alleged adulterous intercourse, was proved by the medical witness to have been born coloured, and to have had woolly hair. The husband and wife were both light. The complexion of the child fixed the paternity on the black defendant.

Having said thus much on inheritance, we must draw special attention to the fact that, although children often do resemble their parents in the colour of the hair, eyes, and skin, also in polydactylism, transposition of viscera, hypospadias, and other peculiarities, this is by no means necessarily the case. In other words, *the absence* of likeness, of transmitted defects and of other peculiarities, neither disproves paternity nor proves legitimacy. The facts known to physiologists and pathologists under the name of *atavism* [German, *Rückschlag*],* explain some of these cases.

Parsons ["*Phil. Trans.*," Vol. lv.] gives an instance of a black man living in Gray's Inn that married a white woman, who bore him a daughter resembling the mother in features and colour, except that the right buttock and thigh were black. The same author mentions the case of a black who married an Englishwoman, the child born to them being quite black. He also refers to the case of two black parents having a white child. The mother was terrified, fearing her husband would suspect her chastity. The father, however, said he was not surprised, seeing that his own father was a white man, although, said he, "my grandfather and grandmother were both as black as you and myself; and although we came from the place where no white people were ever seen, yet there was always a white child in every family that belonged to us."

* "Fit quoque, ut interdum similes existere *avorum*
Possint, et referant *proavorum* sæpe *figuras*,
Propterea, quia multa modis primordia multis
Mista suo celant in corpore sæpe parentes,
Quæ patribus patres tradunt a stirpe profecta:
Inde venus varia producit sorte figuras;
Majorumque refert voltus, vocesque comasque."

Lucretius De Rerum Naturâ.

But another question here deserves notice. In cases where the mother marries a second time, the child may resemble neither parent, but the first husband. That a woman contracting a second marriage, may transmit to the offspring of that marriage the peculiarities she received through the first union, receives abundant proof from analogy. The responsibilities of life are, by a mysterious and inexorable law, far-reaching. The diseases of a man may be transmitted to children not his own. Dead, he yet exerts an influence over the future offspring of his wife, having for ever, by their conjugal union, ineffaceably impressed on her whole system certain of his own peculiarities.

SUPPOSITITIOUS CHILDREN.

If in any case one child be substituted for another, medical evidence would be of little service unless the ages materially differed, or one child had upon it peculiar marks.

A woman may, however, pretend that she has recently been delivered. (*Cases* 129 to 135.)

It may be worth remarking that stains on bedding and marks of blood in a room, are not to be taken as proof that a woman has been confined! (*Case* 129.) Even an afterbirth may be procured to render the deception more deceiving. (*Case* 135.) The difficulty of providing a placenta at the right moment, has not prevented the substitution of some other article (such as a sheep's pluck) to play its part. (*Case* 129.)

In all cases where doubt exists whether a woman has or has not been confined, it will be necessary to proceed with great caution and with the least possible delay:—

1. To make a careful examination of the person, in order to determine whether or not signs exist of recent delivery.

2. To demand to see the placenta. It is necessary to make perfectly certain, moreover, that it is a placenta which is produced.

3. To examine the child, observing specially whether its appearance corresponds or not with the period of the alleged accouchement.

NOTES FOR THE EXAMINATION DURING LIFE OF CASES WHERE IMPOTENCE OR STERILITY IS ALLEGED.

(1.) *Note*—

Age.
General appearance.
Growth of hair.
Character of voice.
Muscular development.

(2.) *Enquire*—

What diseases or illnesses the person has suffered from, and the date of these illnesses (specially paralysis, mumps, etc).
Whether the person has suffered from any accident affecting the head or spine.
Whether the person is addicted to spirits, opium, tobacco, or self-abuse.

(3.) *Examine*—

(α.) In the Male :—

Whether the general genital development be defective or otherwise.
The growth and extent of the pubic hairs.
The length of the penis, and the position of the urethral opening.
The size and number of the testicles.
The condition of the prostate.
All abnormalities.

(β.) In the Female :—

The growth and extent of the pubic hairs.
The general development of the external genitals.
Whether they exhibit extreme tenderness to touch.
The Hymen—
  Position.
  Character.
  Condition—*i. e.*, whether it be intact or not.
The Vagina—
  Size and dilatability.
  Whether the os uteri can be seen or felt, or whether the vagina terminates in a cul-de-sac.
The development of the breasts.
All abnormalities.

ILLUSTRATIVE CASES.

1. Atchley v. Sprigg.—(*January*, 1864, 33 *Law Journal Chan.*, N.S, p. 345.) (See Taylor's "Med. Juris.," p. 270, Vol. II.)—In this case Vice-Chancellor Kindersley decided that the child of a married woman is *primâ facie*, legitimate, the onus of proving the opposite resting with those interested in establishing illegitimacy. In this case the illegitimacy of the child was proved, although the Vice-Chancellor held that there was possibility of access.

The evidence to repel the presumption of the legitimacy of a child born during wedlock must be strong, distinct, satisfactory, and conclusive, and such as to produce a judicial conviction that the child was not procreated by the husband.

Where, however, as in this case, a husband and wife lived together for nine years without having a child and then separated and never lived together again, and a child was born ten years after the separation, while the wife was in the habit of committing adultery with another man, which child was treated by the paramour as his own, and was called by his surname and brought up by him, the child, notwithstanding the possibility of access on the part of the husband, was held to be illegitimate.

In this case it was decided that a mother's evidence was inadmissible to prove the legititimacy or illegitimacy of her child born during wedlock.

This case was tried three times by a jury, and then referred to Lord Lyndhurst. (Pages 1, 2.)

2. Cope v. Cope.—(5 *C. & P.* 604, *and* 1 *M. & R.* 269, 1833.)—In this case the husband and wife lived fourteen miles apart, the wife having formed an illicit connection with another man. Both husband and wife regarded the last child to which she had given birth (the plaintiff) as illegitimate. On this, however, Baron Alderson said, "Lord Hardwicke decided that the mother could not be allowed to give evidence on such a point, as she could not discharge the husband of the birth of the child; and, *à fortiori*, the husband could not be permitted to discharge himself. Lord Mansfield and Lord Hardwicke both decided that illegitimacy could be proved only by the fact of there being no marriage, *or by proof of non-access:* and *it was held, on the ground of decency and morality, that the parties them-*

selves should not be allowed to prove non-access after marriage." "If a child be born in marriage during the lifetime of the husband, that child, in law, is presumed to be legitimate. If a husband have access, and others at the same time have criminal intimacy with his wife, still a child born in such a case is legitimate in the eye of the law. But if the parties are living separately, and the wife is notoriously living in open adultery, although the husband have opportunities of access, yet under such circumstances, it would be monstrous to suppose that he would avail himself of them. The legitimacy of a child so born could not therefore be established." The jury returned a verdict for the plaintiff that he was legitimate. He had been registered in the parish register as illegitimate. (Pages 1, 2.)

3. Morris v. Davis.—(1830, 8 *L. J. Chanc., p.* 120.)—"In this case it was contended that the plaintiff was illegitimate, though born in wedlock. Husband and wife had voluntarily separated, but lived within a short distance of each other. The wife was living in adultery, and the child was born fourteen years after the separation. She even so far concealed the child's birth from her husband, that he did not know of its existence for seventeen years. The Lord Chancellor, to whom the case was referred, said that, although the husband and wife met occasionally, it so happened that *none of these meetings would correspond with the time requisite for the birth of the child to make it legitimate*—and coupling with this the general bad conduct of the woman and her open adultery, he was led to regard the plaintiff as illegitimate." (Pages 1, 3.)

4. Plowes v. Bossey.—(*Before Vice-Chancellor Kindersley*, 31 *L. J. (N. S.) Ch.*, 681, *February*, 1862.)—This case was decided in favour of a child's legitimacy, because although the husband was in an asylum, his wife visited him at the asylum from time to time. (Pages 1, 4.)

5. Gurney v. Gurney.—(*Sir W. Page-Wood's Court, May*, 1863, 32 *L. J. (N. S.) Chanc.*, 456.)—This case was decided by proof of non-access. (Page 1.)

6. Banbury Peerage Case.—(*H. of Lords*, 1806, 2 *Peerage Claims*, 48.)—In this case the claimant asserted that he was the son of Lady Banbury by Lord Banbury, the opponents contending that he was her son by a paramour. The legitimacy was contested chiefly on the ground of Lord Banbury's age. Although the House decided against the claimant, they refused to entertain the question of age, but decided the case on the ground that the birth, and even the existence of the child, was concealed during life from his Lordship. (Page 12.)

7. Johnson v. Johnson.—(*V. C. Malins' Court, Jan.*, 1871.)—A man, aged 60, married a girl, aged 16. After 15 years' cohabitation (in 1861), a child was born, a second in 1862, and a third in 1865. The plaintiffs

sought to set aside the will of the husband, on the ground that the last two children were not his, seeing that at the time of their births he would have been 78 and 81 years of age respectively.' The Vice-Chancellor declined to interfere. (Page 12.)

8. Med. Gaz., XL., p. 857.—Male, æt. 42. Sexual organs undeveloped. The testicles of exceedingly small size. Voice effeminate. No spermatozoa were found in the contents of the glands. (Pages 11, 13.)

9. Curling on Sterility, p. 95.—A case mentioned of a man, æt. 26, having sexual organs like a child of 8. After marriage he became a father, the genitals developing naturally within two years of the union. (Pages 11, 13.)

10. British Med. Gaz., April 13, 1872, p. 409.—Premature sexual desires in a boy, æt. 4½. Attempted intercourse with his sister, a child, æt. 2. (Page 11.)

(A case also mentioned of a boy given to masturbation, from the age of 3.—(Mr. Mason.)—"*B. M. J.*," *April* 27, 1872, p. 461.

11. Ogston's Med. Juris., p. 81.—(*Quoted from "Causes Célèbres."*)—Two married couples were without issue. On a journey they both put up at a hotel. The wives preceded their husbands to bed. When the gentlemen retired, they respectively mistook their friend's room for their own, with the result that both ladies became pregnant. (Page 9.)

12. Lond. Med. and Surg. Journal, Vol. IV.—(*Mr. Hird.*)—A male in whom the penis was amputated to such extent that on pressure a very small portion only of the organ protruded, became the father of two children. (Page 14.)

13. Med. Times, Sept. 21, 1850, p. 321.—A boy æt. 17 was summoned on a charge of affiliation. The defence set up was that it was impossible for him to be the father, seeing that he was a *hypospadiac.* The paternity was allowed. (Page 14.)

(See also "*Med. Times,*" Sept. 14, 1850, p. 292. "*Assoc. Med. Journal*" (Manchester), March, 1853, p. 236.)

14. Guy's Hospital Reports, 1843, I., 163.—(*Mr. Poland.*)—Male, æt. 29; a cryptorchid. Married at 20, and had two children. (Page 16.)

15. Taylor's Med. Juris., Vol. II., p. 294.—(*Dr. Taylor.*)—Male, æt. 32, a cryptorchid of masculine appearance. Married and had two children. (Page 16.)

16. Taylor's Med. Juris., Vol. II., p. 294.—(*Two cases communicated by Mr. Cock.*)—Two cryptorchids, both virile. One had been twice

married, and had had two families and several illegitimate children (Page 16.)

19. Hargrave's State Trials, Vol. X., p. 24.—The wife of John Bury alleged that her husband was impotent. On examination she was found to be a virgin, and he to have but one testicle the size of a small bean. The marriage was annulled. John Bury married again, and by this second marriage had a son. (Pages 9, 15.)

20. Ogston's Med. Juris., p. 78.—One testicle extirpated for carcinoma. The other testicle afterwards shrank to the size of a bean, and the man acquired a boyish voice and appearance. The genitals became infantile, and there was an absence of sexual desires. (Pages 16, 20.)

21. Legge v. Edmunds.—(*V.C. Court*, 1854).—(See a full account in Guy's Forensic Med., p. 41.)—In this case a question arose as to the legitimacy of a child. The father died four months before its birth. On the part of those who contested the legitimacy, it was contended that two months before conception, the husband (an intemperate man) had slight hemiplegia, from which he partially recovered in the course of a month. After this he had disease of the liver with dropsy. Dr. Carpenter and Dr. Taylor both said it was possible, seeing he had access to his wife, that the child was his, but that it was not probable. The case was further complicated by the fact that for eight years preceding the paralysis, no child had been born of the marriage (suggesting sterility somewhere), whilst the wife had had four children by her second husband (proving that she was not sterile). Verdict for defendants. (Page 20.)

22. (See Guy's Forensic Medicine, p. 42.)

(1.) Male, æt. 58. Hemiplegia at 33, leaving him permanently lame, with his speech slightly affected. Coitus took place within three weeks (according to his wife) of the attack. Three children were born after the seizure.

(2.) Male, æt. 32. Slight hemiplegia at 26. A second attack at 28. Intercourse within fourteen days of, and a child born eighteen months after, the first attack of paralysis, and two at a later date. (Page 20.)

23. Trans. Chir. Soc., VII., p. 179.—Trans. Path. Soc., XVII., p. 186.—"Lancet," May 23, 1874, p. 730.—(*M. Teevan.*)—Four cases of sterility after lateral lithotomy occurring in males, aged respectively 44 47, 45, 45. In none of the cases did emissions occur during coitus. (Page 20.)

24. Jour. de Med. et Chir. Prat., 1866.—Amer. Jour. Med. Sc., Vol. LVI., p. 281.—(*Amussat.*)—Male; married 5 years; no family. On examination a very contracted phymosis, with excessive length of prepuce found, so that the glans could not be uncovered. This was relieved by operation, within a year of which his wife gave birth to a son. (Page 21.)

25. New York Med. Jour., Vol. VIII., p. 126.—(*Proj. W. H. Van Buren.*)—Aspermatism in a male, æt. 30. Sterile. Incurable. (Page 21.)

26. Amer. Jour., July, 1870, p. 280.—Female, æt. 40. Good health. Uterus and ovaries absent, but vagina, clitoris, labia and breasts well developed. (Page 33.)

27. Ogston's Med. Juris., p. 83.—(*From Foderé.*)—In a female, æt. 25, of good health, a tumour, pierced by a small hole, was found at the site of the vulva. At the post-mortem, both vagina and uterus were found to be absent.

The husband in this case procured a divorce. (Pages 33, 34.)

(See also in Andral's Pathological Anatomy, a case where the uterus was absent, a small tumour resembling it being found in its place.) The vagina was about one inch in length. The Fallopian tubes and ovaries were present.

27a. Lancet, March 22, 1879, p. 430.—(*Dr. Gooding.*)—Female, married. Absence of vagina, the urethra taking its place in copulation. Operation and cure. (Page 33.)

27b. Lancet, Nov. 27, 1880, p. 854.—(*Dr. C. H. Carter.*)—A girl, æt. 16. Vagina absent. An operation was attempted to remedy the defect, but with very partial success. (Pages 33, 34.)

[Dr. C. thought marriage in such a case inadmissible, since delivery could not take place *per vias naturales*. (In this view we agree.)]

27c. Lancet, July 3, 1880, p. 10.—(*Mr. R. T. Leeming.*)—Congenital atresia of the vagina. Operation. Cure, followed by pregnancy. (Page 33.)

28. Ogston's Med. Juris., p. 84. — (*From London Med. Gaz.*)—The cure of a female who had no vulva, the vagina terminating in the rectum. Copulation, followed by pregnancy and the delivery of a living child through an artificial opening, is stated to have occurred. The woman again became pregnant, the operation wound being afterwards kept open. (Pages 33, 34.)

[See cases related by Siebold, Barbant, and Morgagni. In Morgagni's case the vagina opened on the anterior wall of the abdomen.]

29. Ogston's Med. Juris., p. 85. (*From Memoirs of the Academy of Sciences of Paris.*)—The vagina in this case was so narrow as scarcely to admit a quill. After being married for eleven years, the woman became pregnant, and at full time the vagina dilated sufficiently to allow of delivery. (Page 34.)

30. "Gazettes des Hôp.," July 5, 8, 10, 1873.—Also **Med. Times and Gaz., July 26, 1873.**—Suit for nullity of marriage, on the ground that the wife possessed none of the organs essential to a woman (Case of M. Darbousse). The husband declared, on the authority of a midwife who had examined her, that his wife had neither breasts, womb, ovary nor vagina; that her pelvis was as small as that of a man, and that although 27, she had never menstruated. The Court not having much confidence in these statements, ordered her to be officially examined by a medical man and also by a midwife (!), to which examination, however, she declined to submit.

When the case came on for hearing, she claimed that the demand for nullity could not be made after six months' cohabitation, but this plea was over-ruled. For the plaintiff Dr. Legrand du Saulle, whose evidence was directed to show that the woman was of no sex at all, urged that any feminine feeling she might possess was the result of habit and bringing up. For the wife, however, Dr. Carcassonene, after examining her, stated that she had a mons veneris, labia, clitoris and urinary meatus, but admitted that there was no vagina, or at any rate an imperforate one, so that copulation was impossible. The Court on this decided that the defendant was a woman, notwithstanding the absence or imperforate nature of the vagina, and non-suited the husband.

This judgment was annulled by the Cour de Cassation, and a new trial ordered before the Court of Appeal of Montpellier. Tardieu at this inquiry stated that the individual in question was a male. M. Courty differed from Tardieu, but insisted there was every reason to believe that the organs indispensable for characterising a woman, were either absent or elementary. In his opinion the individual was sexless, and unable to contract marriage. The marriage was ultimately annulled with costs. (Pages 33, 34.)

31. Med. Times and Gazette, Jan. 7, 1871.—(*Dr. J. E. Hardie.*)—Female, æt. 7. Enlarged clitoris, with adhesion of labia. The case was mistaken for one of hypospadias.

32. Med. Times and Gaz., June 22, 1872, p. 724.—(*Dr. Squarey.*)—Absence of uterus and ovaries in three sisters. They had never menstruated. (Pages 33, 34.)

33. Ogston, Med. Juris., p. 44 (with plate).—Child æt. 8. The urine and fæces passed through a small cloaca between the pubes and umbilicus. An abortive organ (? clitoris or penis) and two folds (? scrotum or labia) were apparent. The sex could not be determined during life.

Post-mortem. (Age 8 years, 8 months.) Neither uterus nor rectum found.

34. Ogston's Med. Juris., p. 86.—A female (a prostitute). At the post-mortem the uterus was found to be plugged with a fibrous tumour. The Fallopian tubes were also blocked, and about the centre of each, a fibrous cyst was discovered about the size of a pigeon's egg.

Similar cysts were found in both ovaries. (Pages 35, 36.)

35. British Med. Journ., Dec. 21, 1878.—(*Dr. J. C. Dalton.*)—Girl (young) died eight days after menstruation, and after an illness of sixteen hours' duration.

Post-mortem. The ovaries were found to be normal both in size and appearance. It was evident menstruation had taken place without the rupture of Graafian follicles or the formation of corpora lutea.

The right ovary showed a prominent follicle with a transparent covering, as if approaching menstrual maturity. Dr. Dalton thinks that the coincident ovarian development was about to commence. (Page 27.)

36. Medical Press and Circ., Oct. 6, 1880.—M. Tillaux brought before the Academy of Medicine of Paris, a woman on whom he had performed hysterectomy for cystic disease a year previously. The greater part of the uterus had been removed, but both ovaries had been preserved. The connection, however, between them and the remaining stump of the uterus had been completely severed. Nevertheless the woman had menstruated regularly every month since the operation, the blood coming from the stump of the uterus and not from the vagina. The operation had not interfered with the genital functions. (Page 28.)

[M. Tillaux also showed a girl æt. 22, in whom he had removed both ovaries for disease, and who had also since the operation menstruated regularly.]

37. North. Journal Med., July, 1845, p. 70.—Menstruation a few days after birth until death, which occurred when the child was four years of age. Organs much developed. (Page 25.)

38. Med. Chir. Transac., Vol. II., p. 116.—Menstruation at nine months: was as well developed at the age of 2 as a girl usually is at 18. (Page 25.)

40. Paris Medical Journ., Dec. 22, 1876.—(*M. Bouchut.*)—Female. Weight 54 lbs. Well developed. Menstruation occurred at the age of 22 months, the catamenia having since appeared every four weeks, being normal both in the time it lasted and in the amount. Breasts well formed. Pubes covered with well-developed down. (Pages 25, 27.)

41. British Med. Journal, March 12, 1870, p. 265.—Menstruation at 23 months. (Page 25.)

42. London Med. Rec., 1876, p. 126.—(*Dr. Huggins, of Alabama.*)—Precocious development in a female child æt. 2. (Page 25.)

43. Lancet, 1878, I., p. 777.—(*Dr. Horatio Yates.*)—Menstruation in girl æt. 2, returning regularly every four weeks, and lasting for three days.

Abundance of hair both on pubes and in the axillæ. Both breasts developed. (Page 25.)

[See also other cases —**Lancet, 1866, II., pp. 11, 85; 1871, I., p. 366. Biennial Retrospect, 1871—1872, p. 372** (one case mentioned was hereditary). **Ziemssen's Cyclop., Vol. X., p. 322.** Case of menstruation at one year old. **Med. Press and Cir., 1873, I., p. 112; 1881, I., p. 100. British Med. Journ., 1872, I., p. 220; 1873, II., p. 666; 1875, II., pp. 447, 514; 1879, I., pp. 801, 841. London Med. Rec., 1876, p. 416; 1877, p. 24. Edin. Med. Journ., XII., p. 70. New York Med. Journ., IX., p. 203; V., p. 265. Amer. Journal of Med. Sc., July, 1872, p. 245. Lancet, Jan. 29, 1848, p. 137. Med. Chir. Transactions, IV., p. 204. Med. Gazette, XLVII., p. 244. Med. Times and Gazette, July 24, 1858. Centralblatt, f. d. Med. Wissenschaften, Feb. 17, 1873.**]

44. Lancet, 1879, II., p. 71.—(*Mr. G. C. Harding.*)—Menstruation at the age of 26 months, at intervals of from three to four weeks. (A similar condition occurred in her elder sister when seven years old.) (Page 25.)

50. Lancet, 1878, II., p. 110.—(*Mr. F. Harrison Tetley.*)—Menstruation commenced in a child æt. 4½. After this it occurred regularly, lasting three days, during which time she lost about 2 oz. of blood. No inconvenience. (Page 25.)

52. Med. Press and Circ., March 20, 1868, p. 245.—(*From Gazette Hebdomadaire.*) (*M. Lefebvre.*)—Girl born with hair on pubes; menstruated at the age of 4. Became pregnant when 8 years old by a carrier, æt. 37, who was afterwards sentenced to five years' imprisonment for the seduction. The pregnancy terminated in the expulsion of a mole containing a well-characterised human embryo. (Pages 25, 29.)

53.—(Pages 25, 29.)

(1.) **Med. Press and Circ., March 20, 1868, p. 245.**—(*From Gaz. Hebdomad.*) (*M. Lefebvre.*)—Became pregnant at 8. (See Case 52.)

(2.) **Lancet, April 9, 1881, p. 601.**—(*Mr. H. Dodd.*)—Became pregnant at 8 years and 10 months, and in due course was delivered of a child that weighed 7 lbs.

(3.) **Henke's Zeitschrift der S. A., 1844, p. 249.**—(*Rüttel.*) (*Quoted by Taylor*, II., p. 303.)—Cases of pregnancy at 9, 11, 13, and 14.

(4.) **Beck's Med. Juris., p. 368.**—Pregnancy in a girl under 10. Menstruated when 1 year old.

(5.) **Transylvania Journal, Vol. VII., p. 447.**—(*Dr. D. Rowlett.*)—Delivery of a girl 10 years 13 days old.

(6.) **Lancet, Dec. 13, 1873, p. 852.**—(*Mr. Macnamara.*)—Pregnancy at 10½ (an Indian).

(7.) **Robertson's Essays and Notes on Midwifery, p. 29.**—Pregnancy in 11th year.

(8.) **Louisville Med. News, Feb. 12, 1881.**—Pregnancy at 11 years 10 months (a negress). Child weighed 10 lbs. (Other cases recorded at 12 and 13.)

(9.) **Amer. Jour. of Med. Sc., Oct., 1846, p. 547.**—Pregnancy at 12. First menstruated when 11½ years old.

(10.) **Med. Times and Gazette, Jan. 25, 1879, p. 96.**—Pregnancy at 12 and 1 month, the child being born alive and full grown.

(11.) **Med. Gazette, XLII., p. 751.**—(*Taylor's Med. Juris.*, II., p. 303.) (*R. J. Chattaway.*)—Pregnancy and delivery at 12½. First menstruated when 10 years and 2 months old. First intercourse when 11 years 8 months old.

(12.) **Lancet, Aug. 5, 1876, p. 209.**—(*Mr. A. Kebbell.*)—Pregnancy at 13. Accidental hæmorrhage when 5 months pregnant. Delivery of living child at full term.

(13.) **Lancet, Sept. 19, 1874.**—(*Mr. Braden.*)—Pregnancy at 13. Had menstruated once before becoming pregnant. Child born alive and well developed.

[For other cases see "Lancet," Dec. 20, 1879 (Dr. Boyd B. Joll), at 13 years; "Lancet," April 10, 1880 (Dr. May), at 13 years 19 days; "Edin. Med. Journ.," Oct. 1861, (Dr. Wilson,) at 13½ years.]

66. Lancet, Feb., 1842.—Female æt. 25. Pregnancy before menstruation. Became regular after her confinement. (Page 28.)

[See also "Murphy's Obstetric Reports," 1844, p. 7; "Capuron Méd. Lég. de Acc.," p. 96; "Med. Gazette," Vol. XLIV., p. 969; "Med. Times and Gazette," March 12, 1853, p. 277; for case of pregnancy before menstruation in girl æt. 13. "Lancet," Sept. 3, 1853, p. 296; "Edin. Med. Journal," July, 1870; for case of pregnancy before menstruation in a girl æt. 15.]

67. Edin. Med. Journ., July, 1870.—(*Dr. James Young.*)—A series of cases recorded where pregnancy occurred in women who had menstruated not more than once or twice during the 10 or 12 years of their married life, and where during the time six or eight children had been born. (Page 28.)

68. Amer. Journ. of Med. Science, Oct., 1870, p. 568.—(Page 28.)

(1.) Case of a woman who had menstruated regularly before marriage, and also the month after she was married, but not again for nearly ten years, during which period she had given birth to six healthy children.

(2.) Case of a married woman who had menstruated regularly before marriage, and but three times only for 15 years afterwards, during which period she had borne nine children.

69. Taylor's Med. Juris., Vol. II., p. 304.—(*Mr. Pearson, of Staleybridge.*)—A lady æt. 44 had given birth to nine children. The menses

gradually ceased after the ninth child was born. Eighteen months after the *entire* cessation of the menstruation, she was delivered of her tenth child. (Page 28.)

70. Edin. Med. Rev., Vol. XIII., p. 956.—(*Dr. David Gordon.*)—A case mentioned where conception occurred six months after menstruation had ceased. (Page 28.)

71. Med. Times and Gazette, 1871, Vol. II., p. 555.—One case reported of the menstrual climacteric at 23; one at 34; and two at 53. (Page 29.)

72. Med. Times and Gazette, Nov., 1860.—Two cases of menstruation at 67. (Page 26.)

73. Lancet, 1866.—(*Mr. Whitehead.*)—A case of regular menstruation up to 77 years of age. (Page 26.)

74. Amer. Jour. of Med. Sciences, Jan., 1845.—(1.) Case where menstruation ceased at 52. It re-commenced at 62, and again ceased at 73. (2.) Case where menstruation was regular from 15 to 52. It reappeared at 60, and continued until 90. Health good. (Page 26.)

75. Med. Times and Gazette, Aug. 7, 1852, p. 148.—A woman ceased to menstruate at 45. After an illness the menstrual discharge reappeared when she was 69 years of age at irregular intervals. (Page 26.)

[The same thing happened both to her mother and sister when they were 69 and 60 respectively.]

76. Lancet, Feb. 14, 1880, p. 249.—(*Dr. Sutherland.*)—Female, æt. 59. Menstruated at 12. Married at 27, and had seven children. Was regular until she was 51, when the catamenia ceased, but returned again when she was 58. (Page 26.)

77. British Med. Jour., June 17, 1876, p. 775.—(*W. L'Heureux Blenkarne.*)—Female, æt. 82. Catamenia first appeared at 11. Married before she was 15, and had seventeen children. Ceased menstruating at 50. Recommenced at 80. (Page 26.)

78. Orfila, Méd. Légale, Vol. I., p. 257.—Was first poorly when she was 20 years of age, the catamenia continuing until she was 99. Her first child was born when she was 47, and her last (7th) when she was 60. (Pages 26, 30.)

79. New York Med. Jour., XVII., p. 336.—Menstruation *from the breasts* in a female, æt. 56, in whom normal menstruation had ceased when she was 50. (Page 26.)

80. The Douglass Peerage Case, 1767-9. — Lady Jane Douglass was married August 10th, 1746, to Colonel Stewart. She became pregnant, and the fact was notorious in January, 1748. On the 10th of July, 1748, *being in her fiftieth year*, she was delivered of twins at Paris. Of these, one (Sholto) did not live to manhood, but the other (Archibald) did. Lady Jane, after their birth, had a miscarriage. In process of time both the father and mother died. Their positive declarations had convinced the Duke of Douglass, and he left his dukedom and other estates to his nephew and their son, Archibald, who was the appellant in the case. The Duke of Hamilton opposed the claim on the ground that they were supposititious children. The cause came up for final adjudication in the House of Lords in 1769, when Lord Chancellor Camden, and Lord Chief Justice Mansfield decided in favour of the appellant. The following extracts from the decision of Lord Mansfield are interesting, both as to the age at which pregnancy is possible and probable, and as to the *resemblance of children to their parents*:— "Lady Jane became pregnant in October, 1747, at the age of forty-nine years, a thing far from uncommon, as is attested by physicians of the first rank, and confirmed by daily experience. It is further proved that the elder child, the appellant, was the exact picture of his father, and the child Sholto as like Lady Jane as ever child was like a mother. I have always considered likeness as an argument of a child's being the son of a parent, and the rather as the distinction between individuals in the human species is more discernible than in other animals. A man may survey ten thousand people before he sees two faces perfectly alike, and in an army of a hundred thousand men every one may be known from another. If there should be a likeness of features there may be a discriminancy of voice, a difference in the gesture, smile and various other things, whereas a family likeness runs generally through all these, for in everything there is a resemblance, as of features, size, attitude, and action. And here it is a question whether the appellant most resembled his father (Sir John), or the younger Sholto resembled his mother. Many witnesses have sworn to Mr. Douglass being of the same form and make of body as his father; he has been known to be the son of Colonel Stewart by persons who have never seen him before, and is so like the elder brother, the present Sir John Stewart, that except by their age it would be hard to distinguish one from the other. If Sir John Stewart, the most artless of mankind, was actor in the *enlèvement* of Mignon and Saury's children, he did in a few days what the acutest genius could not accomplish for years. He found two children, the one the finished model of himself, and the other the exact picture, in miniature, of Lady Jane. It seems nature had implanted in the children what is not in the parents, for it appears in proof that in size, complexion, stature, attitude, colour of the hair and eyes, nay, and in every other thing, Mignon and his wife, and Saury and his spouse, were *toto cælo*, different from and unlike to Sir John Stewart and Lady Jane Douglass." The House of Lords decided in favour

of the appellant, only five peers dissenting. ["Collectanea Juridica, London, 1792, Vol. II., p. 386. Beck gives further details of this peer (afterwards Lord Douglass) in a foot-note. There was an interval of 181 years between the birth of the grandfather and the death of the grandson !] (Page 32.)

81. Briand, Manuel Compléte de Méd. Légale, p. 137.—(*Halles.*)—Two cases of delivery, one at 63 and one at 70 years of age. (Page 30.)

82. Medical Gazette, Vol. XXXIX., p. 950.—(*Dr. Davies, of Hertford.*)—Pregnancy at 55, the woman menstruating up to the time of the child's birth. (Pages 30, 31.)

83. Henke's Zeitschrift, 1844, p. 251.—First pregnancy at 50, after being married for 19 years without children. Menstruation ceased two years before the pregnancy. (Pages 28, 29, 30.)

84. Cases of Early Viability. (Page 50).

Quotation.	Period of Utero-Gestation.	General Remarks.
2. *British and Foreign Med. Rev.*, Vol. II., p. 236.	4th month.	
3. *Nouv. Dic. de Méd. et Chir.*, Vol. XVI., p. 15. (M. Bailly.)	4th month.	Child lived for one hour and a-half.
4. *Obstetrical Journal*, 1873, p. 80. (Dr. J. More Madden.)	4th month.	Child lived 1 hour 25 minutes. [See *Case* 85 (1).]
5. *Journal de Medicine.*—*Med. Gazette*, Vol. XXXIX., p. 97. (M. Maisonneuve.)	4½ months.	Child lived for 6 hours. The fœtus was expelled in the membranes, from which it was removed after an interval of 2 hours, when it was found to be living. Respiration was then established.
6. *Obstetrical Journal*, 1873, p. 80. (Dr. J. More Madden.)	4½ months.	Child lived for 20 minutes. [See *Case* 85 (2).]
7. *Capuron Méd. Légale relative à l'Art des Accouchemens*, p. 157. (Paris, 1821.) Case of Fortunio Liceti.	4½ months.	Child lived to 80. [For doubts about this case, see M. Mahon, *Méd. Légale*, T. i., p. 432.]

Quotation.	Period of Utero-Gestation.	General Remarks.
8. *Med. Chir. Review*, July, 1844, p. 266. (Mr. Smythe.)	148th day.	Child lived about 12 hours. When born, the action of the heart was feeble, but the pulsation in the cord strong. It cried as strongly as a full-aged child, and swallowed some food. *Weight*, under 2lbs.; *length*, 12 in. Membrana pupillaris entire. Testicles not descended. Head well covered with hair.
9. *New York Med. Journ.*, Vol. V., p. 346. (Dr. Kennedy.) Case mentioned by Dr. Stoltz.	5 months.	Child born alive. [See *Case* 119.]
10. *Lancet*, Nov. 11, 1865. (Dr. J. D. Moore.)	5th month; calculated from the cessation of catamenia.	Child born alive, proved by its breathing and other signs of life, such as opening its mouth, etc. Measured 6½ in.
11. *Transactions of Obstetrical Society*, Vol. XIV.; p. 67. (Dr. Heywood Smith.)	5th month.	Child born alive.
12. Taylor's *Med. Juris.*, Vol. II., p. 250. (Mr. Carter, of Richmond.)	5th month.	Child lived for 30 minutes. It cried slightly at birth, and frequently tried to breathe. *Length*, 1 foot; *weight* 20½ ozs.
13. Devergie, *Med. Legale*, Vol. I., p. 228. The case of Cardinal Richelieu.	5th month.	Lived to adult age. (See *Case* 89.)
14. *Medical Gazette*, Vol. XL., p. 1022. (Dr. Davies, of Hertford.)	5th month.	The child showed certain signs of life such as moving its limbs.
15. *Lancet*, Oct. 8, 1870, p. 525. (Mr. Newington.)	5th month (Twins.)	One child lived for 20 minutes, during which time it cried. (*Weight*, 1 lb. 3½ ozs.; *length*, 11½ ins.) The other breathed for 15 minutes, although pulsations could be felt for 5 minutes after respiration had ceased. (*Weight*, 1 lb.; *length*, 11 ins.)
16. Henke's *Zeitschrift der S. A.*, 1844, p. 241. (Dr. Rüttel.)	5th month.	Lived for 24 hours.

Quotation.	Period of Utero-Gestation.	General Remarks.
18. *Med. Times and Gazette*, April 25, 1874, p. 465. (Dr. Edis.)	5 months and 10 days (reckoned from last catamenial period).	Child cried loudly when born, and lived for 44 hours. Had to be fed with a spoon. Great difficulty found in keeping it warm. It passed meconium, but no urine. The eyelids were perfectly closed. *Weight*, 1¼ lbs. *Length*, 11 inches.
19. *Med. Times*, Sept. 1850, p. 259, and Oct. 12, p. 392. (Dr. Barker, of Dumfries.)	158th day. (5⅓ months.)	*Weight*, 1 lb. *Length*, 11 in. The appearance of the child coincided with its alleged uterine age. It sucked after a month, and was able to walk at 19 months. When 3½ years old it was healthy and thriving, although small.
20. *Med. Gazette*, Vol. XIX., p. 165.	Between 5th and 6th m.	Child lived between 3 and 4 hours.
21. *Obstetrical Transactions*, 1872, Vol. XIII., p. 132. (Dr. Routh.)	Between 5th and 6th month.	Child lived for 18 days. It was small and weakly.
22. *R.* v. *West*, Nottingham Lent Assizes, 1848.	Between 5th and 6th mth.	Child lived for 5 hours. (Case of criminal abortion.)
23. Case mentioned in evidence in the Jardine case. (Dr. Christison.)	167 days.	Child lived for 8½ hours.
24. Henke's *Zeitschrift*, Vol. VI., p. 12. (Fleischmann.)	168 days.	Child lived for 8 days.
25. *Lancet*, Nov. 28, 1874. (Dr. Charles Carter.)	172 days (from date of marriage.)	Child lived 21 hours. *Weight*, 1 lb. 6 ozs. *Length*, 12 in. (See *Case* 90.)
26. *Lancet*, April 23, 1842, p. 119. (Mr. Tait.)	180 days (5 months 27 days).	Child lived for 4 months.
27. *Med. Times and Gazette*, July 3, 1880. (Quoted from *New York Med. Rec.*) Dr. J. H. Moore.	End of the 5th month.	The child at birth weighed 1½ lbs. Length, 9 in. When 15 months old it was healthy, and weighed 19 lbs.
28. *Med. Times*, Feb. 16, 1850, p. 129.		
29. *Obstetrical Journal*, 1873, p. 80. (Dr. T. More Madden.)	6th month.	The child was born alive, but died the same night. [See *Case* 85 (4).]
30. Ditto, ditto.	6th month.	The child died the following day. [See *Case* 85 (5).]
31. *Dublin Quarterly Journal*, May, 1846, p. 563 (Dr. Halpin, of Cavan)	6th month.	Weight (4th day), 2 lbs. 13 oz. (34th day), 3 lbs. 7 oz. (4 months), 8 lbs. 8 oz.

Quotation.	Period of Utero-Gestation.	General Remarks.
32. *Henke's Zeitschrift der S. A.* (Dr. Ruttell.)	6th month (twins).	One child lived for 3 hours. There was no perceptible respiration, but merely pulsation of the heart.
	6th month (twins).	Both children were alive and healthy a year after birth.
33. *Archiv. de Tocologie*, Dec., 1879. (Prof. Bailly.)	6 months 20 days, estimated from cessation of catamenia.	Weighed on the 13th day 1250 grammes (2 lbs. 12 ozs.). It took the breast at the end of a week. Was ultimately reared.
34. *Med. Times*, Sept. 9, 1848, p. 304. (Mr. Annan, of Kinross.)	6th month, or a little over.	The child lived for 4 months 8 days. Weight when 7 days old 1½ lbs.
35. *Jahrbuch*, III., p. 128. (Kopp.)	182 days.	The child lived for 4½ days.
36. *Beitrage*, II., p. 104. (Bucholtz.)	189 days.	The child lived for 2 days.
37. *Lancet*, Aug. 23, 1851, p. 177.	6 months 10 days.	The child was reared.
38. *Montgomery*, p. 515.	6 months 10 days.	The child was alive when born.
39. *Obstetrical Journal*, 1873, p. 80. (Dr. T. M. Madden.)	195 days.	The child lived for 6 hours. [See *Case* 85 (3).]
40. *Montgomery*, p. 514.	198 days (6 months 2 weeks).	
41. *Calcutta Med. Times*, Vol. I. (1825).	6½ months.	The child when 50 days old weighed 1 lb. 13 oz.; length, 14 inches. Sucked freely.
42. *Méd. Lég. des Acc.*, pp. 162, 208. (M. Capuron.)	6½ months.	The child was 2 years old when the case was reported, and at that time was in good health.
43. Ditto.	6½ months.	The child lived for 10 years.
44. *Taylor's Med. Juris.*, II., p. 251.	6½ months.	The child lived 14 days.
45. *Med. Gazette*, Vol. XXXII., p. 623.		
46. *Montgomery* (Mr. Piridon), p. 515.	198 days (6 months 16 days.)	The child lived 11 days.
47. *Montgomery*, p. 514.	200 days (6 months 18 days.)	The child lived for 13 years.
48. *Henke's Zeitschrift*, Vol. VI. *Med. Chir. Review*, Vol. XXXI., p. 438. (Dr. Outrepont, of Bamberg.)	27 weeks.	*Weight*, 1½ lbs. *Length*, 13½ in. The child breathed as soon as born. When 11 years old was the size of an average boy of 8.

85. Obstetrical Journal, 1873, p. 80.—Paper on the early viability of the fœtus in premature deliveries.—(*Dr. T. More Madden.*)—Cases recorded :—

(1.) Æt. 30 (1st pregnancy). Believed herself to be 4 months pregnant when labour occurred. Had not quickened. Drs. Madden and Denham both believe that the duration of gestation did not exceed the commencement of the fifth month.

The child (female) breathed for 1 hour 25 minutes, during which time it cried.

P.M.: Length, 8 in.; weight, 9 ozs.

Membrana pupillaris distinct. Nails unformed. Skin of a bright red colour.

Lungs *en masse* sank in water, but portions of the upper lobes floated.

The F. ovale and D. arteriosus were both open.

(2.) Æt. 32 (6th pregnancy). Was not more than 4½ months pregnant when the child was born. Child (male) lived for twenty minutes.

(3.) Æt. 26 (4th pregnancy). Believed to be 195 days pregnant when confined. Child (male) lived six hours.

(4.) Æt. 19 (1st pregnancy). Child (female) born alive at the sixth month, but died the same night.

(5.) Æt. 32 (5th pregnancy). Delivered of a male child weighing 1 lb. 10 ozs., at the sixth month. The child died the following day.

86. Med. Gazette, Vol. XVII., p. 92.—Med. Chir. Review, Vol. XXXI., p. 424.—In the famous *Jardine* case, the parishioners of Kinghorn, in Scotland, brought an accusation of incontinency against the Rev. F. Jardine. Mr. Jardine was married on March 3rd, 1835, and on the 24th August (five calendar months and twenty-one days, or 174 days after marriage), a daughter was born, who survived till the 20th March, 1836. The enquiry lasted from 1835 to 1839, and in the end the ecclesiastical court (General Assembly of the Church of Scotland), pronounced the libel "not proven," thus deciding in favour of the legitimacy of the infant. (Page 51.)

87. A still earlier case (occurring about the year 1710) of a similar kind is reported, in which the Rev. Thomas Elder, minister of Whithorn, in Scotland, was deprived of his clerical functions in consequence of a living child having been born within five months of his marriage. This sentence was afterwards reversed, partly on account of his personal character, and partly on a certificate signed by the celebrated Doctors Pitcairn, Preston, and Drummond, who declared "that for a child born at the beginning of the sixth lunar month to be alive and continue in life is consistent with our observation and experience." Edinburgh. May 12, 1710. (Page 51.)

88. Quoted from Taylor, II., p. 229.—The Hon. Arthur Cole Hamilton, second son of the first Lord Mountflorence, married, in 1780, Letitia, daughter of Claudius Hamilton. A son was born on July 7, 1781, who lived

to maturity, and a daughter, Letitia, on January 5, 1782, who lived and married Major Stafford. Between the two deliveries there was an interval therefore of 182 days only. If we assume fourteen days before prolific intercourse, then the period of utero-gestation for the second child is only 168 days or 24 weeks, *i.e.*, a little over five and a-half months. (Page 51.)

89. Devergie, Med. Légale, I., p. 228.—Case of Cardinal Richelieu, who was born at the fifth month of utero-gestation, and was declared legally viable by the Parliament of Paris. (Page 50.)

90. Lancet, Nov. 28, 1874.—(*Dr. Charles Carter.*)—Pregnancy lasting 172 days, dated from the time of marriage. The fœtus weighed 1 lb. 6 oz., and its length was 12 inches. It was of a dark red colour, and had an abundance of hair on the head, and down on the cheeks. It lived for 21 hours, and cried loudly several times. It passed both urine and meconium. It took a little milk and water. The nails were well formed and reached the ends of the fingers. The eyelids were agglutinated together, and on tearing them open, the pupillary membrane was distinctly visible. The right lung and the upper lobe of the left lung were perfectly expanded. The testes were between the kidneys and the internal ring. There were centres of ossification in the first three pieces of the sternum, and one in the os calcis, but none in the astragalus. (Dr. Carter says the fœtus was not more than six months, if so far advanced.) (Page 50.)

[A case mentioned (p. 765) by Dr. Brodie, of a six-months' fœtus, living five hours, and both crying and swallowing. Also one by Dr. Wiltshire (p. 765), of a case of twins born at the fifth month, where one lived three or four, and the other twenty-four hours.]

91. British Med. Journ., Nov. 9, 1872, p. 532.—(*Dr. Turner Anderson, of Louisville.*)—(1.) Pregnancy in a woman æt. 51. Child (still-born) born at full term. The woman had been confined seven years previously, and had menstruated regularly since.

(2.) (*Dr. Speed.*)—Case of pregnancy in a woman æt. 53, whose youngest child was 9 years of age. (Pages 30, 31.)

92. British Med. Journ., Nov. 16, 1872, p. 570. (From "*Cincinnati Inquirer.*")—Pregnancy in a female æt. 69. Child healthy and mature (male). The father was 74 years old. (Pages 12, 30.)

93. Lancet, 1867, I., p. 727.—Woman, æt. 62, delivered of triplets. (Pages 30, 32.)

94. London Med. Gaz., Vol. XXXIX.—(*Dr. Davies, of Hertford.*)—Pregnancy at 55. (Page 30.)

95. Philadelphia Med. Times, Dec. 12, 1875.—(*Dr. Fordyce Barker.*)—Pregnancy at 51 and again at 52 in the same woman. (Page 30.)

96. Lyon Méd., June 8, 1873.—(*Dr. Meynert.*)—The case of a lady who had four children, the first when she was 40, the second when 48, the third when 51, and the fourth when 56 years of age. (Page 30.)

97. In re Widdow's Trust (40, *L. J. Rep., N. S.* 380).—Vice-Chancellor Malins made an order for payment to two ladies, one being over 55, and the other 53 and 8 months (single) entitled absolutely, subject to the contingency of having children.

[In the case of *Forty v. Reay*, 1 *D. V. & P., p.* 320 (Ed. 4) (Feb., 1853), Vice-Chancellor Kindersley acted on the presumption that no child was likely to be born of her, the lady at the time being 53. Although she was unmarried, security was nevertheless taken for repayment in the event of her having lawful issue.] (Page 29.)

98. Conduitt v. Soame.—Vice-Chancellor Wickens declined to act upon the presumption that a lady at 53 would not have a child. (Page 29.)

99. New Orleans Med. and Surg. Journal.—(*Dr. Pettitt.*)—(Quoted in "*Med. Press and Circ.*," June 20, 1877.)—A negress, æt. 35, had had nineteen full-term children and one four-months' fœtus. The woman had two nipples on each breast. (Page 31.)

100. British Med. Journ., 1880, II., p. 374.—(*Dr. Mapother.*)—Sterility in a female, æt. 28, due to an anomalous membrane (congenital) crossing the vagina at right angles about three inches above the carunculæ myrtiformes. It had an aperture two lines in diameter above the centre of the os. The membrane was removed and conception resulted. The organs generally were normal. (Page 35 *note.*)

101. British Med. Journ., 1875, II., p. 7.—(*Dr. Heywood Smith.*)—Case of sterility, due to anteflexion of uterus and constriction of the internal os, cured in a woman æt. 29, who had been married for six years. (Page 36.)

102. Lancet, June 23, 1877, p. 911.—(*Dr. George Roper.*)—Pregnancy in a female, æt. 36, after thirteen years' sterility. She had suffered during this period from dysmenorrhœa. (Page 35 *note.*)

103. Hyrtl, Handbuch der top. Anatom. (Quoted in Holden's "*Anatomy.*")—Instances are recorded where the neck of the uterus projects preternaturally, even to the extent of 1½ inches, into the vagina. In such cases it usually tapers and terminates in a very narrow mouth. In support of the opinion that this may be the cause of sterility, Dupuytren cites a case where an abnormally long neck was removed by operation, the result being that the woman, who up to this time had been barren, became pregnant (Page 34.)

104. Lancet, June 26, 1882.—(*Mr. E. D. McNicoll.*)—Female, æt. 22 Left ovary removed for an ovarian tumour, on March 13, 1881, 2 months

and 16 days after her second confinement. The menstrual flow did not re-appear after the operation, but on Nov. 29, 1881, she gave birth to a seven months' fœtus (stillborn). (Pages 19, 33.)

105. Allg. Wiener Med. Zeitung, Sept. 7, 1880.—(*Dr. Keppler.*)—Case of a third ovary. (Page 33.)

106. Lancet, April 18, 1874, p. 546.—(*Mr. Murrell.*)—Case of pregnancy lasting 280 days, resulting from a single intercourse. The woman quickened on the 106th day (15 weeks 1 day). (Page 47.)

107. Lancet, Oct. 2, 1875, p. 512.—(*Dr. W. T. Greene.*)—Pregnancy following a single coitus. Duration of pregnancy 265 days. The coitus was on the ninth day after the monthly period had commenced. (Page 47.)

108. Lancet, May 2, 1874, p. 643.—(*Mr. Clement Walter.*)—Two cases of pregnancy lasting 272 and 286 days, the times being fixed by definite circumstances. (Page 47.)

109. Cases of Protracted Utero-Gestation. (Page 66.)

Reference.	Authority.	Period of Utero-Gestation.	Mode of Reckoning.
1. *Med. Gazette*, Vol. XXXI., p. 917.	Dr. Lee.	287 days (41 weeks).	From the departure of the husband for the West Indies.
1a. *Med. Gazette*, Vol. XIX., p. 646.	Dr. Montgomery.	Between 42 and 44 weeks.	
2. *Lancet*, 1850, Vol. II., p. 79.	Dr. Reid.	287 days.	From a single intercourse.
3. Evidence given in the *Gardner Peerage Case.*	Dr. Blundell.	287 days.	Not stated.
4. *Dewees' Midwifery*, p. 170. (*Montgomery*, p. 542.)	Dr. Dewees.	287 days (41 weeks).	From a single coitus.
5. *Montgomery, Signs and Symptoms of Pregnancy*, p. 547.	Dr. Patton.	291 days.	From a single coitus.
6. *Dublin Med. Journal, Sept.*, 1835, p. 78. (*Montgomery*, p. 548.)	Dr. Beatty.	292 days.	From a single coitus.
7.	Mr. Skey.	293 days.	
8.	Dr. McIlvan.	293 days.	
9. *Lancet*, 1850, Vol. II., p. 79.	Dr. Reid.	293 days.	From a single coitus.

Reference.	Authority.	Period of Utero-Gestation.	Mode of Reckoning.
10. *Lancet*, Vol. V., N.S., p. 418, recorded by Dr. Granville. (See *Dict. de Méd., Tome* X. p. 462.)	Professor Desormeaux	294 days.	From date of coitus.
11. (See Case 112.)	Anderton *v.* Gibbs (V.C. Court, 1834.)	294 days.	From last coitus.
12. *Taylor*, II., p. 26.	Mr. Howell.	295 days (42 weeks 1 day).	Delivery occurred 323 days from last appearance of menses. Deduct from this 28 days =295 days.
13. *British Medical Journal*, 1876, I., p. 505.	Dr. Lee Strathy.	298 days.	Reckoned from the date of the last coitus.
14. *Exeter Assizes*, 1840. (See Case 114.)	Luscombe *v.* Prettyjohn.	299 days.	From date of access.
15.	Dr. Ashwell.	300 days.	
16.	Prof. Simpson.	300 days.	
17. Case 182 in *Report on Obstetric Practice of Univ. Coll. H.*, 1844.	Dr. Murphy.	301 days (43 weeks).	Delivery occurred 329 days from last appearance of menses. Deduct 28 days = 301 days.
[*Other cases also*	*recorded by*	*Dr. Murphy of*	314, 323, *and* 324 *days.*]
18. Cases recorded in evidence during the *Gardner Peerage Case.*	Dr. Merriman.	303 and 309 days.	From the last day of last menstrual period.
19. *Boston Med. and Surg. Journal*, March 30, 1876, p. 516.	Dr. F. T. Graves.	306 days.	Mother æt. 17. First pregnancy. Time reckoned from date of last coitus. Certain premonitory symptoms occurred at the end of 9 months. Male child. Weight 10½ lbs.
20. Case recorded in evidence at the *Gardner Peerage Case.* (See *Beck, Med. Juris.*)	Dr. Granville.	306 days.	From the day before the next expected menstruation.

Reference.	Authority.	Period of Utero-Gestation.	Mode of Reckoning.
[*Other cases also given of* 290, 300, *and* 315 "*Lancet*," *Vol. V., p.* 418.)]		(? 310) *days.* (*See*	
21. (See Case 113.)	Renouf *v.* Eden.	307 days.	From date of intercourse.
21*a*. *Am. Jour. Med. Sc., July*, 1845.	Dr. Hedrich.	309 days.	From date of intercourse.
22. *Traité des Accouchements*, T. I., p. 383.	Velpeau.	310 days.	From time of quickening.
23. (See Case 110.)	Gardner Peerage Case, [House of Lords, 1825.]	312 days.	From date of coitus.
24. *Dublin Med. Press*, Nov. 4, 1846. (See Case 116.)	Commonwealth *v.* Horner.	313 days.	From date of coitus.
25. Quoted from *Dublin Quarterly Journal of Med. Science.*	Dr. Joynt.	317 days.	
26. *Amer. Jour. of Med. Sciences*, Oct. 1845. (See Case 115.)	Commonwealth *v.* Porter.	317 days.	From date of coitus.
27.	Prof. Simpson of Edinburgh.	319 days.	
28.		324 days.	
29. *Med. Times and Gazette*, Dec. 29, 1877, p. 712. (See Case 118.)	Mr. Duncan.	325 days.	
30. *Edin. Med. Journal*, XIII., p. 956.	Dr. Young.	326 days.	From the disappearance of the catamenia. Child born 201 days from the time of quickening.
31. *Taylor*, II., p. 262.	Mr. Chattaway.	330 days (47 weeks).	Deducting 28 days from last appearance of menses.
32.	Prof. Simpson, of Edinburgh.	332 days.	
33.		336 days.	
34. (See Case 117.)	Dyson *v.* Dyson (V. C. Court, Feb. 18, 1852.)	336 days.	From date of husband leaving home.
35. *Lancet*, 1873, I., 293.	Mr. Carey.	350 days.	
36.	Dr. Atlee.	356 days.	

Reference.	Authority.	Period of Utero-Gestation.	Mode of Reckoning.
37. (See Case 111.)	Cotterall *v.* Cotterall (Consistory Court, 1847).	12 months.	From period of husband leaving home. Claim disallowed.
38. *Naphey's Physical Life of Women*, p. 168.	Prof. Charles D. Meigs, of Philadelphia.	420 days (60 weeks.)	

110. House of Lords, 1825.—(*The Gardner Peerage Case.*)—Captain (afterwards Lord) Gardner, married Miss Adderley in 1796. They lived together as man and wife until January 30, 1802, on which day Mrs. Gardner parted from her husband on board ship. Shortly after this, he sailed to the West Indies, but returned to England on July 11. Before and during his absence, Mrs. Gardner carried on an adulterous connection with Mr. Henry Jadis. On her husband's return, she was found with child, and expecting to be delivered in due time, made no secret of it. The time when she expected to be confined passing by, she professed herself to be, and was considered, dropsical. On the 8th December, however, she was secretly delivered of a son, in the presence of three witnesses. The existence of this child was concealed from Captain Gardner, who only discovered his wife's adultery in 1803. They were divorced, and he married again in 1809. But in the year 1808 he succeeded to the title, and died in 1815, leaving a son by his second marriage, who in 1824 petitioned the king to be entered on the Parliament roll as a minor peer. The son of the first and divorced wife, who claimed to be the eldest son of Lord Gardner, though he went by the name of Henry Fenton Jadis, and was born 312 days (or ten calendar months and nine days) after Captain Gardner had left England, now opposed the claim of the son of the second wife, and claimed the peerage himself. The case in the long run was not decided on its merits, that is so far as relates to the protracted gestation, but on the ground of the wife's adultery, and the concealment of the birth of the first child. (Pages 66, 69.)

[Dr. Taylor's Medical Jurisprudence (Vol. II., p. 267), and Dr. Montgomery's work on the Signs and Symptoms of Pregnancy, contain fuller accounts of this trial. The medical evidence was published *in extenso* by Dr. Lyall, in 1827.]

(See also Beck's Med. Juris.)

111. Cotterall v. Cotterall (*Consistory Court*, July, 1847).—In this case a child was born during the marriage. A divorce was sought on the ground

that if legitimate it must have been a 12 months' child, the husband having been absent from his wife during that period. Divorce granted. (Pages 66, 69.)

111a. Foster v. Cook.—(3 *Brown's Rep., Edw.*, p. 347.)—Child born 43 weeks after the death of the father declared legitimate. (Pages 66, 69.)

112. Anderton v. Gibbs (*V. C. Court*, 1834).—Legitimacy of a child born 10 months (42 weeks) after the last intercourse with the husband allowed, although since that time the wife had been living in adultery, and during the two years of cohabitation with the husband there had been no family. The Vice-Chancellor stated that the jury were not to decide by whom the child had been begotten, but whether it could possibly be the child of the husband. (Pages 66, 69.)

113. Renouf v. Eden. For details see **Med. Times and Gazette, 1870, I., p. 290.**—(*Queen's Bench, Feb.*, 1870.)—Action for seduction. A child was born 307 days (or 44 weeks, minus one day) after the possibility of intercourse occurring between the parties.

Verdict for the plaintiff. The case, however, was not decided on the medical evidence, but on the ground that the plaintiff was entitled to damages, because he had induced the child to leave her mother's roof and had then seduced her. (Pages 66, 67, 69.)

114. Luscombe v. Prettyjohn.—(*Exeter Summer Assizes*, 1840.) **Lancet, August, 1840.**—This was an action for damages for seduction. The child was born on the 5th December, 1838, the last meeting being 299 days before the birth. On this ground the defendant disputed the paternity, and the judge summed up in his favour. The jury, however, did not concur in this view, and returned a verdict for the plaintiff, thus pronouncing an opinion that the defendant might have been the father of the child. (Pages 66, 69.)

115. Commonwealth v. Porter (Cambria County, Pa.). *Amer. Journ. Med. Sciences, Oct.* 1845.—The defendant was indicted for fornication and bastardy. The prosecutrix, aged twenty-three, stated that she had had intercourse with the defendant on the 24th September, 1842, and with no other person before or subsequently. She was delivered of a child on the 7th August, 1843, *i.e.*, after 317 days' (=forty-five weeks and two days') gestation. She swore that the defendant was the father of the child. The menses ceased about three weeks after intercourse, and only appeared again slightly about five weeks before the child was born. At this time she had pains which continued more or less until delivery. She first knew that she was pregnant three or four weeks after intercourse. Defendant relied on the length of gestation, and therefore merely proved his absence, admitting her statement of date. The court and jury both took the view that protracted gestation was probable — and found defendant

to be the father of the child. One of the jurymen said his own wife had gone ten months with one child. (Pages 66, 69.)

116. Commonwealth v. Hooner.—(Tried in May, 1846, in the United States. Reported by Dr. Taylor, p. 269. See also "Dublin Med. Press," Nov. 4, 1846.)—The alleged duration of pregnancy in this case was 313 days. The last intercourse was alleged to have taken place on March 23rd, 1845. The child, a large, healthy male, was proved to have been born on the 30th January, 1846. The medical evidence was conflicting. Twelve obstetric physicians were examined. The Court decided that, although unusual and improbable, this length of gestation was not impossible, the jury returning a verdict that the defendant was the father of the child. (Pages 66, 69.)

117. Dyson v. Dyson.—(*Vice-Chancellor's Court, Feb.* 18, 1852. Reported by Dr. Taylor. See also "Legal Examiner," Feb. 21, 1852.)—In this case the husband left his wife in Madeira in February, 1849. She returned to England in the following August. The child whose legitimacy was disputed, was born on January 8, 1850. In this instance the period of gestation was alleged to be 336 days. The Vice-Chancellor, having referred to the Gardner Peerage case, declined to make a decree in favour of the legitimacy of the plaintiff. (Pages 66, 69.)

118. Med. Times and Gazette, Dec. 29, 1877, p. 712.—(*Mr. Duncan.*)—A case of pregnancy lasting 325 clear days, reckoned from the last day of menstruation. The woman's bulk when confined was enormous, and the child of more than usual size and weight. In three previous pregnancies, it was said that she had carried the children 300 days in one case, and 285 days in the other two cases. (Page 69.)

119. New York Med. Journ., V., p. 346.—(*Dr. W. Kennedy.*)—Primipara.—Fœtus alive when born. Measured eight inches. It was "as red as a piece of raw beef." Eyes closed. Chest two inches broad. Respiration feeble, and it uttered no sound. Fed drop by drop with milk. The child grew to be a fine boy.

(Case referred to, recorded by Dr. Stolz, where a child born at the fifth month as the result of criminal abortion, measured six inches, and lived one hour and 40 minutes.)

120. Amer. Journ. of Med. Sc., October, 1874.—A primipara delivered of a well-formed seven months' child weighing 1¾lbs. When three months old it weighed 3¼ lbs.

121. Amer. Journ. of Med. Sc., Vol. LXVIII., p. 575.—(*Dr. Mursick.*)—Primipara; child (male) born at the seventh or eighth month of pregnancy, and weighed 1¾ lbs. It was healthy and well formed, and had to be

fed by the bottle, the mother having no milk. When three months old, it was thriving, and weighed 3¼ lbs. (Page 55.)

122. Med. and Surg. Reporter, New York, April, 1875.—(*Dr. Blake.*)—Child 48 hours after its birth measured 23½ inches in length, 13½ inches around the chest, and 7 inches around the thigh. The cranial bones were well ossified. (Page 55.)

[See "Med. Times and Gazette," Aug. 4, 1868. Report by Dr. Meadows of a new born child weighing 18 lbs. 2 ozs. and measuring 32 inches.]

123. Med. Press and Circ. Feb. 5, 1879.—(*Dr. Perrins, of Boston, Mass.*)—Female æt. 27, primipara. Child born weighed 19¾ lbs., and measured 25¼ inches. (Page 55.)

124. Med. Press and Circ., April 30, 1879.—Child of the Nova Scotia Giantess (Mrs. Capt. Bates) weighed 23¾ lbs.;—height 30 inches. (Page 55.)

125. British Med. Journ., Jan. 4, 1879, p. 12.—(*Dr. Hunter Mair.*)—Male; stillborn. Weight 16lbs.; length 2 feet 2 inches; measured 14¼ inches round chest. Mother æt. 36; eleventh child. (Page 55.)

126. British Med. Journ., Jan. 4, 1879, p. 12.—(*Dr. Bradley.*) (Page 55.)

(1.) Male child; living. Weight 13·5 lbs.

(2.) An anencephalous fœtus. Weight 15·5 lbs.; length 21¾ inches.

127. British Med. Journ., Feb. 1, 1879.—(*Mr. Chubb.*)—Child at birth weighed 21 lbs. (Page 55.)

128. Lancet, March 13, 1847, p. 336.—Two men, A and B, had frequent intercourse, unknown to each other for some years, with a young woman in delicate health. In course of time she was delivered of a female child, 279 days after intercourse with A, and 271 days after intercourse with B, giving eight days between the two acts of coitus. She did not menstruate in the interval, and is believed to have had no other intercourse. After her death the two men became aware of the mixed intercourse, and each refused to maintain the child. The child was remarkably like the mother, but showed no special resemblance to either of the men. It is clear, as Dr. Taylor remarks, that there were no medical grounds for affiliating the child on one rather than on the other, as both periods were within the ordinary range of gestation. (Page 70.)

129. R. v. Skepelhorne and Wife.—(*Central Criminal Court, February, 1870.*)—("*British Med. Jour.*," 1870, I., p. 88.)—The prisoners were charged with conspiring to deceive a man named Ironside, by falsely representing that his wife had given birth to a female child. Mrs. Ironside, who had been married about nine months, was in collusion with the prisoners. The child of another woman was secured, and the nurse obtained a "sheep's

pluck" (which they afterwards burnt!) to represent the after-birth. Dr. Taylor justly says that medical men must not consider all stains or marks of blood on bedding in a room as conclusive proof of delivery! [In his charge to the Jury, Mr. Justice Byles remarked on the enormity of such a crime, where large estates and the rights of legitimate heirs were concerned. He thought, however, Mrs. Ironside did it mainly to please her husband! The prisoners were convicted.] (Page 73.)

130. Ann. d'Hyg., 1847, I., p. 463.—A case is recorded where a married woman, æt. 42, deaf and dumb, simulated being pregnant for six months, and at last asserted delivery. She procured a child for her false accouchement born a few days before. The object in the deception was to deprive the heir at law of property to which he was entitled if she died childless. (Page 73.)

[See also the case of Hutchins *v.* Hutchins, V. C. Court, 1851.]

131. Med. Jur. for India, p. 512.—(*Dr. Chevers.*)—An Indian midwife, (Mussarnat Janoo,) took away a woman's child, and pretended to lie in herself. The midwives and the civil surgeon who examined her, declared that she presented no sign of recent delivery. She was sentenced to seven years' imprisonment. (Page 73.)

132. R. v. Mary Hall.—(*Reported by Dr. Taylor, p.* 233.) (*C. C. C., December*, 1870.)—The prisoner conspired with a woman to make it appear that the latter had been delivered of a child. The nurse was not allowed to be present during the alleged delivery—the prisoner acting as midwife. The nurse was then called in, and shown by the prisoner marks indicating a recent delivery. On proceeding to wash the child, however, she found that this had already been done, and that it was not a newly-born unwashed child. It was proved that the prisoner on this very day procured a child from another woman. Dr. Farre said he attended the woman after the alleged birth, and from what he saw he was sure that she had never given birth to a child. The prisoner was convicted. (Page 73.)

133. The Wicklow Peerage Case.—(*Committee for Privileges, April* 1, 1870. Reported by Dr. Taylor.)—The title and estates of the Earl of Wicklow passed at his death to his brother's issue. The first in succession was George Howard, who, after a career of dissipation, died in October, 1864. He had been married in February, 1863, to Ellen Richardson, a coachman's daughter. In default of issue the estates devolved on his brother Charles, the second in succession. Ellen Howard (née Richardson), produced a male child, born, she alleged, on the 16th May, 1864, and who, if such were the case, would be the son of her husband, George Howard, and the rightful Earl. Mrs. Howard was at that time living in lodgings, and the lodging-house keepers, Mr. and Mrs. Bloor, and a sister of the latter, one Rosa Day, were the principal witnesses in favour of the

claimant. Mrs. Howard was, or professed to be, taken suddenly ill on the date mentioned. Mr. Bloor went for a doctor, who was not at home. On returning, he was told that Mrs. Howard had been confined, and he saw an infant in Rosa Day's arms. This was the whole of the evidence for the child's parentage. The Lord Chancellor observed that the evidence was given by the witnesses with a firmness of demeanour, and an absence of hesitation which would have commanded credence, unless it had been contradicted by all the surrounding circumstances. No medical man, and no nurse attended Mrs. Howard, although it was her first confinement, and the infant would have been a seven months' child. It was neither registered nor baptized. There was further strong evidence that she had not borne a child, and that the child she had produced as her own, was obtained by her from a girl who had been recently delivered in the Liverpool workhouse. Mrs. Howard was clearly identified as the person who had taken away a child from the workhouse about this time. Her story was thus proved to be false. The House of Lords decided against the claim, and came to the conclusion that the witnesses had been guilty of perjury (Page 73.)

134. Gedney v. Smith.—(*Roll's Court, November*, 1864. For details refer to Dr. Taylor, *loc. cit.*, p. 234.)—Two medical men attended Mrs. Gedney for a recent confinement. It appeared from the subsequent post-mortem examination (four years afterwards) that she had never been pregnant at all! (Page 73.)

135. British Med. Journ., Feb. 14, 1880, p. 241.—(*Dr. T. A. G. Balfour*).—Dr. B. attended a Mr. X. at his death. Two months afterwards he was sent for to see Mrs. X., and was given to understand (a nurse being in the room at the time with an infant in her arms), that she had been confined. He was told that the child had been born at 5 p.m. the previous evening, before the nurse had arrived. She explained she had not sent for the doctor because it was a rough night, and that a neighbour had waited on her. The chemise was well stained with blood. On examination, however, it was evident that she had never given birth to a child. Further, the age of the child did not correspond to the time of its supposed birth. She confessed at last that it was not her child. An after-birth had been sent to her along with the child shown, in order to make the case appear the more real. The object of the deception was to acquire property which otherwise would have gone to her husband's relatives. (Page 73.)

136. Stagg v. Edgecombe.—(9 *Jur., N.S.*, 698.)—It was decided that incapacity to consummate a marriage, is no ground for a decree of nullity, unless the incapacity is permanent. If there is a possibility of its cause being cured, the Court will not pronounce a sentence of nullity, although such cure may be highly improbable. (Page 7.)

137.—Williams v. Homfray.—(30 *L. J., M. C.*, 73.)—In this case the result of the medical evidence proved that the malformation might possibly, but at great risk to life, and with doubtful success as to the end desired, be removed. It was decided that the petitioner need not call upon the respondent to submit to an operation of this nature, and that such a state of things is equivalent to a permanent and immovable malformation. (Page 7.)

138. L. v. L.—(*L. R.*, 7, *P. Div.*, 16.)—In this case, after a partial cohabitation of two years and eight months, it appeared that the woman was impotent, but that she might possibly be cured if she would submit to an operation involving no great risk of life. This she refused to do. The Court made a decree *nisi*.

Sir J. Hannen said: "The difficulty might perhaps be overcome if the lady would undergo an operation which would probably be successful. But the Court cannot compel her to submit, and the man can only be expected to take all reasonable means to persuade her. This he has done, and she has distinctly refused." (Page 7.)

139. G. v. G.—(*L. R.*, 2 *P. and D.*, 287.)—The ground of the interference of the Court in cases of impotence is the *practical impossibility* of consummation.

In this case, where the parties had cohabited for two years and ten months, and the man's capacity and desire to consummate were not questioned, the Court being satisfied of the *bona fides* of the suit, and of the practical impossibility of consummation in consequence of the hysteria of the woman, pronounced a decree of nullity, although there was no structural defect in the woman.

Lord Penzance remarked: "The invalidity of the marriage, if it cannot be consummated on account of some structural difficulty, is undoubted; but the basis of the interference of the Court is not the structural defect, but the impracticability of consummation. If, therefore, a case presents itself, involving the impracticability (although it may not arise from a structural defect), the reason for the interference of the Court arises. The impossibility must be practical. It cannot be necessary to show that the woman is so formed that connection is physically impossible, if it is shown that it is possible only under conditions to which the husband would not be justified in resorting . . . . . If not, what is he to do? He had his wife examined by the most eminent medical men in the kingdom, and they recommended certain remedies. These remedies have been tried, not under the most favourable conditions, but under conditions as favourable as it can be expected that they ever will be tried. I see nothing in the evidence tending to show that if they were to resume cohabitation to-morrow, there would be any difference in the state of things that has existed for the two years and ten months of the previous cohabitation." (Pages 8, 41.)

140. H. v. P.—(*L. R.*, 3 *P. and D.*, p. 126.)—In a suit for nullity of marriage it appeared from the husband's evidence that whenever he attempted to have intercourse with his wife, the act had produced hysteria on her part; and that, although he had cohabited with her for more than three years, the marriage had never been consummated. The wife refused to submit to inspection. Decree *nisi* granted.

Sir J. Hannen said: "The rule appears to be this: the impediment in way of intercourse must be physical, and it must not arise from the wilful refusal of the wife to submit to her husband's embraces. Here, however, the hysteria made it practically impossible for the husband to consummate the marriage, and in the absence of any counter-statement, the husband is entitled to a decree." (Pages 8, 41.)

141. S. v. E.—(3 *Sw. and Tr.*, 240.)—A woman married E. on the 22nd of July, and lived with him till the 23rd of September. She petitioned for a decree of nullity, on account of his inability to consummate the marriage. E. did not appear, but had submitted himself to medical examination. The report negatived any apparent or incurable defect on his part, but ascribed the non-consummation to incapacity caused by a long-continued habit of self-abuse, which (as further explained by their *vivâ voce* evidence) the inspectors considered might possibly (but not probably) be cured. The question involved being one of moral restraint, the Court refused to make the decree. (Page 6, 8, 21.)

142. Drane v. Aveling.—(1 *Robertson*, 279.)—The facts were substantially as follows:—The external sexual organs, and the development necessary to the creation of sexual desire and gratification were perfect; but the vagina was contracted in depth, admitting of penetration to perhaps less than half the usual extent, and becoming impervious at that depth, where it formed a cul de sac, with no communication to any of the internal organs. There was an entire absence of uterus. The defect had improved slightly between the first and final examinations; but it was deemed incurable, and not capable of any material further improvement. The only impediment, therefore, so far as copulation was concerned, was in the restricted depth to which penetration could extend, and from the imperfect intercourse permissible, actual emission could ensue. Upon these facts, and solely because no complete copulation could take place, the marriage was set aside. (The Judge in the case was Dr. Lushington, sitting in the Consistory Court, 1845.) (Pages 6, 8, 34.)

143. W. (falsely called) R. v. R.—(*L. R.*, 1 *P. Div.*, *p.* 404.)—In August, 1875, a wife, then aged 47, instituted a suit for a declaration of the nullity of a marriage contracted in May, 1849. There was evidence that the petitioner was a *virgo intacta*, and that the respondent was incurably impotent.

The petition was dismissed, the Court being of opinion that there was no

satisfactory explanation of the delay in taking proceedings, and that the proceedings had been taken in consequence of disagreements and quarrels between the petitioner and the respondent, and not with the single object of obtaining redress for the injury done by the respondent's incapacity. (Pages 6, 8.)

144. Lewis v. Hayward.—(35 *L. J., P. M.* and *A.*, 105.)—After a cohabitation of fourteen years, a woman presented a petition for a decree of nullity of marriage on the ground of the man's impotence. The medical evidence showed that the woman was *virgo intacta et apta virgo*, and that there was no apparent defect or malformation in the man. The House of Lords held that a decree should be granted, on the ground that the cohabitation had been for a much longer period than was required to raise the presumption against the husband, and that the onus was thrown on the respondent either of disproving the facts, or of showing by clear and satisfactory evidence that the result was attributable to other causes than his own impotency. (Pages 6, 8.)

145. W. v. J.—(*L. R.*, 1 *P and D.*, *p.* 460.)—In this case the Court declined to grant a decree upon the unsupported testimony of the petitioner, the medical evidence proving that the physical appearances were such that no opinion could be formed whether for two years she had had regular intercourse with her husband or not. (Pages 6, 8.)

146. S. v. A.—(*L. R.*, 3 *P. Div.*, 72.)—In this case it was decided that the wilful and wrongful refusal of marital intercourse is not in itself sufficient to justify the Court in declaring a marriage null by means of impotence.

When, after a reasonable time, it is shown that there has been no sexual intercourse, and that the wife has resisted all attempts, the Court, if satisfied of the *bona fides* of the suit, will infer that the refusal arises from incapacity, and will pronounce a decree of nullity of marriage. (Pages 6, 7, 8.)

147. Curling on Sterility in Man. (*Brit. and For. Med. Chir. Rev.*, *April*, 1864, pp. 12, 15, 16, 19.)

(*a.*) A cryptorchid (both testicles in the groin, outside abdominal rings). Æt. 38, married 11 years. Male appearance. Power of copulation perfect, but sterile. Absence of spermatozoa.

(*b.*) A cryptorchid (one testicle outside abdominal ring, the other within the abdomen), married. Masculine appearance, penis rather large. Power of copulation perfect, but sterile. Absence of spermatozoa.

(*c.*) A monorchid. Æt. 46. Descended testicle removed for disease. After this the power of copulation continued satisfactory, but the fluid secreted by the undescended testicle contained no spermatozoa.

(*d.*) Æt. 29. A case where one testicle was outside the inguinal canal, and the left completely atrophied. Powers of copulation satisfactory, but the semen contained no spermatozoa.

(*e.*) References to three cases where spermatozoa were absent in vesiculæ

seminales on the side of detained testicle, but present on the opposite side. (Mr. Follin, "Archiv. Gén. de Méd.," 4 Sér. : t. xxvi., p. 265.)

(*f.*) Similar case. (Curling "Diseases of Testes," p. 27.)

(*g.*) Similar cases in animals and in the human subject. (MM. Goubaux and Follin.)

(Cases also mentioned in this memoir, where animals which had the power to copulate were quite sterile, p. 147.)

(*h.*) Three cases of cryptorchids who were sterile. (M. Godard, "Etudes sur la Monorchidie et la Cryptorchidie," pp. 103, 147.)

(*i.*) Case of both testicles in inguinal canal. Married. Powers satisfactory, but semen destitute of spermatozoa. ("Puech, Gaz. Hebd.," Dec. 1856.)

(*k.*) Male, Æt. 24. A cryptorchid. Had desires and emissions, but semen destitute of spermatozoa. (Partridge, "Path. Trans.," Vol. ii.)

(*m.*) Cases related to Mr. Curling by Mr. Cock and Mr. Durham of fruitful cryptorchids. (Case 14.)

(*n.*) Male. Æt. 42. A cryptorchid said to have a family. Died of strangulated inguinal hernia. No spermatozoa found at the P. M. in testicles. (Dr. Debrou, "Gaz. Hebd.," t. viii., 1861, p. 3.)

(*o.*) Cases of sterility and absence of spermatozoa after epididymitis. (M. Gosselin, "Archiv. Gén.," 5 Sér., t. ii.)

(*p.*) Male. Æt. 42. Absence of spermatozoa after double orchitis contracted at 28.

(*q.*) Male. Æt. 44. Double orchitis from cold after marriage. Before the attack he had begotten a child, but was sterile afterwards. Entire absence of spermatozoa.

(*r.*) Male. Æt. 45. Contracted syphilis at 25. Afterwards had acute orchitis on left side, after which the testicle atrophied and also epididymitis on the right side. Power of copulation perfect but sterile, and the semen wanting in spermatozoa.

(*s.*) Male. Æt. 38. Abscess following inflammation of prostate and parts around from excessive venery when 28 years of age. Afterwards suffered from inflammation of both testicles. Afterwards married, but although his desires were strong, he had no emissions. (See full account of this case in Curling's book).

(*t.*) Male. Æt. 26. Sterility from malposition of one testicle, and obstruction in the excretory duct of the other.

(*u.*) Male. Æt. 20. Case of physical obstacle, congenital absence of the vas deferens and impossibility of the semen escaping.

(*v.*) Male. Æt. 28. Case of tubercular deposits in the epididymis. Sexual powers satisfactory, but no spermatozoa found on examination.

(*w.*) Male. Æt. 32. Absence of spermatozoa in a case of strumous orchitis of the testicle. Power of copulation not disturbed.

(*x.*) Male. Æt. 47. Wasting of testicles accompanied by loss of sexual power and an absence of spermatozoa in seminal secretions.

CHAPTER II.

SOME OF THE MEDICO-LEGAL ASPECTS OF PREGNANCY.

Signs of Pregnancy in the Living—Cases where questions of Pregnancy may be referred to the Medical Jurist—Symptoms of Pregnancy—Signs of Pregnancy revealed at a Post-mortem—Signs of recent Delivery in the Living—Signs of Delivery revealed by a Post-mortem—Indications of a more or less remote Pregnancy—The time that must elapse between Delivery and a fresh Conception—Superfœtation—Rules to be observed in the examination of cases of Suspected Pregnancy.

(ILLUSTRATIVE CASES, Page 147.)

WE shall confine our attention in this chapter to the following questions :—

I. The signs of pregnancy in the living.

II. Further signs of pregnancy revealed at a post-mortem.

III. The signs of recent delivery in the living.

IV. Further signs of recent delivery revealed at a post-mortem.

V. The indications by which to determine whether a woman has, or has not been pregnant, at some remote period.

VI. The time that must elapse after delivery before a woman can again conceive.

VII. The possibility of a second ovum becoming impregnated during an existing pregnancy (Superfœtation).

I.—The Signs of Pregnancy in the Living.

Pregnancy is generally accepted by the practitioner on the faith of a patient's statement. Forensically, this is insufficient, seeing that many old women deceive themselves, and that many young women have strong grounds in such matters for deceiving the medical man.

The existence of pregnancy may become a subject matter for medico-legal investigation in such cases as the following :—

(1.) Where a woman condemned to death pleads pregnancy to stay execution. The ordinary course of procedure in such cases is, that, after sentence of death has been pronounced, the prisoner is asked whether there is any reason why it should not take effect. If she then pleads pregnancy, "the Judge must direct a jury of twelve matrons or discreet women to enquire into the fact, who may if they please be assisted by the opinion of a medical man, who must be examined as a witness in open court (*Reg.* v. *Wycherley*, 8 Car. and Payne, 262), and if they bring in their verdict *quick with child* (for barely *with child*, unless it be alive in the womb, is not sufficient), execution shall be stayed" (*Black.*, "*Com.*," IV., c. 21, of "Reprieve and Pardon").

However self-evident the pregnancy, or however difficult the diagnosis, the jury of matrons must decide whether the woman be with child or not, and on their decision only can the execution be postponed.

In the case of *R.* v. *Christiana Edmunds*, tried at the Old Bailey, in January, 1872, the prisoner pleaded pregnancy to stay execution. It was found to be untrue by the jury of matrons on incontrovertible evidence. There are cases, however, and those not a few, where the jury of matrons have been wrong in their decision. (*R.* v. *Wright*, Norwich, 1832; "*Med. Times and Gaz.*," Jan. 27th, 1872, p. 98.)

As a rule, the jury of matrons request the services of a medical practitioner. The time seems to have arrived when the jury of matrons might fairly be dispensed with, and the matter referred to one or more medical men. For, perhaps, there is no subject on which average women display greater ignorance than on questions connected with pregnancy. The lead has already been taken in New York, where in similar cases, the condition of the prisoner is referred to a jury of six physicians.

To stay execution, the woman must be "quick with child." It can never be too often repeated, that the womb of the pregnant woman contains within it from the first moment of impregnation a living human being, and that to kill this living ovum is murder. For the unborn has done no wrong, whatever its begetter may have done. If the phrase "quick with child," is

one signifying pregnancy (be it the pregnancy of a week or of six months), well and good; but if the word "quick" has the slightest reference to the ordinary term "quickening," then the state of the law is physiologically wrong.

The real question should be (as is laid down by Art. 27 of the penal code of France), "Is this woman pregnant?" It may fairly be contended that the word "quick" does imply this (quick and dead), but if so, it is to be regretted that the jury of matrons in such cases is not as a rule more clearly instructed as to the precise object of their enquiry.

(2.) Where a lady asserts after the death of her husband, that she is pregnant with an heir to an estate.

(3.) Where a girl who has been seduced, asserts that she is pregnant, as ground for increased damages.

(4.) Where a married woman in order to please her husband, or from other motives, asserts herself pregnant. A similar statement may be made by a lunatic or religious impostor, like Joanna Southcote.

(5.) Where the plea of pregnancy is set up as an excuse for non-attendance at a trial. (See Part I., p. 11.)

(6.) Where an accusation of pregnancy is made against a single woman, or a widow, or a married woman living separate from her husband. Such a charge may furnish grounds for an action for libel, or, if the person be married, for proceedings in the Divorce Court.

(7.) Where accusations of Mala-praxis are made against a medical man on the ground that he has mistaken pregnancy for some other condition, and that the treatment adopted by him has caused abortion.

(8.) Where a woman, after the death of her husband from negligence, asserts herself pregnant as a ground for increased damages from those supposed to be liable for the neglect which caused his death. In respect of such a charge, the Court of Admiralty (under Lord Campbell's Act), in a case where the husband had been killed by a collision between two vessels, decided that the widow then pregnant was entitled to damages in respect of the child unborn, but that the amount of damages could not be actually assessed until the child was born. If the

child was stillborn, the claim would prove abortive. Thus in law, a child "en ventre sa mère," is considered as actually born where any question arises for its benefit. (See decision of Lord Westbury in *Blasson* v. *Blasson*, 34 L. J. (N. S.) Chanc. p. 18.—"*Med. Times and Gazette*," 1871, II., p. 146.)

The principal symptoms of pregnancy are (1) Cessation of the catamenia; (2) Morning-sickness; (3) Changes in the breasts; (4) Abdominal changes and symptoms; (5) Changes in the uterus and vagina; (6) Symptoms referable to the fœtus and placenta; and (7) Certain miscellaneous symptoms.

(1.) *Of the Cessation of the Catamenia.*—The catamenia are as a rule suppressed for as many monthly periods as the woman is months "gone with child," the general health not suffering from such suppression.

But in respect of this sign several difficulties present themselves, viz.:—*First.* The catamenia may not be suppressed during pregnancy, or at any rate a woman may have periodical hæmorrhages in the earlier months of, and sometimes throughout, pregnancy. ("*Med. Times and Gazette*," April 30, 1859; Murphy's "*Obstetric Report*," 1844, p. 9; Whitehead "*On Abortion*," p. 19.) No doubt, further, it is far from uncommon for young married women to have a slight show for two or three periods after their first impregnation, a fact too often overlooked. *Secondly.* Some women conceive without having been "regular" at all. ("*Lancet*," Sept. 10, 1853, p. 236; "*Ed. Med. Journ.*," July, 1870.) *Thirdly.* Cases are recorded in which no appearance of a monthly discharge presented itself, except during pregnancy. *Fourthly.* An arrest of the menses may occur for one or two months after marriage, without the woman being pregnant, arising it would seem from the profound impressions made upon the system by the new relations of the individual. *Fifthly.* The catamenia may be suppressed from cold, fright, phthisis, anæmia, etc.

A further difficulty occurs from another cause. We must not be unprepared to find deception practised in this matter. Thus according as the need occurs, the woman may either conceal the

occurrence of menstruation, or may feign menstruation. For this latter purpose she may stain her underclothing with blood, or with some pigment closely resembling it in colour. It is further to be borne in mind that stains upon clothes or bedding may be due to hæmorrhage either from polypoid or fibrous tumours of the uterus, or from vascular tumours of the meatus urinarius, or from boils, abscesses, piles, and other causes.

The practical conclusion, apart from the question of deception is, that the presence or absence of the catamenia are signs of very little value in themselves in the diagnosis of pregnancy, although of considerable value when taken in conjunction with other symptoms.

six weeks or two months. They are most marked in a first pregnancy, and are best seen in women with clear complexions and a moderate amount of skin pigment. The breasts grow larger, firmer, heavier, and more knotty, concurrently with the growth and development of the fœtus. The woman frequently states that they are the seat of a stinging or pricking sensation. Part of this increased size is doubtless due to adipose tissue, but the most characteristic change is the increased size of the true breast, or gland tissue.

It is worthy of note respecting the size and firmness of the breasts, that if they be much handled the observer may easily be deceived by the physiological congestion thereby induced. For this reason we advised the looking at them in the first instance, without touching. It is the first impression given to the touch which is of value.

At the end of six or seven weeks, a decided darkening will be observed around the nipple. It must not be forgotten that an areola or coloured circle, varying from a pink in very fair women to a brown, or almost a black, in brunettes, is the normal condition. The size of this areola, however, is greatly increased by pregnancy, so that its diameter may range from one half to two or three inches. Upon this dark ground, a double or triple row of follicles or tubercles (which in reality are miniature nipples) will be noted, their lighter colour strongly contrasting with the dark ground on which they lie. Their number varies from twelve to about twenty, their size being much increased by pregnancy. Besides this, towards the end of gestation, small white spots become visible on the outer part of the areola, presenting an appearance very much as though the colour had been discharged by a shower of raindrops falling on the parts. [Secondary areola of Dubois.] Dr. Montgomery attributes great importance to these spots, as a sign of pregnancy. Blue veins (especially in the fair) will be distinctly marked, their prominence increasing as the pregnancy advances. Dr. Lumley Earle has noted the occurrence of silvery streaks on the breasts (like the lineæ albicantes), seen by slightly stretching the skin between the finger and thumb. These are best observed in multiparæ. The nipples become more prominent, turgid and

perhaps painful, and there will often be found upon them branny scales, from the drying up of a milk-like fluid which now begins to be secreted. The insertions of the nipples present in most cases a moist and slightly greasy appearance. Milk is very often present in the breasts, and may be squeezed from the nipple. It frequently happens, however, that true milk is not secreted in any quantity until after delivery, although at the fifth or sixth month we shall nearly always be able to distinguish the milk constituents, if the fluid from the nipples be placed on a glass slide, and examined by a ¼-inch objective.

But examining these changes of, and in, the breasts critically, we are led to observe—

First, that during menstruation, or in ovarian disease, or if the mind of the female be much directed to the subject, single and non-pregnant women may exhibit many of the mammary symptoms described above—more especially enlargement of the breasts. A case is recorded somewhat of the same kind as occurring in the lower animals. (*Case* 3.) We can, therefore, scarcely be too cautious in forming our judgment upon this point, especially as, occasionally, pregnant women show few characteristic signs in the breasts until after delivery.

Secondly. The existence of milk in the breasts must not be over-estimated as a sign of pregnancy. For (*a*) the presence of milk has on many occasions been observed in the breasts of very young children, showing that its secretion may not only be absolutely independent of pregnancy, but also independent of sexual inclinations. Indeed, it has been said that the secretion of two or three drops of milk in new borns before the tenth day (although rarely, if ever, after the fifth or sixth week), is almost a normal condition. Thus, Dr. Faye, in 120 cases, found it only absent in six children, four of which were boys and two were girls. ("*Lond. Med. Rec.*," Oct. 15, 1877, p. 413.) (*Cases* 1, 2, 4.) In *Case* 2 this occurrence of milk seemed hereditary. (*β*) Milk has frequently been found in the breasts of single and non-pregnant women. One such case (*Case* 4*a*) has been recorded by the author, and formed the subject matter of enquiry, owing to certain scandalous reports that found currency respecting the person in question. It may be worth recording that external

irritation, and certain uterine and ovarian diseases, will in many cases cause a secretion of milk. (γ) Authentic cases of milk in the male breasts have been recorded by Humboldt and others. (δ) Cases where no milk has been secreted during pregnancy, and where the breasts have never assumed maternal proportions, are not a few. Occasionally cases occur where the milk, although absent during the time the woman is carrying the child, becomes normally secreted a short time after her confinement.

(4.) *Abdominal Symptoms.*—During the first two months of gestation, there is little change in the size of the abdomen. Indeed, as a fact it commonly becomes flatter, whilst the navel sinks in (*en ventre plat, enfant il y a.*). About the third month, however, the increased size of the abdomen, the stretching of the skin, and the obliteration of the navel, become obvious, and from this time steadily increase till nearly the end of gestation. The abdominal enlargement is pear-shaped, thus distinguishing it from the swellings of dropsy (for pregnancy has often been confounded with ovarian tumour), and other affections.* About the fifth month, the uterus may be felt through the abdominal walls. At the sixth month, the uterus reaches the umbilicus. At the seventh, it is half-way between that and the ensiform cartilage. At the end of the eighth month, it reaches the ensiform cartilage, and the navel becomes very prominent. Between this and the end of pregnancy, the uterus falls a little, so that the abdomen may appear somewhat smaller at full term than it does at the eighth month.

In general the tumour produced by the gravid uterus after the seventh month, will be found to be symmetrically ovoid, semi-solid, and dull on percussion. It will sensibly contract and again relax under the hand, especially if the latter be cold. This *elasticity* of the pregnant womb is perhaps the most important detail to be observed in examining the abdomen, presenting, as it does to the practised touch, a different feel to that produced by any other abdominal tumour. Given a pear-shaped abdominal tumour containing a movable and elastic substance, the presence of a fœtus is next to certain. An ovarian tumour even may exhibit ballottement, but its walls will not contract (*Leishman*).

* See Edis on *Diseases of Women*, p. 284.

The outlines of the fœtus may usually be felt through the uterine wall, and a cold hand will often cause fœtal movements of a lively character.

Dr. Montgomery lays some stress upon a dark line extending from the navel to the pubes. This is almost invariably present, and is sometimes of considerable width. It may, however, date from a previous pregnancy—and something like it is commonly present in ovarian disease.

For medico-legal purposes these signs need critical enquiry:—

In typical cases, it is true, nothing can well be mistaken for the enlargement of pregnancy. When, however, the uterus is bicornate, or if there be lateral displacement so that the fœtus lies entirely on one side of the abdomen, or when there is an excessive quantity of liquor amnii, or when pregnancy is combined with ovarian disease, tumours, etc. ("*Lancet*," October 16, 1847, p. 408), or if there be a large quantity of abdominal fat, etc., the diagnosis of pregnancy founded on the size of the abdomen, is often a matter of the utmost difficulty. Numerous cases recorded by Dewees, Montgomery, and others, and the well-known instance of Lady Flora Hastings, show the danger of making a diagnosis of pregnancy dependent on the *mere fact* of abdominal enlargement.

Again, it must be remembered that enlargement of the abdomen may result from retained menstrual fluid. In such case there would be presented two symptoms of pregnancy, viz., the absence of the catamenia and abdominal enlargement. Further, enlargement may result from dropsy, in which case, however, the shape of the swelling will constitute an important diagnostic sign.

There is another point to be noted in relation to abdominal symptoms. About the change of life there is often an enlargement of the abdomen, caused by a deposit of fatty matter. This, with nervous perturbations, cessation of the catamenia, &c., often lead women to suspect that they are pregnant, and perhaps, in the case of the childless, to hope that the wishes of life are at length to be gratified. (*Edis*, p. 276.)

With respect to the *brown line* extending from the pubes to the umbilicus, this occurs more or less in all cases of abdominal enlargement.

(5.) *Changes in the Uterus and Vagina.*—The gradual enlargement of the uterus itself has just been described. We need only further note that from a weight of two to three ounces (unimpregnated), it reaches 24 ounces or even 2 lbs. at full term. But to the medical jurist, the most important changes in the womb occur to the cervix uteri. The shortening of the cervix becomes evident about the fifth month, whilst at full term it can scarcely be said that the uterus has any appreciable neck at all. This shortening, however, is probably more apparent than real. (See Playfair's "*Manual of Midwifery*," and an article, "Cervix Uteri," by Dr. Angus Robertson in the "*Edin. Monthly Journal*," April, 1877.) About the same time (*i.e.*, the 5th month) the follicles about the os become very perceptible. The os itself will be seen to be directed more backwards, and to have acquired a peculiar velvety feel. Professor Goodell (University of Pennsylvania) lays great stress on the feel of the cervix as a diagnostic sign of pregnancy. He says:—"When the cervix feels as hard as the tip of the nose, pregnancy does not exist, but when it is as soft as the lips, the womb most probably contains a fœtus." ("*Med. Press and Circ.*," Dec. 16, 1877, p. 524.)

The *uterine souffle* (*bruit placentaire* of some authors) can generally be heard after the fifth month (it has been said to have been heard earlier) by auscultation over the uterus. This bruit is a blowing sound, which may be either hoarse and harsh or soft and musical, and occurs synchronously with the radial pulse. It is best heard near the usual site of placental attachment, and on this account has been ascribed to the placenta. But this view is clearly erroneous, seeing that it may be heard for a few days after delivery, and in certain cases of fibroid tumours without the woman being pregnant. It is therefore of very slight diagnostic value. ("*Med. Press and Circ.*," Oct. 9, 1878, pp. 303, 321, 342, 362, 421.) It is almost certainly an arterial bruit, although venous bruits are also heard over the gravid uterus.

The *Vagina* in pregnancy is generally somewhat relaxed. Its artery pulsates more strongly than usual (Osiander), and its mucous membrane becomes congested, giving it a *violet tinge*, a peculiarity shared by the inner surface of the vulva, and by the

cervix uteri (Jacquemier, Kluge, Parent Duchatelet). (See also Dr. Carston, "*Detroit Lancet*," Sept., 1880.) This change of colour, however, being simply a pressure symptom, is of little value by itself. As a rule, it occurs very early in pregnancy, and may generally be observed until the fourth or fifth month, after which the colour of the parts assume a more or less natural tint.

