

April 8, 1875.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

Pursuant to notice, the Right Hon. the Earl of Carnarvon and the Right Hon. William Edward Forster were balloted for and elected Fellows of the Society.

Pursuant to notice given at the last Meeting, Pierre J. van Beneden of Louvain, Joseph Louis François Bertrand of Paris, Alfred Louis Olivier Des Cloizeaux of Paris, Hippolyte Louis Fizeau of Paris, Elias Magnus Fries of Upsal, Jules Janssen of Paris, August Kekulé of Bonn, Gustav Robert Kirchhoff of Berlin, and C. Ludwig of Leipzig were balloted for and elected Foreign Members of the Society.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read :—

- I. "First Report of the Naturalist attached to the Transit-of-Venus Expedition to Kerguelen's Island, December 1874."
By the Rev. A. E. Eaton. Communicated by the President.
Received March 15, 1875.

To the Secretary of the Royal Society.

Royal Sound, Kerguelen's Island,
31st December, 1874.

DEAR SIR,—It is difficult, owing to the inexactness of the charts, to inform you of the positions of the Astronomical Stations in whose neighbourhood I have been able to work in this island. The German Station is in Betsy Cove, the American at Molloy Point, Royal Sound. The English Stations also are in this Sound, the second being situated about three miles N. by W. of Swain's Haulover. The first English Station is between these last two on the mainland, six or seven miles N.W. of Three-Island Harbour, in what will be called Observatory Bay. Two days before the Transit of Venus, a party under Lieut. Goodridge, R.N., was detached from the first English Station to observe the transit from a position which he selected near the base of Thumb Peak. I have not yet been able to visit Betsy Cove.

Observatory Bay is one of the minor inlets of a peninsula comprised between two narrow arms of the sea. One of these runs up from the sound, along the western flank of the hills adjacent to Mount Crozier, several miles, and terminates at a distance of three or four hours to the north of us, and about four miles from the inlet near Vulcan Cove. The other arm, opening nine or ten miles away to the southward, proceeds

in a north-easterly direction to within three or four miles of the former, and no great distance from Foundry Branch.

Besides the inlets of the sea, numerous freshwater lakes present obstacles to inland travelling. Some in this neighbourhood are two or three miles in length, but in general they are not more than a mile long. They are usually shallow, and appear to be uninhabited by fish. The bogs and streams in this vicinity are not impassable, but can be traversed with ease if ordinary care be taken.

The most salient features of the landscape are the basaltic hills, with irregular terraces of rock on their sides, and broken cliffs at their summits. In lieu of grass, their slopes are clothed with banks and boulder-like clumps of *Azorella selago*, excepting where rich damp loam affords a soil suitable for the *Acena* and the *Pringlea*. Here and there a fern (*Lomaria*) and grass (*Festuca*) grow in the interspaces of the other plants.

The climate of Royal Sound is far warmer and drier than we were led to expect it would be. In November the weather was very pleasant; since then it has deteriorated, though the snow has not again covered the ground as it did when we first arrived. Probably the previous accounts of its meteorology were based upon observations taken in parts of the island where bad weather prevails; or it may be that the condition of the country in winter has been presumed to be constant throughout the year. In one respect we were rightly informed; for usually when there is no breeze there is a gale. A calm day is an exceptional event. Meteorological observations are being taken in Observatory Bay on board the 'Volage' and by the sappers on shore.

Corresponding with the unlooked for superiority in climate, a difference is noticeable in the vegetation of this part of the island. Some plants which occur at both extremities of the country display, in Royal Sound, marks of luxuriance. For instance, *Pringlea antiscorbutica*, which is elsewhere apetalous, here, in sheltered places, frequently develops petals—some flowers in the same inflorescence possessing one petal only, others having two, three, or four. And the petals are not always of a pale greenish colour, but occasionally are tinged with purple. Again, *Lomaria alpina*, which is mentioned in the flora as rare in the neighbourhood of Christmas Harbour, is excessively common and very finely grown here. There are also more species of flowering plants and of the higher orders of Cryptogamia here than were found by the Antarctic Expedition at the north of the island; but there are fewer species of Mosses, Lichens, and Algæ. Their paucity, in comparison with those of the other district, is probably due to the nature of the rocks on land, and to the seclusion of the bay from the open sea. The additions to the flora are for the most part Falkland-Islands species.

In speaking of the climate, it may be mentioned that the plants of Ker-guelen's Island are not (as was supposed) in flower throughout the year;

but, probably, some of them do not cease flowering until late in the winter. When we first arrived in Royal Sound the ground was covered with snow, and scarcely any thing had begun to come out. The *Pringlea* was far advanced in bud, barely commencing to blossom. The *Acœna* was just beginning to burst into leaf. About the first week in November, *Festuca Cookii* came out, and, a few days later, *Azorella selago*. The young fronds of the ferns were just about to unroll. In the third week of the same month, *Montia fontana* and *Acœna affinis* were in flower in a sheltered spot, and *Leptinella plumosa* was first found in blossom. *Galium antarcticum* appeared about the same date. A week later, *Ranunculus hydrophilus* and a *Festuca* (*purpurascens*?) were out, and *Lycopodium clavatum* was sprouting. By the middle of the month, *Trioida* and *Lyallia kerguelensis* and also *Ranunculus crassipes* were in flower; the *Pringlea* was everywhere past flowering (excepting upon the mountains), and *Aira antarctica* began to shoot forth its panicles. Before the end of the month a *Carex* came out; but *Bulbiarda* and other plants delayed still.

