MINERAL WATERS.

The most remarkable mineral water in the world, is that of the most wonderful fountain, the Great Geyser. The deposition of siliceous earth was a fact at which chemists were greatly surprised, and which announced a property of water unexpected and important. The celebrated Dr Black, in his elegant and accurate analyses of the Geyser water, and that of a spring at Reikum, has pointed out the cause of these waters containing silica in solution; and has given it as his opinion, that the uncombined alkali contained in them, assisted by the great heat to which the water is subject in its subterraneous caverns, is the agent which enables the water to dissolve that refractory earth. It is to be regretted that Dr Black did not analyse the matter which is deposited by these waters. The appearance of the ancient depositions is various, and presents some singular forms; and it will not be an uninteresting inquiry, to ascertain whether, at former periods, the water has held different substances in solution.

The contents of the water of the Geyser, as ascertained by Dr Black, are as follow:

In gr. 10,000 of Geyser water—

Soda - - - - - - -	0.95 gr.
Alumina - - - - - -	0.48
Silica - - - - - - -	5.40
Muriate of soda - - -	2.46
Dry sulphate of soda -	1.46
Total - - -	10.75

In gr. 10,000 of Reikum water—

Soda	0.51
Alumina	0.05
Silica	3.73
Muriate of soda	2.90
Dry sulphate of soda	1.28
Total	8.47

Dr Black has also given the proportions contained in an English gallon of the waters:

Geyser.

Soda	5.56 gr.
Alumina	2.80
Silica	31.38
Muriate of soda	14.42
Dry sulphate of soda	8.57

Reikum.

Soda	3. gr.
Alumina	0.29
Silica	21.83
Muriate of soda	16.96
Dry sulphate of soda	7.53

There are some hot springs at Reikum which deposit carbonate of lime in considerable quantities. The muddy springs near the Geyser have not yet been examined; nor the waters which escape from the sulphur mountains.

The first cold mineral water which we procured was from Stadarhraun. The minister of the place informed us, that he had discovered the spring not very long ago; and that, on drinking some of it, he felt considerable uneasiness in his bowels. When fresh from the spring, from which it issues in a small quantity, the water tastes acid and astringent, and

is not perfectly transparent. It rises at the distance of a few yards from the bank of a small river, seemingly from amongst lava, of which the valley is full. This water was put into the hands of Dr Thomas Thomson, who favoured us with the following remarks.

1. This water is transparent and colourless; its taste is acid, and rather unpleasant. Its specific gravity, at the temperature of 60°, is 1.0025. This, according to Mr Kirwan's formula, gives us 3.5 as the quantity of saline matter in 100 parts of the water.

2. Ten cubic inches of this water, which are equivalent to 2533.52 grains, were found to contain $2\frac{1}{2}$ cubic inches of carbonic acid gas, or $\frac{1}{4}$th of their bulk. No other gas could be detected in the liquid.

3. From 10 cubic inches of the water, $3\frac{1}{2}$ grains of carbonate of lime were obtained, partly by boiling, partly by evaporation.

4. The only other constituent detected in the water was muriate of soda. The quantity was not determined; but it was not much greater than what is found united to water in most cases.

5. This water, then, owed its peculiarities entirely to the portion of carbonate of lime (held in solution by the carbonic acid gas) which it contained.

The water of the spring called Ölkilda, or the ale-well, was contained in a hollow near the banks of a small stream, about two miles from Roudemelr. The temperature was 45°. The water was in constant and violent agitation, owing to the escape of a great quantity of carbonic acid gas, with which it was very highly impregnated. Unluckily, the water which we succeeded in bringing home, froze and burst the bottle in which it was contained, so that its other gaseous

contents could not be ascertained. When thawed, the water had nothing peculiar in taste or smell. According to Dr Thomson, its specific gravity, at 60°, was 1.0001, which indicates a water of great purity. Accordingly, nothing could be detected by re-agents, except traces of muriate of soda.

The spring at Lysiehouls was of the temperature 96°, and was considerably agitated by the escape of a gaseous fluid; probably carbonic acid gas. The following is Dr Thomson's account of it.

1. This water was transparent and colourless. Its smell was peculiar, and probably proceeded from a minute portion of sulphurated hydrogen gas which it contained, as was indicated by the brown colour of the precipitate when nitrate of silver was dropped into it. Its taste was acid and disagreeable. Its specific gravity, at 60°, was 1.0020.

2. The constituents detected in 10 cubic inches of this water were as follows:

3.7 cubic inches of carbonic acid gas, probably mixed with a minute portion of sulphurated hydrogen gas;
0.9 grain of carbonate of lime;
1.7 grain of crystallised subcarbonate of soda;
1 grain of muriate of soda; and
Traces of a sulphate, probably sulphate of lime

The next mineral water we found not far from Buderstad. It was in a hole, in a flat piece of ground, close to a swamp. There was a little agitation, from the escape of a small quantity of gas, and the water appeared slightly turbid. Its taste was acid and disagreeable, and very like the former. Dr Thomson found,

1. Its specific gravity, at 60°, to be 1.00217.

2. Ten cubic inches were found to contain the following constituents:

3.8 cubic inches of carbonic acid gas mixed, probably with some sulphurated hydrogen gas. For nitrate of silver was thrown down, of a dark brown colour, by the water; and this took place even after the liquid had been boiled for an hour in an open flask;

4 grains of crystallised subcarbonate of soda;

0.8 of carbonate of lime;

0.33 of a white powder, which does not fuse with soda, but dissolves without effervescence in hot sulphuric acid. It is therefore alumina.

A minute portion of muriate of soda.

Thus the examination of the mineral waters of Iceland has shewn the possibility of two of the earths, not before suspected to be soluble in water, being held in solution by means of a small portion of soda. Dr Black does not seem to have attributed any influence to the neutral salts; though it is not unlikely that the presence of alumina may be owing to the action of the sulphate of soda. Sulphate of alumina will probably be found to constitute a principal ingredient in the water of the muddy springs. The source from which the water derives the substances it holds in solution, must be involved in mystery, till some convulsion of nature shall lay open its hidden laboratories. Dr Black has supposed that the muriate and sulphate of soda, conveyed by sea water, has been applied, under the influence of violent heat, to the strata which contain siliceous and argillaceous earth. The analyses by Dr Kennedy have shewn, that silica, alumina, soda, and muriatic acid, exist in lava and in greenstone; so that the conveyance of the saline matter, by means of sea water, need not be had recourse to, when we can suppose a more probable source of supply. The springs that are turbid, seem really

to have acted on rocks liable to decomposition; and pyrites being found in considerable quantity among the clay which they throw out, is sufficient evidence of the fact. But the remarkable transparency of the water of the Geyser, while it is subject to the most violent agitation, renders the supposition of decomposed rocks being the source of the ingredients found in the water improbable. The iron, and other matter which might have destroyed the transparency of the water, no doubt, may be left by the water in its progress to the place from whence it is thrown out. Some may be disposed to think, that both the heat and the solution, are caused by water meeting with the metals of the earths, and that of the alkali; but, notwithstanding such conjectures being interesting and reasonable, they do not carry us beyond bare possibility, and leave the inquiring mind still dissatisfied.

APPENDIX.

APPENDIX.

No. I.

ON THE DISEASES OF THE ICELANDERS.

The poverty of the Icelanders, and the dispersion of their small community over so vast an extent of country, render it almost impossible that medical practitioners should obtain an independent subsistence in the island. To obviate, as far as possible, this evil, a small medical establishment is provided at the public expence; consisting of a superintendant physician, who has the title of Landphysicus, an apothecary, and five subordinate medical men, who are stationed in different parts of the island. The physician and apothecary are settled in the vicinity of Reikiavik; where a house, somewhat superior in size and accommodation to the common class of Icelandic habitations, is provided for their reception. Independently of this provision, and the use of some land annexed to the house, the Landphysicus has an annual salary of 600 rix-dollars, with the liberty to avail himself of the profits of any practice which his situation may afford. The present pos-

sessor of the office is Dr Klog, a native of Iceland, but educated at Copenhagen. Of the country practitioners, one is stationed on the southern coast of the island; another on the eastern coast; a third on the northern; and two in the western province. The reader will readily conceive how entirely destitute of medical assistance many parts of the country must be, when it is mentioned that some of these districts, subject to the care of a single individual, extend nearly 200 miles along the coast, with a breadth varying from ten to thirty miles. We had the opportunity, while in Iceland, of seeing two of the country practitioners; both very respectable men, and well informed in their profession. One of them, Mr Paulson, has already been noticed, as possessing a more extensive knowledge of natural history than any of his countrymen.