French surgeons attach considerable importance as a sign of pregnancy to a method of examination termed *Ballottement* or Repercussion, of which there are two kinds, external and internal. Ballottement can scarcely be applicable, except between the fourth and the sixth or seventh months. To practise *internal ballottement*, the woman must either stand or lie with the trunk in a semi-recumbent position. The object of this is to bring the uterus as low down as possible, and to make its axis coincide with a line passing perpendicularly from the fundus to the ground. One or two fingers of one hand are now to be introduced into the vagina, and applied to that part of the os which is most anterior. With the other hand steady pressure should be maintained on the abdomen. The patient should then be told to inspire fully, and to hold her breath. A rapid jerk should then be made with the fingers that are in the vagina against the uterus, when a hard body (the head or breech of the fœtus) will be felt first to recede from, and then to fall back on, the tips of the fingers. *External ballottement* is a similar manœuvre, best performed by placing the woman on her side, with the abdomen projecting beyond the edge of the bed or couch. Admitting that ballottement is a useful method of diagnosis, and fairly free from fallacies, the practical difficulties of manipulation, and the very limited period during which it is available, greatly detract from its value.

Dr. Adolph Rasch ("*Brit. Med. Journ.*," Aug. 30, 1873, p. 261) lays great stress as a sign of pregnancy, on the existence of a *fluctuating* enlargement found on vaginal examination. He considers that in many cases it can be felt as early as the seventh week, and in most after the second month.

(6.) *Of the Symptoms due to the Fœtus.*—The older writers attached great importance to the first recognition on the part of the mother of fœtal movements, or as it is called

"quickening" (*le choc fœtal*). For quickening is not, as is vulgarly supposed, the first advent of life. The time of its occurrence is variable. Further, it is to be observed that living children have been born without the mother having ever perceived movements at all. It generally occurs, however, between the sixteenth and the twenty-fourth week of gestation; but it may occur as early as the third month, or as we have said, be altogether wanting. As far as we are concerned, quickening may be either a subjective or an objective symptom:—

Regarding it as a *subjective* symptom (a matter of little interest to the medical jurist), the patient may tell us she is conscious of certain movements ascribed by her to the presence of a child, but which may be due to a variety of causes. Thus, flatulence of the bowels, dropsical effusions, etc., may in this respect deceive a woman. Queen Mary, in her desire for issue, mistook the primary symptoms of dropsy for quickening. Cases, moreover, are recorded where women have possessed a marked power, sometimes voluntary, sometimes involuntary, of imitating the movements of a fœtus by effecting contractions of the abdominal muscles. And this leads us to remark that, even as an *objective* symptom—that is, when we ourselves feel the apparent movements of the child—care must be taken not to mistake (*α*) contractions of the abdominal muscles, or (*β*) contractions of the uterus itself, for the movements of a fœtus. Nevertheless we must admit, that very active movements on the part of an infant in utero (S. Luke i. 41) could scarcely be mistaken for anything else, and that the "fœtal impulse" which may often be felt externally about the third or fourth month, and when other signs moreover are not very evident, is a symptom of pregnancy of the greatest possible value. ("*Ann. de Gynæc.*," March 15, 1874.)

The sounds of the fœtal heart (discovered in 1818 by Mayor, of Geneva), constitute a valuable diagnostic sign of pregnancy. The position of the fœtal heart necessarily varies with the child's position in utero, &c. As a general rule, it may be heard if the stethoscope be placed on one side or other of a line drawn from the anterior superior spine of the ilium to the umbilicus. The beats vary from 120 to 160, 130 to 150 being about normal.

The beats are said to be more numerous if the fœtus be a female. Thus Dr. James Cumming ("*Edinburgh Med. Journ.*," 1875, pp. 327—419), says that "for the same pulse-rate the male infant at birth should be heavier than the female, in the proportion of 20·2 to 19; or, if the female infant equal the male in weight, the female pulse will be the higher one." Frankenhauser ("*Monatschrift für Geburts Kunde*,") also says, "that the fœtal heart of the male is slower than the female; and that pulsations under 144 may be taken to signify that a male infant is in utero."

The fœtal heart-beats are not synchronous with the mother's pulse.—If we find that the beats we hear are synchronous, we may at once conclude that we are not listening to the fœtal heart, but to that of the mother, the sounds being conveyed either through some solid or enlarged organ, such as the liver, or along the walls of the abdomen. It is important, therefore, to note the exact characteristics of the fœtal heart-sounds. There are, in fact, two beats of the fœtal heart:—in other words, the number of beats is from 240 to 320; but in counting we reckon only the second or louder sound.

The sounds of the fœtal heart, may sometimes be heard as early as the fifth month, continuing, if the child be living, up to the period of delivery. But the fœtal heart may cease to be heard for a time, even when the child is alive. Its absence, it is to be remembered, does not prove the non-existence of pregnancy, although other signs of pregnancy being present, it makes it highly probable that the infant is dead.

Sometimes a "souffle" is also heard from the funis. And this suggests the remark, that care is necessary not to confound the beats of the fœtal heart with the so-called "placental bruit," or with the muscular susurrus of the uterus—a mistake far from impossible. Dr. Braxton Hicks ("*Lancet*," Oct. 18, 1873, p. 557) observes that the vibrations of the abdominal muscles, in a state of half-suspension, can be distinctly counted watch in hand, and that their number and sound are so like those of a very rapid fœtal heart, that they may be mistaken for them.

(7.) *Miscellaneous Signs of Pregnancy.*—Alterations of temper and of character—strange antipathies—voracious or pecu-

liar appetite (longings)—an increased secretion of saliva—irritability of the bowels—a frequent desire to pass water, especially in the night—peculiar pigmented patches on the face or arms (Dr. Swayne)—anæmia of the optic discs and retinæ, causing transient amaurosis—headache (the so-called "test of Beccaria" was intense pulsating pain in the occipital region)—a tendency to syncope and vertigo—convulsions—albuminuria or saccharine urine—increase of fibrin in the blood—hypertrophy of the heart (some degree of which is normal in pregnancy), giving rise to a stronger pulse than usual, are symptoms that have been noticed in pregnant women again and again, but none of which are specially diagnostic.

Enlargement of the thyroid body* is another minor sign calling for note, although one less perhaps of pregnancy than of sexual excitement. (Dr. James Reid.) Another popular sign is known as "turning out the toes," alluding to the necessity for securing a wider basis to support the increased weight of the gravid uterus. For the same reason the woman walks with a more than usually erect gait, with the abdomen, as it were, pushed before her. It is also frequently remarked that she looks "ridiculously well." It is obvious, that these "signs" are of little or no forensic value.

So much has been made of the so-called *kiestin* or *gravidine* test that some notice of it, though utterly worthless as a sign of pregnancy, is called for. It was said by its discoverer that if, after the first month of pregnancy, the urine of the gravid woman be left to stand from thirty hours to eight days, a pellicle having a cheesy odour and an appearance like "the fatty scum of cooled broth," would form upon it. This pellicle, when examined by chemical tests and by the microscope, shows fungi, triple phosphates, fat globules, and sometimes a peculiar form of albumen. Unfortunately, men, young girls, and very old women may furnish urine yielding a similar pellicle. It is said, however, with, great probability, that lime salts (phosphates) are considerably diminished in the urine during pregnancy.

* Evidently known to Catullus (De Nuptiis Pelei et Thetidos, lines 376-7): "Non illam nutrix orienti luce revisens Hesterno collum poterit circumdare filo."

We have thus dealt with the signs of pregnancy. It might be supposed that they are sufficiently numerous to leave little chance of error, at any rate in the later stages, when the signs enumerated have become fully developed. Still, apart from deception, as in prisoners who may sham pregnancy, cases of spurious pregnancy, and even of spurious labour where "the wish is father to the thought," are on record. (*Cases* 5, 6, 7.) Such, *e.g.*, is *Case* 5, where the woman had been newly married, and *Case* 7, where the patient had practically reached the limit of her child-bearing life. Although cases of spurious labour are rare, cases of spurious pregnancy are numerous. Except, as Dr. Duncan remarks, that animals at times exhibit spurious parturition, we might be inclined to deny it altogether as a real thing. As it is, the mere idea of pregnancy, as groundless as it is imaginary, may be a reality—in fact a disease, for which the medical jurist must be on his guard.

Further, the medical jurist must not be mistaken by what are called phantom tumours. (See *Case* 8.) (*Edis*, p. 277.)

Some of the conditions likely to simulate pregnancy are the following:—

1. Corpulency. (*Edis*, p. 276.)

2. Flatulent distension of the abdomen (tympanitis). Enlargement of the abdomen—for example, from kidney, liver, and heart-disease, ascites, ovarian and other tumours (*Edis*, pp. 277 and 285), such as malignant and fibroid growths springing from the pelvis or pelvic organs.

3. Diseases or habits inducing morning sickness and hæmorrhages.

4. Hydatids of the uterus.

As regards *Hydatids of the Uterus*, these are of two kinds. (*a*) In the *first* or common form, known as *hydatiform degeneration of the chorion*, all obstetric and pathological writers agree that *they are cystic degenerations of a fœtal structure* (*the chorion*), *and that they therefore imply a previous impregnation.* [See Paget's "*Lectures on Surgical Pathology*," p. 419; Müller's "*Archiv.*," 1860, H. v., p. 417; Churchill's "*Diseases of Women*," p. 281 (5th edition); and papers in the "*Obstet. Trans.*" Vol. iii., p. 177; Vol. i., p. 249; Vol. ii., pp. 112, 242; Vol. vii.,

pp. 113, 117, 228; Vol. ix., p. 85; Vol. x., p. 93.] There is, however, (β) a *second* kind, viz.—the *true hydatids of the uterus*, which contain *echinococci* or their hooklets (the so-called teeth), or the beautifully striated membranes belonging to them, and which are in reality a peculiar mode of the development of tapeworms. They are excessively rare, one case being reported by Grailly Hewitt ("*Obstet. Trans.*," Vol. xii., pp. 135, 237), and a second by Braxton Hicks. This form of hydatids is quite independent of sexual intercourse. The microscope would be the best means of establishing a diagnosis between these two varieties. (See Tardieu, "*Observations et Recherches pour servir à l'Histoire Médico-légale des Grossesses fausses et simulées.*") (Grailly Hewitt, "*Diseases of Women*," p. 472.)

5. Physometra.
6. Menorrhagia and metrorrhagia.
7. Hypertrophy of the breasts with a secretion of milk.
8. Contractions of the abdominal muscles.
9. Movements from within, due to uterine contractions, or to the presence and movements of gases, or perhaps to intestinal worms.
10. Amenorrhœa, and particularly retention of menstrual fluid from the existence of an imperforate hymen.

Another question may occur, viz., If the woman be pregnant, how far has the pregnancy advanced? Without discussing the evidence afforded by the size of the abdomen, the length and conditions of the cervix, the catamenial periods missed, etc., respecting all of which we refer to manuals of midwifery, we content ourselves with noting that Dr. Vassily Sutugin has described in a paper of great labour ("*Edin. Med. Journ.*," Vol. xx., p. 869), "the means of ascertaining the length of gestation by the measurement of the fœtus and gravid uterus during the second period of pregnancy." The measurement of the fœtus in utero can only be undertaken when the projecting parts of the child are easily felt, and the womb keeps its solid contents fixed, *i.e.*, after the seventh month of pregnancy. Dr. Sutugin concludes that the size of the fœtus serves as one means of determining the period of pregnancy. Further, he considers the

height of the fundus uteri above the symphysis, to be a trustworthy objective symptom of the various periods of pregnancy in normal presentations, when the uterus contains only one fœtus.

II. Further Signs of Pregnancy revealed at a Post-mortem.

Apart from the subjective phenomena, the signs noted in the living would for the most part be observed in the dead.

There are, however, two further points specially revealed by a post-mortem that need consideration :—

(1.) *The presence of an ovum in the uterus, or, after the second month, the existence of a distinct fœtus, with its placenta and membranes.*

We have already described the fœtus as it appears at different periods of development, under "Viability." (Page 59.)

(2.) *The presence in one or both ovaries of a true corpus luteum or of corpora lutea.*

This name has been given to a peculiar cicatrix found in the Graafian follicle or ovisac, after a ripened ovum has been discharged from it. The subject has been a fruitful source of discussion.

Authorities speak of true and false corpora lutea. By a *true corpus luteum, i.e.*, the corpus luteum of pregnancy, is implied the cicatrix formed after the discharge of an impregnated ovum. By a *false corpus luteum* (or as it is called the *menstrual* corpus luteum), is implied that formed at each menstrual period, after the discharge of an unimpregnated ovum.

It is advisable here that we should investigate the precise changes said to result in the formation of a true corpus luteum.

At the time of the escape of the ovule, a clot of blood is effused into the cavity of the ovisac. At the same time, according to M. Pouchet, the epithelial lining of this ovisac (the membrana granulosa) becomes thickened by a cell formation, the hypertrophied layer being at first of a red and afterwards of a yellow colour (luteum). On the contraction of the ovisac, this yellow matter is thrown into corrugations or plicæ (folds), which diverge from the cavity towards the circumference of the ovisac.

As the development of the corpus luteum proceeds, the corrugations thicken, until finally the internal surfaces of the ovisac are brought into contact. In this way the stellate cicatrix found in the centre of the true corpus luteum is formed. Before this apposition, however, occurs, the fibrinous clot becomes either decolorised or converted into fluid, but in either case ultimately absorbed.

"The substance of the corpus luteum itself is soft, fleshy, and friable, and permeated with numerous vessels from the external surface of the ovisac. In size and shape it resembles a small bean, and projects from the surface of the ovary as a mamillary body, occupying from one quarter to one-half of the entire superficies of the organ. It is largest in the earlier weeks of pregnancy; and after the third month it slowly decreases in size until the time of parturition, when it rapidly retrogrades, and at length becomes a mere scar." (Tyler Smith.) "At the end of eight or nine weeks it has become so altered that its colour is no longer distinguishable; and only faint traces of its convoluted structure are to be discovered by close examination. These traces, however, may remain for a long period afterward, more or less concealed in the ovarian tissue. We have distinguished them so late as nine and a-half months after delivery." (Dalton.)

The value of the indications afforded by the presence of a corpus luteum is not to be over estimated, seeing that a corpus luteum is not in itself a sign of pregnancy. It is true that the menstrual, false, or virgin corpus luteum, *i.e.*, the corpus luteum formed when the unimpregnated ovum escapes at the menstrual period, differs as a rule in many respects from the true corpus luteum. Thus it usually disappears more rapidly, the development of the stellate structure is less marked, the yellow colour more rapidly declines, and it seldom possesses a central cavity. Nevertheless, it must be admitted that to decide positively whether a given corpus luteum results from the escape of an impregnated or of an unimpregnated ovum—*i.e.*, whether it be a true or a false corpus luteum—is often a matter of the greatest possible difficulty, if we ought not rather to say of absolute impossibility.

In the following table I have arranged the several points of distinction (as commonly described) between true and false corpora lutea :—

	Corpus Luteum of Menstruation.	Corpus Luteum of Pregnancy.
At the end of Three Weeks.	Three-quarters of an inch in diameter. Central clot of a reddish colour.	Convoluted wall pale.
One Month	Smaller. Convoluted wall of a bright yellow. Clot continues of a reddish colour.	Larger size. Convoluted wall bright yellow. Central clot continues of a reddish colour.
Two Months	Reduced to the condition of an insignificant cicatrix.	7-8ths of an inch in diameter. Convoluted wall bright yellow. Central clot perfectly decolorized.
Six Months	Entirely disappeared.	As large as at the end of the second month. Convoluted wall paler, but still of a yellow colour. Central clot appears fibrinous.
Nine Months		Half an inch in diameter. The external wall tolerably thick, and convoluted, but the yellow colour disappeared. Central clot converted into a radiating cicatrix.

Admitting that certain differences exist between false and true corpora lutea, a difficulty presents itself in this :—viz., that the ovum is not necessarily impregnated in the ovary. Hence we may have impregnation after the discharge from the ovary of an unimpregnated ovum. The question arises whether in such a case a true corpus luteum would be formed ? *

Now it is commonly held that the cause of the difference between the corpus luteum of pregnancy and that of menstruation, is the increased amount of nourishment received by the

* For urther details on true and false corpora lutea, reference should be made to Ramsbotham's "*Obstetric Medicine*," Dr. Montgomery's work (already quoted), and Cycloped. Pract. Med. "*Pregnancy*," p. 496 ; also "*Edinburgh Monthly Journal*," January, 1845, p. 58 ; ibid. vol. 53, p. 49 ; "*Medical Gazette*," Dec. 22, p. 43 ; ibid. vol. 35, p. 443 ; Dalton's "*Human Physiology*," Ch. VI.

follicle as the result of the pregnant condition. But the fact is beyond dispute, that not only may such increased nourishment be wanting in the case of the corpus luteum from which an impregnated ovum or an ovum afterwards impregnated had escaped, but that it may be present even where there is no pregnancy. Of this *Case* 37 (1) is an illustration, where in a prostitute, who was neither pregnant nor menstruating, a fully ripe corpus luteum was found, prostitution no doubt being the cause of the increased nutrition and development of the follicle. Again in *Case* 37 (2) in a woman who died at forty-one from gangrene of a uterine fibro-myoma, the ovary was found to contain a corpus luteum resembling in all respects that met with in pregnancy. It is quite conceivable that in this case the increased determination of blood to the parts in consequence of the fibroid, was the explanation of its abnormal development.

The practical conclusions are, *first*, that there may be pregnancy, and notwithstanding a complete absence of a true corpus luteum; and, *secondly*, that bodies undistinguishable from true corpora lutea may be found where there has been no pregnancy, and (as I have myself noted) in aged women, long past the period when pregnancy was probable.

III.—The Signs of Recent Delivery in the Living.

This may become matter of medico-legal inquiry in cases of suspected child-murder and concealment of birth. The certainty with which questions relating to the signs of delivery may be answered, will greatly depend upon the time that has elapsed *since* the birth of the child. If the examination be conducted *within the week*, most of the following symptoms will be present, but if it be delayed much beyond a week or ten days, the evidence of *recent* delivery will probably at best be of a somewhat indefinite character:—

(1.) The pulse will be a little quickened, and more than usually soft and compressible (*i.e.*, the pulse of Asthenia).

(2.) A peculiar expression of countenance, a dark areola under and around the eyes, and a peculiar odour about the body will be observed. The skin is usually moist, soft and relaxed.

(3.) The breasts are almost certain to contain milk, and to show the areola, pigmentation and follicles already described (page 111). They will be tender and knotty, and the nipples more than usually prominent. The character of the milk should be examined. The first milk or colostrum is yellower, richer in salts, and of higher specific gravity than the milk afterwards secreted (1072·0). It also contains an enormous number of granular corpuscles, like the so-called exudation corpuscles. With reference to the silvery streaks on the breasts, whilst we admit that they may indicate a previous *pregnancy* (or to speak more accurately, a previous *distension*), it is certain they do not prove recent delivery.

(4.) The skin of the abdomen will be found flaccid, and in many women thrown into folds. Numerous shiny, silvery, riband-like streaks (lineæ albicantes*) or cicatrices, due to atrophy of the skin, following a stretching of the integuments, may be seen on the abdomen and also on the thighs. There will probably be noticeable the dark line observed during pregnancy, passing from the navel to the pubes, whilst sometimes the muscles are separated in the median line.

(5.) On passing the hand downwards, or pressing it firmly over the pubic region, the enlargement of the uterus will be apparent, often remaining the size of a cricket ball for a considerable time after pregnancy. In health the involution of the uterus takes from fourteen to twenty-eight days, although in some cases (sub-involution) many weeks or months elapse

* On the subject of the *lineæ albicantes*, see Schroeder's "*Lehrbuch der Geburtshülfe*," Bonn, 1872, and the translation by Dr. Carter—"*A Manual of Midwifery*," etc., London, 1873. See "*Med. Times and Gazette*" for details of Krause and Felsenreich's Researches, 1881, I., p. 127). Schroeder states that they are present in the great majority of those pregnant. Crede says they are absent in 10 per cent., Hecker in 6 per cent. He considers the lines are by no means diagnostic of pregnancy, but only of previous distension. Schultze found them on the thighs of 36 per cent. of women who had never had children, and in 6 per cent. of men. He thinks the difference explicable by the greater development of the hips at puberty in the female sex. When there is no history of ascites, ovarian dropsy or of other conditions causing unusual distension of the abdomen, etc., the author believes that pregnancy at some previous period may fairly be inferred from the existence of these lineæ.

before it is complete. The womb, it is to be remarked, is often felt to incline rather to one side.

(6.) By vaginal examination, the os uteri will be found gaping. Two or three fingers may be passed into it with ease, and its margins will probably be found fissured or torn. By the sound, the increased depth of the uterine cavity may be ascertained.

(7.) We may find the lochia exuding from the uterus. The lochial discharge is at first coloured with blood, but afterwards becomes brown or green (green waters). After a week the lochia may be absent.

(8.) The perinæum will in all probability exhibit more or less recent laceration, whilst the vagina and uterus will present a dark and almost bruised appearance.

We must insist upon the necessity that a *combination* of these signs should exist, in order to render it certain that a woman has been recently delivered. Many of them, it is unquestionable, may be produced by uterine, ovarian, and other diseases, or even by accident. Even one of the most important signs, viz., the increased depth of the uterine cavity, might, for instance, be produced by retained catamenial fluid, or by hydatids of the uterus, or by hypertrophic elongation of the cervix.

In considering the signs of recent delivery, we must not be misled into supposing that a woman has not given birth to a child, because of the slight disturbance observed by friends in the pursuit of her ordinary avocations. We are liable to underrate the strength, capacity for endurance and for muscular exertion, of the recently delivered female. *Case* 36 supplies us with an illustration of how under exceptional circumstances, exceptional efforts after delivery may be possible. The slight interference in daily duties resulting from childbirth amongst the uncivilised and uncultured, not to mention those cases where everything depends on the woman keeping her confinement secret, compares curiously with the elaborate arrangements for "lying-in" observed amongst the more favoured of our population. Still to the medical jurist, the fact that such preparations are in a great measure the refinements of our civilisation only, must not be overlooked.

The habits of savage nations in this respect are well known.

An Indian or African woman, or even a gipsy, will step aside into a wood, be delivered of a child without assistance, and then resume her march with the tribe she is accompanying. Even in our own country, there are numerous instances of domestic servants and field labourers resuming their work immediately after childbirth. I have myself seen a country-woman doing heavy field work in wet weather and on a clay soil, the day after the birth of her ninth child.

The medical jurist need be on his guard specially (1) not to mistake disease for the effects of delivery; and (2) not to be misled by supposing that all matters said to have "come away," necessarily indicate a recent confinement.

Respecting the first of these cautions it is to be observed that the *rupture of an ovarian sac* distended with fluid, would in many respects resemble recent delivery, although the small size of the uterus would serve to distinguish the case. It is seldom that the breasts sympathise equally with ovarian tumours as with pregnancy, although it is usual for this to be so to a limited extent.

Again, blood clots (coagula), fibroid or polypoid tumours (sometimes spontaneously expelled with pains and hæmorrhage much resembling labour), hydatids of the uterus or vagina, dysmenorrhœal casts of the uterus or vagina, and casts of the rectum in membranous proctitis, are substances likely to be mistaken for embryonic remains. What are called "*fleshy or carneous moles*," are however almost invariably degenerations of the ovum, and contain indications of fœtal structures.

This rule, however, is a good one:—*Admit nothing expelled from the uterus to be the result of conception, unless a fœtus can be recognised.* To this we make but one exception—that is, the common form of hydatids already described. (*Case* 38.)

It does not seem possible to distinguish the *liquor amnii* (commonly called "*the waters*"), from other weak solutions of albumen. [See "*Annales d'Hygiène*," etc., 1852, ii., p. 414; ibid, 1856, i., p. 156; and Tardieu, *loc. cit.*, p. 90.] Its odour is usually spermatic, and its colour lemon-yellow or slightly greenish, although at times it is brown or red from the admixture of blood. It generally deposits on standing a cheesy substance

usually of a yellow colour, but occasionally of a dark vermilion tint. Its reaction is alkaline. It contains chlorides. The quantity of albumen present varies with the period of gestation, and may be roughly stated as about 10 per cent. at the fourth month, 7 per cent. at the fifth month, and 6 at the sixth month. At the ninth month it contains less than 1 per cent. The specific gravity is about 1008, but this varies considerably. At early periods of gestation the liquor amnii contains sugar. At full term many observers have found urea. Scherer gives the following as its composition :—

	At 5 Months.	At Term.
Water	975·84	991·474
Solids	24·16	8·526
Albumen and Mucus	7·67	0·82
Extractives	7·24	0·60
Salts	9·25	7·06

The stains of this substance stiffen linen, although to a much less extent than the seminal fluid. Robin and Tardieu ("*Annales d'Hygiène*," etc., 2me série, t. xiii., p. 434, Paris, 1860) show that *fœtal hairs* may sometimes be found on the stained cloths, along with much pavement epithelium having granular nuclei.

The *lochial discharges*, or *green waters*, or *cleansings*, are sure to contain blood, together with the remains of decidua and vaginal epithelium. They have an odour "sui generis."

One other question may arise as to delivery. "*Is it possible for a woman to be delivered in a state of unconsciousness?*" Both published cases, and the author's experience oblige an answer to this question in the *affirmative*. These cases are, however, very rare, and the woman could scarcely be long ignorant that something unusual had happened, unless she were the subject of puerperal mania, or of some other form of insanity.

IV.—Further Signs of Delivery revealed at a Post-mortem.

In addition to the condition of the breasts, abdomen, uterus, and vagina already described, we should, at a post-mortem, have the opportunity of observing the appearances pre-

sented by the ovaries and uterus. Within a week of delivery, the womb would present over its interior a dark (almost black) and bruised appearance, scarcely anything like a true mucous membrane being apparent. The sinuses would be found sufficiently large to admit a goose-quill, or perhaps even a finger, and the weight of the organ would probably be about sixteen ounces.

A careful description of the uterus in a case five weeks after delivery has been contributed by Dr. W. F. Jenks. (*Amer. Supplement to the "Obstetrical Journal,"* Nov. 1874.)

Dr. Montgomery (a high authority on these subjects) says, "Should death take place during or immediately after the act of parturition, especially from hæmorrhage, the uterus may be found lying in the abdomen, a flattened flabby bag, from eight to ten inches long, its mouth gaping wide, so that the hand would pass through it without resistance. Its parietes are soft and relaxed, its cavity often containing large coagula of blood, and its internal surface covered with the soft and pulpy remains of the decidua, intermixed with flakes of lymph, which, if the part be immersed in fluid, appear as flocculent processes, adhering to and springing from it in great numbers, while the portion to which the placenta had been adhering, usually about a third of the inner surface of the contracted organ, is distinguished by having less of these deciduous flakes, the substance of the organ in that situation appearing as if laid bare, and exhibiting several semilunar and apparently valvular openings in its structure. . . . But when delivery has taken place at full time, and the uterus has contracted perfectly, if an examination be made within a day or two, it will be found about seven or eight inches long and four broad; its external surface having a vascular appearance, and not unfrequently presenting patches of a purplish colour; its substance, divided by the knife, is found from one to one and a-half inches thick, of the consistency and nearly of the colour of firm muscular fibre, of which it appears to consist, and the cut surface displays the orifices of a great number of very large vessels: it now weighs about a pound and a-half. In the writer's museum is the uterus of a woman who died on the second day after delivery at the full time, and it measures

TABLE SHOWING THE SIZE AND WEIGHT OF THE UTERUS ACCORDING TO VARIOUS AUTHORITIES AT DIFFERENT PERIODS AFTER DELIVERY.

Authority.	Date of Death after Delivery.	Period of Gestation.	Length in Inches.	Breadth in Inches.	Antero-posterior measure in inches.	Thickness of Walls.	Weight of Uterus.
						Inches.	
Dr. Montgomery.	2 or 3 days.	Full term.	7—8	4	—	1—1½	1½ lb.
Do.	2 days.	Do.	8	4¾	3	1⅝—1	1½ lb.
Do.	7 „	Do.	5—6	—	—	—	1¼ lb.
Do.	14 „	Do.	5	—	—	¾ to 1.	¾ lb.
Do.	16 „	Do.	5 2/12	3 8	—	7—8 lines.	—
Do.	13 „	7th month.	3 9/12	2 9/12	—	6—7 „	—
Do.	5 „	3½ months.	5⅝	3⅝	2¼	6—8 „	—
Do.	A few hours.	5 months.	5⅝	3¾	1½	7—9 „	—
Do.	4th day (twins.)	End of 6th month.	7	4½	2	¾ inch.	N.B. Only one *corpus luteum.*
Do. and Prof. Geoghegan ...	14 days.	5 months.	4½	2 7/8	1⅜	Posterior wall very thick, double that of anterior.	—
Do. and Prof. Banks	4th day (twins.)	5 months.	4½	3	2	—	—
Dr. R. Heschl ...	Immediately after delivery.	—	—	—	—	—	1 lb. 6—8 oz.
Do.	Do. (twins).	—	—	—	—	—	2 lbs. 5—7 oz.
Do.	7 days.	—	—	—	—	—	1 lb. 3—5 oz.
Do.	14 days.	—	—	—	—	—	10 to 11 oz.
Do.	5 weeks.	—	—	—	—	—	5—6 oz.
Do.	2 months.	—	—	—	—	—	1½ to 2½ oz.
Dr. Tyler Smith	Just after delivery.	—	—	—	—	—	1½ lb.

8 inches in length by $4\frac{3}{4}$ in breadth, and 3 inches in the antero-posterior diameter. Its parietes are $1\frac{5}{12}$ to 1 inch in thickness...

At the end of a week the organ has diminished to between 5 and 6 inches in length, and weighs about $1\frac{1}{4}$ lb.; after a fortnight it does not exceed 5 inches in length, and its weight is reduced to about three-quarters of a pound, or a little less; its vascularity is diminished, and the thickness of its parietes is reduced about one-third; their density is, however, increased in a like proportion, so that the orifices of the vessels are much less distinct, and the colour of the muscular substance has become much paler."

But this general description needs modification in special cases. For it must be taken into account that the dimensions of the uterus after delivery will depend, *first*, on the activity of the contraction and absorption; *secondly*, on the time that has elapsed since the confinement; and *thirdly*, on the period of gestation at which the contents were expelled. Thus, well-marked alterations will have taken place if the woman survived delivery a few days. In some instances the uterus will be found as large at the end of a week [and even after two or three months in some cases of sub-involution], as it is in others where the examination is made within two or three days. It would, therefore, be very difficult, if not impossible, to assign the exact dimensions which the uterus should present at given periods, or even after delivery at full term. Thus, if labour occurred prematurely, the dimensions given would be still further affected. If delivery, for instance, occurred in the sixth month, the uterus might and would probably be found as small two or three days after delivery, as it would be at the end of two or three weeks after parturition at full term.

It is advisable to bear in mind, in making a post-mortem on a pregnant woman, the possibility of post-mortem parturition. (*Cases* 33, 34, 35.) This subject has been already referred to (Part I., p. 85). Dr. Aveling, who has investigated post-mortem parturition in great detail, has drawn the following conclusions:—

1. That expulsion of the contents of the uterus may take

place after death, without the aid of art and without any signs of normal parturition having been discovered before death.

2. That many of the accidents of ordinary parturition, such as expulsion of the placenta, spontaneous evolution of the fœtus, prolapsus, inversion and rupture of the uterus, may occur in post-mortem parturition. (See *Cases* 33, 34, 35.)

3. That post-mortem parturition may arise either from the post-mortem contractility of the uterus, or from the formation of abdominal putrefactive gases, the latter being the most frequent cause.*

4. That a child may continue to live in the womb for some hours after the death of the mother. (Obstetrical Society, July 3, 1872.)

V.—The Indications by which to determine whether a Woman has, or has not, been Pregnant at some more or less Remote Period.

This may be a subject for enquiry by the medical jurist in cases where—(1) a husband suspects his wife's chastity before marriage, or her fidelity during a prolonged absence; or (2) by a lady whose character is assailed. It is, moreover, important in certain cases of disputed identity after death. Thus it was raised in the case of Wainwright, tried for the murder of Harriet Lane, in which the uterus itself was the chief witness.

Certain facts relating to this subject are beyond dispute, and may be at once noted. The presence of a hymen is proof positive that no mature, or even nearly mature, infant could have been born *per vias naturales*. Cæsarian section, again, must leave a long cicatrix. Extra-uterine fœtation might indeed exist, but great caution should be used in deciding on the nature of the contents of cysts, since hair (presenting in all respects the character of fœtal hair), teeth, and bones, have been found in ovarian and other dermoid cysts. Such contents are often the remains of a twin pregnancy, of which the subject of the tumour is the surviving twin. They are occasionally found, moreover, in cysts

* We might also add from the development of gases within the uterus itself.

in the male. Again, if the breasts and parts of generation preserve their elasticity and virginal character [*see* Rape], the presumption would be strong, although not decisive, against previous pregnancy. Cicatrices (such as lineæ albicantes) may be caused by ovarian tumours, ascites, etc. The breasts may be enlarged by constant manipulations. A relaxed or torn condition of the genitals may be produced by disease or accidents.

The next question we have to discuss is—What are the diagnostic distinctions between the nulliparous uterus and the uterus that has born a child ?

We say (it is to be remarked) "nulliparous" rather than "virgin" uterus, because intercourse without impregnation exerts no very manifest influence on the anatomical characters of the womb. And here note, that the appearance of the uterus is important, because it is the organ which of all others resists putrefaction, and may indeed be found in cases of exhumation practically unaltered, when all the other viscera have undergone decomposition. (See Part I., pp. 108, 313.)

Dr. Tyler Smith remarks that "in the multiparous uterus the anterior and posterior surface of the body is more rounded. The fundus, instead of being flat, is convex, so that there is a considerable protuberance above a line drawn from tube to tube. The vaginal portion of the neck is altered, being usually larger and more prominent in the vagina. The os uteri, instead of presenting a transverse fissure or smooth round aperture, is more oval or puckered in shape. The depression felt by the finger is more evident, and the orifice is considerably larger. These changes in the os uteri are most evident in women who have borne large families. They are imitated to a slight extent in nulliparous women who have been subject to inflammatory conditions of the os uteri, dysmenorrhœa, polypus, or any of the conditions which excite the growth of the organ, and by surgical operations. The uterus which has been fully developed by gestation, rarely returns to the size of the nulliparous organ. Exceptionally, the uterus after delivery undergoes premature atrophy, analogous to the normal senile atrophy which commonly takes place after the climacteric. Meckel gave the weight of the nulliparous organ at seven or eight drams, and the multi-

parous at an ounce and a-half. [These weights are, perhaps, somewhat understated.—C. M. T.] The diameters are all increased in the multiparous organ. The *interior* of the uterus in the two cases also offers some remarkable differences. The cavity of the body of the multiparous womb is considerably enlarged. The os uteri internum is less distant, and the canal of the cervix is shorter, the penniform rugæ being to some extent obliterated. The cavity of the body becomes less distinctly triangular in shape, the angles into which the Fallopian tubes enter being less marked. These changes are not without practical importance medico-legally. A few years ago a lady of family and her maid were burnt to death together in an hotel at the West End. The bodies were so mutilated as to render any recognition by external signs impossible; but the lady had borne a numerous family, and the identity of her body was ascertained from the condition of the uterus." Two conditions, known to obstetricians as *hyper* and *sub-involution* of the uterus, may, however, greatly affect these appearances. Like the heart and other muscles, the walls of the uterus may be found either thicker or thinner after much exertion.*

Beck (*loc. cit.*, p. 161) gives the following measurements from Velpeau and Madame Boivin :—

	Nulliparous Uterus.	Multiparous Uterus.
Total length	2⅛ to 2½ inches. 26 to 28 lines.	2½ to 3 inches. =30 to 36 lines.
Length of neck	13 lines.	13 to 15 lines.
Length of body	13 lines.	2 inches.
Thickness of uterine walls ...	5 lines.	6 lines.
Cervical walls	2 to 4 lines.	8 to 10 lines.
Breadth of neck	9½ lines.	18 lines.
Thickness of neck	7 lines.	8 to 10 lines.
Total weight without appendages	4·9 dms. (Boivin) (?) 8 to 12 drams (Velpeau).	1½ to 2 ounces.

* The work of the uterus and other muscles in labour is reckoned at from fifty-four pounds to a quarter of a ton !

Dr. Barnes gives the following measurements ("*Diseases of Women*," page 32), on the authority of M. Richet:—

	In the Virgin.	In Women.	In Mothers.
	Inches.	Inches.	Inches.
The vertical diameter of the uterus	2·20	2·52	2·72
Vertical diameter of the cavity	1·80	2·20	2·44
Transverse diameter of the uterus	1·24	1·80	1·90
Transverse diameter of the cavity	0·60	1·08	1·24

The following weights and measurements are also taken from Dr. Barnes (*loc. cit.*). The weight of the uterus in girls at the age of puberty is from 360 to 1000 grains, whilst in women who have borne children it ranges from 1,200 to 1,800 grains. In old women it may be so reduced as to weigh not more than from 100 to 200 grains. At the full term of gestation it may weigh from 26 to 52 ounces.

MM. Guyon and Richet, and Dr. Barnes, point out that the unimpregnated uterus attains its maximum size during the menstrual period, and its minimum during the interval, so that before and after the monthly periods, the mean diameter will be a little in excess of, whilst during the intervals they will be a little below the mean. The vertical diameter of the uterus is unequally divided between the body and the neck. In the virgin, the longest portion belongs to the neck. In multiparous women, the two diameters are nearly equal, the difference, if any, inclining in favour of the body. Again, in multiparæ, the body continues to grow, whilst the neck has undergone an absolute or comparative shortening, which reduces its vertical diameter in some cases even below that of the body.

The normal length or projection of the os tincæ or vaginal portion of the uterus, is from 0·25 to 0·5 inch. The *isthmus* or os internum is in imparous women generally 0·20 inch to 0·25 inch long, 0·16 inch across, and 0·12 inch from before backwards

In multiparæ the length of the isthmus (which is always included in the measurement of the body) is reduced to 0·16 inch and even less. The *walls of the uterine cavity*, apart from pregnancy, are 0·4 to 0·6 inch thick. The thickness is greater in women who have borne children, than it is in the virgin.

The *arbor vitæ* of the uterus is commonly much smoothed down after the first labour. But this is not constant, and it is sometimes found intact after several labours.

There can be no doubt of the general truth of these observations respecting the differences between the uterus of a woman who has borne children, and of one who has not. By the touch, the speculum, and the sound, some of these differences may be appreciated during life. The real difficulty arises in exceptional cases, or where some years have elapsed since delivery, or where there has been but one child, or where the children born were premature.

There can be no doubt that the post-mortem appearances rarely justify one in speaking positively, whether the uterus submitted for examination be that of a woman who has or has not borne children.

On this question, we can quote no better authority than Dr. Meadows, who has discussed the post-mortem diagnosis of a nulliparous uterus ("*Lancet*," December 25, 1875) with special reference to the Wainwright case. His conclusions are (1), that as a general rule, no *absolutely certain* opinion can be given at a post-mortem, whether the woman has or has not borne children; and (2), that as a *question of probability*, some reliance may be placed on the internal appearance of the uterine walls, more especially with reference to their convexity. As to the condition of the cervix, Dr. Aveling suggests that the presence of a large polypus or other morbid growth would materially modify its condition.

There remains one further test of pregnancy respecting which our experience supports the following statement. If the posterior commissure be intact, it is practically certain that the woman has not given birth to a child at full term, seeing that the posterior commissure is rarely affected by sexual intercourse, even in the case of prostitutes. Admitting it to be possible that,

under circumstances of extreme violence, it might be destroyed, nevertheless, a ruptured condition of the posterior commissure strongly points to a woman having given birth to a child, whilst its intact condition is equally strong (and perhaps even stronger) evidence of her not having been delivered of a child at all, and *à fortiori* not having been delivered of one at full term.

Marks characteristic of a previous pregnancy are to be found in the blood vessels of the uterus, but as yet these are not well understood. Dr. John Williams regards the changes occurring in the sinuses of the uterine wall at the seat of the placenta (and which chiefly consist of thickening), as diagnostic of previous pregnancy. They have been noted so late as twelve months after parturition. ("*Lancet*," August 10, 1878, p. 193.)

Chaussier and Brookes have noticed, in the case of women who have borne children, a peculiar thinning of the centre of the osseous plates of the bones of the ilium. [*See* Beck, *loc. cit.*] The nerves of the uterus and its appendages become larger during gestation [Tiedemann, Chaussier, Wm. Hunter, Robert Lee, etc.].

VI.—The Time that must Elapse after Delivery before a Woman can again Conceive and become Pregnant with another Child?

It is usually supposed that a month at least must intervene between the delivery of one child and the conception of a second. Thus supposing the child to be born at a time when, if the woman were not pregnant she would have been poorly, twenty-eight days from this period must be reckoned for the procreative organs to assume such normal conditions as to be able again to exercise their proper functions. Certain it is, that the unnatural conditions consequent on parturition, such as the lochial discharge (which on an average lasts three weeks, or even longer if the child be not suckled—although it is true it may cease in three days), the relaxed state of the uterus, the tender and swollen vagina, etc., must become more or less normal for impregnation to take place.

But the time necessary for this restoration of the genital organs to their normal condition, is very different in different women. Thus Dr. George Lindsay Bonnar, of Cupar, Fife, in his "Critical Inquiry regarding Superfœtation, with Cases" ("*Edinburgh Med. Journal*," January, 1865), not satisfied with the common notion that a month or thirty days must elapse between delivery and a fresh conception, investigated the subject by referring to "Lodge's Peerage and Baronetage." He found that in at least nineteen cases, the interval between one birth and another was less than 309 days. There were ten cases varying from 309 to 300 days, two from 299 to 290, four from 289 to 280, one of 273, one of 252, one of 182, one of 173, and one of 127 days. Regarding these cases, and taking the facts relating to the state of the uterus and vagina and the lochia into consideration, Dr. Bonnar fixes on the *fourteenth* day after delivery as the earliest at which a fresh impregnation can take place.

VII. — The Possibility of the Impregnation of a Second Ovum in a Woman already Pregnant. (Superfœtation.)

By the term 'superfœtation' is implied the impregnation of a second ovum in a woman already with child. The children of the two different conceptions may be born either at the same time or independently of each other.*

The subject abounds with medico-legal importance.

Suppose a case such as the following: A husband immediately after the impregnation of his wife is obliged to leave her, and remains absent a year. In the mean time she gives birth to *two* children at an interval of a number of weeks. The question will then arise whether it is possible for her to do so, under the circumstances, consistently with conjugal purity. It will be important in such a case to determine whether the birth of the

* Pliny says:—"Ubi paululum temporis inter duos conceptus intercessit, utrumque perficitur."—"*Hist. Nat.*," vii. 9. The story of Hercules and Iphicles [sons of Alcmena, by Jove and Amphitryon], will occur to classical readers.

second child is, or is not within the prescribed limits of gestation. If it be outside such limits, the question involved will then be one, not of superfœtation, but of protracted gestation.

Respecting superfœtation considerable differences of opinion exist. Those who consider it impossible urge two difficulties to its acceptance, the one having reference to the ovum getting into, and out of, the Fallopian tube, and the other to the semen getting into the uterus :—

First. It is said that in pregnancy the Fallopian tubes lie parallel, and not as in the unimpregnated state horizontal, to the sides of the ovary. Hence they argue that even supposing the ovum to be expelled from the ovary, the chances are against its entrance into, and conveyance through, the Fallopian tube into the uterus.

Secondly. It is said that in the impregnated uterus, the os and the uterine openings of the Fallopian tubes, are so choked with a thick tenacious mucus, that it is impossible for the spermatozoa to reach the ovum so as to fructify it.

Admitting the force of the first objection, as applicable possibly to the later months of pregnancy, it certainly does not apply to the earlier months; and further, admitting the general truth of the statements, we are far too familiar with exceptional positions to assert the impossibility of any deviation from the normal. As regards the second difficulty, again admitting that there is much truth in what is urged, it is difficult to see why under exceptional circumstances the seminal fluid should not find its way into the womb and so reach the ovum, seeing that menstrual blood (as certainly happens during pregnancy in exceptional cases) is able to find its way out.

Many of the supposed cases of superfœtation we must admit are capable of explanation more easily in other ways, than as instances of superfœtation. Of these may be mentioned—

(1.) *Twin births*, where an interval has elapsed between the birth of the two children.

Numerous cases are on record where the interval of birth in the case of a twin conception has been considerable. (*Cases* 13, 15.) In a case of triplets an interval of fifteen days between the birth of each child is stated to have occurred. (*Case* 16.)

In considering how far cases of superfœtation are liable of being confounded with cases of twins, it is important to note that recorded instances abundantly prove the possibility of a fœtus remaining in utero for a considerable time after its death, even when there is no other fœtus alive in the womb. Sir James Simpson and others speak of cases in their experience, where a dead fœtus has been retained for two or three weeks. Other cases are recorded where, at the fifth and eighth month of pregnancy, dead fœtuses, of not greater development than from three to five months, have been born. (*Case* 9 [5,] [6 β] and [7].) Again there are many recorded cases where dead fœtuses of different degrees of development have been retained until the normal period of pregnancy expired. (*Case* 9 [1], [2], [3].) Dr. Ramsbotham from experience admits this to be possible, but seems to doubt those cases where the fœtus was said to have been retained in the uterus for times far in excess of the ordinary period of utero-gestation. Of instances of this kind, however, *Case* 9 (4 α), and (6 α), where 11 months is said to have elapsed, and *Case* 9 (4 β) and also (4 γ), where very much longer periods are mentioned, are illustrations. There seems, however, from the records no reason to doubt but that a dead fœtus may be retained in utero, until the full term of pregnancy has expired.

Cases 10 and 11 bring before us another important fact bearing on this subject, viz.: that in the case of a twin conception one of the children may die at an early stage of the pregnancy, and yet be retained in the womb along with the living fœtus, the quick and the dead ultimately being born together at full term.

In the light of these facts, many of the records where two or more children of different development have been born at the same time (such as *Cases* 23, 26, 27, and 28), must be considered as doubtful instances of superfœtation. *Case* 25, again, is probably one of triplets, where the two dead children were retained in utero until the birth at full term of the living one.

In cases where an interval between the births has occurred, much care is needed before we should be justified in accepting

superfœtation rather than a twin conception as the explanation of the occurrence. Thus, in *Case* 19, notwithstanding the opinion of Zacchias, the most probable explanation is, that the case was one of twins conceived at the same time, but where one fœtus died and was discharged before the other. At any rate this explanation is consistent with experience, and withal simple. *Case* 20 is open to the same interpretation, more especially seeing that we have no accurate records of the degree of maturity of the first child. Again, in *Case* 24, although it is true that the second fœtus, discharged twenty days after the first, was less mature than the first, the difficulties at this early period of deciding exact maturity, and the fact that we are unable to fix the precise time of death, would lead us to hesitate before we accepted the case as one of superfœtation. In *Case* 17, one mature child was born at full term, and 14 days afterwards a fœtus of about four months. But here, seeing that the fœtus itself appeared imperfect, and further that the mother had a severe fright about the fifth month of pregnancy, after which her bulk became reduced, it is less difficult (and the facts seem to bear out this interpretation) to believe this to be a case of twin conception—the dead fœtus being retained for a longer period than the living one—than a case of superfœtation. So again, *Case* 29 is manifestly one of twins, where the living child remained in the uterus its full term, whilst the dead child was discharged,—a condition somewhat the reverse of *Case* 17, and (we may add) the more usual.

From these cases it will be evident that much care is needed to distinguish between superfœtation and twin conception.

(2.) Some apparent cases depend on the existence of a double or bipartite uterus. (See Cassan "*Recherches sur les Cas d'Uterus Double, et de Superfœtation.*") Thus, in *Case* 14, where a four months' fœtus was discharged six months after marriage, and mature twins at forty weeks, both uterus and vagina were found double. Of course this might be a case of superfœtation; nevertheless the anatomical conditions are such as scarcely to warrant us in including it within such category. (Edis "*Diseases of Women,*" p. 31.)

(3.) Some cases may be explained by pre-existing extra-uterine fœtation.

(4.) Some cases may depend on the interval that it is possible may elapse between insemination and fructification.

Making, however, all possible deductions, there remain a certain, though (we admit) small, residuum of cases, which it is difficult, if not impossible, to explain on any other supposition than that a second impregnation must have taken place during the time that the uterus contained a partially developed fœtus.

Take, for instance, *Case* 22. Admit both children to have been conceived at the same time. Assuming the second child to have been a nine months' child, the first child born (and which lived for one or two years) must have been only a three and a-half months' child. Again, *Case* 18, where two "mature" children were born at an interval of nearly three calendar months, is difficult to explain otherwise than by regarding the children as products of different conceptions. Again, in *Case* 12, two mature children were born at an interval of four and a-half months only. Again, the two cases recorded under *Case* 21 are probable instances of superfœtation, for if they be not, in the one, (α) a child of 160 days must have lived to the age of 28 (which we admit not to be impossible, however improbable), and in the second, (β) a child of 113 days must have been reared (which is against recorded cases).

Perhaps, however, analogy supplies us with the strongest arguments in favour of superfœtation. Instances are not unusual, where a bitch gives birth at the same time to pups of different species, and a mare in like manner to a horse and a mule. These facts prove conclusively the possibility of one conception following closely upon another. And of a like kind in the human subject are *Cases* 30, 31, and 32, where women have had twins or triplets, each child being of a different colour, clearly indicating that the woman had had intercourse with men of different nationalities.

In all cases where superfœtation is believed to have occurred, there are two points for the medical jurist to investigate, *first*, the size and development of each child:—in other words, the uterine age of the children, always remembering that healthy

products of the same conception may differ greatly in size, and that absolute exactitude in this particular is scarcely possible; and *secondly*, if there be an interval between the births, it will be important to learn exactly the precise length of the interval.

This latter point suggests the following general statements :—

Supposing both children to be mature, and *the interval of birth to be two months*, superfœtation would be probable, seeing that it is not likely (although possible) for a seven months' child to be as mature and as full sized as a nine months' child.

Supposing that two children be born at an interval varying between two and three months, the first child being immature, although capable of being reared, and the second mature, such a result is far more likely to be a case of twins, where one child is born prematurely and the other at full term, than one of superfœtation.

Supposing that two children be born *at an interval of four months*, and that both be capable of being reared, superfœtation is probable, otherwise we must admit the five months' child to be capable of being reared, a circumstance which, although not impossible, is in the highest degree improbable.

Supposing a child be born at an interval of six or seven months from a previous pregnancy, we must carefully consider the exact degree of maturity of the second child, and the possibility of marital access. It will then be necessary to balance the probabilities of the case being one of superfœtation, or of the second child being born at an unusually early period of utero-gestation.

Remembering (α) that there is no absolute rule whereby an eight months' child can be distinguished from a nine months' child, and (β) that the maturity of children varies somewhat with different women, and (γ) that in twins the degree of maturity of the two children is invariably different, we would lay down the three following as necessary rules to be observed in forming an opinion on a suggested case of superfœtation :—

(1.) Allow no case to be one of superfœtation unless, both children being mature, the interval of birth is at least *two* months.

(2.) If the first child born be mature, and the second im

mature although capable of being reared, the interval of birth must at the very least be *three* months, even to admit the probability of the case being one of superfœtation.

In this latter case the degree of maturity must be most carefully investigated, and every allowance made for possible error.

(3.) If the interval between the two births be *four* months, and both children be capable of being reared, superfœtation may be fairly admitted.

RULES TO BE OBSERVED IN THE EXAMINATION OF CASES OF SUSPECTED PREGNANCY.

One general remark of caution may be advisable. A medical man is not in any case justified in examining a woman at the mere request of a policeman, or of her master or mistress, or of a coroner ("*B. M. J.*," October 7, 1871, p. 419), or even of a magistrate, unless by a written order in the case of a prisoner under his control, *without her full consent* (and it is desirable that this should be given in the presence of witnesses). An unauthorised examination has on more than one occasion constituted the ground of an action for damages. (See case of *Latter* v. *Braddell and Sutcliffe*, "*B. M. J.*," August 7 and December 11, 1880.) Further to submit is not to consent. Assent given by a servant girl because her mistress accuses her of being pregnant, and practically compels her to submit to an examination (the girl fearing worse wrongs) is not consent, although it may be submission. In the case of *Ward* v. *Sergeant* (Manchester, January, 1878), where a police surgeon merely placed his hand on a woman's abdomen against her will, without any examination of the genital organs whatsoever, the case being one where the surgeon feared death from hæmorrhage, the judge (Mr. Justice Denman) dealt with the definition of consent. "If," he said, "the examination was made under a mistaken impression that the woman consented when she really did not do so, the verdict must be for the plaintiff, but the fact would affect the question of damages." (See "*Med. Times and Gazette*,"

January 26, 1878, p. 100; "*British Med. Journ.*," January 7, 1882.)

For a medical man to help strip a patient, even under the pretence of its being necessary for purposes of diagnosis, might be construed into an assault. In all such cases it is infinitely better, if it be requisite that the clothes be taken off, for the medical man to leave their removal entirely to the patient herself, without on his part the slightest interference.

In conducting the examination of a woman where pregnancy is suspected, the following general rules should be borne in mind:—

1. The examination should be thorough, and where important questions are involved, made in the presence of a witness, and with the assistance of a colleague.

2. No reliance (for legal purposes) should be placed upon the feelings or fancies of a woman, nor upon any account given either by herself or friends, but on the physical signs only. Remembering how often respectable married ladies who have had many children are deceived in matters relating to pregnancy, it is not to be wondered at if a woman who has never had a child should make a mistake, more especially considering that she may have great temptations to induce others to believe her pregnant, or the reverse.

3. Never rely on one single symptom as proof of pregnancy, even if it be so marked a sign as the sounds of the fœtal heart. It is seldom safe to pronounce definitely the existence of pregnancy, unless three or four at least of the ordinary symptoms are unquestionably present.

4. In the majority of cases, it is not possible to be *absolutely* certain of the existence of pregnancy before the sixth or seventh month of utero-gestation, although a strong and probably correct opinion may often be formed at a much earlier date.

ILLUSTRATIVE CASES.

1. Lancet, Dec. 12, 1874, p. 853.—(*Dr. Farrar.*)—Female, æt. 7 days. Both breasts contained milk. Each gland measured two inches in diameter, and was considerably elevated. The nipples appeared inverted, the openings being on a level with the surface of the glands. (Page 112.)

2. Lancet, July 6, 1878, p. 34.—(*Mr. Edwin Jackson.*)—Lactation in a female child, æt. 8 days. About a teaspoonful of milk was drawn from each breast on two successive days. (Page 112.)

[Some glandular activity is mentioned as having occurred in the case of a previous child (a boy) of the same parents.]

3. Brit. Med. Journ., Jan. 1, 1876.—A case mentioned where a bitch had a copious secretion of milk nine weeks after being in heat, although at the time not in pup. (Page 112.)

4. New York Med. Jour., IX., p. 440.—(*Dr. V. Havard.*)—Cases of milk in the breasts of new born children. (Page 112.)

4a. London Hospital Reports, Vol. IV., p. 80.—(*Dr. Meymott Tidy.*)—Milk in the breasts of a single woman, from her allowing an infant to suck at the nipples. The quantity secreted was sufficient to permit of her suckling the child. (Page 112.)

5. Edin. Med. Journ., March, 1874.—(*Dr. Underhill.*)—A case of spurious pregnancy with labour in a woman, æt. 23, recently married. No special indications of hysteria. During the supposed pregnancy, there was sickness, cessation of catamenia, swelling of abdomen, enlargement of breasts, and apparent movements of the child. Dr. Underhill was called to see her eleven months after her marriage. She believed herself then to be in labour, and the usual symptoms existed that accompany it. On examination Dr. U. found the whole thing to be a mistake. "She acquired the most accurate description of the breeding symptoms, and with wonderful facility imagined that she felt every one of them." (Page 120.)

[Dr. Duncan in the course of discussion said that he had seen many cases of spurious pregnancy, but only one of spurious labour.]

6. Brit. Med. Journ., Jan. 25, 1879, p. 131.—(*Mr. G. Miles.*)—A case of spurious pregnancy. (Page 120.)

7. Brit. Med. Journ., Feb. 15, 1879, p. 257.—(*Mr. C. R. Brown.*)—A case of spurious pregnancy and labour in a lady, æt. 45. (Page 120.)

8. Brit. Med. Journ., April 17, 1880, p. 592.—(*Rev. Dr. Haughton.*)—A case of a phantom tumour, simulating pregnancy, in an ass. (Page 120.)

9. For Cases where the uterus retained a dead fœtus to full term, confer page 141 :—

(1.) **Vincent Alvario** ("*De Abortu*," *in 4to, Roma*, 1827). A four months' fœtus, completely dried up, discharged at full term.

(2.) **Demeaux** ("*Gaz. Med. de Paris*"). A four months' fœtus born at nine months. The mother, when four months gone, had an accident in a crowd. The skin of the child appeared as if tanned.

(3.) **Gennaro Galbiati** ("*Bulletin de l'Académie Med. Chir. de Naples*," November, 29 1864) records three similar cases to the above.

(4.) **Observatore Medico, Naples, 1834.**—Records—(α.) Case where a dead fœtus was retained for eleven months. (β.) Case where a dead fœtus was retained for 11 years. (γ.) Case where, at the post-mortem on a woman who imagined herself pregnant for 51 years, a desiccated fœtus was found in the uterus.

(5.) **Edin. Med. Journ., XIV., p. 756.**—(*Dr. James Young.*)—Female, æt. 36, 6th pregnancy. Child died three months before labour, during which time the mother was able to attend to her domestic duties. The death was estimated to have occurred at the 5th month, and the labour at the 8th month of gestation. The odour evolved from the fœtus when born was very offensive. Length, ten inches; weight, three pounds.

(6.) **Med. Press and Circ., May 3, 1876, p. 360.**—(*Dr. Churchill.*)
(α.) An ovum retained for eleven months, the catamenia during the time being suppressed.
(β.) A dead fœtus retained for three months, after a five months pregnancy. (*Dr. Atthill.*)

(7.) **Lancet, March 1, 1873, p. 305.**—(*Dr. Mitchell.*)—A fœtus of two months, retained for at least three months after its death.

10. British Med. Journ., July 24, 1875, p. 102.—(*Dr. Edis.*)—A shrivelled fœtus of five months discharged at full term with a living child. (Page 141.)

11. New York Med. Journ., X., p. 36.—(*Dr. P. de Marmon.*)—Birth at term of a healthy living child, and with it at the same time of a six months' fœtus in a state of complete putrefaction. The mother when three months pregnant had a fall.

Two similar cases are recorded, (1) by Dr. Marye ("*Archiv de Med.*," 1830, t. xxiii., p. 259), where a woman was delivered of a living child at term, and of a second estimated to be a five months' child, but not putrefied; and (2) a case by Portal (Cazeau, "*Traité de l'art des Accouchements*," 1846, p. 136.) (Page 141.)

12. Naphey, "Physical Life of Woman," p. 158.—Marie Anne Bigaud, æt. 37, gave birth on April 30, 1748, to a full term mature boy, which survived its birth 2½ months, and to a second mature child (girl) on September 16, 1748, which lived for one year.

The mother was proved after her death not to have had a double uterus. (This case is vouched for by Professor Eisenman, and by Leriche, Surgeon-Major of the Strasbourg Military Hospital.) (Page 143.)

13. "Henke's Zeitschrift," 1837.—(*Dr. Möbus.*) (Recorded by Taylor, *Med. Juris.*, II., p. 227.)—Two children, born at an interval of 33 days. (Page 142.)

14. Med. Gazette, Vol. XX., p. 508.—A four months' fœtus born six months after marriage, and mature twins at forty weeks after in the same woman. [In this case the uterus and vagina were found to be double, each vagina having a separate orifice.] (Page 142.)

15. British Med. Journ., Feb. 14, 1880, p. 242.—(*Dr. Carson.*)—Two children, probably twins, born at an interval of 44 days. (Page 140.)

16. Foderé (Vol. I., p. 484) records the case of a woman at Turin, in 1797, who was successively delivered of three children, at intervals of fifteen days. (Page 141.)

17. Denman's "Midwifery."—A case (from Lady Farquhar) in which a woman had a severe fright between the fifth and sixth months of pregnancy, after which her bulk was reduced. She went the full nine months; and on the 11th February was delivered of a healthy child. She, however, continued in pain, and on the 25th of the month the head and parts of a child were born, that had the appearance of a miscarriage of four months. (Page 142.)

18. "Transact. London Coll. Phys.," Vol. IV., p. 161.—(*Dr. Maton.*)—Mrs. T——, an Italian, married to an Englishman in Sicily, was delivered on November 12, 1807, of a healthy male child, which survived its birth nine days. On February 2, 1808, *i.e.*, not quite three months after, she was delivered of another male infant, completely formed. This child died of measles when three months old. It appears that both children were perfect and mature. The husband himself communicated the circumstances recorded. (Page 143.)

19. Zacchias ("Consilia," No. 66) states that J. N. Sobrejus lost his

life in a quarrel, leaving his wife *enceinte*. Eight months after his death she gave birth to a deformed child, which died in partu. The abdomen remained large. One month and a day after, she gave birth to a perfect living child. The legitimacy of this second child was suspected, the relations urging that it was the fruit of a superfœtation. Zacchias on being consulted, agreed, on the ground of the long interval, that there must have been two conceptions. He considered, however, that the *first* child was the product of the superfœtation, and conceived a month after the other. This opinion established the child's legal rights and preserved the character of the mother. (Page 142.)

20. Glasgow Med. Journ., Jan., 1866.—A girl was accused of infanticide. The medical men who examined her decided she had been recently delivered. She, on the contrary, claimed to be then pregnant. She had, however, previously admitted to a fellow servant, that she had given birth to a child, and had made away with the body. Three months from this time, she was again confined with a mature and healthy child. It was proved that she had had connection with two men.

She was tried for the murder of the first child, but acquitted, because the body was not forthcoming. (Page 142.)

21. Taylor, Vol. II., p. 230.—(*Baron Auckland*, 1782.)—(*α.*) Case of a child that lived to the age of 28, born 174 days after a previous delivery. Supposing fruitful intercourse to have taken place a fortnight after parturition, this makes the pregnancy to have lasted only 160 days.

(*β.*) A similar case recorded (Lord Gordon, 1850), where a child born after an interval of only 127 days from the last confinement was reared. Deducting 14 days, this would make the child to have been born on the 113th day of utero-gestation. (Page 143.)

22. Communicated by Dr. Desgranges, of Lyons (Foderé, Vol. I., pp. 484-5-6).—The wife of Raymond Villard married when twenty-two years of age. She became pregnant five years after, but had an abortion at the seventh month (20th May, 1779). She conceived again within a month, and on the 20th January, 1780, *i.e.*, eight months after her delivery, and seven months from her second conception, she brought forth a living child. This delivery was not accompanied by the usual symptoms, for no milk appeared, the lochia were wanting, and the abdomen remained large. A wet-nurse was got for the child, and two surgeons visited the mother. Being puzzled, they called in Dr. Desgranges, who declared she had a second child in the womb. This was doubted, but three weeks after her delivery she felt the motion of the fœtus, and on the 6th July, 1780 (five months and sixteen days after the first birth), she was delivered of another living child. Milk now appeared, and she was able to suckle the infant. Dr. Desgranges adds, that it is not possible for this second child to

have been conceived after the delivery of the first. "Car le mari ne lui avait renouvelé ses caresses que vingt jours après, ce qui n'aurait donné au second enfant que quatre mois vingt-sept jours." The narrative of this case was accompanied with a legal attestation under the oath of the mother. On the 19th of January, 1782, both children were living. (Page 143.)

23. Med. Gazette, Vol. XLIV., p. 87.—(*Dr. Horlbeck.*)—A fœtus of six months expelled along with one not exceeding six weeks. (Page 141.)

24. Med. Times and Gazette, May 16, 1874, p. 551.—(*Mr. H. D. Dean.*)—A three months' fœtus passed on December 1st. On December 21st, a second fœtus not more than two months old, and about one-half the size of the first, came away. [Case is doubtful as one of superfœtation although quoted as such.] (Page 142.)

25. Lancet, June 30, 1877, p. 959.—(*Mr. Tidswell.*)—A woman at her second confinement gave birth to three children. One was alive and full grown, and the other two of about four to five months' development, being dead. One of these, the reporter believed, had only been dead a week, but the other for a longer time. There were two placentæ, the two dead children having a single placenta between them. (Page 141.)

26. Brit. Med. Journ., March 20, 1875.—(*Mr. H. J. K. Vines.*)—A case where two children were born at an interval of forty-eight hours, one being mature, and the second a fœtus of about two months' development. (Page 141.)

27. Edin. Med. Journ., XIII., p. 1056.—(*Dr. Aitchison.*)—Female æt. 30, gave birth at the same confinement to a seven months' fœtus, and to one of about four months' development. (This case is believed by Dr. Aitchison to be one of superfœtation, but it is exceedingly probable that it is one of twins differently developed expelled at the same time. Similar cases were referred to during the discussion by Drs. Keiller and Cuthbert.) (Page 141.)

28. Med. Press and Circ., Dec. 11, 1872, p. 510.—(*Dr. Carlisle Terry.*)—A supposed case of superfœtation, but of a doubtful nature.

[Dr. Beck refers to a case by Mr. Warner in the "*Philosophical Transactions*," Vol. LX., p. 453.] (Page 141.)

29. Medico-Chirurgical Transactions, Vol. IX., p. 194.—(*Mr. Chapman.*)—"A singular case of the expulsion of a blighted fœtus and placenta, at seven months, a living child still remaining to the full period of gestation." The placenta expelled at seven months, was "the size they usually are between five and six months, to which was attached the membranes also, quite perfect, but of a dirty yellow colour, flattened, and closely embracing a small

fœtus, not larger than they are generally seen between three and four months." (Page 142.)

30. Dr. Mosely on "*Tropical Diseases*," &c., p. 111, tells of a negress who brought forth two children, one a negro and the other a mulatto. She said that a white man on the estate had had intercourse with her directly her black husband had quitted her.

[Instances of this kind appear to have been numerous in tropical and slave-holding countries. Beck gives nearly half a page of references to such cases.] (Page 143.)

31. Rev. Dr. Walsh, in his notices of Brazil, Vol. II., p. 90, narrates circumstantially the case of a creole woman, who had three children at a birth, of three different colours, white, brown, and black, with all the features of the respective classes.—(*Dr. Henry.*) See Naphey's *Physical Life of Woman*, p. 158. (Page 143.)

32. Foderé, Vol. I., p. 482.—On the authority of Buffon a case is recorded of a woman at Charleston, South Carolina, who, in 1714, gave birth to twins, one being white, and *the other* black, very soon after one another. She confessed that immediately after her husband had left her, she was forcibly raped by a negro. (Page 143.)

33. Med. Press and Circ., April 3, 1872.—(*Dr. A. C. Swayne.*)—Case of post-mortem parturition. A pregnant woman, æt. 40, died on March 14th, undelivered. She was buried on March 17th, but was exhumed on March the 18th, when a well developed male infant with the placenta entirely detached from the mother, were found in the coffin. The child lay parallel to the lower limbs of the mother, with its head towards the mother's feet, and the feet eight inches from the vulva. The uterus of the woman was prolapsed and rent, and her abdomen much distended with gas. Dr. S. believes it to have been a case of post-mortem parturition, due to the pressure of putrefactive gases in the abdomen. (See letter on this case "*Med. Press and Circ.*," April 17, 1872, p. 352.)

[A similar case to that mentioned above, occurring two days after death (Mr. F. J. Dillon Lanigan). Also one by Mr. C. H. Roche ("*Med. Press and Circ.*," April 17, 1872), in a woman æt. 35, delivery occurring thirty hours after death, due (in his opinion) to uterine contractions, and not to the gases of putrefaction. Also a case by Dr. H. O'Farrell ("*Med. Press and Circ.*," April 24, 1872.)] (Pages 132, 133.)

34. Lancet, Sept. 28, 1872.—(From the "*Indian Med. Gaz.*").—Two cases of post-mortem delivery. In one case the uterus was found to be completely everted. (Pages 132, 133.)

35. Vierteljahr. für Gericht Med., Band XXVIII., p. 228.—(*Dr.*

Ostmann.)—Post-mortem delivery (spontaneous) accompanied by extrusion of the uterus in a female, married five months. This was no doubt the result of pressure arising from the formation of putrefactive gases in the abdomen. (Pages 132, 133.)

36. Med. and Surg. Reporter, Philadelphia, June 13, 1868.—(*Dr. H. D. Ballard.*) — Girl, æt. 18, delivered of a child, during the night. The delivery caused so little disturbance as not even to excite the suspicion of any member of the family. The girl came down to breakfast as though nothing had happened, walked to the school where she taught, a distance of half a mile, and when her duties were over, returned in the evening. The next day she walked twelve miles, and was married on the fifth day after her confinement. (Page 126.)

37. Obstetrical Society, May 3, 1882.—(See the "*Lancet*," May 27, 1882.) (*Dr. W. A. Popow*).

(1.) A prostitute, æt. 21. Death from prussic acid poisoning. At the post mortem a fully ripe corpus luteum was found in the ovary, although at the time of death she was neither pregnant nor menstruating. (Page 125.)

(2.) Female, æt. 41. Death from gangrene of a uterine fibro-myoma. Not pregnant. The ovary contained a true corpus luteum, which in other respects resembled the ovary of a pregnant woman. (Page 125.)

38. Med. Times and Gazette, February 23, 1878, p. 211.—(*Dr. Armstrong*).—A hydatid mole pregnancy in a multipara, æt. 35, at the 10th week. (Page 128.)

CHAPTER III.

ABORTION.

General Considerations—Natural Abortion—Maternal and Fœtal Causes of Abortion—Artificial Abortion—Criminal Abortion—Law of Fœticide—Means used to procure Abortion—Abortifacients—Duties of Medical Experts in cases of Abortion.

ILLUSTRATIVE CASES (Page 177).

THE interests of society have suffered, and in a measure are still suffering, from such words as "animate" and "inanimate" being applied to the fœtus, and from the absurd attempts to fix a period when vitality begins. Thus it has been stated by some that life begins on the third, and by others on the seventh day after conception. Forty days (Galen), sixty days (Zacchias), the period of quickening, and the period of birth (the Stoics), have each had their advocates as the advent of the first life. Some have held that the time of commencement of vitality in boys differs from that in girls, Hippocrates fixing the thirty-second day for the male and the forty-second for the female, whilst others, with equal reason, have fixed the fortieth for the male and the eightieth day for the female.

But to the modern physiologist these questions have no interest. To him the ovum as really lives the instant of impregnation, as does the child or the man. Criminal abortion, therefore, is as criminal the instant of conception, if we could tell it, as at any other period of pregnancy. The life may be feeble and the embryo incomplete, but neither feebleness of life nor incompleteness of embryo constitute the slightest argument against the existence and perfection of the vital principle. We agree with Percival (Vol. ii., p. 430, 431),—"To extinguish the first spark of life is a crime of the same nature both against our

Maker and Society, as to destroy an infant, a child, or a man."

To cause the death of a child *after* it is born is murder. It surely ought to be regarded in the same light whether the child die by injuries inflicted on it before or after its birth. And yet the law does not account it murder to kill a living child whilst it is being born, nor to cause the abortion of a living ovum. Here law and physiology are in conflict.

In considering a case of abortion, three questions suggest themselves :—

1. Has the ovum or fœtus been prematurely expelled?
2. Has this premature expulsion (abortion) been effected naturally or intentionally.
3. If it be intentional, was the act criminal; or were there circumstances existing to render the operation justifiable?

The subject of abortion, therefore, divides itself under three heads :—

I. *Natural Abortion.* And this is of two kinds ;—

(*a.*) *Miscarriage; i.e.*, the expulsion of an ovum or of a non-viable fœtus.

(*β.*) *Premature Labour; i.e.*, the expulsion of a child after it is viable.

II. *Artificial Abortion: i.e.*, the inducing of premature labour for the purpose of saving the life of the mother, and, if possible, of the child.

III. *Criminal Abortion*, or *Fœticide.*

I.—Natural Abortion.

Of natural abortion there are two varieties :—

(*a.*) *Miscarriage* (abortion): *i.e.*, the expulsion of an ovum or of a non-viable child.

(*β.*) *Premature Labour: i.e.*, the expulsion of a viable child.

And here it is to be remarked that some women are predis

posed to abort from the slightest exciting cause. That fear and anxiety alone may be sufficient, the medical records of the siege of Paris afford abundant evidence. As we have before remarked, it is not improbable that the apparent sterility of prostitutes depends rather on their frequently aborting at very early periods of gestation, than to actual non-conception. And this view is somewhat confirmed by the fact, that if they marry they frequently become fruitful. Others, again, seem proof against the most severe physical injuries and suffering, and the most violent mental excitement. (*Cases* 15, 16.) It will be important to remember this fact when we consider criminal abortion, and the means adopted to bring it about. In one case every attempt, however severe, fails; in a second, any attempt, however slight, succeeds.

The principal causes of what we have called *natural*, in contradistinction to *criminal* abortion, are well stated by Dr. Barnes ("*Obstetric Operations*," p. 385, 1st ed.) as follows:—

A.—*Maternal Causes of Abortion.*

1. *Poisons circulating in the mother's blood:*—
   - (*a.*) Introduced from without; as fevers, syphilis, various gases, lead, copper, etc.
   - (*β.*) Products of morbid action; as jaundice, albuminuria, carbonic acid from asphyxia, and in the moribund.

2. *Diseases degrading the mother's blood:*—
   Anæmia, obstinate vomiting, over-lactation.

3. *Diseases disturbing the circulation dynamically (mechanically); as* liver, heart, and lung disease.

4. *Causes acting through the nervous system:*—
   - (*a.*) Certain nervous diseases; as chorea, etc.
   - (*β.*) Mental shock.
   - (*γ.*) Diversion or exhaustion of nerve force; as from obstinate vomiting.

5. *Local disease:*—
   - (*a.*) Uterine disease; as fibroid tumours [polypi], inflammation, hypertrophy, etc., of the uterine mucous membrane.

(β.) Mechanical anomalies; as retroversion, pressure of tumours external to uterus, etc.

6. *Climacteric abortion.*
7. *Abortion artificially induced.*

B.—*The Fœtal Causes of Abortion.*

1. *Diseases of the membranes of the ovum :—*
   (α.) Fatty degeneration.
   (β.) Hydatidiform degeneration.
   (γ.) Inflammation, congestion.
   (δ.) Apoplexy.
   (ε.) Fibrous deposits,
2. *Diseases of the embryo itself :—*
   (α.) Malformation.
   (β.) Inflammation of serous membrane.
   (γ.) Diseases of nervous system.
   (δ.) „ kidney, liver, etc.
   (ε.) Mechanical, as from torsion of the cord or funis.

The causes of abortion are often complicated; in other words, they may be partly maternal and partly fœtal. It is often difficult to unravel them, or to discover the primary cause. Further, abortion has a great tendency to become a habit.

Whether from disease or otherwise, there can be no doubt that the earlier the period at which the uterus is emptied, by so much the greater, *cæteris paribus*, is the danger. For at or near full term, the uterus is a collection of powerful muscles, able to contract firmly, not only upon its contents, but, when these are expelled, upon the gaping and bleeding vessels; whilst at earlier periods, its powers of contraction are more limited, and, (as a result,) the risks of hæmorrhage infinitely greater. But hæmorrhage is not the only risk, for the gaping sinuses may absorb every kind of poison—gaseous, liquid, and solid. Hence the woman in such case is exposed to a variety of zymotic and septic diseases [fevers, pyæmia, puerperal peritonitis, etc.], to which she is infinitely less liable after delivery at full term.

II.—Artificial Abortion:

In other words, the Induction of Premature Labour.

Our laws do not formally recognise the induction of premature labour by the medical practitioner. Judges, however, have always held that medical men are morally justified in inducing premature labour, provided the object be to save the life of the mother, or child, or both, just as the law regards operations as justifiable, although, as Dr. Taylor remarks, no such exceptions are made in the Statute on Wounding.

The first general medical agreement upon this question appears to have been about 1756, in which year Dr. Kelly informed Dr. Denman that "there was a consultation of the most eminent men at that time in London, to consider the *moral rectitude* of, and the advantages which might be expected from, this practice,—which met with their general approbation." [Confer Denman's "*Introduction to Midwifery*," p. 318, 7th ed.; Churchill's "*Manual of Midwifery*" (chapter on "Obstetric Morality"), and "*Researches on Operative Midwifery*," A Paper by Dr. Barnes in the "*Obstetrical Society's Transactions*," Vol. iii., 1862.] The objection advanced by Catholics against destroying infant life before the possibility of baptism, does not apply to the operation at a time when the infant is *viable*, this being what is generally meant by the induction of premature labour. It must indeed be a very unusual case where the necessity for inducing abortion in the earlier months of pregnancy—*i. e.*, before the child is viable—can be justified.

The cases in which it has been recommended to induce premature labour are:—

(1.) In cases of extreme narrowness of the pelvic brim. In certain cases of deformity, where neither version nor forceps can succeed at full term in bringing into the world a living child, this may often be accomplished, with perfect safety to the mother, by inducing premature labour at the seventh month," ("*Lancet*," March 6, 1880.)

It is mainly in cases of this kind that the induction of premature labour is permissible.

The following table (after Ritgen) gives the periods, founded on the measurements of the pelvis, at which, in his opinion, premature labour may be induced :—

At the	29th	week	when the conjugate diameter of the pelvis is	2 in. 7 lines.
„	30th	„	„ „ „	2 „ 8 „
„	31st	„	„ „ „	2 „ 9 „
„	35th	„	„ „ „	2 „ 10 „
„	36th	„	„ „ „	2 „ 11 „
„	37th	„	„ „ „	3 „

(2.) In some cases of obstinate vomiting, where all expedients have proved fruitless and a fatal result is anticipated.

(3.) In cases of pregnancy complicated with insanity ["*Lancet*," June 21, 1879, (Dr. Thorburn)], diseases of the uterus or other organs, (such as cancer, fibrous tumours, etc.)

(4.) In cases of placenta prævia, or where there is severe hæmorrhage.

(5.) In cases of rupture of the uterus.

(6.) In cases of narrowing of the soft passages, cicatrices of the vagina, etc.

The chief methods of inducing premature labour are :—

1. Puncturing the amniotic sac or membranes.
2. The administration of ergot of rye, or other ecbolic.
3. Separating the membranes from the lower portion of the uterus.
4. Passing a flexible catheter between the membranes and uterus (*i. e.*, within the womb), and retaining it there for some hours.
5. Mechanical dilatation of the cervix by instruments, or by sponges, or by laminaria tents, or by india-rubber bags filled with warm water or air (Barnes' or Keiller's *dilators*).
6. Galvanism.
7. Irritation of the mammary glands or breasts.
8. Injection of carbonic acid into the uterus. (Scanzoni relates a fatal case by this method, and so also do Bernard and others.)
9. Injections of warm or cold water, or of both alternately,

into the vagina or uterus. The use of cold water applied externally is said sometimes to be successful. ("*Amer. Journ. of Med. Sciences*," Oct., 1871, p. 363.) Large enemata, or the introduction of plugs into the rectum or vagina, would probably be effectual.

It is possible, by one or other of these methods, particularly by the use of dilators, not only to bring on labour, but to time the birth of the child to within a few minutes. In some cases, the forceps or version, or even instruments for destroying the child, might have to be used to complete the delivery.

It is manifest that if any question were to arise, or action at law be commenced, against a medical man either for inducing abortion, or for manslaughter if the child born alive died because it was immature, it would be necessary to show—(1) that there was a necessity for the operation, the life of the mother being at stake, and the operation being less to be feared than natural delivery; and (2) that his action was *bonâ fide*.

We strongly urge upon medical men—

(1.) Not to induce premature labour or abortion without the most mature consideration.

(2.) Not to undertake it until after consultation with a second practitioner.

(3.) In any case to have the full consent, in writing if possible, of the husband or guardian.

III.—Criminal Abortion (Fœticide).

The term abortion is popularly limited to procuring the expulsion of the contents of the womb before the sixth month of gestation, but the law makes no such distinction in point of time. As a rule, criminal abortion will probably be attempted between the third and fifth month, that is, about the time when the woman first becomes fully convinced of her pregnancy. The law is thus stated (24 and 25 Vict., cap. 100, sects. 58, 59):—

"58. Every woman, being with child, who with intent to procure her own miscarriage, shall unlawfully administer to herself any poison or other noxious thing, or shall unlawfully use any instrument, or other means whatsoever, with like intent, and

whosoever, with intent to procure the miscarriage of any woman, whether she be or be not with child, shall unlawfully administer, &c., shall be guilty of felony."

"59. Whosoever shall unlawfully supply or procure any poison or other noxious thing, or any instrument or thing whatsoever, knowing that the same is intended to be unlawfully used or employed with intent to procure the miscarriage of any woman, whether she be or be not with child, shall be guilty of a misdemeanour, and, being convicted thereof, shall be liable, at the discretion of the Court, to be kept in penal servitude for the term of three years, or to be imprisoned for any term not exceeding two years."

If a second person endeavours to procure the abortion of a woman, it is immaterial whether the woman on whom the operation be performed be with child or not, or whether the drug given, or instrument used, be effectual or not in producing abortion, or whether or not any injury, permanent or temporary, results. (See *Cases* 17, 18, 19.) (*R.* v. *Goodhall*, 1 Den. C.C., p. 187, and *R.* v. *Goodchild*, 2 C. and K., p. 293.) The French law is similar.

Thus questions of quickening, or whether or not the child in utero be dead, are, so far as the criminality of a second person is concerned, immaterial. Further, by English law, the fact of a fœtus proving to be a monster, would in no way affect the case. (*Case* 27.) And yet again, it is immaterial whether the woman consents to or even solicits the operation, such consent or solicitation in no respect condoning the offence.

The production of abortion by local violence or by instruments, owing to the serious nature of such operations, and the usual ignorance of the operators, and in the case of drugs the necessity, if they are to succeed, of administering large and poisonous doses, frequently results in death, or at any rate, in serious after consequences. If death arises from criminal abortion brought about by a second person (whether the means used be mechanical or chemical), the crime is considered wilful murder, and the penalty death, although the operator may have had no intention to destroy life, and the woman operated on consented to the performance of the operation. If, however, the

instrument or drug used, be *not a dangerous one*, and not used to destroy life, although used for an unlawful purpose, the crime might be manslaughter. The law was thus laid down by Lord Justice Bramwell in Stadtmühler's case (Liverpool Winter Assizes, 1858), (*Case* 1) :—"If a man, for an unlawful purpose, used a dangerous instrument, or medicine, or other means, and thereby death ensued, that was murder, although he might not have intended to cause death, although the person dead might have consented to the act which terminated in death, and although possibly he might very much regret the termination that had taken place contrary to his hopes and expectations. This was wilful murder. The learned counsel for the defence had thrown on the judge the task of saying whether the case could be reduced to manslaughter. There was such a possibility, but to adopt it would, he thought, be to run counter to the evidence given. If the jury should be of opinion that the prisoner used the instrument not with any intention to destroy life, and that the instrument was not a dangerous one, though he used it for an unlawful purpose, that would reduce the crime to manslaughter. He really did not think that they could come to any other conclusion than that the instrument was a dangerous one, if used at all. Then, if it were so used by the prisoner, the case was one of murder; and there was nothing but a verdict, either of murder or of acquittal."

But this brings before us a difficulty of a grave nature, in dealing with criminal abortion. Abortion is in its very nature a *secret* crime. The abortionist and his patient probably act in concert. The patient applies to the abortionist, and submits herself to his treatment; or a midwife and the pregnant woman arrange, the former to procure, and the latter to take, certain drugs. Besides the persons concerned, no human ear hears what was agreed to, and no human tongue can testify positively what was done. Thus the patient becomes the accomplice of the abortionist. Naturally the law is very jealous of the evidence of accomplices. "When the only proof against a person charged with a criminal offence, is the evidence of an accomplice, uncorroborated in any material particular, it is the duty of the judge to warn the jury that it is unsafe to convict anybody on

such evidence, although they have a legal right to do so."—(*Fitzjames Stephen.*)

Certainly it would seem that the law ought rather to throw its protection around those who survive the mischief of abortion-mongers, than around the abortion-mongers themselves, as it would seem to do, by rendering their victims accomplices. If neither can be witnesses, because accomplices, what corroboratory circumstances, can, in the majority of cases, be forthcoming?

It is true the question of how far the evidence of an accomplice is to be trusted rests with the jury. Still cases are far too numerous where men carrying on this hideous trade have escaped punishment, because the evidence of the woman was considered to be that of an accomplice, and to need further corroboration. It would be well if in trials for abortion, as in those for unnatural offences, both agent and patient were regarded as equally guilty, at the same time allowing the guilty associate to be a competent witness. (*Cases* 14, 21.)

Section 59 suggests a further question in trials for abortion, viz.: What is the meaning of a noxious thing? (*Case* 26.) This question occurred in the case of R. *v.* Cramp (Kent Assizes, 1880). The prisoner was indicted for administering a poison *or other noxious thing* to a woman with intent to produce miscarriage (the noxious thing in this case being half an ounce of oil of juniper). The jury found the prisoner guilty, and the question as to the meaning of a noxious thing was reserved for the consideration of the C. C. Cases Reserved (Feb. 28, 1880; *L. R.* 5, *Q. B. D.*, 307). The question had been previously raised in the matter of cantharides, which had been given in exceedingly small doses for its supposed erotic properties. In this case the Lord Chief-Justice Cockburn and Mr. Justice Hawkins decided that the cantharides was not a noxious thing, on the ground that not enough of the drug had been administered to do harm. The question now before the Court in R. *v.* Cramp was, must the drug be injurious or noxious in itself, and not merely when administered in excess. The Court decided "that in each case it was a question for the jury to say whether the substance, administered as it was, and under

the circumstances in which it was administered, was a noxious thing. Therefore neither principle nor authority preclude us from holding what is certainly good sense—that if a person administer, with intent to produce miscarriage, something which as administered is noxious, he administers a noxious thing." ("*Med. Times and Gazette*," March 6, 1880; Dec. 25, 1880.)

But if a woman endeavours to bring about abortion on herself (in other words, she being both operator and patient), the law makes *the existence of pregnancy* material to the charge, but in this case it is again silent as to the efficiency or not of the means adopted.

(See the Report of the New York Medico-Legal Society on Criminal Abortion, "*New York Med. Journ.*," xv., p. 77.)

The Means Used to Procure Abortion.

All the means mentioned as being properly employed to induce premature labour when the case necessitates it, have been imitated by abortion-mongers.

These methods may be classified under three headings:—

I. Violence applied generally.

II. The administration of reputed abortifacients.

III. Mechanical injuries inflicted on the uterus and its contents.

I. *Violent exercise or brutal violence employed in a general manner.*

Copious general bleedings, and the repeated use of very hot and very cold baths usually fail. Yet Mauriceau relates the case of two women who were safely delivered, although one had been bled forty-eight times during her pregnancy, and the other had been blooded no less than ninety times! ("*Observations sur la Grossesse et l'Accouchement des Femmes*," Paris, 1694, p. 18; Tardieu.) Other cases of a similar kind are known in modern times. When the woman has been bled, marks of the operation would be visible either in the bends of the elbows, the backs of the hands, or on the instep, ankle (for it has been thought bleeding from the foot is particularly effective), or some other spot where there are superficial veins.

Again, the application of leeches to the anus or the vulva, or on the inside of the thighs, has been supposed (erroneously we believe) to be effective. The marks of the leeches would in such cases be easily detected. Women will often take extraordinarily long walks, roll down hill, throw themselves down stairs or out of window, or submit to be trampled upon and kicked on the abdomen, in order to get rid of their burden.

Over tight-lacing is another form of violence which has been adopted for the purpose. In one of the cases mentioned by Tardieu a sort of stays was worn for the purpose of producing abortion. These were said to have only measured sixty-two centimètres (a trifle over twenty-one inches), whilst towards the end of the sixth month, the abdomen of a pregnant woman would measure from eighty to ninety-nine centimètres [31½ to 39 inches.]

One fact appears certain, that not unfrequently all general methods of violence fail in effecting their object, notwithstanding which failure, marks will remain to render the fact of their having been resorted to indisputable. (See *Cases* 12*a*, 15.)

II. *The administration of reputed abortifacients.*

Amongst the *ecbolic* or *abortifacient* drugs (that is, medicines that cause the expulsion of the fœtus, or other uterine contents, by exciting uterine contractions), which are, or have been used by those who wish to procure abortion, we might include every known purgative, emetic, diuretic and emmenagogic,* in fact every drug or herb which has medicinal properties.

Emetics (notwithstanding that vomiting is a usual symptom of early pregnancy) have, especially in the later months of utero-gestation, undoubtedly effected the purpose. On the other hand Velpeau mentions that, in his own experience 15 grains of tartaric emetic taken to procure abortion, failed. Others have even urged the claims of emetics as valuable drugs in cases of threatened abortion. ("*Amer. Journ. Med. Sci.*," April, 1871, p. 599.)

Purgatives, especially those that act powerfully on the

* Emmenagogues are medicines that promote the menstrual discharge by stimulating the vascular system.

rectum, such as croton oil, elaterium, gamboge, aloes (hierapicra and pilacotin)—given constantly and in large doses may act as indirect abortifacients, but no reliance can be placed on them as infallible agents. Thus Dr. Rush informs us how, in the yellow fever outbreak of 1793, he gave jalap and calomel to numerous pregnant women, and even to some predisposed to miscarry, without in any case producing abortion. ("*Medical Observations and Enquiries*," iii., p. 249.)

Diuretics may have occasionally succeeded, but they have far more frequently failed.

We may lay down as a general rule, that all poisons may act as abortives to those disposed to miscarry, owing to their intense general action on the system; but that they must be administered for this purpose in such doses as will in all probability prove fatal to the life of the mother.

The following commonly used ecbolics are considered by Tardieu, Teichmeyer, Buchner, Foderé and others to be perfectly harmless in this respect, viz., squills, sarsaparilla, *hellebore, yew, laburnum, grains of paradise*, saffron (see Pereira, "*Mat. Med.*," ii., p. 219), guaiacum, broom, fern, *actæa racemosa, digitalis, lignum vitæ, tansy, aloes,* balm [melissa], horehound [marrubium vulgare], camomile, *wormwood, borax*, matricaria [the common camomile], *mugwort* [artemisia vulgaris], cantharides and juniper. We think, however, that those marked in italics may possess certain indirect ecbolic properties. Dr. Shortt ("*Obstetrical Trans.*," ix., p. 9), states that the juice of bamboo leaves (*Bambusa arundinacea*) the milk-hedge (*Euphorbia tirucalli*), and other Euphorbiaceous plants, also the juice of the *Calotropis gigantea* and the *Plumbago Zeylanicum* or chittra-moolum, are often used in India for this purpose. That many of the Euphorbiaceæ are very poisonous is well-known. Still there is reason to believe that the action of nearly all these medicines, when administered as abortives by the natives of India, is aided more or less by certain mechanical contrivances. (*Case 22 a.*)

Extract of Cottonwood is much used as an abortifacient and emmenagogue in the Southern States. It produces great drowsiness, but its effects are somewhat uncertain.

Carrot seeds are a popularly reputed abortive in Upper India.

In Pekin, the *pediculus bovis*, and also a species of leech dried and powdered, and applied to the cervix uteri, are favourite abortives. ("*Gaz. Hebd.*," April 5, 1872.)

It will be advisable to consider the action of a few drugs in detail:—

(1.) METALS AND METALLIC SALTS.

(*a.*) *Iron.*—The only preparations of iron which seem to have an injurious effect on pregnant women are the sulphate of iron (copperas) and the acid astringents, such as the muriated tincture in excessive doses. Dr. Taylor records a case (*R.* v. *Rumble*, vol. ii., p. 183), where large doses of the muriatic tincture given daily failed to produce abortion, although they made the woman very ill. We believe there are no authentic instances of iron salts causing abortion. Very eminent obstetricians sanction the use of iron in suitable cases throughout pregnancy. ("*Obstetrical Transactions*," xii., p. 33.)

(*β.*) *Mercury.*—Metallic mercury, although a supposed abortifacient, is no doubt innocent. (*Case* 25.) There is no reason to believe that calomel is in the true sense an abortive agent. No doubt Burns advises that calomel should not be given during pregnancy; nevertheless numerous authorities can be quoted to show it has no injurious action under ordinary circumstances. Still we are inclined to think that in women predisposed to abort, mercury salts given to salivation may induce miscarriage. Beck relates a case where he gave calomel to salivation to a woman eight months pregnant for inflammation of the lungs, but without causing a miscarriage. Dr. Campbell ("*Campbell's Introduction to the Study and Practice of Midwifery*") records a case showing how completely it failed in producing abortion, although taken in great excess for the purpose.

(γ.) *Arsenic.*—Dr. Taylor records the case of a woman, æt. 22, who when five months pregnant took a large dose of arsenious acid, which proved fatal after seven hours, but without causing her to abort.

(δ.) *Potassium Salts.*—(1.) *Iodide of Potassium.*—Tardieu quotes a case from the "*Presse Médicale de Marseille*," 1858, Nos. 7 et 9, in which a herbalist gave a pregnant woman a mixture

containing about 3i. of the iodide in about five ounces of water ("*Medical Times and Gazette*," January 29, 1859.) She appears to have taken about one-half, and then to have aborted. MM. René Dumas and Fuster, professors at Montpelier, all attributed the abortion to the drug, and Tardieu seems to have agreed with them. On the other hand many obstetricians report that they have frequently given this medicine to pregnant women suffering from secondary and tertiary syphilis, without perceiving any evil consequences.

(2.) *Nitrate of Potash.*— A case is reported where abortion occurred half an hour after the patient had accidentally taken a handful of nitre. ("*Paris and Fonblanque's Med. Juris.*," iii. p. 94.)

(ε.) *Sodium Salts.—Biborate of Soda* (Borax) has been used, and at times, it is said, efficaciously, as an abortifacient. There is great doubt whether it has any real power in exciting uterine action.

2. VEGETABLE PREPARATIONS.

(α.) *Yew* (*taxus baccata*) seems to have produced abortion in certain cases. (See Tardieu, p. 32, for some experiments with yew on animals.)

(β.) *Rue* (*ruta graveolens*) together with the oil and the decoction of the plant and particularly of the seeds, appears to have frequently proved ecbolic. Tardieu reports three cases in which the decoction produced abortion at the fourth, fifth, and sixth months severally of pregnancy, the woman in each case recovering. Profuse salivation, great swelling of the tongue, and in fatal cases slight inflammation of the mucous membrane of the stomach [Orfila], are the appearances recorded. [See a memoir by Dr. Helié, of Nantes, on this subject, in the "*Annales d'Hygiène et de Médicine légale*," t. xx., p. 180, 1838; also Horn's "*Vierteljahrs.*," 1866, I., 233; also a paper by Tardieu in the same Annales for 1855, I., 403.]

According to Taylor, rue acts most powerfully when fresh, its active principle being the volatile oil. The rutine or rutinic acid present, according to the same authority, is inert.

(γ.) *Tansy.*—This reputed abortifacient would seem to be absolutely without action either directly or indirectly.

(δ.) *Pennyroyal* (*Mentha pulegium*) is not considered ecbolic by any author of repute. Drs. Hicks, Barnes, and Tyler Smith, have severally denied that this drug would produce abortion. It is, however, frequently given for this object, and certain facts known to the author make him hesitate in joining in the opinion of its absolute innocence. A man, Robert Collins, (Chelmsford Assizes, Aug., 1820), was convicted of *intent* to procure abortion by administering steel filings and pennyroyal water to a woman. In *R.* v. *Wallis* (Winchester Autumn Assizes, 1871), a solicitor was charged with having given pennyroyal and Griffith's Mixture (a saccharine carbonate of iron) to a woman.

