

RABIES AND ANTI-RABIC

TREATMENT

IN

INDIA

BY

CAPTAIN HUGH ACTON, I.M.S.,

AND

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Pasteur Institute of India,

KASAULI.

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Formerly Directors, Pasteur Institute of India.

Rabies:—Definition.
Etiology.
Incubation period.
Symptoms in the Dog.
Differential diagnosis.
In other animals.

Method of removing the brain of a supposed rabid animal.

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DEFINITION.

Rabies or canine madness is an acute disease of the central nervous system, occurring in dogs and allied animals, and transmitted from animal to animal by means of bites. Man and domesticated animals participate in the disease only, as a rule, by chance. The term "Hydrophobia" should be confined to this disease as met with in man only, as the fear of water is not seen in the lower animals.

ETIOLOGY.

The causative agent of rabies has not yet been identified, but there is not the least doubt that it is a living organism. As we shall have to refer frequently to this unknown organism it will be referred to as "the rabies virus."

In the body of a rabid animal the virus is found in the nervous system, that is to say in the brain, spinal cord and large nerves; also in the salivary glands and in certain of the internal organs, such as the pancreas and suprarenal glands. For practical purposes the blood, and other structures of the body, such as bone, muscles etc., do not contain the virus in sufficient quantities to convey the infection.

The danger of infection from the central nervous system only applies to those, e.g., medical officers etc., who have occasion to open the skull of a rabid animal in order to remove the brain, and, whilst doing so, inoculate themselves by an infected knife or similar means.

The virus passes from the brain into the salivary glands, and thence into the saliva of the infected animals. The saliva of human beings and herbivora contains practically no virus.

Before the saliva can infect another animal or man, it must gain entrance into the body through some broken surface of skin or abraded mucous membrane. The teeth of the rabid animal penetrating the skin constitute the usual method of the virus into the system of a healthy animal: the same result may occasionally occur if the infective saliva comes into contact with any recent cut or abrasion. The chance of infection through cuts and abrasions is very much smaller than in the case of definite bites; for, in the former case, the virus is only deposited on the surface of the wound, and being very delicate in nature it is easily destroyed by antiseptics, etc. With deep, penetrating bites the case is very different, as caustics are very rarely able to reach all the virus inoculated.

It is, therefore, important to know at what stage of the disease in the biting animal the virus enters the saliva. From experiments conducted to elucidate this point it has been determined that the saliva is never infectious earlier than 72 hours before definite symptoms appear. There is, however, one case recorded in the literature in which the saliva was believed to be infective 6 days before symptoms appeared in the biting animal. Once symptoms set in the animal rarely lives longer than 2 to 4 days. From these facts we formulate the following:—

If the biting animal remains alive and well for 10 days after biting a human being, the saliva cannot have been infective and treatment in such cases is not necessary.

The milk of animals suffering from rabies has seldom been shewn to contain the virus, which probably exists in the milk only in very high dilution, so that if no recent cuts or abrasions are present on the lips or mouth, this unboiled milk can be drunk with impunity. If further, the milk be boiled the virus, if present, is invariably killed, thereby eliminating even the remote chance of infection by this unlikely route.

For all practical purposes, *the saliva* is the only channel by which man or other animals contract rabies. As the dog is the animal most frequently affected by this disease, it stands to reason that if rabid dogs could be prevented from biting healthy animals, the disease would, in a short time, be completely eradicated.

That this is a matter of fact and not of imagination was conclusively proved by the General Muzzling Order of 1894, introduced by Walter Long. The importation of rabies into the British Isles, has since been prevented by a strict quarantine for 3 months of all dogs entering the country, and by a further police supervision of them for another 3 months.

INCUBATION PERIOD.

The incubation period of rabies—that is to say the interval of time that elapses between the bite of a rabid animal and the onset of the earliest symptoms in the bitten animal—is an extremely variable period. This is due to the fact that the disease does not make itself evident until the virus has reached the brain and spinal cord and has set up sufficient changes in these structures to cause symptoms. The variability of the incubation period is probably due to two factors:—

1. The variations in the dose of poison or virus inoculated.
2. The situation of the bite, or "the proximity of the bite to the brain."

We know that a large dose of poison kills an individual in a shorter time than does a small dose; and the case is similar with the rabies virus. Multiple, deep bites on bare skin are followed by a shorter incubation period than are superficial bites, or bites through clothing where a good deal of the virus is lost on the clothing.

M. Pasteur considered that the virus travelled along the nerves, and that the nearer the wound was to the brain, the shorter was the path to be traversed by the virus, and consequently the shorter the incubation period. Bites on the face are especially dangerous; they are, moreover, always bites on bare skin, they are frequently deep and, as the biting animal is in such cases usually a particularly ferocious one, the bites are usually multiple. We believe that these factors, *viz.*, depth of the bites, bareness of skin, and multiplicity of bites, are of greater importance in this connection than the actual situation of the bites.

The incubation period varies in the dog from about 16 days as a minimum to a maximum of 90 days. The majority of cases in the dog shew symptoms between the 25th and 55th day after the bite: very occasionally the incubation period is longer than 3 months.

For this reason a dog or other animal which has been bitten by a rabid animal should be segregated for at least 3 months, and kept under careful observation for another 3 months.

SYMPTOMS.