With the exception of three hospitals, in which a few incurable lepers receive gratuitous support, no medical institution exists on the island. These hospitals are maintained at the public expence; and in a method worthy of being noticed from its singularity. On a certain specified day, at that time of the year when the fishery on the coast is most abundant and successful, every fishing boat in the island is required to contribute one man's share of the capture that has been made. A provision is added to the law, that if the number of fish taken by any boat on this day does not afford a share of five to each fisherman, the contribution to the hospitals shall be delayed, until the next time when the produce of a day's fishing equals or exceeds this amount.

In speaking of the diseases of Iceland, it will be necessary to allude only to those, which furnish any facts peculiar and interesting; or which are more especially connected with the climate and mode of living among the inhabitants.

The diet of the Icelanders consists almost solely of animal food; of which, fish, either fresh or dried, forms by far the largest proportion. During the summer they have milk and butter in considerable abundance; but of bread, and every other vegetable food, there is the utmost scarcity, and, among the lower classes, an almost entire privation. The want of cleanliness in the personal and domestic habits of the people has been frequently alluded to in the preceding pages. It is an evil incident to their situation; the removal of which could probably only be accomplished by the sacrifice of other habits still more essential to their comfortable existence. As an effect of these circumstances in the mode of life of the Icelanders, cutaneous diseases, arising from a cachectic state of the body, are exceedingly frequent among them, and appear under some of their worst forms. Scurvy and leprosy are common in the island; occurring especially in the districts of Guldbringè and Snæfell Syssels, and on other parts of the western coast, where the inhabitants depend chiefly upon fishing, and where the pastures are inferior in extent and produce. The scurvy *(kreppusott,)* as it appears in Iceland, presents no remarkable peculiarity of symptom. The disease is observed to occur with greatest frequency at those periods, when there has been a deficiency of food among the inhabitants, or when the snow and frost of the winter succeed immediately to a wet autumnal season. For its cure, a vegetable diet is employed, in as far as the circumstances of the Icelanders will allow of such means. Fruits of every kind are altogether wanting to them; but some advantage is derived from the employment of the cochlearia (Officinalis et Danica,) of the trefoil (Trifolium repens,) of the berries and tops of the juniper (Juniperus communis,) and of the Sedumacre; plants which are all indigenous in the island.

The leprosy of the Icelanders, *(Likthra, Holdsveike,* or *Spitelska,)* exhibits in many instances all the essential characters of the genuine Elephantiasis, or Lepra Arabum ;* and is a disease of the most formidable and distressing kind. Indolent tumours of the face and limbs are generally among the first symptoms of the complaint, attended by swellings of the salivary, inguinal, and axillary glands. The nostrils, ears, and lips are progressively affected with swelling and deformity. The skin over the whole, or different parts of the body, becomes thick and hard; sometimes exhibiting a shining or unctuous surface, sometimes one rough and scabrous, which at a more advanced period of the disease, displays numerous cracks or fissures. The senses are usually much enfeebled; and anæsthesia of the extremities generally occurs. The voice assumes a peculiar hoarseness and nasal tone, frequently with swelling of the tonsils, but without any hindrance of deglutition, until the disease has made great progress in the habit of the patient: the breath and perspired matter are extremely fetid ; and the hairs and nails frequently fall off. The tumours in different parts of the body gradually pass into malignant ulcers, which discharge an acrid, unhealthy matter. In this state the patient often lingers during a long time ; or where the disease has a more speedy termination, all the symptoms are rapidly aggravated, and he is carried off in a state of extreme debility and wretchedness.†

When it is considered how frequently unsuccessful the treatment of this disease is in more auspicious regions, it will not excite surprise that in Iceland the attempt at cure should

* The Elephantiasis of Cullen; the Elephantiasis Legitima of Sauvage.'

† The description given by Dr T. Heberden of the Elephantiasis occurring in the island of Madeira, accords very exactly with the appearance of the disease as it exists in Iceland. See London Medical Transactions; Vol. 1.

generally be unavailing. Where, from the situation of the patient, medical assistance can be obtained, laxatives, diaphoretics, and issues, or sometimes even venesection, are employed in the earlier stages, or with a prophylactic view. The indigenous plants which the natives employ as remedies, are the Juniper, the Vaccinium Myrtillus, the Rhodiola-Rosea, and the Dryas Octopetala; the latter of which particularly grows in great abundance on the island. These remedies, however, appear to be of little avail in relieving any of the urgent symptoms of the disease.

It does not appear that any distinct record exists in Iceland of the first appearance of the leprosy in this country. The Chevalier Bach, in his letter to Dr Van Troil on the subject, thinks it probable that the disease was brought into Iceland from Asia or the South of Europe, at the time of the Crusades; in which he asserts that these islanders bore a part with the other nations of Europe.* From the Ecclesiastical History of Iceland, it appears that the latter statement is not well founded; but though not participating in the holy wars, the Icelanders had at this period an intimate connection with the European continent; and the disease, of which we are speaking, when once introduced, would readily be kept up, partly by its contagious character, principally perhaps by the food and personal habits of the people. In the rest of Europe, it has gradually disappeared, in consequence of the progressive improvement in the modes of living among every class of society.

The ravages committed by the small pox in Iceland have been such as to render this disease important even in the political history of the island. Introduced from the conti-

* See Van Troil's Letters on Iceland.

nent at different periods, and these in general distant from each other, it has spread rapidly, and under its most virulent form; producing effects almost unexampled in the history of this dreadful disease. The most remarkable instance of this kind occurred in 1707; during which year the mortality amounted, according to the most accurate estimate, to about 16,000 souls; more than a fourth part of the whole population of the country, at that period. Several similar instances are recorded in the history of Iceland, though none attended with effects so extensively disastrous. A few years ago, the vaccine matter was introduced into the island from Denmark; but owing to the smallness of the population, and its dispersion over so wide a surface, this was soon lost again; and at the time of our arrival, we found the practice of inoculation entirely suspended. In the contemplation of this circumstance, we had taken out with us a few vaccine crusts, with the design of recommending the method lately proposed by Mr Bryce. Almost immediately on our arrival, we inoculated several children at Reikiavik, and afterwards in other parts of the country; and having a communication with the Landphysicus on the subject, we had the satisfaction of knowing, before we returned to Britain, that the vaccine crust had found its way into every part of the island. The adoption of the plan of inoculating from the crust will doubtless secure to the inhabitants a permanent continuance of this blessing.

The Icelanders have occasionally suffered much from the measles, as well as from the small pox; the epidemic being attended with inflammatory affections of the chest. In 1797, six hundred people were carried off by this disease.

Syphilis cannot be said to exist in Iceland. Single cases have sometimes occurred from communication with foreign-

ers; but the disease has always been intercepted before it made any progress in the country.

Psora is an almost universal complaint in Iceland, appearing indiscriminately among all classes of the inhabitants. No discredit is attached to it, nor does it seem that any means of cure are attempted, though the most efficacious remedy exists in so great abundance in the country.

It would seem that scrophulous affections are not of frequent occurrence in the island.

