As a matter of fact, any one who will take the trouble to read Dr. Calmette's papers and Prof. Fraser's, will find that the sole credit of discovery in this matter rests with Dr. Calmette, who worked under the direction and with the suggestions of Dr. Roux.

It would be interesting to know whether the *Annales de l'Institut Pasteur* are accessible to Prof. Fraser, and whether he thinks that his vague reference to Calmette's detailed researches, and his designation of the interval between May 1894 and June 1895, as "a few months," are calculated to give to the British public a fair notion of the merit in this matter of his French colleague.

E. RAY LANKESTER.

Oxford, November 28.

The Maerjelen Lake.

A CORRESPONDENCE which I was recently the innocent cause of initiating in the *Standard*, revealed a very remarkable conflict of evidence touching the question of how often and to what extent the Maerjelen Lake[1] has of late years emptied itself. As I pointed out, the rare phenomenon of a total discharge of the lower basin through the Aletsch glacier recurred last September; whilst in the great majority of cases, a pool more or less deep is left in that basin, and the upper, more shallow basin is never quite empty.

Considering the grandeur of the emptying of the lake as an Alpine phenomenon, it might reasonably be expected that those who are fortunate enough to witness it, would take the trouble to note the dates and facts accurately. Such, however, is rarely the case, for many eye-witnesses are so led away by their enthusiasm at the time, and so deceived by their memory afterwards, that their evidence is often flatly contradictory, and hence of little or no value. This is strikingly illustrated by the public correspondence referred to, as well as by private letters and other information I have received since.

It would lead too far to enumerate all the vague and contradictory statements, both as regards dates and facts. Suffice it to mention that, while some eye-witnesses infer a total emptying of the lake simply from having seen a rush of water along the surface of the Aletsch glacier, others draw the same inference from the fact that they saw the lake empty. But neither of these inferences affords proof of a total discharge; for in the first case, only a partial discharge may have taken place, such as last occurred in September 1894, and in the second case, the lake, unless it was seen full the day or a few days before, may have been partially or completely empty for months. A partial emptying is of frequent occurrence; but the only true test of a total discharge, as authentically recorded, *e.g.* in 1864, 1878, 1887, and 1895, is the exposure of the glacier wall to its full depth of at least 150 feet immediately after the event. Some years ago, Prof. F. A. Forel gave a list of the recorded discharges (without special reference to partial or total discharges) up to 1890);[2] but even that list cannot, and, I believe, does not lay claim to completeness and strict accuracy.

The occurrence of September this year is of peculiar interest, because it shows that, notwithstanding the recently completed artificial overflow tunnel to the Viesch glacier, the Maerjelen Lake prefers its old outlet through the Aletsch glacier.

C. S. DU RICHE PRELLER.

The Former Northward Extension of the Antarctic Continent.

I SHOULD not presume to draw the attention of your readers to this much-discussed topic without having a new fact to contribute. The opportunity of loading still further the already overweighted scale which now dips so deeply in favour of the notion of a former northward extension of the Antarctic continent, has been afforded me by the kindness of Prof. Parker, F.R.S., of Otago, New Zealand. He has forwarded to me a few worms collected in Macquarie Island, which lies to the south of New Zealand, about half-way between it and the land of the southern continent. These belong partly to the almost world-wide *Pachydrilus*, and one species—a new one—is referable to the earthworm genus *Acanthodrilus*. The importance of this latter species is that it is firstly an *Acanthodrilus*, and secondly that it is closely allied to a group of Patagonian and South Georgian species of the same genus, and is less like any New Zealand form. It is to me a matter of surprise that Dr. H. O. Forbes, in his recent and important essays upon this question, has ignored the distribution of earthworms, which are so thoroughly wedded to the soil, and (except in a few cases) so impatient of sea-water. I have attempted to rectify this state of affairs in a text-book of zoogeography, lately issued by the Cambridge University Press. In Patagonia and some of the islands immediately to the southward, only two genera of indigenous earthworms, so far as is known at present, exist. These are *Acanthodrilus* and *Microscolex*. Of the former there are nine species, and of the latter five; but five species of *Microscolex* and two species of *Acanthodrilus*, in addition to those referred to, range northwards into Chili, which zoologically is indistinguishable from Patagonia. Let me emphasise the point that these are the only two genera which occur in these latitudes, save for a species or two of the European *Allolobophoba*, which is universal in range—thanks probably to direct exportation by man. In Kerguelen and Marion Islands but one species of earthworms has been found, which is an *Acanthodrilus*. In New Zealand there are nine species of *Acanthodrilus*, also six species belonging to genera that are very nearly akin to *Acanthodrilus*, and three species of *Microscolex*. The remaining six species of *Microscolex* are South and Central American to the extent of four, while the two remaining are from Tenerife and Algeria. Of *Acanthodrilus*, the only species left, after deducting those already enumerated, are one from the Cape of Good Hope, one from New Caledonia, and three from Western and North Australia. Besides these forms New Zealand possesses a single Perichætid worm and Schmarda's species, *Hypogæon orthostichon*, which I have recently (a "Monograph of the Order Oligochæta," Oxford, at the Clarendon Press) referred to the characteristically Australian genus *Megascolides*. It is clear that, if the former northward extension of the Antarctic continent is not believed, some explanation of these remarkable facts is much wanted; on that hypothesis they are perfectly explicable.

FRANK E. BEDDARD.

Zoological Society's Gardens.

The Feeding Ground of the Herring.

I HAVE no desire to set aside lightly the observations of Profs. Herdman, Brady, Scott, or any other scientific gentleman, as suggested by Mr. Calderwood in your issue of November 21. There is no evidence that these gentlemen have made any systematic examination of the deep waters of Loch Fyne, whereas I have carried out investigations of this kind during many years at all seasons under the direction of Dr. Murray and Dr. Mill, and I think Prof. Herdman set these observations very lightly aside in his Ipswich address.

If various kinds of tow-nets be dragged through the surface waters of Loch Fyne, down to a depth of 20 fathoms, at the present time of the year, probably not a single specimen of red-coloured *Calanus*, *Euchæta*, *Nyctiphanes*, or *Boreophausia*, will be captured, and these animals I hold make up nine-tenths of the bulk of the food of the herring in Loch Fyne. If the same nets be dragged near to the mud at the bottom in depths between 70 and 100 fathoms, immense numbers of these Crustaceans will be taken; and this state of matters practically holds good throughout the whole year, these Crustaceans being always found at the bottom and rarely at the surface. It occasionally happens, however, that at quite local spots some of these deep-sea Crustaceans rise or are drawn up to the surface, and being carried out of their natural habitat are killed there, and are blown upon the shore, where they form a red line along the beach. It must be remembered, however, that this is quite an exceptional occurrence. On several occasions we wished to send to Inveraray living specimens of *Nyctiphanes*, in order that their brilliant phosphorescence might be exhibited. These were captured in large numbers in the trawl sent down to 70 fathoms, but we found that they were all killed as soon as they were put into the jars, which we afterwards found had been filled with the somewhat fresh water floating on the surface of the loch; it was only by collecting water from the deeper layers that a few specimens could be preserved alive. On other occasions, after a long spell of dry weather, there was no difficulty in keeping large numbers of *Nyctiphanes* alive for a long time, and on one occasion I conveyed many bottles filled with these Crustaceans to Edinburgh, and exhibited them at an evening meeting of the Royal Society.

The very fact that Mr. Calderwood was able to scoop up red-

[1] *Vide* NATURE, 1887, vol. xxxvi. p. 612. T. G. Bonney.
[2] "Variations Périodiques des Glaciers des Alpes." S. A. C. 1890, p. 358.