Guinea) might be collected into a Melanesian sub-region, and subordinated to the Oriental Region. Since I have elaborated these views in another place, I will here limit my argument to a couple of supporting references.

(1) When Dr. Wallace first returned from his Eastern travel his impression of a natural region was one "extending from the Nicobars in the north-west to San Christoval, one of the Solomon Islands, on the south-east, and from Luzon on the north to Rotti, at the south-west angle of Timor, on the south" (Report British Assoc. 1863, *Trans.* p. 107).

(2) Dr. W. Botting Hemsley has stated: "There is no doubt that the combined Fijian, Samoan and Tongan flora is eminently Malayan in character" (*Journ. Linn. Soc.* Botany, xxx. p. 211).

To map New Zealand thus as an extreme and impoverished outlier of the Oriental or Malayan Region would express but a part of her affinities, since it would ignore the Antarctic relationship. But zoo-geographic problems are too complex to be expressed in terms of colour on a map. If, however, New Zealand and related areas must be forced into one or other of the recognised divisions, then I submit that this arrangement would do less violence to nature than that accepted in the text-books.

Australian Museum. CHARLES HEDLEY.

Mercury Jet Interrupters.

MY attention was attracted recently by a brief notice that appeared in NATURE of March 1 (p. 421) of a new form of mercury jet interrupter devised and placed on the market by Messrs. Isenthal, Potzler and Co.

As that form of break appeared to be of interest to the readers of NATURE, a short description of one that I designed some months ago, along similar lines, may be of interest to some.

While experimenting with wireless telegraphy an interrupter of great frequency of break seemed desirable, and as I wanted also to know the rate of interruption accurately, it was deemed best to use some form of mechanical one. After investigating several kinds, the following one was finally decided upon as the most promising:—

An iron vessel, arranged as a Mariotte flask to maintain a constant head, holding about a pint of mercury, formed one terminal and a metallic plate the other. The plate was arranged below the vessel, and the mercury fell upon it, completing the circuit. In the bottom of the flask was a row of ten holes, arranged around in a circle, with nozzles fitted into them. On a vertical shaft, concentric with the row of nozzles, a series of mica sectors were arranged, so that, when revolving, they would cut the mercury jets falling from the vessel above. These strips were placed with the line of their edges parallel to the axis of the shaft. Thus they would break the circuit in several places at the same instant, giving a very sharp break.

It was found better to break the circuit by interposing an insulator than to break by opening the circuit with a conductor, as the wear at the spark tended to keep them all equal, so they automatically adjusted themselves to the best positions.

The object of the row of jets was to get a more rapid interruption. To break a single jet in five or six places simultaneously, and at the same time with a satisfactory frequency, was found to require too great a head and velocity of jet to be practicable, so by adopting a row of ten the frequency could be increased that many times. These jets are all in parallel, and when the mica strips are revolving the head is so adjusted, by the Mariotte flask arrangement and screws on the sides of the reservoir, that at the instant of interruption of one jet, all the others are in a state of interruption; but the one directly in front of the mica strips will be the first to make the circuit. Thus it continues to break at a rapid rate.

Greater rapidity of break can easily be obtained by increasing the speed, by increasing the number of nozzles, by increasing the number of sets of mica strips, or by any combination of the three.

This form of interrupter will be found quite useful to any one desiring a known rate, high frequency interrupter.

S. M. KINTNER.

Western University of Penna, Allegheny, Pa., April 2.

Tyndall's Ice Crystals.

WOULD you, or some of your readers, kindly inform me whether the ice crystals, as shown in Tyndall's "Form of Water," p. 33, are considered to represent skeleton crystals or solid ones arranged in patterns? J. A.

Tunbridge Wells, April 14.

MARINE ZOOLOGY IN AUSTRALIA.[1]

IN these columns was noticed recently the admirable activity of the various Australian museums in making known to science the natural objects of southern lands and seas. On that occasion it was an important addition to our knowledge of mammalian palæontology—Prof. Stirling's description of *Diprotodon* remains—that was especially under discussion. Now we have to record equally important investigations in marine zoology undertaken by the staff of the Australian Museum, Sydney.

Besides "guides" and "miscellaneous publications," the Sydney Museum issues a series of "records" for minor papers; "catalogues," which are large and fully illustrated, contain descriptions of many new species, and are really in some cases monographs; and "memoirs," such as the natural history of Lord Howe Island (1889); that on the Atoll of Funafuti more recently, in ten parts; and, finally, the "Scientific Results of the Trawling Expedition of H.M.C.S. *Thetis*," of which Part i. is now before us. From the introduction, by Mr. Edgar R. Waite, we learn that this expedition was the outcome of a desire on the part of the Government of New South Wales to investigate the trawl fisheries of their coast. In 1898 H.M.C.S. *Thetis* was commissioned, the expedition was financed by the Colonial Government, and an experienced North Sea trawler was obtained, upon whose skill depended the successful working of the apparatus. Finally, the Trustees of the Australian Museum were asked to appoint one of their officers to join the expedition, and Mr. Waite was selected to act in that capacity. He tells us how a large and valuable collection was obtained and preserved (not without considerable difficulty, as experience showed that the *Thetis* was a most unsuitable vessel for the purpose), and promises that the various groups will be dealt with in detail by members of the museum staff in succeeding parts of the memoir. An "Addendum to the Introduction" on fishing with electric light—not yet brought to perfection—concludes with the sentence: "I lowered an incandescent lamp in a tow-net, and obtained a number of small invertebrates, thus reproducing the experiments conducted at the Liverpool Biological Station" (p 132). He does not tell us what the forms were which were obtained in the illuminated net. In the Liverpool experiments they were all actively swimming forms provided with eyes.

The remainder of the present part contains Mr. Waite's report upon the fishes. One hundred and seven species were taken, representing ninety-five genera, including one new genus, viz. *Paratrachichthys* (formed for *Trachichthys trailli*, Hutton). Nine new species are described, a number of others are new records for the colony. But it is very evident that, as Mr. Waite says, "the interest of the results is, however, not exhausted by an enumeration of the new or rare species; the expedition has been the means of materially extending the known range, both geographically and vertically, of several of our common food fishes. The breeding season of one or two species has been ascertained, . . . and our knowledge of the habits of the soles has also been extended." As the trawling was for the most part not carried on in really deep water, but within the limit reached by line fishermen, the scientific and economic success was all the more marked. As an example of the latter may be taken the information as to *Zeus australis*, a rare and valuable food fish, which was found under circumstances indicating that it may yet take its place as a popular and cheap food fish.

Of the nine new species described, perhaps the most interesting is the "ghost-shark" (*Chimaera ogilbyi*),

[1] Australian Museum, Sydney. Memoir IV. "Scientific Results of the Trawling Expedition of H.M.C.S. *Thetis*," &c. Part i. Pp. 132; 31 plates, frontispiece, and a chart. (Sydney, 1899.)