Inflammatory visceral affections are very common among the Icelanders. The variable nature of the climate, and the constant exposure to wet and cold which is incurred in the occupation of fishing, give a strong tendency to pulmonary complaints; and out of the annual number of deaths in the island, a very large proportion are referable to this cause. This fact was ascertained from the examination of certain statistical registers, which are annually drawn up by the priests of the several parishes, and transmitted to the Bishop at Reikiavik. In these pulmonary affections, and especially in cases of Phthisis, the Lichen Islandicus is much employed by the natives; and possesses a reputation among them, which the experience of its effects in other countries would scarcely seem to warrant. As a demulcent remedy, however, it probably in some degree alleviates the symptoms, and, as an article of diet, in such cases its use may certainly be advantageous.

Inflammatory affections of the abdominal viscera are likewise very common among the Icelanders; chiefly perhaps in consequence of the peculiar nature of the diet to which they are accustomed. It is possible also that a disposition may be given to these complaints by the treatment of the children in their early infancy. A mother in Iceland seldom suckles her child; but nourishes it from the time of its birth, with cow's or

sheep's milk, which the infant sucks from a piece of moistened rag, or a sponge. Where from extreme poverty, or other circumstances, milk cannot be obtained, a little fish or flesh meat, rolled up in cloth and linen, and put into the infant's mouth, is the substitute most commonly employed. The diet of the Icelanders likewise gives much disposition to worms; and the ascarides are observed to be particularly frequent.

The climate and the occupations of the people, particularly that of fishing, render rheumatic affections very common. It is said that gout also occasionally occurs; but it may be doubted whether it is not some modification of rheumatism which obtains this name.

Hypochondriasis is a frequent complaint among the natives of Iceland; induced probably by the physical circumstances of their situation, and the long confinement to their habitations, which is necessary during the winter season. Yet the general temperament of the Icelanders does not appear to be a melancholic one, and the vivacity of their manner frequently forms a striking contrast to the wretchedness which their external condition displays.

Besides the diseases which have already been noticed, I had the opportunity, while in Iceland, of seeing cases of Epilepsy, Hysteria, Amenorrhœa, Menorrhagia, Asthma, Icterus, &c. No case of idiopathic fever, either intermittent or continued, occurred to my observation. With respect to intermittents, however, I was informed that they occasionally appear among the inhabitants under a well marked form; an effect no doubt of the vast extent of bogs and marshy ground, which are found even in the most populous districts of the island.

A singular complaint remains to be noticed, the effects of which, though limited to a small spot, are eminently disastrous as far as they extend. This is the disease, called

Ginklofe by the Icelanders; the Tetanus or Trismus Neonatorum of medical writers; which invades children at a very early age, and almost invariably proves fatal in its event. It occurs very rarely, if at all, on the mainland of Iceland; but is confined principally to the group of islands, called Westmann-Eyar, situated on the southern coast, of which a description has already been given in the Journal, p. 255. The population of Heimaey, which is the only one of these islands that is inhabited, does not amount at present to 200 souls, and is almost entirely supported by migration from the mainland; scarcely a single instance having been known, during the last twenty years, of a child surviving the period of infancy. During a great part of the year, the island is wholly inaccessible in consequence of storms, currents, and the nature of the coast. The inhabitants are therefore left almost solely to their own resources. Their chief article of food is the sea-fowl, called the Fulmar, which they procure in vast abundance; using the eggs and flesh of the bird, and salting the latter for their winter food. The destructive effect upon the fishery around these islands, by the great volcanic eruptions in 1783, has before been mentioned. Of vegetable food the inhabitants have none, and there are only a few cows and sheep on the island.

The distressing consequences of this disease led the Danish government to give an official direction to the Landphysicus of Iceland, to visit the Westmann Islands, for the purpose of investigating its nature and causes. This gentleman went over to the islands during the summer of 1810, and remained three weeks on the spot. Though he did not himself see a case of the disease, he obtained all the principal facts connected with it from the priests, and those of the inhabitants who had had children. The symptoms of the complaint are brieffy these.

Very soon after birth, strabismus and rolling of the eyes are observed; subsultus tendinum occurs; and the muscles of the back are often drawn together and stiffened, evidently by incipient spasm. These appearances infallibly denote the approach and event of the disease. Having continued during a period varying from one to seven days after birth, trismus generally comes on, sometimes attended by Opisthotonos, which is strictly called the *Ginklofe*, occasionally with Emprosthotonos, to which the name of *Klums* is given by the natives. The trismus present impedes deglutition, and the paroxysms becoming more violent, the infant is speedily carried off. When the rare event of a favourable termination occurs, it is portended by a critical diarrhœa, or by an exanthematous eruption, with the evacuation of the meconium.

The following Table, which includes a period of twenty-five years, shews the mortality consequent upon this disease in the Westmann Islands; and exhibits also the days upon which death has happened.

Children.		*Days.*	*Children.*		*Days.*
1	lived	2	18	lived	9
2		3	10		10
14		4	2		11
16		5	1		12
22		6	1		13
75		7	5		14
16		8	1		21

It will be seen from this Table, that the number of deaths on the 7th day greatly exceed those on any other; and also that they are more frequent on the 14th day, than on the days immediately preceding or succeeding it. From the propor-

tion which these cases of fatal event bear to the whole population of the island, it is probable that few, if any, instances of recovery have occurred, during the period included in the Table. No methods of cure have hitherto been resorted to by the inhabitants.

This disease is well known to prevail in other parts of the world; and has been particularly described as it appears in the West Indies, and in the island of Minorca.* It exists also in Switzerland, and in some northern districts of Scotland; especially in the island of St Kilda; the inhabitants of which, in their diet and mode of life, much resemble the natives of the Westmann Islands. The exciting causes are involved in much obscurity. It may be presumed, however, that they must vary considerably, when the disease appears in countries so widely different with respect to climate, and the situation of the inhabitants. Its occurrence in the Westmann Islands may reasonably be supposed to have some connection with the extraordinary diet of the natives; and this is the more probable, as it appears that the complaint has been much more frequent, since their fishery was destroyed by the volcanic eruptions in 1783. Independently of any effect which the peculiarity of the mother's constitution may have upon her offspring, the practice of giving to the infant a strong and oily animal food almost immediately after birth, will necessarily create irritation in the bowels, and dispose to spasmodic affections. Dr Klog, in some remarks he gave me on this subject, attributes much to the effects of the sea air, and of a moist atmosphere; but had these causes any considerable influence, we might expect that the disease would be more

* See the works of Hillary, Chisholm, and Clarke, on the Diseases of the West Indies; and Cleghorn's Diseases of Minorca.

frequent in different parts of the world, than is actually found to be the case.

The age which the Icelanders usually attain presents nothing very remarkable in either extreme. From the Table of Population, given in a preceding part of this volume, it appears that in 1801, when the number of inhabitants was 47,207, there were 41 persons between the ages of 90 and 100; 443 between 80 and 90; and 1698 between 70 and 80. The number of females was 25,371: of males, only 21,746. The longevity of the females exceeds considerably that of the males; owing no doubt to their less exposure to the severities of labour, and the hardships of the climate. Of the 41 persons between 90 and 100, 35 were females; of those between 80 and 90, 285 were females, while the number of males was not more than 158. A comparison of facts would probably prove, that the longevity of the Icelanders rather exceeds, than falls short, of the average obtained from the continental nations of Europe.

The Icelanders are in general of a tall statute; arising, however, rather from the length of the spine, than of the limbs: the head is of the middle size: the countenance open: the complexion exceedingly fair, and among the women, often very florid. The hair is almost universally of a light colour, and seldom curled. Corpulency is rarely observed among the natives of the island.

No. II.

LIST OF ICELANDIC PLANTS.*

By W. J. Hooker, Esq.

I. MONANDRIA.

1. *Monogynia.*

Hippuris vulgaris
Zostera marina

2. *Digynia.*

Callitriche aquatica
— — γ autumnalis

II. DIANDRIA.

1. *Monogynia.*

Veronica officinalis
— serpyllifolia
— Beccabunga
— Anagallis
Veronica scutellata
— alpina
— fruticulosa
— marilandica
Pinguicula vulgaris. — "Les Islandais s'en servent quelquefois en guise d'ail." *Voyage en Islande.*
— alpina

2. *Digynia.*

Anthoxanthum odoratum

* This catalogue is principally taken from Zoega's *Flora Islandica*, (attached to the Danish edition of Povelsen and Olafsen's account of Iceland) and Mohr's *Forfög til en Islandsk Naturhistorie*, published at Copenhagen in 1786. The few additional species, which I am enabled to insert by means of Sir George Mackenzie's and Mr Paulsen's collections and my own researches, are distinguished by being printed in Italics.