The report of this Institute for 1912, page 11, shews the order of frequency of biting animals. Of over 17,000 human beings treated at Kasauli between 1902 and 1912, the animals which bit them were as follows:—

Dogs	...	...	...	...	14,730
Jackals	...	...	...	...	2,491
Horses, Mules, etc.	...	...	...	...	140
Cats	...	...	...	...	78
Cows and Buffaloes	...	...	...	...	16

As the dog, jackal and horse are, therefore, the animals chiefly concerned in spreading rabies in India, we will enumerate the symptoms which these animals develop in this disease.

RABIES IN THE DOG.

In every text-book two types of the disease are described:—

1. Dumb or Paralytic Rabies.
2. Furious Rabies.

In the dog the symptoms are extremely variable. Sometimes the dog shews furious symptoms and later on dies in a paralysed state; at other times only paralysis is seen: more rarely the animal may only be restless and off its food and die within a few hours from convulsions. We have also noticed that the symptoms vary with the kind of dog under observation.

In pariah dogs and in young puppies furious symptoms are more common, and hence human beings are often bitten by these dogs. Well cared-for dogs, on the other hand, practically never bite human beings: in fact in the early stages of the disease they often exhibit an increased affection towards their masters. This fact is clearly brought out by the figures of our last year's report, for 1912. Out of the 3,103 Indians treated, only 14 were licked on cuts and abrasions: whilst out of the 400 Europeans treated 143 were licked on cuts or abrasions. There were also 360 further cases in which treatment was unnecessary: these latter were chiefly Europeans, who had saliva on their hands, but who had no cuts or abrasions.

The facts mentioned above ought to make it amply clear to the reader that all the signs and symptoms below enumerated are not to be expected in every rabid dog.

For descriptive purposes these symptoms may be classified under two main headings :

(1). The earliest symptoms observed are those of "Brain Irritation" and are as follows:—

Restlessness, as shewn by the animal straying away from home or aimlessly wandering up and down the room, and every now and then hiding away in dark corners. In well kept dogs this restlessness is often missed, as the dog continually keeps coming up to his master to be petted.

Hallucinations, e.g., snapping at imaginary objects, flies etc. In well cared for dogs the eating of filth may be looked upon as a very characteristic symptom.

Fury. This symptom, as previously mentioned, varies with the type of dog concerned. In well kept dogs fury is, as a rule, only vented on its own personal belongings, e.g., tearing up its bedding or the ground, or biting the chain or post to which it is attached. Such a dog almost invariably quiets down on the approach of its master. These dogs may attack other animals, but rarely viciously bite human beings. The most that they usually do is to just grip the hand of their master and inflict a trifling wound.

With pariah dogs the case is different, for they attack all and sundry who happen to cross their path.

Convulsions. The most typical sign of brain irritation is the occurrence of convulsions, affecting the whole body. As a rule these convulsions do not appear until paralysis has set in and is marked. In young animals convulsions appear early in the disease, and cause death within a few hours from their onset.

Besides the symptoms mentioned above, other early signs are—

1. Fever, accompanied by a rapid pulse.
2. Increased salivation, which may or may not be present.
3. Wrinkling of the forehead and eyebrows, giving rise to a hunted appearance in the dog's expression.
4. Redness of the conjunctiva.

(2). *Paralysis* generally follows the symptoms of brain irritation:—

The paralysis usually commences in the hind legs and is shewn by the waddling gait of the dog. This may be preceded or followed by paralysis of the throat and laryngeal muscles. The former is shewn by difficulty which the animal has in swallowing, in such cases the owner usually puts his fingers down the dog's throat to look for an imaginary bone. If this operation seems necessary we strongly recommend the employment of a stout pair of gloves to avoid the risk of infection.

The laryngeal paralysis may be shewn by the alteration in the timbre of the bark. The bark is noticeably altered in note and pitch. Instead of the normal, clear bark, which consists of a succession of sounds, equal in length and intensity, it is raucous, muffled and deeper in tone. The first bark commences with open mouth, followed immediately by 5 or more barks which come from the back of the throat, and during each bark the jaws are not properly closed, as they are in the healthy bark.

The paralysis extends to the jaw muscles, and the lower jaw finally droops. The animal gradually becomes entirely paralysed, so that it can neither sit, move nor feel. During this end stage of complete paralysis, convulsions come on and the end is thereby hastened.

Once definite symptoms appear life is rarely prolonged for more than 2 to 5 days.

At this Institute we rely upon the following chief symptoms as being indicative of rabies in the dog :—

1. The short duration of the disease, 2 to 5 days.
2. The infallible termination of the disease, in death.
3. In well cared for dogs increased affection, hallucinations, "bone in the throat," paralysis of the hind limbs.
4. In pariah dogs—the number of persons or animals bitten at the same time as the patient, and the attack being without provocation.

We have purposely avoided any mention of difficulty in taking food or water because in animals there is never any difficulty in eating or drinking until, at the last stage of the disease, paralysis of the throat muscles makes these acts impossible. The erroneous picture that has been imprinted upon the mind of the lay public,—of the mad dog running down the road sheering to one side on seeing a puddle of water,—is a purely mythical one. We wish to drive this point about the absence of dread of water in the dog well home to the reader. Times without number do patients at this Institute insist that their dogs could not possibly have been suffering from rabies because they never exhibited any fear of water. This popular error has arisen from the use of the term "hydrophobia," the alternative name for the disease as it is met with among human beings, in whom the sign is invariably present.