A few species of Mammals have been introduced into the island. Mice (evidently *Mus musculus*, L.) are common along the coast, and have been found by us in various places. The Rabbits, transported by order of the Admiralty, from the convict settlement in Table Bay have been landed by H.M.S. 'Volage' in Royal Sound. They share with the birds holes of the Petrels, and are (it is almost superfluous to mention) propagating freely. Their favourite food is the *Acœna*; but they occasionally eat *Pringlea*-leaves and gnaw away the green surface of *Azorella*. In the Crozettes, whose climate and flora are said to resemble those of this island, rabbits have become extremely abundant, and so rank and coarse that the sealers will not eat them. Goats are increasing in numbers on the leeward side of the mainland.

Whales and Porpoises occasionally enter the Sound. Old skulls of the latter, wanting the lower jaw, are cast up here and there on the beaches.

Up to the present time, I have captured only two species of Seals—a female Sea-Leopard and two males of a Platyrrhine Seal. The other kinds frequent the more open parts of the coast and islands.

Twenty-two species of birds at the fewest, perhaps twenty-three, frequent Royal Sound, viz. a *Chionis*, a Cormorant, a Teal, a Tern, a Gull, a Skua, eleven (perhaps twelve) Petrels, two Albatrosses, and three (perhaps four) Penguins. Of these I have procured eggs of the first six; also of six Petrels, one Albatross, and two Penguins. The *Thalassidromæ* are preparing for laying.

Fish are rather scarce in Observatory Bay. Only three species have hitherto occurred to us, two of which are common under stones at low water. The remains of a *Raia* have also been picked up on one of the islands by an officer of the 'Volage;' but hardly sufficient is left to enable the species to be determined. It is allied to *R. clavata* and *R. radiata*.

The entomology of the island is very interesting. Most of the larger insects seem to be incapable of flight. I have found representatives of the orders Lepidoptera, Diptera, Coleoptera, and Colembola.

The Lepidoptera comprise a species of the *Noctuina* (as I suppose) and one of the *Tineina*. Of the first I have not yet reared the imago; the larva is a moss eater and subterranean: the adult is probably as large as an *Agrotis* of medium size. The species of *Tineina* is probably one of the *Gelechidæ*, judging from the form of the palpi. Its larva feeds on young shoots of *Festuca*, and sometimes spins a silken cocoon for the pupa. The imago, of which the sexes are alike, has acute and very abbreviated wings, and the posterior pair extremely minute. In repose the antennæ are widely separated and almost divaricate. When the sun shines the adult is active, and, if alarmed, jumps to a distance of two or three inches at a time. During its passage through the air the wings are vibrated.

The Diptera are represented by species of the Tipulidæ and Muscidæ. There are three of the former family. One of them is a small species of the Cecidomyidæ, which is abundant in mossy places, and presents no marked peculiarity. Another seems to be a degraded member of the Tipulidæ. The antennæ have six joints, the palpi two; the wings are ligulate and very minute. It possesses halteres, and the female has the ovipositor enclosed in an exposed sheath. Although it is unable to fly, it lives upon rocks in the sea which are covered at high water, and there it deposits its eggs in tufts of *Enteromorpha*. The third species has full-sized wings; it was caught in the house. The indigenous Muscidæ are very sluggish in their movements, and are incapable of flight. Four species are common about here. One of them is abundant on *Pringlea*, crawling over the leaves. When it is approached it feigns to be dead, and, tucking up its legs, drops down into the axils of the leaves; or, if it happens to be upon a plane surface, one need only look at it closely and it throws itself promptly upon its back and remains motionless until the threatened danger is over, when it gradually ventures to move its limbs and struggle to regain its footing. Its wings are represented by minute gemmules, and it possesses halteres. The ovipositor is extended, its apical joint alone being retracted. The penis is porrected beneath the abdomen, where it fits into a notch at the apex of the penultimate segment. The larva feeds on decaying vegetable matter. Another species occurs on dead birds and animals, as well as beneath stones near the highest tide-mark. It is completely destitute of even the vestiges of wings and halteres. The sexual organs are concealed. It and the preceding species are rather smooth. A third species, slightly hairy, is common amongst tide-refuse and on the adjacent rocks, which are coated with stunted *Enteromorpha*, on which plant, *inter alia*, the larva feeds. It has very small triangular rudiments of wings, slightly emarginate near the apex of the costa, and possesses halteres. The sexual organs are not exposed. The fourth species occurs amongst grass growing

along the shore and also in Shag-rookeries. Its linear and very narrow wings are almost as long as the abdomen. It can jump, but cannot fly. The sexual organs are retracted.