III. TRIANDRIA.

1. *Monogynia.*

Valeriana officinalis
Schœnus compressus
Scirpus palustris
— lacustris
— cæspitosus
— acicularis
— setaceus
Eriophorum polystachion. Of the *pappus* of this plant the natives make wicks for their lamps.
— vaginatum
— capitatum. *Hoppe.*
— alpinum
Nardus stricta

2. *Digynia.*

Phleum pratense
— nodosum
— alpinum
Alopecurus geniculatus
Milium effusum
Agrostis rubra
— stolonifera
— canina
— vulgaris
— — β pumila
— alba
— arundinacea
— cærulea
Aira cæspitosa
Aira flexuosa
— montana
— subspicata
— alpina
— aquatica
— præcox
Holcus odoratus.—Said to be used by the Icelanders to perfume their apartments and their clothes.
Sesleria cærulea
Roa pratensis
— trivialis
— compressa
— annua
— angustifolia
— alpina
— maritima
— *glauca.*—Both this and the following species are far from uncommon in Iceland.
— *cæsia*
Festuca ovina
— rubra
— elatior
— fluitans
— duriuscula
— *vivapara*
Arundo Phragmites
— Epigejos
— arenaria
Elymus arenarius.—The seeds

are occasionally made into a sort of bread.

Triticum caninum
— repens

3. *Tryginia.*

Montia fontana
Koenigia islandica

IV. TETRANDRIA.

1. *Monogynia.*

Scabiosa succisa.—The Icelandic names for this plant, *Pukabit* and *Dievelsbid*, have both the same signification as our *Devil's bit.*

Galium verum
— palustre
— Mollugo
— *pusillum*
— boreale
— Plantago major
— lanceolata
— maritima
— *alpina.* — This I recollect seeing, in some plenty, at Thingvalla, and I have since received specimens from Sir George Mackenzie and Mr Paulsen.
— Coronopus
Sanguisorba officinalis
Alchemilla vulgaris
Alchemilla alpina

3. *Tetragynia.*

Potamogeton natans
— marinum
— compressum
— lucens
— crispum
— perfoliatum
— pectinatum
— pusillum
Sagina procumbens
Tillæa aquatica

V. PENTANDRIA.

1. *Monogynia.*

Myosotis scorpioides α and β
Pulmonaria maritima
Echium vulgare
Primula farinosa
Menyanthes trifoliata. — This plant is important to travellers who are not acquainted with the route in the morasses; for they are well aware that wheresoever it grows they may safely pass; its closely woven roots making a firm bed upon the soft subsoil. The Icelanders call it *Reidinga*, and employ the matted tufts to prevent the saddle or any

load from chafing the horses' backs.

Azalea procumbens

Campanula rotundifolia

— patula

Viola canina

— tricolor

— palustris

Glaux maritima

2. *Digynia.*

Gentiana campestris

— amarella

— nivalis

— aurea

— detonsa

— bavarica

— tenella

— verna

— rotata

Hydrocotyle vulgaris

Ligusticum scoticum.—To this plant, which Mr Paulsen named by mistake *Imperatoria Ostruthium*, was attached the following observation: 'Hæc (in 'Islandiâ) rarissima herba, in saxis solùm et 'montibus præruptis maritimis reperiunda. Devoratis radicibus hìc tra-'ditur divinos edidisse 'effectus in hydaridibus 'abdominalibus. (isl. *me-'inlæti*).'

Angelica Archangelica.—The Icelanders gather the stems and roots of this plant, which they eat raw, and generally with the addition of fresh butter.

— sylvestris?

Imperatoria Ostruthium

Carum Carui.—Naturalised in Iceland, according to Sir George Mackenzie.

4. *Tetragynia.*

Parnassia palustris

5. *Pentagynia.*

Statice Armeria

Linum catharticum

4. *Hexagynia.*

Drosera rotundifolia

— longifolia

VI. HEXANDRIA.

1. *Monogynia.*

Convallaria biflora

Juncus effusus.

— *arcticus.* — Discovered by Mr Bright.

— squarrosus

— trifidus

— articulatus

— bulbosus

Juncus bufonius
— biglumis
— triglumis
— pilosus
— campestris
— spicatus

2. *Trigynia.*

Rumex digynus.—All the species of *Rumex* are boiled and eaten by the Icelanders; though only the young shoots of *acutus* are employed. Of the *Acetosa* a beverage is made by the common people, by steeping the plant in water till all the juice is extracted. This drink is kept some time; but soon becomes bad and putrid in warm weather.
— acutus
— Acetosa
— Acetosella
Triglochin palustre
—maritimum
Tofieldia palustris

VIII. OCTANDRIA.

1. *Monogynia.*

Chamænerium halimifolium. —From specimens now before me it appears that this species is subject to considerable variation, as well in the proportional breadth of its leaves, as in the size of the flowers. —Mr Paulsen remarks, 'Crescit ferè solum ad 'fluvios montium glacia- 'lium, in argillâ et arenâ 'vulcanicâ.'
— angustifolium
Epilobium montanum
— palustre
— *origanifolium*
— alpinum
— tetragonum
Vaccinium Myrtillus
— Oxycoccos
— uliginosum.
Erica vulgaris.—'Ex ejus magnâ florescentiâ de magnâ nivis hyemalis copiâ augurantur Islandi.' *Paulsen in Epist.*

2. *Trigynia.*

Polygonum viviparum
— Bistorta.—The roots are often eaten raw, and sometimes converted into bread.

Polygonum Hydropiper
— amphibium
— Persicaria
— aviculare

3. *Tetragynia.*

Paris quadrifolia

X. DECANDRIA.

1. *Monogynia.*

Andromeda hypnoides
Arbutus Uva Ursi
— alpina
Pyrola rotundifolia
— secunda
— *minor*

2. *Digynia.*

Saxifraga Cotyledon
— stellaris
— nivalis
— Hirculus*
— *palmata*
— punctata
— oppositifolia
— autumnalis
— aizoides
— bulbifera
— *cernua*
— rivularis
— tridactylites
Saxifraga cæspitosa
— groenlandica.—My specimens of this, gathered by Sir George Mackenzie, exactly accord with the figure of this species in the *Flore de Pyrenees.* La Peyrouse has observed it growing at the height of sixteen hundred toises above the level of the sea.
— hypnoides
— *tricuspidata*
— petræa
Scleranthus annuus

3. *Trigynia.*

Silene maritima
— acaulis.—Boiled and eaten with butter by the Icelanders.
Stellaria media
— biflora
— cerastoides
Arenaria peploides.—This is steeped in sour whey, where it ferments; then the liquid is strained off, and fresh water added to

* I am informed by Mr Holland, that this beautiful Saxifraga which is abundant in Iceland, is only found on one small spot in Britain, near Knutsford in Cheshire. G. M.

the beverage, which is said to taste like olive-oil; whence the name of the plant in Iceland, *Smidiu-kaal.*—*Voyage en Islande.*

— serpyllifolia

— ciliata

4. *Pentagynia.*

Sedum *saxatile*

— rupestre

— annum

— acre.—'Vulgatum in Islandiâ vomitorium.'—*Paulsen in Epist.*

— villosum

Lychnis Flos-Cuculi

— alpina

— — *var. fl. albo.*

Cerastium viscosum

— vulgatum

— alpinum

— *latifolium*

Spergula arvensis

— nodosa

— saginoides

XII. ICOSANDRIA.

2. *Pentagynia.*

Pyrus *domestica.*—This was found by Sir George Mackenzie, growing eight feet high in a cheft of lava near Buderstad in Snæfell Syssel. Another plant of the same was brought to Sir George Mackenzie, from Eyafiord, on the north coast.