RABIES IN OTHER ANIMALS.

Jackals. The signs and symptoms of rabies in this animal are greatly simplified. It may be taken as axiomatic that if a jackal attacks a human being without provocation it is certainly rabid.

Horses etc. In these animals the most characteristic signs are :—

1. Fury, as shown by their madly rushing about and smashing up everything with which they come into contact, thereby frequently causing injuries to themselves.
2. Biting their own chest, body etc.
3. Sometimes biting other animals or human beings.
4. Commencing paralysis, as shewn by staggering.

THE DIFFERENTIAL DIAGNOSIS OF RABIES.

As has been previously pointed out, the symptoms of rabies in the dog are extremely variable, and we have already drawn attention to certain of them which we regard as characteristic of the disease. The following diseases of dogs and allied animals may, however, simulate rabies :—

(1) *Distemper.*—The term "distemper" does not imply a single disease, but is applied generally to any acute bacterial disease that affects young dogs. The following clinical types of distemper are recognised :—

1. An acute catarrhal disease affecting the mucous surfaces, the nose, eyes and throat. It is commonly met with in young animals, although adult dogs who have never previously suffered from it may be infected. It occurs in epidemics, and is met with during the months of October to April. The symptoms commence with high fever, running from the eyes and nose, the discharge being at first watery and later purulent. The infection may extend up through the nose to the brain, giving rise to a meningitis; or down the trachea causing a broncho-pneumonia. The causative agent is a diplococcus, (MacCowan). The disease is very often fatal.

2. Intestinal form. This commences with fever and diarrhoea: the motions are black in colour, and sometimes tinged with blood or mucus.
3. Meningeal form. Is generally a late stage of the acute catarrhal form. The hind limbs become paralysed, and the paralysis finally extends to all parts of the body. The diagnosis is made by the presence of a purulent discharge from the nose and eyes.

(2) *Pseudo-rabies of Zwick and Zeller.* This disease is seen in epidemic form and is transmitted from animal to animal by means of bites. The incubation period is from 2 to 5 days; in rabies the incubation period is never less than 14 days.

The symptoms commence with twitchings of the muscles in the neighbourhood of the bite. These gradually become more and more violent and finally come to affect all the muscles of the body. In this stage there is increased salivation, and fury is often exhibited. The animal frequently dies in one of these convulsive seizures.

(3) *Pyocyaneus Disease.* Often affects young animals, and the symptoms closely simulate rabies. The only means of differential diagnosis is by blood culture and recovery of the *Pyocyaneus bacillus*.

(4) *Snake Poisoning.*

(a). With Colubrine snakes, e.g., cobra, krait etc. Within a couple of hours after the bite the animal begins to appear drowsy: the upper eyelids droop, the lower jaw hangs down, and finally complete paralysis occurs. Death takes place within 2 to 6 hours by paralysis of the respiratory muscles. The heart often goes on beating for some minutes after respiration has ceased. There are practically no local signs or symptoms seen at the site of the bite; but the bitten limb is the first to shew evidence of paralysis, often within 3 minutes after the bite.

(b) With Viperine snakes, e.g., Russell's Viper, Echis, etc. If the venom has been injected into a vein, death takes place from generalised convulsions within 5 to 10 minutes of the bite. But if the venom has only been inoculated just under the skin the local symptoms are prominent and characteristic of the action of the venoms of this family of snakes. There is great pain, tenderness and swelling of the limb, occurring within a few minutes of the bite. After a short time a continuous oozing of blood occurs from the punctures caused by the fangs. If the dose of venom inoculated has been a large one death occurs from intra-vascular coagulation, or by heart failure. If the dose inoculated be small, death may be delayed for 1 to 3 days, and is caused by the numerous hæmorrhages which occur from all mucous surfaces. In all cases of viperine bites the inoculation site becomes gangrenous.

5. *Tetanus.* This disease is characterised by generalised spasms all over the body and by rigidity of the jaw muscles. This latter sign differentiates it from rabies.

METHOD OF REMOVING THE BRAIN OF A SUSPECTED RABID ANIMAL FOR LABORATORY EXAMINATION.

The diagnosis of rabies in animals is made in the laboratory by a microscopical examination of the brain: and before this can be carried out the brain must be sent up properly preserved, packed, etc. Unless these instructions are carefully carried out results often cannot be given. Many of these brains for examination arrive at this Institute in such a state of emulsification or putrefaction that it is impossible to say what is the tissue sent, apart from attempting to make a diagnosis as to what the animal was suffering from.

1. The first procedure is to open the skull and expose the brain. Wash the head of the dog with an antiseptic, such as Carbolic Acid, Phenyle, etc. Then take a hammer, and with a few sharp blows fracture into many pieces, through the intact skin, the top and sides of the brain cavity. With a knife reflect the skin and remove very carefully the pieces of fractured bone, in this way exposing the brain.

Incise the membranes covering the brain and divide the brain equally down the centre into two longitudinal halves.

If the skull vault is well broken each half of the brain can now be lifted out with the aid of a knife and forceps.