A *Pulex* is parasitic upon *Halidroma*, and one (possibly the same species) on *Diomedea fuliginosa*.

Coleoptera are not uncommon. The larger species seem to have their elytra soldered together. There is a small species of the Brachelytra.

Several species of *Nirmidae* have been obtained.

Two *Podura* (one black, the other white) are plentiful.

There appear to be few species of Spiders, though individuals are numerous. Penguins and some of the other birds are infested with Ticks. The remaining Arachnida are related to *Cribates*.

The Crustacea, Annelida, Mollusca, and Echinodermata, in this part of the island, have probably been collected by the 'Challenger' more extensively than I have been able to do; therefore I need not particularize further about them than to state that Entomostraca abound in the lakes; an earthworm is common, and a land-snail is very plentiful amongst the rocks on the hills. This last appears to appreciate comparative heat, for specimens obtained in an exposed place, during the frosty weather, were assembled together for warmth under the drip of an icicle.

In Observatory Bay, Cœlenterata are not numerous. One or two species of Actiniidæ on the rocks and *Macrocystis*-roots, and an Ilyanthid in mud, are the only Actinozoa I have met with. The Hydrozoa similarly have afforded only three species—a Corynid, a Campanularian, and a *Sertularella*.

There are several Sponges.

With the exception of *Limosella aquatica*, and perhaps *Agrostis antarctica*, I have obtained all the flowering plants and ferns given in the 'Flora Antarctica' as indigenous to the island. Besides these, *Ranunculus hydrophilus* and another species, a *Carex*, a *Festuca* (probably *F. purpurascens*; but I have no work containing descriptions of the flowering plants), *Polypodium vulgare*, a fern allied to *Polypodium*, and *Cystopteris fragilis* have occurred to me. There is also a plant which appears to belong to the Juncaceæ. *Lycopodium clavatum* and *L. selago* are common about here. None of the Mosses, Hepaticæ, or Lichens have been worked out as yet; but amongst them are one or two species of *Cladonia*, and some examples of *Lecanora paleacea*. Fungi are represented by *Agaricus* (*Psalliota*) *arvensis*, *Coprinus atramentarius*, and a peculiar parasite on *Azorella*, which grows out from the rosettes in the form of a clear jelly, which becomes changed into a firm yellowish substance of indefinite form. There are also some *Sphæriacei* on grass and dead stems of plants. At present few additions have been made to the marine flora. The larger Algæ in Royal Sound are usually not cast upon the shore by the waves, and I have almost been entirely dependent upon grapples thrown from the rocks for specimens of the more delicate forms. *Polysiphonia Sullivanæ*

and *Rhytiphloea Gomardii* are amongst the novelties. A large number of zoological and botanical specimens have been lost through my inability to attend to them in time without assistance. This has principally affected the number of duplicates; but in one instance it has led to the loss of a species—one of the Petrels, which was the commonest bird about here when we first arrived. Fortunately it is a well-known species.

The 1st of March is announced as the approximate date of our sailing from Kerguelen's Island. Five weeks later I hope to arrive at the Cape and to forward to you such of the specimens collected as require only ordinary care in their transmission. The more fragile things are likely to reach you in better condition if I keep them until my return to England, than they would if they were sent with the others.

I am, dear Sir,

Faithfully yours,

A. E. EATON.

II. "Experiments to ascertain the Cause of Stratification in Electrical Discharges *in vacuo*." By WARREN DE LA RUE, HUGO W. MÜLLER, and WILLIAM SPOTTISWOODE. Received February 24, 1875.

Some results obtained in working with a chloride-of-silver battery of 1080 cells in connexion with vacuum-tubes appear to be of sufficient interest to induce us to communicate them to the Society, in anticipation of the more detailed account of an investigation which is now being prosecuted, and which it is intended to continue, shortly, with a battery of 5000 cells, and possibly with a far greater number.

The battery used up till now consists of 1080 cells, each being formed of a glass tube 6 inches (15·23 centims.) long and $\frac{3}{4}$ of an inch (1·9 centim.) internal diameter; these are closed with a vulcanized rubber stopper (cork), perforated eccentrically to permit the insertion of a zinc rod, carefully amalgamated, $\frac{3}{16}$ (0·48 centim.) of an inch in diameter and 4·5 inches (11·43 centims.) long. The other element consists of a flattened silver wire passing by the side of the cork to the bottom of the tube and covered, at the upper part above the chloride of silver and until it passes the stopper, with thin sheet gutta percha for insulation, and to protect it from the action of the sulphur in the vulcanized corks; these wires are $\frac{1}{16}$ of an inch (0·16 centim.) broad and 8 inches (20·32 centims.) long. In the bottom of the tube is placed 225·25 grains (14·59 grms.) chloride of silver in powder; this constitutes the electrolyte: above the chloride of silver is poured a solution of common salt containing 25 grammes chloride of sodium to 1 litre (1752 grains to 1 gallon) of water, to within about 1 inch (2·54 centims.) of the cork. The connexion between adjoining cells is made by passing a short piece of india-rubber tube