— aucuparia*

Spiræa Ulmaria

3. *Polygynia.*

Rosa hibernica.—This, the only species of *Rosa* discovered in Iceland, was sent me by Mr Paulsen with the following remark: 'Nulli hic priùs obvia. 'Crescit in rupe unicâ 'ad villam Seljaland.'

Rubus saxatilis

Fragaria vesca

Potentilla verna

— anserina.—The roots are frequently eaten in the

* It is probable that the Pyrus Domestica has been taken for Aucuparia, which, on that account, perhaps, should have no place in the Flora. It was only on close examination that Mr Hooker and Dr Smith discovered the specimen I found to be Domestica.

southern parts of the island.

— aurea

Tormentilla officinalis

Geum rivale

Dryas octopetala.—Its leaves are gathered, and made into a sort of tea.

Comarum palustre

XIII. POLYANDRIA.

1. *Monogynia.*

Papaver nudicaule

5. *Polygynia.*

Thalictrum alpinum

Ranunculus acris.—Often used for making blisters.

Ranunculus hederaceus

— reptans

— aquatilis

— lapponicus

— repens

— glacialis.—A rare plant in Iceland. I was not so fortunate as to meet with it myself. Sir George Mackenzie has favoured me with the only specimen which he procured; and which he found growing among loose stones on the declivity of a mountain between Stadar-hraun and Kolbeinstadr.

— nivalis

— hyperboreus

— Caltha palustris

XIV. DIDYNAMIA.

1. *Gymnospermia.*

Lamium purpureum

Galeopsis Ladanum

— Tetrahit

Thymus Serpyllum.—An infusion of the leaves is often used to give an aromatic flavor to the sour whey.

Prunella vulgaris

3. *Angiospermia.*

Bartsia alpina

Rhinanthus Crista-Galli

Euphrasia officinalis.—I possess alpine varieties of this plant from Iceland, which (though bearing perfect flowers) scarcely rise a quarter of an inch above the surface of the ground.

Pedicularis sylvatica

— flammea

Limosella aquatica

XV. TETRADYNAMIA.

1. *Siliculoso.*

Subularia aquatica

Draba verna
— muralis
— incana
— — *var. contorta. Retzius.*
Thlaspi Bursa Pastoris
— campestre
Cochlearia officinalis
— danica.—Occasionally eaten as spinage, and reckoned of service in the cure of the scurvy, though seldom made use of.
Bunias Cakile.

2. *Siliquosa.*

Cardamine pratensis.
— hirsuta.—A singular variety of this plant, if not a distinct species, has been sent me both by Sir George Mackenzie and Mr Paulsen, having the lower leaflets round, the upper ones linear, and all very entire.
— bellidifolia
Sisymbrium terrestre
Arabis alpina
— hispida
Brassica alpina.—Sent me by Sir George Mackenzie.

XVI. MONADELPHIA.

5. *Decandria.*

Geranium sylvaticum
— pratense
— montanum

XVIII. DIADELPHIA.

3. *Octandria.*

Polygala vulgaris

4. *Decandria.*

Lathyrus pratensis
Vicia cracca
Pisum maritimum
Lotus corniculatus
Anthyllis vulneraria
Trifolium arvense
— pratense
— repens. — 'Les gens de la 'campagne, dans la par- 'tie Nord et Est de cet- 'te ile, en mangent en 'légume.' — *Voyage en 'Islande.*

XIX. SYNGENESIA.

1. *Polygamia Æqualis.*

Leontodon taraxacum
— autumnale
Hedypnois Taraxaci
Hieracium Pilosella
— Auricula
— alpinum
— præmorsum
— Murorum

Serratula arvensis
Carduus lanceolatus
— heterophyllus.

2. *Polygamia Superflua.*

Gnaphalium alpinum
— uliginosum
— *sylvaticum*
— fuscatum. *Pers.*
Erigeron alpinum
Senecio vulgaris
Pyrethrum inodorum
— *maritimum*
Achillea Millefolium. — The Icelandic appellation, *Vall-Humall* (field-hops) seems to imply that this plant has been used instead of hops in that island, as it is still in some parts of Sweden. At present the natives only make an ointment of its leaves with butter, which they apply to cutaneous and other external sores.

XX. GYNANDRIA.

1. *Diandria.*

Orchis maculata
— Morio
— mascula
— latifolia
— hyperborea
Satyrium viride
Satyrium albidum
— nigrum
Epipactis ovata.—I possess the only specimen of this ever gathered in Iceland: it was found at a place called *Vik*, by the son of Mr Paulsen.
— *Nidus avis?*—Either this or a new species of *Epipactis* has been sent me by Sir George Mackenzie. The specimen is destitute of its root, so that I cannot ascertain it with certainty.
Cymbidium corallorhizon.

XXI. MONŒCIA.

1. *Monandria.*

Zostera marina. — This the cattle eat, and the natives gather and dry for their beds.
Chara vulgaris
— hispida.

3. *Triandria.*

Sparganium natans
Cobresia scirpina. Willd.-Carex Bellardi of preceding authors.
Carex dioica
— capitata

Carex pulicaris
— arenaria
— uliginosa
— leporina
— vulpina
— muricata
— loliacea
— canescens
— elongata
— flava
— pedata
— montana
— rigida
— limosa
— *atrata*
— pallescens
— capillaris
— Pseudo-cyperus
— acuta
— *ampullacea*.—The specimen sent me by Sir George Mackenzie is a slight variety with branched spikes.
— vesicaria
— hirta.

4. *Tetandria.*

Urtica dioica
— *urens*.—This I only saw growing in Mr Savigniac's garden at Reikiavik.

8. *Polyandria.*

Myriophyllum spicatum
Myriophyllum verticillatum
Ceratophyllum demersum
Betula alba
— nana.

XXII. DIŒCIA.

2. *Diandria.*

Salix Myrsinites
— arbuscula
— herbacea.—The downy substance from this and other species of Willow is applied by the natives to wounds both of man and beast. The leaves steeped in water are employed in tanning skins. The wood is used in making ink, being steeped in a decoction of the leaves, to which is added some of the earth used in dyeing; it is then all boiled together until the liquid has acquired a proper consistency.
Salix purpurea
— reticulata
— myrtilloides
— glauca
— lanata
— Lapponum
— arenaria
— fusca

Salix capræa
— pentandia

3. *Triandria.*

Empetrum nigrum

8. *Octandria.*

Rhodiola rosea

13. *Monadelphia.*

Juniperis communis

XXIII. POLYGAMIA.

1. *Monœcia.*

Atriplex laciniata
— patula

XXIV. CRYPTOGAMIA.

1. *Filices.*

Equisetum sylvaticum.—Various species of Equisetum are given to the cattle in Iceland, where they are said to be excellent food for the saddle horses.
— arvense
— limosum
— palustre
— fluviatile
— hyemale
Osmunda Lunaria
Ophioglossum vulgatum
Lycopodium alpinum
— clavatum
Lycopodium annotinum
— Selago
— selaginoides
— dubium*
Polypodium vulgare
— fontanum
— ilvense
— arvonicum
— Phegopteris
— Dryopteris
Aspidium Lonchitis
— Thelypteris
— Filix mas
— Filix fæmina
— fragile.—I possess a curious and elegant species of Aspidium (Cyathea of Dr Smith) somewhat allied to this, but hitherto undescribed.
Asplenium septentrionale
Isoetes lacustris.