In removing the brain of a rabid animal the greatest care must be exercised, as the brain substance and saliva are infective, and, therefore, should never be allowed to come into contact with the hands. It is best to wear an old pair of riding gloves when carrying out this operation.

2. Preservation of the brain.

For the microscopical method a special portion of the brain is required, viz., the Hippocampus major. To those who are unacquainted with the anatomy of the brain, it is best to divide the brain into two longitudinal halves, as directed above. If the brain is a large one, e. g., horse, cow, great Dane, etc., and therefore difficult to preserve, only send one half, as there is a Hippocampus major on each side.

The brain is lifted out between the forceps and knife and placed in a large, wide mouthed bottle, with a capacity of at least two pints. A layer of cotton wool should previously be placed at the bottom of the bottle.

The bottle is now filled up to the BRIM with one of the following solutions:—

(a). Zenker's fluid.

Potass. Bichromate	...	...	5 drachms.
Mercury Perchloride	...	...	7 drachms.
Glacial Acetic Acid	...	..	7 drachms.
(or Ordinary Acetic Acid	...	...	21 drachms.)
Water to make up to	...	...	20 fluid ounces.

(b). Formalin, 10% formaldehyde, or 1 part of commercial formalin to 3 parts of water. Add a salt-spoonful of common salt to each pint of fluid.

(c). Rectified Spirit or Methylated Spirit.

The best results are obtained with the first fluid, and very inferior results with Methylated Spirit. Large quantities of preservative fluid are always required in order to ensure full fixation of the brain: at least ten times as much fluid as brain volume is necessary.

3. Packing.

A layer of cotton wool is placed at the bottom of the bottle which is then filled up to the BRIM with the preservative fluid. The cotton wool prevents jarring during the journey, so that the brain is not shaken up and emulsified. In no case should the brain be wrapped round with cotton wool, lint or other wrapping, as this prevents penetration of the fixing fluid into the brain.

The lid of the jar is now sealed and the jar is carefully packed in a box with sawdust, etc.

A descriptive account of the illness of the animal should always accompany the brain, and also the full address of the person to whom the result of the examination is to be sent. Brains are not infrequently received at Kasauli unaccompanied by any indication of the sender's name and address.

We should be grateful if medical and veterinary officers would also send a small fragment of the brain in 50% glycerine, in cases of animals which they regard as *undoubtedly* suffering from rabies. This "Glycerine brain test" has now been discontinued at this Institute, but from time to time we require "street virus" for our work.

The reasons for the discontinuing of the glycerine in vivo test are as follows:—

1. The incubation period in the inoculated animal is very variable—from 10 to 60 days. It, therefore, fails to yield the immediate information which is required in order to decide whether treatment is or is not necessary.
2. The virus may die in transit from the plains, especially during the hot weather.
3. If the brain is not perfectly sterile the inoculated animal may die of septic infection, thus vitiating the test.

VALUE OF THE MICROSCOPICAL EXAMINATION OF THE BRAIN.

The "Negri body test" is only of value if positive. The Negri body is not the parasite of rabies: and its occurrence in the ganglion cells of the brain is met with in other diseases also, as it is a structure produced by the degeneration of the nuclei of nerve cells. Nevertheless, if Negri bodies are present and fairly numerous, a diagnosis of rabies can be made with certainty, as in no other condition are Negri bodies to be found on microscopical examination in such large and definite numbers.

If, therefore, a report is received to the effect that no Negri bodies were found, this finding does not necessarily exclude rabies. For in some cases the rabid animal dies before Negri bodies have had time to form: whilst in the case of brains not properly preserved and hardened the brain structures may be so disorganised that Negri bodies, even though present, may be very difficult to find.

Hence if a report is received that the brain was received at Kasauli in a condition unfit for examination, or if a report is received that no Negri bodies could be found, it must remain with the medical or veterinary officer or with the person bitten to decide whether the animal was or was not suffering from rabies. In so doing the above detailed account of the symptoms to be looked for will perhaps be found of use.

No reliance is to be placed upon the examination of the brain unless it results in a positive finding of rabies. We would impress upon medical and veterinary officers that the symptoms shewn by the animal, and the keeping of it tied up for 10 days will afford much clearer evidence regarding the diagnosis of rabies than any laboratory test.

MEASURES TO BE ADOPTED FOR ANIMALS BITTEN BY A RABID ANIMAL.

When the biting animal develops any symptoms of rabies and dies or is killed, all animals which it has bitten must be treated on the assumption that they are liable to develop rabies within *three months*, and even possibly within *six months*. If the bitten animals are not valuable, or if there are children in the house, it is better not to run any risks, and to destroy at once all animals bitten. As, however, *every* animal bitten by a rabid animal does not develop rabies, the owner of a valuable animal may decide to run the risk of keeping it alive on the chance of its escape. If he does so, especially in the case of dogs, he is morally—if not legally—responsible for any damage done by that animal, should it develop rabies at a subsequent date.

If the owner decides to keep the dog it should be securely chained up; and, when taken out for exercise, should be muzzled and taken on a lead. The attendant should be warned about the possibility of the dog developing rabies. If it appears to be ill the greatest care must be exercised in going near the dog, giving it medicines, etc. Any handling of the dog's mouth should be performed with thick gloves on: for this purpose a cheap pair of wicket-keeping gloves is in use at Kasauli.