A case is related where the mere odour of pennyroyal has caused abortion. (Coxe's "*Medical Museum*," Vol. ii., p. 431.)

(ε.) *Savine* (*Juniperus Sabina*) has been often proved to possess abortifacient properties. It is usually given for this purpose either as the oil, or in the form of the powdered leaves, or as an infusion of the tops. It is scarcely, however, a true abortive, but acts indirectly, owing to its poisonous and deadly properties. In a case recorded by the author, a woman in the eighth month of pregnancy died from its action without any effect being produced on the uterus.

(ζ.) The ecbolic properties of *Ergot* are too well known to require dwelling upon them. (*Case* 22.) Dr. Taylor mentions that he found a liquid, sold as "Persian Otto of Roses," to be a strong ethereal tincture of ergot.

Ergot interferes with the circulation by acting on the unstriped muscular fibres in the walls of the smaller arteries. This reacts on the heart, so that the circulation becomes notably interfered with. It also diminishes body temperature, rapidly reducing it to 96° F. It also affects the pulse, the tracing exhibiting a curiously flat apex.

(η.) *Actæa Racemosa* (black cohosh—squaw root). (See a paper by Dr. Tully, "*Boston Med. and Surg. Journ.*," April 10, 1833.)—A fluid dram of a saturated alcoholic solution is said to have acted efficiently as an abortifacient.

(θ.) *Digitalis.*—A case is recorded where abortion resulted from the prolonged administration of this drug, but the woman died. Further, Mr. Dickinson ("*Med. Chir. Trans.*," Vol.

xxxiv., p. 1), has shown that it possesses a specific action on the uterus in doses of ℥ss. to ℥iss. of the infusion, and of 20 to 40 minims of the tincture.

(ι.) *Quinine* has been mentioned as an abortifacient. ("*New York Med. Journ.*," xiii., p. 121.) A series of cases where quinine was administered to pregnant women is recorded, but in none of them did it cause abortion. (*Cases* 23, 24.) In *Case* 24, however, abortion was said to have resulted from the exhibition of only 10 grains.

(κ.) *Pilocarpine.*—The experiments of Dr. Hyernaux ("*London Med. Record*," Jan., 1879), prove conclusively that this drug does not hasten labour (oxytocic), but that it reduces the patient's health and strength to the lowest ebb. Experiments were tried both on pregnant rabbits and women. (*Case* 20.)

(λ.) *Belladonna.*—We note that suppositories and vaginal injections of belladonna have been used, it is said successfully, to procure abortion. (See "*Med. Gaz.*," vol. xxxvii., p. 171; "*Lancet*," July 23, 1853, p. 89; See also *R.* v. *Wallis.*)

(3.) ANIMAL SUBSTANCES.

Cantharides.—Cases are recorded where abortion has resulted from their administration. ("*Med. Chir. Review*," vol. xvii., p. 98.) At the same time large doses (such as ℥j. of the powder) have entirely failed in this respect, although the general symptoms produced were very severe. ("*Memoirs of Medical Society*," vol. ii., p. 208.) The action of cantharides on the bladder and rectum is undoubtedly direct and intense, but its action on the uterus is probably indirect.

We shall consider the action of these drugs in greater detail, as well as that of other substances of this class, in the section which deals with "Poisons."

III. *Mechanical injuries inflicted on the uterus and its contents.*

A variety of instruments and various mechanical means have been used to procure abortion. The destruction of the ovum or the rupture of the membranes arrests gestation. But after the membranes are pierced, some days may elapse before the expulsion of the uterine contents takes place. It is invariably because of the great hurry on the part of the operator in criminal

cases, that fatal results occur. (*Cases* 1 to 14, 18.) It scarcely seems necessary to dwell upon this subject, except to remark that in cases of this kind, traces of violence will frequently be found both on the fœtus and on the woman. (*Cases* 3 to 6, 8, 11, 12.) The human hand alone has sometimes been the instrument employed, and, horrible as it may seem, has been used with such extreme violence as to drag away the intestines. (*Case* 12*a*.) Sometimes fatal inflammation has been set up without any actual injury to the womb. (*Case* 5.) At other times death has resulted from the instrument not only piercing the womb, but being positively driven through it with such violence as to injure parts, one would have thought far out of reach. (*Cases* 5*a*, 12.)

The *uterine sound* has been known to cause abortion, when used in ignorance of pregnancy. (*Case* 7.) Medical men should be careful not to use the uterine sound, without first ascertaining that the woman is not pregnant. Dr. Taylor also cautions against the use of the *speculum* in women who are enceinte; but we think that with caution it might, where necessary, be safely employed. (*Case* 13.) As of abortifacients, so of mechanical means—the most violent have at times failed. Nevertheless it may be said that, as a rule, local violence is as likely to produce abortion, as indirect violence is to fail.

The Duties of Medical Experts in Cases of Suspected Abortion.

I. The examination of the female during life or after death.
II. The examination of substances expelled from the womb.
III. The examination of instruments, or of drugs, in the possession of the accused.

I. *Examination of the Woman.*

(*a*.) *During Life.*

An Indian surgeon of experience remarks that "with some persons all signs of delivery disappear within twenty-four hours." Admitting this may be true (although such cases must surely

be rare, seeing that the lochia rarely cease within a week or ten days), *a fortiori* it must apply to abortion. And, on the other hand, admitting that there are cases where sufficiently indicative signs remain after intervals of fourteen, eighteen, and twenty-one days (and in one case, it is said, after a month), it is equally certain that, as a rule, where the examination has been delayed for a week, the medical evidence will be of an almost entirely negative character. Much, in such cases, will manifestly depend (1) on the state of health of the mother, and (2) on the period of gestation reached.

Before we proceed to discuss the ordinary signs of abortion, we have to remark—*first*, that if the symptoms mentioned occur during the earlier periods of gestation, they are at most of an exceedingly evanescent character, whilst it is fairly open to question whether they are not as a rule entirely absent; and, *secondly*, that some, if not all, the symptoms named, may be simulated by menstruation.

The signs of abortion in the living are commonly stated as follows:—

(*a*.) A relaxed condition of the vulva and passages, patulousness of the os uteri, the presence of a lochial secretion in the earlier stages, and a white mucous secretion at a later period, accompanied by that characteristic acid smell common to puerperal women. The distension of the breasts, yielding a flow of milk on pressure, with a fulness and knotty feeling for a short time after aborting, are also observable. A general anæmic appearance from loss of blood, with sunken eyes, will be noticed. A peculiar excitement of the pulse, with dryness of skin, is also invariably present. A speculum may be needed to see the lacerations of the os uteri, but as a rule they may be felt by the finger. It will, of course, be of primary importance to remark on all signs of violence to uterus or vagina; also whether there be an excessive inflammatory condition of the genital organs. Further, all marks on the body of the female which may indicate general violence for the purpose of effecting the object in view, should be carefully recorded.

(*β*.) If abortion occurs naturally at an early period of utero-gestation, the signs usually found may be very slight, or even

altogether absent. After the third month the insertion of the placenta may be detected by a rough place on the inner uterine wall. In making a post-mortem, care is necessary in removing the uterus and laying it open, as if there be a wound it may be suggested that it was made during the *post-mortem*. The specimen itself should refute such a charge. *Punctures*, *lacerations*, and *incisions* in the uterus and contiguous organs must be specially looked for. These (particularly the punctures) are often multiple. "He stabbed me three or four times," is a common remark of the victim.

It is usually not difficult to distinguish wounds made before from those inflicted after death, because the former will have cicatrized, or be coated with lymph, pus, or blood. It is not always possible, but generally it is easy, to distinguish the results of violence from natural and spontaneous ruptures. (For the general characters of natural or spontaneous ruptures of the uterus, see the chapter on that subject in Barnes's "*Obstetric Operations*," 2nd edit., pp. 320-375.) Peritonitis, when resulting from violence, is generally more localised than when it is, so to speak, spontaneous in puerperal cases at term. Note should especially be taken in all cases of abortion whether there are signs of irritant poisoning in the stomach and intestines, or any inflammation of the bladder and kidneys resulting from the administration of abortive drugs.

Note, further, any general marks of violence especially on the abdomen; also the general characters of the viscera, *i.e.*, whether they indicate loss of blood during life, such as commonly results from abortion.

If a woman die during the menstrual period a thickened state of the uterus, a swollen condition of its mucous lining, and a generally increased hyperæmic appearance, are invariably found. And it is well to bear this in mind, lest we mistake the appearances resulting from menstruation for those produced by abortion.

II. *The Examination of Substances expelled from the Uterus, of Stains on Bedding, etc.*

The general principles we have already laid down, when discussing the signs of recent delivery, will apply for the most part here. (Page 124.) If a fœtus be found, a very careful examination must be instituted to determine (1) its age, (2) whether it was born alive, and (3) if so, to what cause its death may probably be attributed. Further, the fœtus must be most carefully examined for punctures or wounds, and every attempt made to form an opinion whether the injuries, if such be found, were caused during life or after death. This latter point is essential, not so much to prove that the wound was sufficient to cause death, as to negative the certain contention on the part of the defence that the injury was caused after birth..

III. *The Examination of Instruments or Drugs found in the possession of the Accused, and supposed to be the means used by the Criminal for producing Abortion.*

The remarks elsewhere made on the means of inducing premature labour will suffice as regards this point also.

MEDICO-LEGAL EXAMINATION IN CASES OF ABORTION.

I. *Examination of the Mother, if living.*

(α.) Temperament.

(β.) As to the woman's predisposition to abort, and the period at which abortion had commonly occurred.

(γ.) General state of health. (Note existence of leucorrhœa, excessive menstruations, syphilis, asthma, malignant disease, uterine diseases, etc.)

(δ.) Whether the woman be well or ill formed. (Note pelvic malformations, effects of tight-lacing, etc.)

(ε.) Whether or not there be signs of recent delivery, or of the expulsion of uterine contents.

(ζ.) Whether any cause can be assigned to account for the abortion. (*E.g.*, Violent coughing, blood-letting, straining at stool, violent exercise, undue excitement, septic poisoning, violence, administration of medicines, etc.)

(η.) All injuries of the genital organs. (Consider whether the injuries might be self inflicted.)

II. *Examination of the body of the Mother, if dead.*

[NOTE (1.) The necessity for care not to mistake the effects of menstruation for those produced by abortion.

(2.) To avoid injuring the parts by the knife or otherwise during the autopsy.

(3.) To consider the possibility of injuries being self-inflicted.]

(α.) Note the existence of any marks of violence on the abdomen or other parts.

(β.) The condition of the genital organs, noting all inflammations, rents, tears, perforations, etc. [If the uterus be injured it should be preserved.]

Note also—

(1.) The condition of the passages (relaxed or otherwise.)

(2.) The condition of the os uteri (virginal or gaping, etc.)

(3.) Vaginal secretions, and if present their character.

(4.) The general appearance of the breasts, presence of milk, etc.

(γ.) Whether there be any signs of irritant poisoning in the stomach, or of inflammation of the bladder, kidneys, rectum, etc. [The contents of the stomach if necessary to be preserved.]

(δ.) Whether the viscera generally indicate loss of blood during life.

III. *Examination of the product of Conception.*

(α.) Nature of the supposed product of conception.

(β.) Consider whether there is evidence of a diseased condition of the membranes or of the placenta, *e.g.*, structural degeneration.

(γ.) If a fœtus be found, determine (1) whether it was born alive; (2) its probable age; and (3) the cause of its death.

(δ.) Determine whether, if there be wounds or other injuries, they were inflicted during life or after death.

IV. *Examination of all Drugs, Instruments, etc.*

ILLUSTRATIVE CASES.

1. **R. v. Stadtmühler.**—(*Liverpool Winter Assizes*, 1858.)—Charge against a German doctor for procuring abortion by means of instruments. Death of the woman in forty-eight hours, from severe internal injuries. Prisoner convicted of murder. (Pages 162, 171.)

2. **R. v. Vaughan.**—(*Stafford*, 1872.)—Abortion effected by an instrument used for the purpose by one woman on another. Abortion succeeded the day following the use of the instrument. Previous acts of the kind proved against the operator. Sentence fifteen years' penal servitude. (Page 171.)

3. Dr. Shortt examined the body of a Hindoo female where abortion had been effected by mechanical violence, and found the base (or fundus) of the uterus perforated in three places. (Page 171.)

4. **R. v. Heap.**—(*Liverpool Assizes*, April, 1875.)—The prisoner, an unqualified practitioner, was charged with procuring abortion. At the post-mortem it was found that two punctured wounds had been made into the womb, and that death had resulted from peritonitis. He was convicted and sentenced to death. (Page 171.)

5. **Tardieu.**— On October 3rd Tardieu was asked to see a female prisoner who had aborted on September 1st. The midwife had several times used a knitting-needle. Tardieu found signs of delivery and also of metritis, but not of any puncture. The appearances were, however, consistent with the woman's statement. (Page 171.)

5a. **Amer. Journal of Med. Science, April, 1873, p. 406; London Med. Rec., April 2, 1873.**— (*Dr. Guillard Thomas.*)— Abortion procured by a wire about 20 inches long passed upwards through the peritoneal cavity and *into the lung*. Death. (Page 171.)

6. **Lancet, Aug. 12, 1876, p. 220.**—Cases of abortion from punctures of the uterus. (Page 171.)

7. **Tardieu, Case XVII.**—The midwife had introduced her hand to-

gether with an instrument which proved to be a uterine sound. A domiciliary visit revealed a packet of dry herbs [reputed abortifacients], a stylet, two knitting-needles, and two silver (uterine) sounds. Wormwood, saffron, and mugwort had previously been administered. (Page 171.)

8. R. v. Colmer.—(*Yeovil*, April, 1880.)—Death from the use of instruments, used with intent to procure abortion. Severe lacerations found at the post-mortem. (Page 171.)

9. R. v. Addison and Boyce.—(*C. C. C.*, June, 1872.)—**Med. Times and Gazette, June 7, 1879, p. 621.**—Convicted of procuring abortion and causing death. The instrument used was probably a catheter, and the cause of death peritonitis. (Page 171.)

10. *Durham Assizes*, 1781. Quoted by Beck.—Margaret Tinckler was indicted for the murder of Janet Parkinson, by inserting pieces of wood into her womb. Deceased took to her bed on the 2nd and died on the 23rd of July. She declared she was about five or six months pregnant. She went to the prisoner, a midwife, who took her round the waist, and violently shook her five or six times, tossing her up and down, three days before she was delivered. The child was born alive, but died instantly. There were no marks of violence on the child. On examining the womb of the mother two holes were found, caused, it was proved, by wooden skewers. (Page 171.)

11. Tardieu, Case XXXVII. (from Devergie).— Marie S——, aged twenty-six, pregnant 4½ months, consulted an *officier de santé* at 10 a.m., on Feb. 24th, 1833. She was then apparently in good health. The same day, at 4 p.m., she took one bath, and another the next day at 11 a.m., and towards 2 p.m. underwent an operation. Thirty hours afterwards she died. At the post-mortem the neck of the womb was found lacerated; and in its fundus there was an opening 4 to 5 centimetres (1½ to 2 inches) long, in which were fragments of placenta. In the peritoneum was a vast quantity of blood, and signs of commencing peritonitis. (Page 171.)

12. Tardieu, Case XL.—(Taken from Dr. Raynard, "*American Journal of Medical Sciences*," 1853, p. 77.)—The deceased, aged thirty-six, was six months pregnant. She went to a quack, who operated on her. She died after twelve hours. Four surgeons made the post-mortem. The body was found bloodless, but the abdominal cavity was filled with blood, partly coagulated. The posterior wall of the uterus had an opening, the size of a common sound, extending into the right internal iliac artery, which was perforated near its origin. The opening in the vessel would admit a goose-quill. Three other punctures existed in the uterus, nearly in the same direction. A probe introduced by the vagina, easily followed the course of the punctures. None of them, however, had penetrated either ovum or membranes. (Page 171.)

12a. Tardieu, Case LI.—A husband, to cause his wife, who was then seven months pregnant, to abort, tore away through a four-inch rent in the vagina and uterus, a part of the uterus, and nearly the whole of the small intestines. The child was found between her legs, and had evidently breathed.

In another case (No. 52, of Tardieu's), the vulva, perinæum, vagina uterus, urethra and rectum, had all been cut or dragged away from a young girl. A doctor and midwife were suspected. It appeared probable, however, that the mutilation was post-mortem. (Pages 165, 171.)

13. R. v. Griffin and Venn.—(*Exeter Lent Assizes*, 1854.)—Venn, a surgeon, was charged with feloniously using an instrument with intent to procure the miscarriage of the prosecutrix. The defence was that Venn had used a speculum, once in a coppice and a second time in a field, to ascertain if the woman were pregnant or not. Acquitted.

Dr. Taylor justly remarks, "that medical practitioners, in the lawful exercise of their profession, do not commonly use a speculum in open fields, etc., for the purpose named, and it is a well-known fact that a speculum is not required for determining the question of pregnancy at all." (Page 171.)

14. R. v. Watts.—(*Sheffield*, April, 1876.)—Prisoner procured abortion in a woman with instruments. Discharged because the evidence of the woman was the only evidence forthcoming, and she being an accomplice it needed confirmation. (Pages 163, 171.)

15. Etude Medico-légale sur l'Avortement, p. 27, Tardieu.—In the Assize Court of the Loire-Inférieure, it was proved that a peasant, who had seduced his servant, and wished to make her abort, mounted on a strong horse, and put the girl on the same horse, then galloped wildly hither and thither, throwing her down on the ground whilst in full gallop, and this repeatedly. Having tried this twice without success, he conceived the horrible idea of applying to her stomach bread just taken from a very hot oven. This means like the former, failed, the poor victim ultimately giving birth to a living and well-formed child at term. [Brillaud-Laujardière, "*De l'Avortement Provoqué*," Paris, 1862, p. 279.] (Pages 156, 165.)

16. A case quoted by Dr. Guibaut of a young Munich lady, living in California. Becoming pregnant, she wished to go to Munich to be delivered. In crossing the Isthmus of Panama a railway collision occurred. In consequence of this, labour pains set in. In spite of this she embarked for Portsmouth. She had a horrible passage, with fresh accidents. Notwithstanding these the pains subsided each time. On reaching Paris, she fell from the top to the bottom of the hotel stairs! Again she was seized with pains like those of labour. She was then eight months pregnant. Next day she

departed for Munich, and was not confined till some days after her arrival in that city. (Page 156.)

(See a similar case from Dr. Wagner, of Berlin, mentioned in Guy and Ferrier, p. 98.)

17. Ann. d'Hyg., 1847, I., p. 466.—A woman convicted of intent to produce abortion in a woman not pregnant, but merely suffering from ovarian disease. (Page 161.)

18. Taylor, Vol. II., p. 198.—A young woman, admitted into Guy's Hospital in 1846, accused a policeman of having first given her drugs, and then of using instruments to procure abortion. On Dr. Lever's examining her, he found there was no reason to suppose she had ever been pregnant. (Pages 161, 171.)

[Similar cases are mentioned by Casper, Vol. III.]

19. British Med. Journ., 1870, I., p. 88.—Abortion induced by a druggist. The patient died. At the post-mortem the woman was found not to be pregnant. (Page 161.)

20. British Med. Journal, Sept. 27, 1879, p. 509. (Page 170.)

The following cases recorded on the action of pilocarpine in inducing labour :—

(1.) Female pregnant : 0·3 gr. of pilocarpine chlorhydrate given hypodermically. Patient's eyes became brilliant, then tumid and tearful ; sight obscured without any great alteration of pupil ; face bathed in sweat. Pulse 160 ; respiration 30 ; profuse ptyalism ; diarrhœa and watery vomit ; urine abundant. After three injections the patient became very ill, but there were no signs of labour. (Dr. Hyernaux.)

(2.) Female pregnant : three injections of pilocarpine given, labour occurring at the end of three days. (Dr. Kleinwachter.)

(3.) Female pregnant : eight injections of pilocarpine given. On the fourth day the os uteri was dilated to the size of a halfpenny, but was still rigid. Constitutional symptoms very severe. Dilators and forceps had eventually to be employed.

[Cases where pilocarpine failed are also recorded by Parisi, of Verona, Bergesio, and Cuzzi, of Milan.]

21. R. v. Brown (*Lewes Assizes, July*, 1878. *See* "*Brit. Med. Journ.*," July 27, 1878, p. 145.)—The prisoner was a herbalist, and was indicted for administering drugs with intent to procure abortion in two cases.

In Case No. 1, the woman who took the drugs was the only witness. She admitted having applied to the prisoner for an abortive. No other evidence forthcoming, the judge (Lord Justice Thesiger) directed the jury that they must acquit the prisoner, because the woman was an accomplice and there was no evidence to corroborate her statement.

In Case No. 2 the prisoner was likewise acquitted, the woman herself

being too ill to attend. In this case also there was no corroborative evidence. (Page 163.)

22. R. v. De Baddeley and Wife.—(July, 1871.)—Ergot of rye given to procure abortion.. The prisoners pretended to be clairvoyants, through which agency they discovered the condition of their victim and what drugs to administer. They were detected by means of a sham case, and sentenced to twelve months' imprisonment. (Page 169.)

22a. Med. Times and Gazette, Jan. 19, 1867.—(*Dr. Shortt*, of Madras.)—Cases illustrating the use in India of the juice of bamboo leaves as an abortifacient. The juice of the *Euphorbium Tirucali* is also applied to the os. The Caloptris Gigantea, root of Plumbago Zeylanica, are used in a similar manner. (Page 166.)

23. Lancet, Jan. 22, 1881, p. 162.—(*Dr. Fogerty.*)—A case recorded where quinine (20 grains per day) was given to a pregnant woman without inducing abortion. (Page 170.)

24. Lancet, Oct. 16, 1880, p. 616.—(*Dr. Downes.*)—Abortion induced by two 5-grain doses of quinine. (Page 170.)

25. Lancet, March 8, 1873, p. 339.—(*Sir G. Duncan Gibb.*)—Female, æt. 30. Abortion attempted by the administration of 2½ teaspoonfuls of quicksilver. No effect was produced on the uterus, but mercurial tremors were induced. No salivation nor any blue mark on the gums resulted. The muscles on one side of the body only were first affected by the tremors. (Page 167.)

26. R. v. Waller and James Tregellas.—(*C. C. C.*, June 8, 1871.)—The prisoners were charged with attempting to procure a noxious drug in order to cause the miscarriage of their niece. Not guilty. (Page 163.)

27. Gaz. Med., July, 1841. Brit. and For. Med. Rev., Vol. XXIV., p. 563.—A girl acquitted of procuring abortion at Drôme in France, because the fœtus was a monster (accephalous). (Page 161.)

28. R. v. Camp, L. R. 5, Q. B. D., 307.—The prisoner was convicted under 24 & 25 Vict., c. 100, s. 58 of having feloniously and unlawfully caused to be taken by E. V. a certain "noxious thing," to wit, half an ounce of oil of juniper, with intent to procure the miscarriage of the said E. V. It was proved that quantities of juniper considerably less than half an ounce are commonly taken medicinally without any bad effect, but that half an ounce to a pregnant woman produces ill effects, and is dangerous. The question reserved was—whether there was evidence that the half ounce of oil of juniper was a "noxious thing" within the statute.

Held by the Court, that there was evidence that it was a "noxious thing," and that the conviction was right. (See reference, p. 163.)

CHAPTER IV.

RAPE—Legal definition—Signs indicating Virginity—Signs indicating Defloration—Post-mortem following Death from Rape—Examination of the Accused—Inspection of the Place where the Rape was committed—Proofs of Violation from Stains—Usual defence in Cases of Rape—Examinations of the Victim and of the Accused—INDECENT EXPOSURES—UNNATURAL OFFENCES—Tribadism—Sodomy—Bestiality—Examination of the Ravisher and of the Victim in a Case of suspected Sodomy.

ILLUSTRATIVE CASES (Page 235).

RAPE.—INDECENT EXPOSURE.—SODOMY.—BESTIALITY.

CIVILISED nations, ancient and modern, have invariably set a high value upon female chastity. And rightly so, since it is the bond and security of all social virtues and family happiness, and intimately connected with the well-being and political integrity of states.

The law regards a touch, or even an attempt to touch, on the part of a male, any of the sexual organs (the breasts included) of a female against her will, even though they be covered by clothing, as a criminal or indecent assault.* In the French and most of the German penal codes, such conduct is embraced under the heading of "Unchaste Conduct." (See *Casper* [Dr. Balfour's Translation], Vol. iii., p. 276.) Medical practitioners are not likely to be consulted in cases of this kind, unless actual violence has been offered, or disease conveyed thereby. For it must be remembered, that syphilis has more than once been communicated by a kiss.

* By 43 and 44 Vict., 1880, cap. 45, sec. 3, it is no defence for a person charged with an indecent assault on a girl under thirteen to prove that she consented.

The infliction of injuries upon the female genitals, such as cuts or burns, or the forcible thrusting of a stick or other hard instrument into the vagina—the exact motive for which may vary, being sometimes jealousy, sometimes a desire to avenge real or supposed unchastity, and sometimes pure lasciviousness—are crimes of more common occurrence abroad than in England. Thus, Dr. Harvey speaks of a large number of such cases (many of which proved fatal) as occurring in India. Great congestion commonly results, although the extent of inflammation, as well as the injuries inflicted, will of necessity vary with the weapon and the force used. Such charges, as a rule present very little medico-legal difficulty, except so far as determining whether the injuries could possibly have been self-inflicted, and the accused the subject of a false charge.

But where a rape has been attempted or committed, medical evidence will probably constitute an important, if not the most important, part of the case. It will be necessary for us as medical jurists, to examine all points connected with this subject in detail.

By the 4th and 5th Vict., c. 56, sec. 3, penal servitude or imprisonment was substituted for death, as the punishment for rape. "Whosoever shall be convicted of the crime of rape shall be guilty of felony, and, being convicted thereof, shall be liable, at the discretion of the court, to be kept in penal servitude for life, or for any term not less than three years, or to be imprisoned for any term not exceeding two years, with or without hard labour."

It is said that since this alteration was made in the law, the crime has enormously increased. The Roman law ordained, Rapta raptoris, aut mortem, aut indotas nuptias optet,' and upon this, says Dr. Percival, there arose what was thought a doubtful case, 'Una nocte quidam duas rapuit, altera mortem optat, altera nuptias.'" ("*Medical Ethics*," note 17, p. 231.)

Beck has collected together the laws of many countries, ancient and modern, relating to rape, some of which are exceedingly curious (pp. 95-107).

The law has fixed no limit to the time when a female may lodge the charge of rape. But considering that all appearances

resulting from the commission of the crime rapidly vanish, and so render medical evidence impossible, juries are loth to convict (and justly so) when the accuser allows any unnecessary delay to occur in making the charge.

For reasons which are obvious, rape is usually attempted when the victim and ravisher are alone. For this reason, the evidence of one witness only, viz., the victim, is all the legal proof absolutely necessary. As, however, false accusations are exceedingly common, the judges of late years have generally required corroboration of some kind, and medical testimony is usually sought as the best form of evidence.

In a very large proportion of the cases sent for trial, the victims are young children. There are several reasons for this. One is the popular superstition, that if a man suffering from gonorrhœa have intercourse with a virgin, he will be cured. Disgusting as it may seem, it is no less a fact, that old women doctresses not unfrequently prescribe this criminal attempt to young men who consult them for urethral discharges. Many cases recorded show this to be the fact. (*Cases* 12, 13.)

It is, however, undoubtedly true, that most of the false accusations in cases of this nature, are made by children, who are too often terrified by their parents or friends into accusing perfectly innocent people of having taken improper liberties with them. No importance, it is certain, should be attached to statements elicited from a child by threats. (*Case* 34.)

These cases of false accusation are of different kinds. In some, the mother, finding that her child has a discharge, at once rushes to the conclusion that it is due to violence, and bullies the girl into accusing some lodger or acquaintance. (*Case* 34.) And indeed in some cases there is this much to be said for the parents, that the inflammation resulting from masturbation, especially in young children, may strikingly simulate that caused by an unlawful assault. It cannot be too strongly affirmed, that there is no well marked diagnostic sign by which to distinguish between inflammation of the vulva due to a criminal attempt, and inflammation caused by general violence. ("*Brit. Med. Journ.*," Nov. 20, 1880, p. 822.) But in other cases, there is not even this much ground for the charge.

Trumped up cases, where children are made the vehicles for the parents to extort money or pay off some old-standing debt of revenge against an unfaithful lover, are only too common. *Case* 35 illustrates to what an extent vindictiveness may proceed. Fortunately, however, in such cases the appearances are commonly of such a nature and degree of severity, as plainly to tell their own story.

The charge of rape is in many cases hard to prove; but it is still harder, considering the legal definition of rape, to disprove by an accused person, even though he be innocent. And false charges being so common, medical men must be specially careful not to be the dupes of impostors.

When a medical man is asked to examine a woman alleged to have been violated, he should note the exact time (and that if possible by a public clock), at which the application was made, as well as the names of persons accompanying her, and their general behaviour. For, although the evidence of the medical jurist may in such cases be limited primarily to professional questions, it is his duty, as probably the first person consulted in the case by the accuser or her friends, and before the story (if it be manufactured) is fully concocted, to take note, in the interests of justice, of everything told or confided to him. Thus, such a detail as the position said to have been assumed during coition is important (*Case* 3). It would not be easy, *e.g.*, for a very tall man to violate a short girl in a *standing* attitude, such as against a wall. Again, the place where the violation was said to have occurred (*Case* 10)—whether the female admitted having cried out or not, etc., are matters of general detail, upon which the evidence of the medical man will be most important, in elucidating the truth or otherwise of the charge.

We shall consider the following points:—

I. The legal definition of rape.
II. The signs indicating virginity.
III. The signs indicating defloration, and the diseases that may simulate the effects of violation.

IV. The examination of the accused, and the inspection of the place where the rape was said to have been committed.
V. Proof of violation from stains.
VI. On the usual defence in cases of rape.

I.—The Legal Definition of Rape.

Legally, rape is defined as:—"The carnal knowledge of a female by force, and against her will."

The first question we are called upon to investigate is:—

(I.) *What is implied by the term "carnal knowledge"?*

In old times both English and Scotch judges, in order to substantiate a charge of rape, required proof of both *penetration* of the male organ, and *emission* of the seminal fluid. But by the 24th and 25th Victoria, cap. 100, sec. 63, proof of penetration only is required, the fact of the emission of semen being immaterial. If emission can be proved, it constitutes, of course, most important evidence, if not of the act of intercourse having been consummated, at least of its having been attempted, but the charge may be substantiated without it.

(II.) Hence arises the question:—*What is implied by the word "penetration"?*

In a case reserved for the consideration of the judges by Coleridge, C.J., and reported in 9 Carrington and Payne, *R.* v. *Hughes*, p. 752, the principle was admitted that to constitute a rape in law, penetration, without effecting rupture of the hymen, is all that need be proved. [See also *R.* v. *Lines*, 1 Carrington and Kirwan's, p. 393, Reports, and *R.* v. *Gammon*, 5 C. and P., 321, in which case penetration is defined.] According to the decisions of our judges, the degree of penetration is immaterial; in other words, vulval penetration, with or without violence, is as much rape as vaginal penetration.

This question was similarly decided by the Scotch judges, in the case of *Macrae*, in the High Court of Justiciary, 1841. [See Cormack's "*Edinburgh Journal*," January, 1846, p. 48.]

In our opinion these decisions are based on sound common sense. That a scoundrel who has attempted the chastity of

a child should escape punishment, merely because the imperfect development or narrowness of her genitals prevented his fully consummating the crime, would be as undesirable as unjust.

Carnal knowledge then signifies penetration merely, which penetration need only be vulval, inflicting no injury on the hymen or other soft parts, and unaccompanied by the emission of seminal fluid.

In legal medicine such a phrase as "*partial penetration*" has no place, and should be avoided by the medical-jurist as tending to mislead the court and to puzzle juries unnecessarily.

(III.) We have now to consider the question of *consent* in its relationship to rape.

No matter what the age of the female, or whether she be married or single, or whether she be chaste or unchaste, provided the carnal knowledge be against her will, it constitutes in law a rape, and is regarded as felony.

By the 24 and 25 Vict., cap. 100, secs. 50 and 51, it was decreed that if a girl be under 10 years of age, whether she consent or not (a child of such age being regarded as incapable either of desire or of discretion), or whether even she solicits intercourse, the act of connection is to be regarded as rape, and constitutes in law a *felony*. (Sec. 50.)

We need not stay to discuss the possibility of sexual intercourse between an adult male and a female of very tender years, for this possibility has been placed beyond question by innumerable cases. Such intercourse, however, will no doubt as a rule be only vulval, and the hymen consequently remain uninjured. It has been doubted whether complete penetration could be effected in very young children (considering the deep situation of the hymen, the narrowness of the vaginal orifice, and the acuteness of the pubic arch), without causing serious injuries. But recorded cases prove this possible, although as a rule where intercourse has been effected, severe lacerations have resulted.

The Act of 24 and 25 Vict. has been to a certain extent repealed by the 38 and 39 Vict. (Offences against the Persons Act, 1875.) Secs. 3 and 4 of c. 94 provide that:—

Sec. 3. "Whosoever shall unlawfully and carnally know and abuse any girl under the age of 12 years shall be guilty of felony."

Sec. 4. "Whosoever shall unlawfully and carnally know and abuse any girl being above the age of 12 years and under the age of 13 years *whether with or without her consent** shall be guilty of a misdemeanour."

Although the question of consent is manifestly one for the jury rather than for the medical jurist, there are several medico-legal questions bearing on the subject, that need consideration in detail :—

(1.) *Can a female of adult age be violated without consent?*

With respect to all charges of rape, differences in age, development, and strength must be carefully considered. (*a.*) Given the case of a full grown, vigorous female charging a slight lad or an aged, feeble man with having violated her, neither the medical jurist nor the jury will have much difficulty in forming a just opinion on the question of consent. (*β.*) Given

* The words "whether with or without her consent" are obviously a mistake, for if taken literally they make it impossible to commit a rape upon a girl between 12 and 13, as they provide that carnally to know a girl between 12 and 13 without her consent is a misdemeanor. The words ought either to be omitted altogether, or else changed into "even with her consent." Probably the court would so construe them, for it is impossible to suppose that Parliament can have intended the monstrous consequence pointed out above. (Sir J. Stephens, *Digest of the Criminal Law*, p. 173.)

Speaking on this point Mr. Justice Mellor in the case of R. *v.* Dickin (14 Cox 8) said "*Ex abundanti cautelâ* the words 'whether with or without her consent' were inserted in the statute, but, save in respect of the alteration in the age of the girl, the law remained exactly as it was previously, that is to say, if she consented the prisoner might be convicted of the statutory misdemeanor; and if she did not consent *a fortiori* it might be so. But if she did not consent, his offence would amount also to the higher crime, viz., the felony of rape, and he might be indicted and tried for it, quite irrespective of the modern statutes throwing special protection around children."

Since the above paragraphs were written, this question has been decided by the Court of Crown Cases Reserved in the case of R. *v.* Ratcliffe (*Weekly Notes*, 1882, p. 162) in the way that Sir J. Stephens anticipated; the Court holding that a rape could be committed upon a girl between twelve and thirteen years of age.

again the case of a strong young woman and a man of ordinary power and strength, we believe there can be very little question that in 99 cases out of 100, she may, by movements of the thighs and trunk (always provided she retains her senses), prevent the intromission of the male organ. (γ.) Given again a very young girl, or a weak, aged female, the resistance capable of being offered, would in our judgment in most cases be insufficient to prevent the commission of the crime.

We have already mentioned that a boy under 14 is not considered capable of committing a rape (and therefore incapable of committing an assault with intent to ravish), a legal conclusion at variance to known physiological facts and to recorded cases. (*Case* 32.)—(1 Hale, P.C., 629; R. *v.* Groombridge, 7 C. and P., 583; R. v. Phillips, 8 C. and P., 736.)

Cases however may occur where boys under fourteen are charged with a common assault on young girls. Thus (*R.* v. *Read* and others, 1 Den. C.C. 377) three boys aged respectively 13, 12, and 11, were indicted for a common assault on a girl 9 years of age. They were proved to have had connection with her, penetration being effected in each case. The jury returned a verdict of "Guilty, the child being an assenting party, but that from her tender years she did not know what she was about." It was held by the Court of Crown Cases Reserved that on this finding there could not be a conviction.

But the question of consent needs further consideration:—

A dread of violence or even of death (in other words, the sense of fright), may so paralyse the muscles as to prevent even a strong woman from offering effectual resistance. The feeling, again, that it is impossible for her to obtain assistance, may intensify this temporary loss of power. Further, it is possible for a girl to be rendered insensible by fright, as well as faint from the severity of the pain. (*Cases* 20, 21.) Hence the Jewish law drew a wise distinction between a rape perpetrated in a lonely place, and one committed in a populous city.

Or again, victims under threats of violence, or possibly of death, may be driven to yield assent. Such a forced assent does not, however, exculpate the criminal, *moral* force, in the eye of the law, being as much force as *physical* force.

If non-resistance on the part of a prosecutrix proceeds merely from the female being overpowered by actual force, or from her inability owing to want of strength to resist any longer, or from the number of persons attacking her rendering resistance dangerous, or at any rate absolutely useless, the crime is complete. And it will not be any excuse that she was first taken with her own consent, if she were afterwards forced against her will; nor will it be a defence that she consented after the fact; nor that she was a common strumpet, or the concubine of the ravisher; for she is still under the protection of the law, and may not be forced (1 Russ. *Crimes*, 859).

In Scotland, according to Baron Hume, the following facts must be proved to substantiate a charge of rape: (1) Penetration, and (2) actual force in its consummation. It is held, however, to be forcible consummation, if the female discontinue her resistance out of fear of death, or be rendered incapable of resistance by the administration of narcotic drugs, or be under the age of puberty.

(2.) *Can a female be violated unknowingly during sleep?*

We are of opinion that *rape during sleep*, could only be possible in the case of married women, or those habituated to sexual intercourse (*Cases* 22, 23, 24). If it does occur in the case of virgins, the sleep must be of that profound nature that would fall under the head of unnatural somnolence or catalepsy. Magnetic trances, or the so-called mesmeric state, might possibly lead to sufficient unconsciousness to allow of intercourse; but the old maxim, "*Non omnes dormiunt, quæ clausos habent oculos*," probably applies, as has been justly remarked, to many of these cases. (See *Case* 18.) The Scottish judges recently decided that it was possible for a man to have connection with a woman whilst she was asleep, but that this could not be called rape in the indictment, seeing that no force was used to overcome her will! (Case of *Sweene*. Irvine's "*Justiciary Reports*," Vol. iii., p. 109; and "*Edinburgh Monthly Journal*," Dec., 1862, p. 570.)

And here a curious question may arise. Suppose the case of a man getting into bed with a married woman who is asleep at the time, but who rouses just sufficiently to know that some-

body is getting into her bed. Suppose further that in this half-conscious semi-awake condition, the room at the time being dark, and she naturally believing the person to be her husband submits to his embraces—Is this consent? (*Cases* 22, 26.)

This was the case of *R.* v. *Young* (14 Cox, 114). Whilst a married woman was asleep in bed with her husband, the prisoner got into the bed and proceeded to have connection with her. When she awoke, she at first thought it was her husband, but on hearing the prisoner speak, and seeing her husband at her side, she flung the prisoner off and called out to her husband. Upon this the prisoner ran away. The Court for Crown Cases Reserved were unanimously of opinion that the case was one of rape.

It is worthy of remark that in this case the woman had gone to bed "partially under the influence of drink."

In *R.* v. *Mayers* (12 Cox, 311), Lush, J., thus stated the law to the jury: "If a man gets into bed with a woman while she is asleep, and he has connection with her, he is guilty of rape."

In the cases of *R.* v. *Saunders* (8 C. & P., 265), and *R.* v. *Williams* (8 C. & P., 286), it was decided that if a person gets into the bed of a married woman, and by the fraud of making belief to be her husband, has connection with her by consent, this is not rape.

In the case, however, of *R.* v. *Barrow* (L. R. 1, C. C. R., 156), a woman while in bed with her husband permitted the prisoner, under the belief that he was her husband, to have connection with her. It was held: That in the absence of proof that she was asleep or unconscious at the time, it must be taken that her consent was obtained by fraud, and that the prisoner's act, therefore, did not amount to rape.

Certain of our Judges, however, viz., Kelly, C.B., Mellor, J., Denman, J., Field, J., and Huddleston, B., doubt whether this case was rightly decided, not admitting the principle that "where consent is obtained by fraud, the act does not amount to rape." As a fact, this has always been a doubtful point, more especially when it occurs under the above-mentioned circumstances. Thus, in the case of *R.* v. *J. Jackson* (Russ. and Ryan, 487), four judges thought that the carnal knowledge of a woman whilst

she was under the belief of its being her husband, would be a rape, but eight other judges thought it would not. Dallas, C.J., pointed out forcibly the difference between compelling a woman against her will, when the abhorrence which would naturally arise in her mind was called into action, and beguiling her into consent and co-operation; but several of the eight judges intimated that if the case should occur again, they would advise the jury to find a special verdict.*

Bearing on this question of consent, a curious case came before the Court for Crown Cases Reserved (Feb., 1877). A medical man persuaded a girl and the girl's mother, that an operation on the genitals was necessary to effect a cure for certain fits from which she suffered. A rape was perpetrated, the prosecutrix making a feeble resistance only, believing (she swore) that the prisoner was performing a surgical operation, to which she had consented to submit. The law refused (and rightly) to admit this as consent on the part of the girl, and in the case referred to, the conviction was confirmed. ("*Brit. Med. Journ.*," Feb. 10, 1877, p. 181.) (*Case* 52.)

There must, however, in such cases be no consent on the part of the female to the prisoner's act as the act of sexual connection. In other words, where the female consents, the further point is considered whether she submitted to the act as being, and knowing it to be, sexual connection (in which case the prisoner's act does not amount to the crime of rape), or whether she consented under the belief he was about to perform a surgical operation.

In the case in question the prosecutrix swore that she consented to the act of the prisoner, believing it to be a surgical operation. (*See* Sir J. Stephens, *Dig. Crim. Law*, p. 171, note 1.)

It can scarcely be deemed worthy of serious discussion whether the medical man, in acting as he did, was doing so with a *bona fide* belief that it was for the good of his patient. So improbable

* The cases in chronological order having reference to this point are as follows:—R. *v.* J. Jackson, Russ. and Ryan, 487; R. *v.* Saunders, 8 C. and P., 265; R. *v.* Williams, 8 C. and P., 286; R. *v.* Barrow, L.R. 1 C.C., 156; R. *v.* Young, 14 Cox, 114.

and far-fetched is such a defence, that but for the fact that in one such case it was gravely raised, we might have passed it over unnoticed.

(3.) *Can a female be violated unknowingly whilst under the the action of narcotics and intoxicants?*

Chloral-hydrate, opium, tobacco, chloroform, ether, and other narcotics and anæsthetics, have doubtless been used to facilitate criminal intercourse (*Case* 26); but it is to be remembered, that none of them (not even chloroform or ether), induce immediate insensibility. Hence, the stories of some dose or another having been administered, or of a handkerchief being forcibly held to the nose, followed by *instant insensibility*, are to be looked upon with the gravest suspicion (*Cases* 25, 26, 27). Still, a rape has been committed under the partial insensibility of ether ("*Med. Gaz.*," Vol. xl., p. 865), and we can understand how even a very slight anæsthesia might facilitate the commission of the crime.

It is to be noted that during the time an anæsthetic is being administered, patients are often the subjects of delusion. In this way a false charge might be made by a patient against the medical man in attendance (and that from no evil or improper motive), founded entirely on certain false impressions received during the period intervening between consciousness and unconsciousness (*Case* 41). It is of importance to bear this fact in mind in administering anæsthetics to women, and it further suggests the desirability in such cases of securing the presence of a third person.

It would seem (*R.* v. *White*, Northampton Winter Assizes), although this is a matter of some doubt, that it constitutes no valid excuse in a case of rape for a man to prove that the woman with whom he had intercourse was insensible from drink, and consequently unable to offer effectual resistance.

Thus in the case of *R.* v. *Camplin* (1 Den. C. C., 89), the prisoner gave a girl of thirteen years of age liquor for the purpose of exciting her. She became quite drunk, and when in a state of insensibility, he violated her. It was held that this was rape.

(4.) *As regards the unconsciousness of idiocy or insanity.*

The law has decided that carnal intercourse with an idiot or an insane person is rape (*R.* v. *Ryan*, C. C. C., 2 Cox, 115), although in the case of *R.* v. *Fletcher* (L. R. 1 C. C. R., 39), a conviction for a rape on an idiot girl was quashed, no evidence being offered to show that (as was alleged in the indictment) the act was done against her will!! (*Case* 53.)

It is, however, clear that upon an indictment for rape, there must be some evidence to show that the act was without the consent of the woman, even although she be an idiot. Thus in the case above-mentioned of *R.* v. *Fletcher*, Keating, J., left it to the jury, that if they were satisfied that the girl was incapable of expressing consent or dissent, and that the prisoner had connection with her without her consent, they should find him guilty; but that a consent resulting from mere animal instinct, would suffice to prevent the act from constituting a rape. (*See* also *R.* v. *Barratt*, L. R. 2, C. C. R. 81.)

In the case of *R.* v. *Ryan* (2 Cox, 115), a rape was committed upon the person of an idiot. Questions relating to her general habits and character, were asked by Platt, B., of the girl's father, with a view of eliciting the probability or improbability of her having been a consenting party.

Where a girl is in a state of utter unconsciousness, whether occasioned by the act of the prisoner or otherwise, a person having connection with her during such time is guilty of rape.

In several penal codes, carnality with the insane, with idiots, and with drugged persons, is termed "*violation*," thereby distinguishing it from rape, which is commonly understood to include violence.

(5.) *With respect to certain diseased conditions.*

A girl may bring a charge of rape, asserting that intercourse took place whilst she was labouring under *an hysterical or epileptic fit* (*R.* v. *Baker*, C. C. C., 1872). Such a charge must be received with great caution (*Case* 19). Girls, it may be important to remember, usually make considerable noise during an hysterical attack. *Syncope* may, of course, occur, and

would no doubt, favour the designs of the seducer. But the terror and excitement resulting from a criminal assault, do not usually, although they may, produce syncope. (*Cases* 20, 21.)

II.—The Physical Signs indicating Virginity.

We consider these apart from the signs indicating defloration or non-virginity, seeing that cases may occur, and notably in applications for a decree of nullity of marriage, where a woman asserts her husband impotent, and in proof declares herself a virgin.

No female should be examined, with the object of testing whether or not she be a virgin, during the period of menstruation.

The "physical signs" indicating virginity are as follows:—

1. The presence of an intact hymen.
2. The absence of the carunculæ myrtiformes.
3. The entirety of the fourchette, fossa navicularis, and posterior commissure of the labia.
4. A narrow and rugose state of the vagina.
5. A plump and elastic condition of the breasts, with slight development only of the nipples.
6. The integrity of the perinæum.

We remark that no one of these six signs, taken alone, constitutes proof of [physical] virginity, although the presence of a perfect hymen is undoubtedly strong presumptive evidence of chastity. As in a doubtful case of pregnancy, so here:—it is not one sign but several signs that must determine our opinion.

(1.) *As to the Hymen:*—*

And here two questions arise:—

(*a.*) *Given the presence of an intact hymen, are we justified in assuming virginity?* *

There are undoubted difficulties in answering this question

* See *Edin. Med. Journ.*, Vol. xxiii., p. 906. Paper by Prof. Schroeder, on "The Condition of the Hymen and its remains, by Cohabitation, Child-bearing, and Lying-in."

affirmatively. The hymen is a membrane stretched out at the entrance to the vagina, in which there is an opening, not in the centre, but towards the orifice of the urethra. The normal condition of this opening is for it to be of sufficient width to permit of a finger being passed into the vagina without injuring its border of mucous membrane. This being so, it follows that if the male organ be not specially voluminous, and the aperture slightly larger than usual, repeated intercourse may occur without any other change resulting than an increased dilatability of the aperture, or perhaps slight indentations on its free edge from minute tears. If the aperture be small, then it would almost to a certainty be ruptured by the first coitus. Cases are recorded, however, where a complete hymen has continued throughout pregnancy, its rupture not taking place until delivery. (*Cases* 36 to 38.) We are told moreover that in one case a five months' fœtus was discharged through the aperture of the hymen, without rupture of the membrane resulting.

Notwithstanding these difficulties (and they are admittedly very great), we think there are good grounds for accepting the following statement of Casper with the additions we have placed within brackets :—

"Not assenting to that unfounded scepticism which has been asserted in regard to this question both in earlier and more recent times, I must declare, that when a forensic physician finds [in a girl arrived at puberty] a hymen still preserved, even its edges not being torn [and more particularly if the aperture be undilatable and of small size, and the membrane itself normally placed, and of ordinary shape, and structure], and along with it [in young persons], a virgin condition of the breasts and external genitals, he is then justified in giving a positive opinion as to the existence of virginity." Of late years experienced obstetricians, such as Drs. Barnes, Oldham, and Tyler Smith, have sworn to the fact of females being "*virgines intactæ*," chiefly on the ground of the integrity of the hymen.

Admitting that, of all the signs of virginity, an intact hymen is the most valuable, it must nevertheless be conceded that it is not to be regarded as infallible proof that a rape has not been

committed, and this more especially in the case of young girls, where the hymen is deeply placed, and the genitals small and undeveloped. (*Cases* 1 and 9.)

(*β.*) *But, given the absence of an intact hymen, are we justified in assuming non-virginity?*

The presence of an untorn hymen in a female arrived at puberty, is undoubtedly a more certain indication of virginity, than its absence is to be regarded as proof of non-virginity.

It must be manifest that in cases where mechanical means have been adopted to dilate the vagina, in order to render immature girls *aptæ viris*, (the fruit of the plantain being a favourite instrument in India for this purpose,) destruction of the hymen is almost certain to occur.

Casper, again, speaks of a case in which the hymen was lacerated by the child's mother, first by the introduction of the fingers, and afterwards by a stone forced into the vagina! Tardieu gives similar cases. The author knows of cases where the hymen has been destroyed by the breaking of a steel crinoline hoop, by the fracture of domestic utensils, etc. A curious case of laceration of the hymen is recorded, resulting from a goat attacking a young woman whilst she was straddling to cross a stile. Such accidents are, after all, rare.

Nor, again, must the possibility of some congenital malformation of the genitals, with an absence of hymen (as in a case reported by Capuron), be overlooked. Again, it is said that the hymen may be destroyed by primary menstruation, and by the passage of clots during the catamenial period (Foderé and Bellow). Surgical operations, or a medical examination of the genital organs (which, we would add, should, in the case of the unmarried, be always conducted with the utmost caution and gentleness) may cause its destruction.

Although Madame Boivin and others have written on the ease with which the hymen may be lacerated, it is, as a fact, seldom destroyed, either by self-abuse (except when very excessive), or by the scratching due to the presence of worms or to other causes of irritation in children. It has been alleged that riding, dancing, and leaping, may in exceptional cases destroy it; but considering how deeply placed the hymen is, the author

believes that its rupture from such causes must be an event of extreme rarity. As a fact no such case has occurred within his experience.

(2.) As regards the *carunculæ myrtiformes*. Two or more of these are vaginal, and not hymeneal. The vaginal carunculæ may, therefore, co-exist with an unruptured hymen. Again, the presence of these little bodies, even supposing them hymeneal, only proves the destruction of the hymen, and does not necessarily prove rape, however much they may tend to corroborate such a charge. (*Case* 3.) (See "*Edin. Med. Journ.*," xxiii., p. 906.)

(3.) The *fourchette*, *posterior commissure*, etc., seldom survive a first labour at term, although, as a rule, they are little affected by sexual intercourse, except under circumstances of violence. This fact is, we believe, of great value diagnostically. As a result of a very large number of examinations, it would appear, that whilst intercourse rarely if ever destroys the posterior commissure, the first labour invariably does. (*Case* 3.)

(4.) Although *a narrow and rugose state of the vagina* is a mark of virginity, it not uncommonly continues to exist in young healthy married women previous to child-bearing, whilst such a condition is sometimes found after a single confinement occurring at an early age. In this latter case, however, we should probably find changes in the os uteri and perinæum. It is said that, by the use of astringents, the contractility of the vagina may be perfectly preserved. It is evident that mere sexual intercourse could scarcely so alter the virginal condition of the vagina except under circumstances of inordinate violence), as to admit of evidence being founded upon such alteration; whilst, on the other hand, a profuse leucorrhœa or dysmenorrhœa may destroy the narrow vaginal rugæ, even of those who have never had intercourse.

(5.) *The breasts* in virgins are plump, elastic, and non-pendulous, the nipple being at the apex and undeveloped. The breasts are, however, slightly affected by *constant* intercourse, and considerably affected by advancing age and by feeble general health. The areola is altered by conception, but not by mere connection.

(6.) The *perinæum* is invariably lacerated a little in first labours. Its integrity, however, (which is, of course, always found in virgins,) is not affected by sexual intercourse, unless this be accompanied by violence.

III.—Physical Signs indicating Defloration (*i.e.*, deprivation of virginity), and the Diseases that may Simulate the Effects of Violation.

It is practically impossible, in discussing the signs of non-virginity, to separate the two questions:—(1.) Has this woman ever had sexual intercourse? And (2.) If so, has the intercourse been recent or long antecedent?

Seeing that mere vulval penetration constitutes a rape in law, it is possible for intercourse to have taken place, and yet leave no marks upon which the medical jurist could with confidence found definite evidence. Save exceptionally (*Case* 3), no inference of any value can be drawn after the lapse of a week; but often a much less time than this (even three or four days), suffices to heal lacerations, and to clear away swellings and abrasions (*Case* 1). Of course, the cicatrices of tears, or the appearances presented by a lacerated hymen would remain; but it is difficult, after some time has elapsed, to fix the period when the injuries causing these conditions occurred.

Before attempting to examine a patient, it is most important for the medical jurist to note how the girl walks, *i.e.*, whether, as she entered his consulting-room, she appeared to suffer pain and inconvenience. It will generally be remarked that, in cases of rape, the female walks with difficulty, owing to inflammation of the genital organs, and to an instinctive dread of separating the thighs. This sign is important, as not likely to be simulated.

The medical jurist should, in the first instance, institute a careful search (α) for spermatozoa within the vulva, removing for this purpose a small quantity of the discharge with a glass or silver spatula; and (β) for stiffened masses of the genital hairs. If clotted hair be found (best looked for by examining the parts with a large hand magnifying lens), the stiffened mass should be carefully removed and preserved for microscopic

examination. Spermatozoa, it is well known, cling with marvellous tenacity to hair, and their presence in such a situation constitutes material evidence. (Part I., p. 196.)

As undoubtedly the most important physical sign of defloration, we consider, first of all—

(1.) *The appearances presented by the destruction of the Hymen.*

In searching for the hymen, it is often necessary to separate the labia, and even the thighs, to a considerable distance.

It is worth remarking that the examination of a girl immediately after violation, and more particularly the search for the hymen under such circumstances, is often far from easy, owing to the inflamed condition of the parts (*Case* 5). It is better in all such cases, to insist on a second and more minute examination after the swelling and extreme tenderness have somewhat subsided. Notwithstanding, however, this second examination, it is most important, for purposes of evidence, to make as complete an examination as practicable at the earliest possible moment after the rape was said to have been committed.

For anatomical reasons, the rupture and even a slight laceration of the hymen, may cause severe hæmorrhage, which has been known to prove fatal. The laceration of the hymen may vary from one or more simple slits, to double perforation, with wide stretching of the parts.

Recent wounds are sharp edged, fresh looking, and tender, whilst those of old standing are rounded and have callous edges.

If no fresh attempts at violation or the introduction of foreign bodies be made, the floating folds of a torn hymen may remain for many months. (Devergie and Tardieu.)

The hymen, once destroyed, is never renewed. The only sense, therefore, in which virginity can be said to become restored, is in the recovery of a certain narrowness and healthy tonicity of the vagina and external parts. We mention this, as a well-known passage in Boccaccio appears to point in a different direction.*

And here another question suggests itself:—*Can intercourse*

* "Essa, che con otto uomini forse diecemilia volte giaciuta era, allato a lui (al Re del Garbo) si coricò per pulcella, e fecegliele credere, che cosi fosse; e Reina con lui lietamente poi più tempo visse; e perciò si disse: Bocca basciata non perde ventura, anzi rinnuova, come fa la luna."

occur, with consent, between young persons in good health, without the hymen being lacerated? It is possible, no doubt, seeing that fruitful intercourse has taken place without rupture. (*Cases* 36, 37, 38.) It is possible, again, for it to occur if the membrane be more than ordinarily deep seated, or more than usually tough. It is possible, again, if the membrane be very elastic, and its aperture of a greater size than usual (page 196). Possible, again, no doubt, if the male be of weak virile power. But it is exceedingly improbable, we must add, that the intercourse should be simply vulval, much less urethral (*Case* 38), supposing both parties consent, and both be normally constituted and in good health.

Our remarks hitherto apply to girls who have arrived at puberty. For it must be admitted, that in rapes on very young children, a laceration of the hymen is not a usual occurrence (*Cases* 9, 12), although it does happen occasionally (*Case* 28). Of course, if the finger be employed, the hymen will probably be destroyed. This non-laceration of the hymen in rapes on infants, depends on the depth at which the hymen is placed, and the difficulties of coitus arising from the general narrowness of the parts. The hymen, under such circumstances, will probably be congested, although not ruptured. (*Case* 9.)

Admitting the difficulties we have already indicated in regarding a lacerated hymen as proof of unchastity, nevertheless Devergie's statement that "in 999 cases out of 1000 where defloration has taken place, the hymen is destroyed," is, so far as girls arrived at puberty are concerned, no doubt not far from the truth. (*Cases* 2, 3, 4, 8, 21, and 40.)

It will, in such cases, be important for the medical jurist to record, whether there be indications of the rupture being recent, and whether or not it be associated with a congested and injured condition of the genitals. Still, it is to be noted that in *Case* 8 (a genuine one of rape), a lacerated hymen was practically the only lesion found, there being neither evidence of pain or of a discharge, nor marks indicating general violence.

(2.) *A swollen, more or less congested, hot, and tender state of the vulva and genitals generally.* These conditions will inva-

riably be found associated with difficult micturition and passage of fæces, whilst if there has been resistance, bruises, and possibly lacerations, with ecchymosis of the clitoris and of other parts, are conditions almost certain to exist. (*Cases* 1, 2, 3, 9, 10, etc.) And this, more particularly, must happen in the case of young children, supposing the penetration to have been vaginal. It is, moreover, not at all unlikely in children, as we have already remarked, that legal penetration may be complete, accompanied with extensive swelling of the labia and effusion of blood, without the hymen being ruptured. (*Case* 9.)

In certain cases, the genital injuries resulting from forced intercourse have been excessive:—such, *e.g.*, as the more or less tearing through of the recto-vaginal septum (*Cases* 20, 28, 29, and 30), lacerations of the vagina, rupture of the perinæum, etc. (*Cases* 21, 28, 29, 31.)

Cases, again, are recorded where the external marks of violence have been practically absent, whilst the internal injuries have been so severe as to cause death. (*Case* 31.)

The degree of injury will necessarily depend on the force used, the resistance offered, and the respective ages of the parties concerned;—in other words, on the degree of disproportion between the male and female organs involved. It follows, therefore, that the relative vigour of the male and female needs most careful consideration by the medical jurist. Given a vigorous male and a female scarcely arrived at puberty, it is evident that the injuries to the female would probably be more severe than if the male was very young or very old, and the female of advanced age, with relaxed genitals, and a vagina dilated by menstruations or frequent discharges. The injuries in the former case with consent, are likely to be infinitely in excess of those in the latter without consent.

(3.) *Discharges; Leucorrhœa; Gonorrhœa; Syphilis; Noma.*—A muco-purulent vaginal discharge may (and probably will) be found within a few hours of a rape having been committed upon a girl, more especially if she be a virgin and under the age of fifteen. In one instance (a genuine case of rape, spermatozoa being found in the vaginal discharge in large number), the

author saw this discharge become purulent within twenty-four hours. This discharge (it is to be remarked) is not gonorrhœa, but is the result of inflammation arising from the irritation of connection. Hence it may be found on the victim, without being found on the ravisher. It is usually at first bloody, but rapidly changes to a greenish tint, ultimately becoming glutinous. It is commonly attended with great smarting, and a constant desire to scratch the genitals. It should at its first appearance, be carefully examined for spermatozoa. For this purpose, it is best to employ a glass pipette to remove a small quantity of the discharge from the vagina. Such mucus often retains living spermatozoa for ten or fourteen days after the rape. (Beale's "*Archives of Medicine*," Vol. I., p. 139; Case by Dr. Henry Munroe.) In this and in all such cases, it must be borne in mind that the non-discovery of spermatozoa does not prove the absence of semen. (*Case* 40.) (Part I., p. 235.)

But the existence of a discharge, important evidence though it be, is not *per se* a proof of rape. For, altogether apart from rape or intercourse, it is well known that the majority of females (virgins or not) suffer at times from leucorrhœa, whilst in the case of female infants and young children, inflammations of the vulva (*vulvitis*) and of the vagina (*vaginitis*), giving rise to what is called *infantile leucorrhœa*, are far from uncommon. (*Case* 34.) The discharge may, owing to its irritating nature, cause excoriation and sloughing of skin. Further the symptoms produced, and the appearances resulting, may be confounded with gonorrhœa. Even a leucorrhœal discharge will cause an ophthalmia, very similar to gonorrhœal ophthalmia, and equally contagious. ("*Med. Times and Gazette*," Jan. 17, 1857, and April, 1859.) Thread-worms in the rectum (oxyurides and trichocephali dispares, commonly called ascarides), are a frequent cause of these diseased conditions, whilst in scrofulous and delicate children, dentition, catarrh, loaded bowels, etc., produce similar effects. (See an able paper on this subject by the late Sir W. Wilde, "*Medico-Legal Observations*," etc., 1853; also Churchill's "*Diseases of Woman*," pp. 57—64).

In all cases where a discharge exists, the main question for the medical jurist to consider is, Is this discharge gonorrhœal?

Now it is certain that leucorrhœal discharges arising from a variety of causes, such as irregular menstruation, masturbation, skin diseases, calculi, injections, etc., might be mistaken for gonorrhœa, and *vice versâ;* and further, that there are no certain diagnostic signs by which under all circumstances, they can be differentiated.

Again, it must not be overlooked that a rape might be attempted and perpetrated on a girl already suffering from a discharge with vaginitis, and that as the result of the violation, a gonorrhœa may be superadded to a pre-existing leucorrhœa.

Even the discharge from a chancre has but few points of real distinction, by which to differentiate it from a discharge arising from a common sore. Inoculation would no doubt prove its real nature, but this test is scarcely practicable in all cases.

This subject of discharges has been a fruitful matter for controversy. Donné suggested the reaction of discharges as a test of their nature, a gonorrhœal discharge being (he stated) acid, whilst the natural mucus of the vagina was alkaline. Our own experience shows that this test for forensic purposes is useless.

Again, although it is true that a gonorrhœal discharge is usually purulent, and a leucorrhœal discharge mucous, it must not be forgotten, as we have already pointed out, that to the conditions producing leucorrhœa, there may be superadded certain ulcerated states of the vulval lining membrane and vaginal walls, resulting in a purulent leucorrhœal discharge. (See a case where a mistake of this kind was almost committed, "*Lancet*," Feb. 8th, 1873, p. 218.)

Leucorrhœal discharges, as we have said, are very common in females. They have at times a serious aspect, for they are intensified by any irritation, such as a first intercourse. Hence, a girl suffering from leucorrhœa *before* marriage, may *after* marriage sue for a divorce on the ground of her having been infected by her husband with the venereal disease. (*Case* 33.)

We need only indicate here the great importance of investigating the *presence* or the *absence* of syphilis and gonorrhœa in all cases of rape, and for this purpose *both the accused and the accuser should be examined.* The existence of a discharge simulating gonorrhœa, or of syphilis, in both accuser and accused

constitutes important evidence in support of the rape having been committed (*Cases* 11, 12, 13); whilst the presence of a discharge or of syphilis in the one, and its absence in the other, constitutes important evidence in an opposite direction. (*Cases* 14, 15.) But although such evidence is important, it can never be considered conclusive.

A man may give a child gonorrhœa, although penetration was only vulval. (*Case* 12.) In fact there is but little doubt that a child is more easily infected with gonorrhœa than an adult.

In cases where syphilis, or a discharge which may be gonorrhœal, is found on a female, most careful inquiry should be instituted as to the precise time that the rape was said to have been committed. (*α.*) For if gonorrhœa or syphilis be clearly marked in a female at the time of the examination, such examination being conducted immediately after the rape was said to have been perpetrated, the unchastity of the female is next to certain (*Case* 15), seeing that the venereal affection could not have been the result of the alleged rape. (*β.*) If both accuser and accused are suffering from the disease, a sufficient period of incubation having elapsed before its appearance in either case, the fact is material evidence in favour of the truth of the accusation. (*Cases* 11, 12, 13.) (*γ.*) If the accuser is suffering from the venereal disease, and the accused not, or vice versâ, it constitutes important evidence on the part of the defence.*

It will thus be seen that the history of a discharge, more particularly in respect to the time of its appearance, needs special attention. (*Case* 16.) Both gonorrhœa and syphilis have a *period of incubation* or *latency*. In *gonorrhœa*, this varies from some hours to three or four days, or even more. In *syphilis*, the period is still longer, say from ten to forty-four or more days. [Bäumler on "*Syphilis, Ziemssen's Handbuch der Speciellen Pathologie und Therapie*," p. 73, etc. See also the medical evidence in *Davy* v. *Simpson*, 1875.] The *existence of secondary and tertiary symptoms soon after an alleged rape*, or of a *profuse discharge* a few hours after, would be opposed to the supposition that the disease had been recently communicated.

We repeat, it is scarcely possible either from the examina-

* The prisoner cannot be examined unless he consent.

tion of a discharge, general or microscopic, or by a medical inspection of the person, to form a decided opinion of its precise nature or cause. Medical evidence may help non-medical evidence in this particular, but medical science alone is incapable of deciding the question, no actual difference, so far as we know, existing between the microscopic characters of a gonorrhœal discharge, and those presented by the purulent discharges of other diseases.

There is one other point worthy of consideration. Given a gonorrhœal discharge, may it not result from causes other than intercourse? (See *Case* 17.) And that this may be the case is indisputable. Hence a gonorrhœal discharge alone is not complete evidence of a rape having been committed, or of the female being other than a virgin. The evidence afforded by a discharge, must always be considered in conjunction with marks of violence and general evidence.

Leaving discharges, we note, (as Dr. Percival has remarked,) that a severe form of genital inflammation may prevail in young children (from 4 to 10) as an epidemic, terminating in a destructive and gangrenous form of ulceration of the genitals. This disease, called *noma* (not unlike that of the same name which occurs in the mouth), might be mistaken for the results of attempted violation (see also Devergie, p. 359). The genitals, at first dusky-red, become the seat of foul sloughing ulcers, attended with great constitutional disturbance. These cases of noma of the genitals have proved fatal. Mr. Kinder Wood, of Manchester, who has investigated the subject with great care, regards the disease as a form of typhus, accompanied with a mortification of the pudenda. ("*Med. Chir. Transac.*," Vol. viii., p. 84.) Such ulcers might, unless the medical jurist was on his guard, be mistaken for primary syphilitic sores. Although in many respects dissimilar (see "*Lawrence's Surgical Lectures*"), such a faulty diagnosis is possible, and what is more, has occurred. (See *Case* 32.)

The point in such cases to be remembered is, that the complaint (so far as we know) is confined to young children. Careful enquiry must also be instituted whether a like disease be epidemic or not.

It must never be overlooked, that a ravisher may unknowingly select a child already diseased as his victim. This was probably the case with *Amos Greenwood* (*Case* 28), whom Sir W. Wilde thought unjustly accused. It was, however, proved to the satisfaction of the Court, that he had inflicted violence on the sexual organs of the deceased.

(4.) It has been stated that in a case of rape the vagina usually presents signs of excessive dilatation. In really recent cases our experience is that the vagina, on account of the swelling, appears more than usually contracted, although it is true a dilated vagina may indicate previous defloration (*Case* 3). We hold strongly, that the condition of the vagina is, *per se*, of very slight value forensically. We know of instances, for example, in which women who have had repeated sexual intercourse, and even borne children, have presented a narrowness of vagina exceeding, or at least equalling, that of a virgin. On the other hand, as we have already stated, virgins who have suffered from profuse menstrual discharges, or excessive leucorrhœa, may have very dilated vaginas.

(5.) The presence of the *carunculæ myrtiformes* in the condition of small pyramidal tubercles, is to be regarded as a sign, not of recent, but of previous defloration. In the case of a recently lacerated hymen, the carunculæ will be found swollen and inflamed. (*Case* 3.) In very aged females, they may so wither and dry up, as to be no longer recognisable.

(6.) The virgin or nulliparous state of the os and cervix uteri is little, if at all, affected by sexual intercourse. (See p. 133.) It is, however, much altered by pregnancy, although certain tumours and diseases may, it should be remembered, simulate these uterine changes.

(7.) The *breasts*, again, though their condition may be influenced by lactation and by frequent manipulations, are scarcely affected by sexual intercourse.

(8.) The signs already described of previous child-bearing are seldom available in cases of rape, although they may conclusively prove the absence of the virginal condition.

Respecting the signs of rape already noted, there is one general circumstance to be noted. Supposing them all to be well

marked, however clearly they establish the fact of intercourse, they do not prove that the connection was *against the consent* of the girl. For such injuries on the genitals as we have described, might almost without exception, be found to occur under certain conditions even when the intercourse was with consent, such, *e.g.*, as in the case of a first connection—or if the male be specially vigorous and the female have only just reached puberty, when the organs are somewhat undeveloped—or if both male and female be actuated by intense desires, etc.

Hence follows the importance of our next consideration, respecting which, however, we must say that general marks of violence never prove that a rape has been committed, but at most only that a rape has been attempted.

(9.) *General Marks of a Struggle.* (*Cases* 4, 6, 40.) Owing to the pain caused by the relative disproportion in size of the penis of an adult male and the capacity of the genital organs of a small female child, or in the case of an adult on account of the discomfort and irritation invariably caused by a first connection, the female commonly resists to the very utmost of her power. Scratches, bruises, and other signs of injury therefore, will probably be discovered on her body. These are most likely to be found about the thighs and in the vicinity of the genital organs, also on the arms, legs, and front of the body, and on the chest and throat. In the case of females after puberty, the possibility or probability of injuries being *self-inflicted*, will need most careful consideration, seeing that the accusation of rape is one not unfrequently made from motives of spite, or to extort money. Such voluntary injuries are generally of a slight nature, and on parts—such as the vulva, inside of the thighs, etc.—easily reached by the hands.

It is manifest that much we have said respecting the signs of violation, will not apply to rapes committed either on married women or on those accustomed to sexual intercourse. In the case of a child or virgin, it is scarcely possible to imagine forcible connection without injury of some kind; whilst in those accustomed to intercourse, unless the struggle be great, it is quite conceivable that no signs of pudendal or other injury may be detected, more especially if before connection the thighs be well

separated. Such cases are on record. (See Dr. Taylor, vol. ii., p. 457.)

But there is another point of view from which this subject must be regarded. The absence of injuries or marks of a struggle is inconclusive as evidence that a rape has not been committed. Thus a woman may be held down tightly by assistants, or be so nearly suffocated by having her clothes thrown over her head when on the ground, that violation may be effected without either bruises or injuries occurring, and this although the intercourse was without consent. (*Case* 3.) And here, of course, the most careful examination of all vaginal injuries is required, although, as we have remarked, these may in like manner be absent.

At the same time seeing that the absence of signs of virginity neither proves consent, nor constitutes conclusive evidence of sexual intercourse, it becomes a matter of great importance, in cases of this nature, to record the existence of all injuries such as would indicate a struggle. Further the medical jurist must decide whether the injuries are such as could be self-inflicted, or agree, in their general appearance, with the time when the crime was said to have been committed.

Another consideration forces itself upon us. Most, if not all the signs of rape, may result from the not uncommon solitary vice of *masturbation.* A foreign body may lacerate the hymen, and so carunculæ be formed :—it may produce pain, congestion, and difficulty of walking :—it may dilate the vagina :—and finally it may, if not actually produce, at any rate increase, a pre-existing leucorrhœal discharge. Hence, given all the symptoms and signs of rape, the medical jurist must consider whether or not they could have resulted from a cause other than sexual connection.

Where doubt exists in the mind of the medical jurist as to the truth of a story of rape, such doubt is commonly due to two causes : (1) the absence of local marks of injury, and (2) the absence of signs of resistance. And it must be admitted that if both sets of data are wanting, the difficulty of proving a rape is great. It can only be argued (and the contention is not without its value), that if the case on the part of the plaintiff

was groundless, she would probably have taken care to have produced marks consistent with the story she had invented. It is possible again that subsidiary and accidental signs of rape (such as spots of semen or of blood) may be discovered. And these should always be sought for. As medical experts however, we have only to give evidence on the conditions observed.

Apart from the subject of rape *per se*, the question may be submitted to the medical jurist, whether a female is or is not a prostitute. We mean by that—not simply whether she has on one occasion had sexual connection, but—whether she is accustomed to it as a practice.

This subject, we must admit, is full of difficulty. Duchatelet ("La Prostitution de la Ville de Paris") relates how two prostitutes (one of whom had even suffered from syphilis) were examined by a distinguished physician, who admitted his inability to decide whether or not they were virgins. (See "*Guy's Forensic Medicine*," p. 49.) *Size of vagina* is not to be relied upon, for, as Duchatelet points out, the vagina may be as large in girls who have only recently become prostitutes, as in married women who have had a family; whilst on the other hand, the vagina in some prostitutes of twelve or fifteen years' standing, has been observed to be as small as the vagina in virgins. Nor can *general appearance of genitals* be relied upon, for the same authority has recorded how in a female, æt. 51, who since 15 had been a woman of the town, the genital organs presented an almost virginal appearance. *The bulky, elastic, and well closed state of the labia, entirely concealing the vulval orifice,* such as is usual in virgins, is by no means peculiar to them, whilst even in virgins this normal condition may be lost by ill health and continuous leucorrhœa. *The colour and plumpness of the nymphæ, and more particularly their small size, so that they lie concealed by the labia,* (signs as a rule undoubtedly characteristic of virgins, in contradistinction to those accustomed to sexual intercourse, when the nymphæ become enlarged and project beyond the labia,) are conditions of parts that might be destroyed by self-abuse. *A small, non-erectile clitoris,* with a *non-mobile prepuce,* indicative of virginity, and an enlarged clitoris, facile of erection, with an easily moved prepuce

indicative of non-virginity, need much care as indications of chastity or of unchastity, seeing how easily self-abuse may effect similar results to those produced by intercourse.

An entire fourchette, common in the virgin, is often lacerated, it is true, by a first connection, but it may also be lacerated from many other causes, such as acts of accidental violence.

Further, that undeveloped girls are at times the ardent solicitors of libidinous practices on the part of boys, is a fact only too well known to medical jurists. Enlarged labia, open vulva, enlarged and reddened clitoris, and a peculiar funnel-shaped vulval cavity, having the hymen for its lowest point, are the special characteristics that in such cases must be sought for.

Casper, Tardieu, and other foreign writers give instances of rapes on males by females, followed by conviction and punishment. Although there can be little doubt that this crime has been often committed by grown-up women on small boys, yet it appears to be unknown in English courts of law.

To the question, "*May rape, or even violent sexual intercourse prove fatal?*" the answer must be in the affirmative. The famous case of *Amos Greenwood*, and numerous instances recorded by Tardieu, Casper, Taylor, and others, show that death in periods varying from a few hours to a week, not unfrequently occurs. Dr. Harvey records 205 cases of rape in India between the years 1871 and 1873 inclusive, of which five proved fatal. (*Cases* 28, 29, 30, 31, 31*a*.) This result may be a consequence of shock, of hæmorrhage, of the after effects of wounds, and (in the case of females at or near puberty) of a general state of erethism or extreme congestion of the sexual organs, brain and spinal cord, leading to hæmorrhages in nervous matter, to arrested circulation in the lungs, to apoplexies of the ovary, and to effusions of blood into the peritoneal and other cavities. That the penis of a vigorous male may inflict frightful injuries upon a young and immature female, has been abundantly shown from civil practice in India, where infant marriages are only too common, and is also within the experience of the author in cases where there was no criminal intent. The vagina may be torn through into the bladder and rectum (and in such cases it is the posterior portion which commonly suffers laceration), the

perinæum destroyed, and the peritoneal cavity opened by the force of the male organ only. (*Case* 29.) Thus inflammation followed by sloughing may set in and prove fatal, more especially in the case of badly constitutioned children. (*Cases* 29, 31.) And, further, such liability to a fatal termination will be increased by unhealthiness on the part of the male. Nevertheless it must be admitted that patients often recover from very severe local injuries occurring to the genitals.

"*Can pregnancy follow rape?*" Impregnation is independent of volition on the part of those having connection (*Cases* 7, 18). The fact that pregnancy may follow rape is beyond all question.

Post-mortem after death from rape.

Given marks on the genitals indicative of rape, the medical jurist must consider the following questions:—

(1.) Were the injuries found after death on the body and genitals, such as would indicate the commission of the crime during life?

(2.) Were the injuries sufficient to cause death?

(3.) May the injuries found on the body have been inflicted after death, in order to divert suspicion from the real cause of death?

(4.) Are there any signs of violence on the body which might have proved fatal, other than those that may be ascribed to rape?

It will be important to examine the mouth, to see if, for the purpose of preventing the cries of the victim, foreign bodies have been forced into it during life; and also to examine the vaginal mucus and hairs about the genitals, for spermatozoa.

(Cases of post-mortem after rape, 28, 29, 29*a*, 30, 31, 31*a*.)

IV.—The Examination of the Accused, and of the Spot where the Rape was said to have been Committed.

The examination of the accused may furnish evidence of a struggle. Scratches, more particularly on the face, hands, and penis, with lacerations of the frænum preputii, may be

apparent, particularly if the accused be not accustomed to intercourse. It will be important to observe all rents and tears, spots of blood (*Case* 10), semen, or dirt—the latter possibly indicating a struggle on the ground. It is to be noted that even the special form of earthy matter with which the clothes or boots are soiled, *i.e.*, whether it be clay, gravel, etc., may be important. Stains, such as of fresh paint, tar, etc., on the clothes, are all details likely to constitute important evidence, and may perhaps serve to mark the precise place and spot where the crime alleged was committed. In all such cases the medical jurist should endeavour to discover whether marks of blood, dirt, paint, etc., similar to those on the accused, exist on the clothes or person of the female. The loss of a button on the trousers of the accused, more especially if the button be found at the spot where the rape was said to have taken place, and if the accused fails to account satisfactorily for its loss or discovery, should be noted.

The presence of smegma around the glans, and of semen in the urethra, should be carefully sought for. It is true with respect to the finding of semen, that its value as a sign of rape will much depend on how soon the accused person was examined after the crime was committed. Neither its presence or its absence must be over-estimated as evidence, for, on the one hand, if the prisoner has passed water since he committed the crime, the probability is that no semen will be found in the urethra, and that although a short interval only has elapsed since coitus; whilst on the other hand, proof of emission is not necessary to establish the charge. Again, the actual vigour of the accused, but more especially the relative vigour of the accuser and accused, should be noted. For example, the male may be impotent, or of too tender years, or of too advanced an age, to be likely to have been guilty of an assault.

We have already pointed out the importance of noticing whether the accused is, or is not, suffering from gonorrhœa or syphilis. (*Cases* 11 and 16.)

The precise spot where the rape was said to have been committed should be carefully examined for marks of a struggle, spots of blood, etc. The character of the earth and soil should

also be recorded, as well as any article found on the ground that may serve for purposes of identification. It may be possible to connect the mud on the boots of the accused with that found at the spot where the female states she was violated. (*Case* 10.)

V.—Proofs of Violation from Stains, etc.

1. *Seminal Stains.*—Important evidence may be derived from detecting seminal stains on (*a*) the clothes of the victim worn at the time of the alleged rape; or on (*β*) the shirt, drawers, etc. of the accused. The value to be attached to such stains, *if present*, must not be over regarded, seeing that if they be found on the female, they in no respect fix the crime on any one particular individual, whilst if they be found on the male, they may result from spermatorrhœa or other causes. Again, if seminal stains be *absent*, it must be remembered that a legal rape may be committed, and yet be unaccompanied by the emission of semen, whilst subsequent washing may remove whatever stains previously existed—a circumstance, however, which of itself, may constitute important evidence, and should be recorded.

(For methods of testing seminal stains, see Part I., p. 234).

It must be admitted that seminal spots on dirty linen are far from easy to find, much less is it easy to determine their nature.

2. *Blood Stains.*—Blood stains should always be carefully looked for, both on the clothes of the accuser and accused.

The character of the blood stain is important. The first blood that would flow from the genitals of a female that had been violated would probably be unmixed with mucus, and of a uniformly red tint; but stains resulting from the blood discharged at a later period would be more or less non-uniform and of a dirty colour, from admixture with the vaginal discharge. It can scarcely, however, be argued that blood stains on clothes are *per se* of much value in establishing a charge of rape, nor, on the other hand, that their absence can be regarded as of much importance as proof of innocence. (See *Cases* 8, 9.) In *Case* 8, where a rape had undoubtedly been committed, the hæmorrhage from the genital organs of the girl was excessive, nevertheless no blood was found on the boy,

and that, notwithstanding he was examined before he had had time to change his clothes. Dr. Taylor thinks that in this case the boy probably withdrew so soon as the girl screamed, and that the oozing of the blood did not take place immediately on the parts being lacerated.

It must always be borne in mind that blood stains on the garments of a female may be menstrual.

Again, supposing injuries accompanied by hæmorrhage to be found on a female, it is impossible to say whether such injuries might not have been caused by the finger, or by some foreign body other than the male organ. It will be manifest why the absence of blood on the accused, although there may have been free hæmorrhage from the victim, is not proof positive of innocence.

Again, in women accustomed to intercourse, no hæmorrhage is likely to occur from even forced connection, except under circumstances of most inordinate violence. On the other hand, there may be considerable hæmorrhage from superficial injuries, although the penetration had been merely vulval. And, further, there may be hæmorrhage, especially in a first coitus, even though it be with consent, both from the male organ, owing to laceration of the frænum preputii, and from the female, from laceration of the hymen (*Case* 8), and other unavoidable injuries. Thus the "*shift of honour*" (*camiscia dell'onore*), that is, the shift of the newly-married wife, having upon it the bloody traces of recent injury to the hymen, is, in the East, often preserved by the friends as proof of her ante-nuptial chastity.

[For methods of testing for Blood, see Part I., p. 215.]

3. *Stains of Venereal and other Discharges.*—There are no special microscopic characters by which these stains may, with any certainty, be identified, much less differentiated.

VI.—On the Usual Defence in Cases of Rape.

The lines of defence usually adopted in cases of rape are as follows:—

1. That the accused is *impotent*, in other words incapable of committing the alleged crime. This may be true in the case of the very old or very young, or of those labouring under certain

diseases, such as diabetes, some forms of paralyses, etc. (See page 20.) On the other hand, real criminals will frequently allege that they are impotent, and gravely point to a very slight phymosis, or to a miniature wart on the penis, or to a slight varicocele, or even perhaps to a congenital shortening of the prepuce, as evidence of impotence.

2. It may be asserted in cases of rape on infants that, although not impotent, the accused could not have committed the crime because of the disproportion in the size of his sexual organ compared with those of the child. From a medico-legal point of view, such a defence is worthless, because, although a great disproportion may prevent complete intercourse, it does not prevent vulval penetration nor the attempt at intercourse, which is justly held to be the essence of the crime. Again, it is because of this disproportion, that such frightful injuries so often result. It is always to be remembered that these injuries may be inflicted either by the male organ itself, or by the hands, or by some other instrument used to dilate the parts.

3. An *alibi*, if substantiated, is, of course, a complete defence, quoad the particular person accused. It cannot, however, weaken the medical evidence respecting the special signs of defloration. In cases where the medical evidence points to disease, an alibi will, of necessity, greatly strengthen such evidence.

4. It may be proved that the alleged crime was stated to have been perpetrated in some place, or at some time, in which it was only necessary for the victim to cry out in order to secure assistance against the supposed ravisher. Medical evidence is scarcely called for in such cases, except as to the distance at which sounds may be heard. (Part I., page 249.) It might be asked whether fright, syncope, or narcotics would prevent such outcry, and the answer must clearly be, that this is possible.

5. Questions as to the self-infliction of injuries on the pudenda or on other parts, may occur. The answers will depend on (1) the nature and (2) on the site of the injuries, and (3) on the age of the female.

EXAMINATION IN A CASE OF RAPE.

(A.) *Examination of the Female.*

I. Record—

(α.) The date and hour when the female first made complaint, and the precise words employed by her at the time.

(β.) The persons by whom she was accompanied.

(γ.) The general behaviour of the female. Whether her statements were apparently made under compulsion, or were in any measure dictated by those accompanying her.

(δ.) The general feeling of those accompanying the female, (1) towards herself, and (2) towards the accused.

(ε.) Any further remarks made by the female or her friends.

[Note.—If the medical jurist be directed to visit the female for purposes of examination, it is advisable that he should not give notice of the precise time of his intended visit, in order to avoid preparations being made for it.

II. Enquire—

(α.) The age of the female.

(β.) The *date*, and exact *time*, when the rape was said to have been committed.

(γ.) The place where it occurred.

(δ.) Whether she uttered any cries, or was too terrified to do so.

(ε.) The exact circumstances under which the rape was committed (as, for example, whether the parties were standing or lying on the ground, etc.).

(ζ.) Whether or not the female was menstruating at the time.

(η.) Whether she was sensible during the whole time that the offence was committed.

[Note.—Avoid all leading questions, more especially in the case of of children.]

III. Note—

(α.) Whether the female exhibits any signs of narcotism, or of intoxication, or otherwise of drugging. (This detail will be of no avail unless the person be brought for examination immediately after the rape was committed.)

(β.) Whether the female walks as if in pain.

(γ.) Whether she appears of robust constitution, or whether there are signs of a low state of a health, strumous habit, etc.

(δ.) Whether she has the general appearance of a masturbate.

Having remarked on these points and made sufficient general enquiries, let the female be undressed. Institute a thorough investigation, with professional assistance if possible.

IV. Examine the clothes worn at the time of the alleged rape. Preserve such portions as may be necessary for microscopic examination for—

(α.) Blood. [Note if the stains are uniformly red or marked by want of uniformity, suggestive of the admixture of blood with mucus.]

(β.) Semen.

(γ.) Other discharges.

(δ.) Mud, dirt, etc.

[Note if any of the clothes worn at the time of the alleged rape are torn, and if so, the position of the rents. Record further if there are any indications of the clothes having been very recently washed.]

Note with respect to stains :—

1. That the presence of a blood stain does not prove connection against the consent of the female, nor that the injury, even supposing the blood to have come from the genitals, was the result of violence from intercourse. Such injury might arise from the introduction of a foreign body, or of the fingers, or be due to menstruation. The *absence* of blood, moreover, does not prove that the charge of forcible rape is untrue.

2. That the *presence* of a seminal stain on the garments of the female, is strong presumptive evidence that a rape, or an attempt to rape, has been committed, although it in no respect fixes the crime on any one individual. The *absence* of seminal stains is no proof that the charge of rape is unfounded.

3. That with respect to stains arising from other discharges, it is practically impossible to differentiate the character of a discharge (*i. e.*, whether it be gonorrhœal, leucorrhœal, etc.) by the appearance of the stain.

4. That it is most important to compare mud stains that may be found on the clothes of the accuser, with mud stains, existing on the coat or trousers or other garments of the accused; and, further, to compare both with the earthy matter found at the precise spot where the assault was said to have been committed.

V. Whether the breasts are virginal, or show signs of having been manipulated, etc.

VI. Carefully examine and record all *general* injuries or marks of violence on the body of the female.

Note with respect to such general injuries—

(α.) Their character, size, and exact position

(β.) Their probable age.

(γ.) How far they coincide with the story told by the victim.

(δ.) Whether the injuries could have been self-inflicted.

(ε.) Whether they could have been inflicted by others for a malicious purpose.

[Note.—Marks of general violence constitute most important evidence. It

should be carefully considered whether the marks of injuries correspond or not with the alleged cause.]

VII. Carefully examine and record the appearance in detail presented by the genital organs :—

A.—*External genital organs.*

Note

(α.) The presence of swelling, redness, tenderness, bruises, wounds, lacerations, etc.

(β.) Whether the vulva, or the hairs on the vulva, show any appearance of being massed or clotted. (If this be the case, the hairs are to be cut off and preserved for microscopic examination.)

(γ.) Whether any dried blood-stains on the genital organs be visible

(δ.) Whether there is any external sore on the genital organs.

(ε.) The probable date of the several injuries observed.

B.—*Internal genital organs.*

Note

(α.) Is the perinæum or fourchette lacerated ?

(β.) Is the hymen ruptured or inflamed ?

(γ.) Are the carunculæ apparent, and if so what is their condition (*i.e.*, Are they small and colourless, or large and inflamed ?)

(δ.) Is the vagina narrow and rugose ?

(ε.) Is there any sign of disease, such as noma, etc.

(ζ.) Are there any syphilitic sores ?

(η.) What is the probable date when the injuries noted on the female were inflicted ?

If the existence of syphilis or gonorrhœa be indicated, enquire—

(α.) All particulars as to time, date, etc.

(β.) Whether the female has been exposed to the possibility of infection otherwise than by intercourse ?

[Note.—If there be extreme tenderness and swelling, make as full an examination as possible at the time, postponing a more complete examination until the swelling has subsided.]

Supposing marks of violence on the genitals are found—

1. Consider whether such marks may result from masturbation, or be self-inflicted, or result from the introduction of foreign bodies etc., or be inflicted by others for a malicious purpose.
2. That, given signs of non-virginity, intercourse is not necessarily established because marks of violence be present.
3. That given marks of injury caused by intercourse, such intercourse may have been by consent.
4. As a rule, therefore, the medical jurist should content himself with merely stating the marks observed by him, without stating their cause.

Supposing no marks of violence on the genitals be found—

1. Consider whether the interval since the crime was said to have been committed is sufficient to explain the disappearance of such marks.
2. If the examination be conducted immediately after the crime was said to have been committed, and the victim be of tender years, the absence of all marks of genital injury is strong presumptive evidence that a rape has not been committed.
3. On the other hand, if the victim be accustomed to sexual intercourse, the absence of marks of injury on the genitals is no certain proof that a rape has not been committed.

VIII. Examine carefully any discharge from which the female is suffering, remarking its character (*i.e.*, whether it be thick or purulent, etc.), its quantity, its probable source, etc.

Enquire :—

(α.) Whether the female suffered from any discharge previously to the alleged rape having been committed, and

(β.) If not, how soon afterwards did the discharge occur?

(Supposing a discharge be present, the question will be all important whether the accused is suffering from gonorrhœa.)

The medical jurist should not commit himself as to the exact nature of the discharge.

Post-mortem where Death has occurred from Rape.

1. Examine the body generally for injuries (bruises, fractures, etc.)
2. Examine the mouth for foreign bodies.
3. Examine the genital organs.

With respect to injuries consider—

(α.) Are they such as to indicate that a rape has been committed?

(β.) Are they sufficient to have caused death?

(γ.) Might the injuries have been caused by malicious design after death?

4. Examine the vaginal secretions, the pubic hairs, the vulva, etc., for spermatozoa.

5. Are there any post-mortem appearances by which the death might be accounted for, other than those resulting from rape?

(B.) *Examination of the Accused.*

Note

(α.) His size, strength, and general development, in comparison with those of the accuser. Is he impotent or not?

(β.) Marks of scratches, etc., on the face, hands, penis and body generally.

(γ.) The condition of the frænum, the presence of seminal fluid in the urethra, and of the smegma around the glans, etc.

(δ.) Rents in, or stains of blood, semen, mud, etc., on the clothes.

(ε.) Whether the marks on the accused correspond or not with those on the accuser.

(ζ.) Whether the stains of mud or dirt, etc., on the clothes or boots of the accused, correspond or not with what might have resulted from a struggle at the spot indicated by the accuser as that where the alleged crime was committed.

(η.) Whether the accused be suffering from gonorrhœa or syphilis. If he is not and the accuser is, or if he is and his accuser is not such evidence is most important.

(C.) *Examination of the spot where the crime was said to have been perpetrated.*

Note

(α.) Whether the ground shows any marks indicative of a struggle.

(β.) Whether any articles of jewellery, dress, &c., can be found on the spot where the rape was alleged to have been committed, such as might lead to identification, or otherwise be important as evidence.

(γ.) Whether the character of the mud or of other materials likely to cause marks on the clothes (such as paint, tar, etc.) correspond with marks actually found on the garments of the accuser or of the accused.

I. INDECENT EXPOSURES.

These cases are generally determined by the testimony of bystanders, and for this reason medical evidence is rarely asked for. We believe, however, in a very large majority of such cases, that the accused would be found, on careful examination, to be suffering from some form of mental unsoundness. It is remarkable that in this country, as in France, nearly all those charged with this crime are of the male sex, of advanced age and of no occupation. (See Tardieu, "*Etude Medico-Legale sur les attentats aux Mœurs*," pp. 3—8.) If the patient be a female—as in the instance of the young girl mentioned by Tardieu (*loc. cit.*, p. 6), who exposed herself shamelessly, and openly solicited intercourse—she will probably be found either imbecile or afflicted with hysterical mania. Extreme sexual passion is called *erotomania*. This is subdivided into, (*α*) *nymphomania*, as it is termed when it occurs in the female, and (*β*) *satyriasis* when it occurs in the male. The subjects of puerperal mania, epileptics of both sexes, imbeciles, and general paralytics, are the most prone to this peculiar and disgusting form of sexual aberration.* In such a case, it would be the duty of the medical jurist to make full enquiry into the sanity of the accused.

There are, however, one or two conditions, apart from insanity, that may lead innocent men into being accused of indecent exposure. Thus—(1.) Very studious or very busy people are subject to what is called "absence of mind,"† leading them to neglect to "adjust their dress" on leaving a public convenience. (2.) Certain diseases may cause a frequent application of the hand to the sexual organs or their vicinity. Of these the chief are—*large scrotal and other herniæ, pruritus ani, eczema, impetigo* (and other diseases in which itching is a prominent and painful symptom), *prolapsus or procidentia ani, varicocele, hydrocele*, and other *scrotal tumours*. In the female, *prolapse of the uterus*, and diseases analogous to those of the male just mentioned, might act similarly.

* "Want of decency is want of sense."—POPE.

† "Absence of mind" is often, in reality, a "status epilepticus" or form of "le petit mal," of which "le grand mal" is epilepsy.

II. Unnatural Offences.

The interests of public morality demand that we should discuss without reserve these "body-dishonourings" and "vile affections" (Romans i. 26). References by ancient writers show that in every age, especially in populous places, aberrations of the sexual passions of the most horrible kind have been more or less prevalent. Greece and Rome at the very climax of their greatness, seem to have been centres of these hideous iniquities. "The men, leaving the natural use of the woman, burned in their lust one toward another; men with men working that which is unseemly, and receiving in themselves that recompense of their error which was meet." The criminal records of Berlin, Paris, and London (fortunately hidden from the readers of public papers) furnish sad accounts of this "horrible mystery," and of the lives of those who "knowing that they which commit such things are worthy of death, not only do the same but have pleasure in (*or* consent with) them that do them." These vices in fact are found in every habitable spot, and "glide about enshrouded in a darkness which is impenetrable to the uninitiated."

Hideous as these crimes are, we must not shut our eyes to the certain fact, that many who indulge in them are far from regarding them as criminal, and truly plead, when charged, their ignorance of acting contrary to the law. (*Case* 45*a*.) Nor must the hereditary nature of such crimes be altogether overlooked. (*Casper*.)

Further, it must be admitted (and this to the medical jurist is an all-important fact), that false accusations, originating most commonly with a low class of policemen and soldiers, are not uncommon.