2. *Musci.*

Phascum muticum
Sphagnum obtusifolium.-The same use being made of this moss in Iceland as in Lapland, I shall be readily excused for inserting Lin-

* Surculis simplicissimis, erectis, compressis; foliis complicatis, carinitas, acutis, alternis, distiche imbricatis. *König.*

næus' words upon the subject. 'Feminis *Lapponicis* 'maxime notus est hic 'muscus; hunc enim, lin- 'teis cùm destituantur, in- 'fantibus, dum cunis suis 'continentur, undique cir- 'cumponunt, qui et pul- 'vinaris et tegmenti vices 'servat, urinam acrem ab- 'sorbet, calorem conser- 'vat, sericisque stragulis 'gratior est tenellis; mu- 'tatur deinde vesperi et 'mane, dum purus et re- 'cens substituitur in pri- 'oris locum.'—*Fl. Lapp. p. 337.*

Sphagnum capillifolium
Gymnostomum truncatulum
— *fasciculare*
Tetraphis pellucida
Andræa rupestris
— *Rothii*
Splachnum ampullaceum
— urceolatum
— mnioides
— rubrum
— vasculosum
Conostomum boreale
Encalypta vulgaris
— *alpina*
Grimmia apocarpa
— *maritima.*—Not uncommon on rocks by the sea shores.
Weissia cirrata.
— *lanceolata?*
Dicranum scoparium
— undulatum
— heteromallum
— purpureum
— flexuosum
— squarrosum
— *pusillum*
— pulvinatum
— taxifolium
Trichostomum fontinalioides
— fasciculare
— canescens
— *ellipticum*
Syntrichia ruralis
— subulata
Tortula *tortuosa*
— convoluta
Catharinea *hercynica*
Pollytrichum commune
— *alpinum*
— *sexangulare*
— urnigerum
— aloides
— *subrotundum*
Orthotrichum striatum
Neckera curtipendula
Bryum androgynum

Bryum argenteum
— *Zierii*
— cæspititium
— *dealbatum*
— hornum
— crudum
— *turbinatum*
— serpyllifolium
— pyriforme
— dendroides
Hypnum sericeum
— abietinum
— *filamentosum*
— prælongum
— velutinum
— *proliferum*
— nitens
— illecebrum
— purum
— filicinum
— aduncum
— *uncinatum*
— *revolvens*
— denticulatum
— triquetrum
— squarrosum
— cuspidatum
— Crista castrensis
— cupressiforme
— scorpioides
— *silesianum*
Bartramia fontana
Bartramia *ithyphylla*
— pomiformis
Fontinalis antipyretica
— *squamosa*
— *falcata*
Funaria hygrometrica
Buxbaumia *foliosa*

3. *Hepaticæ.*

Jungermannia *concinnata*
— *julacea*
— *asplenioides*
— *scalaris*
— *Sphagni*
— *angulosa*
— *byssoides*
— *bicuspidata*
— disticha. *Mohr.*
— albicans
— nemorosa
— resupinata
— complanata
— dilatata
— ciliaris
— epiphylla
— pinguis
— furcata
Marchantia polymorpha
— hemispherica
— tenella
Targionia hypophylla
Blasia pucilla
Riccia crystallina

Riccia glauca
Anthoceros punctatus

4. *Lichenes.*

Lepraria botryoides
— Jolithos
Lecidea sanguinaria
— fusco-atra
— fusco-lutea.—About Reikiavik.
— atro-virens α and γ
— pustulata
Gyrophora glabra β
— deusta
— erosa
— cylindrica.—Used, in times of scarcity, as food, but more frequently for dyeing woollen cloth of a brownish green colour.
— *hirsuta.*—'Longè optimum 'in re cibariâ Lichenis 'genus.—Pagina inferior 'pilosa. Crescit unicé in 'lapidibus magnis discretis, et rupibus alpinis, 'imprimis summis cacuminibus, ubi Falcones 'sæpiùs insident.'—*Paulsen in Epist.*
— vellea
Endocarpon Hedwigii
Endocarpon *tephroides.* About Reikiavik.
Sphærophoron compressum
Isidium defraudans
Urceolaria calcaria
Parmelia tartarea
— subfusca
— pallescens
— candelaria
— *brunnea.*—About Reikiavik.
— gelida
— stygia
— fahlunensis
— omphalodes
— saxatilis
— stellaris
— parietina
— olivacea
— *scrobiculata*
— nigrescens
— physodes
— furfuracea
— ciliaris
— Prunastri
— fraxinea
— farinacea
— ochroleuca
— *sarmentosa*
— jubata
Peltidea venosa
— resupinata
— canina

Peltidea apthosa
— crocea
— saccata
Cetraria islandica
— nivalis
Cornicularia lanata
— pubescens
Usnea hirta
Stereocaulon paschale
— *globiferum*.—About Reikiavik and other places, not uncommon.
Bæomyces cocciferus
— digitatus
— deformis
— pyxidatus
— cornutus
— gracilis
— *endivifolius*.—About Reikiavik.
— uncialis
— subulatus
— rangiferinus
— *vermicularis*
— *tauricus*

5. *Algæ Aquaticæ.*

Fucus serratus.—This and various other large species of Fucus serve occasionally for food for the cattle and fuel for the poor natives.
— vesiculosus
Fucus vesiculosus
——— *var.* divaricatus
——— — excisus
——— — inflatus
——— — spiralis
— ceranoides
— canaliculatus
— distichus. (*Fl. Dan.* 351.)
— nodosus
— siliquosus
— loreus
— aculeatus
— *purpurascens*
— lycopodioides
— ramentaceus
— muscoides
— Filum
— lanosus. *Mohr.*
— fastigiatus. (*Fl. Dan.* 393.)
— digitatus
— palmatus.—This, the *Sol* of the Icelanders, is the most frequently prepared and eaten of any of the genus.
— esculentus
— saccharinus
— edulis
— sanguineus
— ciliatus
— crispus
— alatus
— dentatus

Fucus rubens
— plumosus
— cartilagineus
— spermophorus
— gigartinus
— confervoides
— *flagelliformis*
— plicatus
— albus. *(Fl. Dan.* 408.)
— corneus
— fungularis. *(Fl. Dan.* 420.)
— clavatus. *Mohr.*
— coronopifolius
— *fæniculaceus.—(Conferva Huds.)*
Tremella lichenoides
— verrucosa
— hemispherica
— adnata
— Nostoc
Ulva umbilicalis
— intestinalis
— latissima
— compressa
— pruniformis
— Lactuca
— lanceolata
— Linza
— plicata. *Mohr.*
Rivularia cylindrica.—Wahl. MSS.
— *angulosa*
Conferva dichotoma
— *spiralis*
— *bipunctata*
— *nitida*
— *flavescens*
— æruginosa
— *vaginata*
— *limosa*
— littoralis
— scoparia
— cancellata
— polymorpha
— rupestris
— ægagropila
— corallina
Byssus Cryptarum.

6. *Fungi.*

Agaricus campanulatus
— fimetarius
— campestris
Boletus luteus
— bovinus
Helvella atra. *(Fl. Dan.* 354.)
— æruginosa. *(Fl. Dan.* 354.)
Peziza lentifera
— scutellata
— cupularis
— zonalis
Clavaria coralloides
— muscoides
Lycoperdon Bovista
Mucor Mucedo

In the collection of Mr Bright, a specimen of a very minute plant has been lately discovered, which Mr Hooker and Mr Brown think has been mentioned only by Wahlenberg, who found it in Lapland, but has not yet published an account of his travels; at least his work has not reached this country. If it is really the one discovered by Wahlenberg, its name is ‘ Polytrichum Glabratum.’

No. III.

CATALOGUE OE ICELANDIC MINERALS, BEING CHIEFLY GEOLOGICAL SPECIMENS.

Presented to the Royal Society of Edinburgh, and deposited in their Cabinet.

A

No. 1. Rock, in the vicinity of Reikiavik. Its colour is ash grey; it has a rough uneven fracture, and the fragments have blunt irregular edges; it is not very compact, and with difficulty scratches glass: it contains particles of olivin. There is much resemblance, I am informed, between this rock, and the clinkstone of Andernach on the Rhine, where it is said to alternate with pumice. As some specimens contain a minute portion of hornblende, and the rock appears to be principally composed of compact felspar, it might be considered a variety of greenstone. It is, however, a lava, (page 383.)