The Quarantine period should last at least 3 months from the date of bite, and should be followed by strict supervision for another 3 months.

During the latter 3 months the dog need not be tied up, as it has probably escaped rabies. If, however, at any time it appears to be in any way out of condition, it should be again tied up and watched for a few days: and the same precautions taken as before in handling it, etc.

MEASURES TO BE ADOPTED FOR PERSONS BITTEN BY RABID OR SUSPECTED ANIMALS.

(a) Treatment of the wound.

As soon as possible after the bite, the wound should be well washed, dried and then thoroughly cauterised. The best agent to employ is pure carbolic acid because it penetrates well, quickly destroys the virus, and, being a local anaesthetic, only causes a temporary smarting of the wound. If pure carbolic acid cannot be obtained, permanganate of potash—crystals or a saturated solution,—pure nitric acid, silver nitrate, etc., will do; but they are not as efficient as pure carbolic acid.

It is necessary here to describe what is meant by thorough cauterization. Some persons have an idea that to efficiently cauterise a couple of penetrating tooth wounds, it is necessary to destroy about 5 or 6 square inches of skin, and quite overlook the necessity of seeing that the caustic reaches to the bottom of the wound. To thoroughly cauterise a bite each separate tooth mark must be dealt with in turn, and care taken that the caustic actually comes into contact with the sides, and penetrates to the bottom of the wound. Sometimes it is necessary to open the wound to allow the caustic to reach every nook and cranny in which the virus may have lodged. Where there are definite teeth marks a probe should always be used. Care should, however, be taken that the skin is not too extensively destroyed, as this delays healing. All that is necessary is to see that the caustic has destroyed the tissues which may have actually come into contact with the virus on the infected tooth.

We believe that if bitten persons were seen early enough, *i.e.*, within an hour of the bite, and if the situation of the bite, *e.g.*, calf or forearm, rendered total excision of the infected area possible, the best treatment that could be adopted would be to excise the whole wound, thereby getting rid of all lodged virus. Neither cauterization nor excision, however, can be absolutely depended on to remove all chances of infection; yet, at the same time, when properly carried out, the bulk of the virus is destroyed, thereby diminishing the dose of poison inoculated and giving the Pasteurian treatment a better chance of destroying the remainder of the virus left in the wounds.

(b) Pasteurian treatment for the prevention of hydrophobia.

The wound having been efficiently cauterised, the next point for decision is —“Should the person bitten be sent up to a Pasteur Institute or not”? Usually a medical officer is present to decide the question, but sometimes no medical man may be available for consultation, and the bitten person may have to decide for himself. For this reason we give a few hints which may be of use in helping such a person to arrive at a decision.

The first consideration is the state of the dog's health. We may classify cases under the following headings :—

(a) Dog is dead, and has been certified as being rabid by a medical or veterinary officer, or is suspected of rabies.

(b) Dog is unknown.

(c) Dog is still alive and can be put under observation.

(a) *Dog is Dead*, and is certainly rabid. Under these circumstances:—

All persons bitten, and all persons licked on definite cuts or abrasions must proceed at once for treatment to a Pasteur Institute. Contact of saliva on granulating wounds is devoid of any danger.

Dog is suspected of rabies. A popular idea appears to be prevalent that the brain should be sent to a laboratory and if the result be positive, that the patient should then proceed for treatment. At Kasauli we place little reliance upon the microscopical test, for reasons detailed on page 8.

Therefore, when the dog is dead, and the symptoms are at all suspicious of rabies, it is better to be on the safe side and to undergo treatment.

(b) *Dog is unknown*. These cases frequently occur amongst policemen, etc. They are patrolling up and down a bazaar, and a dog suddenly rushes out and bites them in the dark, and nothing more is seen or heard of the dog. Under these circumstances, *i.e.*, an unprovoked attack, it is better to assume that the dog was rabid, and to send the patient up for treatment at once.

(c) *Dog is still alive*. Under no circumstances should the dog be destroyed for, by so doing, one of the most important signs of rabies, *viz.*, the short duration of life, 2 to 3 days, is lost.

If the animal, however, shows no symptoms and remains alive and well for 10 days the saliva cannot have been infective, and therefore, the bitten person need have no further fear, even should the dog develop rabies at a later date. On the other hand if the dog whilst under observation during these 10 days, appears ill and if the person is bitten on the face or has been badly bitten elsewhere, *i.e.*, many deep bites on bare skin, it is better for him to proceed at once to a Pasteur Institute, in order to avoid any delay in commencing treatment.

If the animal should die within these 10 days it may be surmised that it is rabid and treatment therefore becomes necessary.

In the case of Europeans who are licked but not bitten by animals suspected of rabies it is most essential that the patient should, on the day when licked or as soon after as possible, carefully examine the skin to see if any recent cuts or abrasions are present with which the saliva could have come in contact. It is impossible for the Directors of this Institute to inform such patients some 4 or 5 days later, whether they had or had not small abrasions present at the time of being licked. The responsibility for deciding, (1) whether the saliva did or did not come into contact with the skin, and (2) whether any recent cuts or abrasions were or were not present at the time must rest with the patient himself.