In old days sodomy was in most countries punishable by death. The English law is now less severe. "Whosoever shall be convicted of the abominable crime of buggery, committed either with mankind, or with any animal, shall be liable, at the discretion of the Court, to be kept in penal servitude for life, or for any term not less than ten years" (24 and 25 Vict. c. 100, sec. 61).

Omitting as outside the sphere of forensic medicine all forms of depravity other than those that might, or would, leave sufficiently well marked diagnostic appearances, upon which to enable the medical jurist to offer material evidence in criminal enquiries, we limit ourselves to considering—

A. *Tribadism* (τρίβαδες—fricatrices—Lesbian love). This vice consists in bodily contact and friction between woman and woman for sexual gratification. Tribadism corresponds to a variety of the crime of sodomy between man and man, where sexual gratification is found in reciprocal masturbation.

B. *Sodomy* implies unnatural intercourse (*immissio penis in anum**) between man and man, or (as was decided by a majority of the judges in *Case* 43) between man and woman.

[Where the victim is a boy or youth, sodomy is usually termed *pæderastia* (παιδος ἐραστης, love of a boy, *Case* 42).]

C. *Bestiality* implies intercourse by human kind, male or female, with an animal (male or female) other than of human kind. (This is also called Sodomy by the Germans. The term "buggery" includes unnatural intercourse both with mankind and with animals.)

A. Tribadism.

Without disputing that sexual aberrations leading to unnatural and immoral practices may not be unknown between woman and woman, there are no certain means by which to prove the commission of the act.

We mention it only because Parent Duchatelet has endeavoured to show that the so-called Lesbian love produces enlargement of the clitoris and other changes in the female genital organs. We know of no appearances, however, which are characteristic;—in other words, natural conformation, disease, want of cleanliness, and self-abuse, may produce changes of similar character in all respects to those described by the authority named.

* It was decided in the case of R. *v.* Jacobs (R. and R., 231, 1 Russ., 698) that forcing the private parts into a child's mouth, even to the completion of the lust, did not constitute the crime of sodomy.

B. Sodomy.

We now pass to the special crime known as Sodomy, premising that we shall employ the phrase "*active agent*" to imply the male who effects intercourse, and the phrase "*passive agent*" to imply the male or female on whom the intercourse is practised.

We remark, first of all, on the details of evidence necessary to sustain a charge of sodomy, and on certain legal points connected with the criminality of the parties severally concerned.

1. In order to sustain a charge of sodomy, it is only necessary, as in rape, to prove penetration of the male organ—that is, penetration without emission of semen.

2. It is unnecessary to prove *consent*, whatever be the age of the male or female with whom the unnatural intercourse has been effected (unnatural connection with a female being equally criminal as that with a male, *Case* 43), the criminal act on the part of the active agent being altogether independent of consent or dissent on the part of the passive agent.

On the question of *consent*, we would offer two remarks, (*α*) That, considering the difficulty of unnatural intercourse, we believe it would be impossible to consummate the act against his or her will, provided the passive agent retains his or her senses; in other words, that the slightest resistance would suffice to prevent the crime being committed. And (*β*) that for the same reason, we believe unnatural intercourse to be impossible during natural sleep.

3. In the case of unnatural intercourse with a child (male or female) under 14, the ravisher alone (that is, if over the age of 14) is indicted for felony. (Sir James Stephens, "*Crim. Law Dig.*," p. 103.) If the active agent be a boy under 14 and the passive agent over 14, the passive agent only is charged.

4. If both active and passive agent consent, and both be above the age of 14 years, the law regards them as alike guilty. The guilty associate is a competent witness, but being an accomplice his evidence requires confirmation.

And here note :—

1. *The general appearance and habits of the criminals.*

If the crime has been habitual and frequent, there will be the usual evidence of sexual excess in a premature decay of strength, the apparent age of the person far exceeding the real.

Sodomites are persons of all ages (*Cases* 42 to 51), but they usually present a somewhat feminine appearance, or strive to appear like women. To this end they commonly conceal or destroy, as far as practicable, such virile appendages as beard, whiskers, or moustache, wearing a profusion of jewellery, paint, and padding.* So far, indeed, may this liking go, that in one case a male to the death is said have passed himself off as a female, being employed evidently as a passive agent.

And yet, curious to say, sodomites generally affect the society of their own sex, and avoid that of the opposite sex. To them natural sexual intercourse is frequently a matter of absolute distaste. Their pose, it will be observed, is often statuesque, as it is not at all unusual to find in the case of those addicted to masturbation.

All this suggests the curious question, whether such aberration of sexual desires may not be the result of an incipient hermaphrodism. Casper's account of a brotherhood of sodomites and of their mutual powers of recognition, further suggests to the medical jurist (dangerous as the very idea may be accounted) how far the criminality of these people is not beyond their control.

But on the other hand, undoubted sodomites are to be found with none of the characteristics just described (*Case* 42) and

* "Son teint, reluisant de pommade,
Par le carmin est embelli.
On le devine quand il passe,
Autour de lui l'air est ambré,
Ses cheveux bouclent avec grâce,
Son habit presse un dos cambré,
Comme une coquette un peu grasse,
Dans un corset il est serré."—BERANGER.
(See Cases 44, 45δ.)

free from all hereditary taint. Full to the brim of natural sexual indulgence, which by over indulgence has ceased to be pleasurable, they now take refuge, from a desire of change and a yearning for extraordinary excitement, in unnatural connections.

Or it may be that in some the intense dread of contracting venereal diseases by natural intercourse, drives them to unnatural offences. Thus they wrongly suppose that they can gratify their passions without running the risk of contracting disease. To these two causes as accounting for unnatural offences, viz.: (1) that craving for an excitement, which an over-indulgence in natural intercourse has rendered unexciting, and (2) a belief that they can gratify their passions without considering results, I would add two others. (3) Seeing that sodomites as a rule alternate characters, sexual gratification is in this way procured without the expense incidental to ordinary prostitution, a matter of importance to such a class as soldiers, whose pay is exceedingly small. And (4) that soldiers are emphatically an idle class, with much spare time on their hands. It is undoubtedly the fact that the grosser forms of immorality are chiefly to be found amongst those who have little to do and nothing to think about.

I mention these as the four main causes to account for the prevalence of unnatural crimes, because whilst I admit that in many sodomites you undoubtedly find evidence of womanliness rather than of manliness, nevertheless that this is by no means a necessary characteristic of those that practise the crime.

We have now to consider the medical appearances resulting from the practice of sodomy. And since those addicted to the crime are accustomed to alternate characters, the effects both of *active* and *passive criminality* will commonly be found in and upon the same person. Of course this will not apply to cases where boys are the victims and passive agents only, or to such instances as recorded in *Case* 50, where the conditions recorded indicate that the gratification was probably in the passive form only.

We proceed to consider:—

(*a.*) *The effects produced on the male organ as the result of active sodomy.*

The parts of generation are in many cases more than usually relaxed and the scrotum pendulous. According to Tardieu, the penis is commonly found elongated, the glans more than usually bulbous and conical, and the urethra twisted (?)

This latter appearance he considers results from the screw-like action necessary to effect the intromission of the organ, owing to the resistance of the sphincter ani ("*Annales d'Hyg.*," 1858, Bd. ix.). None of the appearances mentioned by Tardieu, however, are as a rule to be found, whilst if found, they are by no means specially characteristic.

(*β.*) *The effects produced on the anus of the passive criminal.*

The natural folds about, and that radiate towards, the anus, rapidly become obliterated by repeated acts, giving the skin of the part a *smooth appearance.* (*Case* 45 *a*, *β*, *γ*, *δ*, 47, 49). Moreover a peculiar funnel-like* depression or hollow of the nates towards the anus, is usually observed. But here again much caution on the part of the medical jurist is needed, this funnel-like depression with obliteration of the rugæ, resulting from other than criminal practices, such, for instance, as the daily necessity that occurs in the case of some people for pushing back piles or slight protrusions of the rectum forced out during defæcation. The author knows of more than one case, where such causes as those mentioned have produced the exact appearances on the nates and anus, commonly described as resulting from the practice of sodomy.

In *Case* 45*a*, the anus was said to be dilated, whilst in *Cases* 45 *β* and *δ* the opposite condition is recorded. The anus itself has often in such cases been observed to be gaping, and the sphincter relaxed. Nevertheless, in a well marked case, examination per rectum was said to have caused great pain, which the accused admitted he had constantly felt when acting as the passive agent. (*Case* 45 *a.*)

If the crime be committed on one unaccustomed to criminal

* Casper calls it "trumpet-shaped."

connection, and the passive agent be examined soon after intercourse, a certain amount of bruising and inflammation—the extent being dependent on the force used—with a slight laceration of the sphincter, would almost certainly be discovered. (*Case* 46.) It is strange, however, in how very few undoubted cases, scars of old lacerations of the sphincter can be discovered. (*Cases* 45 *α*, *β*.) Further there may be congestion and abrasion of the anal mucous membrane, without injury to the sphincter.

Again, excoriations on the parts of generation, and particularly at the verge of the anus (*Case* 47), together with syphilitic lesions, may also be found (*Case* 49). As regards the latter, we content ourselves with remarking that great care is necessary in distinguishing the nature and duration of supposed syphilitic chancres in this situation. Still, given a well marked chancre within or at the verge of the anus, or a gonorrhœal discharge from the rectum, such evidence is practically conclusive. And we may add this further, that it appears to us to be the only form of conclusive medical evidence possible in such cases.

It will be seen from what we have said, that, provided there be no chancre and no well marked gonorrhœal discharge, direct medical testimony to prove the commission of the crime is scarcely possible. Casper and Tardieu rely mainly upon the funnel-shaped depression between the nates, and the smoothness of skin about the anus. Both admit, however, that these supposed characteristics are at times absent even in notorious criminals, and *à fortiori* are they likely to be absent in those who have only had connection once or but seldom, and are of adult age.*

When a young child has been recently violated for the first time, redness and itching, with pain on separating the thighs (as

* See also Rosenbaum, "*Die Lustseuche im Alterthum*," Halle, 1839, 8vo. Dohrn, "*Zur Lehre v. d. Pederastie in Casper's Vierteljahrsschrift*," Bd. iv. s. 193; Casper's "*Forensic Medicine*," N. Syd. Society's translation, vol. iii. Tardieu, "*Etude Médico-légale sur les Attentats aux Mœurs*," 6 ed., Paris; 1873 [p. 200 of this contains other references to books]; Taylor "*Principles and Practice of Medical Jurisprudence*," vol. ii. p. 472, and 2nd edition. Beck, "*Elements of Medical Jurisprudence*," 5th ed., p. 110 [References in foot-note to Zacchias, Foderé, and Mahon].

in walking) and on defæcation, will continue for some days at least, whilst it is not improbable that excoriations and partial lacerations of the margin of the anus may be found. (*Case* 51.) In boys, however, accustomed to repeated acts of intercourse, these symptoms are not so marked (*Case* 49), but fissures and ulcers are occasionally met with. It must be admitted, however, that lacerations and local injuries often disappear rapidly. (*Case* 51.)

Marks of violence, other than local injuries, are not common in these cases, because the act is usually committed with consent.

There are a few cases only where in a charge of sodomy, *stains of semen* can constitute important evidence. (*Case* 48.) For instance, seminal stains on the garments of a child too young to have emissions (more particularly if they occur on the *posterior* portion of such garment) constitute material evidence. Or again, if they occur on the posterior portion of the shift of a woman who claims to have been unnaturally violated, (although in such case corroborative proof is required to render the fact of much avail as evidence) they may prove important in support of the charge. Manifestly, a seminal stain on the garment of an adult male is of no value whatsoever.

At a post-mortem in such cases, it will be advisable to note whether there is evidence of the boy or adult having been gagged. Further, it must not be forgotten that dilatation of the rectum and protrusion of the intestines through the anus are common effects of putrefaction. A gaping anus with a thickened mucous membrane at its margins, and smoothness of the skin around, are the characteristics specially to be looked for (*Case* 50), whilst chancres or scars of chancres on the mucous membrane of the rectum would be specially significant. (*Case* 49.)

We submit on this subject the following conclusions—

1. A medical witness having found certain of the characteristics described, should not state that the crime of sodomy had been committed, but should depose to certain appearances, etc., observed by him, and be content with stating whether or not

they are consistent, in his opinion, with the commission of the crime.

2. He should also state whether such characteristics may or may not in his opinion, have occurred from natural causes.

3. He should also state whether, in his judgment, appearances of any kind exist in or about the anus suggestive of *passive* criminality, or about the penis suggesting *active* criminality. At the same time the Court should be given clearly to understand, that the absence of such signs constitutes no absolute proof of the non-commission of sodomy or allied practices.

4. That in many forms of unnatural immorality, such as Tribadism, etc., we should not expect to find any characteristic appearances whatsoever. Medical evidence in such cases must, therefore, be negative.

C.—Bestiality.

As regards that form of Sodomy known as *Bestiality*,—*i.e.*, the unnatural connection of human beings with the "lower animals,"—very extraordinary, and we must add very worthless, evidence has sometimes been tendered in courts of justice, with the view of proving the impossibility of such unnatural connections [Tardieu, "*Sur les Attentats aux Mœurs*," 6 ed., p. 15]. In our opinion such evidence has no scientific value whatsoever.

The only medical evidence, it appears to us, of the slightest scientific value in such cases, must consist either (α) in the finding of spermatozoa on the person or clothes, or on the hairs of the animal, or (β) in identifying the hairs of the animal on the accused. There is seldom any chance of finding spermatozoa in the vagina of an animal, although (as we have mentioned before) seminal animalcules do adhere with wonderful tenacity to the hairs around the genitals. It is well known that almost every animal has characteristic spermatozoa. On the other hand, it must be remembered that human spermatozoa differ considerably in size and even in outline, according to the age, vigour, and other qualities of the person from whom they have been derived. The *mere* presence of animal

hairs on a man's coat and trowsers, can constitute very slight evidence of guilt, although if the hairs of an animal be found adhering to stains of blood, mucus, or semen, on the *under-clothing* of the man accused, the fact will be of considerable significance. Small hairs, which may be compared with those of the beast with which the connexion had been attempted, may often be found under the prepuce, or at its junction with the glans. Possibly some abrasions may also be discovered. We may add that it is impossible in the case of blood-stains, to assert that the blood has been derived from any one animal specially.

In the case of a female, if seen quickly after the event, excoriations and other signs of rape might possibly be detected. But this is extremely doubtful.

Examination in a Case of Suspected Sodomy.

1. *General appearance and habits of the accused.*

(*a*) Is the accused manly or womanly in appearance? (Remark on the hair, voice, etc.)
(*β*) Does he strive to appear feminine in his dress?
(*γ*) Does he affect the society of men in preference to that of women?

2. *Examination of the genital organs.*

(*a*) Are the genitals relaxed and pendulous—well or ill developed? Are both testicles in the scrotum, and of normal size?
(*β*) Is the penis at all elongated or twisted, and the glans more than usually bulbous and conical?
(*γ*) Are there any signs of old or recent syphilitic disease?
(*δ*) Note the presence or absence of hernia, &c.

3. *Examination of the nates and anus.*

A. In *chronic* cases, note :—

(*a*) Are the nates plump or lean, smooth or rugose?
(*β*) Does the space between the nates present a smooth, funnel- (or trumpet-) shaped depression, tapering towards the anus?
(*γ*) Is the rugose state of skin immediately around the anus, well or ill-marked?
(*δ*) Is the anus gaping, or the sphincter relaxed?
(*ε*) Are there any scars indicating old lacerations of the sphincter ani?
(*ζ*) Does the person suffer from piles, fistula, protrusion of the bowel, etc.?
(*η*) Are there any signs of syphilitic disease, or of gonorrhœa, and if so how long have they probably existed?

B. In *acute cases*:—

(*a*) Is there much smarting, burning, or inflammation about the anus and rectum—more particularly, is there pain in walking and on defæcation?

(*β*) Are there any lacerations of the sphincter, or chancres on or within the anus, or discharge from the rectum to be detected?

(*γ*) (Specially in children and women.) Are there any spots of semen on the garments? If so, note their precise position.

[The medical jurist must endeavour to form an opinion whether the person charged be both actively and passively criminal.]

In Cases of Bestiality.

Examination of the person: The main question here is—

Are any *hairs* to be found under the prepuce, or about the genital organs, or embedded in blood spots, seminal stains, etc., or on the clothes, corresponding to the hairs of the animal with which the crime was supposed to have been committed.

[In the case of a woman, the appearances may simulate those of rape.]

Examination of the animal.

(*a*) Are there any stiff, dry, semen-like spots around the vagina of the animal? If so, remove the hairs and examine them microscopically.

[If spermatozoa be discovered under the microscope, it must be determined whether or not they are human?

(*β*) Are any abrasions indicative of force to be found about the genitals?

[If in these cases excoriations and lacerations liable to bleed, and more particularly spots of blood, be found on the victim, or passive agent, or animal, the existence of corresponding blood marks on the accused will constitute important evidence, although it may not be possible to prove that the origin of the several spots is one and the same.]

ILLUSTRATIVE CASES.

1. Lancet, March 25, 1843.—(*Mr. Adams.*)—A man was charged with the rape of a girl (his daughter), æt. 14. Two days after the crime was said to have been committed, Mr. Adams examined the girl, and found an unruptured hymen, without any marks of violence on the vulva or elsewhere. Two other medical witnesses, who had examined the girl *a day or two before* Mr. Adams, believed the rape to have been committed. Mr. Adams admitted there might have been vulval penetration. The prisoner was found guilty of the assault, but was acquitted of the rape. (Pages 197, 199, 202, 226.)

2. Horn's Vierteljahrsschrift, 1865, I., p. 355.—(*Dr. Lander.*)—An adult violated a girl, æt. 8. The genitals were sunken, ecchymosed and lacerated, and the hymen destroyed. It was suggested in defence that the state of the parts might have resulted from the introduction of a finger, but at any rate was not caused by the organ of an adult male. (Pages 201, 202.)

3. Casper, Vol. III., p. 311.—A man persuaded a female, æt. 25, to accompany him to a public garden in the dark, where after trying in vain to accomplish his purpose against a tree, he threw her down, and having placed her clothes over her head, violated her. The police testified that the ground was frozen hard, so that the fall would probably occasion considerable pain. The man when found was still in a condition of actual satyriasis. On examining the woman nine days afterwards, the entrance to the vagina was found to be reddened, dilated, and painful. The hymen was completely torn, and of a bright red colour. The carunculæ, still slightly swollen, were visible, but the fourchette was entire. (Pages 185, 198, 199, 201, 202, 207 209.)

4. Tardieu, Case 31, p. 171.—The victim was 17½ years of age. The hymen was torn *almost to the perineum.* Three weeks afterwards, there were found five finger-like bruises on the right fore-arm, and others on the outside and inside of the left arm just above the wrist. (Pages 201, 208, 226.)

5. Casper, Case 59.—On examining a girl, æt. 14, supposed to have been raped, Casper "found the genital organs perfectly uninjured, and in their virgin state. The examination gave no pain. The entrance to the

vagina was narrow, the hymen entire without a sign of laceration, either recent or cicatrised." [A Dr. E—— had certified that "there were two small lacerations in the hymen!"] No seminal stains were found on the girl's clothes. (Page 200.)

6. Tardieu, Case 29, p. 155.—A woman committed suicide by throwing herself out of window. Besides injuries due to the fall, there were scratches on her nose, marks of nails on the front of the neck and throat, and bruises on the arms and legs, with marks of nails and of bruises, like finger marks, on the lower part of the belly and inside the thighs. The hymen had long been destroyed. The accused also had bruises on his forearms, especially on the left side, resembling the forcible pressure of resisting hands. He admitted that he had "touched" the deceased and partially introduced his penis, but denied violence. (Page 208.)

7. Tardieu, Case 35.—Violation, followed by pregnancy, at the age of 12½ years. (Page 212.)

For other cases of pregnancy following rape, *see* Tardieu, and Taylor (p. 463).

8. Taylor's Medical Jurisprudence, Vol. II., p. 444.—The rape of a scrofulous girl, æt. 7, by a boy, æt. 17. On examination, half an hour after the crime had been committed, a lacerated hymen was discovered, and much blood found on the clothes. There was no pain, no other marks of violence, and no discharge. The bleeding ceased in forty-eight hours. Although the lacerations of the hymen were apparent, the parts were neither swollen nor inflamed.

No blood was found on the person of the accused, nor on his clothing; and this, although he was examined not more than half an hour after the rape, without a chance having been allowed him of changing or of washing his clothes. (Pages 201, 214, 215.)

9. New Orleans Med. Gazette, 1858, p. 283.—(*Dr. Sawyer.*)—A rape of a girl, æt. 5, by an adult. Genitals bruised and swollen, but no lacerations. Hymen not ruptured, but highly congested. Free hæmorrhage (? from hymen).

No blood was found on the accused (who was examined shortly after he had committed the crime), but merely a few stains on the front of his clothing. (Pages 197, 201, 202, 214.)

10. Case of Mary Ashford (Warwick Assizes, August, 1817).—(See *Beck*, p. 93, and Cummin's Lectures, "*Medical Gazette*," xxi., p. 386.) This case is remarkable as being the last in which "wager of battle," allowed by the old English law, was claimed by the prisoner, Abraham Thornton. The Act permitting this was abolished in 1819. The prisoner, who was doubtless guilty of the murder, escaped harmless, because the brother of the murdered girl was a mere boy. The jury had acquitted

him on the faith of an alibi, which was probably false. The dead body of Mary Ashford was found in a pool of water, with duck-weed and water in her stomach. The genital organs were lacerated, and covered with coagulated blood. She was menstruating at the time. Thornton's shirt and pantaloons were also bloody. He confessed the connection, but denied that it was forced, alleging the consent of Ashford. In this case there was an evident impression of a human figure on the grass, and coagulated blood was found in the middle of the impression. (Pages 185, 202, 213, 214, 226.)

11. Dublin Med. Press, May 4, 1853, p. 276.—(*Dr. Hamilton.*)—Rape of girl, æt. 6, by a boy, æt. 19. The accused was suffering from syphilis, numerous chancres existing around the orifice of the prepuce. The girl also had chancres on the inside of the labia, other syphilitic lesions afterwards appearing. Prisoner convicted. (Pages 205, 213.)

12. Ogston's Medical Juris., p. 96.—Rape on a child, æt. 9. Genitals uninjured. The man pleaded guilty to the attempt. The ravisher at the time was suffering from gonorrhœa, and the child had gonorrhœa two days afterwards. (Pages 184, 201, 205.)

13. Ogston's Medical Juris., p. 96.—Four children ravished by a man suffering from gonorrhœa, to three of whom he communicated the disease. In one of the cases, the child afterwards suffered from a bubo in the groin. (Pages 184, 205.)

14. Ogston's Medical Jurisprudence, p. 119.—A woman accused a man of rape. The case was in a great measure disproved by the accuser suffering from a gonorrhœal discharge and a bubo in one of her groins, whilst the accused was free from gonorrhœa. (Page 205.)

15. R. v. Moseley.—(*C.C.C., Sept.*, 1843.)—An adult charged with rape, by a girl, æt. 12½. It was stated—

1. That on the examination of the girl two days afterwards, there was every appearance of violence having been used, but no decided opinion could be formed whether the crime had or had not been committed. (Dr. Merriman.)
2. That the girl had suffered from a discharge (gonorrhœal) for some time.
3. That the accused was not suffering from gonorrhœa.

Prisoner acquitted. (Page 205.)

16. R. v. McDonough.—(*C. C. C., Oct.*, 1843.)—An adult, charged with rape, by a girl, æt. 15.

The girl was examined six weeks after the violation was said to have occurred, when she was found suffering from gonorrhœa. The medical evidence showed that the discharge might have existed for a week or a little more, but certainly not for six weeks. Prisoner acquitted. (Pages 205, 213.)

17. Med. Gazette, Vol. XLVII., p. 744. Two children (ages 1 and 4) infected with gonorrhœa, from using a sponge that had been employed by a young woman, who was suffering from a profuse gonorrhœal discharge. (Page 206.)

18. Gazette Medicale de Paris; Edinburgh Monthly Journal, December, 1860, p. 588. A girl, æt. 18, finding herself 4½ months pregnant, charged a mesmerist whom she was visiting professionally, with violating her whilst *under magnetic influence.* The time alleged when the rape was committed, corresponded with the period of her pregnancy. It was referred to medical authorities (amongst others Devergie), who decided that it was possible to commit a rape under such conditions, and that her pregnancy did not extend further back than 4½ months. (Pages 190, 212.)

19. Casper, Case L., p. 307.—Connection with a girl, æt. 22, whilst she was in an epileptiform hysterical fit, and unconscious. (Page 194.)

20. Glasgow Medical Journal, July, 1859, p. 140. —(*Dr. McKinlay.*)—Rape of a girl, æt. 6. The pain on connection was so great that the girl fainted. The recto-vaginal septum was torn down to the verge of the anus. The orifice of the vagina was lacerated upwards and laterally. She recovered after two months. (Pages 189, 202.)

21. Dublin Med. Press, March, 1840.—(*Dr. Bullen.*) —Rape of a girl, æt. 17, by several men in succession. Insensibility occurred during the connections. Examined the next day, the genitals, including the labia and perinæum were found bloody and inflamed, the fourchette being torn and the hymen ruptured. Ulceration with sloughing away of clitoris, nymphæ, perinæum, labia and mons veneris occurred. Recovery. There was no evidence of syphilis. (Pages 189, 201, 202.)

22. R. v. Clarke.—(*York Autumn Assizes*, 1854.)—The man was charged with getting into bed, at 2 a.m., with a married woman (who had been married six years, and had had three children), and of having intercourse with her, she at the time being in a half-waking state, and believing the person to be her husband. [The prisoner was convicted, but the case was reserved for a decision whether this constituted rape. The judges decided "that when a man personated the husband, the act of intercourse did not amount to rape, because it was done with the assent of the woman."] (Pages 190, 191.)

23. Edin. Monthly Journal, Dec., 1862, p. 370.—A man had intercourse with a respectable married woman, whilst she was asleep, the man withdrawing from her just as she woke up. Prisoner convicted. (Page 190.)

24. Gerichtliche Medicin, Vol. II., p. 574.—Rape on a married woman whilst she was half asleep. She admitted she was conscious of

the act being committed, and asked who it was (!), proving that she had a *doubt* whether or not it was her husband. (Page 190.)

25. R. v. Snarey.—(*Winchester Lent Assizes*, 1859.) —Prosecutrix said she was rendered *instantly* insensible, by something being held over her face on a handkerchief, and that in that condition she was violated. An alibi was proved by the prisoner. (Page 193.)

26. White v. Howarth.—(*Liverpool Winter Assizes*, 1861.)—Charge of rape against a dentist, the girl stating that she was rendered *suddenly* insensible by chloroform. It was proved that she was aware all the time of what was transpiring. (Pages 191, 193.)

27. Bromwich v. Waters.—(*Chester Lent Assizes.*)—Charge against the defendant of having given Bromwich some liquid, which on tasting rendered her *instantly* unconscious, in which condition he violated her. This he denied. (Page 193.)

28. Medical Times and Gazette, 1859, pp. 361, 417, 442, 518, 544, 638.—Case of Amos Greenwood, charged with rape, and the manslaughter from injuries consequent on the rape, of a child under ten years. He was found guilty.

A question was raised in this case whether rupture of the perinæum could occur from rape. The possibility of such a thing occurring is, however, beyond all doubt. (Pages 201, 202, 207, 211, 212.)

29. Medical Gazette, Vol. XXVI., p. 160; and Dublin Quart. Journ. of Science, Feb., 1859.—(*Dr. Brady.*) — There was evidence in this case to prove that a soldier (Hume) had violated an infant of eleven years (Mary Hall). Marks of violence were noted the next morning. The child, who was examined by a surgeon twenty hours after the rape, was found to be in a state of collapse, the external organs of generation being torn and violently inflamed, and the perinæum and mucous lining of the labia and clitoris lacerated. *The child died after a few hours.* At the P.M. the vagina was found greatly dilated, and torn posteriorly from its attachment to the neck of the uterus, an opening being formed into the abdomen, into which a quantity of bloody semen was effused. (Were these appearances produced by the penis or by the fingers?) (Pages 202, 211, 212.)

29a. R. v. Coates, Purfleet Murder.—(*Dr. Tidy.*)—The rape of a child, æt. 8, by an adult. The recto-vaginal septum was entirely broken through. The ravisher afterwards killed the child, by thrusting her head down the pan of a privy. (Page 212.)

30. Ogston's Forensic Medicine, p. 117. A female violated by two men, who afterwards forced foreign bodies (coal, prickly plants, etc.), into the vagina. Death occurred on the third day.

P.M.—Recto-vaginal wall broken down. Abdominal viscera highly inflamed. (Pages 202, 211, 212.)

31. Med. Times and Gazette, June 2, 1860, p. 560.—(*Mr. Colles.*) —Rape of a child, æt. 8, by an adult. Much pain and loss of blood occurred from the connection. No marks of violence were found externally. Death resulted after six days from peritonitis. P.M.—The orifice of the vagina was lacerated in its entire circumference, and the perinæum nearly torn through. The vagina was in a state of gangrene. No ulceration. (Pages 202, 211, 212.)

31a. Indian Medical Journal, Nov. 1, 1875, p. 284.—(*Dr. Harvey.*) —Female, æt. 9. Death from hæmorrhage after rape, the bleeding taking place from a wound caused by the introduction of the male organ. The left wall of the vagina was ruptured from the orifice upwards for 2½ inches, and the rent was an inch wide. (Pages 211, 212.)

[Other similar cases are also recorded.]

32. Med. Times and Gazette, 1853, April 23 and 30. [Also related by Dr. Percival, in his "*Medical Ethics*," pp. 103 and 231.] A boy, æt. 14, was charged with violating a girl, æt. 4 (Feb., 1791). He had slept two or three nights with her in the same bed. The symptoms recorded were pain on micturition and inflammation of the parts, resulting in mortification of the genitals, from which the child died on the 9th day. The prisoner was acquitted on the ground that about the same time several girls (where there were no reasons to suspect improper conduct) were suffering similarly, and that in some cases a fatal termination had ensued. [See also "*Med. Gazette*," Vol. xlviii., p. 372. Case of discharge due to vaginitis, and supposed by the parents to indicate rape. See a similar case, "*Med. Times and Gazette*," April 13, 1861, p. 403. See "*Dublin Med. Press*," May 4, 1853, p. 276.] (Pages 189, 206.)

33. Ann. d'Hyg., 1870, II., 192.—(*M. Segneau.*)—A young married woman sought a divorce on the ground that her husband had infected her with the venereal disease. It was proved, however, that she was suffering from leucorrhœa at the time of marriage. (Page 204.)

34. Infantile Leucorrhœa.—Accusation of Rape.—Acquittal of Accused.—A girl, aged thirteen, was brought to the author, stating that ten days previously, a cabman had forcibly violated her in his cab. The child was rather under the average size, weak, thin, and cachectic. She appeared somewhat weak-minded. There were no signs of puberty. All her clothes had been washed. The clitoris was large. The pudenda, buttocks, and thighs were excoriated, and stained with ordure and discharge. There were muco-purulent discharges both from the vulva and the vagina. The hymen was still present, but exhibited a slight laceration on the left side. The fourchette had also been lacerated, the edges of the torn parts appearing callous

The parts were of a dirty pale-red colour. The discharge was first noticed, and soreness complained of by the child, ten days before—but it was only after her parents had asked her all sorts of questions, and threatened to beat her, that she accused the cabman. She pointed out a man known to her parents who drove a white horse, as the person who had violated her. It was, however, clearly proved that the man was miles away from the place at the time the supposed rape was committed. In this case there had probably been attempts at sexual intercourse with the girl at some time or another—but certainly not on the date mentioned. (Pages 184, 203.)

35. Before the Academy of Med. of Paris, Oct. 26, 1880.—(*M. Fournier.*)—Girl, æt. 8, said to be the victim of a criminal assault. Violent inflammation of vulva. Swollen labia with numerous erosions. Nymphæ congested and œdematous. All parts were intensely inflamed, and covered with a thick greenish pus. Hymen intact. Several enlarged glands were observed in each groin. Cured in fourteen days.

The child ultimately confessed, that the condition presented by the parts, resulted from rubbing them with a blacking brush. (See "*B. M. J.*," Nov. 20, 1880, p. 822.) (Page 184.)

36. British Med. Journal, 1872, p. 633.—(*Dr. Karl Braun.*)—Pregnancy in a married woman, æt. 20, with an imperforate hymen. Delivery by Cæsarian section. (See "B. M. J.," June 15, 1878, p. 862.) (Pages 196, 201.)

37. Lancet, Aug. 12, 1876, p. 237.—(*Dr. Burgess.*)—Pregnancy with a completely imperforate hymen. [The hymen must have closed up after connection.] (Pages 196, 201.)

38. Wien Med. Woch., March 25 and April 1, 1876.—("*Med. Times and Gazette,*" May 20, 1876.)—(*Dr. Gustav Braun.*)—Three cases of pregnancy with unruptured but perforate hymens. The hymens were ruptured during delivery. In one, the urethra had taken the place of the vagina in copulation. (Pages 196, 201.)

40. Lancet, Aug. 11, 1877, p. 225.—(*Dr. Barnard.*)—Female, æt. 13. First raped, and afterwards murdered by strangulation. Decomposition was far advanced when the body was discovered. No spermatozoa were found. The hymen was lacerated. Marks of bruises existed on the perinæum and thighs. (Pages 201, 208.)

41. R. v. Howard.—(*Northampton Assises, Nov.*, 1877.)—Charge of rape under chloroform. It was clearly proved that, during the time the girl was under chloroform, she was, as often happens, the subject of delusion. Dr. Richardson gave many illustrations of similar cases in the course of the trial. ("B. M. J," Nov. 17, 1877, p. 709.) (Page 19.)

42. R. v. Smith and another.—(*C.C.C., Old Bailey*, April 10, 1877, *before Mr. Justice Manisty.*)—Case of sodomy. Smith was condemned to penal servitude for life, and the other prisoner to ten years' penal servitude. Smith (aged 35) was a thick-set muscular man, with dark bushy beard and whiskers. He was not at all feminine in appearance, but was dandified in dress, and went by the name of Captain Smith. He had debauched about fifty lads employed in the telegraph service of the General Post Office. His custom was to enter into conversation with the boys—give them wine, suppers, spirits, cigars, &c., show them indecent pictures, and finally commit unnatural crimes upon them. No medical evidence was taken. (Pages 224, 226.)

43. R. v. Wiseman. Fost. 91.—In this case it was held by the majority of the judges, that unnatural connection with a woman came within the statute. (Pages 224, 225, 226.)

44. R. v. Boulton and Parke.—(*Queen's Bench*, 1871.)—The indictment was for "conspiracy to commit or to incite to the commission of immorality." The prisoners, of markedly feminine appearance, had assumed female names and attire, and had allowed themselves to be entertained as prostitutes. They had frequented theatres and other places of amusement (as was supposed) for criminal purposes. The medical evidence was conflicting, and there were no definite appearances indicative of their criminality. The prisoners were discharged. (Page 226.)

45. Cases of Count Cajus and six others.—(Vide *Casper*, Vol. III. p. 337.) (Pages 223, 226, 228, 229.)

(*a.*) Case LXXXIII. The adventures of Count Cajus, æt. 58, a man of slender build with blonde ringlets, were recorded in a diary (!). In this he admitted that three or four times a week during twenty-six years, he had committed sodomy, but did not think he was acting contrary to law. He did not appear mentally feeble. Up to the age of 32 he had had constant intercourse with women.

Examination.—Genitals fairly developed and healthy. Nates lean, smooth, and gaping, presenting a trumpet form towards the anus. The anus itself was perceptibly dilated, but not funnel shaped. No rugæ were found round the anus, nor were any scars of old lacerations of the sphincter apparent. Great pain was produced on examination per rectum, and this he admitted to have commonly felt when acting as the passive agent. The man suffered from a double inguinal hernia.

(*β.*) Case LXXXIV. A sodomite (a nobleman) over 50.—Physically vigorous.

Examination.—Genitals normal; nates gaped towards the anus; skin round anus smooth; anus not dilated; no signs of recent or of old lacerations.

(γ.) Case LXXXV., male, æt. 53, pale-faced.

Examination.—Nates lean and very trumpet-shaped. Skin round anus very smooth. Nothing else abnormal noted.

(δ.) Case LXXXVI. Male, 52. Stout. He was by profession an actor, and accustomed to perform female characters. Very feminine in appearance. Hair and beard grey.

Examination.—Penis and testicles small; nates gaped trumpet-fashion; skin round anus very smooth; sphincter uninjured; rectum undilated.

(The above were undoubted cases of pæderastia.)

46. Casper, Vol. III., p. 341.—Case XCI. A male servant, æt. 21, was used by his master as a passive agent. Shortly after a violation, the sphincter was found painful, and a small laceration two lines deep was noted on the left side. (Pages 226, 229.)

47. Casper, Vol. III., p. 341.—Case XCII. Boy, æt. 16, violated by a man, who had apparently used considerable violence in effecting connection. The boy complained of pain both on defæcation and on walking.

The *examination of the rectum* on the fifth day after connection, was attended with great pain. Gaping and trumpet-shaped appearance of nates noted. A recent laceration (slightly suppurating) two lines long, was found on the skin close to the anus. Two distended veins were noted in front of the anus. The anus was quite closed, and the sphincter was uninjured. (Pages 226, 228, 229.)

48. Casper, Vol. III., p. 342.—Pæderastia by a male, æt. 14½, on a boy, æt. 8.

Examination of passive agent.—Anus normal in all respects.

(The case was complicated by certain abrasions due to the boy having ridden a cow.) A seminal stain was found at the lower part of the *posterior* portion of the boy's shirt at the examination on the sixteenth day.

Examination of the accused.—A vigorous muscular lad, without beard or hair on the pubes, and with no formed male voice. He admitted to have had occasional erections. The penis was of ordinary size. The testicles were small, and situated in front of the abdominal rings. (Pages 226, 230.)

49. Casper, Vol. III., p. 345.—(Case C.)—At a post-mortem on a male æt. 20, two slightly depressed cicatrices (scars of chancres) were found just inside the anus on the mucous membrane of the rectum. Nothing abnormal was noted about the genitals. The skin in the neighbourhood of the anus was smooth and non-rugose. (Pages 226, 229, 230.)

50. Case of Eliza Edwards (afterwards found to be a male).—("*London Medical and Physical Journal*," Feb. 1833, p. 168. "*Taylor's Med. Juris.*," Vol. II., p. 473.)—This man had all his life passed himself off

as a woman, securing his male organs by a bandage round the abdomen. He was a confirmed sodomite.

The anus after death was found to be gaping and large, with slight thickening of the mucous membrane at the margins. The skin around the anus was smooth. (Pages 226, 227, 230.)

51. Indian Medical Gazette, December 1, 1875.—Hindoo, male æt. 12. Passive agent in a case of sodomy. The anus had several bruises upon it running across the sphincter. The sphincter itself was somewhat relaxed, and the mucous membrane within was excoriated. The bruises completely healed on the third day. (Pages 226, 229, 230.)

52. R. v. Flatting, L. R. 2, Q. B. D., 410.—The prisoner professed to give medical and surgical advice for money. The prosecutrix, a girl of nineteen, consulted him with respect to an illness from which she was suffering. He advised that a surgical operation should be performed, and under the pretence of performing it, had carnal connection with the prosecutrix. She submitted to what was done, not with any intention that he would have carnal connection with her, but under the belief that he was merely treating her medically, and performing a surgical operation, that belief being wilfully and fraudulently induced by the prisoner. The Court for Crown Cases Reserved, were unanimously of opinion that these facts constituted the crime of rape. (Page 192.)

53. R. v. Fletcher, 8 Cox, 113.—The crime of rape is the having connection with a woman forcibly, where she neither consents before nor after (Stat. West. 2, 13 Edward I., c. 34). Therefore, when a man had carnal knowledge of a girl (aged thirteen) of imbecile mind, and the jury found that it was by force, and without her consent, she being incapable of giving consent from defect of understanding, this was held to amount to the crime of rape, although the jury did not find the offence to have been against the will of the girl. (Page 194.)

CHAPTER V.

LIVE BIRTH IN ITS CIVIL AND CRIMINAL RELATIONSHIP.

Tenancy by Courtesy—Infanticide and Concealment of Birth—The Legal Meaning of the term Live Birth—Evidence needful to prove Live Birth—Evidence of Life and of Death before Birth, deduced from the Post-Mortem and from the Examination of the Child at Birth—Evidence required to show the length of time that a Child had Lived.

(ILLUSTRATIVE CASES, Page 289.)

FORENSICALLY this subject is of great importance. Thus, in criminal cases involving questions relating to the life and death of an infant, such as charges of infanticide and concealment of birth, and in civil cases, involving what is called "*tenancy by courtesy*," the prime question that commonly arises is, Was the child born alive or dead?

(1.) Tenancy by courtesy, is the estate for his life which a man has, on the death of his wife, in the lands and tenements of which during the marriage she was seized in fee simple or in fee tail. To acquire such life interest, it is necessary that he had issue by her—(α) born alive; (β) during the marriage; (γ) capable of inheriting her estate. (Stephens' *Blackstone*, vol. i., p. 262.) In order, therefore, to preserve the rights of the husband, it must be shown:—

(α.) *That the child was born alive*, the onus of proving which rests with the husband. (*Case* 3.) A curious question might arise of this kind:—Supposing craniotomy to have been performed, and (as has happened) the child after delivery to have manifested slight signs of life; would this be sufficient to allow the husband his rights as tenant by courtesy? ["*Guy's Hospital Reports*," 1860, p. 477.]

(β.) *That the child was born whilst the mother was living.* Lord Coke and most legal authorities quote a case that occurred three centuries ago, which was decided against the husband on the ground that the child was extracted by Cæsarian operation after the mother was dead. It is possible, now this operation on both living and dead women has become of somewhat frequent occurrence, that this decision might be reversed, more especially seeing that a child thus born is declared to be legitimate, although death had dissolved the marriage before the birth. It might prove a curious matter for discussion, altogether apart from this question, whether extraction by Cæsarian section can legally be called "*birth.*"

(γ.) *That the child born was capable of inheriting.* (See Part I., p. 313.)

(2.) *Infanticide. Concealment of Birth.*—Infanticide will form the subject matter of the following chapter. It is unnecessary to quote statistics to prove the frequency of the crime. Usually committed to save the reputation of the mother, it is not surprising that the greater number of infanticides occur amongst illegitimate children. As our laws throw almost the whole cost of the child's maintenance on the mother, and as, besides suffering the pains of childbirth, the woman has been too often herself deceived, juries are reluctant in such cases to convict a woman of the more serious offence. It would be unfair that a poor seduced girl should be judged by the same laws as a hardened criminal. By a former statute (21 Jac. I., cap. 27, on which Sir Walter Scott founded the chief incidents of "The Heart of Mid-Lothian,") the mother of a bastard child, endeavouring to conceal its death, was required to prove, by one witness at least, that the child was actually born dead. In 1803, infanticide was placed on the same footing as ordinary murder, the onus of proof that the child was living being thrown on the prosecution. It is not necessary, however, that the body of the child should be discovered. The Act of 1803 further provides that if the woman be acquitted of infanticide, she may afterwards be tried for concealment of the birth, and if found guilty, punished by imprisonment for a term not exceeding two years. An Act

passed in June, 1828 (9 George IV., cap. 31), confirming this, also provides that it shall not be necessary, *quoad concealment*, to prove whether the child died before, at, or after its birth. The difficulty of proving live birth after a long interval is so great, that it becomes practically impossible under such circumstances to obtain a conviction for murder. Hence, as a rule, the prisoner is tried for the minor offence of concealment only. (See "*British Med. Journ.*," March 17th, 1877, p. 329.) The Consolidation Act (24 and 25 Vict., cap. 100) adopts and extends these provisions. Sect. 60, which relates to *Concealment of the birth*, is to the following effect:—"If any woman shall be delivered of a child, every person [and this includes doctor, midwife, or nurse], who shall, by any secret disposition of the dead body of the said child, whether such child died before, at, or after its birth, endeavour to conceal the birth thereof, shall be guilty of a misdemeanour, and being convicted thereof, shall be liable, at the discretion of the Court, to be imprisoned for any term not exceeding two years, with or without hard labour; provided that if any person tried for the murder of any child shall be acquitted thereof, it shall be lawful for the jury, by whose verdict such person shall be acquitted, to find, provided it shall so appear in evidence, that the child had recently been born, and that such person did, by some secret disposition of the dead body of such child, endeavour to conceal the birth thereof, and thereupon the Court may pass such sentence as if such person had been convicted upon an indictment for the concealment of the birth."

We have to consider:—

I. The legal meaning of the term "live-birth."

II. The nature and scope of the evidence needed to support the contention, either that the child was alive or that it was dead when born:—

(1.) *Evidence of* LIFE, *furnished by an examination of the child immediately after birth.*

(2.) *Evidence of* DEATH, *furnished by an examination of the child immediately after birth.*

(3.) *Evidence furnished by the post-mortem examination of its live- or of still-birth.*

III. The evidence to be adduced if the child be born alive to show the length of time that it survived its birth.

I. The legal meaning of "live-birth."

The law has not defined "live-birth," save by the decisions of the judges. Live birth may be stated to be "*the manifestation of some certain sign or signs of life by the child after it is completely born.*"

We must consider in detail two points suggested by this definition :—

(1.) The exact meaning of the term "*completely born.*" This implies that the child must be in the world in all its parts, *i.e.*, completely external to the mother. It does not imply, however, either that the placenta has been separated, or that the cord has been divided. Thus to prove child-murder it is necessary to show that the child was destroyed *after* its whole body was born, and delivery so far complete. It would not be infanticide if the child was destroyed when only half in the world, however complete the proof might be that in that position it cried or exhibited other undoubted manifestations of life.

Hence it follows that mere warmth and cadaveric rigidity are not proofs of live birth, seeing that both may occur in still-born children that have recently died. (*Case* 50.)

Some deep points of scientific interest arise in regard to the question, "What constitutes the independent life of the newly-born child?" Admitting that the practice of the English courts in refusing to entertain such recondite scientific questions is sensible, it is certain that to require the body of a child to be entirely external to the body of the mother before being considered legally born, is a physiological absurdity, and a direct encouragement to child-murder. In the case of *R.* v. *Poulton* (Chitty "*Med. Jur.*," 412), the medical evidence showed that the

child had breathed; but as the medical witnesses, very properly, would not swear that it was wholly born when it breathed, the judge held their evidence to be insufficient to convict the prisoner. Baron Gurney again (*R.* v. *Simpson*, Winchester, March, 1835) stopped a trial for child-murder so soon as the medical witness allowed, in cross-examination, that the lungs might have been inflated during the birth of the child. Similarly Parke, B. (Herts Lent Assizes, 1841), in charging the grand jury said, "The law requires that it should be clearly proved (in cases of infanticide) that the child was born alive, and that the whole body of the child had come from the body of the parent. If it should appear that death was caused during delivery, then you will not find a true bill." Similarly again, Erle, C. J. (*R.* v. *Christopher*, Dorset Lent Assizes, 1845), drew a distinction between physiological life and legal life. "Medically," he said, "this might be a live child, but legally it was not one, for in law the birth of the child must be complete." As a result the prisoner, who had murdered a child whilst it was being born by cutting off its head, was acquitted. (See also *R.* v. *Brain*, *R.* v. *Sellis*, Norfolk Spring Assizes, 1837; *R.* v. *Stevens*, 1853; *R.* v. *Taylor*, Hereford Summer Assizes, 1863; "*Ed. Monthly Journal*," Oct., 1845, p. 796; "*Ann. d'Hyg.*," 1847, p. 1,455.)

Entire delivery being necessary to constitute live birth legally, it follows that the time of a child's birth is the moment of its being *completely* expelled from the body of the mother. The birthday of a child, therefore, whose head was in the world at one minute to twelve on Dec. 31st, 1799, but whose body was not entirely expelled until one minute past twelve on January 1st, 1800, is the latter date and not the former. And this precise time and date should be noted by the accoucheur in every midwifery case, seeing how important the questions are that may thereafter arise upon it.

A child in utero may through its mother claim damages (Court of Admiralty, 1871, *Blasson* v. *Blasson*, see page 109);—it may have money or estates left it by will; a guardian may be selected for it, or it may be appointed an executor. But in all these cases any judgment of the Court, or any arrangements

made on its behalf, are dependent on the child being born alive. Although in the case of damages, the Court may decide that the unborn child is entitled to damages, the actual assessment cannot be considered until the child is live born.

(2.) We have next to consider what constitutes a sufficient sign or manifestation of life to satisfy the law that the child was born alive?

The law knows no mid-stage between life and death. It recognizes no distinction between intra-uterine and extra-uterine life, or between fœtal and non-fœtal existence. Take any sign of life—be it a muscular twitch, a pulsation of the cord, a breath—the law does not ask how long was the sign of life observed, or with what degree of vigour was it manifested—but simply, Was it observed at all after the child was completely born? In law, a single second of live birth will, so far as civil rights are concerned, bestow all the advantages that would result from a week or a year.

We have now to consider—

II. The evidence to be offered by the medical jurist in support of the contention either that the child was alive or that it was dead when born.

This evidence may be of three kinds—

(A.) The evidence of life, furnished by an examination immediately after the birth.

(B.) The evidence of death, furnished by an examination immediately after the birth.

(C.) The evidence of live- or of still- birth furnished by a post mortem examination.

(A.) *The evidence of life furnished by an examination of the child immediately after its birth.*

The signs or manifestations of life need consideration in some detail:—

(*a.*) *Muscular twitchings.*—The question whether mere muscular movements, or twitchings of the muscles of the lips, constitute signs of life (*i.e.*, altogether independently of breathing

etc.), was answered in the affirmative in the case of *Fish* v. *Palmer*. (*Cases* 1 and 22.) We can scarcely suppose that a muscular twitch would *per se* be regarded as sufficient evidence of live birth in a criminal inquiry. We admit that the movement of a lip is as definite an act of life as the movement of an arm; still it would require a very strict investigation into the *degree and character of the movement*, to enable the medical jurist in such a case to ignore the possibility of muscular irritability. Whilst strongly leaning to the view that such movements are very unlikely to be mechanical or independent of vital power, still we should hesitate before we positively assert (especially on the evidence of those unaccustomed to careful observation) that a slight muscular twitch is to be accepted as a necessary manifestation of live birth.

(*β.*) *Respiration.*—Respiration (*i.e.*, breathing as evidenced by chest and other movements) is a true sign of life. But on the other hand, it does not follow that because a child does not breathe, therefore it is not living. (*Cases* 30, 31.) For this reason, however much the fact that a child's lungs sink in water (as we shall hereafter point out) may prove that respiration has not taken place, it is certainly no proof that the child has not lived, seeing that life and respiration are not convertible terms. On the one hand *a child physiologically may live and not breathe*, as has been clearly shown by the cases reported by Maschka ("*Vierteljahrs.*," 1854, iii. p. 1). On the other hand (although seeing that for the moment we are limiting ourselves to the mere signs of life, we need not discuss this question further), *a child may breathe, and yet legally not be a living child.*

(*γ.*) *Crying.*—Crying, after complete delivery, is an indisputable proof of live birth. It is not necessary, however, for the child to cry to prove live birth. Blackstone ("*Comment.*," Vol. ii., ch. viii., p. 127) says:—"*Crying*, indeed, is the strongest evidence [of live birth], but it is not the *only* evidence." (*Cases* 2, 4, 28, 30.) Coke says:—"If the child be born alive it is sufficient, though it be not heard to cry, for peradventure it may be born dumb." The Scotch law demands proof of audible crying, in order to establish the husband's right of life-rent in his wife's estate (see *Cases* 2 and 4), even breathing not being sufficient

for this purpose. In *Case* 3, where crying was alleged as proof of life, the verdict against the claim of the husband as tenant by courtesy, depended on the circumstance that the evidence of interested witnesses was unsupported. (I Dickson, Ev., 180.)

Regarding the legal definition given of live birth, in conjunction with the Scotch decision that crying must be one of the manifestations of its life, two considerations suggest themselves :—

(1.) That a child may cry during the time of its expulsion from the mother (*Cases* 5—13, 17) (vagitus uterinus et vaginalis), and yet be dead when completely born (*Cases* 9, 11) ; and,

(2.) That a child may be born alive, and not cry for days.

The question *re* crying is—Did the child cry after its complete birth? And as evidence, the answer to this question is of supreme importance; for a child may breathe and not cry, but it cannot cry and not breathe. It may, however, both breathe and cry, and yet legally not be born alive.

(δ.) *Pulsation in the Cord.*—This is an undoubted sign of life, the pulsation being in the umbilical or hypogastric arteries, and due to the action of the child's heart. (See "Fœtal Circulation.") In other words, such pulsation indicates that the heart was contracting, and contractility of the heart muscles is as good a proof of life (if it be not a better) as contractility of the diaphragm or of the intercostal muscles. (*Case* 14.)

(ε.) *Beating of the Heart.*—The beating of the child's heart is, of all tests, *the test* of live birth. Supposing that a child had never cried, never breathed, and never moved, the medical jurist would be justified in declaring the child to be living, if the heart was heard to beat. M. Bouchut records a case where the heart-beats of a child were audible for twenty-three hours after birth, although there were no signs of respiration during that time. (*Cases* 20, 21.)

(B.) *The evidence of the child's death furnished by general signs noted immediately after its birth.*

The absence of movements either in the arms, hands or

feet :—the absence of muscular twitchings of the lips or eyes :—the absence of respiratory movements, pulsation in the cord, or beating of the heart :—the non-utterance of any cry or other sound ;—such are the first indications that the child is still-born.

From tables given on the authority of the "*British and Foreign Medical Review*," No. vii., p. 235, based on eight millions of births, it would appear that from 1 in 18 to 1 in 20 births are *still-born*. Dr. Lever found that the proportion in his 3,000 cases was 1 in 18. So notorious is it that a large number of these deaths could be averted, that some legislation is urgently needed, requiring that still-borns, whose bodies weigh, say not less than *two pounds* (the average weight about the sixth and seventh months [p. 59], and at which age children are viable), should not be buried without registration, and a medical examination.

As regards the *causes of still-birth*, we must reckon :—

(*α.*) *First labours.* The proportion of stillborns, according to Dr. Lawrence, is as 1 to 11 amongst primiparæ, and as 1 to 31·2 amongst pluriparæ ("*Edinburgh Medical Journal*," March, 1863.) A large proportion of these primiparous cases were illegitimate.

(*β.*) *The male sex*, in the proportion of 140 males to 100 females [106 males are commonly born to every 100 females]. Sir James Simpson, and Dr. Falck of Berlin, both agree in this statement, the proportions given by the latter being 56 still-born males to 44 females, or as 127·2 to 100.

(*γ.*) *A large size of head.* An unusually large head is most common in males, rendering the labour a lingering one.

(*δ.*) *Premature birth.* (See remarks on Infant Viability, page 49.)

(*ε.*) *Inherited diseases.*

(*ζ.*) *Certain congenital malformations*, such as an absence of heart, mouth, etc.

Any person, "who wilfully makes, gives or uses any false statement or representation as to a child born alive having been still-born, is liable for each offence, on summary conviction, to a penalty not exceeding ten pounds, and on

conviction or indictment to fine or imprisonment, with or without hard labour, for a term not exceeding two years, or to penal servitude for a term not exceeding seven years." (Births and Deaths Registrations Act, sec. xl.)

What then (we must enquire) is a still-birth? Dr. Priestley considers it not only convenient but *essential*, with these heavy pains and penalties, to regard respiration as a proof of life, because its occurrence can be subsequently proved if necessary by an examination of the lungs. In France the term "still-born" is somewhat widely interpreted. Nothing, however, can justify the use of the term being applied to children that have lived for some time after birth, as certain authors have done. (See "*Lancet*," Oct. 26, 1878.)

But the evidence of the child being dead when born, will be placed beyond question if the body be found in a state of *putrefaction at the time of birth*, such putrefaction being the result of intra-uterine maceration—*i.e.*, maceration at a temperature of 100° F. (38° C.) in a weak saline solution like the liquor amnii. We quote from Casper the following graphic description of these intra-uterine changes (Dr. Balfour's translation, p. 91, Vol. iii.). He says:—

"*It is impossible to mistake the appearance of a child born putrid.* The swollen cutis, the vesicular elevation of the cuticle, or its complete peeling off [*Case* 49], the greyish-green colouration of the body, the putrid navel-string, the well-known stench, etc., do not constitute the diagnosis, since every child, even when born alive, undergoes these putrefactive changes in their turn at the proper time after its death. On the contrary, most of these characteristics are not exhibited by a child born putrid, and the putrefactive maceration in the warm liquor amnii, is so very different in its operation from putrefaction external to the uterus, that it produces an appearance so specific as to be unmistakably recognised whenever it has been once or twice seen. In the first place, a child born putrid is remarkable for its penetrating stench, which cannot be concealed by a thin coffin or chest, etc., and which, though so repulsive and indestructible, is not yet the usual well-known odour of putrefying bodies, but has something sweetish, stale, and indescribable about it, which

makes it all the more unendurable. The difference in the general colour of the skin in the two classes of children is still more remarkable. A child born putrid has not a shade of green upon its skin, but is more or less of a coppery red, here and there of a pure flesh colour. Peeling of the cuticle is never absent, but close to recent patches of this character older ones are found upon the body, the bases of which are already dark and hardened. The excoriated patches are moist, greasy, and continually exude a stinking, sero-sanguinolent fluid, which soaks through all the coverings of the body. The general form of such bodies is as remarkable as their colour. Whilst every highly putrefied corpse preserves for long the roundness of the contour of the body, though its form is disfigured and distorted by intumescence, it must strike every one, when a child born putrid is placed before him, how great a tendency is displayed by it to flatten out, and, as it were, fall to pieces. Thorax and abdomen lose their roundness, their contour forms an ellipse, from the soft parts sinking outwards towards both sides. The head itself, the bones of which are loose and moveable as in every child's body, becomes flattened, and the face thereby repulsively disfigured, as the nose is flattened and the cheeks fall to opposite sides. It is impossible accurately to describe the appearance of such a child, and it is not worth while to append an exact representation true to nature, since the sketch here given, as accurately as possible, is sufficient to characterise a child born putrid."

Maceration differs from putrefaction. Maceration results when air does not gain access to the fœtus. Sometimes the dermis of the infant is raised into ampullæ, whence exudes a sero-sanguinolent fluid that gives to the amniotic liquid the colour of wine-lees, rendered darker at times by the meconium expelled on the relaxation of the sphincters just before death. For some months the fœtus may remain in the uterus in this condition. More especially is this the case in twin pregnancies, where one of the infants compressing the other may cause it to become flattened and atrophied, so as exactly to resemble a little gingerbread figure. These facts are important, seeing that, if a woman be accused of infanticide, it

may be possible to show that the infant had been dead for some time, the death resulting from disease of the placenta or some other cause. ("*Gaz. des Hôp.*" (*Depaul*), Jan. 27, 1880.)

(C.) *The evidence of live or of still-birth furnished by the post-mortem examination.*

We consider first—

(I.) *The condition of the Respiratory Organs.*

At the outset of our enquiries on this point, we must carefully consider the relationship of respiration to live birth. *Physiologically* a child must be alive if it breathes: *legally* it may breathe and yet not be born alive. For,

(*a.*) *A child may breathe in utero* (vagitus uterinus).

This may happen after labour has commenced and when the membranes are ruptured:—*e.g.*, in the case of a face presentation, the mouth of the child being at or near a dilated os; or under circumstances such as version or other manual assistance; or during the application of the forceps, when the child's mouth may be brought into a favourable position to allow the entrance of air. Nearly all recorded cases where a child has breathed in utero, are of such a nature that manual assistance was required at the birth. It will at once be apparent how such assistance would facilitate, if not actually cause, the entrance of sufficient air to allow of the child taking a fairly deep breath. (*Cases* 15 and 16. Also *Cases* 5—13 and 17.)

It is quite unnecessary to discuss here whether the attempt to breathe may not in some cases have occurred before even the membranes were ruptured, liquor amnii being drawn into the air tubes instead of air, death in this manner being actually caused by intra-uterine drowning (*Case* 51).

Much less is there any necessity to make more than a passing allusion to those idle fables where children are said to have been *heard to cry* (the act of crying presupposing respiration and respiratory movements) before the commencement of labour. Admitting the impossibility of such stories, the numerous cases recorded of vagitus uterinus, places the possibility of uterine

respiration *after the membranes have been ruptured*, beyond a doubt.

In considering, however, the bearing of these rare cases of vagitus uterinus on the evidence afforded by the hydrostatic test, it is important to note that they were all exceptionally difficult labours, requiring in a special manner the accoucheur's attendance. They were, therefore, it is fair to suppose, cases where infanticide at the moment of birth would be most improbable, and where the evidence of the medical man in attendance would at once prove or disprove the truth of such allegation.

(*β.*) *A child may breathe whilst its head is in the vagina* (vagitus vaginalis).

And here, again, the facts show that this *à fortiori* is quite within the range of possibility, at the same time the rarity of the occurrence is certain. A case is recorded of a child whilst in the vagina sucking the finger of the accoucheur (*Case* 18). For vaginal breathing to occur, the passages must be roomy, the child vigorous, and the face more or less presenting.

(*γ.*) *A child may breathe after the head only is external to the mother*, i.e., *before the rest of the body is born.*

This event probably is as common, as uterine or vaginal respiration is uncommon. Further, respiration may in such case be as complete, as it is next to certain to be incomplete in uterine or vaginal respiration. Physiologically, this is live birth —legally, it is not live birth. No medical expert can differentiate such cases, and lawyers must be left to fight their battles on the legal technicalities of definitions.

Having regard, however, to legal definitions, it is important to observe that, allowing a child may breathe, and may therefore physiologically live, before it is external to the mother, it is equally certain that it may so easily be choked either in the uterus or in the vagina by vaginal and other discharges, that it may be physiologically dead at the time of its legal birth.

(II.) We have now to consider certain *Thoracic Changes* resulting from respiration.

(*α.*) *Changes in the Shape of the Chest, and alterations in the position of the diaphragm.*—The thorax before respiration is said to be flat, whilst after respiration it is arched. Practically

this fact is unimportant. The attempts that were made by Daniel to decide live birth by a measurement of the chest proved futile, and are justly rejected by Tardieu and other authorities.

The diaphragm before respiration is arched, and rises high up into the chest; after respiration it is flattened and depressed. (*Cases* 53, 54, 57. See *Case* 10 under *Infanticide*, p. 329.) Forensically, the fact is, taken by itself, of no great value, although undoubtedly an indication worth observing.

(β.) *Changes in the Condition of the Pulmonary Vessels.*—Admitting that in all probability the pulmonary vessels contain more blood after the establishment of respiration than before, no accurate data are known upon which we could decide live or still birth from this point of view.

(γ.) *Changes in the Lungs generally.*—The lungs during fœtal life are of little use. They receive (like the other viscera) blood enough for their growth and development, but no more. But after respiration, (a few minutes' breathing being sufficient in the case of a vigorous child, although a longer period is no doubt required in the case of a less vigorous one,) the lungs become the passage for the blood of the entire body, as well as receptacles for the air required in effecting its aëration. Hence with breathing, comes an alteration in the shape and situation of the lungs, as well as in their feel and consistency. In addition to this, we have an increase in their volume, an augmentation in their weight, and a change in their colour, owing to the injection of the superficial capillaries. (See *Case* 10 under *Infanticide*, p. 329.)

(δ.) *Changes in the size, shape, and situation of the lungs.*—*Before* respiration the lungs do not nearly fill the chest, and are so crowded into the sides of the thorax as probably to be invisible when first exposed. The *thymus* gland (not to be confounded with the *thyroid* body) and pericardium occupy a prominent central position. The margins of the unrespired lungs are sharp, well defined, and curve inwards.

But *after* respiration the lungs expand and cover the pericardium. The margins lose their sharpness, and appear rounded. (*Cases* 53 and 54.) Even two or three breaths in the case of

a vigorous child, may suffice to effect these changes in the shape and condition of the lungs.

This is the rule; nevertheless many instances are recorded where the lungs of children that have breathed have been found after death to be very small, expansion it would seem at times taking place by slow degrees. And again, still-born children have been found with full-sized lungs, the apparent development of these organs being dependent on their being filled with serous fluid. Or again artificial inflation, or the gaseous products of putrefaction, might effect a pulmonary enlargement simulating exactly the general effects of respiration. (*Case* 53.)

(ε.) *Changes in the feel and in the consistency of the lungs.—The unrespired lungs* are of a uniformly dense, firm, fleshy and liver-like consistency. They do not crepitate (*i.e.*, crackle) when handled or incised; little or no blood is observed to ooze from, or to be present in them when cut; if pressed under water no bubbles of air escape. (*Case* 53; *Case* 10 under *Infanticide.*)

On the other hand, *the respired lungs* are spongy, vesicular, and light. They crepitate when handled or incised. The walls of the air-cells are injected, and blood oozes from them when they are cut and pressed (*Cases* 54, 55, 56, 57). If pressure be applied to a piece of respired lung under water, minute air bubbles will be observed to escape.

Two remarks are called for here:—

(i.) The extent of the changes described as occurring with respiration, depend on the extent to which respiration has taken place; and

(ii.) Nearly all the changes noted as occurring with normal respiration, might result from artificial inflation or from putrefactive decomposition, except (α) the presence of an increased quantity of blood in the lungs, and (β) the giving off of *minute* air bubbles when they are pressed under water, the gas bubbles of putrefaction being comparatively of large size.

(ζ.) *Changes in the colour of the lungs.*—The unrespired lung at full term is commonly of a dark maroon colour, but varies more or less from a brownish red to a deep violet. Although we doubt (as some have supposed) whether uterine age can

be judged by the colour of the lungs, it is certain that the lungs do undergo a definite series of tint changes in the course of intra-uterine life. The lungs after respiration acquire a bright red or pink hue.

In the matter of the colour of the lungs, however, we must note four things :—

(i.) That the extent of colour change depends more on the extent of expansion and aëration than on the length of time it has continued. A breath or two may be sufficient with active respiration to effect a complete alteration in their tint; whilst if breathing be imperfect, the change of colour may be very slight, and that although the child may have lived and breathed for a considerable time. (*Case* 10 under *Infanticide.*)

(ii.) That the extent of colour change is much influenced by the absence or presence of the pulmonary diseases common to infants, such as œdema, tubercles, hepatization, etc.

(iii.) That the mere exposure of an unrespired lung to the air after death, will develop more or less of the rose red tint characteristic of a lung that has breathed.

(iv.) That inflation is capable of producing all the colour effects of respiration. (See a statement opposed to this, "*Ed. Med. and Surg. Journal*," xxvi., p. 367.)

(η.) *Changes in the appearance of the lungs.*—Ogston insists that after respiration the lungs assume a mottled or marbled appearance, made up of patches of bright vermilion red or rose red spots on a dark livid ground. These are developed air-cells or vesicles (*Cases* 12 and 15 under *Infanticide*). They are usually to be observed as raised patches over the anterior surfaces and margins of the lungs, but more particularly on the upper lobe of the right lung, which admits air more readily than the left (*Cases* 55, 56). Occasionally a lens of very low power may be needed to see them. These air-cells occur in groups, commonly symmetrical and angular in shape, though from their small size they often appear circular, like little beads or globules of millet seeds. They could scarcely be confounded with spots of blood or pigment (melanotic spots). The air cells produced either when air is blown into the sub-pleural and interlobular tissue, or by the gases of putrefaction, may be

known, (1) by their larger and (2) more variable size, and (3) by the fact that whilst such air or gas readily follows the pressure of the finger, no ordinary pressure will disturb the disposition of true air vesicles. Further, although the lung which has breathed may not contain more blood-vessels than one which has not, the blood it does contain will be of a frothy nature. (*Case* 57.)

(*θ.*) *Changes in the composition of the lungs.*—It has been pointed out (M. Guillot, "*Comptes Rendus*," July 12, 1847) that, whilst the tissue of the lungs before respiration contains from 10 to 18 per cent. of fat, after respiration it contains not more than 6 per cent. Be this true or not, it is of no value medico-legally, seeing that in cases where the fact of live birth is disputed, respiration probably at most has been imperfect. Further if any difference be found in the chemical constitution of the lung tissue (which is not likely), the difference at best would be scarcely sufficient to render it of any value in forensic inquiries.

(ι.) *Changes in the absolute and relative weight of the lungs.*

(i.) *The* ABSOLUTE *weight of the lungs as a test of live birth.—The static test.* (Foderé's or Schmidt's test.)

To ascertain the weight of the lungs, they should be carefully ligatured round the roots, so as to compress the pulmonary vessels, and prevent the escape of blood.

Undoubtedly the lungs *after* respiration weigh more than the same lungs before respiration. This increase of weight can only be due to the afflux of blood resulting from the establishment of the process of respiration, and not to any actual increase of lung tissue. But, as Guy points out, lungs which have breathed have been found singularly empty of blood: whilst inversely, lungs that have not breathed have been found congested.

Further, respiration is a process requiring time, albeit an uncertain time, for its complete development. In other words, the enlargement of the pulmonary arteries, and the contraction of the ductus arteriosus, may be rapidly effected (in some cases contraction of the ductus arteriosus has been known to take place before birth), or the alterations may take place very slowly.

It is important to note the exact extent to which Foderé's test of absolute lung-weight may be rendered applicable in courts of law. It is manifest we cannot weigh the lungs of the *same* child before and after respiration, and we are therefore compelled to trust to the average lung-weights (α) of still-born children, and (β) of children who have died soon after their birth, as the data for comparison. This fact, considering the vast differences that exist in the development—in other words, the body-weight—of different children, would alone render the test of doubtful value. But Guy remarks that even this is not the only difficulty, for in two children of the same body-weight, born alive, he found the lungs of one to weigh 494 grains, whilst those of the other weighed 1,544 grains.

Seeing, then, that in Foderé's test we are compelled to trust to averages, it is evident that, to be of the slightest forensic value, the differences in the weight of respired and unrespired lungs must be fairly constant, fairly well marked, and of fairly certain application This, Foderé contended was the case. Thus he fixed 480 grains (1 oz.) as the weight of the lungs of still-born children born at term, and 960 grains (2 oz.) as the weight of the lungs soon after breathing was established. Schmidt (adopting the observations of Bernt on the weight of the lungs of stillborn children) laid down that, (α) if the lungs exceeded 1,000 grains in weight, it was a certain proof that the child had breathed, whilst (β) if they exceeded 550 grains there was strong presumptive evidence that the child had been born alive.

But this test is at once seen to be worthless, because of the inconstancy of lung-weights, as proved by other observers. Thus Taylor gives the average weight, in nine cases, of the lungs of stillborn children as 649 grains, whilst of three cases after respiration, the average was 927 grains. But then it is to be noted that he also records a case where unrespired and airless lungs weighed 1,200 grains. In *Case* 56, where it is evident that breathing had occurred to a slight extent in a mature child, the right and partially expanded lung only weighed 490 grains, the left lung, which had not been concerned at all in breathing,

weighing 390 grains. Dr. Traill, according to his observations on the weight of unrespired lungs, gives from 430 to 600 grains as the limits of their variation. Dr. Ogston records cases of unrespired lungs that weighed 476 and 562 grains, and cases of respired lungs that weighed 833 and 824 grains. ("*Med. Juris.*," p. 229.) But Dr. Ogston also records that in three cases he found the lungs of stillborn children to weigh more than the average weight of the lungs of children born alive, viz., 958, 1,180, and 1,315 grains respectively, whilst in one case of live birth he found the lungs to weigh only 420 grains. Dr. Guy states the average weight of lungs before respiration in 400 cases examined by him to be 874 grains, the average weight of the lungs of those who survived their birth for one month or less being 1,072 grains. Guy gives the following tabular statement, founded on 34 cases ("*Lancet*," Oct. 1, 1842):—

	Before Respiration.	After Respiration.
Maximum	1,950	 1,203
Minimum	510	 510
Mean (average) ...	769	 820

It is evident from all this that in some cases the lungs of stillborn children are heavier than the lungs of children that have breathed. Admitting, therefore, the general fact of increase of weight, it is certain that no reliance can be placed on Foderé's test for forensic purposes.

(ii.) *The ratio of the weight of the lungs to the weight of the body of the child, as a test of live birth.* (Ploucquet's test.)

It is admitted that, owing to the presence of blood, the lungs after respiration weigh more than before respiration. Ploucquet, as the result of experiments, laid down this rule, that "*before respiration* the weight of the lungs compared to the weight of the body was in the ratio of 1 to 70, and that *after respiration* it was in the ratio of 1 to 35."

This statement was made on an insufficient number of experiments, as the observations of more recent investigators given in the following table prove. From these it would appear that the ratio before breathing is as 1 to 56·5, and after breathing as 1 to 46·7, the general mean of the maxima in both cases however, being nearly identical.

The conclusion is evident, viz., that although the observations recorded show a certain difference, nevertheless that the average variation is far too small to sanction our employing Ploucquet's test as a proof of live birth in forensic enquiries.

		Before Respiration.	After Respiration
Taylor		... 1 : 67	1 : 40
Guy ...	Maximum	1 : 21	1 : 39
	Minimum	1 : 91	1 : 65
	Mean	1 : 60	1 : 50
Schmidt		1 : 52	1 : 42
Chaussier		1 : 49	1 : 39
Devergie	Eighth month	1 : 62	1 : 37
	Ninth month	1 : 60	1 : 45
John Beck		1 : 47	1 : 40
Ogston— (66 carefully selected cases, *i.e.*, excluding premature children and all bodies where there was any sign of putrefaction.)		1 : 56	1 : 53
Casper— (52 cases)		1 : 61	1 : 59
	Mean	1 : 56·5	1 : 46·7

(iii.) *The specific gravity of the lungs* (*i.e.*, their relative weight compared to water) *as a test of live birth.* (THE HYDROSTATIC TEST.)

The average specific gravity of a lung that has not breathed is 1050° (water being 1000°), whilst that of a lung that has breathed is 940°. This change of specific gravity is dependent merely on the presence of air.

The hydrostatic test was first suggested by Raygat in 1682, and has proved a fertile topic for controversy. The consideration of this important subject suggests one general remark, "Where doubt exists, avoid being positive."

The method now adopted for carrying out "the hydrostatic test" is as follows:—

(a.) Remove the lungs and the heart together by knife from the thorax, securing in the first instance the larger vessels, to prevent escape of blood.

(b.) Place them entire in a pailful of water (rain water being employed by preference) at 15° C. (60° F.), and note if the lungs float and are able to buoy up the heart with them:—in other words, if the thoracic viscera float as a whole. Should they sink, note whether they do so slowly or rapidly (*Case* 56), and whether they sink completely to the bottom of the pail, or a short distance only below the surface of the water.

(c.) Test each lung separately in a similar manner, and note whether both lungs float or sink, or if one lung sinks whilst the other floats.

(d.) Cut each lung into from 12 to 20 pieces, preserving the position of the several pieces. Note whether these separate portions sink or float.

(e.) Wrap the several portions that float separately in a coarse cloth, place them on the floor, and cover them over with a piece of board. Stand (avoiding any jerking movement) on the board, so as to apply a regular and even pressure to the several portions. This done, again determine whether the several pieces sink or float in water. (Suggested by Béclard.)

The two general conclusions to be drawn from the hydrostatic test may be broadly stated as follows:—

(i.) If the lungs float whole and are able to buoy up the heart with them, and if they also float when cut into small pieces, but more especially if the buoyancy of the several pieces continues after the application of pressure, there is strong presumptive evidence that the child has breathed, and therefore has lived; but it does not prove that the child was born alive in the legal sense—that is, that it drew air into its lungs *after* it was *completely* external to the mother.

(ii.) If the lungs sink in water whole and after being cut into pieces, there is strong presumptive evidence that the child has not breathed; but this does not necessarily prove that the child was born dead.

In stating the conclusions to be drawn from the hydrostatic test, it will be noted that life and breathing are not regarded as convertible terms, the fact being that this hydrostatic test is not a test of live birth, but of respiration only. Respiration, in law, as we have already said, is only one of the proofs of live birth, and by no means an exclusive proof. No doubt physiologically a child that has breathed has lived, but it does not follow that a child that has not breathed has not lived. (*Case* 17 under *Infanticide*, p. 332.) This is shown in such instances as *Cases* 1, 14, 20, 21, 28, and 30, where life was indicated by such manifestations as cardiac pulsation, pulsations of the cord, tremulous movements, etc., and not by respiration. The circumstance that a child may be alive although it has not breathed, owing amongst other causes (as Dr. Hicks has pointed out in *Guy's Hospital Reports*, 1866, p. 476) to spasm of the larynx and retraction of the tongue—is an important fact for the accoucheur. For this reason, the absence of respiration is not a sufficient ground for regarding the child as a stillborn. Equally important is the fact to the medical jurist, that, although the lungs sink in water whole and divided, the child may nevertheless have lived. This we shall examine in detail hereafter, merely remarking at the moment that given no air in the lungs (that is, that the lungs whole and divided sink in water, etc.), it is impossible *from a post-mortem examination* to disprove that the child was born dead. The only evidence, therefore, in such a case in support of the contention, that the child was born alive must be motion of the limbs, or crying, or cardiac pulsation, or other similar life manifestations noted by those in actual attendance at the time the child came into the world. Given these, however, there is no necessity for the hydrostatic or any other post-mortem test, to prove live birth.

Two sets of objections are urged to the hydrostatic test:—

A. *That the lungs of children that have not breathed may float, either from* — (*a.*) The development of the gaseous products of putrefaction; (*b.*) Artificial inflation; or (*c.*), Emphysema.

B. *That the lungs of children which have breathed may sink, from*—(*a.*) Disease; (*b.*) Imperfect breathing (Atelectasis pulmonum); or (*c.*) Complete non-expansion.

It is manifest that the first series of objections is of greater importance than the second, the conviction of the innocent being at all times more serious than the escape of the guilty.

We shall consider these in detail.

A. *That the lungs of children that have not breathed may float.*

(*a.*) *Putrefaction.*—This difficulty to the hydrostatic test was first raised by Mayes and Gross, who suggested that the lungs of stillborns might be rendered buoyant by the gaseous products of decomposition. *Case* 23 (almost, if not quite, unique of its kind) shows that buoyancy of the lungs may result from this cause. In *Case* 24 (reported by M. Douillard as occurring in the practice of Dr. Fajole), it is by no means certain that the child had not breathed; but the conflicting results obtained (one day the lungs floating, and the next sinking,) suggest this rule, viz., "avoid all certain conclusions as to respiration deduced from the hydrostatic test, in the case of decomposed lungs." Similarly in *Cases* 53 and 54, although it is true that putrefaction might have been the cause of the lungs floating, it is by no means certain that respiration had not taken place to a limited extent. Any difficulty, however, in the employment of the hydrostatic test owing to pulmonary putrefaction, will be of rare occurrence; for, as Ogston points out, the lungs in situ decompose very slowly. He records how in the examination of 52 cases (some of which were autopsies on children that had been dead five months), no single instance of difficulty in the application of the test arising from putrefaction occurred. In this we agree, believing that the suggested fallacy is a theoretical one, for if the body and lungs show signs of putrefaction, the medical jurist must admit his inability to give a positive opinion (*Cases* 53, 54); whilst if the body generally shows no signs of putrefaction, the lungs may fairly be regarded as not likely to be influenced by gases arising from decomposition. Of course our reference here to the slowness with which

the lungs decompose, applies to the lungs before the chest is laid open, and not to the lungs after their removal from the body.

To meet, however, this objection to the use of the hydrostatic test, the five following points are worthy of consideration :—

1. The gases of decomposition collect not in the air-cells, but in large bladders of irregular size, mostly under the pleuræ, or, at any rate, in the interlobular areolar tissue of the lungs. Hence, in conducting the hydrostatic test, it is most important to note in all cases whether the pieces into which the lungs have been divided float after pressure has been applied to them ;—because, having regard to situation, if the buoyant gases be the gases of putrefaction, pressure (and even the pressure of the fingers would, in most cases, be sufficient for this purpose) is certain to dislodge them, and to render the pieces specifically heavier than water. If, on the contrary, the buoyant gas be air, and its situation the air cells, no pressure short of that which would entirely break up and destroy the lung tissue, will cause the lung that previously floated to sink. (*Case* 17 under *Infanticide.*) Even two or three breaths will in some cases suffice to render the lungs thus persistently buoyant. (Taylor *Med. Juris.*, vol. ii., p. 35.) No rule, however, can be laid down as to the time or the number of breaths required to establish permanent buoyancy, seeing that two minutes in some children will do more than two days in others. You cannot predicate with certainty, therefore, the degree of lung expansion from the time that has elapsed since birth ; nor, conversely, can you decide the age of a child, from the extent of lung expansion. But this is certain, that given complete respiration, no common pressure will expel the air or cause the lungs to sink in water. The employment, therefore, of pressure as an essential part of the hydrostatic test, disposes for the most part of putrefaction as a difficulty. Ogston points out, that if a piece of lung buoyant by putrefactive gases be pressed under water, *large* bubbles escape, whilst in the case of a lung buoyant by respired air, the bubbles set free are excessively minute.

2. When putrefaction is suspected, a piece out of the centre

of the lung should be specially tested to see whether it floats or not, the gases of putrefaction affecting the surface rather than the inner substance of the organs.

3. The gases of putrefaction have, as a rule, an offensive smell.

4. If any putrefactive change has attacked the lungs, other portions of the body, and other viscera, are certain to show signs of decomposition.

5. The gases of decomposition will not produce the peculiar appearances on the surface of the lung described as the result of respiration, whilst the minute globules of air seen in the air-cells when a respired lung is examined under the microscope, will be absent.

(*b.*) *Artificial Inflation.*—Regarding this question from the criminal point of view, we observe that as a *theoretical* objection to the hydrostatic test, inflation is a difficulty; but that as a *practical* objection, it is groundless. For inflation is only likely to be performed under one of three circumstances:—(1.) *By an accoucheur to restore a stillborn child.* If so, the medical man would at once confess to a meritorious attempt (*Case* 57). (2.) *By a mother, with the desire of saving her child's life*—an act scarcely consistent with a criminal attempt at infanticide. (3.) *By some malicious person to criminate another.* To inflate the lungs *in situ* (and this is the only case needing consideration), is far from an easy task for an anatomist to perform successfully; *à fortiori*, is it difficult for one ignorant of anatomy. (*Cases* 34, 40, 57.) The inflation of the lungs out of the body, or after death, by a tube thrust down the larynx, is no doubt easy enough, although an operation that requires more force than is usually supposed. Some have gone so far as to doubt the possibility of perfect inflation before the thorax is opened. Ogston (Albert) ("*Henke's Zeitschrift*," 1837, p. 2,390), who denies the possibility of inflation either by mouth or tube; Depaul ("*Med. Gazette*," Vol. xxxix., p. 283), who remarks on the great force necessary to accomplish a very difficult operation; Taylor (*Med. Jurisprudence*, vol. ii., p. 349), who admits the possibility of inflation, but strongly insists on the difficulty; Casper, and lastly Elsaesser (who, in 45 cases of attempted inflation, was

only successful in one), are all much of the same opinion on this subject. That it is possible to effect inflation, the author thinks there can be very little doubt ("*Med. Times*," Nov. 30, 1844, and Feb. 8, 1845); but that it is extremely difficult, there is no question.

A lung *fully* expanded by respiration—it is agreed on all sides—will not sink in water, even after the application of considerable pressure. The same is undoubtedly true of a lung *fully* inflated artificially. Mendel, Bert, Ogston, Casper (Vol. xiv., p. 67), and Guy, are all at one in this view. ("*Med. Times*," Nov. 30, 1844; Feb. 8, 1845.) But, considering that, where a medico-legal question of this nature is likely to occur, the case will be at most one of *very limited* inflation, the author agrees with Beck, Taylor ("*Guy's Hospital Reports*," No. v.), and Jennings, that the air may be expelled by a sufficiently powerful pressure sufficiently long applied;—in fact, that by efficient pressure the air may be more easily forced out of a partially inflated lung, than out of a partially or imperfectly respired lung. There is little difficulty in deciding between a lung *completely* expanded by respiration, and one *partially* expanded by artificial inflation; but the hydrostatic test fails in proving whether a lung be partially inflated artificially or partially inflated naturally. (*Cases* 25, 26, 27.) There are, however, three considerations that may help us in this matter:—

1. That when lungs have been inflated artificially, they contain little or no blood, but that when they have been inflated naturally (however partially), they are certain to contain more or less blood.

2. That if artificial inflation be successful, it is certain that a considerable amount of emphysema (owing to an excess of power operating on a given spot causing ruptured air-cells) will be found on the surface of the lungs.

3. That the special *mottled* appearance of the respired lung will be absent after artificial inflation.*

* Casper says, "When, therefore, we observe the following phenomena: A sound of crepitation without any escape of bloody froth on incision, *laceration* of the pulmonary cells with hyperæmia, *bright cinnabar red* colour of the lungs *without any marbling*, and perhaps *air* in the (artificially in-

(*c.*) *Emphysema.*—Emphysema (so called) was suggested as a difficulty to the hydrostatic test by Chaussier. It is not easy to understand exactly the nature of the objection. Some suppose that air may be generated by some peculiar action of the lung tissue (*Proofs of Infanticide Considered* by Dr. Cummins, p. 61.) Others that in tedious labours, where the pelvis is narrow, the chest and lungs of the child, although dead, may be so pressed together during delivery, that when the force is suddenly removed (aided by the simultaneous compression of the abdomen), elasticity will cause the chest to expand and thus effect the entrance of air (Lécieux, *Considerations Méd. Légale*, etc.; see *Guy*, p. 99; "*Lancet*," May 20th and June 17th, 1837). Others believe this condition to be partial respiration during protracted delivery. Others, again, believe that any air present under such circumstances betokens the first stage of putrefaction (*Guy*, 99). In *Case* 12, p. 330, under Infanticide, the lungs of a child suffocated in bran were recorded as emphysematous. Admitting emphysema to be a difficulty (and there is, we contend, no well recorded case), it is of a purely theoretical nature, inasmuch as it is certain that pressure would dislodge the air, just as it dislodges the gases of putrefaction.

(B.) *That the lungs of children that have breathed may sink.**

This may occur from—

(*a.*) *Disease. Red hepatization, congestion of the lungs, pulmonary apoplexy, congenital tumours* (cancer, etc.), *œdema of the lungs*, together with *condensation or collapse of the lungs from fluid in the pleuræ*, might undoubtedly cause the lungs to sink in water, although respiration had taken place. But cases of pulmonary disease at such an age, are, it must be admitted, rare. Besides which, it is unlikely that both lungs would be similarly affected, and to such an extent as to render them heavier than

flated) stomach and intestines, we may with certainty conclude that *the lungs have been artificially inflated.*"

* Dr. Barnes mentions that the lungs will sometimes sink in water, although the children may have cried. ("Med. Times and Gazette," April 25, 1874, p. 465.)

water. Further, if such diseased and abnormal conditions exist, the pathologist would be certain to detect them at first sight, and so correct any results obtained by the hydrostatic test itself.

(*b.*) *Imperfect Expansion. Atelectasis pulmonum* (ἀτελης imperfect ; ἔκτασις expansion). (*Cases* 22, and 28 to 47.)

It is important to bear in mind that premature or delicate children may live for a considerable time, life being indicated by such vital acts as crying, pulsation of heart and cord (*Cases* 30, 52, etc.,) with lungs only very partially expanded. By partial expansion is not meant disease, but simply a fœtal condition of lung. Even the lung may increase in size, and yet retain its fœtal characters (*Case* 47). In some cases of this nature, vitality has been well marked by the separation of the funis, which is in itself a very distinct act of life. (*Case* 25.) This condition of imperfect expansion is known by the name of *Atelectasis pulmonum.** It was first described by Jörg (*Die Fötuslunge*, Grimma, 1835).

In many of these cases, however, parts of the lungs may be diseased. The child from want of strength fails to fill the lungs. In other words, the breathing is bronchial, or at any rate confined to the upper part of the air passages (*Case* 33), or to a very small part of one lung merely (*Cases* 55, 56). Although it is by no means necessary for life that the whole of both lungs should be at work (*Case* 48), nevertheless this condition of imperfect

* Dr. Champneys, in a paper read before the Medical and Chirurgical Society, April 26, 1881, discusses at length the question, which part of the lungs of a child that has been subjected to various methods of manipulation, with a view to artificial respiration, is most frequently, and which least frequently expanded? The conclusions are based on post mortem examinations only, and are as follows :—

In children that died soon after birth—

(1.) The right lung is usually better expanded than the left, and
(2.) The anterior surfaces than the posterior.
(3.) The lower lobes are the parts most often unexpanded.
(4.) The right middle lobe is usually well expanded.
(5.) The part of the middle lung, corresponding to the right middle lobe, is most often better expanded than the rest of the left lung.

(Confer "Med. Times and Gazette," May 21, 1881, p. 578, and December 11, 1880, p. 684.)

expansion cannot last long, the lungs speedily in such case becoming hepatized, and losing their cellular structure (*Case* 47).

In the cases described where this condition of atelectasis existed, convulsions (*Case* 43), apparent suffocation (*Case* 47), narcotism (*Case* 46), and sudden death (*Case* 46), were the recorded symptoms. At the post-mortem the blood has been found black (*Case* 34), the lungs dark coloured (*Cases* 34, 35), consolidated and non-cellular (*Cases* 46, 47), non-crepitant when cut (*Case* 30), and heavier than water, merely a bubble or two of air escaping when they were pressed under water (*Case* 44). Many of the cases recorded were of children born prematurely, but this was by no means always the case.

In *Case* 10 under Infanticide, we have an illustration where at most one, two, or three inspirations could have been taken. In Casper's judgment there was sufficient evidence of live birth in the position of the diaphragm, the brighter patches of colour, the bloody froth, and the fine air bubbles given off when the lungs were squeezed under water; nevertheless, the lungs were not buoyant, whole or divided.

(*c.*) *Complete non-expansion of the lungs.* Several cases, both in mature and immature infants, in which life was prolonged for several hours and even days, with complete non-expansion (complete atelectasis, as it has been erroneously called), are recorded. Such children are more than usually livid and cold, and their life easily extinguished. In a case of Mr. Hurd's, of Frome, where the first sign of life occurred after twenty minutes' inflation, it was found necessary to continue artificial respiration for three-quarters of an hour before the child could breathe for itself. In one case that occurred to the author, more than half an hour's artificial respiration was required to get any sign of life into the child beyond warmth and slight twitching. It is evident that such cases are beyond the reach of any lung test, and clearly indicate that life may exist independently of respiration.

The question at last comes to this, What conclusions, considering all the difficulties of lungs floating without respiration, and sinking with respiration, can be deduced from the hydrostatic test?

These two at any rate :—

1. If the lungs float whole, and divided, and after the application of pressure, it is practically certain that the infant has breathed.
2. If the lungs sink whole and divided, it is practically certain that the child has not breathed.

We omit here any statement about life or death, regarding the results of the hydrostatic test as indicative of respiration or of non-respiration, independently of whether that respiration was uterine or vaginal or when the child was half born, or "born alive" in the legal sense. We omit, moreover, all questions as to partial respiration judged by certain pieces floating whilst others sink, such details introducing difficulties into the case, which the medical jurist in the present state of the subject is not in a position to deal with satisfactorily.

We conclude the lung changes we have been considering by arranging, in a tabular form, the characters respectively of lungs which have, and lungs that have not, respired :—

Lungs which have not breathed.	Lungs which have breathed.
1. Dark in colour [black-blue, maroon, or purple], resembling liver.	1. Light in colour [rose-pink, pale pink, light red, or crimson].
2. Air-vesicles not visible to the naked eye.	2. Air-vesicles distinctly visible to the naked eye, or to a lens of low power [say a 2-inch, or even a common reading-glass.]
3. Do not crepitate or crackle when squeezed or cut.	3. Crepitate, or crackle freely.
4. Contain but little blood—therefore little escapes on section.	4. Contain a good deal of blood, which escapes freely on section.
5. The blood present is not frothy, unless there be putrefaction.	5. This blood is freely mixed with air, and therefore appears frothy.
6. Sink in water, unless putrid, and often even then.	6. Float in water, or at all events, the parts which have been expanded, or have breathed, float. If fully expanded, they will even buoy up the heart.
7. Bubbles of gas arising from putrefaction may be squeezed out, and as they escape are usually noted to be of large size.	7. The air cannot be squeezed out.

(III.) *The conditions of, and changes in, the organs of circulation.*

(1.) *The umbilical cord.*—If the cord pulsates at birth, live birth is certain. (*Case* 14.)

Usually, but by no means necessarily, the cord pulsates for a few seconds after complete birth; but this, although the cord be not tied, ceases at most within a minute or two of birth. The cord rapidly undergoes certain well marked changes.

It is important to distinguish between the changes indicative of life, and those not referable to the act of living. Further, the appearance of the cord may constitute important evidence in determining the age of the child.

(*a.*) At birth the cord appears more or less plump (due to the gelatine of Wharton), of a bluish tint, and of a spiral form. Often at birth, a reddish ring may be noted around its insertion.

We may now suppose the cord to be tied.

(*β.*) After a period varying from a few minutes to two days, the cord undergoes *mummification* (*i.e.*, shrivelling), the process commencing at the ligature, and spreading towards the point of attachment to the body.

(*γ.*) On or about the third day, the spot where the separation of the cord ultimately occurs is marked by a red line of capillary congestion (termed, *the line of demarcation*), also by thickening and swelling, and commonly by a slight purulent secretion. This line of demarcation is not to be confounded with the red line often noted at birth.

(*δ.*) Usually about the end of the third day, but sometimes as early as the first day, and at other times as late as the fifth day, *desiccation* (*i.e.*, drying up) takes place. The cord becomes brown, flat, parchmenty, and more or less translucent, so that when held up to the light, the contracted blood vessels may be plainly seen.

(*ε.*) In from three to five days, but sometimes more slowly [two to fifteen days, (Churchill)], the cord separates from the body, with or without cicatrization of the navel.

It would appear that in vigorous, large, and well-formed infants, the separation of the funis takes place more rapidly than in the case of feeble, small, and immature children.

With regard to the period at which the cord falls off, Tardieu gives the following details on the authority of M. Bouchaud and Mdme. Alliot, of the Paris Maternité:—

The cord fell off on the-

2nd	day in	5 cases.	7th	day in	9 cases,
3rd	„	22 „	8th	„	3 „
4th	„	36 „	9th	„	2 „
5th	„	47 „	10th	„	2 „
6th	„	31 „			

These figures agree with Casper's observations.

(ζ.) Lastly, *cicatrization* of the umbilicus begins generally about the tenth day, and is complete about the twelfth.

A curious case of the persistent vitality of that portion of the cord attached to the child, is recorded (*Case* 19).

We have next to inquire the importance of these several changes as tests of live-birth:—

There can be no doubt, as Casper, Elsaesser, etc., remark, that the drying of the cord is not a vital sign, as it was supposed to be by Billard, Hervieux, and others.

Lorain has shown [in his Thesis "*De la Fièvre puerpérale chez la Femme, le Fœtus et le Nouveau-né*"] that the drying of the cord depends on its being wrapped up and kept at a temperature of about 98° F.; and that the reason why the cord does not dry so much in infants born dead as in those live-born, is that their bodies are cold, and are kept so. This is no doubt partly true, seeing that the condition of the cord varies according to the temperature (in other words, the season), the amount of moisture in the air, and the conditions under which the body has been preserved. This will not, however, deceive those who have studied the subject practically. Tardieu relates a case in which an infant, who had only lived a few seconds, was placed near a stove. After some time, the greater part of the cord was found to be perfectly dry, although a part near the middle (the cord having been left almost entire) appeared moist by reason of its contact with the body.

Ogston remarks that pressure on the cord during birth may render it flattened and almost mummified. It is certain, however, that shrivelling of the cord occurs even if the child be born dead, although the tint assumed by it under such condi-

tions is of a dirty grey colour instead of brown, such as results when mummification proceeds during the life of the child.