A2,A,A' On examining these specimens, which are from the lower part of the same bed of rock, they all bear the most unequivocal marks of fusion. This is the case on the whole of the lower surface; hence I conclude that this rock is a species of lava.

A

No. 3 In this specimen, which is broken from a columnar mass, the effects of decomposition are apparent, and the olivin seems to have been destroyed.

4, 5, 6 Are from the bed of rock under A 1. It seems to be the same, only it is entirely vesicular; the vesicles are partly filled with a reddish white decomposed matter, quite soft and friable. This bed may be readily distinguished by its columnar form, as exemplified in the two last specimens. Some of the specimens contain specks of a brilliant golden lustre, which are olivin in an altered state.

7 Wacke lying horizontally above A 1, but visible only for a few yards.

8, 9 The same with A 4, 5, 6, from a place where it appears mixed with clay, slags, and other matter forming a tuffa.

10 Friable white steatite, forming a tumulus near the hot springs in the neighbourhood of Reikiavik. It is

11 also found where the hot water bubbles up. This circumstance, and the tumulus being hollow at the top, make it probable that the latter has been the site of a boiling spring, of a larger size than any which now exist at this place.

12 The steatite occurs reddish brown, and has, in some places, recently deposited matter adhering to it, some

13, 14 of which effervesces with acid, though not all. Here

15 is also found tuffa the same as A 9.

16 Greenstone containing splendent crystals of felspar from the island of Vidöe.

17 Fine grained basalt, having a conchoidal fracture, from a vein cutting the greenstone. It contains small vesicles, some of which had water in them.

A
No. 18 This specimen shews a peculiarity common to all the veins we saw in Iceland; a vitreous coating on the sides which becomes gradually blended with the substance of the stone.

19, 20 Columnar greenstone, from the same place. The latter contains small specks of a black vitreous substance, the fracture of which is conchoidal. The same has been observed by Professor Jameson in the trap rocks of Fifeshire, and by Mr Allan in the western parts of Mid Lothian.

21 From a vein of vesicular greenstone which cuts a mass of trap tuff.*

22 A slaggy mass from the tuff.

23 Mass of vesicular greenstone from the same; many of the vesicles coated with zeolite.

24 This rock may be considered as non-descript. It is composed principally of the brilliant black substance, small specks of which were observed in A 20; but here it occurs in larger masses, mixed with a dull blackish green matrix, which circumstance denotes it
25 to be a tuff. It contains masses of amygdaloid; and
A′ 1 nodules of pyrites, some of which have a small quantity of pitchcoal adhering to them. Professor Jameson informed me, that he observed a rock in Dumfries-shire which resembles this. The black substance seems to be pearlstone; and the rock may therefore be called pearlstone tuff. This rock appears irregularly connected with greenstone. There is in the island of Vidöe, a rock of fragmented amygdaloid, which in some places appears divided into large

* The term tuff is used here, because this rock is similar to the trap tuff of Werner.

A
masses by a sort of net work of veins; the substance
No. 26 of which is similar to A 23. Columns of vesicular greenstone are seen resting on it.

27 A great portion of the island of Vidöe consists of A 1. In A 27, there are specks of olivin, of a brilliant blue colour in a state of decomposition. In one place we observed a vein of greenstone about forty feet thick, in such a situation that it must have cut A 27, though we did not see the junction of the rocks; several yards between the beds on each side and the vein, being covered with soil.

28 From columnar greenstone, near the above-mentioned vein.

29 Columnar greenstone; the columns being composed of tables from three to six inches thick, and from three to five or six feet in diameter, from one of which, A 29 was broken.

30, 31 From a vein of basaltic tuff cutting greenstone.

32 Broken from the wall of a rent in greenstone which appeared to have been once filled with matter forming a vein. This mass has a curious reniform appearance, and the vitreous coating mentioned as being common to the veins of Iceland.

33 From the same place; tinged green by some metallic substance.

34 Another from the same place, having a vitreous metallic glaze on its surface.

35 The rock from which this specimen was taken, is on the mainland opposite to Vidöe. It has, on the great scale, an external appearance from which one might be led to think that it had a slaty structure; but this seemed to be owing to decomposition. It is a

A

No. 35 fine grained greenstone, and it passes into the columnar form, the columns being horizontal. Near the place where this was observed, we saw diverging columns of amygdaloid resting on vertical columns of greenstone. We could not discover any connection of A 1 and A 5 with this greenstone.

36 Tuffa, found a few miles to the south of Reikiavik, on the sea-shore. It contains masses of greenstone, basalt, amygdaloid, small specks of the substance forming so large a proportion of A 24, (black pearlstone?) of A 1 and 5.

37 Under the tuffa is a bed of wacke, containing shells, in some places four or five feet thick. This was traversed by a vast number of cracks, on each side of which at right angles with them, were innumerable

38 minute columnar masses, of which A 38 is a specimen.

39 From an included mass in the tuffa.

40 Appears to be wacke much indurated.

41 Under these we observed A 1; and also a rock the same as A 24.

42 Is a specimen of the tuffa, with the wacke adhering to it.

43 Is part of a large mass of columnar greenstone, contained in a rock similar to A 41, which we saw on the sea-shore, in going to Havnefiord.

44, 45 Specimens of the lava near Havnefiord. This lava is of a bluish grey colour, dense and vesicular. It contains crystals of selspar, and has olivin disseminated through it. In several parts of this stream of lava,

46 we observed that the olivin, from decomposition

A
No. 46 or alteration, presented a beautiful irridescent appearance.

47 At the extremity of this lava, towards the west, on the shore of the bay, we found a considerable extent of rock similar to A 1. We did not see the junction of this with any other rock; but we soon came to a tuffa, with a vein of the same rocks passing through
48 it. The sides of this vein have the vitreous appearance
49 already mentioned. A little beyond this vein, a large
50, 51 extent of tuffa occurs, with the same rock passing through it in so many directions, that the two seemed as if mixed together. The tuffa has here a paste similar to A 9, inclosing round, black, vitreous masses like obsidian, perhaps black pearlstone.

52 A specimen of this has part of a vein adhering to it, presenting an appearance which many will consider to be the effect of heat, and which strikes me as such. Above these we found A 1. Not far from this place are some hot springs, which are covered by the sea at high water.

53, 54, Are specimens of slags from the cave, mentioned page
55, 56, 106 of the journal. The first three are from the roof;
57 56 is from the bottom, and 57 is part of a mass which appeared to have been squeezed, while soft, from the side.

58 Is a slag from one of the little craters, mentioned in the same part of the Journal.

59 Is a specimen of tuffa, of which whole ranges of mountains are composed in the Guldbringè Syssel.

60 Soft white clay, from a bank on the side of a mountain on the road to Krisuvik. It has evidently been

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No. 60 produced in the same manner as the banks on the sulphur mountains, which are not far distant.

61, 62, 63 Masses from the same place; the first two are depositions, the last is an altered rock. The specimens of sulphur are deposited in this part of the collection, but are not marked, on account of their delicacy.

64, 65 A rock above the sulphur banks; it appears to be a tuffa in a state of decomposition, and very friable.

65 Similar to the last, but not so much decomposed; from the same place. It may perhaps be a variety of A 24, from the appearance of specks of pearlstone.

66 Porphyry slate, from the same place.

67 We observed a great quantity of the rock A 63, appearing above the surface of the clay and sulphur. It is difficult to give it a name. It is composed of soft roundish masses about the size of a walnut, of a greyish yellow colour, separated by irridescent ferruginous films; and is extremely fragile. It has evidently been altered, and is probably wacke. It has, too, some resemblance to steatite.

The specimens of sulphate of lime which are arranged in this part of the collection, are not marked. They were taken from different places where masses occurred irregulaaly projecting through the clay. They are very beautiful; chiefly white, tinged with red; and are confusedly crystallised, some of them fibrous, and some of them stellated.

68 From the submarine lavas on the coast near Krisuvik. It greatly resembles porphyry slate, and the specimen marked above B.

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No. 69 Lava between Krisuvik and Grundevik.