Persons bitten or licked by rabid animals more than two months previously are, as a rule, not treated at Kasauli. Most cases have either developed hydrophobia or have, in all likelihood, escaped infection on the expiry of two months from the date of the bite or lick. Therefore treatment is not advised in such cases.

In any case of difficulty or doubt a detailed telegram should be sent to the Institute stating symptoms, the circumstances of the infection, etc., when an opinion

can often be given. In cases where treatment is not necessary this may save patients from the expenses and trouble of a long journey. The code words for telegrams are *Pasteur* for the Pasteur Institute of India at Kasauli; and *Lyssa* for the Pasteur Institute of South India at Conoor.

ANTI-RABIC TREATMENT AS ADOPTED AT KASAULI.

The course of treatment lasts 14 days and consists of daily hypodermic inoculation of 1 cubic centimetre of a carbolised emulsion of the rabies virus on each side of the abdomen.

During the treatment patients are not in any way inconvenienced, and not the slightest danger to health need be apprehended. The inoculations are unaccompanied by fever. A local reaction sometimes occurs about the 8th or 10th day of treatment, but it never exceeds anything more than slight local redness and swelling which can be relieved easily by the local application of a hot water bottle or of hot fomentations.

Patients are required to conform to the following rules during the course of treatment:—

1. Inoculations are at 10-30 a.m. daily.
2. Patients should avoid the use of alcohol as it may interfere with the treatment, and is always liable to increase the severity of the local symptoms. There is no restriction placed on diet.
3. Patients should avoid excessive exercise, such as tennis, dancing, etc.
4. Patients should keep warmly clad in order to avoid chills. Those who are subject to attacks of malarial fever should take a small dose of quinine daily.

The same precautions should also be observed for 10 days after the completion of the treatment.

No animals are treated at the Pasteur Institute of India, Kasauli.

Visitors,—with the exception of qualified medical persons,—are not shewn round the Institute at Kasauli. In the case of medical persons, wishing to see the Institute, the most convenient hour is at 9-45 a. m. on Saturdays.

Information likely to be useful to persons sending patients for treatment and to patients arriving at the Pasteur Institute, Kasauli.

1. Kasauli is situated in the Lower Himalayas at about 6,300 feet above sea level. The climate is moderately warm in summer, and cold in winter. Snow occasionally falls during the winter months. Patients should, therefore, bring with them warm clothing and bedding.

2. The most convenient Railway Station for Kasauli is Kalka on the East Indian Railway, 9 miles distant from the Pasteur Institute. The road from Kalka is entirely uphill. Ponies, dandies, doolies and rickshaws are available for the carriage of passengers and baggage.

The prices of these are as follows:—

	Toll			Total.		
	Rs.	a.	p.	Rs.	a.	p.
Coolie ...	0	5	6	0	0	3
Pony, 1st class ...	2	8	0	0	1	9
Pony, 2nd class ...	1	8	0	0	1	9
Dandy, including 8 coolies ...	3	12	0	1	0	0
Jhampan, including 8 coolies ...	3	12	0	1	0	0
Dooly, including 4 coolies ...	1	14	0	0	8	0
Rickshaw, including 8 coolies ...	4	4	0	1	0	0
Baggage Mule ...	0	14	0	0	1	0

3. Kasauli can also be reached by continuing the journey from Kalka by the the Kalka-Simla Railway to either Kasauli Road Station, 6 miles from the Institute; or to Dharampore Station, 7 miles from the Institute. Privately owned single horsed tongas can be obtained from Kasauli Road Station; whilst Mail Tongas ply to Kasauli from Dharampore Station. The prices for these are as follows:—

	Rs. a.	Rs. a. p.
3 seated Tonga from Kasauli Road Station	2 8	to 3 0 0 <i>*rates vary.</i>
Seat in a mail tonga from Dharampore ...	2 8	
Full 3 seated tonga from ...	5 0	
One horsed tongas, privately owned, can also usually be obtained from Dharampore Station for about ...	4 0	

4. The Kasauli Club is a residential one, but from May to August it is very difficult to obtain Club quarters. From November 1st to March 31st the Club is open to married people without children, and to ladies, at an inclusive charge of Rs 7 a head *per diem*.

The Grand Hotel is open from May to October inclusive.

There are also three boarding houses, which are usually open all the year round:—also a Dak Bungalow.

5. A house, "Drumbar," with five quarters is attached to and under the superintendence of the Institute. This is intended strictly for poor Europeans and Anglo-Indians only who are unable to afford hotel rates. It remains open all the winter. The charges are Rs. 2-8-0 per day per person, everything included.

As the majority of the Indian patients are indigent, Lines have been provided for them where they may live during treatment. They are also supplied with warm clothing and blankets when necessary. No charge is made for these. British soldiers receive quarters at the Station Hospital, and their families at the Station Family Hospital.

Middle Class Quarters with accommodation for 6 families are also available for better caste Indians; for these a nominal charge of 4 annas a day is made. Two of these quarters, the Sashi Mukhi Ghose Hostel, are reserved for Bengalis.

A house, "Hardwick," is reserved for Indian noblemen undergoing treatment. No patients are accommodated at the Institute itself.

6. The treatment is free of all charge.

7. A small library of books is available in the Institute for the use of patients. As this is now very much out of date, and needs replenishing, any parcels of books, etc., will be gladly received.