It is important to note that a mummified cord is not restored to its original state by being soaked in water. If, however, a new-born fœtus with the fresh cord attached to it, be thrown into water, the cord does not mummify, but merely (to use Casper's phrase) "colliquesces." Similarly, in the case of a fœtus that has undergone intra-uterine maceration, no signs of mummification will be noted. Hence if a child with a dry cord attached to it, be taken out of the water, it is certain that sufficient time must have elapsed for the cord to mummify before it was thrown into the water, even admitting that a dry cord *per se* is no evidence of live birth.

But although mummification may not indicate live birth, the existence of an inflamed and thickened ring at the insertion of the cord—more especially if this inflamed ring be accompanied by a purulent discharge, or by the separation of the cord, or by cicatrization—is pre-eminently a life sign. Given any one of these conditions, the medical jurist may without hesitation assert the child to have been born alive. Further, they prove that life had continued for some short but perfectly definite period, and may even constitute important data for determining the age of the child.

(2.) *Condition of the umbilical arteries and veins.* — The arteries of the funis begin to contract after twenty-four hours. This contraction commences at the umbilical end of the cord. In two days it will be found to extend to nearly the whole length of the vessels; whilst at the end of the third day, the contraction reaches nearly to their termination in the iliacs (Guy and Billard). The changes in the veins are not so rapid. The obliteration of the hypogastric arteries and of the umbilical vein is, according to Billard, effected by concentric or internal thickening.

(3.) *Closure of the foramen ovale.*—The moment breathing is fully established, a greatly increased quantity of blood goes to the lungs. The course of the circulation at once begins to resemble that of the adult, being now double—*i. e.*, pulmonic

and systemic. This resemblance day by day becomes closer, until perfect identity is established. The foramen ovale assumes its greatest size about the sixth month. At very early periods of fœtal life, no membrane whatsoever can be seen covering the foramen, but about the twelfth week the valve begins to appear. As a general rule the closure of the foramen ovale by this membrane has advanced so far at birth in the case of mature children, as to be nearly complete. According to Billard, its complete closure generally takes place between the second and third days after birth, but cases of its closure before birth have been known. (Capurin, "*Méd. Lég. des Accouchemens*," p. 337; "*Med. Gazette*," Vol. xxxviii., pp. 967, 1076.) Like all practical writers on this subject, the author has met with numerous cases where this closure has been delayed for a long time. In some children it does not close till about the second year. When patent, a blowing murmur is generally heard a little before, and with the systole. The foramen is sometimes never closed, constituting one form of the disease called *cyanosis*. (*Case* 35.) As a rule, according to Dr. Peacock, its closure depends on the contraction of the muscular fibres of which the valve is composed. Cases are also recorded where, at birth, the opening has been closed by a thick layer of lymph deposited across it ("*Assoc. Journ.*," Feb. 4, 1853, p. 104).

Taken by itself, therefore, the closure or non-closure of the foramen ovale is not a sign of much importance, but taken with other signs it tends greatly to strengthen, or the contrary, the fact of live birth.

(4.) *Closure of the Ductus Arteriosus.*—This vessel or duct, which in fœtal life is the communication between the aorta and pulmonary artery, begins to close so soon as respiration is fairly established. The contraction and closure commences at the aortic end of the duct, and, according to Bernt, of Vienna, assumes, if the child has breathed even a few seconds only, a funnel or cone-like shape, with the broad end nearest the pulmonary artery. If, he says, it has lived for a few hours, or for a whole day, it again assumes a cylindrical form, only shortened and narrowed. If the child has lived for several days, or a whole week, the duct becomes narrowed to the

diameter of a few lines (say of a crow-quill), whilst the two branches of the pulmonary artery equal in size a goose-quill. If the child has lived still longer (say several weeks or perhaps months) the duct will be found perfectly impervious and cord-like. Dr. Norman Chevers shows that this *ductus arteriosus* may either be closed before birth ("*Med. Gazette*," xxxix., p. 205), or may remain pervious to adult life (of which the author has seen instances), constituting one form of *cyanosis.* (*Case* 35.) ("*Med. Gaz.*," xxxvi., p. 190; xxxviii., p. 961; and xxxix., p. 205.) Also "*Med. Times and Gaz.*," November, 1861; "*Guy's Hospital Reports*," 1873, p. 23). The case of *Frith* (Ayr Circ. Court of Justiciary, October, 1846), quoted by Taylor (p. 369), is one of great importance, as the duct was found perfectly closed in a child who had probably lived not more than ten minutes. ("*Med. Gaz.*," vol. xxxviii., p. 897; "*Edinburgh Monthly Journal*," November, 1846, p. 385.)

(5.) *Closure of the Ductus Venosus.*—The exact time of the closure of this duct is less perfectly known than the closure of the other ducts. It probably begins in most cases on the second or third day after birth, but the period of complete closure is involved in some obscurity. There is no well recorded case of its closure before birth.

The high sounding name of *Docimasia* circulationis* has been given to an examination of the appearances presented by the several organs of circulation described. It is generally agreed that but little importance can be attributed, from a medico-legal point of view, to the appearances presented by any one of these ducts, unless corroborated by other evidence, such as that derived from the organs of respiration (*docimasia pulmonum*), of which we shall speak presently. (*See* Henry Lee, *Pathological and Surgical Observations*, p. 116.) Still-birth is not necessarily indicated by an open condition of the foramen ovale, or of the ductus arteriosus and venosus, or the umbilical vessels, whilst a child may have lived a short time and the closure of one and all be more or less complete. Given signs generally of still-birth, then an open state of the vessels, and

* Docimāsia, æ, *f.*, from Δοκιμάζω, to examine, a term much used by Continental medico-legists.

ducts, and of the foramen ovale constitute additional and valuable evidence. On the other hand, given signs of live-birth, then the fact that the ducts and foramen ovale are closed is confirmatory.

The following table is taken from Billard :—

Days.	Umbilical Cord.	Foramen Ovale.	Ductus Arteriosus.	Umbilical Arteries.	Umbilical Veins.	Ductus Venosus.
		Open per Cent.	Open per Cent.			
1	Withering.	74	68	Open.	Open.	Open.
2	,,	68	59	Obliteration advanced.	Open.	Open.
3	Dessicating.	64	68	Obliterated.	Open.	Open.
4	Separating.	63	63	,,	Contracted.	Contracted.
5	,,	45	52	,,	Obliterated.	Contracted.
8	Separation complete.	25	15			
10	Cicatrisation commencing					
12	Complete.					

(IV.) *Changes in the abdominal organs.*

The contents of the fœtal stomach have been noted by several observers. It would appear usually to contain some liquor amnii, together with solid matters of an albuminous and mucous nature. The contents of the fœtal stomach and bowels are derived from the salivary secretions, the gastric juice not being secreted until after respiration is fairly established. These facts are important, because if a child has lived for some hours, either food (such as milk, butter, sugar, farinaceous or starchy food, etc.) or medicine (such as castor oil, etc.) is almost certain to have been administered, and will probably be found in the stomach or intestines.

The presence of air bubbles minutely incorporated with the glairy mucus of the stomach, is no doubt strongly indicative of respiration. Tardieu considers this frothy mucus due to the rolling movements of the tongue in the act of swallowing, and that it indicates at least ten or fifteen minutes' life. It is nevertheless worth remembering that air usually finds its way into the stomach if artificial inflation of the lungs be attempted. (*Case* 57.) Under such circumstances, however, the air is present in

considerable quantity, and escapes the instant an outlet is made into the stomach; whereas the air that indicates live birth is so closely incorporated with the contents of the stomach as to render it frothy. Exceptional cases, however, are recorded where, after inflation, no air was found in the stomach (*Case* 57).

And here may be noted the researches of Breslau of Prague, which in few words may be stated as follows ("*Ann. d'Hyg.*," 1868, II. p. 224; "*Horn's Vierteljahrs.*," 1868, p. 1):—

(1.) In children born dead, independently of whether the death occurred before or during birth, no air is to be found in the stomach or intestines. If therefore the stomach and intestines of a still-born child be removed (after they have been carefully tied and secured) and placed in water, they will sink.

(2.) The presence of air in the stomach depends on respiration (the air being swallowed during inspiration), and is independent of the taking of food. Hence the air probably reaches the stomach with the first respiration, and as breathing proceeds, finds its way by degrees into the intestines.

(3.) After respiration the stomach and intestines, when placed in water, float.

(4.) The more completely the intestines be inflated, and the lower in the bowels that air be found, the longer in all probability the child has lived, and the more certain is the evidence of live birth.

That air in the intestines is strongly indicative of live birth is certain. Allowing it, however, to be the result of breathing, and remembering that breathing may occur before a child is legally born, it follows that as legal evidence of live birth, it stands in precisely the same category as respiration. Further, as a test of life, both inflation and putrefaction destroy its value.

The presence of blood, or of meconium, or of the lochial discharge in the child's stomach, would indicate some effort at respiration at or about the time of its coming into the world (*Case* 51). The circumstance can scarcely be regarded as a proof of live birth.

Meconium or first fæces (known by the presence of choles-

terine crystals, greenish ovoid or globular masses of bile pigment, epithelial cells, and mucous granules and corpuscles) and blood, have frequently been found in the stomachs of still-born children, and in those that have died soon after birth.

The contents of the stomach may constitute important evidence if the child has been drowned or smothered. Thus some of the liquid in which it was drowned, or some of the material (if it be a powder or substance of that nature) in which it was smothered, may be found in the stomach.

The expulsion of the meconium (μεκων a poppy, from its similarity to poppy juice). The meconium is an olive green odourless material, which begins to accumulate in the intestines about the sixth month of fœtal life, and is discharged after birth. Its expulsion commences sometimes instantly that the child is born, but at other times after a few hours, continuing for twenty-four hours, and in some cases longer.

Admitting that the complete absence of meconium from the intestines, or its expulsion in quantity, is strongly indicative of live birth, nevertheless it is scarcely possible to accept the dictum of Devergie that its absence proves (in a legal sense) live birth (*Case* 54), because—

(i.) The meconium is sometimes expelled before birth into the liquor amnii, as proved by the colour and appearance of the liquor amnii when discharged.

(ii.) It may be expelled, as in breech presentations, before any part of the child is born.

(iii.) It is often found in small quantity on the nates of children still-born.

And these conclusions, drawn from post-mortem examination, the facts in our judgment warrant:—

(1.) Given the absence of meconium in the intestines, a very strong indication is afforded that the child was born alive, and even lived for some hours after its birth.

(2.) Given the presence of meconium, no inference can be drawn that the child was born dead.

(3.) Given a large quantity of meconium in the large intestine, and in parts of the small intestines, it may be

safely inferred that if the child lived at all, its life at most was short.

(V.) *Changes in the Urinary Organs.* The state of the child's bladder has been supposed to indicate still- or live-birth. If it be full, it was assumed that the child was still-born; if empty, that it was born alive. (*Cases* 53 and 54.) The test is worthless, for (admitting that children as a rule do pass water very soon after birth) an empty bladder is often found in children born dead, (for a child may pass water in the act of being born and yet be born dead), whilst a full bladder, from numberless causes, may be found in a child born alive.

It has been stated that, in children that have breathed, and lived for from two to ten days, uric acid crystals will be found in the papillæ and pelvis of the kidney and also in the bladder. This so-called "uric acid infarction" of the kidney is regarded by some (Virchow, Martin, Hessling, etc.) as important in determining whether a child has been born dead or alive. Engel says that uric acid crystals are rarely found in the kidneys of children that have respired one entire day. The deposit consists of sharply-defined golden yellow streaks of crystallised uric acid, and are found (we have observed) in the greatest abundance in the papillæ of the kidney. Virchow explains the presence of these crystals by the more rapid oxidation of the tissues in consequence of the establishment of respiration, uric acid, together with other products, being formed under such conditions. The water secreted by a child is not sufficient to effect the removal of these products by the kidneys. Uric acid infarction is, says Vogel, as positive a proof of life as the dilatation of the lungs by air. A New York medical jurist states, that in his judgment its presence or its absence may be taken as proof positive of life or death respectively.

We have ourselves made numerous observations on this point. It is beyond all question that uric acid crystals (exceptionally no doubt) are occasionally absent in the kidneys of children that have lived twenty-four hours, whilst we have found them in the kidneys of children that have never lived. Nevertheless, taken as *one* of the indications of live birth, the presence of uric acid crystals in the kidneys is worth recording. As *proof* of live birth, uric acid infarction cannot be sustained.

(VI.) *Changes in the Liver.*—Some of the blood which before respiration went to the liver, after respiration goes to the lungs. Hence that the liver loses weight after breathing is fully established, and is easy of explanation. Bernt, of Vienna, suggested this as a test of live birth; but as a practical test—seeing that to be valuable we must be able to compare the weight of the child's liver before and after birth — it is of no actual utility. (*Case* 54.)

(VII.) *The State of the Middle Ear.*—Wreden, of St. Petersburg, and Schmaltz ("*Lancet*," Nov. 17, 1877, p. 741) insist that the tympanum of a newly born child is filled with the subepithelial layer of the mucous membrane, composed of embryonal connective tissue, which has undergone metamorphosis during intra-uterine life. This regressive change, like all changes that serve to bring the organ into functional activity, leads to the ventilation of the middle ear and to the partial absorption of the so-called "mucus-mass" occupying the cavity of the tympanum. Forensically, this fact is urged as one of importance, since the determination of the presence or absence of air in the Eustachian tube and tympanum would (according to Schmaltz) enable an answer to be given whether a fœtus survived its birth or not.

Admitting (our own observations confirming those of Wreden) that the middle ear of the fœtus is filled with a gelatinous substance, which (as a rule) after 24 hours' breathing entirely disappears, its place being then taken by air; and further, admitting that the absence of this substance clearly indicates respiration, and respiration for a sufficiently long period to indicate live birth; nevertheless, seeing that the replacement of this gelatinous material (according to our own observations) varies within so wide limits of time as from a few hours to five weeks, no very definite opinion can be formed as to the length of a child's life from this condition of the internal ear.

(VIII.) *Changes in the Skin.*—The skin of a child for a short time after birth is dark red. Within an hour it becomes of a lighter colour, but again changes to a darker or yellowish tint. In about a week it acquires a permanently reddish-white

tint. (Henke's "*Zeitschrift der S. A.*," 1849, ii., p. 223.) About the first day after birth, the epidermis, cuticle, or scarf-skin begins to scale off either in layers or as a dust. Sometimes, however, these changes do not commence for three or four days after birth, and are not complete for thirty or forty. This scaling is said to begin on the abdomen and to spread in due order to the chest, groins, axillæ, interscapular space, limbs, hands and feet.

This exfoliation of the scarf skin is a vital phenomenon; its occurrence, therefore, may be regarded as clear proof that the child has survived its birth. It is very different to, and must not be confounded with, the peeling of the skin resulting from intra-uterine maceration, a condition closely allied to putrefaction. Of this peeling, Churchill says, "The peeling of the epidermis is a conclusive proof of the death of a fœtus." Barnes also speaks positively of "a coming away of epidermis and hairs" as a sign of the death of a fœtus. Leishman "regards peeling of the skin as a certain proof of the death of the fœtus." Still must be noted that in *Case* 52 the peeling of the epidermis, occurring in a living child, was very similar both in its nature and extent, to that which commonly happens after death.

III. If the Child was born alive, how long did it probably survive its birth?

We have already indicated the principal facts to guide the medical jurist in answering this question; but it is manifest that the data upon which a certain opinion can be given, lack precision. As regards the respiratory organs, considering how a single minute's breathing, in the case of one child, may effect changes that many days' respiration in another child may fail to accomplish, it is evident that no certain test of time can be found in the state of the lungs. We are thus thrown back on the state of the cord, and the condition of the organs of circulation, as guides in forming an opinion as to the time the child survived its birth, evidence respecting which, however, should under all circumstances be of a very guarded nature.

To avoid repetition, we have arranged the chief facts bearing on this question as follows :—

Conditions observed from a few minutes to some hours after birth.

The stomach contains a frothy fluid, and clots will be found in the vessels of the umbilical cord.

Conditions observed after twenty-four hours.

Contraction and thickening of the coats of the umbilical arteries near the umbilicus.

Conditions observed after the second day.

Contraction throughout the greater part of the umbilical arteries.

The epidermis begins to exfoliate.

Conditions observed after the third day.

Contraction of the umbilical arteries to their termination in the iliacs.

Slight contraction noticeable in the umbilical veins.

Dessication of the cord, the formation of an inflamed ring and a slight purulent discharge at the point of ultimate separation.

Conditions observed after the fourth day.

The cord separates.

Conditions observed after the fifth day.

Contraction of the umbilical veins complete.

Conditions observed after the seventh day.

The ductus arteriosus contracted to the size of a crow-quill.

Conditions observed from the eighth to the tenth day.

The fœtal openings (*i.e.*, d. arteriosus, d. venosus, and f. ovale) become obliterated.

Conditions observed from the tenth to the twelfth day.

The osseous centre of the femoral epiphysis measures more than from 5 to 6 mm. in diameter (= 1-5th to 1-4th inch).

Cicatrization of the umbilicus. (If the umbilicus be healed it indicates life for about twenty-one days.)

Certain conditions important to record, but of doubtful value in deciding a child's age.

The presence of food in the stomach.

The depth to which air is observed to have penetrated in the intestines.

The presence (and if present the quantity and the situation) of the meconium.

The presence of air in the middle ear.

We need only remark, supposing a child to have been born alive, and the question be asked—How long a period has probably elapsed since death?—that, as in the case of adults, we must be guided in forming our opinion by (*α.*) the extent to which the cooling of the body has progressed, and (*β.*) post-mortem rigidity; or (if the time be past for observing these), (*γ.*) the stage of putrefaction reached. And here the season, and the extent of the exposure of the body to air, must be considered, remembering that the body of an infant decays more rapidly than that of an adult. In water (where infants are often found) decay is slower than usual if the immersion be complete, whilst it is more than usually rapid if the body be one half in air and the other half in water.

The Examination of the Child.

(I.) THE EXTERNAL EXAMINATION. This should embrace the following particulars:—

(1.) Everything relating to its external appearance, shape, conformation, condition as regards putrefaction, spots, ecchymoses, etc., etc.

(2.) Its size:—including not merely the length of body, but the dimensions of the head and thorax.

(3.) Its weight.

(4.) The condition of the navel and of the umbilical cord.

(II.) INTERNAL EXAMINATION. This should include,—

(1.) *The condition of the respiratory organs:—*

(*a*) The dimensions and shape of the thorax.

(*b*) The situation of the diaphragm.

(*c*) The colour, volume, shape, situation, consistency, density, absolute weight, and specific weight of the lungs.

(2.) *The condition of the organs of circulation:—*

(*a*) The foramen ovale.

(*b*) The ductus arteriosus, its dimensions and shape.

(*c*) The ductus venosus.

(*d*) The state of the umbilical vessels.

(*e*) The condition of the heart and its cavities. (This must be noted first.)

(3.) *The condition of the abdominal organs:—*

(*a*) The liver, its weight and size.

(*b*) The stomach and intestines. The presence or absence of medicines, food, air, meconium, etc.

(*c*) The state of the urinary bladder and kidneys. (Uric acid infarction.)

(4.) *The condition of the brain and spinal marrow.*

The cranium should be examined for fractures, punctures, etc.

ILLUSTRATIVE CASES.

1. **Fish v. Palmer.**—(*Court of Exchequer*, 1806.)—In this case the wife of the plaintiff *Fish* possessed landed estates in her own right. She died in 1796, after having given birth to a child, supposed at the time to have been born dead. The estates, therefore, were claimed by the defendant *Palmer*, her heir-at-law, the husband surrendering his rights. Many years afterwards, consequent on information received from women present at the birth, he was led to believe that the child had not been born dead, and that the estate had therefore been surrendered to the defendant under a mistake. The action was brought in 1806, ten years after the death of the wife Dr. Lyon, the accoucheur, who was dead, was proved to have declared the child to be alive an hour before it was born, and at its birth had ordered it a warm bath, and given it to the nurse to put into a bath. Although the child neither cried nor moved its limbs, the women swore that when placed in the bath, there twice appeared a *twitching* or *tremulous motion of the lips*. They informed Dr. Lyon of this, and he ordered them to blow into its throat. It did not show any further signs of life. At the trial the medical experts differed. Drs. Babington and Haighton considered the twitching to be a sign of life. Dr. Denman looked on it as the remains of *uterine* life only. The Court, however, decided that the child was born alive, and the plaintiff recovered an estate which he had lost for ten years. (Pages 251, 266.)

2. **Dobie v. Richardson.**—(*Court of Session*, 1765.)—Dobie's wife, nine months after marriage, gave birth to a child, which breathed, raised one eyelid, and died in convulsions about half an hour afterwards. It was never heard to cry. The mother died in childbed, and the question was whether the *jus mariti* was not lost by the death of the wife within the year, without giving birth to a child which had been heard to cry. This was answered in the affirmative, and it was held that the husband was not entitled to any part of his deceased wife's effects. (Beck, 5th edition, p. 195. See also the case of *Blackie*, Court of Session, 1833, quoted by Taylor.) (Pages 251, 252.)

3. **Llewellyn v: Gardner**—(*Stafford Lent Assizes*, 1854, and **Gardner v. Llewellyn**, *ditto*, 1856).—This was an action of ejectment, to try the plaintiff's right to a life interest in the property of his deceased wife. The

real question at issue was—Was the child born dead or alive? Llewellyn stated that his wife after a long walk, and at the seventh month, was confined suddenly of a child which lived a quarter of hour, during which time it cried. It was alleged that it was the fourth or fifth month. The seventh month was confirmed by the sister of the plaintiff. The defendant in the first action said that the wife (at 16) was an epileptic. He proved that the child was buried the same day as a still-born, neither birth nor burial being registered. There was no medical evidence whatsoever. In the first action the husband's claim was admitted, but in the second trial the primary decision was reversed. (Pages 245, 252.)

[Baron Alderson laid down that the onus of proof that the child was born alive rested with the husband. If the jury had any doubt on this point they must find for those who contended that the child was not alive when born.]

4. **Blackie.**—(*Court of Session*, 1833.)—In this case it was proved that a child (seven months) breathed, that its heart beat for three quarters of an hour, but that it did not cry. Their Lordships decided that the only receivable proof of life was crying, and that seeing the child did not cry, they must infer that it was not a living child. The plaintiff was non-suited. (Pages 251, 252.)

5. **Guy's Hospital Reports.**—(*Dr. Crothers, of Moy, recorded by Taylor.*)—Face presentation. The accoucheur ruptured the membranes. On introducing his finger into the child's mouth before delivery, it cried loudly two or three times. (Pages 252, 256.)

6. **Ogston's Med. Juris., p. 268.**—(*Ketteller.*)—Arm presentation. This was replaced, and on attempting to apply the forceps the child cried repeatedly. The cry was again heard when the forceps were abandoned. The child was ultimately delivered by turning. When born the circulation had ceased, but the child recovered. (Pages 252, 256.)

7. **Ogston's Med. Juris., p. 249.**—(*Dr. Falkenbach.*)—Cross birth. Child heard to cry during the operation of turning. (Pages 252, 256.)

8. **Ogston's Med. Juris., p. 249.**—(*Landsberg.*)—Head presentation. The child was heard to cry in utero. It was insensible when born, but was afterwards resuscitated. (Pages 252, 256.)

9. **Ogston's Med. Juris., p. 249.**—Two cases (one being a cross birth and the other a shoulder presentation) of children crying in utero. Both were still-born, and in each case the lungs, whole and divided, floated in water. (Pages 252, 256.)

10. **Ogston's Med. Juris., p. 247.**—(*Dr. Holmes, of Montreal.*)—Repeated cries heard whilst the child was in utero. The mouth of the child rested on the pubes, so that the finger could be introduced into it. Child lived. (Pages 252, 256.)

11. Ogston's Med. Juris., p. 247.—(*Dr. Jobert.*)—Female with deformed pelvis. When examined, the os was dilated to about two inches. On the forceps being applied, and before any attempts at extraction could be made, the child was heard to cry. Turning was then attempted, when renewed cries were heard. The infant did not breathe after birth, although the heart pulsated strongly. (Lungs not examined.) (Pages 252, 256.)

12. Collin's Practice of Midwifery.—(*Recorded by Ogston, p.* 248.)—The child cried four hours before delivery, the head being high up in the pelvis, the membranes broken, and the soft parts dilated. (Pages 252, 256.)

13. Presse Med. Belge, Jan. 26, 1879.—A case of the intra-uterine cries of a fœtus. Delivery attempted by the forceps, the head remaining at the superior aperture of the pelvis for a considerable time. (Pages 252, 256.)

14. Brock v. Kelly.—(Before Vice-Chancellor Stuart, in April 1861.)—In this case pulsation in the funis was held to be a sign of life. The opinion of the accoucheur, Dr. Freeman, was supported by that of Dr. Tyler Smith. Drs. Lee and Ramsbotham gave it as their opinion that nothing but breathing could satisfactorily establish the fact of live birth, of which in this case there was no proof. The Vice-Chancellor decided that proof of breathing was not necessary, and held that sufficient legal evidence of life in the pulsations of the cord, had been observed by the accoucheur. (Pages 252, 266, 275.)

15. Hecker, p. 127, Vol. II., S. 19.—(*Recorded by Casper, Vol. III., p.* 38.)—Cord presentation. Delivery was attempted by turning. On introducing his hand into the uterus, the operator felt the chest expand as if from a deep respiration. The child was stillborn, but on examination it was evident that it had breathed, and that the death resulted from smothering. (Page 256.)

16. Ogston's Med. Juris., p. 249.— (Page 256.)

(*α.*) Cases of heaving of the chest in utero, similar to *Case* 15, recorded by Hohl. Children stillborn, but in these cases no air was found in the lungs at the post-mortem.

(*β.*) Also cases where a little air was found in the lungs, and meconium in the air passages.

(*γ.*) Also a case recorded by Müller, of Marburg, of a cord presentation, the child being stillborn, where patches of expanded air cells were found in the upper and middle lobes of the right lung.

(*δ.*) Two cases (by Hofmann) of lingering labour, one being a cross presentation. The stillborn children both showed evidence of death resulting from smothering, parts of the lungs being found to float in water.

(*ε.*) A case (Dr. Dyce Brown) of turning, where expansion of the chest occurred in utero. Child stillborn. The lungs were fœtal, but at some portions of their margins a few bubbles of air could be expressed.

17. Lancet, July, 1834.—(*Mr. Thompkins.*)—Face presentatio

The face resting on the perinæum, the finger of the accoucheur accidentally entered the mouth, when the child gave a convulsive sob and cried aloud. (Pages 252, 256).

18. Gazette Médicale.—Ogston, p. 251.—(*M. Tourtois.*)—During the time the head was in the vagina, the child sucked vehemently the finger of the accoucheur. (Page 257.)

19. Lancet, May 1, 1880, p. 701.—(*Dr. C. R. Williams.*)—Vitality in that portion of the umbilical cord attached to the child persistent, although the part beyond the ligature dropped off on the fifth day. The fœtal portion of the cord remained highly sensitive to touch. (Page 276.)

20. Taylor's Med. Juris., II., p. 341.—(*Mr. Hind of Frome.*)

(*α.*) Child (eighteen weeks) when born supposed to be dead. Although there was no visible breathing, cardiac pulsations were both visible to the eye, and felt by the hand.

(*β.*) Case recorded where the cord ceased to pulsate eight minutes before birth. The child was apparently dead when born; the first sign of life occurred twenty minutes after artificial respiration had been commenced, and its immersion in a warm bath. The artificial respiration had to be continued for three quarters of an hour before the child could breathe for itself. (Pages 252, 266.)

21. Taylor's Med. Juris., Vol. II., p. 342.—(*Mr. Cann, of Dawlish.*) —A case of breech presentation, requiring force in delivery. Artificial respiration was kept up for twenty minutes, during sixteen minutes of which the heart beats were heard.

P. M.—Dislocation of vertebræ of the neck with sanguineous effusion around the cord. Lungs fœtal, of a bluish grey colour, non-crepitant, and sank in water. (Pages 252, 266.)

22. Med. Gazette, Vol. XL., p. 1022.—(*Dr. Davies, of Hertford.*)—A male child (probably a seven months child) exhumed after burial for fourteen days. Lungs sank whole, and when divided. A part of the upper lobe of the left lung was of a light colour, but sank in water. It was proved, however, that the child had lived for ten minutes, life being manifested by motion of limbs. (Pages 251, 272.)

23. Henke's Zeitschrift, 1837, II., 179.—(*Dr. Albert.*)—The lungs of a putrified child removed from the uterus, were found to float in water. (Page 267.)

24. Case reported by Taylor, Vol. II., p. 347.—(*M. Douillard, November*, 1871.)—A mature newly-born child was found on the river bank, after having been exposed about six weeks. It was much decomposed, and had wounds and injuries upon it. Lungs whole and separately, and both before and after compression, *floated.* On examination the next day, they both *sank* in water. (Page 267.)

25. Meckel: Lehrb. der G. M., 368.—A woman recently delivered stated to have inflated her child's lungs artificially. (Pages 270, 272.)
(*Vide* "*Ed. Med. and Surg. Journal*," Vol. xxvi., p. 374.)

26. Henke's Zeitschrift, Vol. III., 1845.—(*Dr. Van Siebold, of Gottingen.*)—A case where a woman stated that she had inflated the lungs of a child. Respiration, however, was proved to have occurred. (Page 270.)

27. Casper's Vierteljahrs., 1859, II., 38.—Attempted inflation by a midwife. (Page 270.)

CASES OF ATELECTASIS AND INCOMPLETE EXPANSION OF LUNGS.

Cases 28 *to* 48. (Pages 251, 266, 269, 272, 273, 278, 279.)

Authority.	Particulars.	General Remarks.
28. Taylor's *Med. Juris.*, II. p. 342. (Dr. Burke Ryan.)	Æt. 28 mins. (A 5 months fœtus.)	Life manifested only by pulsations of cord and heart, and by a very feeble respiration. Weight, 1¾ lbs. Lungs sank entire, and also when cut into pieces, excepting two small pieces taken from the right lung.
29. Virchow's *Archiv.*, Bd. 66, Heft. 3, from Dr. Erman, Hamburg.	3 children at one birth (7½ months). One born dead. The other two lived forty minutes.	The two live-borns cried so as to be heard in adjoining room. The whole of the lungs of one child, and nearly the whole lungs of the other, sank in water—a small portion of the edge of the right lung floating. The lungs generally were dense, bluish, and distended.
30. Taylor, *Med. Juris.*, II., p. 341. (Dr. Schwörer, of Freiburg.)	Æt. ?	Life manifested only by pulsations of heart and cord, which gradually ceased. Lungs contained no air; did not crepitate when cut, and sank in water both whole and divided.
31. *Amer. Journ. Med. Sci.*, July, 1870, p. 278.	Æt. 1 hour (labour induced at 7 months by ergot).	When born, pulsation in cord distinct, but the child did not breathe. After five minutes sprinkling with water, a violent spasmodic contraction of the diaphragm oc-

Authority.	Particulars.	General Remarks.
		curred. A little blood was allowed to flow from the cord. On the tongue which had fallen back being drawn forward, a sudden spirt of blood from the cord took place, and the child began to breathe at intervals, the heart beating feebly. The pupils were dilated, and the eyes insensible to a bright light. The breathing ceased after one hour.
32. Case noted by Professor Bernt. Quoted by Taylor, II., p. 339, and Ogston.	Æt. 2 hours (a 7 months' child).	Lungs sank both whole and divided.
33. *Ann. d'Hyg.*, 1872, II., p. 181. (M. Budin.)	Æt. 4 hours.	Air did not penetrate beyond the bronchi and their larger ramifications. Lungs sank whole, and when cut into pieces.
34. *Med. Times and Gazette*, May 23, 1857, p. 523.	Æt. 4 hours (a 7 months' child).	Lungs dark coloured and sank in water, notwithstanding an attempt at inflation. Life manifested by frequent cries. The blood at the post mortem was fluid and black. The heart continued to beat after respiration had ceased.
35. *Lancet*, Feb. 3, 1855, p. 121. (Dr. Vernon.)	Æt. 5 hours (a 6 months' child). Died from feebleness and exhaustion.	Weight, 2 lbs. 13 ozs. Length, 12¾ ins. Eyelids adherent. Ductus arteriosus and foramen ovale fœtal. Lungs purplish red, without developed air cells. They sank in water both entire and divided. (Life in this case was manifested by the child crying, and the chest was remarked to rise and fall during life as in ordinary breathing.)
36. *Guy's Hospital Reports*, No. V., p. 355. (Dr. Taylor.)	Æt. 6 hours (mature).	Lungs sank in water.
37. *Lancet*, Feb. 17, 1872, I., p. 227. (M. Poncet.)	Æt. 10 hours (immature).	Life manifested both by crying and breathing. Lungs sank in water completely.

Authority.	Particulars.	General Remarks.
38. Case which occurred to M. Billard. (Quoted by Ogston from *Maladies des Enfans.*)	Æt. 11 hours.	Lungs sank whole and when cut into pieces.
39. Orfila, *Méd. Legale*, I., p. 375.	1. Æt. 4 hours 2. Æt. 6 hours 3. Æt. 10 hours 4. Æt. 11 hours	Lungs in all these cases sank whole and when cut into pieces.
40. *Medical Press*, Nov. 22, 1865, p. 457. Case recorded by Professor Donders, of Utrecht.	Æt. 12 hours (probably a 7 months' child).	Life manifested by crying. Lungs uniformly brown, and sank in water. The right was readily inflated, but the left was not. The entire lungs sank in water, and also the pieces after inflation had been attempted.
41. *Medical Press*, Nov. 22, 1865, p. 457. (Case which occurred to Professor Thomas, of Leyden.)	Æt. 17 hours (child immature).	Cried strongly after birth. Lungs fœtal.
42. *Guy's Hospital Reports*, No. V., p. 355.	Æt. 24 hours.	The lungs both whole, and after being cut into 30 pieces, sank in water.
43. Henke's *Zeitschrift*, 1837, II., p. 422. (Dr. Albert.)	Æt. 36 hours: Death from Convulsions, from which it suffered from birth.	The right and lower parts of left lung were fœtal and sank in water, but were not diseased, and were easily inflated.
44. *Ann. d'Hyg.*, 1872, II., p. 181. (M. Budin.)	Æt. 38 hours (a 6½ months' child).	Life manifested by crying and breathing. Lungs fœtal in colour and situation. No crepitation when cut. Sank in water whole and when divided. Only a very few bubbles of air escaped when they were compressed under water.
45. Henke's *Lehrbuch des G. M.*, p. 374. (Taylor, II., p. 339. Remer.)	Æt. 4 days.	Lungs entire, and when divided, sank in water. (Note—The navel cord had separated naturally before death.)
46. Taylor, *Med. Juris.*, Vol. II., p. 338, and *Lancet*, 1868, I., p. 810. (Dr. Burke Ryan.)	Æt. 5 weeks. Death supposed to be due to an opiate.	Lungs weighed 1,080 grains. Sank in water when whole, and when cut into pieces. Appeared non-cellular under microscope. When inflated (which was difficult) the air was easily displaced by pressure. (Note—Such a state

Authority.	Particulars.	General Remarks.
		must have been sufficient to account for sudden death.)
47. Taylor, *Med. Juris.*, Vol. II., p. 338.	Æt. 6 months Death supposed due to suffocation.	Right lung *as a whole* floated in water, the *inferior* lobe sinking. Although the lung had developed in size, it was perfectly fœtal in colour, density and structure, and so consolidated that it resisted inflation.

48. Med. Times and Gazette, Jan. 3, 1880.—(*Dr. Barlow.*)—Atelectasis of, with emphysematous cyst in, the lungs in an infant, æt. 3 months. (Page 272.)

49. British Med. Jour., Dec. 22, 1877, p. 888.—(*From the Berlin Med. and Surg. Journ.*)—(*Dr. Abbot.*)—Exfoliation of the cuticle. The child had not been dead more than 36 hours, and probably, not 24, before delivery. (Page 254.)

50. R. v. Pitt.—(*Dorset Summer Assizes*, 1869.)—When the child was found, the body and legs were warm, cadaveric rigidity being persistent after 17 hours. These were urged as proof of its live birth, but the evidence broke down. (Page 248.)

51. Casper's Vierteljahrs., 1863, I., p. 97.—Dr. Fleischer found a greenish yellow coloured liquid, evidently meconium (most likely discharged from the bowels during birth) in the stomach, larynx, windpipe and gullet of a stillborn, probably drawn in during attempts to breathe in utero. There was no air in the lungs. (Pages 256, 281.)

(See also *Med. Times and Gazette*, August 3, 1861, p. 116.)

52. Brit. Med. Journ., Jan. 9, 1875, p. 44.—(*Dr. Edis.*)—Female, æt. 35 (second labour) gave birth to a male child (weight 8 lbs.) a few days after the time she expected. It was apparently stillborn, although pulsations were evident from the first. Respiration was fully established after five or ten minutes. The skin was dark blue in appearance. The epidermis pealed off readily in large flakes from the surface of the body, as if maceration had taken place, the entire epidermis pealing off when it was washed. It seemed to be doing well, but died within 14 hours of its birth. (Pages 272, 285.)

53. Casper, Case CCCXLII.—A mature male child was found in the water, enclosed in a bag loaded with stones. The body was green from putrescence. There were many gaseous bullæ in the lungs, the result

of decomposition. The left lung was completely retracted, whilst the right filled about one-half of the pleural cavity. No crepitation was heard on making incisions into the lungs, and a little fluid blood flowed out of the cut surfaces. They floated together with the heart, but the heart itself, the whole lower lobe of the right lung, and isolated portions of the left one, sank. The liver, however, floated. The diaphragm was found at the fourth rib. The trachea was empty and brown from putridity. The stomach contained a teaspoonful of bloody mucus. The bladder was empty, and the rectum filled. The partial floating of the lungs might very reasonably be ascribed to their state of putrescence, yet, though several very important symptoms pointed to the likelihood of the child having been born dead, it was impossible to deny but that respiration might have been temporarily established. Accordingly [says Casper], we gave it as our opinion that the child had 'probably' not lived subsequent to its birth, but had been born dead. (Here putrescence rendered the diagnosis difficult.) (Pages 258, 259, 267, 283.)

54. Casper, No. CCCLII.—A new-born female child was found firmly sewn in a sack, and lying in the street during the heat of summer. It was unquestionably mature (20 inches long, 6¾ lbs. weight, &c., &c.). The osseous nucleus was only 2 lines in diameter, the body greyish-green, and the cuticle almost entirely peeled off. The diaphragm was situated at the seventh rib. The liver was black, covered with large gaseous bullæ, and floated. The spleen and kidneys were pultaceous, and the stomach brownish-red from putrefaction, and empty. The urinary bladder was empty, and there was a quantity of meconium in the large intestines and rectum. The vena cava was empty. The lungs, which completely filled the thorax, were of a dirty, livid, rose-red colour, and appeared marbled, from being thickly strewn with gaseous bullæ. They crepitated strongly under the knife, and in spite of great general putrefactive anæmia, there was a distinct escape of bloody froth from the incisions. The lungs floated perfectly. There was a *caput succedaneum*, but no trace of injury.

Casper gave it as his opinion that this child had lived. He could not, however, say how long, except that it was not many days. (Pages 258, 259, 267, 282, 283, 318.)

55. Casper, Case CCCLXV.—In this case there was no suspicion of infanticide, the post-mortem signs consequently being all the more valuable. This mature male child was delivered by forceps after a severe labour, and shortly afterwards died from apoplexy. The traces of the forceps were as usual, distinctly visible on the forehead, and at the root of the nose, where there were hard leathery portions of excoriated cutis, a precisely similar patch existing upon the occipital protuberance.* There was an extravasation of blood beneath

* On the Continent the forceps are often applied so as to compress the child's head antero-posteriorly.

the occipital aponeurosis. The vessels of the *pia mater* were much congested, and the whole of the *basis cranii* had a layer of dark treacly blood spread over it, which is certainly a rare appearance. The right lung was of a bright brown colour, with reddish patches upon it; the left lung being of a uniformly dark brown colour. On incising the right lung, a faint sound of crepitation was heard, and a little bloody froth escaped. Nothing of the kind was seen or heard on cutting into the left lung. The right lung floated perfectly excepting a few pieces, compression under water causing the usual pearly vesicles to ascend. The left lung sank completely. It was therefore evident that the right lung alone had commenced to respire." (Pages 259, 260, 272, 304.)

56. Casper, No. CCCLV.—"A mature female child (with an osseous nucleus of 2 lines) was found one evening in spring lying dead upon the floor of a house. Three days subsequently it was placed on our dissecting table, already greyish-green. The diaphragm was placed between the fourth and fifth ribs. Gaseous bullæ were scattered through the thymus. The lungs were retracted. The left was of a uniform brown colour, the right of a bright rosy-red, with a few bluish marblings. When the yet unseparated heart and lungs were laid upon the surface of the water, they sank, but slowly. From this it was to be expected that individual portions of the lungs would float when they came to be separated. The weight of the right lung was 490 grains, the left 390 grains. When separated, the right lung floated, but when depressed beneath the surface it rose unusually slowly; the left lung sank at once to the bottom. When further divided into lobes, only the upper lobe of the right lung floated, while the others slowly sank. The two lobes of the left lung sank slowly. Finally, when cut into little pieces, only about a quarter of the right lung, and only three pieces of the left lung, was found to be buoyant. No other organ floated. The lungs were not in the smallest degree putrid, and the right lung crepitated, and gave vent to a small quantity of bloody froth when cut into; the left one did neither. Evidently the child had made a few attempts to breathe; a small amount of inspired air had as usual got into the right lung, while a still smaller quantity had also got into the left one, and an apoplectic attack, the traces of which were distinctly visible, had ended its life immediately after its birth." (Pages 259, 260, 262, 265, 272, 304.)

57. Casper, CCCXLIII.—"This was an extremely intricate case. An illegitimate female child was born in the eighth month (there being no osseous nucleus in the femur). According to its mother's statement, which seemed on this point a little hazy, it had never cried. Shortly afterwards a (very little known) physician was called in. He found the child apparently lifeless, and, holding its nose, attempted to *inflate its lungs* by blowing with his mouth directly into the child's. The dissection proved that this air had not gone into the stomach. The diaphragm was placed

between the fourth and fifth ribs. The liver and vena cava contained much treacly blood. The right lung distended the thoracic cavity, the left one was retracted. Both lungs were of a decidedly bright brownish red, mottled here and there. The middle lobe of the right lung presented a remarkable contrast from its bright cinnabar-red colour, in which there was no mottling. Both lungs crepitated under the knife, and emitted bloody froth very copiously. Both lungs were perfectly buoyant. The trachea was empty and perfectly normal. Within the cranium there was not only very well marked hyperæmia, but even small isolated patches of extravasation upon the base of the brain. What ought to be deduced from these appearances and the known facts of the case? The remarkable contrast presented to the rest of the lung by the unmottled cinnabar red of the middle lobe of the right lung, a colour which is acquired without exception by lungs artificially inflated, evidently pointed to an attempt of this nature, which had so far been successful. But the light brown colour of the rest of the lungs—the mottlings (which, though not numerous, were still present)—the perfect buoyancy of the lungs (which, as well as the entire body, were perfectly fresh, even to the smallest portions into which air artificially blown in could not have penetrated, without of necessity altering their colour)—the crepitation emitted by the air on escaping—and, finally and specially, the large amount of blood contained in the lungs (which never could have got there by mere insufflation)—all decided me [says Casper] on coming to the conclusion that the child had been alive during and subsequent to its birth, and had died from apoplexy from a cause not revealed by the dissection. In giving this opinion I did not exclude the possibility, that air might have been artificially introduced into the lungs of the child after its death." (Pages 258, 259, 261, 269, 280, 281, 304.)

CHAPTER VI.

INFANTICIDE.

The Natural Causes that may Account for a Child's Death—Congenital Debility—Disease—Congenital Malformations—Protracted Parturition—Hæmorrhage—Suffocation—Causes of Death Other than Natural Causes—Neglect or Omission—Suffocation—Strangulation—Drowning—Fractures—Injuries—Poisons—Cold and Exposure—Starvation—Burns and Scalds.

(ILLUSTRATIVE CASES, Page 326.)

THE chief question that will arise in the case of a child found dead, is:—*Was the death due to natural causes, or was it the result of causes other than natural?*

There are, doubtless, certain causes of death severally peculiar to the unborn fœtus, to the child in the act of birth, and to the newly-born child; but it would be needlessly diffuse to consider these separately. Nor is it necessary to discuss at any length the precise meaning to be attached to the term "newly-born." Although a question on which Continental jurists, legal and medical, have differed, it has not (so far as we are aware) given rise to any discussion in our English Courts. A Brussels Court refused to call the murder of an infant 14 days old, infanticide. In Brittany, a jury would not allow a child 15 days old, to be called newly-born (nouveau-né). The French Court of Cassation (December, 1835), would not permit the term newly-born to be given a child 40 days old: "attendu que la loi n'a eu en vue dans le crime d'infanticide que l'homicide volontaire commis sur un enfant *au moment où il vient de naître, ou dans un temps très-rapproché de celui de la naissance.*" Ollivier d'Angers thought the term "*newly-born*" appropriate only before the fall of the navel-string. Tardieu mentions that Robert Froriep of Berlin, would revert to the terms of the old Roman laws:—"*Infans sanguinolentus, cruentatus*" (still soiled

with blood). In Bavaria, the legal definition of a "newly-born" child is, one not more than three days old. In Brunswick and Saxony, twenty-four hours is the term beyond which the child is not regarded as newly-born. Werner and Gans define newly-born thus:—"The child is new-born so long as it has been neither fed nor clad, while the mother still labours under the immediate consequences of the delivery, and while no one besides herself, her parents, and its father, know of its birth." The Roman law, Sect. 2, Cod. De patribus, &c. (iv. 43) speaks of "filium, filiamve *sanguinolentum*"; and Juvenal (Sat. vii., lin. 196) describes a new-born child, "*a matre rubentem.*" (Casper, vol. iii., pp. 8, 9, etc.)

We shall consider:—

I. The natural causes of death occurring to the unborn or to newly-born children.

II. The causes of death other than natural of newly-born children.

I.—The natural causes of death—in other words, the causes, other than those resulting from violence, of the unborn or newly-born child.

And here, speaking generally, we remark that, given the case of a child that has survived its birth for a short time (for in the matter of children born dead, the cause of death is far more likely to be natural than criminal), upon which neither marks of injury, nor signs of violence, nor evidence of poisoning are to be found, we are justified in assuming its death to have been natural. At the same time we must admit the possibility of its having arisen from causes beyond detection, such as from intentional neglect, or from omission, or (under certain circumstances) from closure of the mouth and nostrils. In such cases, seeing that no well-marked post-mortem signs may be found, the proof of the cause of death must rest primarily on eye-witnesses, the medical jurist being in a position to offer secondary evidence only, to show either that the post-mortem appearances support or that they do not support (as

the case may be), the statements made by others as to how the death occurred.

Again, given the case of a child found dead, having marks of violence upon it, we are not justified in at once assuming that it was intentionally destroyed. (*Case* 19.) Hence the following questions arise:—

(*a.*) Are the marks on the child of such a nature, that it is possible for them to have resulted from attempts at self-delivery on the part of the mother, the labour proving more than ordinarily difficult?

(*β.*) Might they have been caused accidentally and unavoidably, in the course of an unexpected confinement?

(*γ.*) Are they of such a nature and do they occur in such a position, as to indicate that the violence was knowingly and intentionally committed?

(*δ.*) Are they such as might arise from some peculiar malformation? [The appearances presented by an anencephalic monster have before now been mistaken for acts of violence? See Part I., page 319.]

(*ε.*) In the case of an exhumed child, are the injuries found on the body, likely to have been caused during exhumation? [Part I., page 151.]

It would seem that in child-murder, the evidence needed in proof of *intentional* violence must be stronger than in cases of ordinary homicide:—whilst as regards the actual murderer, the suspicion of guilt is, as a rule, more easily and with greater likelihood traceable to the mother than to anybody else.

As regards the death of the fœtus in utero, this of course is possible, and has been already discussed in the chapter on Abortion. That actual violence committed on a pregnant woman (*Case* 24), or intense impressions with great mental disturbance on the part of the mother, or diseased conditions of the placenta, etc., may cause the death of the child before its birth, is certain, and need scarcely detain us further.

But it is to be remarked that although the violence may have been done to the woman with the intent to cause the death of the fœtus in utero, this does not amount to either the crime of murder or manslaughter, for the reason that one essential of

these crimes is the killing a "*reasonable creature in being*." (Russ. *Crimes*, I., 645.)

We have now to consider some of the natural causes that may account for the death of young children :—

(1.) *Congenital Debility.*—In premature children specially, although by no means in premature children only, death may result simply from congenital weakness and feebleness. The child may breathe for a time and at last cease to breathe, not from actual disease discoverable at a post-mortem, nor from any malformation, but merely from the want of power to continue breathing. This extreme debility may no doubt in certain cases be overcome by continuous and incessant exertions on the part of those in attendance, but most often every attempt to preserve life will in such cases prove futile. Hence, where no assistance is afforded (and in the birth of illegitimate children, the absence of an attendant at the time of labour is the rule), death from simple congenital debility is far from impossible.

It has been held that if a person, intending to procure abortion, does an act which causes a child to be born so much earlier than the natural time, and as a result that it is born in a state much less capable of living, and afterwards dies in consequence, the person who by her misconduct so brings the child into the world, and puts it thereby in a position in which it cannot live, is guilty of murder. (*R.* v. *West*, 2 *C.* and *K.*, 784.)

In all such cases, one question must be specially considered by the medical jurist—*Does the appearance of the child indicate want of maturity and development?* Because, given the absence of such indications, it is scarcely likely that death can be fairly attributable to congenital feebleness.

(2.) *Diseased Conditions.*—The following states of the *lung* may prove fatal to the newly-born. *Red* and *grey hepatisation* from intra-uterine or acquired pneumonia ; *pulmonary apoplexy ; tubercles ; œdema ;* Devergie's *œdema lardaciforme ; atelectasis* (generally due to debility) ; *collapse of lungs* from fluid in the pleuræ, and pneumothorax (*Case* 6). An enlargement of the thyroid gland may cause death by suffocation. ("*Edin. Monthly Journal*," July, 1847, p. 64.) In the *brain* and *spinal cord* we

may have *softening* (remembering, however, that the infant brain is always somewhat pulpy), *apoplexy* (see *Cases* 55, 56, 57, under illustrative cases of Live Birth; also *Case* 8); *effusions of serum and other fluids, such as pus or blood; embolisms.* A case of *meningeal apoplexy* is also recorded. (Ranking's *Retrospect*, iii., p. 340.)

Spasm of the larynx, or of the muscles of respiration; tonic or clonic spasms, tetanic and *epileptiform conditions, paralysis of the vocal cords*, etc., may also prove fatal to the newly-born.

Uric acid infarction (*i.e.*, where the kidney tubes are blocked with uric acid or urates), and probably *uræmia*, may destroy life at a very early age. Hydronephrosis is often, if not generally, congenital.

Again, other congenital diseases, such as *syphilis* and *cancer* (and more especially the soft forms of cancer), may be the cause of the child's death. These may kill *through the placenta*, fatty, fibrous, and even mineral degenerations of the after-birth being not very uncommon.

And here one remark is suggested, by way of indicating the special nature of the enquiries that the medical jurist is called upon to institute. For he must decide not merely whether there is evidence of a diseased condition, but whether the diseased condition is of such extent that it may account for the death of the child? Given, for example, disease of the whole of both lungs, it is certain that a child could not live long;—on the other hand, if the diseased condition found at the post-mortem be partial, the medical jurist must then consider the extent to which life would as a consequence be shortened. And further, these diseased conditions have little forensic interest, if it can be shown that the child had never breathed.

(3.) *Congenital Malformations.*—These, although the most obvious, are far from the most common causes of the death of the new-born child. A child that was able to live in the uterus, may not be able to survive in the altered conditions to which birth introduces it. Malformation of the heart and large vessels—contraction of the alimentary canal at either end (for the gullet or anus may be imperforate [*atresia pharyngis vel ani*] (see "*Med. Gazette*," Vol. xxvi., p. 544)—obstructions

in the canal, are more or less certain causes of death ("*Medical Gazette*," Vol. xxvi., p. 542). Monstrosities, it may be said, are usually of feeble vitality.

A monster however monstrous, and however little likely to live, must not be destroyed one moment before its time either by nurse or doctor. Such an act is murder, provided that it will satisfy the words of the definition of murder, viz., destroying the life of a reasonable creature in being. Given a monster with definite marks of violence upon it, the case always presents a suspicious appearance of foul play.

(4.) *Protracted Parturition.*—Exhaustion, if the child be delicate—injury to the child's head if the action of the uterus be excessive—pressure on the cord interrupting circulation, etc., are a few of the many causes of a child's death resulting from a protracted labour. In first cases, moreover, it is to be remembered, such slow confinements are common, even where the pelvic diameters are normal. If the pelvis be deformed, the chances of the child's death are thereby increased. Nor can it be doubted that in the case of illegitimates, the death of the child at, or immediately after birth, owing to a variety of circumstances, is of more common occurrence than where the child is legitimate. The deaths of legitimate children are about one in twenty, whilst in the case of illegitimates, they are about one in ten.

The chief questions to be considered in cases where the death of the child is supposed to depend on a protracted labour, are the size of the mother's pelvis compared with (α) the size of the child's head and (β) the size of the entire child. Further, a deformed pelvis in the case of the mother, or a deformed head in the child, would increase the chances of the labour being slow. Still, as we have said, protracted parturition may cause the child's death, where none of these conditions exist. The absence of marks of violence on the child, other than can be explained by a difficult delivery, such as a sero-sanguinolent tumour on the head (caput succedaneum, or cephalhæmatomata), and a congested brain, are points specially to be noted by the medical jurist in such cases.

It may here be noted generally that more large children die

in the birth than small ones, and more males (being generally of larger size) than females. Further, more children die at first than at other confinements, primary labours being commonly the more tedious.

(5.) *The death of the mother in the act of delivery, or from premature separation of the placenta.*

In such cases, as we shall explain hereafter, the death of the child may result from suffocation, non-aëration of the blood compelling inspiratory acts.

The question may arise, How long may a child live in utero after its mother's death? Dr. Harris, of Philadelphia ("*Amer. Journ. of Med. Sci.*," lxxviii., p. 389), discusses this subject at great length. An old Peruvian record tells of a fœtus expelled alive 18 hours after the mother's death from the fall of a thunderbolt! Dr. Harris considers that the child's life may be prolonged for one or even two hours, but not beyond this period. But the cause of the mother's death is manifestly in such cases an important consideration. If it be slow, *e.g.*, from hæmorrhage, the chances of saving the life of the child are small, whilst if it be sudden, *e.g.*, from accident, the mother at the time being in vigorous health, the chances are greater. Numerous cases are given in Dr. Harris's paper. Certain it is, that in cases of sudden death occurring in pregnant women, the surgeon should attempt the immediate extraction of the child. Although he cannot force the relatives to permit it (and not to permit it is not a punishable offence), still to refuse, is as much a moral murder, as the crime of producing abortion in a healthy woman.

The duration of the child's life after the death of the mother has been investigated by Garezky of St. Petersburg ("*Wien. Med. Woch.*," No. xxii., 1879). From Breslau's experiments on animals, he (Garezky) concludes—

(α.) That the fœtus may survive the sudden death of the mother.

(β.) That if the fœtus can be extracted within 6 minutes of the mother's death, it may be born alive.

(γ.) That if extraction be delayed from 6 to 10 minutes, the child may be born alive, but it will probably be asphyxiated at birth.

(δ.) That if extraction be delayed from 10 to 26 minutes, the infant is, even if alive, certain to be highly asphyxiated.

(ε.) That in most cases infants are more or less asphyxiated after the first minute of the mother's death, supposing the child to be alive at the time.

Of 379 cases where Cæsarian section was performed after death, 308 children were dead when extracted, 37 showed signs of life, 34 were born alive, although of these only 5 lived for any length of time.

(6.) *Hæmorrhage.*—Bleeding may occur from various parts of the newly-born child. Thus Mr. Cullingworth (*Liverpool and Manchester Medical and Surgical Reports*, 1876), calls attention to the occasional occurrence of *hæmorrhage from the genitals* in female children, of which he has collected thirty-two cases.

Besides other internal pathological causes of hæmorrhage, *fatal bleeding from the rectum*, which Casper (Vol. iii., p. 148) states he has observed on two occasions, must be mentioned.

But manifestly the most common seat of hæmorrhage in the newly-born child is the funis or navel. (*Cases* 1, 4, 5.) In England and in most civilized countries, it is customary to tie the cord some $2\frac{1}{2}$ to 3 or 4 inches from the umbilicus before cutting it, whilst to meet the case of twins or from motives of cleanliness, two ligatures are commonly applied and the cord cut between them. Before leaving the house after a confinement, the medical attendant should see that the ligature has been firmly and efficiently tied, so as to prevent oozing of blood. The author has known cases of convulsions and of death to have been caused by the oozing of blood from an imperfectly tied cord. (See "*Edin. Monthly Journ.*," July, 1847, p. 70.)

There are cases, however, of suspended animation, where no doubt it is proper, after having cut the cord, to allow a few drops of blood to escape before applying the ligature. But allowing the possibly salutary nature of such hæmorrhage in certain rare cases, it requires the most careful watching, any excessive bleeding being liable to prove fatal. (See Dr. Churchill, *Theory and Practice of Midwifery*, p. 217, &c.)

Apart from the separation of the cord by cutting or by violent stretching (laceration), there is a third possible way of

severance, viz., *spontaneous rupture*, the result of sudden and unexpected delivery, the possibility of which under normal circumstances has been doubted by certain authorities (*Cases* 2, 3). The weight-power of the umbilical cord has been tested by Negrier ("*Annales d'Hyg.*," Vol. xxv., p. 126, Translation in "*Henke's Zeitschr.*," Bd. xliii. s. 182), and by others. Casper, criticising these experiments, rightly draws attention to two points—*first*, that the experiments recorded were conducted on dead and not on living cords, the resistance in the two cases being very different, living having far less resisting power than dead tissue; and *secondly*, that in sudden delivery the cord would be severed by a sudden jerk, and not, as in the trial experiments, by gradual extension. That it is not easy, owing to its slippery nature, to snap asunder the living cord is true, but if this difficulty be overcome, either by holding it with towels or by some other means, we have never failed in snapping the cord apart after two or three active jerks. Hence we believe spontaneous rupture under circumstances of unexpected delivery to be possible, whilst the shorter the cord and the heavier the child, so much the more likely is it to occur.

We agree with Casper, that a precipitate labour may occur in a first confinement. First confinements, although generally, are by no means necessarily slow.

And here it is to be noted that—

(*a.*) *Fatal hæmorrhage may occur if the cord after severance by cut or tear, be not properly secured by ligature.* (*Case* 1.)

Seeing that, as a rule, the pulmonary circulation is not established until *after* birth, this as a cause of fatal hæmorrhage is easily explained. And this fact is important, when we remember that in secret confinements (which are most often those that come before the medical jurist) untied cords are the rule.

(β.) *Again, fatal hæmorrhage may occur from accidental rupture, even after breathing has been established.* No doubt it is less likely to occur under such circumstances, but that it is possible, even at various periods after birth, has been abundantly proved. ("*Henke's Zeitschrift*," 1839, p. 200; 1840, i., p. 347; and ii., p. 105; "*Annales d'Hygiène*" 1831, ii. p. 128; "*Edinburgh*

Monthly Journal," July, 1847, p. 70. See also *Casper*, vol. iii., p. 149.)

(γ.) *Fatal hæmorrhage may occur from the navel after the separation of the cord.*—Such a case is recorded, notwithstanding that medical attendance was summoned so soon as the hæmorrhage was discovered.

(δ.) *Fatal hæmorrhage may occur if the ligature be not efficiently applied.*—Further, it must be remembered that a ligature may come off accidentally. (*Foderé*, vol. iv., p. 515; Campbell's *Midwifery*, p. 151.) Such an accident in cases of secret delivery is far from unlikely, notwithstanding that the woman may know how to act. It is no stretch of charity to admit that at such time a woman may be physically incapable of tying the cord properly. Of course if the mother be unmarried, and it be her first pregnancy, in addition to a want of physical power there may exist a want of proper knowledge. We must remember, moreover, that the ligature after it has been properly applied, may be purposely removed. And yet again, a ligature may be applied after death for the purpose of deception.

(ε.) Lastly, *whilst admitting that fatal hæmorrhage may occur from an unligatured cord, it must be conceded that such fatal results are exceedingly rare.*

The conditions favourable to hæmorrhage from the funis or navel are important, and need consideration :—

(i.) Hæmorrhage is more likely to occur from an unligatured *cut* cord, than from an unligatured *torn* cord; the arteries in the latter case being necessarily compressed and less likely to bleed.

(ii.) *Hæmorrhage is more likely to occur the nearer the severance of the cord has been to the umbilicus.* The longer the cord the more likely is it for retraction of the arteries to occur, and *vice versâ.*

(iii.) *Hæmorrhage is more likely to occur when the cord is cut very soon after birth, than if a certain interval be allowed to elapse, during which the pulmonary circulation has had time to become more or less fully established.*

(iv.) *Hæmorrhage is more likely to occur if the cord be thick and gelatinous, than if it be thin and small.* (Hohl.)

In cases of supposed death arising from hæmorrhage from the cord, the medical jurist should note the following details:—

(a.) The characters presented by the *edges* of the cord. If the cord be mummified, it should be softened in warm water before examination:—

If the edges be irregular and uneven, we may assume the cord to have been torn.

If the edges be clean and smooth, we may assume the cord to have been cut with a sharp instrument. But,

If the cord has been severed with a blunt knife (*i.e.* half torn and half cut or sawn) it is exceedingly difficult to form any exact opinion (*Case* 9).

(b.) The general characters (*i.e.*, the length and thickness) of the cord itself.

(c.) Whether a ligature has or has not been applied.

(v.) *The constitution of the child generally* should be noted. In the case of a strong and full-blooded child, death is more likely to occur from hæmorrhage, than in the case of an anæmic infant, where faintness might occur from a very slight loss of blood. In the latter case, sufficient time is usually allowed in which to procure assistance.

(vi.) Note further *the post mortem appearances, external and internal.* In death from hæmorrhage (independently of source), a blanched body with bloodlessness of the internal organs (general anæmia) will be noted. And here it must be remembered, that this internal bloodlessness after fatal bleeding does not extend to the cerebral veins, whilst the presence of internal hypostases (as in the lungs), and of external post-mortem stains, are not inconsistent with death from loss of blood. On the other hand mere anæmia in infants that have been dead for some time, and where putrefaction has set in, must not be hastily ascribed to fatal hæmorrhage, seeing that it may arise from simple evaporation of blood.

(vii.) Lastly, having decided that death was due to hæmorrhage we must consider the probable locus of the hæmorrhage, remembering that although there be no external injuries, bleeding may have resulted from internal pathological causes as well as from the funis.

(7.) *Natural suffocation.*

(*a.*) *Obstruction to the fœtal circulation.*—If the cord be so compressed that the circulation through it is interfered with, the blood (purified by the placenta, but failing to reach the fœtus), impels the child to certain instinctive respiratory acts which result in causing its *death by suffocation.* This compression may follow from various causes, such as—

(i.) *Simple pressure in certain abnormal presentations*, as, *e.g.*, in breech or footling cases.

(ii.) *Prolapse of the cord.* Of 743 cases of prolapse collected by Scanzoni, 408 (or nearly 55 per cent.) were born dead.

(iii.) *Abnormal positions of the cord, such as its getting round the neck of the fœtus.* Cases of death from this cause are recorded ("*Med. Gazette*," October, 1840, p. 122, and vol. xix., pp. 232, 233), although Hohl remarks that in his experience, the child was born dead in 18 cases only out of 181 where the cord was found coiled round the neck. In 7 of these 18 cases, it could be shown that the position of the cord had nothing to do with the fatal result, whilst it could not be proved to be the sole cause of death even in the remaining 11. Again, another authority records only 18 deaths out of 685 cases where the cord was so disposed. ("*Hecker's Treatise*," quoted by Casper, vol. iii., p. 126.)

And here it may be noted, that the mark left on the neck by the twisting round of the umbilical cord is broad, grooved, perfectly soft, and never excoriated. A hard, parchmenty depression points away from the cord as the cause of the groove. Of course it will be single, or two- or three-fold according to the number of twists. Such marks must not be confounded with those resulting from folds of skin, or ridges in the fat of the neck, produced by movements of the head, which (more especially in winter) are often somewhat permanent, and liable to be mistaken for cord marks.

And here the question arises as to the presence of ecchymosed spots as a result of the twisting of the cord round the neck. Some hold that extravasations of blood are never found in the subcutaneous cellular tissue (Klein and Elsässer), whilst others (with whom the author agrees) believe that true blood extra-

vasations of a livid colour, from which dark blood oozes when the skin is punctured, are of occasional occurrence, although it must be admitted that such extravasations are rarely found along the whole circumference of the neck, but in isolated spots only.

(iv.) *The spontaneous formation of knots in the cord*, is another cause of obstruction to the circulation. These result from the child by certain movements of its body getting through a loop of the cord. This may happen at any period of intra-uterine life, even during the act of birth; the child thus becoming the cause of its own death. (See Paper with illustrations by Dr. Read, "*U. S. Amer. Journal Med. Science*," Oct. 1861, p. 381. See also "*Trans. Obs. Society*," vol. iii., p. 413, case by W. Sankey, Esq., of Dover, who refers to *Smellie*, vol. ii., p. 335, for an instance of a tight-drawn knot occurring in the middle of the funis in a fœtus during the eighth or ninth month of gestation. Vol. v., p. 25, of the same *Transactions* contains another case of a *double* knot. (See also vol. xi., p. 54 (for two cases), vol. xii., p. 133, and vol. xiii., pp. 51 and 187.) Amputation of the limbs in utero, is probably due to the twisting of the cord round the part. (See Montgomery's *Signs and Symptoms of Pregnancy*, and Sir James Simpson's *Memoirs on Obstetrical Subjects.*)

The consideration of this subject suggests this remark, that although the child was not born alive, there may be post-mortem signs of suffocation.

(β.) *Contraction of the uterus round the neck of the child.*—That a spasmodic contraction of the os round the neck, or other part of the child, may cause its death (the appearances closely simulating constriction by the umbilical cord), is proved by the cases recorded by Hohl (quoted by Casper, vol. iii., p. 129), the pressure in one case being round the neck, and in a second just above the genital organs. In a case recorded by Löffler, the constriction occurred around the body of a dead child.

(γ.) *The child may be born in the membranes.*—When a child is born with the membranes entire, or with a part of the membranes over the face and head (called 'born with a caul'), it must die, unless timely aid be at hand. The author has met with cases in which the membranes were too tough to be torn

by hand, and required incision. Mr. Blenkinsop, of Warwick, in June, 1862, told Dr. Taylor of one such case, where those present at the birth would not interfere. The coroner held that as the evidence showed the child had not breathed, it never had any legal existence.

(δ.) Certain accidents to the child, resulting in its suffocation, are recorded. Such, for instance, is retraction of the base or of the entire tongue, owing to some defect of the frænum ("*North Journ. Med.*," March, 1849, p. 278; "*Guy's Hospital Reports*," 1866, p. 476); obstruction of the air passages by mucus (so that the entrance of air to the lungs is prevented); spasm of the larynx, etc.

II.—The causes of death, other than natural causes, of newly-born children.

(1.) *Neglect or omission.* A child may, and very often does, die of neglect or criminal omission, during or after birth. If care be not taken to prevent it, the child may be suffocated under the bed-clothes, or fracture its skull by falling on the ground, or die of hæmorrhage, from the cord having been cut and not tied, or tied imperfectly. (*Case* 1.) The theory of the law (as implied in the enactments respecting concealment of birth) is, that, notwithstanding exceptional cases of very strong hardy women, who might be able, as well as skilful enough, to attend to themselves and their infant, no woman is competent at the time of her confinement to attend to her child, because she may be overcome by a sudden faintness from pain or hæmorrhage, and that, therefore, she ought to inform others of her pregnancy. The law presumes that any married woman will know what ought to be done for a new-born child. When an accusation, therefore, of child-murder is made, the defence that the mother did not know what ought to be done, or was faint, or delirious, etc., should be supplemented by further evidence that the woman was suddenly taken in labour, whilst alone and away from assistance, etc.

(2.) *Suffocation* is perhaps the commonest, because the easiest, method of causing an infant's death. But it must be remem-

bered that a child may be suffocated without criminal intent. Thus, even permitting the new-born child to lie face downwards on a soft pillow, or stuffing the bed-clothes too closely around it, may destroy life at an early age. Particles of food, again, may obstruct the wind-pipe, and, blocking up the glottis, induce suffocation. Even milk may be curdled in the stomach, and regurgitate into the pharynx and larynx. Or again, the child may vomit, and accidentally draw the vomited milk, etc., into the air-passages. This actually happened to a child one month old, whilst it was lying on its face (*Taylor*, p. 391). The blood of the mother, or fæcal matter, or meconium, may also be sucked into the air-passages soon after the birth. It has been suggested that the pressure of the vagina on the child's chest during birth might cause suffocation. Hypothetical as this appears, it is certainly true that after or during birth, pressure applied for a few minutes to the throat or chest, would certainly destroy life.

Suffocation, again, may arise accidentally from the child falling into a privy, or into the pan of a water-closet or night-chair, during a sudden parturition, occurring whilst the mother is at stool. (*Cases* 8, 10, 11.) In such cases the actual cause of death may be various, such as by drowning, or by injuries resulting from the fall, etc. Most often, however, death will be due to suffocation, as the post-mortem appearances indicate. (*Case* 10.) The question in such cases will be, Was the suffocation *accidental* from unexpected delivery, or *intentional*, the child being thrown into the privy after its birth? (*Cases* 19 and 20.) That it may be accidental is unquestionable. Cases of sudden delivery are not unfrequently accompanied by insensibility or faintness on the part of the mother. In such case, however, the cord would be torn, and although a very limited respiration might occur, at most it could only be limited. In case of death from such a cause (always remembering that the child might be thrown into the privy or cesspool after it was dead), one would expect to find a considerable quantity of ordure in the mouth, fauces, and nostrils, and possibly in the stomach. (*Case* 20.)

But the child may be criminally suffocated by one and all the means we have suggested. Thus thrusting the head into

feathers, wool, dust, bran, etc. (*Case* 12), premature burial, forcing the body into a small box or trunk, etc., are means that have been adopted with criminal intent. Dr. Easton, of Glasgow, reports a case in which *mud* had been forced into a child's throat and mouth, and was found after death in the gullet and air-passages. ("*Cormack's Journal*," Feb., 1845.) Similarly in *Case* 12 the bran in which a child was suffocated was found in the nose, mouth, and trachea. *Straws* have sometimes been found in the stomach, etc., as in the case of *Macintyre* (Glasgow Autumn Circuit, 1829). Dr. Littlejohn reports a case of death from *dough* being forcibly impacted into the throat and larynx of a child—the mass accurately fitting the parts ("*Edinburgh Medical Journal*," Dec., 1855, p. 521). In a case reported in the "*Annales d'Hygiène*" (1863, ii., 395), a plug of flax was found in the mouth. Foreign substances thus found in the interior of the child's body, should be carefully examined and preserved. In one case related by Dr. Dohrn ("*Horn's Vierteljahrschrift*," 1867, ii., 98, and Taylor, p. 394), such an examination led to the mother's acquittal, the truth of the account given by her being substantiated.

Again criminal suffocation may result from something being held over (*Case* 13), or stuffed into, a child's mouth (*Case* 14) or by the mere pressure of the fingers on the mouth, nose, and windpipe (*Case* 18). Two suggestions occur here:—*first*, carefully examine the mouth and windpipe of a child externally and internally; *internally* for materials in which the child may have been suffocated (*Cases* 12 and 15), and *externally* for marks or even portions of a fabric that might have been held over the mouth for the purpose of excluding air, and for other marks indicative of compression with the fingers (*Cases* 13 and 14); and, *secondly*, bear in mind that the apparent is by no means necessarily the real cause of death. Thus in *Case* 13, although the child was found stuffed in a box, the appearances showed that it had been suffocated by a linen cloth held over its mouth, and again in *Case* 15, although the child was found in a privy it had evidently been suffocated by paper plugs.*

* For details respecting suffocation, see the chapter on Suffocation (confer Index).

It is unnecessary to discuss the possibility of suffocation by sulphur vapour, chloroform, and other anæsthetics, these partaking more of the nature of cases of poisoning than of suffocation.

(3.) *Strangulation* is a not infrequent mode of infanticide.* One of the most common instruments of infant strangulation is the funis. But strangulation, may (as we have said) occur *naturally*, from the funis being coiled round the neck, and if there be no skilled assistance at the birth, the child will probably die. A suspicion of child-murder might thus arise. In such case, however, the lungs are not likely to show signs of expansion, whilst, on the contrary, if the child be strangled after birth, some portion of the lungs would probably be found aërated. As regards the possibility of mistake in reference to the mark of the funis round the neck, Casper states that "if we examine a number of fat and fresh bodies of children, especially in winter, we shall readily perceive it to be a possible error to mistake the *folds of the skin* (*produced by the movements of the head which remain strongly marked in the solidified fat*, and are very prominent, particularly in short necks) for the mark of a cord, unless we correct our erroneous impression by a proper consideration of the various criteria belonging to a true mark of strangulation, which will speedily teach us the truth."

It is rarely that a new-born child is actually *hanged*, although such a thing has been recorded.

In all the cases above mentioned, the post-mortem appearances will be similar. Congestion of the right heart, engorgement of the lungs, with punctiform and other ecchymoses on the pleuræ, pericardium, endocardium, peritoneum, and bronchial mucous membranes, will probably be found.

Tardieu insists strongly on these ecchymoses in the case of death from any form of suffocation, and has given an excellent plate representing these blood extravasations. They are usually, he states, bright in colour, the rest of the blood in the lungs, right heart, and veins, being of a very dark colour. Dr. Taylor quotes Drs. Douillard and Gallard ("*Ann. d'Hyg.*," 1872, vol. i., p. 201) to show that sub-pleural ecchymoses may be found after death

* See chapter on Strangulation (confer Index).

from natural causes. Dr. Ssabinski ("*Horn's Vierteljahrs*," 1867, vol. ii., p. 146) states that he only found these ecchymoses once in ten cases of animals suffocated. This observer thinks a bloodless condition of spleen a more constant symptom. Our own experience, entirely confirms that of Tardieu. There is, however, one great difference between the lungs of young children and those of aged adults after death from suffocation. If the child be vigorous and well developed, the muscular and elastic force of the arteries and arterioles will of themselves be sufficient to drive the blood on, after the heart has ceased to beat, and respiration prevented. Such lungs will therefore be often found comparatively bloodless or anæmic, but with a large amount of emphysema, from dilatation and rupture of the air-cells, owing to violent attempts at inspiration. The author has seen this condition in cases where the suffocation was undisputed, and fully proved to be accidental.

(4.) *Drowning.*—If a child had never breathed, it would be impossible to show that its death resulted from drowning. But if the body had been long immersed in water, it would then exhibit the phenomena of *maceration.* The fact, however, that a child had *swallowed* dirty water, containing shells of minute size, sea or water weeds, sand, mud, diatoms, and the like, would be strongly corroborative evidence that it had been placed whilst living in the water.

Long maceration in a warm and weak saline fluid [*e.g.*, the liquor amnii at a temperature of 37° or 38° C.] is the chief cause of the appearance known as "intra-uterine maceration." *Long maceration in sea water at high temperature, as in summer weather*, provided the body be shaded from the sun, produces effects very similar to those of intra-uterine maceration, except that if sufficient time has elapsed, some portion of the body will probably be converted into adipocere. The colour of the lungs, in one such case at least, was found to resemble that due to aëration. (See "*London Hospital Reports*," vol. i.)

Adipocere would take at least four to six weeks for its formation.

The whole of a child's body need not be submerged to destroy life. To use a common phrase, a child of small size might be

drowned in a quart-pot. It is quite enough for the face—indeed for the mouth and nose—to be completely covered by water to cause its death.

In cases where a person is charged with the murder of a child by drowning, the defence usually is that the body was thrown into the water to get rid of it, after the child was dead. It is often necessary, therefore, in such cases to search for signs of live birth, to determine whether the child survived its birth or not.

(5.) *Wounds.*—The discovery of punctured, incised, lacerated, or contused wounds on a child is always suggestive of murder. (*Case* 21.) For although obstetric instruments, or the scissors used to divide the cord, or broken utensils may inflict wounds, yet, as a matter of fact, excepting from obstetric instruments, and then under exceptional circumstances only, such injuries rarely occur.*

The only accidental injuries produced by a careless division of the funis of which we have personal knowledge, happened to the fingers in one case, and to the penis and the toes in two others.

Lingering labours, especially when there is much difficulty in the passage of the child's head, frequently cause a puffy and blood-infiltrated swelling of the scalp known as *caput succedaneum*, or *cephalhæmatoma*. (See *Case* 54 under Illustrative Cases of Live Birth, p. 297.)

Professor J. Stannus refers ("*Irish Medical Gazette*," Aug. 15th, 1873) to a method of destroying infants, by thrusting a needle or other sharp instrument under the upper eyelid, so as to pierce the thin portion of the orbital plate of the frontal bone. This would leave no mark, and the only symptom produced would be convulsions. As a fact, this can be done without causing a fracture or the loss of a drop of blood. Dr. Handsel Griffiths ("*Lancet*," Oct. 11th, 1873, p. 519), from experiments on

* Usually speaking, the mark of one forceps-blade is in *front* of one ear, and that of the other blade *behind* the other ear. Strange as it may seem, we have known a professed pathologist describe the appearances produced by craniotomy as due to the ravages of a carnivorous animal!

the lower animals, states that this method of infanticide is easy of perpetration and difficult of detection. The state of the orbital walls should in doubtful cases be carefully examined.

(6.) *Fractures.*—The bones of the arms or legs might be broken during labour by the accoucheur dragging down the former across the child's back, or by any undue force applied to the latter. In any case, this injury is hardly likely to be immediately fatal.

But it is primarily the skull bones (especially the parietals), and secondarily the ribs, that are the most likely to be broken, whether by criminal violence or by accident. (*Case* 16.) It is important to note the two methods by which such fractures might occur accidentally :—

(i.) *From accidents happening to the mother before the birth of the child.* Thus a fall down stairs, or a kick, or a violent blow on the abdomen, might fracture the skull, ribs, or limbs of the child in utero. The author has known of this occurring in the lower animals. A mare in foal, *e.g.*, fell into a quarry, and the colt with which she was heavy, was born dead with a fractured skull. A costermonger kicked his donkey, who was near her time of foaling, and the young donkey when born had a broken foreleg and a fractured skull. (See *Cases* 24, 25.)

(ii.) *Accidents occurring in the act of birth.* Fractures may occur from the child falling on the ground during an unexpected delivery. There are many instances on record of such an accident. It is most likely to happen to women with large roomy pelves, or if the child be prematurely born. The fractured bone is most commonly the *left* parietal, the exact site being determined, partly by the presentation and partly by the position and movements of the mother. (See Taylor, p. 403, etc., "*American Journ. of Med. Sci.*," Jan., 1853, p. 254 ; "*Hartshorn's Medical Jurisprudence*," American edition ; Tardieu, p. 133 ; Schwörer, of Freiburg, *Beyträge zur Lehre von dem Thatbestande des Kindermordes*, etc., etc. ; Freiburg, 1836, p. 38 ; also Casper's *Medical Jurisprudence*, vol. iii., Dr. Balfour's translation.)

The use of the forceps and of other obstetric instruments may cause fracture of the skull. Tardieu figures such cases. The parietal and temporal bones will be those most likely in

such case to be affected. Version might also be a cause of fracture.

Fractures arising from the woman's hands, the force of the uterus itself, or the pressure of the woman's thighs, may, it has been said, fracture the skull of a child in the act of birth, or dislocate the neck in the act of delivery. Practical accoucheurs know that in difficult labours, quite apart from the use of instruments, the bones of a child's skull may overlap one another, a state of things that can only result from their partial severance. Sometimes an audible crack or grating may be heard under such circumstances. It is not to be doubted that the mother's hands, or even thighs, may exercise an enormous force. What seems to have been forgotten is, that the extent of injury will of necessity very much depend upon the degree of ossification of the child's skull. Necessarily the more mature the child, the more likely is it for fracture to result.

As regards dislocations occurring accidentally during delivery, it is difficult to believe that the neck of a healthy new-born child could be dislocated, or the head severed from the body, without undue violence. Dr. Matthews Duncan estimated that a traction force of 105 lbs. could be applied to a child's neck without destroying life, and that at least 120 lbs. force was required to sever the head of a new-born child from its body. Joulin has even applied 148 lbs. traction force to the neck of a dead fœtus, without effecting separation. Gordell again has seen a child born alive after the application of 130 lbs. traction force, and has twice known living children born after an audible crack. ("*British Medical Journal*," Sept. 19th, 1874, p. 384; "*Dublin Quarterly Journal of Medical Science*," Nov., 1875, p. 445.) Given the case of a decomposed body, the head is, no doubt, somewhat easy of severance, and may possibly under such conditions in breech and footling cases, be left behind in utero, if force be used in its extraction.

Fractures may arise from falls due to sudden parturition whilst the woman is standing. It is, however, seldom that such falls are the direct cause of the death of a child. If it dies under such circumstances there is generally some other cause of death, such as hæmorrhage from the cord, premature separa-

tion of the placenta, dislocation of the cervical vertebræ [?], concussion, or actual cerebral hæmorrhage in various situations. (Ploucquet).

(iii.) *Fractures of the skull from violence*, when purposely inflicted, are usually far more severe than any of the accidental fractures to which we have alluded. The skull is commonly battered in with fearful violence, and it is seldom that the seat of injury is confined to any one spot. Moreover, there are usually several fractures with other signs of violence. This fact alone is, as a rule, sufficient to guide the medical jurist in forming an opinion as to whether the injury is accidental or homicidal. (*Cases* 16, 17.)

In *Case* 17, the fact of coagulated blood being found at the very spot where it had escaped, was very suggestive of criminal violence.

In all these cases it is of the utmost importance not to mistake natural deficiencies in ossification (*Case* 7), or injuries resulting from exhumation, or bruises caused in removing the child's body after death from places where extraction is difficult, for the results of violence. (*Case* 19.)

(7.) *Injuries other than fractures arising from sudden delivery.*—Thus in *Case* 8, Casper considered that the death of the child was due to its being born suddenly, and sustaining such injuries from falling on a hard floor that cerebral apoplexy was induced. This case further suggests the remark, that the place where a child's body is found is by no means necessarily that where the accident causing its death occurred. It is nothing uncommon for the body of a child to be disposed of for no worse reason than to save the expense of burial.

(8.) *Poisons.*—Poisoning is rarely adopted as a means of destroying a new-born child, although it would appear (from Tardieu) that the crime is more frequent in France than elsewhere. In stating this, however, we except one poison, viz., opium. Opium either in the form of syrup of poppies, or of laudanum, or of "soothing syrup," is far too much used to quiet infants. Slingenberg, quoted by Tardieu, states that in one case known to him, orpiment, and in a second case verdigris, was given to a new-born child by the mother ("*Dissert.*

Medic. Forens. de Infanticid," Gröningen, 1834, p. 99). Tardieu mentions two very young infants being murdered by the introduction of sponges dipped respectively in nitric and hydrochloric acids.

(9.) *Cold and Exposure.*—Newly-born children may die from cold and exposure. This, of course, may occur at any time, but is most likely to happen during the winter months. The evidence in proof will be chiefly circumstantial. It is well known that an infant requires more warmth than an older child. (Part I., page 425.)

(10.) *Starvation.*—The death of a new-born infant may result from starvation. A healthy, mature child, if kept warm, will generally live two or three days without any food, or with but very little. If, therefore, death occurs from starvation it will almost certainly be of set purpose. (See Part I., page 560.)

(11.) *Burns and Scalds.*—A child may die from burns and scalds, *purposely inflicted.* The questions likely to arise in such cases have already been discussed in detail (Part I., p. 452).

A study of the recorded cases of infanticide shows the paramount necessity, even in cases that appear straightforward, of careful post-mortem examinations. (*Case* 9.)

Another point needs to be noted. After the murder of a child, there remains the great difficulty of disposing of the corpse. For this purpose criminal records reveal remarkable attempts, such as mutilation of the child's body (*Case* 14), boiling (*Case* 22), burning (*Case* 23), etc.

It may, however, be stated in general terms, that no matter what the treatment to which the body of an infant is subjected in order to destroy and dispose of it, the medical jurist will usually find some means of determining its age, and whether it was born alive. Even where fire has been used to conceal the crime, some portions are likely to remain unconsumed, whilst in any case chemical and microscopic examination combined, will be almost certain to throw some light on these dark passages of human history and crime.

Medico-legal Reports.

It may not be out of place here to give a specimen, as a guide to the practitioner, of a medico-legal report, choosing for this purpose (1) the examination of a newly-born infant, who had survived its birth some days, and had been suffocated, and (2) the examination of the supposed mother.

I, the undersigned Thomas Brown, Doctor of Medicine, Member of the Royal College of Surgeons, and Licentiate of the Society of Apothecaries, residing at , and practising as a Surgeon, and Registered, hereby declare, that being requested to examine the body of a male infant, found on the 20th July, 1882, in a goods-shed of the London and North Western Railway Company, I accordingly did so on the 21st day of July, 1882, and that the following account is a true statement of the facts of the case :—

The body was that of a well-developed and mature male child, and as shown by the facts, born at full term. Its length was 20½ inches. It weighed 7¼ pounds. The head measured 3¼ × 4¼ × 5 inches. The nails were well developed and nearly reached the ends of the fingers. There was a good deal of hair on the head, the hairs being about ¾ of an inch long. Both testicles were in the scrotum. The pupillary membranes were fully absorbed. There was not much hair on the trunk The navel was as nearly as possible at the middle point of the child's length. The navel-string had been tied, and cut off 2¾ inches from the body. It had completely withered, and was almost separated from the body. There were no signs of external injury, except that around the mouth there were longitudinal and transverse markings, intersecting one another, such as the warp and woof of a coarsely woven fabric would produce, if firmly pressed upon the flesh. The extremities of the fingers and toes, especially the nails, and the ears and nose, were extremely livid or dark. On opening the body, I found the following appearances :—The lungs nearly filled the chest. The diaphragm reached as high as the sixth rib. The right heart was loaded with dark blood. The left side of the heart was

empty. The foramen ovale was nearly closed, and the ductus arteriosus was funnel-shaped, and closed at the end nearest the aorta. The pericardium, or bag containing the heart, and the pleuræ, or bags containing the lungs, the lining membranes of the bronchial tubes and of the interior of the heart, were all marked with bright star-shaped patches or extravasations of blood. The lungs weighed 1120 grains. The edges of the lungs were emphysematous, in other words, the air-vesicles were distended, bloodless, and broken down one into the other. The air-vesicles of the rest of the lungs were plainly visible to the naked eye, and some portions of both lungs floated in water. The remainder of the lungs were gorged with blood, which escaped, freely mixed with froth, when they were incised. These portions sank in water, although not quite to the bottom of the vessel. The bronchial tubes contained frothy mucus mixed with blood. There was nothing remarkable in the abdomen, except that all the organs and the veins were distended with dark blood. The umbilical arteries had closed. In the stomach I found a quantity of starchy food [probably arrow-root], with some milk, and in the large intestines there was some fæcal matter of a brownish colour. The point of ossification of the lower epiphysis of the femur was three lines in diameter. On opening the head, the membranes of the brain were found much congested, and the sinuses filled with dark blood. There were numerous bloody points in the brain substance. The brain weighed 10¾ ounces. The liver weighed 3 ounces.

From these appearances I conclude—

1st. That this child was born at full term, and alive.

2nd. That he survived his birth for some days.

3rd. That the probability is he died from suffocation, such suffocation being purposely effected with a coarse damp towel or cheese-cloth—the marks of the fabric on the lips and round the mouth being of a coarser nature than those caused by the linen or baby-clothes generally in use.

Further, I have also examined a woman aged about years, whose name was said to be , whom I found in bed at . She had dark circles round her eyes. The pulse was weak and com-

pressible, and over 100 [106] per minute. The skin, etc., of the belly or abdomen was relaxed, flabby, and wrinkled. It was marked with numerous shiny streaks [lineæ albicantes] and purplish marks, similar marks being also found on the thighs. A body in the situation of the uterus could be felt through the abdominal walls, somewhat larger than a cricket ball. There was milk in both breasts, and a dark circle [areola] round each nipple, in which numerous and large follicles could be seen. The perinæum was torn for about half an inch towards the anus, but not extending into it. The vagina was much relaxed, and had a bruised and dark appearance. The uterus felt large and heavy. The os uteri was wide open, and admitted two fingers. It presented three or four distinct lacerations, or tears. A sound could be passed into the uterus to a depth of nearly five inches. There was a greenish yellow lochial discharge. The under-linen, bedding, etc., were stained with blood. From these appearances I conclude—

1st. That this woman has been recently delivered, and probably within a week or ten days.

2nd. That considering the lacerations of the perinæum and os uteri, the child of which she was delivered was in all probability mature and of full size.

In witness whereof I have hereunto set my hand this 21st day of July, 1882.

(*Signed*) THOMAS BROWN.

In drawing up such reports, special attention should be paid to the three following particulars:—

(1.) All measurements, weights and statements of size should be given in standard measures and weights. If comparisons be made, such comparisons should be with well-known objects.

(2.) Dates, places, and names of persons, where such are known, should be plainly stated.

(3.) The conclusions or the opinions founded on the facts, should be kept distinct from the facts themselves.

ILLUSTRATIVE CASES.

1. R. v. Dash (1842).—In this case it was shown that the child had breathed after its birth, but that it died from hæmorrhage, resulting from a lacerated umbilical cord. The woman was self-delivered, and seeing she did not tie the cord, was tried for infanticide "by omission." The prisoner was acquitted, on the ground that she might not have had the power to tie it, nor known that it was necessary to do so. (Pages 307, 308, 313.)

2. Med. Times, July 24, 1847, p. 433.—(*Mr. Mackie.*)—The child was born alive, after a strong pain. The cord was 4¼ inches long, and was lacerated at birth about 1 inch from the abdomen. (Page 308.)

3. Lancet, July 11, 1846.—(*Mr. Beale.*)—The cord was 5 inches long, but was not ruptured at the birth. (Page 308.)

4. Med. Times and Gazette, March 25, 1854.— (*Mr. Willing.*)—Case of fatal bleeding from the navel, in a properly attended case, six days after the natural separation of the cord. (Page 307.)

5. Casper, Med. Juris., Vol. III., p. 149.—(*From Hohl.*)—A case of the death of a child, apparently of hæmorrhage from the cord, after many hours' life. (Page 307.)

6. Brit. Med. Jour., April 6, 1878, p. 490.—(*Dr. Carl Ruge, Zeitschrift für Geburtschülfe, Bd.* ii., 1 *Heft.*)—The child was born asphyxiated, but afterwards cried a good deal. Ultimately, about twelve hours after its birth, it died in a state of cyanosis.

P. M. (24 hours after death).—Pneumothorax, with hæmatothorax, in consequence of rupture of the pleura. Air escaped on opening the thorax. The heart was displaced to the right. The left lung contained air in parts only. [The author supposes the pneumothorax was the result of violent inspiration, in consequence of the obstruction of the left lung by mucus, meconium, etc., and that the emphysema, at first alveolar and afterwards sub-pleural, caused rupture of the pleura, probably before birth.] (Page 303.)

7. Casper's 370th Case:—The midwife was called in immediately after the delivery, when the child was in the act of drawing its last breath. It

was mature [weight 7 lbs., height 20 inches]. The lungs were of a cinnabar-red colour, mottled with blue. They frothed and crepitated on being incised, and floated perfectly. In the middle of the left parietal bone two round openings close to one another were found, each being three lines in diameter, with serrated edges. The bone surrounding these openings was not specially translucent. It was interesting to find that a narrow spicula of bone ran right across one of these openings, completely removing any possible doubt that these openings were the result of defective ossification. The child had died from hyperæmia. [Casper and others give numerous instances of defective ossification. See his Cases 369, 371, 372, 373, 374, etc., and Tardieu, *loc. cit.*] (Page 321.)

8. Casper's 382nd Case.—The body of a mature new-born boy was found in a night-chair. The placenta weighed 11 ozs., and the child 6½ lbs. It was 18 inches in length, but the diameters of the head and shoulders were small (3 × 4 × 4½ inches for the head, 4½ for the shoulders). The portion of the funis attached to the child was 14 inches long, torn across, with ragged edges, but tied. Beneath the pericranium, on the left parietal bone were a few isolated ecchymoses, but no other trace of violence, internally or externally, was found. The body was perfectly fresh. Death had been caused by cerebral hyperæmia, and not by suffocation. Respiratory life was indubitable.

The fact of the placenta being found along with the child, the funis being torn, the small diameters of the head and shoulders, and the secret delivery, were in favour of the birth being precipitate. The ecchymoses on the parietal bone rendered it probable that the child had fallen on its head. Such a result was not likely to occur if the birth had taken place upon the night-chair, and the child had fallen upon a soft semi-fluid mass of excrement. In this case, moreover, death would have been caused by suffocation, and not by cerebral hyperæmia. Accordingly, it was concluded that this viable and live-born child had died soon after its birth from cerebral apoplexy, produced by falling upon some hard floor at its birth, and that after its death it had been flung into the night-chair to save the expense of burial, and more completely to conceal its birth. (Pages 304, 314, 321.)

9. Casper's 385th Case.—An unmarried maidservant, pregnant for the second time, gave birth to her child secretly in a cellar, during the night. She first of all stabbed it with a table knife, and subsequently inflicted injuries on it whilst dying with a spade with which ultimately she buried it in the sand. The right carotid was punctured within the thorax by one stab, whilst another completely severed the spine and spinal cord between the fifth and sixth cervical vertebræ. The medico-legal decision of the case was consequently easy. A point, however, of some difficulty occurred. The accused stated that after the child was born and while

it was still connected with her by means of the funis, she went into the adjoining room to fetch a table knife with which to cut the umbilical cord; and that she then, *for the first time*, with the knife in her hand, and overwhelmed with fear and terror, was suddenly seized with the idea of killing her child, which she carried out. This view reduced her crime in the eyes of the criminal jurist to a mere act of homicide. Of course, at the dissection of the body, when no one could guess the subsequent confession, the condition of the edges of the remains of the umbilical cord had been carefully examined, and we had ascertained indubitably, from the irregular, serrated, and denticulated edges, that the umbilical cord had not been severed by a sharp instrument, but had been torn across. The instrument employed by the murderess, and subsequently recognised as such by her, was *a very sharp knife*, she herself having sharpened it the day before, along with other knives in the house. We were therefore forced to maintain our original supposition, in spite of this statement of the accused. Her crime thus regarded was "murder," for it was indubitable that she had not fetched the knife to divide the umbilical cord, but to kill the child after the cord had been severed, involving premeditation in the eyes of the judge. As the state of mind of the accused at the time was not quite free from doubt, she was only condemned to the unusual punishment of many years' imprisonment. (Pages 310, 322.)

10. Casper's 395th Case.—In this case a girl, unmarried, stated that not expecting her confinement, and feeling a desire to go to stool, she had been suddenly delivered of a child, and had immediately become senseless. The police report, however, supposed that she had flung the child into the privy *after* its birth, since the umbilical cord was cut, and the placenta was wanting. The child was a mature girl (20½ inches long, 7 lbs. weight, etc.). In the mouth, fauces, and nostrils there was a considerable quantity of human ordure. The diaphragm stood between the fifth and sixth ribs. The stomach was *quite filled* with fluid human fæces. The vena cava was tolerably well filled with dark and not unusually fluid blood. The thymus gland was very large, and almost entirely covered the pericardium. With the heart, the lungs sank at once in water; but without it, they sank more slowly. Their colour was precisely that of the spleen. The middle lobe of the right lung, however, exhibited a few lentil-sized brighter patches, and the edges of both lungs were also somewhat brighter in colour. Petechial ecchymoses were scattered over several parts of the lungs. Each lung, as well as each lobe, sank readily in water, but the middle lobe of the right lung only very slowly. No portion, however, of the lung, even when cut into many pieces, showed itself buoyant. On making these incisions no crepitation was heard, yet, in isolated spots of both lungs, a very little bloody froth could be squeezed out; and from such spots, when pressed under water, fine air bubbles ascended. The lungs themselves contained much blood. The mucous membrane of the trachea

was of a bright rosy red colour, and with the aid of a magnifying glass was seen to be minutely injected. The œsophagus was empty. In each side of the heart there was about one dram of dark fluid blood. The bones of the cranium were uninjured. The veins of the *pia mater* were very full, those of the *plexus choroidalis*, cerebellum, and sinuses, being unusually so.