70, 71 Specimens of the pumice and slag, which were washed on shore during the marine eruption of 1783.

72, 73 Specimens of lava from Grundevik, containing felspar and olivin, the latter irridescent.

74, 75, 76 Varieties of A 1. The first was found on the road from Grundevik to Kieblivik, where subterraneous heat had acted in a tremendous manner; the two last near Kieblivik, in beds.

77 Part of an amygdaloidal vein, near Brautarholt. It seems to be a variety of basalt. Its colour is dark bluish grey. The fracture is imperfect conchoidal passing into uneven. It is difficultly frangible; and the fragments have very sharp edges. It may be scraped by a knife; but it scratches glass easily. It is very compact; and on the whole greatly resembles indurated clay. Beside calcareous spar, and common radiated zeolite, it contains nodules for the most part long and cylindrical, or rather of the shape of an egg much elongated, and sometimes flattened. These nodules are lined with Laumonite, a variety of zeolite lately described; the crystals of which are characterised by their extreme brittleness; so much so, that we could not preserve a single entire specimen. The outside of the nodules was coated with green earth.

77′ Part of one of the largest of the nodules.

78 Vesicular slaty clinkstone through which the former

79 passed. It likewise appeared to traverse greenstone, which also had a slaty structure, and contained much green earth. The mountain of Esian, and those which belong to the same range, are composed of varieties

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No. 79 of greenstone and amygdaloid, traversed by veins of basalt, such as have been described, and of jasper
80, of various colours. The veins have the vitreous coat-
81 ing on their sides. The jasper is often mixed with calcareous spar, and passes sometimes into opal jasper.
82 A specimen taken from the centre of a vein; it is much less compact than the jasper, and appears to have been an included portion of some other rock in an altered state. Sometimes the jasper, from decom-
83 position, is vesicular.
84, 85, Are varieties of jasper. The last specimen is inte-
86 resting, in so far as it shows the jasper passing into opal jasper, and from that into pitchstone.
87 Amygdaloid, containing agate.
88, 89 These two specimens are particularly deserving of notice, especially the last. A 88, is an amygdaloid containing calcareous spar in elongated vesicles. I do not wish to lay any particular stress upon this specimen, because it has been unfortunately damaged, and because certain appearances which it presents may be attributed to the effects of the weather. But as it was found along with the next specimen, I may state what strikes me in regard to it, in order to induce future travellers to attend particularly to the spot where these were found, which is in the face of rock on the shore of the Hval Fiord, before turning into the valley on the road to Houls. Several days might be well spent in this district.

The spar in A 88, is not attached closely to the sides or bottom of the vesicles, which are lined with a number of minute, round, yellowish coloured masses, which have left impressions on the spar.

A
No. 88, These are also seen in the body of the stone, and
89 must have lined the vesicles before the spar was formed. If the spar entered in a state of solution, it ought to have reached the bottom of the vesicles and adhered closely to the sides. If any empty space was left at all, it should have been in the heart of the spar itself; but A 89, which was found at the same place, exhibits marks of fusion which cannot be mistaken. I may here mention, that, among the debris of the rocks in this place, great quantities and varieties of slags were observed; but these did not at first excite particular attention, as we were at the time quite ignorant of whence they came. Nor did I take particular notice of the specimen under consideration, excepting as a slag, till I was repacking it to be sent home. This remarkable specimen contains calcareous spar; and is one which, together with others to be soon described, gave rise to the discussion in the chapter on Mineralogy. At this place there are fine calcedonies and zeolites.

The rocks near Houls consist of apparently hori-
90, 91, zontal beds of amygdaloid, porphyry slate, and of
92, 93, blackish pitchstone. Beyond this place masses of
94, 95, porphyritic pitchstone, of a dull black colour, were
96, 97 found; and also a species of tuffa, and a variety of wacke in a state of decomposition.

On the western side of the Hval Fiord, nothing particular occurred, all the rocks being greenstone or amygdaloid, excepting a variety of the former, of an
98 ash grey colour.

The following specimens illustrate the structure of the mountain of Akkrefell, and probably of almost

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No. 98 all the mountains in this part of Iceland. It was with difficulty and hazard that we obtained so complete a series of specimens, which are peculiarly interesting, as proving the existence of a new set of

B rocks in the structure of the crust of the earth.

1, 2, 3, Tuffa which appears on the shore near Indreholm.

4, 5 Amygdaloidal greenstone containing fine crystals of chabasie, or cubic zeolite, on the shore above the former.

6 Another tuffa, which formed the lowest visible bed of the mountain. It is similar to what is found in the Guldbringè Syssel; but no lava nor slags were observed in it. It contains cavities lined with minute crystals, unconnected with any included masses.

7, 8, 9, Amygdaloid from three different beds.

10 This fossil is very similar to red sandstone; but is in fact a fine grained tuffa. The mass of it which we saw, was not more than a foot thick, and was irregularly interposed between the beds.

11 to 16 Varieties of amygdaloid from different beds. The next specimen is wanting in the series, on account of the package having got wet, and the number having been lost.

18 to 22 Varieties of amygdaloid follow.

23 Is similar to B 10; and, being coarser, serves to elucidate the nature of that substance. Above, amygda-

25 loid again appears. One variety of it is very vesicular; some of the vesicles being empty, and others filled with chabasie, the crystals of which, in one instance, assume a stalactitic disposition.

No. 1 After experiencing great difficulty, we arrived at a bed,

the lower part of which was slaggy. Under some of
No. 2 the slags was a substance, apparently indurated lithomarga, of the same red colour as that which forms so prominent a feature in the aspect of the Giant's Causeway, and which abounds in many parts of the county of Antrim.

3 This specimen shews the junction of the slag with the rock.

4 The rock itself, which resembles the lava of Havnefiord, (A 44, 45.)

5 Above this we found amygdaloid, an unexpected occurrence in this situation, but we afterwards found it again in another part of the same mountain; the amygdaloid being placed between two beds, the lower
6, 7, 8, surface of which were slaggy.

9 From a vein of basalt, which cut the beds nearly in a perpendicular direction.

10 Part of the edge of the vein, vitreous at the sides.

Above this, to the top of the mountain, all the beds, except those of tuffa, were slaggy on the lower surface.

11, 12, Some were amygdaloidal as 11; and others compact
13 as 12; and some were vesicular and scorified looking throughout, as 13. One of the beds of tuffa was very large, not less than fifty feet thick, and contained slags and lava. Many of the included masses were several feet diameter. The average thickness of the beds composing this remarkable mountain, I suppose to be about 20 feet. Above this great bed of tuffa, were several beds slaggy underneath. The uppermost re-
15 sembles the Havnefiord lava.

This singular assemblage of rocks, which I have endeavour-

ed to show to be a series of lavas erupted at the bottom of the sea, I believe will be found to extend over the whole of Iceland; and it is very probable that the future researches of geologists will prove that the whole island has been produced by the agency of heat; the power and efficacy of which seems to be vastly underrated by many philosophers who have not seen or sufficiently considered its effects.

B

No. 26 Deposition of the hot springs near Leira.

27 Conglomerate, formed by the deposition of the same springs.

28, 29, 30, 31 Siliceous petrifactions, apparently of peat, containing roots; from the same place. These have been formed by more ancient springs, which no longer exist.

In passing over the eastern Skardsheidè, the same rocks, we had already observed, occurred; and among them pitchstone. In the vast precipices, which were everywhere exposed to view, we saw the finest possible display of the structure of the mountains; and recognised the tuffa, so often mentioned, at a great elevation. Zeolites and calcedonies were scattered about in abundance, but we did not see any that were remarkably fine.

The rocks of the Western Skardsheidè continued amygdaloidal, till we met with lava of the same nature as that at Havnefiord. Hills of tuffa were on every side. Leaving the defile which was filled with lava, nothing particular occurred till we met with a greenstone very highly crystallised, partly amygdaloidal, and partly porphyritic. The crystals of felspar occurred more than half an inch thick. Beyond the

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33, 34