8. There is a resident Civil Surgeon in Kasauli who will, if called in, attend any cases of intercurrent illness in patients undergoing treatment. For Indians there is a Civil Dispensary and also a Cantonment Hospital.

9. In the case of an Indian patient an accompanying letter should always be sent by the despatching officer, and should contain the following information:—

- (a) All details regarding the manner in which bitten.
- (b) The fate of the attacking animal.
- (c) The total number of persons or animals bitten by the same animal.
- (d) Amount of money given to the patient.

10. Patients who are sent by or at the expense of private employers, friends and other private persons or associations should also be provided by them with the cost of their return journey and also with sufficient money to pay for their food during the treatment, which lasts two weeks. If desired, money for these purposes may be sent to the Director of the Institute and this course is strongly recommended in the case of menial servants and illiterate or other irresponsible people.

The following is a copy of extracts from Government of India, Education Department—Sanitary—letter No. 1688-1698 of date the 3rd September, 1912. *Special attention is directed to para. 9, sub-section 2.* It must be understood that no patient at Kasauli can draw the allowances sanctioned until the intimation required is furnished. Indigent patients are constantly and daily arriving at Kasauli unaccompanied by the necessary intimation mentioned, and are consequently unable to draw these allowances on arrival.

“Para 7. The railways, parties to the Indian Railway Conference Association,

Assam-Bengal Railway.
 Baraset-Basirhat.
 Barsi Light Railway.
 Bengal-Dooars Railway.
 Bengal-Nagpur Railway.
 Bhavnagar Railway.
 Gondal-Porbandar Railway } Formerly known as
 Junagad Railway } Bhavnagar-Gondal-
 Jamnagar Railway } Junagad-Porbandar
 Bombay, Baroda and Central India Railway.
 Bukhtiarpur-Bihar Railway.
 Burma Railways.
 Dholpur-Bari Railway.
 Eastern Bengal State Railway.
 East Indian Railway.
 Great Indian Peninsula Railway.
 His Highness the Nizam's Guaranteed Railway.
 Howrah-Amtah Railway.
 Howrah-Sheakhala Railway.
 Jodhpur-Bikaner Railway.
 Madras and Southern Mahratta Railway.
 North-Western State Railway.
 Oudh and Rohilkhand State Railway.
 Shahdra-Saharanpur Light Railway.
 South Indian Railway.
 Udaipur-Chitorgarh Railway.
 Morvi Railway, (3rd class tickets issued at $\frac{1}{2}$ fares).

tion, which are noted on the margin, allow concessions to *indigent* patients and their attendants proceeding to the Pasteur Institute at Kasauli for antirabic treatment under the conditions noted below:—

(a) an indigent person not in the Public Service (together with one attendant when such indigent person is a woman or is a child under 16 years of age, or is a man who, by reason of age or other sufficient cause, is incapable of travelling alone) will be granted third class tickets free of charge:

(b) tickets for the return journey will be issued on production of a certificate signed by the authorities of the Pasteur Institute:

(c) only one attendant as above will be allowed with each patient or each party of patients of the same family:

(d) the requisition for tickets must have the impression of the official seal of the office from which issued: it must be signed by one of the authorities, namely, Commissioned Medical Officers, Civil Surgeons, Military Assistant Surgeons, Civil Apothecaries in independent charge of hospitals, and, when there is no medical officer present at the station, by Collectors or Commissioners, Divisional Officers, Tahsildars or Taluqdars, Deputy Tahsildars in independent charge, officers of the Police Department of and above the rank of Deputy Superintendent, Sub-Registrars and Sub-Assistants of Survey. In the absence of a gazetted officer, the highest civil authority in the place is empowered to issue the requisition.

Para 8. The Government of India have granted both to Government servants and to such indigent persons as are unconnected with the public service and are not assisted by private employers, etc., certain concessions to enable them

when bitten by a rabid animal, to proceed without delay to the Pasteur Institute at Kasauli for treatment. These concessions are as follows :—

- (1) any Government servant, who has difficulty in finding at once the means to enable him to proceed to the Institute and whose substantive pay exceeds Rs. 100, but does not exceed Rs. 500 a month, may be granted an advance sufficient to defray his actual travelling expenses to Kasauli and back, not exceeding the amount admissible under the rules as laid down in the Civil Account Code, Volume I, paragraph 137 (b) and Army Regulations, India, Volume X, paragraph 79 (x). He may also be given an advance of one month's pay and be granted one month's casual leave or when the appointment of a substitute is found necessary one month's extra privilege leave, any leave required in excess being treated as privilege or sick leave. The sum thus advanced will be recovered in not less than three, but not more than twelve monthly instalments.
- (2) any Government servant, who has been bitten by a rabid animal and who is too poor to proceed to Kasauli at his own expense, may, provided that he is drawing not more than a substantive pay of Rs. 100 a month, be granted :—
 - (a) his actual travelling expenses to Kasauli and back not exceeding the amount admissible under the rules as laid down in the Civil Account Code, Volume I, paragraph 137 (b) and Army Regulations, India, Volume X, paragraph 79 (x). [Government servants of the 3rd and 4th classes (as defined in Article 1002 of the Civil Service Regulations) may, however, be granted their full actual expenses for journeys by road at the discretion of local Governments].
 - (b) an advance of one month's pay ; and
 - (c) one month's casual leave or when the appointment of a substitute is found necessary one month's extra privilege leave.
- (3) Government servants drawing not more than Rs. 25 per mensem are entitled to maintenance allowance during treatment, as well as during the journey to, and from, the Pasteur Institute, at the rates of daily allowance admissible to officers of the third and fourth classes, as the case may be, under Article 1063 of the Civil Service Regulations.
- (4) Any Government servant drawing a substantive pay of not more than Rs. 500 a month may, if a member of his family is bitten by a rabid animal, and he has difficulty in finding at once the means of sending him or her to the Pasteur Institute, be granted an advance not exceeding the actual travelling expenses [as defined in clauses (1) and (2) (a) above] of the person bitten to Kasauli and back plus one month's pay. The advance will be recoverable in the same manner as those referred to in clause (1) above.
- (5) Any indigent person unconnected with the public service, who, in the opinion of any officer authorised to grant the concession is unable to proceed to the Pasteur Institute at his own expense, may be granted :—
 - (a) 3rd class fare by rail if not receiving a railway concession and actual expenses of journey by road, river or ocean steamer, as the case may be to Kasauli and back ;