"In the written opinion which we gave [says Casper], we first proved the maturity of the child and its viability. It had, however, lived and breathed, though for a very short time. The docimasia pulmonaris afforded proof that the lungs contained *some air*, though only in trifling quantity, and consequently the result of but one, two, or three inspirations, since there was no other probable source for the air in this case. This proof consists in the position of the diaphragm, the brighter patches in the lungs, the bloody froth, and the fine air bubbles which ascended from the cut portions of the lung when squeezed under water. This case, therefore, like many similar ones, proves the great *delicacy and excellence of the docimasia pulmonaris*, which has here detected a respiratory life, that ended almost as soon as begun." Further, he states, "the child must thus have fallen into the fluid fæces alive, and must of course, have been drowned therein, and death from drowning is, in a large proportion of cases, death from suffocation."

In reply to the inquiry, if the death of the child were intentional, Casper states that "the appearances agreed with the woman's statement, that the death was accidental; and that though the placenta was not found, it appeared that the man who found the child did not know anything about the after-birth, and never looked for it." (Pages 258, 273, 314.)

11. Tardieu's 1st Case.—The accused was aged 27, and single. She quitted her place of service at Arzillières early in March, 1854, in an advanced state of pregnancy, which she concealed and denied. She went to Paris, and took a place. Her new mistress suspected her condition, but did not charge her with it. On the girl keeping her bed "for a cold" on the 24th March, her mistress extracted a confession that she "believed" herself pregnant, but only admitted six, or at the most eight months' gestation to be possible. Early next morning her master asked her how she was, and she said she was "no better." At a quarter to eight the same morning, her mistress, on entering the room, was first informed that she had had colic, but afterwards she said that it was a miscarriage. She stated that at six o'clock she had gone to stool, and that the infant tumbled into the pan; that it had cried once, sighed once or twice, and then died. She afterwards stated that it had fallen on the ground, and not into the pan. The master and mistress sent for a medical man, who found the child still warm, but dead. There was no trace of external violence, and the child was closely wrapped in a petticoat. He considered the child viable, but could not determine whether negligence or crime was the cause of the suffocation.

M. Tardieu, on being consulted, states that the infant was a strong and vigorous girl, 20 inches long, and weighing 6 lbs., the osseous nucleus being

well developed. The funis was torn and not tied. There was no putrefaction. The head, neck, and upper part of the chest, were of a deep violet colour, presenting no signs of excoriation. On the surface of the scalp were a great many little extravasations of blood, distinct from the caput succedaneum, but there were no fractures. The lungs floated, though not buoyantly; they were gorged with blood, and presented a dull red colour on the surface, with a number of punctiform ecchymoses on the under surface of the pleura, which were blackish in colour, and gave the lungs an appearance of granite. The larynx and trachea contained sanguineous froth. The surface of the pericardium covering the heart was also ecchymosed. The heart contained fluid blood only. The abdominal viscera were normal, but the stomach was distended by a large quantity of bloody mucus.

Tardieu concluded that—1. The infant was mature, vigorous and viable. 2. That it had lived and breathed. 3. That the death was due to suffocation, the air having been forcibly hindered from entering the air passages. 4. That there was no reason to attribute death to any accident of parturition, or to any feebleness on the part of the infant. (Page 314.)

12. Tardieu's 6th Case. — In this case the vigorous and mature male child of a single woman was found in a tub of bran. The body was covered with the fine dust, and the nose and mouth were filled with the same. The infant weighed 6 lbs., the osseous nucleus of the femur being well-marked. The cord was broken fourteen inches from the navel. The lungs were mottled, and were very large and emphysematous, with sub-pleural ecchymoses. They floated both entire and in fragments, but not buoyantly. The trachea contained bloody froth, and some bran dust. The heart was empty. The stomach contained bloody mucus. The other abdominal organs were normal.

Conclusions :—1. That the infant was mature, viable and robust. 2. That it had lived and breathed. 3. That death was the result of suffocation in bran. (Pages 260, 271, 315.)

13. Tardieu's 7th Case.—A female infant, mature and well formed, found in a box. The cord was cut and not tied. The post-mortem symptoms were those of suffocation. The child had clearly lived and breathed. Death was, however, not due to its being suffocated in the box, for the lower lip which was turned inside out, and flattened, its mucous membrane resembling parchment, bore the marks of a woven fabric, some portions of which adhered to it. The tongue also had some fluff on it. The child had clearly been suffocated by a linen cloth applied to the mouth. (Page 315.)

14. Tardieu's 10th Case.—Six pieces, parts of the child of a single woman, were found in a small tub. The head and one foot were missing. The trunk had not been opened. It was much putrefied. The cord was broken off at about 2½ inches from the navel. Osseous nucleus large. The

lungs were marked with sub-pleural ecchymoses. The mutilation was done with some blunt instrument. The sexual organs, one foot, and the head were wanting. The condition of the lungs showed that death had resulted from suffocation. A head was discovered seventeen days after, which corresponded to the dimensions of the body. There were marks of compression at the sides of the nose, and on the inside of the upper lip. These confirmed the conclusion that the infant had been violently suffocated. (Pages 315, 322.)

15. Tardieu's 11th Case.—"On June 3rd, 1855, at the Paris Morgue, an infant was examined, who had been found in a public privy [*fosse d'aisance*], and whose mouth was stuffed up with a piece of paper. It was about an 8½ months' child, but small, weighing rather less than 4½ lbs. It was not much putrefied. The cord was entire, and attached to the placenta There were no signs of violence. There were post-mortem stains on the knees and on the front of the legs. The mouth was disfigured. The lungs were of a pale red colour, and very large. The child had clearly breathed. There were numerous sub-pleural ecchymoses. The heart was full of fluid blood. Decomposed blood was found in the stomach. The death was clearly due to suffocation by the paper, the child being thrown into the privy after death." (Pages 260, 315.)

16. Tardieu's 20th Case.—A male child, 16½ inches long, and 3⅓ lbs. in weight. The cord had been broken 6½ inches from the navel. No osseous nucleus was noticed at the lower end of either femur. On the neck and knee there were severe bruises. The scalp, particularly on the right side, was distended by a thick layer of fluid blood. The whole right parietal bone was broken into many fragments; the dura mater was torn, and the brain substance was escaping. The lungs were rosy red, not very large, but floated and contained air. The stomach was empty, and the abdominal viscera normal.

Conclusions :—1. The child had reached eight months of intra-uterine life, and was well formed, viable, and newly-born. 2. It had lived and breathed. 3. It died from fracture of the skull, caused either by a very violent blow, or by a fall from a great height. 4. This fracture was not accidental, nor were the injuries to the limbs. 5. The fractures and injuries did not happen at the birth. (Pages 319, 321.)

17. Tardieu's 21st Case.—M. Tardieu was asked to give an opinion on the facts elicited by Dr. Tercinier's careful examination of a female and her child from Cognac (Charente-Inférieure). The infant, much decomposed, was dug out of the ground. It weighed nearly 5½ lbs., and measured twenty inches. There was, however, no distinct osseous nucleus in either femur, but only well-marked vascularity. In other respects, the body was well developed. The lungs, which were of a dull red colour, floated at first, but on the bubbles of gas being pressed out, they sank completely. The head appeared flattened, and as if crushed. The bones of the skull

were in many parts broken into fragments, one of which had perforated the scalp. These fractures extended from one side of the head to the other, and included both the parietal and temporal bones. They were accompanied by a very circumscribed effusion of blood, *coagulated at the very spot where it had escaped.* There was also sanguineous infiltration of the tissues, extending over the entire scalp covering the fractures.

MM. Tercinier and Tardieu concluded:—1. That the infant was not mature, but was very nearly so. 2. That it had not breathed, but had lived (chiefly inferred by the coagulation of the blood). 3. That it was killed before it had time to breathe; and, 4, that the death was due to the skull having been crushed by criminal violence. (Pages 266, 268, 321.)

18. Tardieu's 28th Case.—Case of a tall, strong woman suspected of infanticide. She said that three days before examination, she had suddenly, about a fortnight before the time she expected, whilst walking about, been delivered, after three or four sharp pains. She said the child came out and went in again, and that she was obliged to seize it by the neck. She stated further that it *scarcely* showed any signs of life, and did not utter a single cry. She had thrown the afterbirth into the privy. The sexual organs of the woman were the seat of a sanguineous flow, having the characteristic odour of the lochia, and her chemise was soiled. The vulval aperture was much dilated. The abdominal walls were relaxed and thrown into folds [*lit.*, pleated]. The uterus was large, and could be felt above the pubis. The breasts were very large, hard, and gorged. The pulse was quick and the face flushed. It was therefore concluded that she had been delivered, and that within four days of the examination.

Examination of the infant.—A girl. Weighed 7½ lbs., measured 20¼ inches [11 inches to the navel]. Head measured 4½ by 3 inches. The cord was torn off ½ inch from the navel. Nose flattened. Marks of pressure evident on the sides of the nose. On each side of the windpipe were bruises corresponding in shape to the nails of the fingers, three on the left and one on the right side, pressed inwards. There was subjacent infiltration. The lungs were large, and floated, and were marked with ecchymotic spots. The heart contained dark coagulated blood; the stomach was empty and free from saliva. The intestines showed intussusception.

Conclusions:—1. The child was mature, born at term, well formed, and viable. 2. It was born alive, the air completely filled the lungs, and in all human probability it must have cried. 3. It was killed by pressure on the mouth and nose, and by the pressure of the fingers on the throat (windpipe.) The lungs showed that it had probably struggled. 4. It was suffocated soon after birth, and had swallowed nothing. 5. These injuries, considering their seat, were not inflicted in any attempt at self-delivery. (Page 315.)

19. Tardieu's 37th Case.—M. Tardieu was consulted by letter on a very singular case, in which the infant of a domestic servant was found in the pipe of a closet, the pan of which had the peculiarity of being open only

when the user was seated in the closet. ["La cuvette de ces lieux est à bascule, c'est-à-dire ne s'ouvre qu'au moment où l'on est assis sur le siége."] The pipe was large enough to admit the infant, but the body stuck part way down the pipe, and the police, by order of a magistrate, tried to shove it down, and succeeded in doing so, by means of a heavy leaden weight. The cord had been violently torn at a little more than 3 inches from the navel. The question arose if the injuries on the infant's head and face were due to the violence thus employed, or were there before; also whether the child had accidentally fallen into the pipe in being born. To these questions M. Tardieu replied :—1. That the cord was too strong to allow of the child thus falling through the pan into the pipe. 2. The injuries to the head were too serious and too general to have been caused by the police. 3. Death was doubtless due to criminal violence. (Pages 302, 314, 321.)*

20. Tardieu's 49th Case.—Infant male. Entire length 20½ inches, and 12 inches from head to navel. Weight 5 lbs. 10 ozs. Diameters of head, 4⅓ inches fronto-occipital, $3\frac{7}{10}$ bi-parietal. Cord torn and not tied. No putrefaction. Colour normal. Odour fæcal.

The examination led to the following conclusions :—1. The infant was mature, born alive, and viable. 2. It had lived and breathed. 3. Death resulted from immersion in the privy. 4. The flattening of the head and the ecchymoses on its most prominent parts show that pressure was exerted to force it into the privy, and that it did not get there by accident. 5. The state of the lungs, and the quantity of fæces in the stomach show that the child was thrown alive into the privy.

[In Tardieu's next case (No. 50), the infant was thrown alive into a drain, but was rescued living, and made a good recovery.] (Page 314.)

21. Tardieu's 54th Case.—Autopsy at the Morgue, on a child born of a single woman, at the seventh month. Weight 2¾ lbs. It was covered with blood. The cord had been cut by a doctor, who arrived just as the child was dead. At the top of the head a wound was found shaped like an M, with the edges somewhat bruised. It was certainly made with scissors, and not caused by a fall. Infiltrated and coagulated blood was found beneath and around the wound. The bones and the brain were uninjured. Lungs fœtal. The heart contained blood. The infant had been

* The cephalotribe, and other obstetric instruments, cause crushing of the head in the infants on whom they are used. Those who have seen such cases would easily recognise the appearances. But in such a case, there would probably be deformity of the mother's pelvis—for infant life is too easily destroyed to render it probable that either a midwife or male accoucheur would take the trouble to crush the head of an infant when there was no disproportion between the head and the pelvis. The possibility, however, should not be forgotten. [Guy's Hospital Museum and that of the Obstetrical Society contains some casts of such heads. See also a paper of Dr. Braxton Hicks in the "Obstetrical Society's Transactions."]

born alive, but respiration was never established. It was wounded with the scissors, no doubt within the uterus, and as the child was premature, this wound was severe enough to cause death. The woman had milk fever, with sanguineous lochia. The uterus was large, and there were other traces of a very recent delivery. (Page 318.)

22. Tardieu's 55th Case.—On the 30th August, 1865, at Mésanger, about 4.30 a.m., Jeanne Lévêque went to the room of her servant, a girl named Lefeuvre, and asked her to make her a cup of black coffee. When the servant returned she saw her mistress stooping at one corner of a cabinet opening into the room. At 8 p.m. she was found lying in the servant's bed. There was blood on the floor, and on her sabots. She said she had toothache and pain at the heart, that she had spat blood, and that her nose had bled. She had for some time been supposed to be pregnant through her brother-in-law, and the servant did not doubt that her mistress had been delivered, though the latter denied it vigorously. The medical examination left no doubt of her condition. She then *recollected* that on the 30th of August she had given birth to a male child. She pretended, however, that it had never cried. She had covered it up in a counterpane, and carried the corpse into an empty bed in another room. Her sister came to see her at 11 p.m. She told her sister that she had vomited blood, but still denied the birth. The domestic buried the child at 10 p.m. the same night, in the high road four miles off. At 4 a.m. she dug it up again, and threw it into a caldron of boiling lye. After some time she pulled it into small pieces with her hands, and put the pieces, through the bung hole, which was less than two inches in diameter, into a barrel of vinegar.

Notwithstanding all this boiling, etc., it was possible to recognise parts of nearly all the organs. Thus, the bones of the head and face, parts of the chest, pelvis, tongue, liver, intestines, heart, and lungs were recognisable. They clearly belonged to a mature child, well formed and healthy. The examination of the lungs made it probable that the child had breathed for a few seconds. These remains were afterwards submitted to Dr. Thoinnet, who was able to recognise all the parts named, and to establish that they had been forcibly torn apart. The flesh was sodden, and loose from the bones; the skin was gelatinised; the crystalline lens was white like a fish's eye when boiled. The spine had been divided by some cutting instrument. The heart had been cut in two—to one of these pieces, one lobe of the right lung was attached. The lung tissue was reddish, crepitated under the fingers, but no gas escaped when pressed under water. Put under water, it sank slowly, and remained suspended, or resting on one of its corners at the bottom of the vessel. Other fragments of darker colour sank at once. Before reporting, Dr. Thoinnet tried a comparative experiment on the lungs of a young calf, which he boiled in lye till thoroughly cooked, and found it had the same colour as those of the child. Though the animal had lived some days, the lungs, after the combined action of the

boiling lye and the vinegar, showed the same results as those of the child of Jeanne Lévêque. (Page 322.)

23. Tardieu's 56th Case.—This report is one of great interest, but very lengthy. The careful examination of cinders and other remains proved that one packet sent to the reporters contained the bones of a young pig, and that another packet contained a number of fœtal bones, more or less perfect, from an infant at term. The presence of phosphorus and calcium, and also animal fat, was determined in the ashes. In another packet there were only portions of earth, mould and other mineral and vegetable matters. (Page 322)

[Tardieu's 57th and 58th cases are those of the remains of infants attempted to be destroyed by fire. The latter is known as the "*Affaire Lemoine.*" The medical witnesses found great difficulty in identifying any individual bones. A portion of one orbit, some remains of vertebræ, and part of the right frontal bone being most evident.]

24. Gazette des Hôpitaux, Nov. 7, 1846, p. 523.—(*Dr. Stanelli.*) —A pregnant woman, five days before the expiration of her full term, fell whilst running, so that her belly struck sharply against a jagged stone. Four days after, she was delivered of a dead and putrid child, and she herself died in an hour. The child's head was greatly swollen, and the skull was found almost crushed, the parietal having become separated from the temporal bones, as if by external violence. There were no other injuries on the child except those of the skull. (Pages 302, 319.)

25. Tardieu reports a case of fracture of a child's skull by the mother falling out of window whilst in the very act of labour! (*See* also H. Blot, "*Bull. de la Société Anatom.*," xxiii., 1848, p. 198.) (Page 319.)

CHAPTER VII.

ASPHYXIA.

Meaning of the term—Symptoms produced—Periods of Asphyxia—Post mortem appearances indicative of Asphyxia.

ADMITTING that drowning, hanging, strangulation, suffocation, and the action of poisonous gases are modes of death that are so far distinctive as to require separate treatment, nevertheless, on the other hand, their points of resemblance are many and striking. There appears, moreover, a practical convenience in considering the points of agreement in the first instance, and then commenting on the special circumstances of each fatal ending. The usual mode of death in all is by *apnœa* (*a*, priv., and *πνέω*, I respire), or, as it is commonly called, *asphyxia* (*a*, priv., and *σφυξις*, pulse) (Part I., pages 283—287).

Asphyxia means the non-aëration, or the imperfect aëration, of the blood, from a want of fresh air. But asphyxia is not death, for the heart may beat for two or three minutes after breathing has ceased. This is the physician's opportunity to recover the asphyxiated and apparently dead. When the action of the heart actually ceases, then the patient is dead past recovery.

Before, however, considering the causes that may occasion asphyxia, we may consider generally—

1. The Symptoms produced by Asphyxia.

2. The Post-mortem appearances indicative of Death from Asphyxia.

I.—The Symptoms produced by Asphyxia.

The general symptoms of death by asphyxia, are *lividity* of the whole face, and more particularly of the lips, fingers, and extremities generally, with *convulsive* movements—at first more or less voluntary, though instinctive or reflex—constituting the patient's struggles to breathe and to maintain life.

Consciousness is soon lost. In an early stage, however, all the senses may be unusually acute, and memory so incredibly active, that the events of a lifetime will be crowded into a moment. This stage at most only lasts a very short time.

Following on this, we may note involuntary and unconscious spasmodic clonic movements of the muscles and limbs, probably due to the stimulus exerted by the non-arterial blood on the motor centres of the brain and spinal cord. The veins become turgid, and the pulse, at first full and compressible, gradually becomes more and more feeble. There is often frothing at the mouth, the froth possibly being tinged more or less deeply with blood. Blood not unfrequently escapes from the nostrils, anus, vagina, and other mucous tracts. The urine, fæces, and semen may be discharged involuntarily. Abortive efforts at respiration are made for awhile, but finally these cease, and after a certain interval, the heart no longer beats.*

Here, then, we note four distinct periods in asphyxia :—

(1.) A period of intense, sensible, although ineffectual, efforts to breathe.

(2.) A period of insensibility, conjoined more or less with irregular, convulsive and involuntary spasms.

* Shakespeare, with his usual felicity of expression, has condensed all into a few lines :—

> "But see, his face is black and full of blood ;
> His eyeballs further out than when he lived,
> Staring full ghastly like a strangled man ;
> His hair upreared ; his nostrils stretched with struggling ;
> His hands abroad displayed, as one that grasped
> And tugged for life, and was by strength subdued."

(3.) A period when, although life *seems* at an end, owing to the failure of respiration, it may be again resuscitated because of the continuance of cardiac action.

(4.) Its termination in death after the action of the heart has ceased.

With respect to the time occupied by the first three stages, there are well marked differences, dependent, not so much on habit, as on the *exact* mode of death. Curious to say, habit seems to have but little influence on the length of time that people can bear deprivation of air. The first two periods may occupy from three to five minutes; but they may be concluded almost instantaneously, if, as may occur in strangulation, the compression is complete when the ligature is first applied, or, as frequently happens, asphyxia is associated with syncope. From the beginning to the end, however, ten minutes may be regarded as an outside limit.

II.—The Post-mortem Appearances indicative of Death from Asphyxia.

(1.) *Lividity of the lips, extremities, and general surface.*

As a rule, the face betokens pain and suffering. When however, suffocation is gradual, or syncope has taken place, the features may be placid. This is often the case in infants that have been suffocated, and also after death by drowning. The eyes are generally fixed and prominent, and the tongue (more especially its root) red and swollen.

(2.) *Hypostases*, or *post-mortem stainings*, are usually of darker colour than occur in other forms of death. In some cases of drowning, however, for reasons which will appear subsequently, external hypostases are not present.

(3.) The *veins* over the entire body will be found gorged with blood of a dark colour. The *arteries*, on the contrary, will be found, for the most part, empty, particularly in young subjects.

(4.) *The right side of the heart* will generally be found full,

corresponding with the venous hyperæmia, and the state of lungs about to be described.

But this overloaded state of the right heart, and we may add, too, of the lungs, is by no means an absolutely constant post-mortem appearance. Dr. Chevers, admitting that it is a frequent result of asphyxia, states that he has observed many cases where the right heart was not unusually loaded, and several where, the auricle being distended, the ventricle was well contracted. According to Chevers (see "*Med. Juris.*," p. 645, etc.)—

(*a.*) The heart is *over-distended on the right side*, where a mechanical impediment has occurred to the passage of blood through the lungs (*e.g.*, in emphysema), or in cases of *sudden* death, as under the full action of prussic acid; but—

(*β.*) That, in cases where the action of the heart has continued after the cessation of respiration, *the right ventricle* is then commonly *well contracted and nearly empty*, the lungs exhibiting extreme congestion.

(5.) *The lungs* in most cases will be found *gorged with blood*, resembling (except that the blood is of a darker colour) the condition known as red hepatization. The mucous membrane of the bronchial tubes will be found intensely injected with extravasations of blood (see No. 6), and the tubes themselves full of frothy, bloody mucus. But there are, we admit, exceptions to this rule. Dr. Chever's experience is, that the lungs in asphyxia may be found in almost any condition, *i.e.*, from a state of extreme vascular distension, attended with rupture of the vessels (pulmonary apoplexy), to one of unusual bloodlessness. Here, too, we must note an important pathological fact, viz., that in young and healthy subjects, and particularly in children, it will often be found that the blood-vessels of the lungs have emptied themselves after the heart has ceased to beat. The lungs may therefore in such cases be comparatively bloodless, but from the violent efforts made to breathe, present an emphysematous condition.

To repeat:—Admitting exceptions, we say that as a rule the lungs after death from asphyxia are congested, and that the

right heart with the vena cava and pulmonary artery are distended with dark fluid blood; whilst the left heart, the aorta and pulmonary veins, are usually nearly empty.

(6.) *Extravasations of blood* (some minute and stellate, others of irregular form, and many of bright colour) *will be found on the mucous and serous membranes* (pleuræ, pericardium, peritoneum, membranes of brain and lining membranes of the ventricles, the conjunctivæ, and the mucous membranes of the respiratory, digestive, and genito-urinary tracts). M. Tardieu attributes great importance to these extravasations in cases of infanticide, since he believes them to be present only after death from suffocation. The trachea and larynx are specially liable to be turgid after death from asphyxia.

(7.) *The membranes of the brain,* particularly its veins and sinuses, will, in most cases, be found gorged with blood, numerous "*puncta cruenta*" or bloody spots appearing when the brain is sliced.

(8.) *Serum will be found extravasated into serous cavities.*

(9.) *The mucous membranes* generally are very *turgid.*

(10.) *Rigor mortis is said to set in slowly.* It is usually well marked and persistent. The muscles may become tetanized at death, and after death remain fixed in that condition.

(11.) In hanging and other violent deaths, the genital organs are often turgid and erect, so that we get priapism in the male, and an analogous condition in the female. In drowning, the penis is often retracted and the scrotum shrunk, unless the genitals generally be distended with the gases of putrefaction. The bladder is sometimes filled with blood-stained urine. Sometimes the urine, fæces, and semen or prostatic fluid are discharged at or about the moment of death.

(12.) *The viscera generally* (*liver, spleen, kidneys, etc.*) *will be found enlarged, and congested with dark venous blood.*

(13.) *The blood itself will be found unusually fluid and dark in colour,* containing less oxygen and more carbonic acid than normal. Sometimes carbonic oxide will also be present, and if in quantity (as after death from the effects of burning charcoal), the blood will be found of a *bright* red colour, the congested organs generally also exhibiting a bright red appearance.

In dealing with the various forms of death by asphyxia, we notice that each possesses special characters of its own. Thus after death by drowning and hanging, we occasionally find the same post-mortem appearances as we find after death from syncope. The heart may fail, and fainting occur in the first moments of submersion or of suspension, and thus nearly all the phenomena be changed.

CHAPTER VIII.

DROWNING.

Relative Weights of Different Waters and Animal Tissues—Results of Submersion in Water—Causes of Death—Treatment—Post-mortem Appearances—Period of Submersion—The Floating of Bodies—Accidental, Suicidal, and Homicidal Drowning.

(ILLUSTRATIVE CASES, Page 374.)

DROWNING signifies death resulting from the exclusion of air by water or other fluid.

As a rule, in cases of drowning two distinct sets of phenomena occur, viz., (*a*) those due to suffocation, and occasionally to syncope and other causes, and (*β*) those due to prolonged immersion in water. And here we may remark that the discrepancies noted in the description of drowning given by various medical jurists, are traceable to their forgetting that the cause of death may be a mixed one, and that the after-death appearances must in some measure depend on the interval that has elapsed between death and the post-mortem, as well as the medium in which the submersion occurred.*

* Devergie's figures ("*Méd. Légale*," vol. ii., p. 336), as given by Dr. Taylor, are as follow:—

Asphyxia, pure	25·0	Asphyxia ...	87·5
„ and syncope	62·5		
„ and cerebral congestion			
Syncope, apoplexy, or concussion			12·5
			100·0

Dr. Ogston's results are very similar, "*Medical Gazette*," vol. xlviii., p. 291; "*Med. Times and Gazette*," 1876; Dr. Löffler, Henke's "*Zeitschrift der S. A.*," 1844, 1.

We shall consider the following points :—

1. The weight of water (sea and river) relatively to that of the various constituent parts of the human body.
2. The general results of submersion, and the modes of death in drowning.
3. The treatment to be adopted in recovering the drowned.
4. The post-mortem appearances after death by drowning.

The following practical questions will then be discussed :—

5. How long a time has the body been submerged ?
6. How soon after death by drowning does a body float ?
7. Was the death actually caused by drowning, or was the body thrown into the water after it was dead ?
8. Was the drowning accidental, suicidal, or homicidal ?

I.—The Relative Weights of Water to those of the various constituent parts of the Human Body.

Distilled or rain water being regarded as 1·000 at 60° F. (15·5° C.) and 30 in. Bar. Pr., sea water is about 1·028°. River, well and pond waters, although varying slightly according to the amount of solid constituents present, rarely exceed 1·005 sp. gr. Ice has a specific gravity of 0·9175, water in freezing expanding by about 1-11th of its volume.

The human body, on the other hand, has a specific gravity (say equal to 1·08 to 1·1) *slightly greater than that of any water.* Dr. Taylor's remarks on this subject deserve quoting. He says—"The specific gravity of the human body in the *living* healthy state, is made up of the combined specific gravities of its different parts, so that, as in all heterogeneous solids, it is a very complex quantity. In the first place about 72 per cent. of the weight of the body consists entirely of water, hence the question of specific gravity can refer only to the remaining 28 per cent. of dry solids. The only part of the body which is lighter than water, is fat. The specific gravity of this is 0·92, and it is calculated that the proportion of fat in an adult is about 5

per cent., or one-twentieth part of the weight of the body. The specific gravity of muscle is 1·085, of brain 1·04, of the soft organs generally 1·05, of the lungs containing air 0·94, and of bone (the heaviest part of the body) 2·01. The lightness of the fatty portions is more than counterbalanced by the weight of the skeleton (about 10½ lbs. in the male, and 9 lbs. in the female), *so that the naked human body, placed on water has a slight tendency to sink.* This tendency diminishes just in proportion to the quantity of the body immersed, because all those parts which are out of water, not being supported by water, become so much additional absolute weight to the portion immersed. Hence the frequent cause of death by drowning. An inexperienced person exhausts himself by exertion, raises his arms continually out of the water, and as often sinks, owing to their weight having just so much effect on his body as if a leaden weight had been suddenly applied to his feet to sink him. When the *whole* of the living body is immersed, the specific gravity owing to the expansion of the chest, differs so little from that of water, that a very slight motion of the hands or feet will suffice to keep a person on the surface. The head, owing to the weight of the bones of the skull, has always a tendency to sink below the level of water."

As corollaries to this statement, remembering that fat is specifically lighter, and bone specifically heavier, than water, we may note that—

(*α.*) Fat people float best, and lean and bony people worst.

(*β.*) Women float better than men, their bones generally being of less size, whilst the breasts, if well developed, assist to buoy up the chest. Often, too, at first the clothes of a woman help to keep her afloat.

(*γ.*) Infants, owing to the imperfect development and small proportionate extent of their bones, and their frequent fatness, float better than adults. Indeed, frequently it is scarcely possible to make an infant sink in water at all, or if it be made to sink, it rises almost immediately.

(*δ.*) Persons with large, well-developed chests float well, on account of the large quantity of air in the lungs, and the lightness of the contained viscera.

(ε.) During inspiration there is a tendency for the person to rise, and during expiration to sink.

(ζ.) *Some bodies will not sink in sea-water.* Of this Dr. Taylor records an instance, the specific gravity of the body being presumably about the same as that of the water. Every structure of the human body floats in the water of the Dead Sea.

(η.) Many cases are recorded where bodies float within a very short time after death by drowning. (*Case* 1.) (Taylor, "*Med. Juris.*," vol. ii., p. 26.)

(θ.) Cork being relatively so much lighter than water (specific gravity 0·240), a very small quantity only is required to keep a man afloat. It is calculated that 12 lbs. of cork cut in slices, properly arranged and covered with canvas, would sustain six unclothed persons, each of ten stone, or making allowance for clothes, four persons. From three to four pounds of cork may thus be considered sufficient to float one person. It must be so arranged under the armpits, as not to impede respiration or the use of the arms. Inflated india-rubber is equally efficacious for this purpose with cork, but less reliable.

II.—The General Results of Submersion, and the Causes of Death in Cases of Drowning.

Death in drowning under ordinary circumstances results from *asphyxia*, simple or mixed (p. 342, note). It is important we should understand the precise circumstances that may influence the cause of death in cases of drowning.

We borrow the following excellent description of drowning from Guy and Ferrier's *Manual*:—

"When a man falls or is thrown into the water, he soon sinks to a greater or less depth, but almost immediately rises to the surface again; and if he is a swimmer, makes efforts to save himself, till at length he is reduced to the condition of one who cannot swim at all, with this difference, that he has already exhausted the strength which the other has in reserve for the

death-struggles common to both. These struggles consist of irregular movements of the arms and legs, and graspings of the hands at all objects within reach, whether floating in the water, fixed at the bottom, or growing on the banks. In the course of these irregular movements, he rises repeatedly to the surface,* tries to breathe, and takes in air and water. The contact of the water with the windpipe causes a cough, by which part of the fluid is rejected, and with it some air from the lungs. This occurs again and again, till the body no longer rises to the surface; water alone is received in the vain efforts to respire, while forcible involuntary expirations continue to expel the air from the chest. At length all these efforts cease, the body sinks to the bottom, and bubbles of air are forced from the chest by the elastic reaction of its parietes. The greater part of the water which has entered the mouth finds its way into the stomach, the rest into the lungs; and this residue, mixed with the secretions of the mouth and air-passages, and frothed by the air inspired and expired, forms the foam so constantly met with in persons who have perished in this way. In cases belonging to this class, we may expect to find the appearances proper to death by apnœa, coupled with those of the medium in which the death takes place. In the case of the swimmer death may take place by exhaustion, with less distinct signs of death by apnœa."

As regards time, two minutes may be taken as an outside period for the commencement of asphyxia, and five minutes after submersion as the ordinary time when death occurs.

Thus starting with *apnœa* pure and simple as the most common cause of death, we remark that there are many other causes which may directly produce the death, or which at any rate may act as modifying circumstances. Of these we may note the following:—

(*a.*) *Syncope* (Neuro-paralysis).—This may result from shock; from fright, as *e.g.*, from the dread of sharks, or of some spe-

* It is popularly supposed that a drowning man rises three times. The author can state from observation that on the one hand this number is often exceeded, whilst on the other hand (as in cases of shock or syncope) the sufferer often only rises once, or at most twice.

cially dangerous spot; from drunkenness; or from hysteria or catalepsy occurring at the time. In this form of death there may be no struggles for life, consciousness being lost at the moment of immersion. But nothing short of *complete* syncope, which would be fatal either in or out of the water, could entirely prevent some of the results of death by asphyxia.

(β.) *Exhaustion.*—This may be a cause of death in a swimmer, who makes violent and ineffectual efforts to prevent drowning. Exhaustion is likely to result from remaining long under water after a full meal, also if the person becomes embarrassed with high winds and strong currents, and more particularly if the accident happens on a cold and dark night. ("*Lancet*," 1879, ii., p. 598.)

(γ.) *Concussion.*—This may result from violent collision of the chest, head or abdomen with the bed of the river (*Case* 62), or with the banks, or with rocks or posts in the water, or even with the surface of the water itself.

(δ.) *Apoplexy.*—This results from extravasations of blood or of serum occurring during either the first violent struggles for life, or possibly, in the case of suicides, immediately before the person jumps into the water. (*Case* 60.)

(ε.) *Cramp.*—The muscles of the extremities being first tetanized, the spasm extends to the muscles of respiration, and perhaps to the heart itself.

And to these several causes we may add *shock* (a cause not unlikely to occur where the heart is feeble and the circulation languid), and in epileptics, the sudden advent of *an epileptic seizure.*

In *Cases* 25 and 25*a*, where immersion occurred in ice-cold water, the bodies being afterwards found to have retained the precise position they assumed at the last act of life, none of the special appearances of death by drowning were recorded. In such cases death is instantaneous, and probably painless. It is evident that the combination of intense cold and shock was the direct cause of death in these cases, rather than submersion in the water. Dr. Richardson considers this sudden collapse in ice-cold water is due to exhaustion following on peripheral

nervous shock, resulting from the cold, and quickly succeeding exhaustion of the nervous centres.

Thus in drowning we may have death beginning at the lungs, the head, or the heart; or we may have what is more common, death from a combination of several causes.

Respecting this combination of causes, Dr. Ogston remarks that, given a death from pure syncope, it is unphilosophical to say that the cause of death was drowning. But "nothing short of complete syncope, such as would be at once fatal in or out of the water, would in such a case hinder the phenomena of asphyxia from taking place to some extent in a submerged body." Given a person dead-drunk or even in an apoplectic fit, it is hard to conceive that such conditions would prevent some instinctive efforts being made to breathe, and as a consequence a combination of the post-mortem appearances of apnœa with other states. Nevertheless allowing that apoplexy, concussion, etc., may play their parts as modifying circumstances, we may be tolerably certain that if a person fell into the water alive, and died as a result, asphyxia would be the primary cause of death.

Death may result from secondary causes. Of these pneumonia is the most common, caused by the physical injury inflicted on the lungs from water penetration. (*Cases* 64, 68.)

III.—The Treatment of the Drowned.

And here we must note, first of all, the physiological effects of drowning. A person falls into the water. Air is excluded, and the blood receives no new reviver. Asphyxia results. The air in the lungs at the time of submersion escapes, and water takes its place. Still the blood circulates, impure though it be. Respiration at an end, the heart gradually slackens both in force and rapidity. Nevertheless so long as the heart beats rhythmically, however slowly and weakly—that is, with more than a mere convulsive or spasmodic action—and although breathing be at an end, there is a chance for the patient. At last the heart ceases to pump the impure blood. It is then that asphyxia

has passed into death, and that no external influence can set the force-pump at work again. But until this absolute stoppage of cardiac action occurs, there is hope of the patient's recovery, and it is difficult for the auscultator to say with precision when the heart has absolutely ceased to beat. The important fact to remember is, that the cessation of respiration is not death, but that the actual stoppage of the heart is. (*Case* 67.)

The first question is, *How long after submergence is it possible to restore life?* In other words, How long may the heart continue to beat after complete immersion in water? It would be absurd to attempt to restore vitality in the case of a putrefied body. But a bruise must not be mistaken for putrefaction. Again, if a body were found floating, it would as a rule be of little use to attempt resuscitation, because floating is *generally* the result of the putrefactive process;—generally, we say, because there are cases on record of fresh bodies floating. Dr. Voisin ("*Gaz. des Hôp.*," Sept. 5, 1882) in his report to the Paris Municipality on the treatment of the drowned, records the almost absolute certainty of restoring life within five minutes, whilst he has succeeded in effecting resuscitation up to twenty minutes, after submersion. These good results, he states, have been obtained in individuals, not merely in a state of syncope, but in an asphyxiated condition. The treatment adopted, to which he ascribes such excellent results, has been the rigorous and immediate use of Silvester's process, the application of warmth to the body by calorific generators, and quietude after restoration.

The experiments of the Committee of the Medico-Chirurgical Society ("*Transactions*," vol. xlv.), show that in animals suffocated otherwise than by drowning, the respiratory movements cease after about five minutes, the heart continuing to beat for some three or four minutes longer. We thus get a total of eight or nine minutes as the maximum period within which the dogs and other animals experimented upon, could be revived. But after complete submersion in water, about two minutes was the longest period within which animals could be restored. This was probably due to the entrance of water into the lungs, whereby certain physical changes are induced, in addition to the mere

exclusion of air from the lungs. In the human subject, admitting that a somewhat longer period may elapse, and yet life be restored, we doubt if there is much chance after five minutes complete submersion. (*Cases* 13, 17.) In *Case* 18, the man could not be restored although submerged for five minutes only, and immediate treatment adopted. Divers, we are informed, cannot, as a rule, bear more than from a minute and a-half to two minutes' entire submersion. Dr. Wooley (for many years medical officer to the Royal Humane Society) met with but two cases of recovery after five minutes' submersion. Remarkable cases, it is true, of recovery after very long periods of time are recorded. (*Cases* 12, 14, 16, 71.) It is very likely, however, that in these cases, the face was not completely submerged under water the whole of the time, or that some other unusual conditions existed. (*Cases* 70, 71.) Even in the longer authentic periods of a quarter or half an hour, syncope had probably in most cases occurred. Yet, as the precise circumstances of each case are usually more or less uncertain as to time, we should, as a rule, try to restore animation in all cases where a perfectly fresh body is taken out of the water. And as to the length of time devoted to each case, the author knows, from personal experience, that two or three hours' efforts may sometimes be necessary to restore the circulation completely. In *Case* 14 it is said that there were no signs of animation for 8½ hours! ("*Med. Times and Gaz.*," August 31, 1878, p. 258.)

The indications for the treatment of the drowned are:—

(1.) To restore animal heat.

(2.) To stimulate the action of the heart.

(3.) To carry on artificial respiration, until the natural action is resumed.

(4.) To rouse the nervous centres.

(5.) To combat the tendency to death from inflammatory or other sequelæ.

The popular methods of hanging the body up by the heels, or of rolling it on casks and other rough processes, are to be condemned *in toto*. All violence is objectionable, for violence may rupture viscera.

Treatment should be commenced *at once, on the spot, in the*

open air, whilst blankets and dry clothing are being fetched. In order to get rid of water in the mouth, etc., the body may be placed for a *few seconds* with the head a little lower than the feet, and the face downwards, the mouth being kept well open, and the tongue drawn forwards. This done, the body should be turned on the back, and the head and shoulders slightly raised on a board (a door or shutter serving the purpose well), forming an inclined plane. Whilst all this is going on, the body should be stripped and rubbed dry, and the froth from the mouth and nostrils removed. Artificial respiration is now to be employed.

Several methods of effecting artificial respiration have been suggested. Compressing the thorax, and Dr. Marshall Hall's postural method, are sometimes used. The report of the Royal Medico-Chirurgical Society (see "*Brit. Med. Journ.*," Nov. 1, 1879, p. 696) on the subject show these methods to be inferior to that suggested by Silvester. This system was proved capable of introducing from 9 to 44 cubic inches of air into the lungs (20 cubic inches being an average quantity in natural respiration);—Dr. Hall's process at most from 8 to 15 cubic inches;—and by compressing the thorax, the pressure being applied either by the hands or by a crossed bandage, from 5 to 10 cubic inches. Life has been saved by all these methods, but the author has known the gall-bladder ruptured by pressure with the hands.

We propose describing in detail, first, Dr. Silvester's method, and then Dr. Howard's direct method.

Silvester's Method.—The feet being well fixed, grasp the arms at the elbows, draw them above the head, and keep them in this position on the stretch for about two or three seconds. Then reverse the manœuvre for about the same length of time, pressing the arms firmly against the sides of the chest. This twofold or alternate movement should be repeated about fifteen or sixteen times a minute, till a spontaneous effort at respiration occurs. Young operators are apt to make these movements too rapidly. Meanwhile the bystanders or assistants can remove the wet clothes, place hot bottles or tins to the feet, and apply hot flannels, or hot bricks wrapped up in flannel, over the præcordial region, to the armpits, etc. The body should be lightly covered over with blankets, and the lower extremities rubbed, etc.

"*Howard's Direct Method.*"—Dr. Howard has issued the following directions for carrying out what he terms his "direct method." 1. *Instantly* turn the patient face downwards, with a large, firm roll of clothing under the stomach and chest. Press with your weight two or three times, for four or five seconds each time, upon the patient's back, so that the water is pressed out of the lungs and stomach, and drains feebly downwards out of the mouth. Then, 2. *Quickly* turn the patient face upwards, the roll of clothing being now put *under his back just below the shoulder-blades*, the head hanging back as low as possible. Place the patient's hands together above his head. Kneel with patient's hips between your knees. Fix your elbows against your hips. Now, grasping the lower part of the patient's chest, squeeze the two sides together, pressing gradually forward with all your weight for about three seconds, until your mouth is nearly over the mouth of the patient; then, with a push, *suddenly* jerk yourself backwards. Rest about three seconds, then begin again. Repeat these bellows-blowing movements, so that the air may be sucked into the lungs about eight or ten times a minute. *Remember*, the above directions must be used *on the spot*, the instant the patient is taken from the water. A moment's delay, and success may be hopeless. As soon as the water is pressed from the lungs, all clothing should be ripped away from the chest and throat. In making the pressure, either for the removal of water or for breathing, increase it *gradually* and thoroughly, and *suddenly* let go with a jerk. With women and children use less force. *Do not stop these movements under an hour*, unless the patient breathes. Be careful not to interrupt first short natural breaths. If they be long apart, carefully continue between them the bellows-blowing movements as before. ("*Lancet*," March 1, 1873, p. 308; May 25, pp. 748 and 757; June 15, 1878, p. 882; Aug. 10, 1878; "*Practitioner*," Sept., 1878; See also a paper by Dr. Howard, on Preventible Deaths from Drowning, "*New York Med. Journ.*," vol. xvi., p. 636; "*British Med. Journ.*," July 9, 1881, pp. 46 and 804; "*Lancet*," 1882, ii., p. 357.)

There can be no doubt that Howard's system has many advantages in practice, and is scientifically accurate.

In some cases respiration may be promoted by ammonia being applied to the nose, tickling the throat with a feather, dashing hot and cold water on the face and chest, and galvanizing the phrenic nerve. To do this, one pole should be applied to the epigastrium, and the other to the nape of the neck, or just above the middle of the clavicle, where the omo-hyoid crosses the sterno-mastoid muscles. Some advise both poles to be applied above, one on each side of the neck. It has been suggested to insert needles or pins, in the hope of touching the phrenic nerves. The galvanism should not be too long continued, as it is possible to wear out the nervous irritability. Thus protracted galvanism may prove, and indeed has proved, dangerous. Fine needles might in very hopeless cases be inserted for a moment into the heart to stimulate its action. In some cases, as, *e.g.*, if after signs of life are manifest, the right heart appears greatly loaded, bleeding to some ounces may be indicated. (See *Cases* by Dr. Heckford and Dr. Woodman, in "*St. Andrew's Med. Grad. Transactions*," vol. v., p. 230.) (*Case* 63.)

When the patient can swallow, a teaspoonful or two of warm brandy-and-water should be given. Afterwards warm beef-tea, or tea or coffee with an egg beaten up in it, or warm milk should be allowed. If swallowing is difficult, these may be injected into the rectum. In some cases, saline injections (at 100° F., or 38° C.) into the veins are indicated.

When respiration is fairly established, the breathing regular and the body-warmth and heart's action restored, the artificial respiration may be given up. But this should not be done, unless the lips and extremities are of a good colour.

An extraordinary case is recorded, where artificial respiration having failed, resuscitation was effected by the application of plates of white hot iron to the upper parts of the body, near the more vital organs ("*Lancet*," 1873, i., p. 195).

But there may be a relapse:—hence the patient must be watched. He should be kept warm with blankets, by friction with the warm hands, etc. All crowding around him should be prevented, for plenty of fresh air is all-important. The inhalation of oxygen has been recommended. (*Case* 68.) Spirits

and water, in occasional but small doses, may now be given. After this, sleep should be encouraged.

Although respiration may be established, death may still result, even at a considerable distance of time (perhaps weeks after the accident), and then often suddenly, from secondary causes, such as pneumonia, shock, exhaustion, spasm of the glottis, etc. ("*Med. Times and Gaz.*," Feb., 1857, p. 148). (See *Cases* 55 to 59, 64, 68, etc.)

Should death result after a considerable interval, the question may arise—Was the disease of which the patient died caused by the immersion, or was it altogether independent of it? The answer to this question cannot be discussed here.

IV.—Post-Mortem Appearances in Cases of Drowning.

Devergie states that death results from true asphyxia in 25 per cent. of drowning cases, and that even in the remaining 75 per cent. it results from asphyxia in a more or less modified form. Hence in all probability the general post-mortem characteristics of asphyxia, already described (p. 338), will be found. (See Ogston in "*Edin. Med. Journ.*" on Post-Mortem Signs of Drowning, vol. xxvii., p. 865.)

The post-mortem appearances peculiar to death from drowning, vary according to the length of time the body has been under water—whether the body was completely submerged or not—whether it rose after submersion—the number of times the person rose to the surface before death, etc. Taking these four points only, it will be evident that we must be prepared to find certain appearances absent that are usually present, and *vice versâ*. Here lies the real difficulty of dealing with this subject. (*Cases* 33 to 36, and 43, 45, 46.)

A.—*External Appearances.*

1. *Position.* The general position of a drowned body is very well shown in the picture of "A Christian Martyr in the reign of Diocletian," by Delaroche, though the head is perhaps a little too high out of the water (Part I., p. 97).

The precise position of the drowned may constitute important evidence. If two persons are recovered from the water clasped in each other's arms, or if a body is found tightly clutching a rope or a piece of timber, the conclusion that death resulted from drowning is greatly strengthened ("*Med. Times and Gazette*," 1867, i., pp. 89, 133).

2. *Goose-skin*, or *cutis anserina* (a roughness dependent on the prominent state of the papillæ), is found in many cases ("*Ed. Med. and Surg. Journ.*," Jan., 1837), and is usually best marked on the anterior surfaces of the extremities. This condition of skin is not in reality, however, pathognomonic of drowning, for it is often met with during life in those who have a thick, firm and granular skin, whilst it frequently occurs after other violent modes of death. It is, however, strongly suggestive, if present, of a body having been submerged, either during life, or soon after death. In other words, the existence of goose-skin proves that when the body was thrown into the water, the skin possessed the power of contractility. Casper explains its occurrence as being due to nervous shock, whilst others trace it to the sudden immersion of a warm body in a cold liquid. Further, cases of drowning are recorded where this appearance has been absent (*Cases* 33 [2 and 3] and 38). Of course if the cuticle is detached by long maceration, no evidence of cutis anserina can be forthcoming.

3. The face after drowning is sometimes rosy red, but usually pale and placid. If, however, a considerable time (such as two or three days in summer, or eight or ten days in winter) has elapsed before a body is recovered from the water, or if a body after recovery has been exposed for some time to the air, it usually appears red and bloated, signs indicative of the commencement of putrefaction. (Martial twits Sextus with having the face of one "sub aquâ natantis" [*Epig.*, lib. ii., No. 87] which the commentators explain as "subpallidam et tumidam.") The mouth is usually more or less closed, and there will, in many cases, be noted around it and the nostrils, a watery froth, which may either be white or blood-stained. Dr. Ogston has never noticed this condition, if the body has been out of water for a day, and it can scarcely be regarded as abso-

lutely pathognomonic of death by drowning. Ogston explains its appearance by the forcible propulsion forwards of the contents of the air passages, from collapse of the walls of the chest, and not, as some have suggested, to a mere superabundance of fluid in the air passages, nor, as others have supposed, to the force exerted by the gases of putrefaction formed in the passages. We shall discuss the precise meaning to be attached to the froth found at the lips and nostrils at greater length hereafter. (See pages 346, 361.) Twenty minutes was the earliest period after the recovery of a body at which Ogston has seen it, and four days the latest. It appears sooner in winter than in summer, but it disappears less rapidly in summer than in winter.

The *tongue* is said usually to be swollen and congested, and sometimes to be so pushed forward as to be lacerated by the teeth. We agree with Dr. Chevers that this is not commonly the case. Sometimes, indeed, we have ourselves noticed it to be specially pallid (*Case* 26).

4. A livid, greyish-blue, corrugated (wrinkled) state of the palms of the hands and of the soles of the feet (washerwoman's or cholera hand) may be noted. This state does not occur unless the body has been submerged for from 12 to 24 hours, and is not inconsistent with its having been thrown into the water after death (Casper, Trans., vol. ii., p. 235). As proof of submersion during life, it is an appearance of no real value.

5. *The eyes* may be found in all conditions, wide open ["Dreadfully staring, through muddy impurity" (T. Hood)], half open, or closed. The pupils are commonly dilated.

6. *Excoriations or abrasions of the fingers* are commonly, but not necessarily, present. We must remember that such abrasions may be produced before forcible submersion, or by the action of running water after death.

7. *Sand, gravel, mud, etc., are often found under the finger nails, and fragments of weeds clutched in the hands.* (*Cases* 39 and 40.) Similarly, sand, small shells, diatoms, etc., may be found in the nose, ears, and mouth. These should be examined microscopically.* If, however, the body remained sufficiently long in the

* In regard to this point, we must not forget that Barbadoes sand, and

water, sand, etc., might find its way into the ears, mouth, and nose, and even under the nails, notwithstanding that immersion took place after death. The presence of weeds in the hands could scarcely be explained by any process of mere deposition.

But although a drowning man clutches at a straw, there may be no straw to clutch. Hence, although the presence of weeds in the hands is strong evidence of death after submersion, we are not to conclude that death did not result from drowning, because we find nothing in the fingers. The hands may be simply closed and contracted, a state which of itself constitutes important evidence. And again, the person may be senseless when either he fell or was thrown into the water, or death may have resulted from syncope, in which case nothing would be found in the hands. Further, if weeds are found tightly clutched, it is important to determine the precise kind of weed. Thus if the weeds clutched by a drowned person are found to correspond to plants growing at a short distance from the water, no weeds of a like kind being found on the banks, such a circumstance would be strongly suggestive of a previous struggle, further proof of which would probably be found in marks of violence on the body. (See *Case* 39.) The presence, however, of weeds in the hand, certainly suggests submersion during life, and moreover submersion in a state of consciousness.

8. *Contraction with retraction of the penis.* This, being a vital act, is supposed by Casper and Kanzler to constitute, if present, a strong link in the chain of evidence by which to prove that death resulted from drowning. Ogston states he has met with this condition in 6 cases of drowning, but that in 2 cases he found a state of erection, and in 22 semi-erection.

The *scrotum* is usually found to be shrunk and wrinkled.

9. *Post-mortem rigidity.* This is generally present (*Case* 38), and sets in rapidly, so rapidly indeed that not unfrequently the body remains stiffened in the last attitude of life. (*Cases* 25, 25*a*, and 41.) In *Case* 41 a child was found with contracted limbs and rigid on the ninth day after submersion. It was,

other foreign materials may be used for ballast, and discharged in a home port.

however, stated that the child was thrown into the water after having died from convulsions, a statement confirmed by the post-mortem appearances.

There is another point requiring notice, *i.e.*, respecting certain deficiencies in bodies that have remained a long time under water. Thus not unfrequently portions of the scalp and lower extremities will be found wanting. No doubt such breaches of continuity would especially occur, where contusions or wounds had been inflicted before death; but such a condition might result from the excessive action of water simply, more especially on parts affected by cadaveric softening of the tissues, whilst it may also be accounted for by the ravages of fish, or more especially of the crustacea. Respecting this latter cause, it may be noted that the edges of injuries so caused are usually sharp and well-defined, whilst in cadaveric softening or simple water erosion, the edges will be found to be softened and ill-defined.

B.—*Internal Appearances.*

1. *The brain.* This is not as a rule very hyperæmic (*Cases* 28, 35). Indeed, Casper and Taylor think the reverse condition the more common. In two cases recorded by Mr. Semple (*Case* 28), the cerebral vessels were nearly empty. Riedell, in experimenting on animals, did not find congestion of the brain in a single case ("*Med. Gaz.*," xlvi., p. 478). The brain, however, is sometimes congested, such an appearance suggesting a combination of coma and asphyxia, as, *e.g.*, from previous intoxication, apoplexy, epilepsy, mania, etc. (*Cases* 26, 28 [2], 30, 31.)

2. *Position of the epiglottis.* Kanzler's conclusion, that after death from drowning the epiglottis is always upright, was based on his experiments upon animals. Even in these, this rule is by no means invariable, still less is it so in human beings.

3. *The fluidity and dark colour of the blood*, from want of aëration and the consequent lessening of its coagulability, though not peculiar to drowning, are signs scarcely ever absent when death has taken place from this cause, and therefore

deserve special mention. A few instances of coagulated blood in the heart, etc., are mentioned by Orfila and others. (*Cases* 33 [1], 37, 42, 63.)

The remarkable fluidity of the blood after drowning has been the subject of investigation by MM. Brouardet and Vibert ("*Annales d'Hygiène Publique*," November, 1880). Counting the number of corpuscles in a given volume of an animal's blood before and after death from immersion, it would appear certain, that a large amount of water (estimated at not less than one-third of the total liquid in circulation) passes into the blood when the drowning has taken place slowly, but not when the death has been rapid. The corpuscles themselves undergo no marked change. Placing a ligature on the œsophagus, they found it made little difference in the quantity of water absorbed, from which circumstance they concluded that the chief entrance for the water is the mucous membrane of the lungs. It has been remarked that animals killed by the injection of water into the air passages, present a slighter amount of hydræmia than those killed by drowning.

4. *The circulatory system.* The pulmonary arteries and venous system are commonly congested with dark fluid blood (*Cases* 27, 28, etc.). But this is by no means always the case. Dr. Taylor refers to several cases where the right side of the heart was empty, or nearly so; and Dr. Norman Chevers has clearly shown that this condition, though not general, does at times occur. Dr. Ogston found the right cavities of the heart empty in 9 out of 116 cases. Riedell (quoted by Taylor) states that the two sides of the heart contained equal quantities of blood in one-half the cases of drowning seen by him, whilst in the other half the right cavities contained the most. In only one case did he find the left side quite empty. (*Case* 26.)

Seeing that death may take place by syncope, asthenia, shock, or concussion, or from some cause combining two or more of these conditions, as in what Casper calls *neuro-paralysis*, there is nothing remarkable in the fact that both sides of the heart may be partly filled, or both be empty and flaccid, or the left side distended more than the right.

5. The *larynx, trachea, and bronchi*, are commonly deeply con-

gested, and of a cinnabar or vermilion colour, the darker shades found, such as the chocolate tint, being due to putrefaction. There may also be evidences of emphysema, in and around the windpipe. Such a condition is suggestive of forcible closure of the mouth before submersion, and of attempts to scream in that condition. These parts frequently, but not necessarily (*Case* 33 [1]), contain frothy mucus, which may be more or less blood-stained. Small capillary hæmorrhages (the result, no doubt, of physical injury caused by the penetration of the water), are often to be found in the alveoli and parenchyma of the lungs, and are amply sufficient to account for this *blood-stained* foam. (*Case* 63.)

6. *The lungs* are usually more or less congested, and so distended as completely to fill the chest (Casper). They are usually flabby and non-elastic, a bloody fluid escaping when incised ("*Med. Gaz.*," vol. xlvi., p. 478). Sometimes, however, they are anæmic (*Cases* 30, 33 [3 and 4]) and emphysematous. The epithelial cells are said to present a granular and fatty appearance in consequence of water action. ("*Ann. d'Hyg. Pub.*," Nov. 1880.)

It has been stated as one of the signs of death by drowning, that the lungs, on the removal of the sternum, force their way out of the chest. This, however, according to Ogston (p. 387), never occurs until after the active development of the gases of decomposition has commenced. To distinguish between this condition, the result of putrefaction, and of emphysema from other causes, is far from easy.

A certain amount of pulmonary congestion with subpleural ecchymoses (different, however, from the punctate ecchymoses of suffocation) is, we believe, almost, but not altogether, constant after death from drowning. The intensity of this congestion and of these ecchymoses, are dependent on the *life struggles*. Hence we have in this appearance, some indication of what occurred during the last moments of existence.

The passage of water into the lungs in drowning, requires detailed consideration. It would seem that the ingress of water occurs when the drowning person attempts to draw in air;—hence its presence in the pulmonary vesicles may be accepted

as strong evidence that submersion occurred during life, and suggests asphyxia as the cause of death. In the case of an animal drowned in mercury, the liquid metal was found in the smaller air tubes. It has been said, moreover, that the water does not enter the lungs when the body is submerged after death, the walls of the larynx being sufficiently near together to offer an effectual barrier to its entrance. But this is open to some doubt (Orfila and Piorry), and our own experiments do not entirely confirm the statement. It is true, that, as a rule, when a body after recovery is turned face downwards, water flows from the mouth in quantity. In such case, however, it may very probably come from the stomach.

Ogston states that in 48·7 per cent. of cases of drowning, no water was found in the lungs. He accounts for its absence in so many cases, by its transudation from the lungs, seeing that in these cases, water, varying in quantity from 1 to 34 ozs., was found in the pleural cavities.

Closely connected with the presence of water in the lungs, is the froth or foam formed in the air passages (*Case* 44), which has been already mentioned as being found around the lips and nostrils, its far greater persistency about the lips being a point of difference worthy of note. Riedell, and also Bergeron and Montano ("*Ann. d'Hyg.*," 1879), speak of this froth as always present after drowning, independently of whether the death resulted from apnœa or syncope, Riedell remarking on the peculiar fluidity of the froth formed ("*Med. Gaz.*," vol. xlvi. p. 478). They further consider it the only constant post-mortem appearance of drowning. There can be little doubt, however, that the froth so commonly (but not in our experience invariably) present in drowning, and also the water found in the pulmonic air cells, may be regarded as evidence of a struggle to breathe on the part of the person, and therefore as strongly suggestive of submersion during life (pp. 346, 355).

The precise method by which this mucous froth is formed, has been a subject of some discussion. On the one hand, Casper and Taylor think that its presence does not necessarily imply that the drowned person rose to the surface (*i.e.*, got his head out of water) in the act of drowning, for they remark that it is found

in those suicides who have previously weighted themselves; whilst Ogston, Orfila, and Devergie think otherwise. To explain this difference of opinion, Ogston with great forensic minuteness, distinguishes between (*α*) a *froth* formed of air and mucus; and (*β*) a *froth* (or rather as Ogston calls it, a *lather*), formed of air, water, and mucus, tinged occasionally with the blood of a ruptured vessel. The former may be found in the air passages of those who have suffered from lung affections (bronchitis and pneumonia), or in cases of epilepsy and apoplexy, or as a post-mortem result (*i.e.*, a mixture of mucus with the gases of putrefaction), many days (Ogston has found it as many as 56 days) after death from drowning, in common with other causes; whilst the latter, specially found in the common cases of drowning, is "strictly a vital phenomenon" (Ogston), the air bubbles being characterised by their extreme minuteness, the thinness of their envelopes, and the ease with which they are broken—such ease, indeed, that the mere opening of the trachea is often sufficient to dissipate the froth.

But the absence of this "froth" is not to be regarded as proof that the death did not result from drowning. For, (1) the convulsive struggles to breathe necessary to produce this froth, may not have occurred (*e.g.*, after death by shock, syncope, or exhaustion), although the person was submerged during life; (2) or if the body remained in water a long time (say 5 or 6 weeks) after death, the froth may disappear, and even if the head be placed downwards the water in the lungs may flow out; whilst (3) if the body be removed from the water, and the examination be then delayed for some time, no signs of froth may be found.

The fluid found in the lungs should be examined microscopically. Thus the presence of liquid manure, or of other dirty matters, may be recognised and prove important evidence. Marc and Orfila record having found pieces of ice, and Devergie and Ogston sand and pebbles, in the trachea. Casper mentions a case in which some camomile tea, that had been vomited by an adult into a pail, was found in the stomach of an infant.

Dr. Taylor notes, that if a person vomited after submergence,

and then made an attempt to breathe, the contents of the stomach might find their way into the minute air-tubes of the lungs. With respect to vomiting, it may not be out of place to note, that it frequently occurs as one of the convulsive movements dependent on the asphyxiated condition.

Any weeds found in the air passages must be carefully preserved. These have many times furnished important evidence. (See *Cases* 39, 47.)

And here we may remark that the fœtus may be drowned in utero. If (as German authorities teach) the fœtal circulation be arrested either in the cord or placenta, the child will then try to inflate its lungs, and in so doing must draw in the liquor amnii, and thus die drowned. (Bohr.) (*Case* 69.)

7. *The stomach* and *alimentary canal.* These are often much discoloured (rosy? Dr. Guy). (*Case* 28 [1].)

The presence of water in the stomach constitutes important evidence. It does not seem to be found when a body is thrown into the water after death, owing to closure of the sides of the gullet [as stated (no doubt accurately) by Riedell and Kanzler, although disputed by Leman ("*Casper's Handbuch*," Vol. ii., p. 747, fifth edition)], or when death is due to syncope, or when a person has been stunned prior to submersion. It would appear, moreover, that as putrefaction advances, the ingress of water becomes less easy, owing to distension of the internal organs with gases. If the parts break down in the course of decay, the entrance of liquid, especially in very deep water where the pressure would be excessive, is easily accounted for. Hence putrefaction and depth of water must be carefully considered in such cases. The water may escape if the head be allowed to hang down, or it may, if exposed for some time before examination, exude through the coats of the stomach. Kanzler and Riedell (quoted by Casper) often found this appearance absent in cats, even when the mouth was kept open or enlarged. It seems, however, a fairly constant appearance in the human subject, although Dr. Ogston records (*Case* 7), that in two out of seven cases he found no water in the stomach ("*Ed. Med. and Surg. Journ.*," Jan., 1837). There can be but little doubt that water, when present,

must have been swallowed during efforts to breathe. The power of deglutition however is lost directly asphyxia sets in. Hence the absence of water may indicate a rapid death.

Both *the quantity* and *the quality* of the water found must be carefully noted. As regards the *quantity*, it would seem to be dependent both on the number of times the person rises to the surface, and on the depth of water in which he is drowned. The more frequently he rises, and the greater the depth of the water in which the drowning occurs, by so much the greater will be the quantity of water in the stomach. It is manifest that a little water in a water drinker's stomach can indicate nothing. Casper warns us that water may sometimes have been taken just before drowning, as in the case of a little boy, aged two years, whose nurse having just fetched him water from a spring, left him for a moment, and found him drowned in the river on her return. [Case CCXCII., Casper.] In one case the finding about half a teaspoonful of liquid mud in the stomach of a man, whose body had been four or five months in the water, led Casper to the conclusion that death had resulted from drowning (Case CCCXI., Casper). (*Case* 46.)

Certainly all quantities of water in the stomach above half-a-pint are important; but if less than this, of little importance.

As regards *quality*, it is highly improbable that very dirty water, liquid manure, or mud, would be voluntarily taken as a drink. Human ordure in substance has been sometimes found in the stomach, particularly in cases of infanticide in privies and cesspools. (Casper, *loc. cit.*; and Märklin; Casper's "*Vierteljahrsschrift*," 1859, Bd. xvi., s. 26.)

The finding water of a peculiar kind in the stomach, such as salt water, or water having a special odour (like that from peat bogs), may constitute important evidence. The presence of green confervæ, of duck-weed, of minute shells or diatoms, would constitute additional confirmation. Fluids, etc., found in the stomach should be examined with a microscope.

8. Tardieu observes ("*Ann. d'Hyg.*," 1855, vol. ii., p. 307) that sub-pleural ecchymoses, which are invariably found after death from suffocation, do not occur after death from drowning. On this point, however, the author has a strong opinion, based on

the examination of numerous cases, that whilst sub-pleural ecchymoses are not uncommon, the peculiar dotted ecchymosed condition found invariably in suffocation, is not common after death by drowning. If such a condition be found, it undoubtedly suggests that the person had been suffocated before being thrown into the water.

9. The position of the *diaphragm* (*i. e.*, whether it be high in the thorax, or *vice versâ*) will depend partly on the exact mode of death, and partly on the extent to which putrefaction may have advanced.

10. The *liver*, *spleen*, and *kidneys* are usually, but not necessarily, gorged with blood. (*Case* 38.) The *bladder*, occasionally, but rarely, contains bloody urine. The nose, lips, fingers, toes, genitals, and other parts of the body, are sometimes found to have been gnawed by rats, or by such voracious fish as pike, shark, etc. In general the nature of these injuries, and the time when they were inflicted, will be tolerably evident on inspection.

V.—How Long has the Body been under Water.

In answer to this question, we think (although his opinions have been much questioned), that M. Devergie's conclusions, formed as they were from an immense experience at the Paris Morgue, where all the bodies drowned in the River Seine, near Paris, are taken, are more reliable than any others. We shall arrange them for convenience as follows. (See Devergie, "*Ann. d'Hyg.*," Vol. ii., p. 160; and again, Vol. v., p. 429; Vol. vi., p. 209.) Part I., page 97. (See *Cases* 45, 46.)

"*First four or five days.*—Little change. Post-mortem rigidity may persist to the fourth day in some cases, particularly if the water be cold.

"*Fourth or fifth day.*—The skin of the palms, and particularly that of the ball of the thumb and little finger, and the lateral surfaces of the fingers, begin to whiten. On the *sixth* or *eighth* day this extends to the soles of the feet. The skin of the face is softened, and of a more faded white than the rest of the body.

"*Fifteenth day.*—The face is slightly swollen and red. A green spot begins to form on the skin of the mid-sternum. The hands and feet are quite white, except the dorsum of the latter; the skin of the palms being wrinkled. The sub-cutaneous cellular tissue of the thorax is of a red colour, and the upper part of the cortical substance of the brain green.

"*At one month.*—The face is reddish brown, the eyelids and lips green and swollen, the neck slightly green. A brown spot with green areola, about six inches in diameter, occupies the upper and middle part of sternum. Skin very wrinkled; hair and nails still adherent. The scrotum and penis much distended by gas, so that the latter is sometimes erect from this cause. The lungs emphysematous, or rather loaded with the gases of putrefaction, so that they overlap the heart.

"*At six or seven weeks.*—The neck and thorax very green. The cuticle at the base of the hands (wrists) begins to be detached.

"*At two months.*—The body is covered with slime, which penetrates through the clothes. The face is enormously swollen and brown, the lips being parted, so as to expose the teeth. The skin on the middle of the abdomen, as well as that of the arms, forearms, thighs, and legs, continues natural, contrasting with the phenomena of putrefaction in air, where the abdomen is the first part to exhibit change. From this time, the skin with the nails attached, begins to come off like a glove from the hands and feet. The hair falls off, or can easily be detached by pulling. The veins are almost completely empty of blood, and filled with gas. If at the moment of death the right cavities of the heart were gorged with blood, the internal surface of the right ventricle will appear of a jet black colour.

"*At two and a half months.*—The green colour of the skin extends to the arms, forearms, and legs. The nails are quite detached from the hands and feet. Some *adipocere* will be formed on the cheeks, chin, breasts, armpits, and internal parts of the thighs. The abdomen is greatly distended by the gases of putrefaction. As yet the muscles are not much altered in colour.

"*At three and a half months.*—The scalp, eyelids, and nose are so destroyed as to render recognition of person or determination of age impossible by mere inspection. The skin of the breast is generally of a greenish brown colour, the centre of the abdomen presenting an opaline appearance, scattered over with small ulcerations caused by the water. Larger erosions are found on other parts of the body. The hands and feet are bare of skin. The lungs no longer fill the thorax, but leave a space between them and the pleura costalis, filled with reddish serum.

"*At four and a half months.*—The face and scalp are so destroyed as to leave the skull bare, the remains of the face, neck, and parts of the thighs being converted into *adipocere.* [The formation of adipocere is discussed in detail in Part I., p. 111.] Small eminences, indicating the commencement of calcareous incrustations, are observed on the prominent parts. The brain presents traces of adipocere on its anterior part."

In very hot weather, or in very putrid pools and ponds, these changes proceed more rapidly than is here described; and more slowly in salt water, in very cold weather, and when the body is closely invested by clothing. But the general order of events remains the same. (Part I., page 96.)

VI.—How soon after Death by Drowning does a Body rise to the Surface?

In *Case* 7 the body of a man drowned in the sea is reported never to have sunk at all. We have already observed that an unclothed and recently dead body is specifically heavier than fresh water, and that it therefore sinks. After a short time, however, a little gas will be generated by putrefaction, and this causes the body to rise to the surface. It is further manifest that, the specific gravity of the body and of water being so nearly alike, a very little gas will suffice to make a body rise, whilst the rapidity with which it rises after death will be mainly (although not entirely) dependent on the rapidity of the putrefactive process. The gases being given off, the body again sinks. More gas being generated, the body once more rises, and so on.

So much then for the cause of a body floating.

It is certain, however, that the rapidity with which a body will rise must depend on many circumstances, such as—(1) *The season of the year:*—the warmer the weather, the more rapid being the development of putrefaction; (2) *the depth of the water:*—a body rising far more easily in shallow than in deep water, on account of the absence of superimposed pressure; (3) *differences in the thickness of the dress worn, and the material of which it is composed:*—whereby putrefaction may be delayed or otherwise, as well as the specific gravity of the entire body altered; (4) *Weights about the body;* (5) *Mechanical impediments to the body rising:*—such as its being held under water by ships' chains or ropes, or by water weeds, etc.; (6) *the specific gravity of the body:*—very fat bodies rising comparatively rapidly, and very lean bodies comparatively slowly; and (7) lastly, the *specific gravity of the water* in which the body is submerged:—bodies rising less rapidly in fresh than in salt water.

Dr. Woodford, speaking of his Indian experience at the hottest season of the year (quoted by Chevers, p. 640) says that twenty-four hours is the shortest time at which he has known a body to rise in *deep* water, and four or five hours in *shallow* water, but he remarks that should the head be resting on the bank at the extreme edge of the water, the feet will rise to the surface and the body float almost as soon as life is extinct.

Dr. Chevers records an accident to the steamer "Calcutta," (Jan. 1st, 1867), whereby 30 to 50 passengers were drowned at the same moment. The time at which they rose to the surface was noted, the thermometer in the air standing at 75° F. The facts observed are arranged in the table on the opposite page, where we have also noted the special appearances remarked in the several cases.

In this country, as a rule, a body floats after from five to eight days, the water itself acting as a means of preventing the contact of air with the body and the presence of light, both of which conditions favour putrefaction. Further, the water serves to maintain the body at a temperature somewhat below what it would have, if exposed to the air.

The popular notion of a body floating in three days, is (so far

Cases observed.	Hours after the accident at which the submerged body or bodies rose to the surface.	Post Mortem Appearances.
3	87 (=3·5 days)	Bodies covered with sand and mud; hands and feet sodden; face and neck livid; hair perfect.
1	95 (=3·9 days)	Ditto. (One eye had been eaten by fish.)
1	95 (=3·9 days)	Face and neck decomposing rapidly.
1	100 (=4·1 days)	Much decomposed; hands soddened and skin pealing off. (The feet were protected by boots.)
1	112 (=4·5 days)	
1	136 (=5·5 days)	Much decomposed. Could only be identified by the clothes.
1	184 (=8·7 days)	Decomposing but fairly preserved. Hair nearly entirely off the head, the cuticle of the scalp pealing off.

as relates to this country) contrary to our experience. *Case* 1, however, is an illustration of a body floating after about 12 hours' submersion in shallow water. The body was that of a stout woman.

Lastly, it is important to bear in mind one further point connected with the floating of bodies. If a body be thrown into the water after death, it is not improbable, especially if it be hot weather, and still more likely if it be the body of a stout woman, that it may float almost immediately, sufficient gas being generated with such rapidity after death as to prevent its sinking.

Weights are attached to bodies "buried at sea" in order to prevent them from floating. (*Case* 2.)

VII. — Was Death actually caused by Drowning, or was the Body thrown into the Water after Death?

In tabulating our results to prove the death to be caused by drowning, we should carefully distinguish between (1) the appearances strictly suggestive of death by drowning, and (2) the appearances not inconsistent with it.

And here one general remark may be made. The answer to the question stated above cannot be founded on any single appearance, however significant. There must be a series of links, to make the chain of evidence in such case complete. Further, no one post-mortem appearance can be regarded as an infallible, never-wanting, indispensable link. We can only judge aright by considering the whole of the facts presented to us by the autopsy. Considering these intelligently, however, it appears to us that the difficulties in deciding the cause of death after drowning have been much over-rated.

If there are found such *external appearances* as a shrivelled bluish-grey goose-skin, with contraction of the penis in the male, excoriations on the fingers, mud or sand under the nails, weeds in the hands (*Cases* 39, 47), froth on the lips and nostrils, and dilated pupils; and as *internal* appearances, water or other fluid in the stomach, frothy mucus in the air passages, congestion of the larynx and trachea, and fluidity of blood; more especially if superadded to these we have the ordinary appearances of death by asphyxia, we may regard the chain of evidence as complete (always allowing that certain links of the chain may be wanting) to prove the death to have been caused by drowning. It must be remembered that the most characteristic signs of death by drowning, however, are *not* permanent, and that their continuance is of shorter duration in summer than in winter. Whilst the characteristic signs may remain fifteen days in winter, they may disappear within three days in summer.

On the other hand, marks of a cord round the neck, gun-shot wounds, stabs in vital regions, traces of poison, a collapsed condition of lungs, and the absence of the signs enumerated above, would lead to the conclusion that the body had been thrown into water after death. In such case, in addition to putrefactive phenomena, there would be those due to imbibition.

The possibility of a body being thrown into the water, after death from *natural* causes, must not be overlooked. Hence in a post-mortem after supposed drowning, as in all other cases, abnormal and diseased conditions, such as might of themselves have caused death, must be noted. (See *Case* 41.)

A body may be found in water in an attitude such as to

suggest that it was thrown in after the occurrence of post-mortem rigidity. But it must be remembered that in certain cases, death on submersion may be instantaneous (from shock or intense cold), and that under such circumstances the body may become instantly rigid, retaining the position after death of the last voluntary movement of life (*Cases* 25 and 25*a*).

A very little water is sufficient to drown. So long as the water covers the face, it suffices. The immersion of the head only in water is of course ample. Indeed, the immersion of the lips and nostrils is enough. In the case of the "Lowestoft murder," a woman killed her three children by placing their heads one after another in a pail of water (*Cases* 3 to 11).

VIII.—Was the Drowning Accidental, Suicidal, or Homicidal?

Speaking generally, we may say, Given the absence of any marks of injury, or given the presence of marks which may either be self-inflicted, or be caused by the water itself, or by objects in the water, the question we have suggested is one almost impossible to answer. A few points, however, are worthy of consideration :—

(*a.*) *The presence of certain marks of violence, such, for instance, as a cord round the neck, stabs, pistol wounds, etc., suggests homicide.* (*Cases* 48, 49, 65.)—It must be remembered, nevertheless, that suicidal acts may be committed on a river bank, or at the edge of a bridge, so that the suicide may fall into the water immediately after inflicting the wound (*Case* 66), or that a suicide, failing in one effort, may drown himself to complete the act. Thus Dr. Taylor states that he has known three cases of suicides cutting their throats, before throwing themselves into deep water. As regards marks of violence, two questions, therefore, arise :—

1. Were the wounds inflicted before or after death; and if before death, were they the cause of the death? (*Case* 61.)

2. Were these wounds suicidal, accidental, or homicidal?

Wounds and serious injuries frequently occur accidentally in cases of drowning. Several cases are on record where severe

injuries, such as the laceration of the perinæum, the dislocation of both arms (Ogston, p. 517), etc., have resulted from the mere collision of the body with the surface of the water. (See *Cases* 19 to 24, 32.) "Taking a header" into shallow water, and in so doing, the coming into violent contact with the bed of the stream, has caused fractures and displacements of the vertebræ and of other joints. (*Case* 62.) ("*Lancet*," 1873, II., p. 430.) Again, in falling into the water, the person may come into violent contact with the river bank, or with posts, dredging machines, and other hard bodies. ("*Brit. Med. Journ.*," June, I., 1878, p. 797.) Or, again, severe bruises may result, either before or after death, if the water, owing to a strong current, carries the body along, dashing it with force against any impediments that may present themselves, such as boathooks, the keel of a passing vessel, or in winter time blocks of ice, etc. Further marks of contusions are specially liable to result if a person falls or is thrown with a forward impulse, into a narrow well, more especially if it has brick sides, a result, however, scarcely to be expected if an infant is merely dropped into a well.

(*β.*) The finding a body in very shallow water (as in a ditch or shallow bath), although primarily suggestive of homicide, is not inconsistent with suicide or accident.

Thus, cases of *suicide* in water a foot and even six inches deep, are recorded (Devergie, vol. ii., p. 332). It has been said, that no one would have sufficient moral courage to keep his head under water a sufficient time to destroy life—but it must be remembered, that if only the effort be maintained for thirty seconds, the rest needs no effort (*Cases* 4 and 11). Far more courage as regards pain has been shown by lunatics, than this would require. Dr. Taylor gives several such cases (Taylor's *Med. Juris.*, vol. ii., p. 31). So far as *accident* is concerned, a man may fall into a few inches of water in a state of intoxication or in a fit,* and be powerless to extricate himself (*Cases* 3, 6, 7); whilst as regards *homicide*, it is easy to see that there can be no difficulty for a murderer to hold the head of his

* No very uncommon thing to happen from merely seeing the glistening of water on a sunny day. "And ofttimes it (the dumb spirit) hath cast him into the fire and *into the waters* to destroy him."—S. Mark ix. 22.

victim under sufficient water to cover the lips and nostrils for half a minute. (*Case* 5.)

If bodies are taken out of the water with weights attached to them or with the hands and feet tied, the question of suicide or of homicide—for the death could scarcely be accidental—must be decided by the manner in which the ropes are tied, and particularly by the position of the knots, that is, whether they could be made with the teeth or by any movements of the hands or limbs. (*Cases* 50 to 53.) Suicides have been known to attach weights to their bodies before jumping into the water, and Dr. Chevers remarks on this as frequent in India. But the presence of weights on a body, always suggests homicide rather than suicide.

Lastly, it must be remembered that the spot in running water where a body is found, is not necessarily the place where the body was first submerged.

If a body be found at the water's edge with the head submerged on a hot summer's day, such a position always suggests that the person may have had sunstroke and met his death from falling into the water.

In all cases of females, the condition of the genitals and the existence of marks of nails on the thighs, arms, hands, and the like, must be noted.

(γ.) Lastly, the presence or absence of poison in the stomach must be determined. And here, the redness of the stomach and alimentary canal, common in cases of drowning, must not mislead.

We need scarcely do more than remark on the necessity, in cases of drowning, of noting such circumstances as (α) the habits of the deceased—(β) the condition of the body when recovered (*e.g.*, whether it be naked or not, a naked body in summer time suggesting a bathing accident) (*Case* 54)—and (γ) the business of the deceased (*i.e.*, whether he be a boatman a trainer, etc.).

ILLUSTRATIVE CASES.

1. Hargreave's "State Trials," Vol. V., pp. 193—231; Beck; London Law Magazine, Vol. X. — In 1699, V. Spencer Cowper, Esq., an English barrister, and three others, were tried at the Hertford Assizes for the murder of Mrs. Stout. It was alleged that there was a criminal intimacy between Mr. Cowper and Mrs. Stout. About 10 p.m. both were missed by the servant from a room in which she had left them; and next morning Mrs. Stout was found quite dead, floating on water of about five feet in depth. Her body was about five or six inches under the water, although some of her clothes were on the surface. Mr. Dimsdale, a surgeon called in, found both sides of the neck swollen and black, and the skin beween her breasts, up towards the collar-bone, also dark-coloured. The left wrist was slightly bruised. This bruise was afterwards ascribed to some stakes, which may have had their share in preventing the body from sinking, although it is likely, Mrs. Stout being somewhat corpulent, that her specific gravity did not much differ from that of the water. A little froth issued from her mouth and nostrils when first seen. No further post-mortem examination was made for six weeks, when the body was disinterred. On examining it, no water was found in lungs or stomach, and it was said to be so decomposed, that little evidence could be given as to the bruises. This trial is chiefly remarkable for the extraordinary opinions given by some of the witnesses as to dead bodies floating. Most of those examined (some of whom were sailors) correctly explained the floating of dead bodies to be usually due to putrefaction. On this trial Drs. Garth, Sloane, Morley, Wollaston, Crell, with William Cowper, the celebrated anatomist, were all examined. Mr. V. S. Cowper deposed to a previous melancholy state of mind; and the jury brought in a verdict of *non compos mentis*. Mr. Cowper was brother of Lord Chancellor Cowper; and in after years became a Judge in the Court of Common Pleas. (Pages 345, 369.)

2. Male, 2nd Edit., p. 186.—The body of Prince Carracioli was hung by the order of Lord Nelson. *It was sunk in the sea, with double-headed shot, weighing* 250 *lbs., tied to the legs. It was found floating* 13 *days afterwards.* The shot must clearly have slipped off. (Page 369.)

3. Med. Gazette, Vol. XLVII., p. 763.—(*Dr. Ogston.*)—An epileptic in a fit fell into *a pool of muddy water three or four inches deep*, and was drowned. (Pages 371, 372.)

4. Smith, p. 275, quoted by Beck.—In March, 1806, a young woman, at Little Sheffield, in Yorkshire, made away with herself, by *breaking a hole in the ice on a pond, and thrusting her head in*, whilst her body remained out. This situation repelled the idea either of force or of accident. (Pages 371, 372.)

5. R. v. Yaxley.—(*Norwich Lent Assizes.*)—Child drowned by immersing its head for a few minutes in a pail of water. (Pages 371, 373.)

6. Taylor's Med. Juris., Vol. II., p. 22.—Male, æt. 30, found in a room, locked on the inside, with his nose and mouth below the level of water contained *in his sponge bath.* His arm was injured. The post-mortem (as well as the history) proved that he had had a fit, to which (and not to the drowning) the actual death was probably due. (Pages 371, 372.)

7. Taylor's Med. Juris., Vol. II., p. 26.—Male, æt. 40, *drowned in the sea* whilst intoxicated. *Never sank, but the face was turned downwards.* Froth issued from the mouth. No water in stomach. Heart empty. (Pages 364, 367, 371, 372.)

8. Bishop and Williams killed Carlo Ferrari, in order to sell his body for dissection. They first made their victim drunk, and then hanged him up by his heels with his head in the water of a well! (Page 371.)

9. Taylor's Med. Juris., Vol. II., p. 32.—Accidental death of a child æt. 1½ years, from tumbling head foremost into a pail half full of water. (Page 371.)

10. Taylor's Med. Juris., Vol. II., p. 32.—Accidental (?) death from tumbling head foremost into a water cistern. (Page 371.)

11. Taylor's Med. Juris., Vol. II., p. 32, and Taylor's Manual, p. 371.—Cases of drowning of adults (suicidal) by partial submersion in pails, waterbutts, water tanks, etc. (Pages 371, 372.)

12. Lancet, July, 1841.—Girl, æt. 2. Recovery after ten minutes' submersion. (Page 350.)

13. Med. Gazette, Vol. XXIX., p. 78.—Recovery after six minutes' submersion. (Page 350.)

14. Med. Gazette, Vol. XXXI., p. 448.—(*Dr. Douglas.*)—Male, adult. Recovery after fourteen minutes' submersion. Warmth and friction

the only means used or resuscitation. No signs of animation for eight and a-half hours. (Page 350.)

15. Amer. Jour. Med. Science, April 22, 1853, p. 348.—(*Mr. Jennings.*)—Recovery after twenty minutes' submersion. (Pages 349, 350.)

16. Ann. d'Hyg., 1850-52, p. 306.—(*Mr. Guérard.*)—Male adult Recovery after entire submersion for one hour! (Evidence weak. (C. M. T.)) (Page 350.)

17. Med. Chir. Transactions, 1846, pp. 44, 149.—Girl. Recovery after six minutes' submersion. (Syncope.) (Page 350.)

18. Taylor's Med. Juris., Vol. II., p. 6.—Male adult. Could not be restored after five minutes' submersion. Treatment was immediate on the recovery of the body. (Page 350.)

19. Smith, p. 214 (*quoted by Beck*).—A few years ago, a man who had leaped into the Thames from three of the bridges with impunity, undertook to repeat the exploit for a wager. Having jumped from London Bridge, he sank, and was drowned. When the body was found, it appeared that he had gone down with the arms in the horizontal, instead of the perpendicular posture, in consequence of which *both of them were dislocated* by falling upon the water. (Page 372.)

20. Dr. Revillon (*Archives Générales*, "*Med.-Chir. Review*," vol. xi., p. 240) mentions the case of a soldier, an excellent swimmer, who plunged headlong into the River Sambre. He was seen to struggle, and was supposed to be in jest; but as he was noticed to be motionless, he was dragged out. When he recovered his senses he was found to be perfectly paralysed from the neck downwards. Death followed in a few hours; and on dissection, the body of *the fifth cervical vertebra was found fractured transversely.* (Page 372.)

21. Taylor's Med. Juris., Vol. II., p. 29.—Dislocation of cervical vertebræ and death, the result of a jump from a bathing-machine into the sea. (Page 372.)

22. R. v. Kettleband.—(*Nottingham Winter Assizes*, 1843.)—Dislocation of neck and rupture of ligaments by drowning (homicide?). (Page 372.)

23. South's "Chelius," Vol. I., p. 532.—Case recorded in which the fourth cervical vertebra was fractured.

The author knows of recent cases of fractures of the ribs, lower end of radius, sternum, and humerus; also of a dislocated humerus and femur produced by falling on the water.

[Dr. Chevers ("Med. Juris.") mentions two cases of fractured vertebræ produced in a similar manner.] (Page 372.)

24. Taylor's Med. Juris., Vol. II., p. 28.—A deep circular mark found round the neck of a lady, suggesting strangulation previous to her being thrown into the water. This effect was proved to result from the string of her cloak, which the tide drifted in one direction whilst she was making efforts to go in the opposite.

(A similar case of a livid circle, caused by contraction of a linen collar, etc. [*See* Dr. Taylor.]) (Page 372.)

25. Taylor's Med. Juris., Vol. II., p. 11.—In the Regent's Park accident, where a large number of persons were drowned in ice-cold water, many were taken out *stiffened in the attitude of active exertion* (skating). Rigidity continued for 48 hours. (Pages 347, 357, 371.)

25a. Taylor's Med. Juris., Vol. I., p. 66.—Recovery of a body from the water (drowned whilst skating) in the precise attitude in which it was submerged. In this case there were none of the signs of death by drowning, viz., no appearance of breathing and no water or froth in the mouth. Query.—Was the direct cause of death cold or drowning? (Pages 347, 357, 371.)

26. Taylor's Med. Juris., Vol. II., p. 14.—(*Dr. Bishop.*)—At a post-mortem on a case of drowning twenty-four hours after death the *cerebral membranes* were found *congested.* Tongue pallid. Right side of heart flabby and bloodless. (Pages 356, 358, 359.)

27. Phil. Med. Examiner, March, 1845, p. 169.—(*Dr. Dunglison.*) —Female, drowned whilst intoxicated. Post-mortem sixteen hours after death. Face mottled purple. Lungs gorged with blood. Right side of heart full of dark fluid blood. (Page 359.)

28. Lancet, May 29, 1841.—(*Dr. Semple.*)—Two cases of a post-mortem after drowning. (Pages 358, 359.)

(1.) *Female Adult.*—Cerebral vessels nearly empty. Right side of hear contained about 1 lb. of fluid blood. Stomach and intestines slightly inflamed.

(2.) *Female Adult.*—Cerebral vessels much congested. Right side of heart full.

30. Casper, Vol. II., p. 250.—Child, æt. 2½. The brain with its sinuses and membranes very congested. Lungs pale. (Pages 358, 360.)

31. Dr. Meymott Tidy.—A man drowned in a marsh. Post-mortem appearances as usual, but the membranes of the brain were congested

and blood was effused to the extent of an inch beneath the outer membrane. (Page 358.)

32. Ogston's Med. Juris., p. 498. — Male adult, found in the water with a comminuted fracture of the base of the skull. Nevertheless the post-mortem clearly indicated death by asphyxia. (Page 372.)

33—36. Casper (Translation), Vol. II., p. 246.—Post-mortem examination of four children who had been drowned. (Pages 354, 355, 358, 359.)

(1.) Æt. 4. Lungs pale. No froth in larynx or trachea. Right side of heart contained a teaspoonful of coagulated blood. Stomach full of water.

(2.) Æt. 2. Fifteen hours in water. No trace of putrefaction. Tongue between teeth. No cutis anserina. Skin of feet corrugated, but not that of the hands.

(3.) Æt. 1 year 3 months. Seventeen hours in water. Abdomen greenish. No cutis anserina. Brain and membranes anæmic. Lungs pale and distended. Bladder empty.

(4.) Æt. 6 years. Recovered 3 months 28 days after submersion. Putrefaction only comparatively slight. All organs anæmic. Stomach contained a large quantity of a watery food (pulp).

37. Casper, Vol. II., p. 248. — Girl, æt. 19. Suicide. Recovered after a short time. Vena cava and both sides of heart full of coagulated blood. (Page 359.)

38. Casper, Vol. II., p. 249. — Male, æt. 20. Recovered after 24 hours. Cadaveric rigidity persistent on sixth day. No cutis anserina. Neither lungs, right side of the heart, nor liver, were hyperæmic. (Pages 355, 357, 365.)

39. R. v. Thornton. — (*Warwick Summer Assizes*, 1817.)— Case of drowning. Pieces of duckweed (similar to that growing in the pond) and water were found in the stomach at the P.M., and were considered sufficient to prove submersion during life. (Pages 356, 357, 363, 370.)

40. R. v. Carut. — (*Bury St. Edmund's Lent Assizes*, 1851.) — Evidence similar to *Case* 39. (See full account in *Taylor's Med. Juris.*, vol. ii., p. 23.) (Page 356.)

41. R. v. George.—(*Hereford Lent Assizes*, 1847.)—A woman indicted for drowning her child (December), recovered from the water after nine days' submersion. There were no marks of violence upon it, nor any appearances to indicate drowning with certainty. The arms and legs were contracted and the hands closed. Query—Is the act of drowning likely to produce a contracted state of the limbs? It was contended in defence that he child died from convulsions (the state of the brain rendering this pos-

sible), and that the accused afterwards threw the body into the water. Prisoner acquitted. The contraction of the limbs may have been due to the stimulus of the cold water on the muscles of the child when thrown in immediately it was dead, or it may have been thrown in when the mother thought it was dead. (Pages 357, 370.)

42. R. v. Barker. — (*York Winter Assizes*, 1846.)—A case in which the condition of the blood in drowning was a subject of controversy. (Page 359.)

43. R. v. Kirwan. — (*Dublin Commission Court*, 1853.) — Case o drowning. Difficulties depending on the length of time (31 days after death and 26 after burial) that elapsed before a post-mortem examination was made. (Page 354.)

44. R. v. Langley.—(*C.C.C., April*, 1841.)—Question of the cause of mucous froth in a case of drowning. (Page 361.)

45. Casper, Vol. II., p. 274.—Body of a drowned person (male adult) found *after 2½ years' immersion.* Body nearly naked. The left foot was the only part that retained its shape, the soft parts having undergone conversion into adipocere. Adipoceratous deposits lay under each zygoma. Right foot and upper extremities wanting. Skull and the three first cervical vertebræ were complete. Identity established. (Pages 354, 365.)

46. Casper, Vol. II., p. 257.—Male, æt. 24. The body had been in water *four or five months at least, in winter*, and yet post-mortem appearances were sufficient to show that death was caused by drowning, by about half a teaspoonful of mud being found in the stomach. (Pages 354, 364, 365.)

47. Chevers, Med. Juris., p. 644.—A child's body was discovered in a tank of water, at a long distance from his home. *On dissection a large piece of weed was found blocking up the right bronchus, which, however, corresponded with no weeds that grew in the special tank where the body was found.* Similar weeds, however, were found in a tank near the home of the child. It was afterwards proved that the boy was drowned by a woman in this tank, and the body afterwards conveyed to the more distant tank, in order to incriminate a person against whom she had a grudge. (Pages 363, 370.)

48. R. v. Upton.—(*Leicester Summer Assizes*, 1864.)—Wounds suggesting homicide, found on a body taken out of the water. (Page 371.)

49. R. v. Griffin.—(*Shrewsbury Lent Assizes*, 1861.)—(For details see Taylor's *Med. Juris.*, Vol. II., p. 24.) In this case the question arose whether the child was dead or not before it was put into the water? (Page 371.)

50. Guy's Forensic Medicine, p. 277.—A man drowned himself having first tied together his wrists and knees. (Page 373.)

51. Casper, Vol. II., p. 271.—Male, æt. 26. When taken from the water the deceased's legs were found tied together. Casper concluded that the case was one of suicide, owing to the absence of other injuries. (Page 373.

52. Taylor's Med. Juris., Vol. II., p. 32.—Suicide by drowning, the man having tied his neck, legs, and hands together by a cord with a slip knot. (See also another case, where the hands and legs were tied.) (Page 373.)

53. Beck, from the Annales d'Hygiène, Vol. IX., p. 207.—Drowning after having tied the limbs together. The body was that of Sieur X. None of the knots were tight, and they had left but little impression on the skin. On dissection the liver and heart exhibited marks of long continued disease. There were no external injuries, and the knots were slip-knots. Marc, Guichard, and the other medical witnesses, inferred from these facts that this was a case of suicide. (Page 373.)

54. In the Case of Garbett, and others, executors of Rainer v. the Rock Insurance Company.—A Mr. Rainer, whose life was insured in the Rock Insurance Company for £3,000 (the policy containing a special proviso against suicide), was found drowned in a pond. He was known to be insane. From the state of his shoes and stockings it was inferred that he had first gone into the pond with his clothes on, had afterwards taken them off, and then returned to the pond. As he had undressed, it was argued that he meant to bathe only, not to commit suicide. Verdict for the executors. The Chief Baron remarked on the paucity of facts in this case. (Page 373.)

55. Chever's Med. Juris., p. 643.—A boy, æt. 14, taken out of the water alive. A great deal of water had entered the bronchial tubes. No emetic could be got to act. The lad died shortly afterwards of pneumonia. (Page 354.)

56. Taylor's Manual, p. 354.—(*Case of Col. Mackenzie.*)—An adult reached the bank of a river greatly exhausted by the strength of the current. Died after a short time. (Apoplexy or Exhaustion?) (Page 354.)

