the body becomes incandescent." Both Prof. Armstrong and Dr. Welsbach attribute the importance of the special composition of the mantle to this particular mixture forming a solid solution of a dilution favourable to the occurrence of the oscillatory changes.

We have endeavoured to put forward a summary, of necessity brief, of some of the principal theories which have been advanced to account for the luminosity of the mantle. Although it is true that some of these theories, if regarded as individually sufficient to account for the phenomena, lead to conclusions mutually inconsistent, yet there is no reason why they should not all contain some part of the truth, unless the experiments of Messrs. White, Russell and Traver be considered as sufficiently conclusive against the idea of the mantle being hotter than the flame. Such a result does not preclude the possibility of catalytic action, for the additional energy thereby developed may be all dissipated in luminous radiations. It seems that the most satisfactory explanation that the present experimental data justify is that the high luminosity is due to a combination of the good radiating power, the high temperature and the selective emissivity of the mantle. The first accounts for the high candle-power at the temperature attained; the second, which is due partly to the selective emissivity diminishing the useless radiation losses and partly, no doubt, to the catalytic action of the ceria molecules, is responsible for the high luminous efficiency of the light, so far as this is a function of the temperature; whilst the third, most probably due to the recurrent chemical changes, accounts for the high luminous efficiency so far as it is a function of the material. Thus all these causes, operating together and assisting one another, combine to produce one of the most efficient artificial illuminants that the ingenuity of man has devised.

MAURICE SOLOMON.

THE EXPLANATION OF A REMARKABLE CASE OF GEOGRAPHICAL DISTRIBUTION AMONG FISHES.

MOST text-books and papers discussing geographical distribution have made much of the range of a genus of small fishes, somewhat resembling trout, the Galaxias, commonly described as true fresh-water forms, which have long been known from the extreme south of South America, New Zealand, Tasmania and Southern Australia. The discovery, within the last few years, of a species of the same genus in fresh water near Cape Town, whence it had previously been described as a loach by F. de Castelnau, has added to the interest, and has been adduced as a further argument in support of the former existence of an Antarctic continent. In alluding to this discovery when discussing the distribution of African fresh-water fishes in the introduction to my work "Les Poissons du Bassin du Congo," in 1901, I observed that, contrary to the prevailing notion, all species of Galaxias are not confined to fresh water and that the fact of some living both in the sea and in rivers suffices to explain the curious distribution of the genus; pointing out that in all probability these fishes were formerly more widely distributed in the seas south of the tropic of Capricorn and that certain species, adapting themselves entirely to fresh-water life, have become localised at the distant points where they are now known to exist. Although as recently as October last the distinguished American ichthyologist D. S. Jordan wrote (*Science*, xiv. p. 20) "We know nothing of the power of Galaxias to survive submergence in salt water, if carried in a marine current," it is an established fact, ascertained some years ago by F. E. Clarke in New Zealand and by R. Vallentin in the Falkland Islands, that *Galaxias attenuatus* lives also in the sea. In New Zealand, it periodically descends to the sea, where it spawns, from January to March, and returns from March to May. In accordance with these marine habits, this species has a much wider range than any of the others, being known from Chili, Patagonia, Tierra del Fuego, the Falkland Islands, New Zealand, Tasmania and Southern Australia.

I now wish to draw attention to a communication made by Captain F. W. Hutton in the last number of the *Transactions* of the New Zealand Institute (xxxiv. p. 198), "On a Marine Galaxias from the Auckland Islands." This fish, named *Galaxias bollansi*, was taken out of the mouth of a specimen of *Merganser australis* during the collecting excursion to the southern islands of New Zealand made in January, 1901, by His Excellency the Earl of Ranfurly.

It is hoped that by giving greater publicity to these discoveries, the family Galaxiidæ will no longer be included among those strictly confined to fresh waters and that students of the geographical distribution of animals will be furnished with a clue to a problem that has so often been discussed on insufficient data. As observed by Jordan (*l.c.*), "all anomalies in distribution cease to be such when the facts necessary to understand them are at our hand."

Of the fresh-water species of Galaxias, eight are known from New Zealand and the neighbouring islands, seven from New South Wales, three or four from South Australia, one from West Australia, two from Tasmania, seven from South America, from Chili southwards, and one from the Cape of Good Hope.

G. A. BOULENGER.

LOCAL MAGNETIC FOCUS IN HEBRIDES.

IN the course of a recent survey in the Hebrides, Captain A. Mostyn Field, in H.M.S. *Research*, found and examined an area in the entrance of East

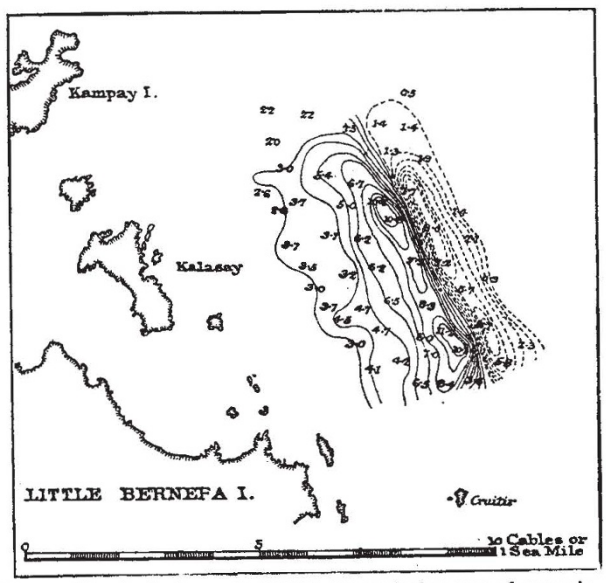

FIG. 1.—Examination in 1902 by H.M.S. *Research* of an area of magnetic disturbance in East Loch Roag, Lewis.
Lines of equal disturbance westerly from the normal declination shown in continuous line.
Lines of equal disturbance easterly from the normal declination shown in broken line.
Normal declination 22° W.
The figures express degrees and decimal parts.
Depth of water over area from 15 to 17 fathoms.

Loch Roag, Lewis, where there is considerable local magnetic disturbance. A plan showing the deviation from the normal declination of the compass needle at