- (b) maintenance allowance at the following daily rates:—Europeans and Anglo-Indians, Re. 1 during the journey and Rs. 2-8 during treatment; Indians, 4 annas a day during the journey and 6 annas a day during treatment.
- (6) Indigent persons including women, children under 16 years of age and men, who are, by reason of age or other sufficient cause, incapable of travelling alone, may be allowed one attendant to accompany them to the Institute. Such attendant may be granted the travelling expenses and maintenance allowance at the rate sanctioned for patients and also wages, not exceeding 4 annas a day, in cases where the despatching officer is satisfied that the patient is unable to pay the daily expenses of the attendant. [This concession is also admissible to Government servants (but not their families) drawing not more than Rs. 100 a month.]

Para 9. The following is a short summary of the rules and regulations which have been laid down by the Government of India for the administration of these concessions:—

- (1) Any Government servant, not below such rank as may be fixed by the Local Government, is empowered to grant the above-mentioned concessions and to authorise the immediate departure for Kasauli of any of the classes specified, whether Government servants or indigent persons unconnected with the public service.
- (2) An intimation is to be sent *immediately* by the despatching officer direct to the Director of the Pasteur Institute stating:—
 - (a) Whether the person relieved is (1) a Government servant, (2) a local fund or municipal servant, or (3) an indigent person; and in the case of (2) and (3), whether the cost is to be borne by General, Provincial or Imperial revenues or any local or municipal fund; and from what source the charge for the forward journey was met;
 - (b) The class to which the person, if a Government servant or local fund or municipal servant, has been treated as belonging for the purpose of travelling allowance;
 - (c) The amount of travelling allowance (by rail, road, and river or ocean steamer) advanced;
 - (d) The number of days for which and the rate at which maintenance allowance has been advanced.

N. B.—This intimation should be sent with the patient or as soon after as possible, because all claims submitted for maintenance allowance or return journey expenses subsequent to the departure of the patient are rejected by the Treasury Officer, Kasauli, as inadmissible.

(3) Allowance for certified indigents, and when admissible for their attendants also, will be drawn as follows:—

- (a) Maintenance charges for the days spent at Kasauli will be advanced by the Director of the Institute and recovered by him from the local Treasury Officer. *No refund will be made by the Treasury Officer for any advance made unless vouched for by a Certificate stating indigence and the fund from which the expenditure is to be met.*
- (b) Travelling allowances and maintenance charges for the return journey will be paid by the Treasury Officer at Kasauli at the same rates as were allowed for the journey to the Institute. This bill will be supported by the original intimation received from the officer who is responsible for the original advance. A discharge certificate from the Director should also be attached to this travelling allowance bill.

- (4) The Director may also make advances to indigent persons who come to Kasauli at their own expense, but are unable to maintain themselves there or to pay for their return journey. The possibility of recovering these advances should then be investigated in the following manner. The Director should correspond direct with the officers in charge of the districts to which the patients, to whom advances have been made, say they belong, and should ask them to take over for investigation claims in respect of the advances made. District officers should take over these claims as soon as they are satisfied that the persons who received the advances actually belong to their districts and should inform the Director that they have done so. The Director should then recover the amounts advanced, from the treasury, producing the district officers' "acceptances" as vouchers, and the claims should then be passed on to the provinces concerned—to be adjusted as the amounts advanced are recovered or written off under the local rules. Any sum which is found to be irrecoverable after being passed on to a district officer will be debited to the province concerned as a provincial charge under the head 32-Miscellaneous—Miscellaneous charges for the treatment of patients at the Pasteur Institute, Kasauli. Otherwise, *i. e.*, if no district officer takes over the claim, the Director will send to the Treasury Officer a certificate to this effect, on which the advance will then be finally adjusted in the books of the Accountant-General, Punjab, under the head specified above.
- (5) With regard to indigent patients who are sent for treatment, from the Pasteur Institute to the Civil Hospital, Kasauli, the Director will, in the first instance, defray the expenses connected with their diet and hospital charges and, in the case of death, of their burial or cremation, as the case may be, and recover the cost in the same way as in the cases referred to in (3) (a) and (4) above.