57. Taylor's Manual, p. 354.—Child, æt. 2½. Recovered by artificial respiration. Had convulsions for two hours. Twenty hours after submersion died from difficulty of breathing. (Page 354.)

58. Taylor's Med. Juris., Vol. II., p. 10.—(*Case of Mr. Gudge.*)—Case of drowning. Patient became conscious three hours after recovery. Insensibility and difficulty of breathing returned, and death occurred twenty hours from the time of submersion. (Page 354.)

59. Med. Times and Gazette, Feb., 1857, p. 148.—Death after drowning from spasm of the glottis. (Page 354.)

60. Med. Gazette, Vol. XXXIV., p. 295.—(*Mr. Kesteven.*)—Paralysis and death after three hours in the case of a man who had jumped into the water after a boy. (Page 347.)

61. Chever's Med. Juris., p. 635.—A girl strangled a boy by compressing his neck, and afterwards threw the body into a well. Other similar cases recorded. (Page 371.)

62. Lancet, April 10th, 1880, p. 562.—(*Mr. J. H. Wilson.*)—Male, æt. 18. Took a header into between three and four feet of water. Became insensible. On being taken out of the water it was found that the lower extremities had lost all power of motion and sensation. There was partial paralysis of the upper extremities; retention of urine with priapism; breathing almost entirely diaphragmatic. No displacement of vertebræ could be detected. Death twenty-three weeks after the accident.

Post-mortem.—Fifth cervical vertebra fractured vertically through the body and partly united at the posterior part. The spinal cord at the spot of injury was reduced to a mere slender thread. (Pages 347, 372.)

63. Lancet, 1878, II., p. 33.—(*Mr. Charlton.*)—Male, æt. 17. Recovery after drowning. Coughed up frothy mucus with blood. Bled to the extent of five ounces, the blood being "treacle-like." (Pages 353, 359, 360.)

64. London Med. Rec., Mar. 15, 1878, p. 123.—(*Mr. V. Richards.*)—Boy, æt. 2½, was found by his mother floating on the top of a tank. He was cold, insensible, and, although the pulsations of the femoral artery could be felt, pulseless at the wrist. The tongue was protruding, and respiration had almost ceased. After an hour's treatment by Silvester's system, he revived. Convulsions, lasting for two hours, then came on. By appropriate treatment (hot water applications, turpentine enemata, etc.) these were stopped. Seventeen hours afterwards, however, difficulty of breathing supervened, with rattling in the throat, terminating in death eighteen or twenty hours after his removal from the water.

Post-mortem not recorded. (Pages 348, 354.)

65. British Med. Journ., Jan. 19, 1878, p. 96.—A dead body recovered from the water, with *marks of severe injuries upon it*, which, in the opinion of the police surgeon, had been inflicted *before death*. The cause of death was stated to be drowning! Verdict, *Found drowned!!* (Page 371.

66. British Med. Journ., Aug. 24, 1878, p. 293.—Male adult. Suicide by shooting himself through the heart, whilst standing at the edge of the bridge over the Serpentine, into the water of which he fell immediately he had committed the act. (Page 371.)

67. British Med. Journ., Feb. 24, 1872, p. 223.—(*Mr. Rickards.*)—Boy. Recovery after prolonged submersion where natural respiration had ceased for some minutes. (Page 349.)

68. New York Med. Journ., XIII., p. 165.—Male, æt. 50. Fell into the river in a fit (?). Rescued after being a minute or two under water. The case being apparently hopeless, oxygen was administered for 1½ hours, reaction in the end being completely established. The man died on the fourth day from double pneumonia.

Post-mortem.—No lesions of the brain or of the abdominal viscera. (Pages 353, 354.)

69. British Med. Journ., 1882, II., p. 1295.—(*Dr. Neil Macleod.*)—Narrow escape of a new-born infant in a breech case. Howard's direct method employed to resuscitate. (Page 363.)

70. Med. Press and Circular, Jan. 30, 1867.—Male adult. Resuscitation after two hours apparent death by drowning. Silvester's process adopted. (Page 350.)

71. Lancet, October, 1881.—(*Mr. Pope.*)—Male adult. Resuscitation after twelve to fifteen minutes' immersion. The head and chest being tightly jammed against a wall, prevented water from entering the lungs. (Page 350.)

CHAPTER IX.

HANGING.

Hanging, Strangulation and Suffocation defined—The Causes of Death in Hanging—Symptoms—Treatment—Post-mortem Appearances—Did Death take place by Hanging?—Was it Accidental, Suicidal or Homicidal?—Examination of the Body after Death.

(ILLUSTRATIVE CASES, Page 409.

HANGING signifies that kind of death in which the body has been wholly or partially suspended by the neck, by means of a rope, cord, or similar ligature, the constricting force being the weight of the body itself.

Strangulation implies pressure round the neck, whereby the entrance of air into the lungs is prevented, the constricting force being either a ligature, the hands, or some power other than the weight of the body itself.

Suffocation implies the prevention of air from entering the lungs, by means other than by external pressure on the trachea.

Hanging is prescribed by the English law as the punishment for high treason and murder only. (See "*Med. Times and Gaz.*," 1871, i., p. 669, for an historical account of hanging.) It is still retained in some parts of Germany, Austria, and the United States as the punishment for murder and other crimes, but in France the guillotine, and in Spain the garotte, have superseded it. Hanging is also a tolerably common method of suicide. Not infrequently it happens accidentally; young lads, and sometimes older persons of both sexes, being foolish enough to try the horrible experiment upon themselves or their comrades. (See an account of a case of mania for hanging

("*Med. Times and Gaz.*," 1860, ii., p. 39). It is said to be sometimes done for erotic purposes, though it is doubtful if other than disagreeable sensations result. Of these may be mentioned noises and fulness in the ears, throbbing in the eyeballs, a sensation of sparks of light, a feeling of constriction in the throat, a taste and perhaps a smell of blood, struggles for breath, with a crowd of more or less confused recollections of past events, ending in darkness and oblivion.

Dr. Haughton, in a paper read before the Surgical Society of Dublin, on the methods of hanging adopted by different executioners, stated his conclusions as follows:—

"1. That the old system of taking a convict's life by suffocation is inhumanly painful, unnecessarily prolonged, and revolting to those whose duty it is to be present.

"2. That the object of an effective execution by suspension, should be the immediate rupture of the spinal column by the fall.

"3. That the use of a 'long drop' [which by habit has become known as the Irish method] is not only preferable from a humanitarian point of view, but is the only method by which the desired object can be effectively attained." [His formula for determining the proper fall is, "*Divide the weight of the convict in pounds into 2·240, and the quotient will be the required length of the drop.*"]

"4. That the short fall of two feet and the position of the knot employed for so many years by Calcraft, are barbarisms which should cease to be permitted. [Mr. Gibson, of Newgate, states that with his long experience, he only knew of one case of rapid death resulting from the process adopted by Calcraft.]

"5. That the fracture of the spinal column can best be effected by placing the knot under the chin [or perhaps under the left ear, the method adopted by Marwood], and allowing a fall of at least ten feet.

"6. That in carrying out the capital sentence, care should be exercised in the selection of a suitable rope." The character and quality of the rope is important. A properly made rope should be freely elastic. It was clearly shown that

in Case I. the rope was incapable of the smallest degree of resiliency; hence the distressing occurrence mentioned.—("*Edin. Med. Journ.*," xvi., p. 477; "*Daily Telegraph*," August 27th, 1879; "*Lancet*," 1879, ii., p. 357.)

Dr. Barker (Surgeon of the Melbourne gaol) suggests the knot being placed about two inches from the spine, so that "when the rope is tightened by the weight of the body, it comes on the vertebra. By the fall [and he advocates a comparatively short one] the body has an impetus forwards, the resistance being at the beam to which the rope is fastened, the knot acting as a fulcrum to push the head forwards." Dr. Barker speaks of this method as having proved in his experience very rapid.

We propose considering :—

I. The causes of death in hanging.
II. The symptoms produced by hanging.
III. The treatment to be adopted in cases of hanging.
IV. The post-mortem appearances indicative of death by hanging.

And out of these details there arise the two practical questions :—

V. Was the death actually caused by hanging?
VI. If so, was the hanging accidental, suicidal, or homicidal?

I.—The Causes of Death in Hanging.

In hanging, as in drowning, death does not always take place in exactly the same way. Thus it may result from :—(1) *Asphyxia;* (2) *Cerebral hyperæmia* (*Cases* 15, 16); (3) a combination of *Asphyxia with Apoplexy;* (4) *Syncope;* (5) *Injury to the Spinal Cord and the pneumogastrics* (neuro-paralytic death).

According to Casper and Remer, the proportion in which these several agencies act as causes of death is as follows :—

	Remer.	Casper.
Apoplexy	9	9
Asphyxia	6	14
Mixed Conditions	68	62
Total	83	85

(A.) That a combination of asphyxia with coma (comato-asphyxia) should be the common cause of death *in suicidal hanging and in those cases where no violence has been exerted*, is what we should expect, the ligature both (*α*) *preventing the return of blood from the head*, thereby inducing congestion of the brain and (*β*) *preventing the entrance of air into the lungs*, thereby inducing apnœa.

But which condition, coma or apnœa, it might be asked, is likely to be the *primary* cause of death where there has been no force or violence used? This must depend on two circumstances mainly, viz., (1) on the position of the cord, and (2) on the extent and direction of the pressure.

Given a very tight ligature, or a loose ligature crossing the neck above the os hyoides, then asphyxia will no doubt predominate over the coma; but given a loose ligature, the larynx being protected by the cord pressing against the os hyoides, then coma will predominate over the asphyxia. A similar ending will probably occur if the larynx be ossified. Again, the cord being fixed over the os hyoides and thyroid cartilage, some protection will be afforded both to the windpipe and blood vessels, whilst if it be applied directly beneath the lower jaw (which often occurs in cases of hanging), or round the lower part of the neck, so that the trachea and the large vessels at their very entrance to, or exit from, the chest will be affected (which seldom occurs), then both respiration and circulation must suffer. Here, then, is the explanation of the great differences observed in the time of death in the various recorded cases of hanging.

Admitting, then, this dual pressure, the question may arise Which caused the death, asphyxia or apoplexy? Knowing how rapidly a stoppage of respiration by pressure on the air tubes will cause death, we are compelled to regard asphyxia as the

probable first cause, rather than an arrest of the circulation. And this has been proved by actual experiments on animals, viz., by fixing the cord above artificial openings in the trachea. A dog lived for three hours suspended by a rope placed above an opening into the windpipe. (*Case* 55.)

And these conclusions the facts warrant:—(1.) Given pressure both on the air tubes and blood vessels, the pressure on the air tubes being only partial, death will probably result from a combination of asphyxia and apoplexy, but from asphyxia primarily. (2.) Given a pressure in such a position that the air-way is more or less protected, death may occur from apoplexy, and will then be *slow*. (3.) Given a complete pressure, so that the entrance of air into the lungs is entirely prevented, death will result from asphyxia, and will be *rapid*, and possibly even instantaneous.

Professor Hoffman, of Vienna, in an essay in the "*Journal de Médicine*" on the causes of death by hanging, states that he finds from frozen sections of bodies of persons that had been hanged, in the majority of cases where the noose is placed between the larynx and the hyoid, the base of the tongue is pushed upwards and pressed against the posterior wall of the pharynx, thus effecting complete closure. Occlusion of the air tubes must, in such case be sudden and complete. But he considers that more important factors in this kind of death are—(*a*) compression of the larger vessels, the upper portion of the carotids being pressed against the transverse processes of the cervical vertebræ, whereby the middle and inner coats of the vessel suffer rupture with simultaneous compression of the jugular veins, and (*β*) compression of the vagi nerves. And that this compression of the vagi is a material factor, he argues from—

(*a*.) The *immediate loss of consciousness* following compression. [On this Professor Hoffman remarks that no person who commits suicide by hanging ever attempts to rid himself of the rope, even when all that is necessary to effect this would be to stand upright.]

(*β*.) The rapidity with which stoppage of the beating

of the heart occurs ("*British Med. Jour.*," 1878, II., p. 929; May 10, 1879, p. 712.)

He thus considers death by hanging to be more prompt than other mechanical forms of asphyxia, and that loss of consciousness and impossibility of self-help occur at the moment when the noose becomes tightly fastened round the neck. The causes of death by hanging, therefore, he considers to be threefold :—

(1) Occlusion of the respiratory tubes.

(2) Interruption to the passage of blood into the brain.

(3) Compression of the vagi nerves.

(B.) We now pass to instances *where violence has been exerted, as in judicial and homicidal cases of hanging.*

Death from "rupture of the spinal column," as it is called, is said to have been first noticed by the celebrated Louis* as one mode of death in hanging. He found in cases of rapid death that the executioner was in the habit of giving a violent rotatory movement to the body of the criminal at the moment the bolt was drawn, whereby a *displacement* of the odontoid process of the second vertebra of the neck (axis) and a consequent compression of the spinal cord took place. Dr. Taylor says, that to secure this, the body must be heavy, and the fall long and sudden. Devergie found this condition to occur once only in fifty-two cases, but according to M. de la Fosse fracture of the odontoid process is more common. M. Caussé (d'Albi) remarks in his Dissertation on the subject ["*Mémoire Médico-Légale sur les Luxations des Vertèbres Cervicales*," Albi, 1852], that the Paris hangman, who was famous for this rapid method of death, always put the slip-knot under the chin, in front, as Dr. Haughton has suggested. M. de Fosse considers that fracture of the odontoid process is more likely to occur than dislocation (*Case* 1), whilst the giving way of the intervertebral substance is a more likely result than either.

When sufficient force is applied to break the transverse and other ligaments, or to fracture the odontoid process, not only are the phrenic and other respiratory nerves likely to be paralysed, but the vertebral and carotid arteries may also be rup-

* A. Louis, "*Œuvres Complètes*," t. i., p. 333.

tured. Further, it is scarcely possible under such circumstances for the medulla oblongata (the centre of respiration, circulation, and deglutition, in fact the *vital knot*) to escape severe and fatal injury. Under these circumstances death must of necessity be rapid. Further, death may result from effusion of blood within the sheath of the spinal cord. (*Case* 37.) The absence of effusion, however, is reported after a fall of 7½ feet. (*Case* 4.)

In judicial executions, instant death is desirable. To effect this the object to be attained is dislocation or even fracture of the vertebræ, with rupture of the cord. And to this end, all experiments suggest the advisability of a long drop, the knot being placed under the chin. And here, as some of the officials and reporters present in such cases are not medical men, it is important for the surgeon to distinguish between mere indications of life, and signs of consciousness and suffering.

Lastly, we may note that death may result from secondary causes after apparent recovery, cerebral congestion and injuries affecting the nervous system, proving fatal at various and distant periods. (*Cases* 6, 7, and 52.)

II.—The Symptoms produced by Hanging.

Death, as we have said, may be instantaneous and symptomless.

Where the fatal termination is not instantaneous, the four symptoms, viz., intense heat felt in and within the head—flashes of brilliant light in the eyes—deafening sounds in the ears—and lastly, a heavy, benumbed feeling in the lungs, are practically the only symptoms (although symptoms uniformly present) in death by hanging. Nevertheless the period of consciousness is invariably very short and unattended with acute pain. (See detailed account of an experiment in hanging, *Med. Times and Gaz.*, 1882, ii., p. 729.)

Symptoms vary (so it has been suggested) according to the exact position of the ligature, and whether the air tubes, or the blood vessels, or both are compressed. It is useless detailing all that has been said on this point. As a rule, efforts to inspire are

made for at least a minute after the air passages are closed. Some have spoken of the pleasurable sensations of hanging, whilst others have said it is a painless death. Although the countenance as a rule in our experience speaks differently, this may merely be the result of convulsive struggles which invariably occur, and do not, any more than in an epileptic fit, necessarily imply pain. Asphyxia is rapid, a very slight constriction quickly reducing loss of power and sensation (*Cases* 53 and 54). Convulsions may, however, be absent, as is tolerably certain to have been the case in *Cases* 35 and 38. Urine, fæces, and semen are at times expelled.

And this leads us, in connection with *Case* 61, to remark that the sudden and complete interruption to the access of air, from whatever cause it may happen, may be attended with the effusion of semen into the urethra, without any ejaculation necessarily occurring to cause its expulsion. Hence to determine whether effusion of semen has actually occurred, pressure along the course of the urethra, and a microscopic examination of the fluid expressed (if any) is required. (Huppert and Müller-Benigna.)

It is evident from recorded cases that hanging may be effected without persons in rooms immediately adjoining hearing any noise to arouse suspicion (*Cases* 36, 37).

Thus in hanging we have in most cases unattended with violence, three distinct stages:—

(*α.*) A short stage of semi-consciousness (partial stupor), extending from thirty seconds to three minutes.

(*β.*) A stage of subjective death but of objective life, varying in time from ten minutes onwards.

(*γ.*) A stage of objective general death, lasting until the occurrence of rigor mortis.

After the convulsions all the muscles save the heart become quiescent; but they simply wait for a stimulus, such as galvanism, heat, etc. (See "*Med. Times and Gaz.*," 1871, i., p. 43.)

And here it is most important to note that the existence of convulsions does not indicate sensibility, or a knowledge of life on the part of the person passing through the ordeal of death.

("*British Med. Jour.*," 1876, i., p. 664. [Execution of the "Lennie" murderers.]) And further, it is certain that the action of the heart may continue long after convulsions have ceased. As a rule the pulse may be felt for ten minutes, and, as a fact, in judicial executions the right auricle has seldom ceased to act when the body of the criminal is taken down after the usual time of suspension. Tardieu mentions a case where the heart beats, numbering eighty, were heard one and a-half hours after the supposed death.

After what period may life be restored? If the stoppage of air is not complete, and there be no actual injury to the tissues, life may be restored any time up to half-an-hour (*Case* 6), although five to eight minutes (that is, supposing the spinal cord be not injured) is to be regarded as commonly the fatal period. A body cut down almost instantaneously after suspension, and that not with violence, may, however, be found to be dead past recovery, more especially if the pressure on the wind-pipe has been below the larynx. (See *Case* 2.)

III.—The Treatment of Persons Hanged [Strangled or Suffocated].

Very few have been resuscitated after hanging. The principles of treatment are mainly those which guide us in the treatment of the drowned. The first thing is to cut the person down. A noise in the throat has been recorded in one case to have occurred when the rope was slackened (*Case* 8). After this all tight clothing round the neck or chest must be removed. Artificial respiration should then be commenced. If the body is still warm, cold affusion to the head and chest, the use of ammonia, pepper, or some mechanical means for inducing sneezing, etc., may be useful.

In some cases it may be advisable to bleed, and that not for cerebral congestion merely, but to relieve the right side of the heart, and hence the pulmonary circulation (*Case* 9). In *Case* 5, where recovery was effected, 32 ounces of blood were extracted. It is seldom necessary or even safe to take so large a quantity

as this, because of the depression of the vital powers thereby induced, but a stingy bleeding of only three or four ounces would seldom effect the object in view. In *Case* 47, Dr. Chevers believes that the throttled man was saved by the injury inflicted on the throat, and the bleeding consequent upon it.

And here we may note that in hanging, drowning, and such like cases, there are three things specially to be accomplished :—

1. *To induce the natural process of breathing.*—With this object, loosen the ligature round the neck, or free the mouth and throat from foreign bodies. It may also be well to draw the tongue forward, and to fix it by an indiarubber band. Sometimes (as suggested by Nelaton, in poisoning by chloroform), it may be useful to hang the body head downwards for a short time, although in drowning and in other cases where cerebral hyperæmia is induced, this practice is likely to be harmful. This done, the employment of artificial respiration, cold affusion, ammonia to the nostrils, and perhaps galvanism to the phrenics or to the spine, are the means of fulfilling this first indication. In *Case* 9, recovery was considered to be entirely due to cold affusion, but the man was also bled and artificial respiration employed.

2. *To promote the action of the heart and to relieve overloaded blood-vessels.*—Warmth to the præcordial region (warmth being also applied to the lower part of the abdomen anteriorly and posteriorly), acupuncture of the heart itself, galvanism, enemata of brandy, and friction applied to the limbs, are the means of fulfilling this second indication.

3. *To maintain animal heat.*—This must be accomplished by friction, by hot blankets, etc., applied to various parts of the body.

Cases 6, 9, and 65 show that well-persevered-in efforts may be successful. *Case* 2 is an encouragement to perseverance in attempts to restore suspended animation, and illustrates the fact that the heart continues to beat for a considerable time after apparent death.

A curious account is given ("*Lancet*," 1871, ii., p. 98) of an attempt to resuscitate a criminal that had been hanged, from

which it would appear that had the authorities allowed the experiment to proceed, it might have been successful. The man, in good health, æt. 35, weight 160 lbs., was executed by a drop of six feet. Struggling ceased after three minutes. Fremitus of the radial artery ceased at the end of six and a-half minutes, all signs of life having disappeared at the end of eleven minutes. After sixteen or seventeen minutes, strong galvanic currents were passed along the pneumogastrics, which resulted in such marked indications of respiration that the sheriff compelled the operators to desist. Numerous other most successful experiments were tried at a later period, a certain degree of muscular action, pulsations in the carotid arteries, a well marked action of the pupils and of the ocular muscles, being restored to a greater or less extent. At any rate the experiments indicated that a considerable number of cases of suicidal hanging, where the drop is seldom considerable, might be resuscitated. (See *Case* 65.)

Dr. W. W. Keen ("*Phil. Med. Times*," March 20, 1875, and "*Lond. Med. Rec.*," August 16, 1875) records a series of experiments on the laryngeal nerves and the muscles of respiration conducted on a criminal half-an-hour after he had been executed by hanging. The left vagus and recurrent laryngeal were dissected as low down as possible in the neck, and the vocal cords examined, while the nerves were excited by electricity. Decided movements of the left cord, but not of the right, resulted. Dissection showed that probably none of the fibres of the vagus in this case were injured. No reflex motion was observed in the larynx.

The experimen tson the muscles of respiration and on the phrenic nerves were negative.

Experiments on the intercostals showed that by the interrupted current they could each be made to raise the cartilage below, the results indicating that the internal intercostals are inspirators, and the external expirators.

The muscles of the face retained their electro-muscular contractility.

IV.—The Post-Mortem Appearances After Death by Hanging.

We purposely omit nearly all those appearances common to death by apnœa or coma. (*Case* 60.)

1. *The body* may be found stiffened in almost any position, determined principally by its attitude in death (*Case* 62).

2. *The position of the head* varies according to the part of the neck to which the rope or ligature has been attached, and the position of the knot. *The commonest position in suicide is for the head to be forcibly flexed forwards*, with the chin pressing against the upper part of the chest. More rarely the head is completely bent back, as in cerebro-spinal meningitis. The head will always be found inclined to the opposite side to that of the knot, which answers to its fixed attachment.

3. *The face* is sometimes pale, but is more often congested and swollen, especially in those who have been long suspended. On this point Esquirol,* Fleichman,† and Ollivier‡ (d'Angers) have offered explanations, which Tardieu justly considers in great part theoretical. (*Case* 3.)

In twenty-one of Dr. Ogston's forty cases of hanging (= 52·5 per cent.) the features were calm and placid. In one (a suicide) the expression was anxious, and the eyeballs prominent.

In one case, the external auditory canals were recorded as full of blood.

4. *The tongue.* Dr. Taylor says that in hanging the tongue is enlarged and livid, and either protruding or compressed between the teeth. Dr. Guy also speaks of the swollen state of the base of the tongue, as affording a strong probability of suspension during life. Dr. Chevers and Dr. Beatson have not noticed protrusion of the tongue in hanging except as a result of putrefaction, but Dr. Chevers remarks on the base of the tongue and of the glottis being invariably of a violet livid hue. (*Case* 3.)

* "*Arch. Gén. de Méd.*," 1re série. t. i., 1823, p. 13.

† "*Annales d'Hygiène Pub. et de Méd. Leg.*," 1re série, t. iii., p. 432.

‡ "*Annales d'Hygiène et de Méd. Leg.*," t. xxiv., p. 314.

In 14 of Dr. Ogston's cases (= 35 per cent.), and in 11 out of 27 of Devergie's cases, the tongue was either protruded or marked by the teeth.

This protrusion of the tongue is entirely independent of the position of the cord.

5. *The pupils* are nearly always dilated, and the eyes staring and prominent. (*Cases* 3 and 37.)

In thirty-nine of Dr. Ogston's cases (= 97·5 per cent.) the pupils were dilated, and in only one contracted.

6. It is generally stated that blood-stained froth is to be found about the nose and lips. Dr. Ogston, however, found froth at the lips in 3 only of his 40 cases, and at the nostrils in but one. (*Case* 3.)

7. *The hands* vary in position like the head. The fists are often closed so tightly that the finger nails penetrate the palms. (*Case* 6.) This is specially noticeable where the hanging has been violently effected. But in incomplete hanging (that is where the feet are not off the ground), the hands may be stretched out, or rest open on the ground.

The legs also vary in position. They generally present a livid appearance.

8. *The neck* in nearly all cases appears stretched, and will probably exhibit marks of the ligature employed. *Probably*, we say, for if the hanging be very brief, and the ligature very soft and supple, and the body be instantly cut down after death, there may be no mark of a ligature at all. Dr. Allison, in a paper in the "*Lancet*," 1869, i., p. 636, contends that the track of the cord is a purely cadaveric phenomenon, and that its diagnostic value is very questionable. Although in our own experience it is true that the mark is more or less independent of the ligature and of the duration of the suspension, and that it does not ordinarily acquire its colour for some hours after death, it is certain that at times it does occur within a comparatively short period. ("*Edin. Med. Journ.*," i., p. 299.)

The mark is usually, but not necessarily, *oblique*, following the line of the lower jaw (*Case* 13). In 81 per cent. of recorded cases it was found between the chin and the larynx. If there is only one turn, the mark is commonly *non-continuous*, that is

not equally apparent around the entire neck, owing to several causes, *e.g.*, the prominence of the os hyoides, thyroid cartilage and sterno-mastoid muscles, etc. (*Case* 38.) If the cord has been passed round the neck more than once, one mark may be circular and the other oblique. (*Case* 14.)

The *general appearance* and *characters* of the mark, we would say then, vary (α) with the ligature used, (β) with the mode of its application, (γ) with the vitality of the tissues to which it is applied, and (δ) with the period that has elapsed since death. The mark varies with the size and the stiffness of the ligature, appearing least distinct in cases where a soft material (such as a handkerchief) has been employed. Still it must be admitted that the relationship of mark to ligature is not so definite as one would expect. (*Case* 64.) The mark will vary also with the kind of knot or loop formed, that is, whether it be a single, a double, a running, or a slip knot. Further, it may have a different character in one part of the neck to what it has in another. (*Case* 15.)

Again, the *size* and *depth* of the mark does not necessarily correspond with the size of the ligature. The narrower the ligature, and the longer the suspension, the deeper as a rule will be the mark.

The *furrow* is single or double (*Case* 14), regular or irregular, like its cause. A double mark results if the cord has passed twice round the neck, but these marks are not necessarily parallel or continuous. Tardieu states that a large, single leather thong, pressing on the neck only by its borders, would leave a double mark.

The mark is usually a well-defined groove or furrow. This varies in character, however, according to circumstances, as follows:—

(α.) If the hanging be very rapid, the ligature soft, and the body cut down instantly after death, there may be (as we have said) little or no mark at all.

(β.) If the suspension be comparatively brief, the person young, and the skin and blood-vessels healthy, the mark may be merely a slight depression, without change of colour, or with at most a red blush (*Cases* 17 and 19). More frequently, the

bottom of the furrow (that is the point of greatest pressure) appears white (a condition recorded in 67·5 per cent. of Ogston's cases), the spot indicating the knot exhibiting a more intense whiteness. The edges of the furrow are usually slightly raised and red, the skin beyond the edges of the furrow being of a violet colour, dependent, according to Ollivier (d'Angers) and Caussé (d'Albi) on congestion, but according to Remer on extravasation. Further, the mark of a single cord may exhibit more than one of these various appearances. In very fat subjects, a mere white depression is often all that marks the course of the cord.

(γ.) But the most common appearance presented by the cord mark, is that of a dry, hard, yellowish brown, parchmenty (horny) furrow. This state Dr. Ogston found in 32·5 per cent. of his cases. It is a condition, however, not apparent until the body has remained suspended after death for several hours. And again, it is not a sign of suspension during life, for a similar appearance may be produced by the application of a cord after death.

In the furrow, *slight excavations* and *superficial ecchymoses* are occasionally found, although this is by no means the rule (*Case* 34). Casper met with an injected condition of skin in 21 out of 71 cases; Ogston in 5 out of 40 cases; whilst Chevers has never once met with ecchymoses along the line of the cord mark. The presence of these ecchymoses does not indicate suspension during life, or *vice versâ*. The existence of abrasions on the skin *with effused blood*, is strongly suggestive, however, of suspension during life.

On dissection, the cellular tissue beneath the mark usually appears condensed and of a silvery white colour, especially if the body has been suspended for some time. Injuries to the muscles and to deep-seated parts only occur when the hanging has been violently performed.

(δ.) Lastly, it must be noted that the mark of the rope may not be apparent along its entire course (*Case* 15), and further that when once distinct it remains constant and apparent for a long period after death. (*Case* 63.)

9. *The state of the genital organs* is often one of turgescence

so that in males the penis is more or less erect and large, an emission of seminal fluid (most often of prostatic fluid only) having occurred. This may or may not be mixed with blood. There may, however, be expulsion of semen without its ejaculation. Hence it is necessary carefully to press the urethra to determine whether emission has occurred (*Case* 63). In the female there may be found an erect clitoris, and often a sort of spurious menstruation. There is, however, no reason to believe that any pleasurable feelings whatsoever are excited by hanging. (Brierre de Boismont, Rouget, and others, quoted by Tardieu, *loc. cit.*, pp. 38, 39.)

In ten of Dr. Ogston's forty cases (= 25 per cent.) there were signs of *excitement of the genitals.* The penis was erect in seven cases, and semi-erect in four. In eight there were discharges of prostatic fluid; in four, of urine; and in two (one male, one female), of blood. (See Casper's statements on page 429.)

10. The *urine* and *fæces* are sometimes both expelled.

11. A flow of saliva invariably occurs in hanging. This runs out of the mouth, and down the chin and chest. The secretion of saliva being a vital act, it has been supposed that the existence of this saliva-line, is a proof that suspension took place during life.

The special internal appearances met with in hanging are:—

(1.) Fracture or dislocation of the cartilages of the larynx.

In suicidal hanging fracture of the larynx is exceedingly rare, whilst even ecchymosis of the neck is so uncommon that Devergie regards its presence as a strong presumption of homicide ("*Med. Légale,*" ii., p. 752). Of course it is more likely to occur in the old than in the young. Remer found the larynx fractured once only in 101 cases of suicidal hanging. Orfila once saw a fracture of the os hyoides ("*Traité de Médicine Légale,*" ii., p. 425). In judicial executions, the injury is often considerable. Thus fractures of the larynx are recorded by Morgagni, Plouquet, Orfila, Houston and others ("*Brit. and For. Med. Rev.,*" ii., p. 114).

(2.) Similar lesions in the os hyoides. These are also very rare. ("*Med. Times and Gaz.,*" 1860, ii., p. 172; "*Brit. and For. Med. Chir. Rev.,*" ii., 1857, p. 531.)

(3.) In hanging with violence, there may be dislocation of the cervical vertebræ, fracture of the odontoid process with rupture of its ligaments, dislocation of the axis and atlas, and injury of some kind to the spinal column. There is no recorded case of suicidal hanging, however, where such results have occurred.

Dr. Barker, of Melbourne, states that in 50 post-mortem examinations of criminals executed by the *old* method, there was not a single case of dislocation or fracture of the vertebræ, death being caused in all instances by congestion of the brain with strangulation ("*Med. Times and Gazette*," 1871, i., p. 671.)

(4.) Amussat and others (in 1828) noticed that the inner or middle coat of the carotid artery may be divided, the outer coat remaining intact. Combined with this there may be extravasation of blood from the walls of the artery.

Since Amussat's memoir, the subject has been investigated by many observers, viz., Devergie, Kussmaul, Hoffman, Ogston, and lastly by Friedberg ("*Virchow's Archiv.*," November, 1878). Both the stretching and the squeezing of the artery have no doubt to do with the injury to the coats of the vessel, although there are reasons to think that stretching is a more powerful agent than squeezing, the rupture of the vessel often occurring at a point distant from the mark of the ligature. In *Case* 63 it was the right external carotid that was injured, the ligature being placed between the hyoid bone and the larynx, whereas usually it is the common carotid of one or both sides that suffers.

The fact that the coats of the vessels are ruptured, does not prove suspension during life. The extravasation of blood, however, either in the walls of the carotid or in the outer or beneath the inner coat—in other words, into the walls of the carotid or into the ruptured wound—are valuable indications that the wound was inflicted whilst the person was alive. Admitting that the coats of the carotid may be injured after death by the application of a ligature, it is exceedingly improbable that extravasation would occur under such circumstances.

Dr. Adolph Lesser ("*Vierteljahr. für Gericht Med.*," xxv., p. 201) has tabulated the post-mortem appearances recorded by him in fifty cases of suicidal hanging as follows:—

i. *Lesions of the skin only.*—Three cases. (In all three there was a double mark, the skin of the neck being bloodless.)

ii. *Lesions of the skin and of the deeper lying soft parts.*—One case. (Punctiform and streaky extravasations of blood in and beneath the left sterno-hyoid).

iii. *Lesions of the deeper lying soft structures only.*—Five cases.

iv. *Lesions of the skin and of the hyoid bone, larynx, or of the vertebral column.*—Three cases.

v. *Lesions of the skin, of the deeper lying soft parts and of the hyoid bone or of the larynx.*—One case.

vi. *Lesions of the deeper lying soft parts, and of the hyoid bone, or of the larynx.*—Twelve cases.

vii. *Lesions of the hyoid bone, and of this and of the larynx alone.*—Six cases.

In the fifty cases reported, a lesion of the left common carotid was observed in two cases, of the right common carotid in two, of both common carotids also in two, of the right external maxillary in one. The number and severity of the lesions did not stand in any constant relation to the thickness of the ligature, nor to the force employed, but was much dependent upon the position of the body.—(See Dr. Stevenson in the "*London Med. Record*," Jan. 15, 1882.)

(5.) The larynx and trachea are usually deeply congested (*i.e.*, red but not violet, the latter tint being due to putrefaction). There will generally be some froth found in the bronchi, and in the trachea.

Of the 40 cases recorded by Ogston, mucous froth (which was in no case bloody) was found nine times in the pharynx, six times in the trachea, and four times in the lungs. In one case blood was effused in some quantity both into the larynx and pharynx.

Dr. Taylor thinks the pinkish froth in the trachea occurs when obstruction is incomplete, and Dr. Chevers considers that its formation is dependent on spasmodic efforts to carry on respiration below a nearly complete impediment.

Dr. Chevers remarks, as an invariable post-mortem appearance, an exudation of clear mucus from the muciparous follicles in the larynx and upper part of the trachea, each follicle being marked by a minute globule of this exuded mucus.

(6.) As regards the lungs and heart, the conditions vary accordingly as death occurred from syncope, asphyxia, etc. Ogston notes that in 22 cases, he found in four expansion, and in two collapse, of the lungs (*Case* 3). Tardieu denies that punctiform ecchymoses or apoplexies occur after death from hanging, unless there has been suffocation. (*Case* 18.)

(7.) The stomach (Yellowly, Chevers, and Taylor) is often so much congested as to resemble the effects of irritant poisoning. But this is by no means always the case. (*Case* 37.) In the experience of the author, it is frequently marked by rugæ.

(8.) There is rarely much congestion of the cerebral vessels. Effusion was found once by Remer in his 101 cases, but not in a single instance by Casper in his 106 cases.

The following two practical questions remain to be considered:—

V. Did death actually take place by hanging?

VI. Was this hanging accidental, suicidal, or homicidal?

V.—Did Death take place by Hanging?

Neither the finding of a cord round the neck of a dead body, nor the marks of a cord round the neck, prove death to have taken place by hanging. Further, we must be prepared, in a case where a body is found suspended (death by hanging always suggesting suicide rather than homicide), for the actual death to have been caused by means other than hanging, the body being afterwards suspended by the murderer for purposes of deception. It is difficult, however, to imagine such a thing to be done except by a murderer. (*Cases* 49 and 50.)

Dr. Chevers ("*Jurisprudence*," pp. 590—593) records many cases where the victims were first strangled, and then suspended after they were dead, and also where the victims were *nearly* killed by some act of violence, such as by beating (Chevers, p. 600), drowning (p. 604), etc., and finally hanged just before life was extinct. (*Case* 51.)

The special characters presented by the mark of the cord will necessarily constitute important evidence. But even here great caution is required;—for the mark of a cord is not absolute proof of death by hanging, nor is its absence conclusive evidence that death did not result from hanging.

Casper found in his experiments that, when a body was hanged shortly after death (say within one or two hours) the appearances presented by the mark of the cord, etc., were in all respects similar to those noted when death had actually taken place by hanging ("*Klinische Novellen*," 1863, p. 489). These remarks, however, apply almost exclusively to the external appearances, and to the neck in particular. Casper's conclusions are somewhat contradictory in regard to his experiments at different times. We are bound, however, to adopt his conclusions in the main so far as this, viz.: that (1), Provided the tissues preserve a certain amount of vitality, a cord will produce marks after death very similar in appearance to those resulting from its application during life, except in the presence of effused coagula about the cord, a condition at all times strongly suggestive of suspension during life. And (2), that if the cord were applied during life but removed *immediately* after death, scarcely any marks at all might be apparent.

Lastly, we may notice that the fact of a body being found in such a position that the feet can touch the ground, is in no way opposed to the view that death resulted from hanging. The fact is, suicide by hanging is consistent with almost any posture of the body. (*Cases* 10, 20 to 36.)

Cases 20 to 32 and 34 are descriptions of Tardieu's plates illustrating this point. *Case* 33 is one of hanging whilst the suicide was lying full length on a bed, and *Case* 36 whilst the person was in a sitting posture.

M. Tardieu has collected together 261 cases from MM. Marc,

Esquirol, Jacquemin, Duchesne, Brierre de Boismont, and others, where death has resulted from this incomplete form of hanging. The results are as follows :—

The feet resting on the ground	in 168	cases.
The body in a kneeling posture	„ 42	„
The body extended and lying down	„ 29	„
The body in a sitting position	„ 19	„
The body huddled up or squatting (*accroupi*)	„ 3	„
Total	261	

The answer therefore to the question, "Did death take place by hanging?" can seldom be positive, since we have seen that there is no one constant sign peculiar to hanging. Nevertheless most medical jurists admit that it is very seldom the medical witness can have much doubt as to the cause of death, if he is careful to observe the several lesions named, together with the general surroundings of the body.

VI.—Was the Hanging Accidental, Suicidal, or Homicidal?

In hanging, the chances are always in favour of suicide. (*Cases* 10, 11, 12, 58, 59.) It is altogether erroneous to say that even the very feeblest cannot take their own lives. A resolute invalid or valetudinarian can do wonders (*Cases* 8, 10, 11, 12). Dr. Taylor has given cases, in which suicides first wounded themselves or took poison, and then finished their self-slaughter by suspension. (*Cases* 41 to 46.) (See also Casper "*Gericht Leich. Oeffn.*," vol. ii., p. 89, and "*Annales d'Hygiène*," 1848, i., 444. See Ogston, "*Med. Jurisp.*," p. 532.)

But given great disparity of strength—or that the victim was drunk or has been drugged—or that the murder is the work of more hands than one, then of course homicidal hanging becomes a possibility. A case is recorded where a woman tied a ligature round her husband's neck whilst he was asleep, and then pulled him up. (*Case* 48.)

The accurate reply to the above question must depend on a variety of circumstances, and, like the former, can seldom, if

ever, be answered merely from post-mortem appearances. The surroundings—the absence of all signs of struggling, or of marks of injury on the body—the previous history of the deceased—the time, the place, and the manner of the hanging—for example, the hands of the deceased being tied together, (a condition not likely to be found in a case of suicide, although it can scarcely be denied that it is not impossible) (*Cases* 39, 40)—will assist us in forming an opinion. Homicide is suggested in cases where the injuries produced by the cord are considerable, and where contusions and well-marked ecchymoses are evident. Further, if the cartilages or hyoid bone be fractured, or if the carotids be injured, or if blood be extravasated on the walls or in the outer or beneath the inner coat, the suspicion of homicide is strengthened. Where wounds of the heart, throat, etc., exist, of sufficient severity to threaten syncope from loss of blood, or where there are many marks of violence on the body, or where the furniture of the room shows indications of a severe struggle, we may usually suspect murder.

But wounds, as we have said, may be *self-inflicted* (*Cases* 11, 12, 57). Hence the number, the situation, the extent, and the direction of such wounds, must be carefully noted. And again, certain wounds may be *accidental.* For instance, a person may throw himself off a chair or table on to the floor or hard pavement, break the rope and injure himself in doing so, and again a second time attempt to hang himself. Or again, remembering the fluidity of the blood, it is possible for wounds, resembling life-wounds, to occur after death. (*Case* 1.)

If both doors and windows are found fastened from the inside, suicide may fairly be suspected.

Again, poison may have been given or other injuries inflicted homicidally, and the body afterwards hanged to avert suspicion, (*Cases* 49, 50, and 56); or a person may be seriously ill-used, and finally hanged during the very last moments of life. (*Case* 51.)

The position and character of the ligature (and it would appear that a cord or rope was used in more than half the cases of hanging collected by Devergie and Casper, portions of sheets, shirts, and other articles of dress being used in the

remainder), should always be noticed. Respecting position, Tardieu and Taylor give the following table from Remer, Devergie, and Casper, which shows that the ligature was found encircling the neck between the chin and os hyoides in more than two-thirds of the cases of suicidal hanging recorded by them.

	Remer.	Devergie.	Casper.	Totals.
Above the Larynx	38	20	59	117
On the Larynx	7	7	9	23
Below the Larynx	2	1	0	3
	47	28	68	143

We purposely omit discussing such questions as the obliquity of the cord, the number of turns round the neck, etc., all of which we believe to be useless as diagnostic signs. Although in judicial executions a considerable fall is often employed, and is always desirable, yet it is not necessary, in order to ensure death by hanging, that the feet should be off the ground. Hence the fact that the feet may touch the ground, is not opposed to suicidal hanging, although it is opposed to homicidal hanging. (*Case* 10.)

Hanging may occur by accident. Taylor and Tardieu mention several such cases (Taylor, p. 49; Tardieu, p. 121).

Again, children not unfrequently "play at hanging" with fatal results. Dr. Taylor mentions the case of a lad, aged fourteen, who having witnessed an execution at Nottingham, determined to try what the sensation was like. The same day he was found dead, hanging from a tree. Once the hanging fit gets into a school, it is very difficult to check it, the smallest possible provocation leading children to hang themselves, by way, as they suppose, of revenge.

Hanging exhibitions have been recorded. The morbid appetites and demands of spectators will create a supply of almost anything. (*Cases* 53, 54.)

SUGGESTIVE OUTLINE FOR THE INSPECTION AND EXAMINATION OF A BODY IN A CASE OF HANGING OR STRANGULATION (TREATED OF IN THE NEXT CHAPTER.)

It is advisable to have a photograph taken of the body, as well as of the furniture and of other articles in the room, before anything is touched.

GENERAL ENQUIRIES.

Was the room locked on the inside, without other possible means of escape?

Were any firearms or other weapons, or marks of blood, or signs of struggling, noticed about the room?

Is the dress of the deceased torn, or the hair disarranged?

Does the dress, etc., indicate any interference with the body after death?

Note the position of the body, and the character of the dress worn (a tight cravat?).

What is the weight of the deceased? (This is important if a question should arise as to the power of the cord to sustain the ascertained weight.)

NOTES RESPECTING THE LIGATURES USED.

If the ligature is still round the neck, carefully note (or better still sketch) its exact position; the number, the character, and the method of tying the knot or knots (that is, whether the tying was the work of a right or left-handed person); and the exact position of the knots. Remove the cord by cutting so as to leave the knots intact.

If the ligature has been removed, ask for it.

Preserve and retain the ligature for evidence. It may be needful to compare it, with some material either in the possession of an accused person, or belonging to the deceased; or its possession may be traced to some one else.

Note the material of which the ligature is composed.

Do the ends of the ligature appear (if a rope) to have been freshly cut?

Compare the ligature with the impression on the neck. Note whether there is any brown line on the ligature, such as might result from perspiration.

What is the strength (or weight-bearing power) of the ligature by which the body was suspended? (*Cases* 11, 43.)*

Are there any marks of blood, or of hair or other matters, adherent to the ligature?

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* The *strength* of a rope is that of its *weakest* part. This may be tested

External Appearances.

Are there any marks of violence on the deceased, other than those directly caused by the hanging or strangling?

By what instrument were these marks (if present) likely to have been inflicted?

Are they sufficient in themselves to account for death; or, if not sufficient, are they of such a character that they would induce great weakness from loss of blood?

Were they probably accidental, suicidal, or homicidal (*i.e.*, likely to be caused in a struggle)?

Note:—

Face.—Pale? Swollen? Placid?

Mouth and *Nostrils.*—Foam?

Tongue.—Position? Colour? Whether injured or not?

Eyes.—Prominent?

Pupils.—Dilated?

Neck.—Note—

Character of Marks.—Presence of a groove? Whether it be complete or not? Colour of the borders of the groove, and of the parts beyond? Marks of fingers, etc.?

Direction of the Marks.—Whether oblique or not. Note the apparent position of the knots.

State of the integuments in the furrow.

Any excoriations or ecchymoses.

by suspending it (by a loop) from a ring or hook, and adding weights till it breaks.

The rules often given, such as the following, are useless for small cords:

"To estimate the strength of a cord of hemp multiply the square of its number of inches in girth by 200, and the product will express in pounds the practical strain it may be safely loaded with. In the case of cables, multiply by 120 instead of 200." The ultimate strain is probably double this. Again, "in cables, the strength, when twisted, is to the strength when the fibres are parallel, as about 3 to 4." (Gregory and others.) The only safe way of answering questions as to the strength of cords, etc., is to experiment. As some guide to the *comparative* strength of materials, we give the following table of the breaking strain of certain fibres as experimented upon by two authorities:—

Fibre.	De Candolle.	Labillardière.
Flax (*Linum usitatissimum*)	11·7	1000
Hemp (*Cannabis sativa*)	16·3	1370
New Zealand Flax (*Phormium tenax*)	23·8	1996
Pita Flax, or American Aloe (*Agave Americana*)	7·0	596
Silk	34·0	2894

Hands.—Bloody? Clenched? Anything in the hands? (Carefully preserve any hair, etc., that may be found grasped or attached.)

Sexual Organs.—(In the male, note if there be spermatic fluid in the urethra.)

INTERNAL APPEARANCES.

Neck.—Dissect out the mark around the neck, cutting for this purpose through the skin an inch above and an inch below the mark. Note the state of the underlying tissues, the presence of coagula, etc.

The entirety or otherwise of the muscles of the neck?

Effusion of blood amongst the muscles and ligaments.

Injury to the larynx and trachea.

" " ligaments of neck.

" " bones (specially the os hyoides, atlas, and axis).

" " invertebral substance.

" " spinal cord (effusion of blood, etc.?).

Carotid Arteries.—Condition of inner and middle coats? Whether or not there are extravasations of blood on the walls or within the vessels?

Brain and Membranes.—Congested? Vascularity?

Larynx and Trachea.—Congested? Mucous froth?

Heart.—Right side full?

Lungs.—Congested? Emphysematous patches on the surface? Apoplectic extravasations in the substance?

Stomach.—Congested? Presence of food? Presence of poisons (such as of opium, etc., given to drug the deceased, or for other purposes)?

Are there any morbid appearances that would account for death, otherwise than by the hanging or strangulation?

Has there been any disposition on the part of the deceased to commit suicide, or is insanity hereditary in the family?

ILLUSTRATIVE CASES.

1. Lancet, 1871, Vol. I., p. 166, and Vol. II., p. 210; Edin. Med. Journ., XVI., p. 160. — Judicial execution, at Dublin. Fall 14 feet. Head severed from body. No dislocation of vertebræ. Axis fractured. Blood flowed from the head in greater quantity than from the body. Carotids bled for five minutes after death. (Pages 388, 404.)

2. Tardieu [who quotes Parrot, "De la Morte Apparente," Thèse de Concours, Paris, 1860, p. 61; see also "Med. Times and Gazette," July 1, 1854, quoted by Dr. Taylor].—Drs. Clark, Ellis, and Shaw of Boston, were the observers, and the man who suffered judicial hanging, aged twenty-eight and very vigorous, weighed 130 pounds. The execution took place at 10 a.m. There was "not the least perceptible struggle or convulsion," showing the absence of rapid asphyxia. The lungs and brain were found normal, death probably occurring from syncope, caused by the sudden fall of the body (from seven to eight feet) at the moment of hanging. The heart was heard to beat 100 times a minute for seven minutes after suspension. After nine minutes, the beats were 98 per minute. Two minutes later, the beats could not be heard. At twenty-five minutes past ten he was cut down, but the rope was not untied. No impulse or sound of the heart was perceptible. The face was purple, although a small space near the ear seemed less congested. The tongue did not protrude, nor were the eyes staring; the pupils were dilated. The rope had been attached just above the thyroid cartilage. At 10·40 the ligature was relaxed, and also the ropes binding the arms. After this the face and body gradually became pale. The vertebral column had not been injured. There had been no emission of semen. At 11·30 a regular pulsation was observed in the right subclavian vein. On applying the ear to the chest this was found to depend on the heart, which beat eighty times per minute. Only one sound was heard, regular and distinct, accompanied by a very slight impulse. The thorax was then opened, and the heart laid bare, but without stopping its movements. The right auricle contracted and dilated with energy and regularity. At noon the pulsations of the heart were forty per minute. At 1·45 they were only five per minute. At 2·45 the spontaneous movements

ceased altogether, but irritability persisted till 3·18 p.m., *i.e.*, more than five hours after the hanging.

[Although Dr. Clark does not say so, it is extremely probable that the sound discovered by auscultation, before the opening of the chest was due to the auricles rather than to the ventricles.] (Pages 391, 392.)

3. Lancet, 1867, II., p. 575.—Dr. Massey.—Post-mortem after a case of judicial hanging. Countenance swollen.—Tongue indented at border.—pupils dilated.—Frothy mucus issuing from the mouth.—Lips and ears livid.—Mark visible all round the neck, except where the noose was placed.—Mark of a tallowish hue intersected by lines of a purplish colour, the skin around being much puckered.—Right sterno-mastoid much congested.—Penis congested and semen discharged.

Lungs very dark, and so collapsed as not to be visible when the chest was opened. Heart :—right side full and left empty.

Along the course of the indentation the skin was very thin and semi-transparent, with slight extravasations of blood underneath. The right sterno-cleido muscle was ruptured, the ends being about two inches apart. There was extravasation of blood in the sheath of the carotid, but the coats of the common carotid and internal jugular vein were uninjured. Slight venous congestion of the laryngeal mucous membrane above the vocal cords. No bones or cartilages were injured or displaced. Brain healthy. (Pages 394, 395, 401.)

4. Dublin Quarterly Journal, No. 35, August, 1854, p. 86.—(*Dr. Croker King.*)—Judicial hanging. No effusion of blood was observed in the course of the cord, although the man dropped 7·5 feet, and with a great jerk. (Page 389.)

5. Recovery after Hanging, Lancet, Nov., 1839.—(*Quoted by Dr. Taylor.*)—A robust woman of 33 years, hanged herself whilst drunk. She was missed for about ten minutes, although the precise time of suspension was not known. Medical assistance reached her about ten minutes after she had been cut down. She was then quite insensible, the pulse being barely perceptible, and the breathing slow and laborious. The face was pale, the lower jaw sunken, the extremities moderately warm, the hands convulsively clenched, the pupils dilated, and scarcely acting. A dusky red mark, a quarter of an inch wide, was seen round the upper part of the neck, forming an angle over the ramus of the lower jaw on the right side, where the knot of the silk handkerchief used as a ligature had rested, in consequence of which the constriction was incomplete. She was bled twice freely, hot water being applied to the feet, mustard to the calves, and cold to the head. After thirty-two ounces of blood had been taken from her, the breathing became stertorous, the sphincters relaxed, the pupils dilated fully, and the jaw dropped further. She appeared sinking. She was then rubbed on the chest with ammonia liniment; in an hour more she

could swallow, but remained comatose till evening, though conscious of pain. She quite recovered. (Page 391.)

6. Lancet, July 6th, 1844.—(*Dr. Shearman.*)—Suicidal hanging with a handkerchief. The man was cut down apparently lifeless after half an hour. The face and neck were found swollen, and a livid ecchymosed mark existed below the thyroid cartilage; the fingers were bent and the hands clenched. The man was bled, and in a few minutes began to breathe. He rallied after a few hours. This was succeeded by great restlessness and by convulsions. He afterwards became calm, and spoke several times, but suddenly died from exhaustion nineteen hours after he had been cut down. (Death was due probably to the injury to the cerebral circulation.) (Pages 389, 391, 392, 395.)

7. Medical Times and Gazette, Dec. 17, 1853, p. 639.—(*Dr. B. W. Richardson.*)—Male adult. Died on the second day after hanging. At the post-mortem the brain, lungs and heart were found congested. Effusion of serum was found under the arachnoid, and solid fibrinous deposits in the right ventricle of the heart. (Page 389.)

8. British Med. Journal, May, 1875, p. 575.—(*Dr. Holland.*)—Male, 57. Suicidal hanging. Cut down one hour after suspension. On slackening the rope, air escaped from the larynx with a long loud groan. [Dr. Holland suggests that just before the rope was applied a deep breath was taken, the retained air escaping as the ligature was removed.] (Pages 386, 391, 403.)

9. Medical Gazette, Vol. XXXVII., p. 75.—(*Mr. Noyce.*)—Suicidal hanging. Cut down after two or three minutes' suspension. Cold affusion was employed after four or five minutes, the man having ceased to breathe, although the heart's action had not stopped. Artificial respiration said to have been used without benefit. Bled to sixteen ounces. Recovery. (Pages 391, 392.)

10. Tardieu, loc. cit., pp. 73, 74, etc.—*Suicidal Hanging mistaken for Murder.*—In this case, a married woman of loose morals, who had twice brought on abortion and was nearly always drunk, was found by her husband in a crouching position, hanging by a rolled-up handkerchief attached to the key of her chamber door [the keys are often large in Normandy] at a height of only ninety-eight centimetres (or little more than three feet) from the ground. The husband tried to conceal her mode of death, and [on medical evidence, which M. Tardieu shows to have been quite erroneous] was sentenced to the galleys, where he died within a year. (Pages 402, 403, 405.)

11. Tardieu, p. 74.—A husband was accused of having strangled his wife, aged forty-eight, who was found in a loft or granary in a sitting posture, propped up against some planks, and below a beam from which a broken rope still hung. The rope had broken by her weight. The husband,

who ound her at 8·30 a.m., carried her to her bed, and sent for a doctor some time after. He found her, when he arrived at 11·30, quite cold and stiff, and there were marks on the neck like those of fingers, besides a furrow where the rope had been.

The case was referred to M. Tardieu, and his investigation is masterly. He shows that the place was adapted for suicide, and bore no marks of a struggle; that the rope had broken by slowly yielding under the weight of rom 99 to 112 pounds. The body was attached to the beam by a simple bow-knot (rosette), whereas murderers usually tie very firm knots; he shows that the marks on the neck (figured at page 80 of his work) were rather consistent with hanging than with strangulation. The mark was single though the rope was double. He considers that the ecchymoses might have been produced by her own hand (as in Plate IX. of his book), and that this explains the sinuosity and inequality of the mark. Finally, he argues against strangulation from the pallor of the face, and the absence of pulmonary engorgement. (Pages 403, 404, 406.)

12. Ann. d'Hyg., 1873, Vol. II., p. 113.—Male. A case of hanging. The brother was charged with the murder, because there was no deep ecchymosed depression round the neck, and the body was found in a sitting posture. (It was evidently suicide.) (Pages 403, 404.)

13. Orfila, Méd. Lég., Vol. II., p. 376.—Suicidal hanging. Mark of the cord extended longitudinally round the neck from behind forwards, the slip knot being in front. (Page 395.)

14. Taylor's Manual, p. 385.—(*From Esquirol.*)—Female. Suicidal hanging. Two impressions of the cord were circular, and the third oblique. (The body was partially supported.) (Page 396.)

15. Casper, Vol. II., p. 184.—(*Case* 264.)—Female, 70. Suicidal hanging. *Brain congested. No signs of death by apnœa.* The mark of the cord was entire and depressed, *a part being livid and soft, and the remainder mummified.* (Pages 385, 396, 397.)

16. Casper, Vol. II., p. 184.—(*Case* 265.)—Male, 36. Suicidal hanging. Cord placed over larynx. Distinct cutis anserina. *Cause of death probably apoplexy.* (Page 385.)

17. Casper, Vol. II., p. 186.—(*Case* 269.)—Male, 32. Suicidal hanging. Brain normal. *Lungs and right heart very congested. Mark of cord scarcely visible.* (This circumstance is remarkable, when conjoined with such distinct signs of death by apnœa.) (Page 396.)

18. Casper, Vol. II., p. 187.—(*Case* 270.)—Male, 18. Suicidal hanging. Apnœa. The heart and the internal surface of the pericardium were sprinkled over with petechial ecchymoses. (Page 401.)

19. Casper, Vol. II., p. 190.—(*Case* 276.)—Male, 30. Suicidal hanging. Apnœa. Mark of cord not visible, the neck being protected by a strong beard. On shaving this off "all that could be seen was merely a superficial mark on the right side of the neck 3 lines broad, 1·5 long, and of a faintly dirty colour. (Page 396.)

20 to 32.—The following are descriptions of the plates figured by Tardieu, illustrating the circumstances under which hanging may occur fatally without the feet being off the ground. (Page 402.)

Plate I.—Shows the suicide of the Prince de Condé, Duke of Bourbon. On August 27th, 1830, at eight, a.m., he was found in a bed-room of the Château de Saint Leu, already cold and stiff, hanging to the fastening of the window by means of two handkerchiefs. The points of his toes touched the ground, the distance between these and the fastening to which he was hanged being only six and a half feet. It was urged that it could not have been suicide, because of a defect in one hand which would have prevented him making the knot. There were no traces of struggle or of violence in the room. Tardieu, *loc. cit.*, p. 18. [Quoted from "Répertoire Général des Causes Célèbres Anciens et Modernes, t. xiv., p. 121, Paris, 1835.]

Plate II.—Shows a youth of sixteen, hanging by a simple loop formed in a handkerchief, the knot being under the chin, but the handkerchief not encircling the neck. The handkerchief was placed over a rope between the two rafters of a granary. His toes rested on a heap of wheat, the knees being bent at an angle of about 100 deg. measured from the front.

Plate III.—Shows a prisoner hanging from the bars of his cell-window, by means of his shirt rolled up to form a slip-knot. He was almost seated on the window-ledge, his hands being tied in front, and his feet resting on the ground.

Plate IV.—Another prisoner, hanging by the sleeve of his shirt, from a bar of the window, his feet touching the window-ledge.

Plate V.—An English pæderast hanged himself in prison from the bar of a window, with a rope made of the sheets, his feet having slipped on the floor. The attitude was that of sitting in the air. The lower extremities form an angle of about 120 deg. with the body, the head being inclined forwards towards the toes (arc-boutant.)

Plate VI.—A workman, hanging from the top of his bedstead, in a kneeling posture; his toes, but not his knees, touching the bed.

Plate VII.—A girl, hanging by a towel, with a slip-knot, from the bracket of a shelf. Her legs in sliding became stretched very widely apart, but the feet (heel of right, and toes of left foot) touch the ground.

Plate VIII.—A girl, in a penitentiary, hanged herself at the foot of her bed, by means of her chemise rolled up. She lay sideways, almost on the ground; the left arm, hip, and lower extremity touching the floor. She had

ost consciousness, her face was red, her mouth open, and the tongue protruded. She recovered after appropriate treatment.

Plate IX.—A man, aged twenty-four, hanged himself in the corner of the window of his prison cell, by the help of the leather string of his hammock, to which he had attached a piece of linen, and his cravat. His feet were on the mattrass, one hand being between his neck and the ligature.

Plate X.—A prisoner at Mazas, hanging to the gas pipe, at a height of 51 inches, by the thong of the hammock, and a cravat. He occupies a sitting posture on the ground. One hand rests on the ground, and a plug of linen rag is stuffed into his mouth.

Plate XI.—Another prisoner, at the same place, hanging to the gas-pipe by a slip-knot, made with the thong of his hammock. He is kneeling on the ground, his hands behind his back, and his face towards the ground.

Plate XII.—A prisoner at Mazas, hanging from the window sash, in a remarkable position, the head being forcibly bent backwards, owing to the position of the knot under the chin. His toes touch the ground.

Plate XIII. — Represents a pæderast, aged sixty, hanging from the window-sash by a similar kind of leather thong as was used by some of the other prisoners. One foot is on the ground, and the other (right foot) rests on a chair.

33. Med. Times and Gazette, Aug. 7, 1852, p. 137.—(*Mr. Webb.*)—Suicidal hanging whilst lying full length on a bed. (Page 402.)

34. Taylor's Manual, p. 387. — Man hanged by his (mechanic's) apron, which he had wedged in at the top of a door. Depression on the neck nowhere ecchymosed. Feet rested on floor.

(See reference as above for other similar cases). (Pages 397, 402.)

35. Ogston's Med. Juris., p. 534.—Suicidal hanging. The toes touched the floor. Absence of struggling proved by a Bible being found placed between the knees by the suicide before death. (Pages 389, 390, 402.)

36. Ogston, Med. Juris., p. 534. — Suicidal hanging of adult in the sitting posture. Two girls in the same bed were not awakened. (Pages 390, 402.)

37. Lancet, Aug. 10, 1844.—(*Mr. Campbell de Morgan.*)—Female, æt. 50. Suicidal hanging from a rail 5 feet 8 inches from the ground by means of a silk handkerchief. Features calm and face pale. Eyes neither congested nor prominent. Tongue natural. Cord-mark parchmenty. Stomach pale. Lungs and heart natural. Death caused neither by asphyxia nor by cerebral congestion. The deep muscles over the second and third vertebræ of the neck were ecchymosed, the ecchymosis extending to the sheath of the spinal marrow. On the left side, external to the sheath, there was a large effusion of firmly coagulated blood. This was evidently

the cause of the death. (The people in the adjoining room heard nothing.) (Pages 389, 390, 395, 401.)

38. Taylor's Manual, p. 374.—(*Dr. Elliott.*)—Suicidal hanging by a boy, æt. 11, effected by tying a knot in his handkerchief, placing one part of it over the knob of the upright at the foot of the staircase, and the other underneath his chin, *so that it did not go round his neck.* Died rapidly and quietly, without struggling. The act was committed in order to frighten his parents. (Pages 390, 396.)

39. Ann. d'Hyg., 1832, Vol. I., p. 419.—Suicidal hanging by a man with his hands tied. (Page 404.)

(See also "Med. Gaz.," Vol. XLV., p. 388, and "Guy's Hospital Report," Oct. 1851) where hanging was effected, although the hands and ankles were tied.)

40. Beck, *loc. cit.*, **p. 566; Paris, Vol. III., p. 44.**—Many years ago a tailor named George Hebner was found hanging to the top of a bedstead in the garret of a house of ill-fame, kept by a widow named Hughes, in Dean Street, London. *His hands were tied behind his back*, and his handkerchief drawn over his face, the *rope round his neck being fastened by a sailor's knot.* These circumstances led to the arrest and conviction of a sailor called Ludman, who, with Mrs. Hughes, was found guilty and executed. (Page 404.)

41. Ann. d'Hygiene, 1835, Vol. II., p. 410.—Female. Fastened a cord to the top of the bed, and whilst in a kneeling posture, put her head through the noose. Having done this she made a deep wound in her arm with a razor, shut up the razor and put it aside. Then becoming faint, she fell forward, and died from the pressure of the cord. (Page 403.)

42. Taylor's Med. Juris., Vol. II., p. 47.—Male adult. Suicidal hanging, having previously cut his throat. (Page 403.)

43. Taylor's Med. Juris., Vol. II., p. 47.—Male adult. Suicidal hanging, having tried the night before to poison himself with arsenic, afterwards inflicting a deep incision with a razor in the bend of his left arm. (Pages 403, 406.)

44. Casper, Vol. II., p. 224.—(*Case* 288.)—Female, æt. 34. Suicidal hanging, preceded by the infliction of two stabs ($\frac{3}{4}$ in. long) in the thorax, penetrating the pericardium; after which she had apparently bathed the wounds with a sponge. (Page 403.)

45. Ogston's Med. Juris., p. 532.—Male. Suicidal hanging, after cutting his throat with a razor, the blood from which filled a chamber-pot. (Page 403.)

46. Taylor's Med. Juris., Vol. II., p. 48.—(*From Desgranges.*)—Suicidal hanging (?). The man first cut his throat, and afterwards placed a handkerchief in the wound to arrest the bleeding. After this he went upstairs to another room, looked out a cord, and then climbed a ladder to fix the cord to a nail. The cord was found in the wound. (Opinion given in favour of suicide.) (Page 403.)

47. Chever's Med. Juris. for India, p. 405.—A man throttled by Thugs, who also cut his throat. Recovered. (Dr. Chevers thinks the cutting the throat relieved the congestion caused by the throttling.) (Page 392.)

48. Ogston's Med. Juris., p. 532.—A woman tied a ligature round her husband's neck while he was asleep, and then pulled him up. (Page 403.)

49. Taylor's Med. Juris., Vol. II., p. 46.—(*From Devereux.*)—A woman found hanging. The death, however, was caused by a wound, concealed by the breast, which had penetrated the heart. (Pages 401, 404.)

50. Chever's Med. Juris., p. 597.—Numerous cases of after-death hanging recorded, the actual murder having been committed by other means, (There seems no case on record where poisoning has been first effected homicidally.) (Pages 401, 404.)

51. Chever's Med. Juris., p. 600.—Cases where persons have been hanged alive, having been first maltreated. (Pages 402, 404.)

52. Taylor's Manual, p. 373.—(*Sir B. Brodie.*)—Male, æt. 17. Breathing restored imperfectly after about fifteen minutes apparent death from hanging. The pulse became perceptible, but the patient remained insensible, breathing stertorously and irregularly, with irregular pulse. Bled. Died insensible twenty-four hours after being cut down.

Post-mortem.—Vessels of brain full of blood. No other post-mortem appearances noted. (Page 389.)

53. Lancet, April 17, 1847, p. 404.—Hornshaw, whose case was published by Dr. Chowne, was on three occasions resuscitated from hanging—a feat which he performed to please the public! He stated that he lost his senses almost at once; that it seemed as if he could not get his breath, and as if some great weight were attached to his feet. He felt that he could not move his hands to save himself [this attempt is, however, sometimes effected], and that the power of thinking was gone. (Pages 390, 405.)

54. Taylor's Med. Juris., Vol. II., p. 38.—Scott, the American diver, was in the habit (says Dr. Taylor) of making public experiments in hanging. He had frequently gone through them without accident, but in January, 1840, he died during one of his performances. It is probable that a slight shifting

of the ligature caused compression on the throat between the chin and the larynx, so as to produce asphyxia. No attempt was made to save him till too late. He *was allowed to hang thirteen minutes*, and not brought to the hospital until thirty-three minutes had elapsed. [This case, like one of M. Tardieu's plates, shows that *the ligature or rope need not completely encircle the neck to cause death.*] (Pages 390, 405.)

55. Ogston's Med. Juris., p. 525: Guy and Ferrier, p. 280.—Case recorded by Dr. Gordon Smith ("Forensic Med.," Appendix, p. 561), where a surgeon (Mr. Chovet) attempted to save a criminal (executed April, 1733) by making an opening in the trachea before he was hanged. The man showed signs of life after hanging three quarters of an hour, but could not be further resuscitated. (Page 387.)

56. Vierteljahrsschrift, 1867, Vol. I., p. 161.—(*Dr. Walter.*)—A case of hanging. Suicidal? Two marks were found on the neck, one like the effects of strangling, the other of hanging. It was thought that the woman was first strangled and then hanged by the same ligature. (Page 404.)

57. Vierteljahrsschrift, 1871, Vol. II., p. 223.—Suicidal (?) hanging. Boy, æt. 9. Found hanging. There were marks of pressure on the neck. (Suicide probable.) (Page 404.)

58. Doubtful murder or suicide. Case of Sarah M. Cornell.

[Abridged from Beck, pp. 571-3, who gives original references, including private letters, and refers also to the "*Boston Medical and Surgical Journal*," Vol. viii., p. 334.]

On the 20th December, 1832, S. M. Cornell, a factory girl, of immoral character, known to be pregnant from her own confession, left her home in the evening, in good health and spirits, and was found dead on the morning of the 21st, suspended to a stake. Her cloak was hooked together, except one hook about the centre of the chest. Her calash was on her head, and her gloves on her hands. Her shoes were found about eighteen inches from the body, a little mud being on one of them. Her toes only touched the ground. The knees nearly approached the ground, and her clothes were smoothed back as far as they would reach under her legs. The cord was of hemp, small in size, twisted twice round the neck, and attached to the stake about six inches from its top. Its length, from the stake to the neck, was less than six inches. Her calash (or hood) was so far back on the right cheek that her face rested against, and was marked by, the stake. One witness (a seaman) described the knot as a *clove hitch*. He added, that it must be drawn at both ends horizontally to tighten it.* The knot was at

* Beck figures this knot. So do Erichsen, Druitt, and other writers on Surgery. It is made thus: Take a string and make first one simple loop,

the right side, and the strings of her calash were under it. A groove or furrow passed round the neck horizontally, so deep that whilst the neck normally measured 11¼ inches round, in the groove it measured only 10½ inches. The mark was above the thyroid cartilage, 1¼ inch below the lobule of the ears on each side. The face was pale, and the tongue slightly protruded. The females who laid her out on the same day, found finger-marks passing upwards on the abdomen, and bruises on the legs, the worst bruise being on the back of the hip. There were scratches on the knees, with some dirt. One knee seemed stained with grass, and one witness (a female) swore that she picked grass from off it. The vagina was bloody, and her linen stained with blood. The fæces were evacuated and flattened. The right arm was raised, and was quite stiff, and under the cloak. A physician (who knew from herself of her pregnancy) was called in, and inclined to the idea of suicide. She was buried, but was exhumed two days after, on account of suspicions. Further medical examination revealed parchmentation of the furrow in the neck, a healthy stomach, lungs gorged with black blood, and the abdomen livid and discoloured. [No mention is made of finger-marks.] They confirm the other appearances noted by the women, especially as to the grass stain. The uterus was examined, and a fœtus found. The membranes were entire. The fœtus weighed five ounces, and measured eight inches. It had neither nails nor hair. The alleged date of conception was the 30th of August; the last catamenia being August 21st. Death took place on December 20th. A question was raised—Which is most probable, that a fœtus, aged only three months and twenty days, should be so large, or that she menstruated after conception? On the 26th of January the body was again examined, but fruitlessly. A man called Avery was tried for the murder of this female. Whilst it seems certain that death was caused by strangulation or apnœa, there are many difficulties connected with this case. The author considers that the clove hitch, and some other circumstances, point to the idea of murder by some person or another. (Page 403.)

59. Beck, p. 567; Foderé; (vol. iii., p. 167, from the *Causes Célèbres* and Grimm's *Historical and Literary Memoirs* (from 1753 to 1759), vol. ii., pp. 41, 117, and 166.) [See Voltaire's *Traité sur la tolerance à l'occasion de la mort de Jean Calas; Nouveaux mélanges Philosophiques Historiques*, &c., IIme partie, édition de 1772 (t. xxxii., p. 30), containing the *Piéces originales concernant la mort de Sieurs Calas*, and Tardieu, *loc. cit.*, p. 67, etc.] *The case of Marc-Antoine Calas.*

then another like the first, and put the last-made loop behind the other. Your *clove-hitch* is then made. It is much used to reduce dislocations, because it can only be tightened in the manner described by the sailor whose evidence is given above. It is used by seamen.

We quote this case because many of the English versions (even that of Dr. Taylor) are incorrect in some details.

Jean Calas, aged 68, was a Protestant merchant of Toulouse, of excellent character. His wife and family were Protestants, except one son [Louis Calas] who had become a Catholic. One of his favourite servants was also a Catholic. One of the sons, Marc-Antoine, was a man of letters, but considered to be of a turbulent disposition, gloomy and violent. Having no taste for business, and being hindered from the practice of the law on account of his Protestantism, he resolved to end his life, communicated the idea to one of his friends, and read all he could find in books on the subject of suicide. At last, on the 13th October, 1761, having lost some money by gambling, he determined to carry out his project. One of his friends supped with him and other members of the family. After supper they went to another room. Marc-Antoine disappeared when the friend was about to take his leave. The brother, Pierre (Calas' second son), went downstairs with the friend, and found Marc-Antoine hanging in his shirt, from a stick or billet of wood placed across partly open folding-doors, which led to to the shop. His other clothes were folded up on the counter. His hair was neatly arranged, and there were no marks or signs of injury of any kind on the body. [Some slight marks were afterwards caused by carelessness in carrying the body to the town-hall.] The cries of the unfortunate family caused a great crowd to assemble. Some fanatic cried out that the old man had murdered his son, out of hatred to the Catholic religion. The mob took up the cry, and some said that the friend (Lavaisse) also had helped to hang the deceased. The whole family, their friend, and even the Catholic servant, were put in irons. Improbable as it was that the old man alone could have hanged this youth of twenty-eight, he was condemned to death [to be broken on the wheel]. A surgeon named Lamarque declared that the remains of food found in the stomach had been taken four hours. [They had really only been taken two hours.] The public hangman denied the possibility of hanging across folded doors in the manner described! Great stress was laid on some slight contradictions in the evidence of the father and brothers, as to whether the old man said he had cut down his son, and on their first wish to conceal their grief and shame. Yet it is to be noted that Pierre and his friend Lavaisse went themselves to the officers of justice.

The poor old man was first tortured and then executed on the wheel, and the youngest son banished for ever. Voltaire (greatly to his credit) exerted himself for three years to defend the memory of Calas, and to reverse the sentence against the son. "On the 9th day of March, 1765, fifty judges, who had investigated the circumstances, declared Calas altogether innocent, and that Marc-Antoine had committed suicide. The king, by his liberality, sought to compensate the unhappy family as far as possible. The medical witnesses had never examined the cord, nor the place where the hanging occurred. (Page 403.)

60. Indian Med. Gaz., October 1, 1881, p. 275.—(*Mr. David Wilkie.*)—Notes of post-mortems on two cases of judicial hanging. (Page 394.)

61. Berliner Klinische Wochenschrift, August 31, 1877.—(*Dr. Müller-Benigna.*)—Male, æt. 40. Suicidal hanging. When the body was examined one hour after death, there was no turgescence of the genitals nor any signs of discharge noted.

Post-mortem (twenty-four hours after death). Signs of death from asphyxia well marked. About half a teaspoonful of seminal fluid, containing numerous spermatozoa, was found under the urethral orifice. (Page 390).

62. Ann. d'Hyg., October, 1881, p. 359.—(*Dr. Hurpy.*)—Female aged. Suicidal hanging. The body lay prone on the floor, and around the neck there was a cord with a running noose. The cord was attached to the leg of a low table, at a height of 16 inches from the floor. (Page 394.)

63. Virchow's Archiv., 74, p. 401.—(*Dr. Freidberg.*)—Post-mortem on a body exhumed twenty-eight weeks after death from hanging.

Post-mortem.—Deep mark found on the throat caused by the rope, with clots of coagulated blood in the cellular tissue. Division of the inner and middle coats of the right external carotid artery, with hæmorrhage from the vessels running along the coats of the carotids. (This is thought to be a very characteristic appearance, caused by the tension of the vessel.) (Pages 397, 398, 399.)

64. British Med. Journ., 1875, I., p. 294.—(*Dr. Littlejohn.*)—Suicidal hanging. Although the ligature used was a soft cotton handkerchief, the furrow caused by the pressure of the ligature was well marked, dark, and parchment-like. (There was a cicatrix on the thyroid cartilage, due to a suicidal wound inflicted seven years previously.) (Page 396.)

65. Lancet, 1870, I., p. 446.—(*Case at the Hôpital St. Louis.*)—Male, æt. 62. Suicidal hanging. When discovered he presented no signs of life. He was then bled, and electricity employed, etc. Recovery. During convalescence congestion of the right lung, followed by a limited pleuritic effusion, occurred.

In this case it is recorded that the temperature fell three degrees below the normal, whilst with the return of sensibility and intelligence it rose three degrees above the normal. (Pages 392, 383.)

CHAPTER X.

STRANGULATION.

Strangulation defined. — Symptoms. — Treatment. — Post-Mortem Appearances. — Death by Strangulation. — Accidental, Suicidal, and Homicidal Strangulation.

(ILLUSTRATIVE CASES, Page 436.)

BY "strangulation" or "throttling," as distinct from "hanging," we mean death as a result of pressure on the neck, the body itself not being the constricting force. The pressure may be effected in numerous ways, viz.:—by the fingers (*Cases* 1, 2, 12, 66), or thumb (*Case* 35); by the knee (*Case* 3), or foot (*Cases* 4 and 5); by ligatures of various kind (*Cases* 13, 14, 16, 17, 18, 24, 65, etc.); by flexible twigs and bamboos (*Cases* 5, 6, 7), etc. Even in one case of suicidal strangulation, a woman is recorded to have used her long hair as a ligature (*Case* 8). Sometimes a hard body, such as a stone or piece of coal, has been wrapped up in the ligature, thereby increasing the pressure at a given spot. (*Case* 36.) Numerous other methods of strangling are recorded. (*Cases* 21, 22, 27, etc.)

In Spain the customary method of execution is by a steel collar (the garotte) tightened by a screw, the criminal being seated and fastened to a pillar or post. In Turkey and some other Eastern countries, suffocation by the bow-string is a common mode of execution. The notorious Thugs of India sometimes used a cummer-band, or soft loin cloth, and at other times a *lasso*, or long thong, with a running noose.

In England the term "garotting" is used to signify the forcible compression of the neck by thieves on the highway. The attack is usually made from behind, the victim being robbed whilst the throttling process is proceeding. That death is not more common under such circumstances, depends on the

rapidity with which the performers operate. By the 24th and 25th Vict., c. 100, s. 14, it is enacted:—"That whosoever shall attempt to drown, suffocate, or strangle any person with attempt to commit murder, shall, whether any bodily injury be inflicted or not, be guilty of felony and being convicted thereof shall be liable, at the discretion of the Court, to be kept in penal servitude for life, or for any term not less than three years * * * * or to be imprisoned for any term not exceeding two years." As the intent in cases of garotting is usually robbery, it is provided by section 21, in order to check this crime, that, "Whosoever shall, by any means whatsoever, attempt to choke, suffocate, or strangle, any other person, or shall by any means calculated to choke, suffocate, or strangle, attempt to render any other person insensible, unconscious, or incapable of resistance, with intent, in any of such cases, to enable himself, or any other person, to commit, or with intent in any of such cases thereby to assist any other person in committing any indictable offence, shall be guilty of felony, and being convicted thereof shall be liable, at the discretion of the Court, to be kept in penal servitude for life, or for any term not less than three years * * * * or be imprisoned for any term not exceeding two years," etc.:—

We shall consider:—

I. The symptoms produced by strangulation.
II. The treatment required in cases of strangulation.
III. The post-mortem appearances indicative of death by strangulation.

Out of which arise the two questions:—

IV. Was death caused by strangulation?
V. Was the strangulation accidental, suicidal, or homicidal?

I.—The Symptoms produced by Strangulation.

Death from strangulation (unlike hanging) is invariably the result of pure apnœa. Whether it be immediate or not, will depend on whether the means adopted blocks out the air completely or only partially. From M. Faure's experiments

on animals (*"Ann. d'Hyg."* 1859, i., p. 122), it would appear that a dog died in 3½ minutes when the constriction was sudden and complete, but that death was delayed for a considerably longer time when the stoppage was imperfect (a tube capable of gradual closure being introduced), although the animal died before complete closure was effected. In both cases there were convulsions. In the human subject, death as a rule is more rapid than this;—sometimes even it has been instantaneous when the air has been completely stopped.

With incomplete closure, convulsive movements sometimes occur. Occasionally there has been bleeding from the ears (*Cases* 10, 17), nostrils (*Case* 61), mouth and throat (*Cases* 11, 17). The face usually becomes in the first instance black (*Case* 17). The hands are clenched (*Cases* 61-66). As a rule insensibility is so rapid that there is no pain (*Case* 17).

The after effects of strangulation, that is, supposing the first effects be recovered from, are often serious. In addition to convulsions and an extreme swelling of the neck, lower part of the face, and upper part of the chest, there may be pulmonary and laryngeal troubles, paralysis, together with the formation of abscesses and bed-sores, whilst death may occur unexpectedly and at a period somewhat remote from the attack.

II.—The Treatment required in cases of Strangulation.

The principles of treatment are similar to those recommended in hanging—viz., the removal of all constriction from the neck, artificial respiration, and (if the body be not cold) cold affusions. Perhaps galvanism, ammonia to the nostrils, stimulants and light nourishment administered by the mouth or rectum, may be required.

If the body be cold, hot bottles with rubbing, and sometimes venesection should be adopted. The subsequent treatment must depend on whether pneumonia, or the local injuries to the neck and other parts, or the effects of shock, etc., have to be combated.

If no injury has occurred to the neck, there is a good

chance of life provided treatment be adopted within five minutes. That so few have been recovered, is due to the fact that strangulation is usually homicidal.

III.—The Post Mortem Appearances Indicative of Death from Strangulation.

Death being generally due to pure apnœa, the special post-mortem appearances of asphyxia are as a rule better marked in strangulation than in hanging.

A.—*External Appearances.*

1. *The face and extremities.* These parts are usually livid (violet, dark red (*Case* 20), or black) and swollen. (*Cases* 61, 66.) Casper, however, states that in his experience the face usually "has the appearance of any other corpse." In the cases we have ourselves observed, there has been a general lividity of the whole body. Tardieu remarks on the constant existence of minute ecchymosed spots (a dotted redness) on the skin of the face, neck, chest, and conjunctivæ (*Case* 20). This state we have noticed after death other than from suffocation, although we agree that it is usually better marked where death has resulted from suffocation than from other causes.

2. *Blood from the mouth, nostrils, ears, and eyes.* (*Cases* 10, 11, 17, 20, 42, 54, 61, 66.) Bleeding from the ears does not seem to be frequent, for Dr. Chevers states that he has never seen it. When it occurs it implies a rupture of the tympanum.

3. *The eyes.* The eyes are usually wide open, and the eyeballs congested and prominent (Casper doubts this). (*Case* 20.) The pupils are usually dilated.

4. *The tongue* is frequently swollen, dark-coloured, protruded, and sometimes bitten. The position of the tongue has been supposed to be dependent on the position of the ligature. If the ligature (according to *Belloc, Foderé*, and *Orfila*) be *above* the hyoid bone, the tongue is not protruded, whilst if it be *below* the hyoid bone, it is. *Fleischmann* thinks that its position depends on whether death occurs during expiration or inspiration. *Casper* and *Devergie* remark that protrusion and biting of the tongue are to be found at times in all violent deaths,

and that neither the position of the ligature nor the act of breathing has anything to do with it.

5. The *hands* (as in other violent deaths) are commonly clenched. Note must be specially recorded whether they contain anything grasped within them.

[The appearances noted above (1 to 5) are more marked in strangling than in hanging.]

6. *The marks on the neck.* These vary according to their cause as follows :—

(*a.*) *Manual pressure.* Such marks are usually to be found, if present, in front of the neck, and just above or below the larynx. They commonly consist of marks of a thumb and of one or more fingers. (*Cases* 12, 66.) In one case a thumb mark only is recorded. (*Case* 35.) The marks, too, are often merely those of finger-points, together with scratches caused by the nails.

(*β.*) *Pressure of a hard body wrapped in a handkerchief, etc.* In this case, there may be a bruise, of considerable size and of great distinctness, at one spot on the neck, corresponding to the body used. (*Case* 36.)

(*γ.*) *Pressure of a ligature, as of a rope, etc.* In strangulation, the mark of the rope is usually more complete (that is, more entirely encircles the neck), than in hanging. Further, in hanging the rope is generally higher in the neck, and more oblique (the knot being the highest point) than in strangulation. But, on the contrary, the rope may be *horizontal* in hanging, and *oblique* in strangulation (*Case* 25), as, *e.g.*, when a rope that has been employed to effect strangulation, is after death used to drag the body from one spot to another. (*Case* 50.)

As a rule, however, a *horizontal* mark of a cord, the knot being on the same level as the cord, more especially if it be a *complete* mark and *below the larynx*, suggests strangulation rather than suspension. There may be *several marks*, and this circumstance is always rather suggestive of strangling than of hanging.

The effects of a ligature are not constant. As a rule the mark in a case of strangling corresponds more closely with the breadth of the ligature, than in a case of hanging, although it is not always possible to say from the mark the nature of the

ligature employed. Thus Dr. Taylor figures a mark produced by a silk handkerchief, having all the appearances of one resulting from a narrow cord.

Cases are recorded where no marks, or but very slight marks, were apparent after death from strangulation. (*Case* 37.) The Thugs were supposed to operate thus artistically. Such cases must be very rare. The author believes that the riddle of strangulation without mark, depends on the use of a soft yielding ligature, suffocation being added to slight preliminary constriction of the throat.

The cord mark in most cases is circular and well defined, a condition dependent on the lividity of the parts around. The bottom of the groove is usually very pale. The mark as a rule is not deep, nor is the parchmenty skin (common in hanging) so frequently observed after strangling, owing (Tardieu thinks) to the constriction being generally of shorter duration. As a rule, on account of the violence common in strangling, we have more or less ecchymosis and abrasion of the skin. (*Case* 12, 59, 61.)

The marks become more apparent a short time after death, that is, when the body has become cold. They are most evident in the case of persons who have recovered from attempted strangulation.

B.—*Internal Appearances.*

1. *The mark.* As a rule effusion of blood will be found in the sub-cutaneous areolar tissue, and in the muscles underlying the mark. (*Case* 59.) These effusions are commonly isolated and circumscribed, corresponding to the impression of fingers, etc., on the surface. At times infiltration of blood through the loose areolar tissue of the neck generally, has been noted. (*Case* 46.)

2. *The inner and middle coats of the carotid arteries may be ruptured.* This is more likely to occur in lean-necked persons, or where the carotids are brittle (atheromatous), and the compression on the neck has been great.

Some of Casper's cases show that laceration of the carotids may result from the operator using an excess of force either

with forceps or fingers in pinching the artery. To avoid this the artery should be severed above and below by a sharp instrument, and then laid open.

3. *The lining membranes of the larynx and trachea* are always more or less congested, even to the extent of being livid and of a dark red colour, bloody froth, extending to the air tubes, being apparent. (*Cases* 59, 61, 66.) [It should be noted that the trachea is the earliest part affected by putrefaction.]

4. *Injuries to the neck.* Extreme injury to the neck is not common, but occurs occasionally, and owing to the violence employed, more commonly in strangulation than in hanging. Three cases are recorded of broken neck (*Cases* 3, 45), although the injury in the first case was no doubt more due to the stamping than to the strangulation. Tearing of the trachea (*Cases* 9, 13, 43, 60, 61), which may be accompanied by a transverse or longitudinal fracture of the (ossified) thyroid cartilage (*Case* 53), and other injuries, are on record.

In homicidal throttling, where the perpetrator employs excessive force, extensive lesions of the larynx usually occur. As a fact, hand-throttling is, of all kinds of external violence, that most likely to produce such laryngeal lesion. (*Cases* 60, 61.) Murderers are not often so adept as the infamous Burke. ("*Edin. Med. and Surg. Journ.*," xxxi., pp. 238, 239.) Nevertheless, in a recorded case of hand-throttling accompanied by severe injuries, neither the cartilages nor the hyoid were injured. (*Case* 66.) Injuries to the cricoid cartilage are recorded by Pyl in a female who had been strangled; to the thyroid cartilage, by Henke; and to the hyoid and both cartilages, by Devergie, also in a female who was strangled. Facts abundantly prove that, given fractures of the larynx, the application of enormous force is indicated. And this fact is of importance, seeing that, given injuries in a charge of throttling, the defence is certain to be that they resulted from a fall. (See *Cases* 59, 61.) But then, fracture of the larynx by a fall or by an ordinary accident is exceedingly rare. One such case is recorded as occurring from a kick. ("*Edin. Med. and Surg. Journ.*," xviii., p. 412.) A case of fracture of the cricoid cartilage by the kick of a horse is recorded ("*Liston's Ele-*

ments of Surgery," p. 447), whilst injuries to the trachea by accident are said to have occurred in a boy from coming into violent contact with a post ("*Beck's Med. Juris.*," p. 718), and in a child by a fall on a stone ("*Edin. Med. and Surg. Journ.*," xxx., p. 570). In all these cases death resulted. The fact is, that in young animals the elasticity of the cartilages of the larynx is very great, the cricoid cartilage requiring very great force to fracture it, and the thyroid also a great force, although less than the cricoid. Dr. Keiller. ("*Edin. Med. Journ.*" i., pp. 533 and 824) records a series of experiments to test this point on the dead body. In two cases he succeeded in fracturing the hyoid bone and the thyroid and cricoid cartilages by the forcible application of one hand only, whilst in a third case both hands were required. He concludes—

i. That ordinary falls on the larynx are not capable of causing fractures of the laryngeal cartilages, whilst even falls from a height with superadded force are unlikely to do so.

ii. That *severe pressure applied from before backwards* so as strongly to compress the larynx against the vertebral column, or violent blows inflicted over the larynx by means of a heavy body may cause fractures of the larynx. Fractures so produced, however, will be most discernible on the *internal* (or posterior) surface, and generally in or near the mesial line.

iii. Violent compression applied to the sides of the larynx (as in ordinary manual throttling or strangulation by grasping) is, of all applied forces, that most likely to produce fractures of the alæ of the thyroid cartilage, or even of the cricoid cartilage; and that fractures so produced are most perceptible, as well as most extensive, on the *external* (or anterior) surface of the larynx.

By this lateral mode of applying force, the hyoid bone is also the most readily broken. (*Case* 60.)

iv. That the condition of the larynx in regard to the absence or presence of ossific deposit, materially influences its liability to fracture from external violence.

5. *The brain* is usually normal. (*Case* 66.) Sometimes it has been found congested (*Cases* 20, 44, 46, 61), and in one case blood was said to be effused on the surface. (*Case* 42.)

6. *The lungs.* These are sometimes congested, sometimes normal. M. Tardieu ("*Ann. d'Hyg.*," 1856) states, that in his experience, the lungs are seldom very full of blood, but that *patches of emphysema,* due to rupture of the superficial air cells either singly or in groups, making the lungs appear as though covered with thin layers of white false membranes (in reality the emphysematous patches), are invariably to be found. When these patches are punctured, air escapes. Dr. Ogston agrees that these patches are found in pure strangulation, but not so much in the mixed cases. Tardieu further regards punctiform ecchymoses (such as occur in suffocation) to be rare in cases of strangulation, whilst he observes that apoplectic patches (*i.e.*, effusions of blood, or pulmonary apoplexies) throughout the substance of the lungs, varying in size from a threepenny piece to a crown, are very common. (*Case* 66.)

7. *The heart.* This varies. Sometimes it is empty (*Cases* 20, 66), whilst at other times it has been found full of dark fluid blood. (See *Case* 59.)

8. *Sexual organs.* The genitals in both male and female are sometimes congested, erection in the male, and a moist condition of vagina in the female, being noted. Tardieu, Devergie, and Casper are doubtful whether this state of erection is usual. Indeed, Casper writes that in hanging (vol. ii., p. 103)—"In not one single instance of the very many persons hanged examined by me, most of whom were indubitable suicides (and therefore alive when hanged), have I neglected to examine the condition of the genitals, and in not one single case have I found erection of the male organ."

9. *Involuntary discharge of urine, fæces and seminal fluid.* These may or may not occur. Further, the involuntary discharge of seminal fluid occurs at times in most violent deaths, as in those shot or drowned—in suffocation by irrespirable gases—in hydrocyanic acid poisoning, etc. (*Case* 66.) (Devergie, "*Ann. d'Hyg.*," iii., 1855, p. 470.)

When a post-mortem is made after an interval, the fact is to be remembered that evacuation of fæces may result from gaseous intestinal distension.

10. *The blood* is usually very dark and very fl

11. *The stomach* is often congested (*Cases* 44, 46), sometimes normal (*Case* 66.)

We remark, comparing strangulation with hanging, that on account of the greater violence required, and the fact that strangulation is usually homicidal :—

(*a.*) The external marks are more complete in strangulation.

(*β.*) The congestion of the larynx, trachea, and air passages is invariably much greater.

We have now to consider the two following questions :—

IV. Was death caused by the strangulation ?

V. Was the strangulation the result of accident, suicide, or homicide ?

One general remark. It is as a rule not easy to decide whether death was actually caused by the strangulation ; but it is not difficult, in cases of death by strangulation, to decide whether it be suicidal or homicidal.

IV.—Was Death caused by Strangulation ?

Nothing short of *distinct external marks* would justify the medical jurist in pronouncing death to be the result of strangulation. It is very doubtful if a person could be strangled without some marks being left, although the possibility of such an occurrence must be admitted (*Case* 37). The history of the Thugs show how neatly strangulation may be accomplished by means of a soft band, combined with carefully regulated pressure. On the other hand, it must be remembered that finger marks may be visible on the neck, and yet death not be the result of strangulation ; for it is quite conceivable that a person intoxicated, or in an epileptic or hysterical fit, may, gasping for air (which itself occasions a feeling of constriction), produce finger marks by the application of his own hands to the neck. (See "*Chever's Med. Juris.*," p. 580.) Hence our opinion is, that no direct medical evidence is possible in a case of stran-

gulation, unless the marks of such strangulation are perfectly distinct.

The marks found may be as varied in character, as their causes may be various. There may be marks of a thumb and of one or more fingers, with nail scratches:—or there may be a well-defined ecchymosed spot, with a mark more or less round the neck, as when some hard body wrapped in a handkerchief is applied to the throat:—or there may be a complete or partially complete mark of a rope or other ligature, etc. Appearances must not mislead us;—a silk handkerchief with a hard border may produce marks very like those resulting from the pressure of a rope.

But can marks be produced on a body after death similar to those resulting from the application of a cord during life? (*Case* 50.) The experiments of Casper and of others prove the possibility of this, but only within a certain limited time after death. ("*Casper*," Vol. ii., p. 169.) Our own experiments lead as to fix *three hours* as the limit of time when an ecchymosed mark may be produced after death, and about *six hours* for a non-ecchymosed mark. Hence the mark must be regarded in conjunction with other things, which are not likely to occur from the after-death application of a ligature:—*e.g.*, lividity and swelling of the face and chest—prominence and congestion of the eyes,—the position of the tongue,—ruptured air-vessels on the surface, and apoplectic patches in the substance of the lungs,—the congested state of the larynx and trachea,—the presence of bloody mucous froth in the windpipe and air tubes, etc. For here specially the warning is required, that no opinion can be formed that death resulted from strangulation from any one single appearance (not even a cord mark), nor on the other hand that, from the absence of any one appearance (except visible signs of outward pressure), death did not result from strangulation. Hence the internal appearances in cases of strangulation are all-important in leading us to a correct judgment.

We must be careful not to be misled in forming our opinion from the circumstance that a rope is found near a body, or even round the neck of the deceased. Because a body is found

in the water, it does not follow that the person was drowned. Again, even a mark round the neck is no proof that death resulted from strangulation, for such marks have been wilfully inflicted after death for purposes of deception. Again, marks very like marks of violence have been noted when a person has died with a tightly-fitting collar or handkerchief round the neck, which remained on until the body was cold (*Case* 58). Even suspiciously depressed marks may be caused by a bend in those who have short and fat necks. (*Cases* 49, 55, 58, 62.)

Dr. Taylor describes and figures (vol. ii., p. 68) a case recorded by Dr. Schüppel of Tübingen, in which he was able to verify the fact of strangulation after the burning of a body! The victim was a lad aged ten years, but the circumstances pointed to his step-father as the murderer, and probably as the incendiary. Although the boy's neck was much burnt, the mark of the ligature was very distinct, being about one-eighth of an inch in depth, and varying in width from one-fourth to three-fifths of an inch.

Again, in the case of the Countess of Goerlitz, whose body was burnt, the protrusion of her tongue from the mouth suggested that she had been strangled before being set on fire. Ultimately John Stauff, her servant (who was tried for the crime at Darmstadt in 1850), confessed that he had murdered her in this way. (Taylor, vol. ii., p. 69; vol. i., p. 703.)

V.—Was the Strangulation accidental, suicidal, or homicidal?

Strangulation may be accidental or suicidal, but it is generally homicidal. The question whether a given case be one of suicidal or of homicidal strangulation, is exceedingly difficult to answer. (*Cases* 42 to 53.)

(*a.*) *Accidental.*—Accidental strangulation is rare, but *Cases* 14 to 19 and 62 are illustrations in point, and prove its possibility. In *Case* 62, accidental strangulation occurred from the pressure of a shirt collar during an epileptic fit. *Case* 14 is questionable.

(*β.*) *Suicidal.*—Such cases are rare, but possible (*Cases* 20 to 29, 63, 64, 65). It seems doubtful if suicidal strangulation could be effected by the voluntary compression of the fingers on the throat, seeing that the power to press efficiently would cease so soon as insensibility set in, and that pressure being removed, the person would recover. Nevertheless the experiments of Fleischmann suggest the possibility of such an occurrence. It is most important in such cases to observe the position of the knot. One knot tied in front is consistent with suicide; but more than one knot always suggests homicide rather than suicide. One knot, again, at the back of the neck is consistent (*Case* 20), whilst two or three knots are as certainly inconsistent, with suicide, although two knots are recorded in a case of suicidal strangulation (*Case* 29), and even more than two were said to have been tied by a girl who had the use of her right hand only (*Case* 23). Suicidal strangulation may be effected by the mere pressure on a cord fixed at both ends a short distance from the ground:—or a person may twist a rope two or three times round the neck and then tie it (*Cases* 27, 64, 95), or he may pull it so tight, that, although it might be relaxed so soon as the person became insensible, the tightness of the first twist would remain.

The methods of partial hanging already described, in reality amount to strangulation. Determined suicides commonly tighten the ligature with a stick or by a rough cord passed two or three times round the neck, tightened by the hands (*Cases* 64, 65). More rarely one foot, or both lower extremities, have been used to tighten the knots, by twisting the ends of the rope in loops.* Sometimes one tight knot has sufficed; or the tying a double knot has been attempted. Dr. Taylor quotes the case of a young woman of Montevrin, in the Canton of Lagny, found dead in bed, lying on her face, with a woollen garter passed twice round her neck, secured in front by two simple knots, strongly tied the one on the other. Putrefaction had set in. The medical witnesses, without examining the head, gave it as their opinion that

* Greenacre attempted to destroy himself thus, but a timely discovery permitted of his being resuscitated.

she had died from apoplexy! Yet the state of the lungs, and the ecchymosed patches in different situations, pointed to death by apnœa ["*Ann. d'Hygiène*," 1829, ii., p. 440. Dr. Taylor also refers to a case by Dr. Simeons in Henke's "*Zeitschrift*," 1843, i., p. 335].

(γ.) *Homicide.*—Strangulation is generally homicidal, just as hanging is generally suicidal. The marks of a single finger, or of two or more fingers, especially if there be marks of a cord in addition, suggest homicide (*Case* 12). It is deserving of note that pressure with the hands on the throat, is amply sufficient in young infants to cause death (*Case* 12), whilst cases are on record where adults have been destroyed in a similar manner (*Case* 35). In such case it is necessary to consider the relative strength of the attacked and of the attacker, although it must be remembered that a powerful man may be so surprised that he may lose his presence of mind and with it his power. Once attacked, the position of the assailant, although he may be the weaker of the two, improves every instant, owing to the decreasing strength of the victim. (*Cases* 30 to 34, 38 to 41, etc.)

The presence of marks of violence on a strangled body (*Case* 43), provided such marks be not easy of explanation by accident or self-infliction, point to homicide. But even here it must be remembered how much a determined suicide will go through, and, failing to succeed by one method, with what perseverance he will try another and another.

The position and number of knots in a rope, and the number of its turns round the neck, constitute in such cases important evidence, as we have already pointed out.

As a rule marks of a struggle will be found on the person in cases of homicide, whilst ecchymoses and excoriations around the mark, with injury to the deeply seated parts, are more likely to occur than in suicidal attempts. But even here we must not be misled. The circumstance that the mark is not very distinct does not negative the idea of homicide (*Case* 48), for strangulation may be employed to complete a murder, after the victim has in the first instance been rendered insensible by blows, drugs, etc. Hence in a case of strangulation it is most important to note (*a*) whether there is evidence of previous

drugging; (β) the presence or absence of injuries to the head, etc., (*Case* 34); and (γ) the signs of struggling. (For illustrative cases see Chevers, pp. 589 and 590.)

The twisting of the funis round the neck may in the case of a new-born infant cause strangulation, and give the appearance of a death by foul means.

Further that strangulation may be effected, even where a number of people are about, without any disturbing noise, is abundantly proved by cases. (*Cases* 36 and 40.)

Lastly, we have to bear in mind that false accusations of homicidal strangulation are on record. (*Case* 57.)

ILLUSTRATIVE CASES.

1—8. Chever's Med. Juris., p. 583, et seq. (Pages 421, 427.)

(1.) Child, æt. 7, throttled by the mere pressure of a woman's fingers. (A second case of the same kind is recorded on an adult.)

(2.) A boy throttled by the pressure of the knee on the throat.

(3.) A case where a man attacked an old woman, stamped on her neck and strangled her. (Neck broken.)

(4.) Several cases of throttling by stamping on the neck with the feet.

(5.) Throttling by throwing the victim on the ground, placing a bamboo across the throat, and pressing down the two ends with the hands.

(6.) Strangulation by placing one bamboo on one side, and a second on the other side of the neck, and pressing the ends together.

(7.) Strangulation by the flexible twig of a *dhak* tree.

(8.) Strangulation (suicidal) by a female with her long hair.

9. R. v. O'Brien.—(*Liverpool Winter Assize*, 1857.)—Homicidal strangulation. Cartilage of windpipe broken. (Page 427.)

10. Taylor's Manual, p. 393.—Bleeding from ears in strangulation. Two cases recorded—(1) by Dr. Geoghegan, and (2) by Sir W. Welde of Dublin. (Pages 423, 424.)

11. R. v. Millar (C. C. C., July, 1870).—Strangulation of a Mr. Huelon and his housekeeper. Crime discovered by the large quantity of blood that poured from the mouth and throat. (Pages 423, 424.)

12. Guy and Ferrier, p. 290.—Case of Hector M'Donald, who strangled his wife. An abrasion was found on each side of the windpipe, as well as on the arms, neck and chest. Marks of the thumb and of three fingers found on the throat. (Pages 421, 425, 426, 434.)

13. Chever's Med. Juris., p. 587.—Female, 13. Strangulation with a cord. Windpipe and parts within the throat ruptured. (Pages 421, 429.)

14. Beck, p. 581.—The case of a coloured man, Frederick L. Terge, a drunkard, found dead in a gutter. Supposed to have been *strangled by the tightness of his own shirt-collar.* There were marks on the neck of a thumb and three fingers, which do not seem to have been compared as they should have been with the hand of the deceased. (Pages 421, 432.)

15. Taylor's Med. Juris., Vol. II., p. 66.—(Dr. Gordon Smith.)—Case of a paralysed lad, who used to carry a heavy weight suspended from his neck by a string. One day he was found dead, sitting in his chair. During the time he was asleep the weight probably slipped, and drew the cord tightly round his neck. (Page 432.)

16. Dr. Taylor records the case of a girl who carried fish on her back, in a basket suspended by a leather strap passing round the front of her neck, above the shoulders. She was found dead (June, 1839) sitting on a stone wall, the basket having slipped off, probably whilst she was resting. This raised the strap, which forcibly and fatally compressed her windpipe. (Pages 421, 432.)

17. Taylor's Med. Juris., Vol. II., p. 66.—Dr. Taylor saw a case in Guy's Hospital in Nov., 1864 [figured in his work] of a boy, "aged fourteen years, whose silk necktie, knotted and tightly twisted round his neck, was caught in the band of an engine, his neck by this means being drawn down against one of the revolving shafts. His neck was thus compressed for about one minute, a deep circular depression, three-quarters of an inch wide resulting. The neck was twelve inches in circumference, while the inner circumference of the handkerchief which compressed the neck was reduced to eight inches! He *became black in the face*, and *blood escaped from his mouth and ears.* For six or seven minutes after the ligature had been removed, he was insensible. He then revived, and was able to speak, but could not hold up his head. When brought to the hospital soon afterwards, he was sensible; his face was pale, his lips livid, his eyes suffused, and the conjunctivæ injected. He breathed without difficulty, and only complained of pain when he moved his head. The boy told Dr. Taylor that at the time of the accident he felt no pain; he had a sense of choking, and then became insensible. *For at least one minute* no air entered his lungs. He recovered and left the hospital after *eighteen days.*" (Pages 421, 423, 424, 432.)

18. Guy and Ferrier, p. 289.—Female. Went to bed intoxicated, with her bonnet on. The bonnet became fixed between the bedstead and the wall, and she, tumbling out of bed, was strangled by the strings. (Pages 421, 432.)

19. Ogston's Med. Juris., p. 543.—Male adult. *Case of accidental strangulation.* (Page 432.)

20. Lancet, Aug. 15, 1863, p. 183.—Case of suicidal strangulation.

Post-mortem rigidity seven hours after death. Arms flexed. Ligature (a calico strip) fixed below the cricoid cartilage, and tied at the back of the neck. Skin of face dark red, dotted with spots of a darker red colour. Conjunctivæ ecchymosed. Blood escaped from nose. Brain and lungs congested. Heart empty. (Pages 424, 428, 429, 433.)

21. Medical Times and Gazette, 1876.—(*Surg.-General Francis.*)—Adult male. Suicidal strangulation by twisting a stout thread round his neck, attaching the ends to his wrists, and extending the arms to their utmost limits. (Pages 421, 433.)

22. Ogston's Med. Juris., p. 541.—Female; strangled herself by putting her head through a loop in the middle of a sheet, the weight of the upper part of her body being the constricting force. (Pages 421, 433.)

23. Tardieu, p. 191.—On the authority of M. A. Rendu, "Ann. d'Hygiène," 1re série, 1833, t. x., p. 152, Tardieu relates a case in which a girl, who had lost the use of her right hand from an old burn, strangled herself in bed with a kerchief or shawl rolled into a cord. It had been passed round the neck two-and-a-half times, and was fastened on the left side by two knots, the first knot being tighter than the second. (Page 433.)

24. Orfila, Méd. Légale, Vol. II., p. 389.—Suicide by strangulation with a cravat. (Pages 421, 433.)

25. Guy's Hospital Reports, October, 1851.—Suicidal strangulation. The cord had been tightened with a stick. (Pages 425, 433.)

26. Ogston's Med. Juris., pp. 542 and 544.—Suicidal strangulation. Male adult. Ligature oblique. The neckcloth used had been tightened by a stick. (Page 433.)

27. Casper, Vol. II., p. 219 (Case 285).—Female. Suicidal strangulation whilst in the recumbent posture. A thin string, *wound three times* tightly round the neck, and fastened in front over the larynx in a simple knot employed. (Pages 421, 433.)

28. Casper, Vol. II., p. 220 (Case 286).—Female, æt. 46. Suicidal strangulation in a recumbent posture. (Page 433.)

29. Beck's Med. Juris., p. 579.—Female. Tied a handkerchief round her neck from behind forwards, made a knot, then returned the free ends, and made a second knot at the back of the neck. (Page 433.)

30. Guy, p. 290.—Case where a man seized another by his cravat and pressed him firmly against a wall till he was dead. (Pages 421, 434.)

31. R. v. Fowler.—(*Stafford Lent Assizes*, 1841.)—Homicidal strangulation. (Page 434.)

32. R. v. Browning.—(*C. C. C., December*, 1845.)—Homicidal strangulation. The cord was twice twisted round the neck, and tied in a knot, (Page 434.)

33. Amer. Jour. of Med., October, 1845, p. 389.—Homicidal strangulation. (Page 434.)

34. Chever's Med. Juris., p. 589.—(*Dr. Leckie.*)—Homicidal strangulation, after severe injuries had been inflicted on the head. (Page 435.)

35. In one of the cases recorded as above there was the mark of *one thumb* only on the throat. The murderer afterwards confessed this was the means adopted by him to kill his victim. (Pages 421, 425, 434.)

36. Beck, p. 576. Hargraves' "State Trials," Vol. IV., p. 495.—Dr. Clench, a physician in London, was called out of bed by two persons on the night of the 4th of January, 1692, who desired him to visit a friend who was not well. He entered a hackney coach with them, and drove about several streets in the city for an hour and a quarter. The two individuals then left the coach, and sent the driver on an errand. When the coachman returned he found Dr. Clench sitting on the bottom of the coach, against the front seat, with his head against the cushion. Thinking him in liquor he shook him, but obtained no answer. He then called the watch, and they found him strangled by a handkerchief, in which a piece of coal had been so placed that it might press directly on the windpipe. The coachman had heard no noise whilst driving the carriage. (Pages 421, 425, 435.)

37. Casper, Vol. II., p. 221.—(*Case* 287.)—Female, 68. Murder by throttling. No marks of a cord visible. Both hands of the victim were firmly tied behind with a towel, and a piece of calico was bound round the legs. Death, doubtless, arose from apnœa, although the special post-mortem appearances were entirely destroyed by putrefaction. (Pages 426, 430.)

38. R. v. Taylor.—(*York Lent Assizes*, 1842.)—Homicidal strangulation. (Page 434.)

39. R. v. Greek.—(*Salisbury Lent Assizes*, 1842.)—Homicidal strangulation. (Page 434.)

40. Ann. d'Hyg., 1859, I., p. 157.—An old woman strangled by an apprentice. The act was performed so rapidly that her husband, who was in an adjoining room, did not hear it. (Pages 435, 439.)

41. R. v. Cooper.—(*Shrewsbury Lent Assizes*, 1863.)—A father con-

victed of strangling his son (æt. 8) with a twisted cotton handkerchief, (Page 434.)

42. Ann. d' Hygiène, 1829, Vol. II., p. 447; Taylor, Tom. II., p. 76.—A servant girl was found dead in her bed. Her body was rigid and lying in a constrained position with her face turned to the right, whilst around the neck there was a handkerchief so firmly tied that it was with some difficulty removed. A quantity of froth and bloody mucus escaped from the nostrils and mouth. The knot in the handkerchief tied round the neck was on the *left side*, as it customarily is when tied by left-handed people. The deceased was not left-handed, and there was no reason to suppose that she meant to commit suicide. She went to bed the night before in her usual health and spirits. There was no mark of violence externally, but there were large patches of cadaveric lividity scattered over the skin. There was a deep impression, as it were, of a necklace on the skin of the neck, resulting, it was supposed, from the force with which the handkerchief had been tied. The neck appeared swollen, particularly on the right side. On opening the head, the vessels of the brain were found distended, more especially on the right side, where about half-an-ounce of blood was extravasated. The tongue was pushed against the teeth. The lungs were gorged with blood. The examiners attributed death to strangulation, and in their judgment the act was not suicidal, because (*a*) the handkerchief was tied in a *double knot*, and (*β*) there was an absence of all motive. The College of Brunswick being appealed to by the legal authorities, concluded that the deceased died from apoplexy, and they assigned as a reason for this the absence of a mark on the neck, but in this they were (as Dr. Taylor remarks) probably wrong. Dr. Taylor, however, concludes that the act was probably suicidal, because there were no signs of violence, or disarrangement of dress. In our opinion, the girl may have been suffocated first, and the handkerchief tied afterwards. (Pages 424, 428, 432.)

43. Dr. Taylor, Vol. II., pp. 71-2.—(*R.* v. *Pinckard, Northampton Lent Assizes*, 1852.)—It was proved that the deceased was found in a sitting posture in a corner of her room, on the floor, with a narrow tape round her neck, the other end being placed over a small brass hook about three feet above her head. Her clothes were placed smoothly under her, and her hands were open and stretched out by her side. [Dr. Taylor gives a sketch of the room and body, in position.] There was a severe bruise over the right eye, and there were marks of blood on the tape as well as on the floor and walls of the room at some distance from the body. There was a stain of fresh blood on the knot of the tape where it passed over the hook, but there was no blood on the hands of the deceased. The rings of the windpipe for about 1½ inch were lacerated longitudinally, and there was a deep circular mark round the neck in the course of the doubled tape, caused either by great pressure applied by some person, or by the weight of

the suspended body. This latter hypothesis, so far as the tape round the neck was concerned, was however untenable. *The body of the deceased did not weigh probably less than* 120 *pounds, whilst the tape found round her neck broke with a weight of forty-nine pounds;* hence the deceased could not have been freely suspended by it.* Apart from this, *the injuries to the neck*, including the longitudinal fracture of the windpipe, *were not such as the tape could have produced as a result of partial suspension* in the position in which the deceased's body was found. The noose had been so placed that the chief pressure was on the back of the neck, and the least in front, where the greatest amount of mechanical injury was actually done. The deceased had been strangled, probably by manual violence, in the first instance, and afterwards a ligature drawn tightly round the neck. The body was then looped up with the double tape. These facts, taken in connection with the smooth arrangement of the clothes, the severe marks of violence on the body (inexplicable on the hypothesis of suicide) and the marks of blood and of struggling in the room, proved that there had been homicidal interference; and the crime was brought home to the prisoner by a series of moral and circumstantial proofs inconsistent with her innocence, and only consistent with her guilt. The prisoner had been a nurse accustomed to "lay-out" dead bodies, and she appears to have placed the corpse in the above case in what she considered a "becoming attitude." (Pages 427, 432, 434.)

44. Chaussier, p. 279; Beck, loc. cit., p. 579; Tardieu, p. 159. —(*Case of General Pichegru.*) — "This distinguished soldier was confined in a State prison in the Temple (Paris). On the 5th April, 1804, he was as well as usual, at 10 p.m. the keeper locked the cell and took the key. The general was heard to cough during the night, but at 7 a.m. when they came to light the fire, he was found dead on his bed. A commission (including several medical men) was appointed to examine the body. They found, twelve hours after death, a circular mark round his neck, about two fingers wide, produced by a black silk cravat strongly knotted, through which a small stick (18 inches long and 3½ inches in circumference) had been passed. This stick had been used as a tourniquet to produce the strangulation. One end of the stick lay under the left cheek, where, by an irregular movement of the body, it had caused a slight scratch. The face was ecchymosed, the tongue held between the teeth, and the jaws fixed. The body was swollen, the extremities cold, and the muscles of the hands and feet were strongly contracted. The brain and its membranes were congested. The lungs were gorged, and the stomach was red. Chaussier and others justly condemn the imperfect reports of the medical examiners, so different from the usually diffuse French reports. "No human eye," says Sir Walter Scott, "could see into the dark recesses of a state prison; but

* In this case the tape was unbroken. Some of Tardieu's cases seem to show that a rope may break (slowly) after causing death, in cases of hanging.

there were not wanting many who entertained a total disbelief of Pichegru's suicide." Napoleon's denial of the murder at St. Helena may be true so far as his own personal complicity is concerned.* (Pages 428, 430, 432.)

45. Beck, p. 574; Hargraves "State Trials," Vol. II., pp. 759—791. Beck gives other references.—(*The case of Sir Edmundbury Godfrey.*) —The supposed murder in this case was, no doubt erroneously, attributed to Roman Catholics. "Sir Edmundbury Godfrey, an eminent magistrate in London, was on the 12th of October, 1677, found dead in a ditch nearly a mile out of town. His sword was thrust through him, but there was no blood on his clothes or about him. His shoes were clean, his money in his pocket, his neck, which was open, without anything on it, had a mark all round an inch broad. It was also dislocated. The breast was marked with bruises. This is the statement of Bishop Burnet, who went to see the body. Subsequently several individuals were tried in the Court of King's Bench, for publishing letters importing that Sir E. Godfrey had murdered himself. Though a case of libel they endeavoured to defend themselves by calling witnesses to prove the truth of the fact, and this the Chief Justice (Pemberton) allowed to the fullest extent. The medical testimony was as follows :—Two wounds were found on the body, within an inch and a half of one another. One went no farther than the bone, having struck on a rib; the other passed through his back. When the sword was drawn out blood followed. The neck was very flexible. The face was bloated, and the eyes blood-shot. Mr. Lasinby, a surgeon, deposed to the marks on the neck as being very distinct, with a swelling above and below them. It is urged in opposition to these striking facts, that Sir E. Godfrey was of a melancholy temperament, and laboured under a great depression of spirits; that he probably destroyed himself under the operation of this feeling, and that the mark round the neck might be owing to the tightness of the collar." Beck considers this case to be one of homicidal strangling, and we think properly. The sword wounds were doubtless inflicted after death. (Pages 427, 432.)

46. R. v. Gibbins.—(*Northampton Lent Assizes*, 1853.)—A mother was charged with strangling her son, æt. 8, with a silk handkerchief. Prisoner was acquitted, the medical evidence showing the absence of any ecchymosis in the course of the ligature, an extreme redness of stomach (suggesting poison), the absence of post-mortem signs of asphyxia, and a marked congestion of the brain and its membranes. (Pages 426, 428, 430, 432.)

* Napoleon's words are :—
"Pichegru fut trouvé étranglé dans son lit. On ne manqua pas de dire que c'était par mes ordres. Je fus totalement étranger à cet événement. Je ne sais pas même pourquoi j'aurais soustrait ce criminal à son jugement. Il ne valait pas mieux que les autres, et j'avais un tribunal pour le juger et des soldats pour le fusiller. Je n'ai jamais rien fait d'inutile dans ma vie."—*M.S. de Sainte Hélène.*

47. Casper, Vol. II., p. 215.—(*Case* 284.)—Female. A doubtful case of homicidal or suicidal strangulation. The body was found in a recumbent position. (Page 432.)

48. Gaz. Médicale, 9 Mai, 1846, p. 375.—Question respecting the possibility of strangulation without visible marks of violence. The case was decided in the affirmative. (Pages 432, 434.)

49. Ann. d'Hyg., 1859, Vol. I., p. 139, and Vol. XXVI., p. 149.—Death attributed to homicidal strangulation, the marks on the neck being really due to an after-death change. (Page 432.)

50. R. v. Dixblanc.—(*C. C. C., June*, 1872.)—(*Murder of Madame Riel.*)—Question, whether the rope round the neck had been applied during life, or had been merely put round the throat after death, in order the more conveniently to drag the body from one place to another. (Pages 425, 431, 432.)

51. R. v. Reynolds.—(*C. C. C., Dec.*, 1842.)—Question raised whether death was due to strangulation or exposure to cold. The prisoner was acquitted, not being indicted on the latter charge. (Page 432.)

52. R. v. Drory.—(*Guy's Hosp. Rep., Oct.*, 1851.)—Female. The rope had been passed round the neck three times, the first two coils being tight. Dr. Taylor concluded it was homicide, on the ground that, supposing the deceased could have drawn one coil tight, she could not have drawn the second! Further, the murderer had placed the end of the rope near the hand of the deceased, but had selected for this purpose the *left* hand, and did not leave enough rope free from the neck for either hand to grasp, in order to produce the violent constriction of the neck caused by the two inner coils. (Page 432.)

53. Taylor's Med. Juris., Vol. II., p. 74.—(*Dr. Campbell.*)—In this case there was a fracture of the (ossified) larynx, and marks on the throat of an old man found dead, which, from their peculiar form, were clearly produced by a *left-handed person. The prisoner, on being asked to throw a stone, did so with his left hand!* He was, however, acquitted, on account of the notoriously bad character of the deceased's sister, though she had sworn to witnessing the act. (See a similar case by Dr. Keiller's *fracture of larynx*, "Edin. Med. Journal," Dec. 1855, p. 527.) (Pages 427, 432.)

54. Beck (also noticed by Taylor and others); Hargraves' "State Trials," Vol. VI., pp. 816, 831; Croker's "Boswell," Vol. I., p. 332.—Murder by strangulation on board ship. A rope was afterwards tied round the neck of the victim.

Sir John Dinely Goodere, in 1741, was forced by violence on board the "Ruby," (commanded by his brother, Captain Goodere, who was said by

some to be insane,) lying in the port of Bristol. At night-time Sir John was strangled by two assassins in the pay of his brother. One of these confessed that the other fell on Sir John as he lay in bed, took hold of his throat with his hand (his stock being on), and strangled him with his own stock. They then put a rope, with a noose in it, round his neck, and drew it tight, so as to insure the certainty of the murder. In accordance with this, Mr. Dudgeon, the surgeon's mate of the "Ruby," swore that there were some marks on the neck, which looked like the scratches of nails, while blood was oozing from the nose and mouth.* (Page 424.)

55. Ann. d'Hyg., 1841, II., p. 149.—Male, adult, strangled first with the hands, and these failing, afterwards with a rope. (Page 432).

56. Casper, Vol. II., p. 206 (Case 282).—Female, 34. Homicide by throttling (fingers), the body being afterwards suspended. The woman had, it was proved, been in the first instance violated, although the examination of the clothes and genitals did not suggest violation. (Page 432)

57. Taylor, loc. cit., p. 79; Tardieu, loc. cit., pp. 230-248; Paris, 1864; Ann. d'Hyg., 1864, Vol. I., p. 415. ("Affaire Armand et Maurice Roux.") Prisoners tried before the Court of Assizes of the Bouches du Rhône in March, 1864. A servant man, in the prime of life, accused his master of trying to strangle him. The accuser was found in a cellar, senseless, and almost lifeless, with his hands and feet tied. M. Armand was very properly acquitted, partly because the servant pretended that he had been in the cellar eleven hours in this condition, although the limbs, which were tightly tied, were not swollen where they were ligatured. Further, the cord round the neck was not half so tight as a would-be murderer would have drawn it. (Page 435.)

58. Mistakes as to putrefaction. See the cases of Mrs. Ellen Byrne (Dublin, Aug., 1842), and "R. *v.* Mahaig" (Kingston Winter Assizes, 1863, Taylor, *loc. cit.*, p. 65.) (Page 432.)

59. Edin. Med. Journ., I., p. 828.—Female, adult. Suffocated (strangled) whilst drunk, from falling with her neck across the sharp front of a sofa, so that the entire weight of her heavy body was suspended. Death resulted from the violent compression, the woman at the time being unconscious from intoxication.

Post-mortem. An indentation (dry, puckered, and of a brown colour) found across the front of the neck. The skin was slightly abraded,

* Dr. Smith justly remarks that in cases like this, where struggles may have been made, and thus some aëration of blood effected, the congestion of the lungs and brain, and of the venous system generally, may be less marked than in cases where a cord is suddenly drawn tight round the neck. [John Gordon Smith, M.D., "On the Principles of Forensic Medicine," London, 1821, p. 229.]

but there was no ecchymosis, the effects of the pressure being entirely external.

No froth found in the mouth and air passages. The mucous membrane of the trachea and bronchi coated with bloody mucus. Lungs distended with dark fluid blood. Heart healthy; right side empty. (Pages 426, 427, 429.)

60. Edin. Med. Journ., I., p. 829.—(*Dr. Charles Murchison.*)

(1.) Fracture of thyroid cartilage in a female (aged) from manual compression.

(2.) Female, æt. 29. Fracture of hyoid bone by manual compression. (Pages 427, 428.)

61. Edin. Med. Journ., I., p. 288. — (*Dr. Charles Wilson.*)— Female, æt. 30. Case of imputed murder by manual strangulation.

Post-mortem (48 hours after death). Face and neck livid, with a contusion on the right side of the forehead. Eyes suffused. Traces of blood from the right nostril. Fingers rigid and semi-contracted. A yellowish brown, hard parchment-like mark was found on the left side of the chin, running along the lower margin of the jaw, and a similar mark, the skin feeling thickened, hard, and congested, across the throat, immediately over the larynx. To the right of this there was a similar but smaller mark.

Extravasations of blood were found in the cellular tissue, and muscles underlying the marks recorded.

The trachea contained frothy mucus. In the interior of the larynx there was a considerable extravasation of blood lying beneath the investing membrane. The thyroid cartilage was broken in the right wing, and the cricoid cartilage in two places at the opposite sides of its ring.

The veins of the neck were turgid with fluid blood.

Extravasated blood found beneath the left mamma and greater pectoral muscle, there being no corresponding external mark apparent. Lungs congested. No effusion within the pleura or pericardium. Heart healthy.

Brain congested, but no signs of extravasation.

The medical evidence was to the effect that death was caused by a violent compression of the throat. The defence was that the accident might have occurred from a fall.

(See reference for a full analysis of this case.) (Pages 423, 424, 426, 427, 428.)

62. Vierteljahr für Gericht Med., Band. XXXVI., p. 258.—(*Dr. A. Lesser.*)—Accidental strangulation of an epileptic during a fit, resulting from the pressure of a shirt collar. (Page 432.)

63. Brit. Med. Journ., 1877, II., p. 422.—Suicidal strangulation, combined with hanging, of a man in a barn, whilst in a sitting posture.

In this case the man was sitting, and had fastened the rope which was round his neck to a nail, and had afterwards fallen forward on to the rope. (Page 432.)

64. Indian Med. Gaz., December, 1882, p. 330.—Female, æt. 17. Suicidal strangulation with a band of cloth, which she had passed in three coils round her neck, the one tightly overlapping the other. The short ends she had then tightly knotted with a "granny" knot at the back of her neck. The coils pressed so tightly on the neck that there was some difficulty in uncoiling the band, which had to be cut open.

Post-mortem appearances of asphyxia. (Pages 432, 433.)

65. Med. Times and Gaz., 1876, II., p. 634.—(*Dr. Francis.*)—Male, adult. Suicidal strangulation of a lunatic. Unweaving a piece of the stout thread with which the matting supplied to the prisoners for bedding was made, and twisting two or three cords of it round his neck, he attached the ends securely to his wrists and then extended his arms to their utmost limit. (Pages 421, 432, 433.)

66. Lancet, 1875, I., p. 608.—(*Mr. Cullingworth.*)—Throttling of a woman effected by pressure with the thumb and fingers on the neck, by a man with whom she had cohabited.

Post-mortem. Face swollen and livid. A little blood had oozed from the mouth, nose, and inner angles of the eyes. There were marks of a thumb and fingers on the neck. Hands clenched and elbows flexed. Fæces discharged.

Brain and membranes normal. Neither the hyoid nor the cartilages of the larynx were injured, but the mucous membranes of the larynx and trachea were congested and covered with frothy mucus. Lungs intensely congested, hæmorrhages of large extent into the lungs having occurred. Heart entirely empty. Stomach empty, but normal. Abdominal viscera healthy. (Pages 421, 423, 424, 425, 427, 428, 429, 430.)

CHAPTER XI.

SUFFOCATION.

Suffocation defined.—Its Causes.—Treatment.—Post-Mortem Appearances.—Death by Suffocation.—Accidental, Suicidal, and Homicidal Suffocation.

(ILLUSTRATIVE CASES, Page 464.)

SUFFOCATION implies the exclusion of fresh air, other than by external pressure on the trachea. This definition includes both drowning and smothering. The former we have already considered, but *smothering* (which is the exclusion of air by covering the mouth and nostrils only) we shall include under this section. Poisoning by impure gases and noxious vapours will be considered in detail in a future volume.

Suffocation is an ancient method of murder. The first recorded case will be found in 2 Kings viii. 15: "And it came to pass on the morrow that he [Hazael] took a thick cloth and dipped it in water, and spread it over his [Benhadad's] face, so that he died: and Hazael reigned in his stead," Benhadad being, as we are informed by the context, already very ill and not expected to live.

We shall consider:—

I. The causes of suffocation.
II. The symptoms of suffocation.
III. The treatment to be adopted in cases of suffocation.
IV. The post-mortem appearances indicative of suffocation.

Out of which arise the two questions:—

V. Was death caused by suffocation?
VI. Was the suffocation accidental, suicidal, or homicidal?

I.—The Causes of Suffocation.

These may be both external and internal.

(A.) *External.*—In the case of infants, *overlaying* is a frequent cause of death. ("*Brit. Med. Journ.*," 1870, i., p. 89; 1874, i., p. 187.) It was noted by Mr. Wakley that the majority of these cases occur on Saturday, Sunday, and Monday nights, and on public holidays. The story generally told by the parents is, that the child slept in the same bed with them, and that on waking they found it dead. In some cases drink is no doubt the cause. The infants, stupefied by alcoholic poisoning through the mother's milk, are predisposed to death, whilst the parents themselves, in a state of intoxicated stupor, do not know what they are doing. In others, the temptation of burial club money may have something to do with it. The actual cause of death in these cases is the pressure of the body of one or other of the parents. (*Case* 58.) Cases are also recorded where children have been suffocated by being pressed too closely to the mother's breast. (*Cases* 34, 37, 76.)

If in these cases, drunkenness on the part of the parents be proved, it is fairly open to question how far are they not liable to a charge of manslaughter.

Perhaps here, however, a word of warning is needed. I have myself known several cases where at first the death of infants has been supposed to be due to intentional overlaying on the part of the mother (especially in the case of single women), but where a post-mortem has clearly shown disease to have caused the death. And this suggests the remark that in all cases where an imputation of neglect, much more of wilful murder is suggested, a post-mortem is an absolutely essential part of the enquiry, however clear the case may seem to be. ("*British Med. Journ.*," 1870, i., p. 276.)

Cases of suffocation in bedclothes, shawls, etc., are recorded. (See *Cases* 1, 2, 15, 16, 34, 35, 36.)

Other external causes of death from suffocation are direct pressure on the thorax (*Case* 59), as in a crowd, in which case fractured ribs frequently occur (*Case* 19), or a combination of

pressure on the chest with closure of the mouth and nostrils, as in the murders committed by Burke and Williams (*burking*) (*Cases* 11, 13, 14). (See "*Med. Times and Gazette*," 1871, i., pp. 284, 326.) The taking plaster of Paris casts of the neck and face without inserting tubes into the nostrils, has several times nearly proved fatal. A falling house has more than once suffocated men in the ruins (*Cases* 25 to 28). Exclusion of air by the external application of lime (*Case* 10), plasters (*Case* 12), earth and ashes (*Cases* 38, 51), sand (*Cases* 23, 24), privy soil (*Case* 56), linseed (*Case* 22), corn (*Case* 54), flour (*Case* 21), hay (*Case* 20), and other soft substances are recorded. The accidental contact of any material by which the entrance of fresh air into the lungs is prevented, may destroy life if it should continue for a sufficiently long period.

(B.) *Internal.*—The air passages may directly be closed by foreign bodies, or the œsophagus be so dilated by a foreign body as indirectly to block the air passages. There are recorded cases of suffocation by mud (*Case* 5), cotton and rags (*Cases* 6, 17), cord (*Case* 8), meat (*Cases* 46, 47, 68, 71), peas and beans (*Case* 43, 64), pepper (*Case* 9), potato skins (*Case* 29), the fangs of a tooth, false teeth (which should never be worn during sleep) (*Case* 30), a buckle (*Case* 88), shells (*Case* 86), a piece of flint, a button, a crust (*Case* 73), a piece of bone or fish shell (*Cases* 70, 92, 93, 94), fish bones (*Cases* 101, 102), stones of fruit (*Cases* 89, 96, 97), a head of grass (*Cases* 90, 91), coins (*Cases* 61, 74, 76, 79), a spoon (*Case* 95), a piece of slate pencil (*Case* 65), a nut, a piece of nutshell ("*Path. Trans.*," xiv., p. 41) (*Case* 87), a glass bead, a leaden shot, a screw, a piece of a metallic penholder (*Case* 61), etc. A most remarkable case is recorded of suffocation from swallowing a squeaking air-bladder (*Case* 74). Dr. Chevers remarks, that a proportion of mankind are suffocated by the impaction of living fish in the air passages (*Cases* 50, 98, 99, 100). Again, an inspiration occurring at the moment of vomiting, the contents of the stomach may slip into the trachea. (*Cases* 3, 4, 44, 48, 49.) Very commonly this accident happens from the person swallowing just as he is attempting to speak (*Case* 71), or owing to some jerk at an unexpected moment (*Case* 91).

A case is recorded of an infant vomiting curdled milk, some of the curds suffocating the child (*Cases* 41, 58). A similar case is also recorded in a girl, æt. six. (*Case* 63.) Another case is recorded of a little bag of sweetened pap, given to a child to keep it quiet, destroying life by suffocation (*Case* 52). Also one of the suffocation of an infant by retraction of the base of the tongue is on record (*Case* 42). Negroes have been said to commit suicide by swallowing their tongues (in other words, by doubling them back and drawing them into the throat). Children sometimes suffer from a kind of convulsion, which produces a similar effect.

We are reminded here that suffocation has resulted from obstruction caused by the tongue, epiglottis, and velum palati during the administration of anæsthetics, whilst the patient is placed in the ordinary supine position, such obstruction being promoted (according to Dr. Howard) by the customary flexion of the head and neck. He remarks that whilst firm traction upon the tongue may open the pharynx that had been closed by its retreat, the epiglottis may remain unlifted. He points out that in such cases all obstruction may be instantly and simultaneously removed by elevating the thorax, and by the complete extension backwards of the head and neck. He considers that in the induction of anæsthesia, the head should be kept lower than the shoulders, and that in all cases of threatened or actual apnœa, complete extension backwards of the head and neck should be the first measure. If the withdrawal of the tongue is attempted (which is not unadvisable) it should be accompanied with as little lowering of the lower jaw as possible. ("*Med. Times and Gazette*," 1878, i., p. 603.)

In one case false teeth falling from the mouth during the administration of chloroform caused death, suggesting the necessity of seeing that a patient does not wear false teeth at the time of administering anæsthetics. (*Case* 69.) A similar accident happened during a labour associated with puerperal convulsions. (*Case* 80.)

False teeth should only be worn when wanted (*Case* 83). Further, it is quite open to question how far it is advisable for

epileptics to wear them at all, except at meal times, for fear of an accident (*Case* 85).

And here we note that it is not necessary for the closure of the air way effected by the foreign body to be absolutely complete to induce asphyxia, partial closure being amply sufficient for the purpose.

It is most important, lest we improperly assume a case to be homicidal, to note that suffocation may result from certain diseased conditions, of which the following may be taken as illustrations :—

(α.) *Bleeding from the nose, or from wounds in the mouth and throat.* In cases of cut-throat, where the windpipe is jagged or completely divided, a kind of valvular closure effected by the indrawing of the lower cut end into the throat, sometimes occurs.

(β.) *Scalds of the glottis, and the application of irritants to the fauces or glottis.* These may produce sufficient œdema of the glottis to cause suffocation. (See a case of suffocation from the application of the acid nitrate of mercury to the throat. Dr. Taylor, vol. ii., p. 82.) Œdema of the glottis may also result from kidney disease.

(γ.) Tumours pressing on the throat or fauces.

(δ.) The bursting of an abscess of the tonsils (*Case* 103), or of a pharyngeal abscess (such as occurs in quinsy).

(ε.) The effusion of lymph or other morbid materials into the trachea (*Cases* 31, 32, 33), or about the rima glottidis. ("*Brit. Med. Journ.*," i., 1881, p. 386.)

(ζ.) An accumulation (often great and rapid) of the bronchial secretion in infantile bronchitis.

(η.) Acute double pleuritic effusion.

(θ.) Simultaneous œdema of both lungs.

(ι.) The bursting of an aortic aneurism into the windpipe or into a bronchus. (*Case* 103.)

(κ.) Very copious and sudden hæmoptysis.

(λ.) So called 'pulmonary apoplexy.'

And here it is to be noted, that diphtheria and some other diseases may cause a more or less complete paralysis of the muscles of deglutition, which would predispose to the occurrence of suffocation.

II.—The Symptoms of Suffocation.

As a rule, when a foreign body passes down the trachea it enters the right bronchus, the right bronchus being larger than the left. When it has entered one or other bronchus, it may, for a time of variable duration, occasion but little inconvenience especially if its shape and size are such as not completely to block up the tube, although symptoms of great distress, *e.g.*, urgent dyspnœa, occur in the majority of such cases almost immediately. Sometimes the circulation is affected from defective aëration of blood, whilst convulsions, apoplexy, and other brain complications are also recorded. As a further result, acute emphysema of portions of unobstructed lung from forcible over-distension frequently occur.

The ultimate results recorded show great variety :—in some cases there has been perfect recovery, and in others death after different intervals, with varying degrees of suffering and from very varied causes.

The diagnostic indications of a foreign body in a bronchus are as follows :—

(*α.*) The sudden advent of symptoms, which may be partial or complete, persistent or intermitting, occurring in a healthy person.

(*β.*) Physical signs of obstruction, alternating with symptoms of laryngeal spasm and irritation. Thus, when the foreign body is coughed up a little, a sudden rush of air into the lung may occur, indications of an equally sudden obstruction occurring as the foreign body falls back.

(*γ.*) Signs of pulmonary inflammation and irritation. Should the obstruction be complete, no moist or respiratory sounds may be apparent over the obstructed portion of the lung. Thus in one case the symptoms suggested the existence of a large vomica in the lung. (*Case* 61 *β.*)

The obstruction, however, may be incomplete. Thus long intervals of alternating good and bad health may occur, sometimes ending in recovery, the foreign body being brought up after a greater or less interval (*Cases* 65*β*, 70), sometimes in

death from secondary causes, such as pneumonia (*Cases* 65*a*, 91, 94, 95), sometimes in continued ill-health from disturbed circulation resulting from the apnœa induced (*Case* 67), etc. In *Case* 70, the throat symptoms in a patient who suffered from a piece of neck of mutton bone in his larynx for upwards of twelve months, closely simulated syphilis, for which he was treated. In *Case* 88, the disturbance of the foreign body some days after it was swallowed, the interval being one of comparative ease, set up an inflammation that proved fatal. The peculiar shape of the foreign body in this case (viz., a buckle) is worth noting. In *Case* 90 an ear of barley was removed through an abscess that formed in the right lateral region of the chest.

Partial closure of the larynx may cause gradual asphyxia, with some of the symptoms of apoplexy, rendering a diagnosis difficult. Of this Dr. Johnson records a case (*Case* 68). Partial closure is more likely to occur with a flat substance, or one of irregular outline, than with a body of globular form.

A foreign body, we have said, may remain impacted in the larynx for very long periods, causing more or less distress, alternating with periods of comparative ease. The symptoms indicative of such condition are spasmodic cough and croupy breathing, with blood-tinged expectoration, hoarseness or complete aphonia, pain and dyspnœa, with crepitation and dulness on percussion. The terminations may be various—*e.g.*, sudden death from closure of the glottis; the passage of the foreign body into the trachea; its expulsion, etc. (*Cases* 70, 74.)

A foreign body may obstruct respiration, and even endanger life, by becoming lodged in the throat, without entering the air-passages (*Cases* 77 to 103). And, whilst on this point, it is worth noting that where an accident, such as the swallowing of a foreign body, is suspected to be the cause of a train of bad symptoms, such as difficulty of swallowing, a constant cough, etc., a laryngoscopic examination would in most cases reveal the cause, and save the patient much suffering (*Cases* 76, 86).

Tracheal obstruction necessarily occasions more distress than mere bronchial obstruction. The chief diagnostic symptom to

be observed is, that the respiratory sound will be exceedingly feeble over the *entire* chest, the distress being very great, and not, as in the obstruction of a bronchus, limited to the one or other side. In *Case* 94, where a bone was lodged in the œsophagus, death occurred on the sixth day, the post-mortem revealing a perforation, with an actual wound in the lung. In *Cases* 101 and 102 perforation with ulceration is recorded as having taken place into the heart and aorta respectively.

It is worth noting that if a foreign body be impacted in the œsophagus, it may so compress the posterior wall of the trachea, as to cause almost identical symptoms to those which would result if it were actually in the trachea or bronchus.

As *to the time required to kill* in cases of complete suffocation, experiments render it probable that death will occur on an average after from two to five minutes. In dogs it was found that, when access of air was absolutely excluded, respiration ceased in about four minutes and five seconds, the heart continuing to beat some three minutes and fifteen seconds longer. The longest period after which recovery took place in a case where there had been complete stoppage of respiration, was three minutes and fifty seconds. Where respiration had been prevented for a little over four minutes but less than five, no dog recovered. The sooner air was re-admitted, the more rapid, naturally, was the recovery.—("*Med. Chir. Trans.*," 1862, vol. xlv., p. 454.) But death may occur instantaneously. Thus Dr. George Johnson tells of instant death from a piece of orange becoming impacted beneath the epiglottis, the larynx thereby becoming completely plugged. (See also *Cases* 62, 72.)

III.—The Treatment of Suffocation.

The principles of treatment are identical with those previously mentioned. The first care must be to explore the mouth, etc., and to clear the air passages and pharynx. For this purpose, the finger should be introduced into the mouth and a laryngoscopic examination made (*Cases* 76, 86). If a foreign body be felt or seen in the throat, an endeavour should be made

to extract it by the curved forceps, and not at first to push it further down. (See "*Lancet*," 1878, ii., p. 501). (*Case* 68.) If a bougie be required, and there be none at hand, a tallow candle may be used as a substitute. In some cases suction, by some such instrument as the Higginson's syringe adapted to a trachea tube, might be advantageously used, or sneezing excited by irritating the nostrils with snuff or ammonia, or coughing induced by irritating the glottis (*Cases* 64, 70, 86, 93, 95), or laughing (*Case* 61 β), or vomiting by the administration of an emetic (*Cases* 89, 93). Sometimes inverting a patient, accompanied by gentle taps on the back and placing the index finger as far back as possible in the throat so as to cause retching, has proved useful (*Case* 83). If inversion be adopted, care should be taken that at the moment of inversion the patient be directed to take a deep inspiration, by which means the exit of the foreign body is favoured by widely opening the glottis. Further the patient must be warned to make no noise in his throat when inverted, a vocal sound implying a closed glottis. In Brunel's case, both tracheotomy and inversion were resorted to with a good result (*Case* 75).

A better system, however, than strapping a patient to a table in the prone position, is to place him unstrapped upon a table on his back, one end of the table being raised two feet, and his legs hanging over that end. The advantage of the supine position over the prone is, that the foreign substance may the more easily gravitate towards the wide base of the triangular opening of the larynx, thus giving it a better chance of a speedy exit, than if it were to strike the anterior angle of the glottis. Further, the respiratory muscles, thoracic and abdominal, would be less impeded, and the necessary inspiratory act more readily made. And lastly, the advantage of not strapping the patient down is that there is less risk of danger, because he can in an emergency, such as that of a spasm occurring, regain an upright position by his own effort, the knees acting as a fulcrum.

It is natural to suppose that the inhalation of oxygen gas would be a good remedy for what is essentially poisoning by carbonic acid, combined with the want of oxygen. But it is not always safe in such cases to administer pure and un-

diluted oxygen. The author knows of one case of cardiac disease in which apoplexy appeared to be induced by its use. In the case of foreign bodies, which owing to their shape or position cannot be removed above, or in dyspnœa of doubtful origin, it may be necessary to resort to tracheotomy or laryngotomy, in order to dislodge it (*Cases* 60, 65).

In a case of great emergency that occurred at the London Hospital in 1876, where a boy, æt. 13, had swallowed a button, Mr. Maunder performed tracheotomy, and after fruitlessly attempting to dislodge the foreign body by inverting and shaking the patient, passed about seven inches of silvered wire through the wound into the left bronchus, and succeeded in withdrawing it. The boy recovered (*Case* 66, "*Lancet*," 1876, i., p. 754). See also *Case* 64, where an elastic catheter was passed in a similar manner. In *Case* 71 a pair of curved forceps was passed through the tracheotomy wound, and in *Case* 67 a coin was pushed up into the mouth with a silver probe.

With respect to the impaction of fish in the gullet, as well as, in a lesser degree, where ears of wheat or of other cereals have been swallowed (*Cases* 90 and 91), the extreme difficulty of treatment when the head of the fish is (as is usually the case) lowermost must be remembered, on account of the spines of the fins preventing withdrawal save at great risk of fatal laceration. (*Cases* 98, 99, 100.) No doubt in such cases, if the fish be in the œsophagus, the best method would be to push it down; but at any rate the patient must be provided with the means of breathing ("*Med. Times and Gaz.*," 1874, i., p. 486).

If a foreign body be in the bronchus, it may possibly be ejected without surgical interference. But if the dyspnœa be urgent, persistent, and paroxysmal, or if pulmonary inflammation threatens, tracheotomy is indicated, either as a means of allowing the expulsion of the foreign body by an effort of coughing, or to permit of its extraction by forceps.

As regards venesection, the indications that might suggest its being resorted to, are intense suffering with excessive dyspnœa in a person of robust health (*Case* 94).

In œsophageal obstruction where suffocation is threatened, the use of the probang, or of a large bolus of food, to push

down the foreign body, or of the long forceps to bring it up, are indicated. (*Cases* 78, 79, 100.) And to try to get it up is at all times better than to use force to push it down. *Case* 102 is no doubt an illustration of the ill effects of endeavouring to force a fish bone that resisted the operation down the œsophagus. At times, too, an emetic, if it can be administered, may relieve, by relaxing the spasm occasioned by the foreign body. (*Case* 81.) And, further, if the foreign body be pushed into the stomach it must always be considered how the stomach is afterwards to get rid of it. If an emetic will effect this it is better than a purgative. (*Cases* 81, 87.) In *Case* 89 vomiting was successfully induced by the hypodermic injection of apomorphine. In one case where a set of false teeth was swallowed, the patient died fourteen hours after their extraction from severe hæmorrhage (*Case* 84).

Dr. Beveridge, R.N., considers that, in cases of suffocation from foreign bodies, the guiding principle with a view to its expulsion, is the induction of reflex action by "blowing in the ear." ("*British Med. Journ.*," 1877, ii., p. 538.)

At a coroner's enquiry in a case of suffocation, the question whether or not the medical man did all that was possible, or whether what he did was the right and wise thing to do is certain to be discussed (*Case* 60). And this further is to be noted, that when a foreign body having an uneven surface has been caught in the throat, and has scratched the mucous membrane, the impression that the irritating substance is still impacted in the throat remains long after it has been dislodged.

Cold affusion, (and this should be used at once), artificial respiration, galvanism, venesection, friction applied to the limbs, the application of heat, stimulants cautiously administered by mouth or rectum, may one and all find a place in the treatment. But whatever else is done, care is specially needed to see that there are no obstacles to respiration.

IV.—The Post-mortem Appearances resulting from Suffocation.

These are (par excellence) those of asphyxia. It must be admitted, however, that the appearances are as a rule scarcely so well marked as we might expect. It will for instance be noted that in *Cases* 13, 47 and 51, most of the ordinary after-death appearances were absent.

1. If external violence has been employed, we may then find flattening of the nose and lips. If the throat has been grasped, ecchymoses, scratches or abrasions may be apparent. If there has been compression only, it is not unlikely that there may be no external signs indicative of it.

2. Patches of lividity and of dotted or punctiform ecchymoses will usually be found on the skin and conjunctivæ (*Cases* 19, 59), (Tardieu, p. 254, &c., and "*Ann. d'Hygiène*," 1866, ii., p. 346). In most cases there is lividity of the lips and extremities. The face may be pale or violet, but is often placid, especially in accidental cases of suffocation. The eyes are usually congested (*Case* 19). There is a mucous and sometimes blood-stained froth about the mouth, ears, and nose (*Case* 19). The tongue may either be found behind the teeth (*Cases* 24, 26), or be protruded (*Cases* 27, 28).

3. The *blood* is usually dark coloured and very liquid. Hence wounds made after death may bleed.

4. The condition of the *brain* is variable, but is generally congested (*Cases* 28, 58), and so are the vessels of the pia mater. Congestion of the brain has been noted to be invariably present when the eyes are congested (*Case* 19).

5. The *heart* is variable, both in its appearance and condition. Small ecchymosed spots, such as are found on the lungs, have been noted. Sometimes, indeed frequently, the right side of the heart is more or less full of blood (*Cases* 25, 27, 69), whilst occasionally the heart has been found empty (*Cases* 13, 51). Often the abdominal veins have been remarked as very turgid (*Cases* 25, 28).

6. The *trachea* is usually of a bright red colour (*Cases* 26, 27,

28, 51), and often contains bloody froth (*Cases* 24, 26, 58), although this is not an invariable appearance (*Case* 27). It is very likely to contain in certain cases the materials that were the proximate cause of the suffocation (*Cases* 23, 38, 51, 54).

The œsophagus and trachea, obstructions in which may cause suffocation, frequently exhibit evidences of more or less severe injuries, hæmorrhages from which have more than once ended fatally (*Case* 84).

7. *The lungs.* At times they are very congested (*Cases* 26, 28), whilst at others both are normal (*Cases* 13, 25, 69), or one congested and the other not (Taylor). As stated elsewhere, the lungs of young persons may be found comparatively small, almost bloodless, and more or less emphysematous. (*Case* 73.) (Consult "*Trans. Méd.*," Oct., 1832, and "*Mém. de l'Académie de Méd.*," Paris, 1843, tom. x., p. 655; Devergie "*Ann. d'Hygiène*," etc., 1832, vii., 310, and xxv., 1841, p. 442; Oznam, "*Arch. Gén. de Med.*," Jan., 1854.)

M. Tardieu (supported by M. Causse d'Albi) and others lay great stress on the existence of *punctiform sub-pleural ecchymoses* (Tardieu's spots) as indicative of suffocation. They consider them due to small effusions of blood from over-distended vessels, ruptured during efforts at expiration (Lukomsky.) (See Tardieu's coloured plates.) ("*Ranking's Abstracts*," i., 1868, p. 93; "*Brit. and For. Med.-Chir. Rev.*," ii., 1874, p. 250.)

It is important to note the *general character* of these spots. They are usually round, well defined, and of a dark colour, varying in size from a pin's head to a small lentil [d'une tête d'épingle, jusqu'à celles d'une petite lentille]. This will serve to distinguish them from the petechiæ met with in the lungs (and also on the heart) after purpura, cholera, eruptive fevers, etc., and also from certain effusions that occur on the scalp (where Tardieu's spots may also be found) after a tedious labour, such effusions being non-uniform, and varying in size from a pea to a large marble.

As regards the position of Tardieu's spots, they are usually seen at the root, the base, and the lower margins of the lungs. (*Case* 58.)

We have now to consider the precise value to be attached to these spots medico-legally :—

(*α.*) It is indisputable that punctiform sub-pleural ecchymoses are of frequent occurrence after death from suffocation. Provided they be well marked and occur in adults or in infants that have breathed, and further provided that no other definite cause of death can be determined, their presence is to be regarded as strongly indicative of smothering as the cause of death.

(*β.*) But that they are not an *infallible* sign of death from smothering, has been proved by Simon, Ogston, and as a result of numerous observations, by ourselves. For (*α*) on the one hand the spots may be *absent*, although death *was due* to suffocation. (See nine cases reported by Ogston. Also Vierteljahrss., 1867, ii., 146.) (*β*) On the other hand they may be *present*, although death *was not due* to suffocation. Thus they have been found after death from hanging and drowning (Simon and Ogston). They have also been found in fœtuses where the mother has perished before the commencement of labour (of which Dr. Ogston records a case, page 553). They have also frequently been found in still-borns ; although here, as Dr. Ogston remarks, " the arrest of the fœtal circulation has been shown to induce attempts at inspiration, and the subsequent death of the infant by asphyxia, either by *drowning* where the liquor amnii is drawn into the lungs, or by *suffocation* (properly so called) where the waters had been previously discharged, or where the membranes have been interposed between them and the child's mouth." And, lastly, they have been found by Ogston after death from scarlatina, heart disease, apoplexy, pneumonia, pulmonary apoplexy, and pulmonary œdema. (" *British Med. Jour.*," Sept. 26, 1868, p. 332.)

(*γ.*) That as well as beneath the pleura, these spots have been frequently found on the thymus gland, occasionally on the pericardium and under the hairy scalp in the periosteal cellular tissue (Durand-Fardel), and less frequently on other parts. Dr. Chevers has drawn attention to ecchymosed spots on the descending thoracic aorta (p. 620).

(*δ.*) Here we quote Dr. Ogston's words :—

" A distinction may be drawn betwixt the ecchymoses met with

in infants in these cases, and those in adults perishing from other forms of asphyxia. In the first place, in the latter the ecchymoses were only encountered in one instance on the thymus gland; while in the former class of cases they are usually encountered in greatest abundance on this gland. Secondly, in the cases in which the persons had perished from drowning, hanging, disease, or violence, the ecchymoses were single and scattered, not in numbers and clustered, as in those children whose bodies presented no obvious traces of disease or injury to account otherwise for the death, than by the presumption of suffocation, or rather smothering. Thirdly, while in only one of these infants were the ecchymoses in a marked form wanting in the lungs, in the twenty-two other cases in which they were found in these organs, the spots were few in number and discrete, not in clusters as in the children's cases."

(ε.) That the punctiform sub-pleural ecchymoses may be distinguished so long as the tissue of the lung remains unchanged.

(ζ.) That the apoplectic effusions in the substance of the lungs, common in strangulation, are not found in cases of suffocation.

8. The *kidneys* are generally congested to an even greater extent than the liver and spleen (Casper). (*Cases* 24, 26, 27, 28). [Not unfrequently recovery is retarded in cases of suffocation by the occurrence of albuminuria (*Case* 59).]

9. The *spleen* has frequently been found by Ssabinski to be anæmic.

10. If sand or such like material has been the foreign substance that has stopped out the air, some of it will probably be found in the air passages and possibly in the stomach (*Cases* 23, 24, 54).

11. Lastly. In a post-mortem examination, it is most important to look for foreign bodies in the air passages, and for scratches the result of foreign bodies. And, above all, the question must be answered, "Are there any indications of disease to which suffocation might be traced"?

The practical questions arising out of this subject are:—

V. Was the death caused by suffocation?

VI. Was the suffocation accidental, suicidal or homicidal?

V.—Was the Death Caused by Suffocation?

Bearing in mind that there is no absolutely certain anatomical appearance indicative of this mode of death (if we except Tardieu's spots, which we have seen are not unexceptional evidence), we must admit that the answer to this question is one of the greatest difficulty.

VI.—Was the Death Accidental, Suicidal, or Homicidal?

Accidental suffocation is not infrequent. For instance, the mother being alone and unassisted, or fainting at the time of delivery, the child may be born into blood and ordure—or children may be overlain by drunken or overtired or deep-sleeping parents, or be suffocated in the bed clothes (*Cases* 34, 35), or by too close a pressure to the breast, etc. (*Cases* 34 and 37). Again, accidental suffocation may result from pressure in a crowd, or from accidental drowning in hay (*Case* 20), flour (*Case* 21), linseed (*Case* 22), sand (*Cases* 23 and 24), wet bark (*Case* 25), or in the ruins of a building (*Cases* 25, 26), or in ashes (*Case* 38), or by the impaction of food either taken and swallowed "the wrong way"* (*Cases* 43, 46, 47), or vomited and then sucked into the trachea before being entirely rejected (*Cases* 29, 44, 48, 49), an accident not unlikely to occur in the case of an infant vomiting curdled milk (*Case* 41). A case of accidental suffocation from retraction of the larynx causing death is recorded (*Case* 42), also from false teeth slipping into the glottis (*Case* 30), and from various diseased conditions (*Cases* 31, 32, 33).

* A case told me by M. Pomian, a Russian physician, shows how careful we should be in drawing conclusions. A Russian sentry on guard was found dead in his watch-box, with a large piece of meat in the lower part of the pharynx, pressing upon, and partly covering, the glottis. His death was therefore supposed to be accidental. Some years after, his superior officer, on his death bed, confessed that he had first suffocated the man, and then placed the piece of meat in his throat, in order to divert suspicion.

It may be worth noting that chloroform is always given on an empty stomach in order (if possible) to avoid vomiting, thereby lessening the risk of the contents of the stomach getting into the trachea.

Suicidal suffocation is rare. *Cases* 15 to 18 prove, however, the possibility. It is scarcely possible for an adult to kill himself by simply holding his breath.

Homicidal suffocation.—Cases 1 to 14 are illustrations. It has been effected by forcing foreign bodies into the air passages (*Cases* 5, 6, 7, 8, 9), by smothering (*Cases* 1, 2), by preventing the air from entering the lungs, the face being held in various materials (*Cases* 10, 12), or by maltreatment producing vomiting, the food vomited blocking up the trachea (*Cases* 3, 4).

In the case of the Resurrectionists (as they were called), pressure on the chest was employed, in addition to a plaster placed over the mouth and nostrils (*Cases* 11, 13, 14).

The question then in cases of suffocation is, for practical purposes, homicide or accident? In children accident or homicide are equally likely; but in adults one would always suspect accident rather than homicide, unless the victim be drunk or had been previously drugged. It is difficult to imagine a murderer being able to suffocate his victim under ordinary circumstances, so slight an effort being all that would be necessary on the part of the latter to prevent it. At the same time we must remember that the effects of asphyxia are rapid, so far as causing unconsciousness is concerned. The absence of all signs of struggling, would be important evidence against homicide. *Cases* 51 to 57 supply instances where disputes have arisen on this point. In the case of children the marks of a coarse cloth or sheet over the mouth—or the presence of foreign bodies in the mouth, nostrils, throat and air-passages —or the discovery of the body in a box, linen press, water-closet, cesspool, heap of bran, and the like, would suggest homicide.

It is evident that the settlement of both the questions last under consideration must depend on the special evidence forthcoming in each case.

ILLUSTRATIVE CASES.

1. R. v. Johnson.—(*Lincoln Lent Assizes*, 1843.)—Homicidal suffocation of an adult in the bed clothes by a burglar. (Pages 448, 463.)

2. Ogston's Med. Juris., p. 550.—Homicidal suffocation in bed clothes of two old women by burglars. The hands and feet were first of all tied. (Pages 448, 463.)

3. Ann. d'Hyg., 1868, I., p. 450, and II., p. 226, and 1869, I., p. 471.—Asphyxia from vomited food being forced into the air passages by violence (trampling on the abdomen). (Pages 449, 463.)

4. Horn's Vierteljahrsschrift, 1868, I., p. 123.—Suffocation due to the aspiration of food from maltreatment. (Pages 449, 463.)

5. Chever's Med. Juris., p. 616.—Boy, æt. 12.—Homicidal suffocation effected by cramming mud into the mouth. (Pages 449, 463.)

6. R. v. Cox.—(*Warwick Lent Assizes*, 1848.)—Female tried for suffocating her infant (æt. 11 days) by stuffing rags into its mouth. (Pages 449, 463.)

7. Edin. Med. and Surg. Journal, April, 1842.—Homicidal suffocation effected by plugging the throat with a hard plug of spindle cotton. (Page 463.)

8. Edin. Med. Journal, Dec., 1855, pp. 511 and 540.—(*Dr. Littlejohn.*)—Female adult. Homicidal suffocation by forcing a cork into the larynx whilst the woman was drunk. The sealed end was uppermost, and there were marks of a corkscrew in the cork, rebutting the defence that the cork had slipped in as the woman was drawing it from the bottle with her teeth. Ribs fractured. (Pages 449, 463.)

9. R. v. Spaul.—(*C.C.C., Sept.*, 1872.)—Child. Homicidal suffocation, the throat and air passages being choked with pepper. (Pages 449, 463.)

10. Ogston's Med. Juris., p. 551.—Homicidal suffocation of a boy, by holding his face in a heap of unslaked lime. Tracheotomy. Recovery (Pages 449, 463.)

11. R. v. Elizabeth Ross.—*(Old Bailey, Dec.,* 1831.)—Homicidal suffocation, by pressure on the chest and by covering over the mouth and nostrils. (See "Taylor's Med. Juris.," Vol. I., p. 150.) This case was remarkable because the body of the deceased was never discovered. The prisoner was found guilty and executed. (Pages 449, 463.)

12. Taylor's Med. Juris., Vol. II., p. 95.—*(Assizes of the Seine.)*—Homicidal suffocation of a woman by placing a pitch plaster over her face. (Pages 449, 463.)

13. Ed. Med. and Surg. Journal, April, 1829, p. 236.—Cases of Burke and Macdougall, and of Bishop and Williams, who suffocated their victims by pressure on the chest, at the same time compressing the mouth and nostrils with one hand, the other being forcibly applied under the chin. (Pages 449, 458, 459, 463.)

Case of Margery Campbell. (Killed by Burke.)—P.M. 59 hours after death. Eyes closed and bloodshot. Face composed, but somewhat red and swollen. Excepting the face no other lividity. Blood issued from nostrils. Tongue normal. Slight laceration on the upper lip, opposite the eye tooth. Flaccid joints. Os hyoides and thyroid cartilage more separated than normal, but no external injuries apparent. Some marks of violence found on the limbs.

Windpipe normal, except that it contained a little tough (not frothy) mucus.

Lungs normal.

Heart: right side full of black fluid blood.

Blood black and fluid.

Abdominal viscera healthy, except incipient liver disease.

Brain slightly turgid. Three extravasations on scalp.

Effusions of blood on the sheath of the spinal cord and among the muscles of the neck, back, and loins.

Injury to the posterior ligamentous connection between the 3rd and 4th cervical vertebræ. (This was probably done after death by doubling up the body.)

In reference to the case of *Campbell*, for whose murder by suffocation Burke was condemned and executed, Dr. Christison remarks "that the lungs were remarkably free from infiltration, and although the blood in the heart and great vessels, as well as throughout the body, was fluid and black, yet the conviction in the public mind that a well-informed medical man should always be able to detect death by suffocation, simply by an inspection of the body, and without a knowledge of collateral circumstances is erroneous, and may have the pernicious tendency of throwing inspectors off their guard, by leading them to expect strongly-marked appearances in every case of death by suffocation. That such appearances are very far from being always present ought to be distinctly understood by

every medical man who is required to inspect a body, and give an opinion of the cause of death." ["Ed. Med. and Surg. Journ.," Vol. XXXI., p. 239.]

Case of Carlo Ferrari.—(Murdered by Bishop and Williams.)—Face swollen and congested. Eyes bloodshot. Lips tumid. Wound found on the left temple.

Lungs healthy, not congested.

Heart, small, contracted, and quite empty.

Effusion of blood under the scalp, also amongst the muscles of the neck, and on the spinal cord.

14. R. v. Norman.—(*C. C. C., July*, 1871.)—Homicidal suffocation of three children by a servant girl, æt. 15. One, æt. 15 months, died. The means used to effect suffocation were pressure on the mouth and throat. (See Taylor's "Med. Juris.," Vol. II., p. 94.) (Pages 449, 463.)

15. Taylor's Med. Juris., Vol. II., p. 90.—Suicidal suffocation effected by a woman placing herself under the bedclothes, and making her child pile numerous articles of furniture on the bed. She was found dead some hours afterwards. (Pages 448, 463.)

16. Taylor's Med. Juris., Vol. II., p. 90.—Suicidal suffocation by merely leaning against the bedclothes. (Pages 448, 463.)

17. Taylor's Med. Juris., Vol. II., p. 90.—Suicidal suffocation by a a male prisoner, who filled his nostrils and mouth with rags, then tied a handkerchief over his mouth, and finally threw himself on his face. (Pages 449, 463.)

18. Ogston's Med. Juris., p. 550.—(*From Henke's Zeitschrift.*)—Suicidal suffocation of a servant girl by shutting herself up in a trunk. (Page 463.)

19. Ogston's Med. Juris., p. 549.—Suffocation (by pressure on the chest) of 23 people in a crowd at Paris (1837). Death occurred whilst the people were standing and being borne along. (See Guy and Ferrier, p. 293.) (Pages 448, 458.)

In all 23 cases, the skin of the face and neck were spotted violet, with black ecchymoses.

In 9, eyes bloodshot.

In 4, bloody froth from mouth and nostrils.

In 4, blood from nostrils.

In 3, blood from ears.

In 7, fractured ribs.

In 2 (females), fractured sternum.

In 16 cases where a post-mortem was made, the blood was found black and fluid, filling the large veins and the right side of heart.

Pulmonary tissue reddish brown, with an accumulation of black fluid blood on the posterior part of three-fourths of the lungs. There was but one case where ecchymosis occurred on the surface or in the substance of the lungs. The brain and vessels of the pia mater were congested in those cases where the eyes were bloodshot, and where blood had flowed from the ears.

(A second case of 40 persons being suffocated in a crowd at the Champ de Mars also recorded.)

20. Taylor's Med. Juris., Vol. II., p. 89.—(*Mr. Rake.*)—A groom accidentally suffocated by falling into a quantity of hay, in an iron hayrack in the stable, through a hole in a hayloft. (Pages 449, 462.)

21. Taylor's Med. Juris., Vol. II., p. 89.—Accidental suffocation in flour, which the man was shooting from the upper to the lower part of a granary. (Pages 449, 462.)

22. Chever's Med. Juris., p. 622.—Fourteen men, women and children killed by being smothered with linseed, which poured down upon them "in *a perfect torrent*," from a room above where they were at work. When recovered the pit of the linseed was impressed on all the exposed parts of the bodies. (Pages 449, 462.)

23. Chever's Med. Juris., p. 622.—Two cases recorded of death by "*drowning in sand*," from the falling in of high river banks.

The mouths were filled with sand, and the pharynx plastered with it. The larynx and larger bronchi, œsophagus, and in one case the stomach, also contained sand.

In one case it seemed as though the sand went furthest into the lungs, and in the other case into the stomach and alimentary tract. (Pages 449, 459, 461, 462.)

24. Casper, Vol. II., p. 136.—(*Case* 229.)—Male adult. Accidental suffocation in sand. Tongue placed behind the teeth. Trachea contained bloody froth. The sand was found adhering to the mucous membrane, as far down as the commencement of the bronchi. *Kidneys* congested. (Pages 449, 458, 459, 461, 462.)

25. Casper, Vol. II., p. 137.—(*Case* 230.)—Boy, æt. 9. Suffocated in bed from the fall of the floor of a room above full of wet bark. Lungs not congested. *Heart*, on the right side, contained four drachms of half coagulated blood. Pulmonary artery moderately full, but the abdominal veins very turgid. (Pages 449, 458, 459, 462.)

26-28. Casper, Vol. II., p. 135.—(*Cases* 226-228.)—Accidental suffocation of three men by the fall of a newly-built house :—

1. Æt. 36. *Face* red and swollen. *Tongue* behind teeth. *Lungs*

full of dark fluid blood. *Heart* normal. *Trachea* bright red, and full of bloody froth. Liver, spleen, brain, and kidneys much congested. (Pages 449, 458, 459, 461, 462.)

2. Æt. 26. *Face* red and swollen. *Tongue* protruded half-an-inch beyond the mouth. *Kidneys* enormously distended with fluid blood. *Trachea* bright red, but contained no froth. *Lungs* congested. *Heart*, on the right side, turgid. (Pages 449, 458, 459, 461.)

3. Æt. 20. *Face* red and swollen. *Tongue* dark, swollen, and protruding beyond the teeth. *Trachea* bright red. *Lungs* very distended with blood. *Abdominal veins* very full of blood. *Brain* congested. *Kidneys* very congested. (Pages 449, 458, 459, 461.)

29. Ed. Med. and Surg. Journ., April, 1844, p. 390.—(*Dr. Jackson, of Leith.*)—Male, æt. 31. Death from suffocation occasioned by a piece of potato skin becoming impacted over the rima glottidis. The man had had potatoes for dinner the day before, and had vomited when intoxicated. The potato skin thus vomited was drawn back during inspiration, the patient, owing to his condition, being unable to cough it up (Pages 449, 462.)

30. Taylor's Med. Juris., Vol. II., p. 90.—Accidental suffocation from impaction of three false teeth in the glottis. (Pages 449, 462.)

31. Pathological Researches, 1850, p. 7.—(*Dr. Wright.*)—Female. Suffocation by a pellet of tough mucus being forced into the rima glottidis during coughing. (Pages 451, 462.)

32. Taylor's Med. Juris., Vol. II., p. 82.—(*Dr. Geoghegan.*)—A boy. Accidental suffocation from blocking of the trachea with cheesy scrofulous matter. A powder had been given five minutes before the attack. (Pages 451, 462.)

33. Taylor's Med. Juris., Vol. II., p. 82.—(*Mr. Edwardes.*)—Boy æt. 8 years. Suffocation occasioned by a dislodged bronchial gland. (Pages 451, 462.)

34. Casper, Vol. II., p. 143.—(*Cases* 223 to 244.)—Suffocation of infants at the breast (*Case* 223); in bed (*Case* 235), etc. (Pages 448, 462.)

35 to 37. Taylor's Med. Juris., Vol. II., pp. 92, 93.

1. Child, supposed to have been suffocated by being wrapped too closely in a shawl. (Pages 448, 462.)

2. Child suffocated under the bed-clothes (six folds). A little frothy mucus found about the mouth. (Page 448.)

3. Child, æt. 5 days, suffocated by being pressed too closely to the breast. (See "*Lancet*," Jan. 16, 1868, p. 69.) (Pages 448, 462.)

38. Med. Gaz., Vol. XVII., p. 642.—Child suffocated by falling into the ashes under a grate. Some of the ashes were found in the windpipe. (Pages 449, 459, 462.)

39. Med. Gazette, Vol. XLII., p. 970; Lancet, Sept. 2, 1848, p. 259. (See cases of suffocation.)

41. Lancet, 1873, I., p. 669.—(*Dr. Parrot.*)—Child, æt. 1 year. Suffocated in the middle of the night by vomiting curdled milk taken before going to bed, a portion being drawn into the air-passages. (Pages 450, 462.)

42. Seller's Journal, March, 1854, p. 278.—(*Quoted by Dr. Taylor.*)—New-born child, suffocated by retraction of the base of the tongue. (Pages 450, 462.)

43. Taylor's Med. Juris., Vol. II., p. 83.—(*Mr. Nason.*)—Death of a child, æt. 17 months, during violent coughing. It appeared to have been suffocated by a pea in the larnyx. (Also see "Med. Gaz.," vol. XXIX., page 146. (Pages 449, 462.)

44. Lancet, August 31, 1850, p. 262.—(*Mr. Matthews.*)—Suffocation from food which being vomited blocked up the throat. (Pages 449, 462.)

45. Lancet, May 16, 1846, p. 561.

46. Edin. Monthly Journal, July, 1851, p. 68.—(*Dr. Mackenzie.*)—Suffocation by a large piece of meat filling up the throat, a part having entered the windpipe through the rima glottidis. The meat had pressed the epiglottis forward. (Pages 449, 462.)

47. Lancet, March 9, 1850, p. 313.—Suffocation by a piece of meat which *incompletely* stopped the air passages. This allowed the man to rise from the table; but immediately on doing so, he dropped down dead.

The case is important, because the son-in-law was charged with manslaughter, having had a fight with the deceased two hours previously to the accident occurring.

Post-mortem.—All organs healthy except the brain. (Pages 449, 458, 462.)

48. Chever's Med. Juris., p. 617.—A seaman vomited whilst intoxicated. In the act of respiration and whilst vomiting, the patient drew into the rima glottidis a piece of half-masticated beef, which remaining fixed, completely prevented the passage of air into the lungs. Death. (Other cases recorded of potatoes, etc., causing suffocation.) (Pages 449, 462.)

49. Chever's Med. Juris., p. 617.—Male; accidentally suffocated by a

piece of meat, vomited whilst the man was intoxicated, becoming fixed in the rima glottidis.

(See similar cases, pp. 617, 618.) (Pages 449, 462.)

50. Chever's Med. Juris., p. 619.—Boy, accidentally suffocated by the impaction of a living fish (coie) in the air passages. The catching of its gill plates, anchor-wise, below the vocal cords preventing its withdrawal.

(See similar cases, pp. 619, 620.) (Page 449.)

51. Casper, Vol. II., p. 139 (Case 231.)—Suffocation (accidental or homicidal?) of a newly-born child, by burial in a mass of loose earth, shavings, and peat refuse. In the mouth, larynx, and pharynx there was a quantity of peat, powdered peaty matter being also found beneath the epiglottis. Abdominal organs not congested. Mucous membrane of *larynx* and *trachea* bright red. *Lungs* bright red, and filled the chest. *Bronchi* empty and normal. *Heart* empty. (Here note that the ordinary post-mortem signs of suffocation were absent, yet the presence of peat in the air-passages pointed to suffocation as the cause of death.) (Pages 449, 458, 459, 463.)

52. Casper, Vol. II., p. 140 (Case 232.)—Suffocation (accidental?) of a child 3 months old, by a bag of sweetened bread pap being put into its mouth to keep it quiet. (*Zulp*). (Pages 450, 463.)

53. Chever's Med. Juris., pp. 595.—A man first stunned by blows on the head, the body being afterwards suspended.

Female: right parietal bone bored by a gimlet, the body *before death* being suspended by the neck. Either the injury to the bone or the hanging would in this case have proved fatal, leaving no doubt that it was not suicidal. (Page 463.)

54. Ann. d'Hyg., 1852, II., p. 195.—(*Devergie.*)—Suffocation (accidental, suicidal, or homicidal?) from a man's head falling into a quantity of corn. Indentation of the grains of corn on the face well marked after death. This is supposed to have indicated homicide (?). The marks of violence found were certainly more conclusive. Some corn grains were found in the pharynx, trachea, œsophagus, stomach, and duodenum. (Pages 449, 459, 461, 463.)

55. R. v. Heywood, Lancet, September 14, 1839, p. 896.—Query; suffocation or apoplexy? (Page 463.)

56. Ann. d'Hyg., 1855, Vol. II., p. 379.—(*M. Tardieu.*)—Sub-pleural ecchymoses apparent, after the lapse of ten months, in a child suffocated in privy soil. (Pages 449, 463.)

57. Taylor's Med. Juris., Vol. II., p. 95.—Trial of Mr. and Mrs.

Taylor for the murder of Mrs. Meller and her three children. Suffocation. (Page 463.)

58. Lond. Med. Rec., June 15, 1879, p. 246. — (*Dr. Weiss.*) — Infant, four months. Death by overlaying. There was evidence of its having vomited.

Post-mortem (after 48 hours). Vessels of brain, right side of heart, and venous trunks of chest and abdomen full of dark-coloured fluid blood. Viscera generally congested. Mucous membrane of trachea and air passages much injected, and contained bloody froth. Minute sugillations (like flea-bites) over pleural surfaces of the lungs and pericardium, and other sugillations also on the surfaces of the lungs, heart, and pericardium, described as if produced by a feather dipped in red ink. (Sub-pleural ecchymoses.) (Pages 448, 450, 458, 459.)

59. Med. Times and Gazette, 1879, II., p. 690.—(*Mr. Hulke.*)—Female, æt. 21. Nearly suffocated by a severe squeeze. Punctiform hæmorrhages noted on the skin and conjunctivæ, which slowly disappeared. Albuminuria. Recovery. (Pages 448, 458, 461.)

60. Liston's Practical Surgery, p. 415; Chelius's Surgery, II., p. 402.—Extraction of foreign bodies from the bronchus by a tracheotomy wound. (Pages 456, 457.)

61. British Med. Journ., 1861; Lancet, 1878, II., p. 721.—(*Dr. George Padley.*)

(*a.*) Male, adult. A sixpence lodged in the bronchus. The coin was removed by the man being placed on an inclined plane, head downwards, with his knees flexed over the end. (Page 449.)

(*β.*) Boy, æt. 9. Bronchial obstruction caused by a piece of japanned metallic penholder, about an inch long. It was brought up during a laughing fit, together with a quantity of purulent fluid. Recovery.

[The symptoms suggested a large vomica in the right lung.] (Pages 452, 455.)

62. Lancet, 1878, II., p. 721.—(*Dr. J. T. W. Baird.*)—Child, æt. 4 years. *Instant* death from bronchial obstruction (right bronchus) by a plum stone.

[In this case it is suggested that the stone had been swallowed, and that it had been vomited and drawn into the bronchus during an inspiration (?). See Dr. George Johnson's letter, "*Lancet*," 1878, II., p. 824.] (Page 454.)

63. New York Med. Journ., 1882, XXXV., p. 478.—(*Dr. Stanley P. Warren.*)—Girl, æt. 6. Suffocation. Death.

Post-mortem. Suffocation due to a lump of hard curdled milk, three quarters of an inch long, in the right bronchus.

[There was no doubt from the history that the milk had been regurgitated three days before death.] (Page 450.)

64. Boston Med. Journ., October 19, 1876.—(*Dr. Brug.*)—Child, æt. 2. Threatened suffocation. Tracheotomy performed, and a large elastic catheter passed into the left bronchus. The irritation induced a cough which expelled the instrument, together with a bean that the child had swallowed. Recovery. (Pages 449, 455, 456.)

65. Lancet, 1876, Vol. II., p. 391.—(*Dr. R. J. Spitta.*)—(α.) Child, æt. 22 months. Piece of slate pencil, 1½ inches long and pointed, became impacted, point downwards, in the left bronchus. Death on the eighth day from pneumonia. (Pages 449, 453, 456.)

(β.) Child, æt. 2½ years. Suffocation from swallowing a screw about an inch long. About twenty minutes afterwards, the child was suddenly relieved. For three days the child remained well, hopes being entertained that by some means or another the screw had been jerked into the pharynx and had been swallowed. On the third day a violent attack of dyspnœa suddenly set in. Tracheotomy was performed on the fourth day. One month and two days after the accident the screw, surrounded with mucus, was brought up during a cough, and voided by the mouth. Recovery. (Page 452.)

66. British Med. Journ., 1876, Vol. I., p. 686.—(*Mr. Maunder.*)—Male, æt. 13. Removal of a sleeve-link from the left bronchus by means of a silver wire passed through a tracheotomy wound. Inversion of the patient and shaking had failed to remove it. Recovery. (Page 456.)

67. Stokes on Diseases of the Chest, p. 288.—Male, æt. 20. Tracheal obstruction by a piece of cheese eaten when talking. Insensibility. Relieved by tracheotomy. After-symptoms occurred indicating a disturbed circulation resulting from the apnœa induced. Recovery. (Pages 453, 456.)

68. Lancet, 1878, Vol. II., p. 502.—(*Dr. George Johnson.*)—Male adult. Had a fit (as was supposed) during dinner. Suspecting a foreign body, the surgeon passed a probang. The man died in the afternoon.

Post-mortem.—A piece of tendon was found under the epiglottis.

[In this case the surgeon was blamed for not performing tracheotomy, which, had he known all the facts, such as a laryngoscopic examination would have shown, was clearly indicated.] (Pages 449, 453, 455.)

69. British Med. Journ., 1872, Vol. I., p. 419.—(*Mr. E. Chaffers.*)—Female, æt. 46. Whilst chloroform was being administered on an empty stomach, symptoms of suffocation set in. It was found to be due to a metal plate, to which false teeth were attached, having fallen from the roof of the mouth during the administration, and become lodged in the glottis. There

it remained, the patient being unable to exert any voluntary effort, or to communicate the cause of the obstruction. Death.

Post-mortem (after twenty-three hours).—Right ventricle dilated, and contained a small quantity of fluid blood. Lungs empty. (Pages 450, 458, 459.)

70. Med. Times and Gazette, 1879, I., p. 607.—(*Mr. Ambler.*)—Male, æt. 50. A foreign body (a piece of a neck of mutton bone) remaining in the larynx for upwards of twelve months. Constant throat symptoms supposed specific, and treated accordingly. Suffocation constantly threatened. The bone was voided during a violent fit of coughing. Recovery. (Pages 449, 452, 453, 455.)

71. British Med. Journ., 1876, I., p. 504.—(*Dr. Harker.*)—Male, æt. 38. Suffocation from a piece of meat, swallowed as he was attempting to speak, becoming firmly fixed in the larynx. Became unconscious. Tracheotomy, with artificial respiration. The meat was removed with a pair of curved forceps.

[See a similar case, "*New York Med. Journ.*," XII., p. 364. (*Dr. Bentley.*)] (Pages 449, 456.)

72. British Med. Jour., 1870, I., p. 247.—Child, 11 months. Sudden from suffocation whilst being fed. (Page 454.)

73. British Med. Journ., 1875, I.—(*Mr. Campbell de Morgan.*)—Child, æt. 1 year. Choked by a crust. Tracheotomy with artificial respiration. Death after thirty-four hours.

Post-mortem.—Acute capillary bronchitis in both lungs, the left being hepatised from pneumonia. At the apex of the left lung was a cavity filled with puriform fluid, and surrounded by tubercular deposit. (Pages 449, 459.)

74. Lancet, 1878, I., p. 398.—Child. Suffocation by swallowing a squeaking air-bladder. The toy slipped through the glottis, bladder downwards, and the quill mouthpiece upwards, so that with every respiration the bladder became more or less inflated. Death. (Pages 449, 453.)

75. Med. Chir. Trans., Vol. XXVI.; Lancet, 1878, II., pp. 538, 604, 639.—(*Case of Brunel.*)—Mr. Brunel, on April 3rd, 1843, swallowed a half-sovereign, which became lodged in the right bronchus, and at first caused great dyspnœa. For two days afterwards he experienced little inconvenience, bad symptoms not setting in until after this. On April 25th he was strapped in a prone position to a platform, made movable on a hinge in the centre, by which means the head was lowered to an angle of about eighty degrees with the horizon. When in this position the back of the chest was struck with the hand, violent choking symptoms resulting. On the 27th of April, being placed again in this position, tracheotomy was

performed, but the attempt to grasp the coin through the wound failed. On May 13th, the wound having been kept open, he was again inverted and his back struck with the hand, when the coin, owing to an effort to cough, quitted the bronchus and fell out of the mouth. Recovery. (Page 455.)

76. Brit. Med. Journ., Jan. 7, 1871, p. 7.—(*Mr. Henry Smith.*)—Partial suffocation from swallowing a half-sovereign. The symptoms, which at first were urgent, somewhat subsided. After four days the patient suffered severely from pain in the throat, loss of voice, stridulous breathing, dysphagia, cough, and mucous expectoration. The coin was seen on laryngoscopic examination, but was found to be impossible to reach. An opening was made in the crico-thyroid membrane, and the coin dislodged and pushed into the man's mouth with a strong silver probe.

(See also as above a case of Mr. Pridgin Teale, where a piece of bone had become similarly impacted.) (Pages 448, 449, 453, 454.)

77. Med. Chir. Transactions, Vol. XLVIII.—(*Dr. Sanderson* and *Mr. Hulke.*)—Partial suffocation from swallowing a sixpence, which was seen lying flat across the glottis. The coin eventually passed by stool. (Page 453.)

78. Lancet, 1880, I., p. 271.—(*Mr. Williams.*)—Child, æt. 4. A half-penny in the œsophagus. Four or five months afterwards bad symptoms set in, and on passing a double probang, the coin, much discoloured and coated with mucus, was dislodged and ejected. (Pages 453, 457.)

79. Lancet, 1878, II., p. 501. — (*Dr. George Johnson.*) — Male, æt. 20 months. Swallowed a penny. Imminent danger of suffocation immediately resulted, but soon subsided. Fifty-two hours after the accident the attempt to swallow was found to cause pain and to excite coughing. The mouth was much troubled by the secretion of saliva. On laryngoscopic examination the coin was seen sticking in the upper part of the œsophagus, just below the opening of the larynx. It was removed with a pair of long slender forceps, and the child recovered in a week. (Pages 449, 453, 457.)

80. New York Med. Review, Sept., 1873.—(*Dr. D. E. Smith.*)—Death from swallowing a set of artificial teeth by a young married woman during an attack of puerperal convulsions. (Pages 450, 453.)

81. Lancet, 1872, I., p. 407.—Female. Swallowed her false teeth, which lodged in the œsophagus. The symptoms were relieved by an emetic, which relaxed the spasm in the œsophagus.

[See also "*Lancet*," 1872, Vol. I., p. 600, for a case of the impaction of false teeth in the œsophagus for six months, eventually relieved by eating a large piece of meat, which pushed the teeth into the stomach. This was

succeeded by vomiting, when the foreign body was ejected.] (Pages 453, 457.)

82. Lancet, 1876, I., p. 130.—(*Mr. Pearce Gould.*)—Female adult. Swallowed two sets of teeth during sleep, one set passing into the larynx, and the other into the œsophagus. Tracheotomy was performed seventy-eight hours after the accident, by which means one set was brought up, the other set passing by stool the same day.

(See another case, "*Lancet*," 1876, Vol. I., p. 231.) (Page 453.)

83. Lancet, 1876, I., p. 268.—(*Mr. Faulkner.*) — Female, adult. Swallowed her artificial teeth during sleep. Severe dyspnœa. The patient was relieved by placing her flat on her stomach, on a couch, the the head and neck hanging down as low as possible. Whilst in this position she was told to put her index finger in her throat. This caused retching, during which the teeth were dislodged. (Pages 450, 453, 455.)

84. British Med. Journ., 1875, I., p. 16.—(*Dr. Sinclair.*)—Accidental swallowing of false teeth, which lodged in the upper half of the œsophagus. They were removed, but the patient died fourteen hours afterwards from severe hæmorrhage. (Pages 453, 457, 459.)

85. Medical Times and Gazette, January 18, 1862.—(*Sir James Paget.*)—Male, æt. 60. Swallowed a set of teeth, probably during an epileptic fit. Difficulty of swallowing and dyspnœa resulted, but in a few days these symptoms abated. After a short time other symptoms came on, such as pain, coughing, vomiting, bloody expectoration. The case led to a suspicion of cancer. Four months afterwards Sir James Paget examined him, and, when the tongue was depressed, saw something white near the epiglottis. Passing his finger down he hooked out a set of nine teeth, with a gold plate and fittings. Recovery. (Pages 451, 453.)

86. Lancet, 1880, I., p. 718.—(*Dr. Poore.*)—Boy, æt. 8. Swallowed a cockle shell, the size of a three-penny piece, with sharp edge, which lodged in the trachea. Dyspnœa with spasmodic coughing occurred. On examination with the laryngoscope at the end of a week a white body was seen about an inch below the vocal cords. During the examination the child coughed violently and voided the shell. Recovery. (Pages 449, 453, 455.)

87. Lancet, 1878, II., p. 761.—(*Dr. E. Gwynn.*)—Infant, 4 months. Nearly suffocated by a piece of walnut shell which she swallowed, and which was ultimately passed by stool. Castor oil was administered. (Pages 449, 453, 457.)

88. Lancet, 1878, II., p. 502.—(*Mr. Oliver Pemberton.*)—Child, 7½ years. Partial suffocation from swallowing a japanned buckle. The

primary urgent symptoms were soon relieved. Some days after vomiting occurred from over-eating, and this stirring the foreign body set up inflammation of the laryngeal mucous membrane, and caused death. (Pages 449, 453.)

89. Med. Times and Gazette, 1878, II., p. 504.—(*Dr. Verger.*)—Child, æt. 9. A plum stone became impacted in the œsophagus of a child so completely that not even water could pass. The stone was expelled by inducing vomiting by the hypodermic injection of 2·5 milligrammes of apomorphine, administered in two doses, the one closely succeeding the other.

["*Brit. Med. Journ.*," 1880, II., p. 49. Threatened choking in a child from swallowing a cherry. Relieved by the probang. (Pages 449, 453, 455, 457.)

90. Lancet, 1878, II., pp. 824, 867.—Suffocation by an ear of wall-barley (*hordeum murinum*). The foreign body was removed through an abscess that formed in the right lateral region of the chest. (Pages 449, 433, 456.)

91. Lancet, Oct. 19, 1878, p. 537.—(*Sir Thomas Watson.*)—Boy. Partial suffocation from swallowing an ear of corn. The accident occurred from a sudden jolt occurring whilst he was riding, holding the ear of corn between his teeth. Symptoms of pulmonary irritation set in, attended with fever and fetid expectoration. Death. (Pages 449, 453, 456.)

92. Med. Chir. Trans., XXVI., p. 293.—(*Sir B. Brodie.*)—Two cases where foreign bodies (the one a berry, and the other a lobster claw) were found in the trachea after death. (Pages 449, 453.)

93. Lancet, 1878, II., p. 679.—(*Dr. Fisher.*)—(α.) Male adult. Threatened suffocation by a mutton-chop bone in the trachea. The bone was brought up during an effort at vomiting.

(β.) Child, æt. 6 years. Swallowed a piece of bone, seven-eighths of an inch long and half an inch wide. The symptoms resulting were constant cough, copious expectoration containing blood and mucus, etc. The bone was ultimately expelled during an attack of coughing. (Pages 449, 453, 455.)

94. British Med. Journ., 1873, II., p. 543.—(*Dr. Shann.*)—Male, æt. 41. Impaction in the œsophagus of a bone swallowed whilst eating. Severe symptoms of dyspnœa set in. After a few hours symptoms of pleuro-pneumonia occurred. Death at the end of the sixth day.

Post-mortem.—A sharp piece of bone, about an inch and a half long, was found at the lower part of the œsophagus, perforating it, and causing a wound into the lung. Cause of death, pneumonia.

(In this case bleeding was resorted to.)

[See "*Brit. Med. Journ.*," 1873, I., p. 77.—Fish bone in a child removed from the larynx by tracheotomy. Death from bronchitis.] (Pages 449, 453, 454, 456.)

95. Lancet, 1873, II., p. 269.—Threatened suffocation from the lodgment of a spoon, swallowed by a lunatic, in the œsophagus. The spoon was expelled during a cough. (Pages 449, 453, 455.)

96. Stokes on Diseases of the Chest, p. 291.—Threatened suffocation from swallowing a plum stone. (Pages 449, 453.)

97. Lancet, March 4, 1876, p. 366.—Fatal suffocation of a child from swallowing a damson stone. (Pages 449, 453.)

98. Indian Med. Gazette, Sept.; Med. Times and Gazette, 1878, II., p. 504.—(*Dr. Dantra.*)—Male adult. Threatened suffocation from accidentally swallowing a live fish whilst he was swimming. The fish was extracted, having caught hold of the man's uvula, which it was persuaded after great difficulty to let go. (Pages 449, 453, 456.)

99. Med. Times and Gazette, 1874, I., p. 486.—Male, æt. 20. The patient attempted to secure a perch, four inches long, by taking its head between his front teeth. It escaped, however, and jumped down the man's throat. Symptoms of suffocation set in, rendering tracheotomy necessary. Death. (Pages 449, 453, 456.)

100. Lancet, 1873, II., p. 103.—(*Dr. MacLaren.*)—Male adult. Impaction of a live fish, three inches long, in the œsophagus for 34 hours. The man had caught the fish, and was endeavouring to kill it with his teeth. Emphysema. The fish was ultimately pushed down by the probang. (Pages 449, 453, 456, 457.)

101. Lancet, 1871, I., p. 646.—Male adult. Impaction of a fish bone in the œsophagus. Ulceration into aorta. Hæmorrhage. Death. (Pages 449, 453, 454.)

102. Lancet, 1880, I., p. 448.—(*Mr. Eve.*)—Male, æt. 59. Impaction of fish bone in the gullet. The probang was passed. The man died suddenly on the third day.

Post-mortem.—A fish bone was found lodged in the œsophagus, a quarter of an inch above the cardiac orifice, passing upwards and forwards through the diaphragm and pericardium, and producing a lacerated wound on the posterior surface of the heart. (*Query.* How far was this condition due to the use of the probang?) [Cases mentioned of the aorta and stomach being similarly perforated.] (Pages 449, 453, 454, 457.)

103. Edin. Med. Journal, Vol. XX., p. 772.—(*Dr. H. J. Littlejohn.*)

(*Case* 1.)—A case of great difficulty, but probably one of accidental suffocation from hæmorrhage. The case was attended with suspicious circumstances, viz., a fall from a height, causing a fracture of the skull and other injuries. Probably this again was accidental, due to the man having gone to the window to relieve himself of the blood which threatened to choke him. In this position it was believed that he had overbalanced himself, and fallen accidentally into the street.

(*Case* 2.)—Female adult. Accidental suffocation from the bursting of an abscess of the tonsil. (Pages 451, 453.)

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