

students in the graduate departments, 909 in the College of Science, Literature and the Arts, and 181 in the College of Engineering, Metallurgy and the Mechanic Arts. 307 degrees were conferred at the commencement exercises on June 3d.

Of the £30,000 immediately required towards the endowment fund of the new Sheffield University College £24,000 has already been subscribed.

DR. A. HILL, Master of Downing College and lecturer on human anatomy, has been elected Vice-Chancellor of Cambridge University for the coming year.

AT Columbia University Mr Herbert M. Richards has been appointed tutor in botany; Dr. James Ewing, instructor in clinical microscopy; Dr. Charles Norris, tutor in pathology; Mr. Benjamin Jakish, assistant in chemistry; Mr. William E. Day, assistant in physics, and Mr. James H. McGregor, assistant in zoology.

AT the Teachers' College, New York, Mr. Richard E. Dodge has been promoted to a professorship of geography, and Mr. C. E. Bickle to an associate professorship of mathematics.

DR. CHARLES ST. JOHN, of the University of Michigan, has been made professor of physics at Oberlin College.

PROFESSOR WILLIAM A. ROGERS has resigned from the chair of physics and astronomy at Colby University, and it is reported that he has accepted a professorship of physics at Alfred University.

DISCUSSION AND CORRESPONDENCE.

THE DISTRIBUTION OF MARINE MAMMALS.

TO THE EDITOR OF SCIENCE: The interesting memoir of Dr. P. L. Sclater 'on the Distribution of Marine Mammals' (SCIENCE, V., 741-748) ignores previous investigators, and the general reader might, therefore, receive the idea that the subject under consideration has been entirely neglected by other writers, and would be also liable to suppose that his 'six sea-regions' were of equal value. In both postulates he would be entirely mistaken. The bearings of marine mammals on zoogeography and the differentiation of the 'regions' into primary

and secondary ones have been frequently considered by others.

Dr. Sclater considers that, "for the geography of marine mammals, the ocean may be most conveniently divided into six sea-regions, which are as follows:—"

- 'I. *Regio Arctatlantica.*'
- 'II. " *Mesatlantica.*'
- 'III. " *Indopelagica.*'
- 'IV. " *Arctirenica.*'
- 'V. " *Mesirenica.*'
- 'VI. " *Notopelagica.*'

The characteristic types of each of these regions are named, but Dr. Sclater has evidently overlooked some sources of information and hence has unduly restricted certain forms. Thus, the *Balæna mysticetus* is by no means 'peculiar to Arctatlantis,' but has been the object of an extensive fishery north of Bering strait.* Nor are *Delphinapterus* and *Monodon* 'not found elsewhere,' for they also occur in Arctirenia. Further, *Berardius* is not restricted to the Notopelagian area, for a species occurs in the North Pacific.† It follows that these extensions of the ranges of the several genera diminishes the value of the regions supposed to be distinguished by their exclusive possession. If we have regard for the most characteristic aggregates of sea mammals, we are led to three primary divisions, viz:

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|-------------|---|--------------------------------|
| Arctalian | { | I. <i>Regio Arctatlantica.</i> |
| realm. | { | IV. " <i>Arctirenica.</i> |
| Tropicalian | { | II. " <i>Mesatlantica.</i> |
| realm. | { | III. " <i>Indopelagica.</i> |
| | { | V. " <i>Mesirenica.</i> |
| Notalian | { | VI. " <i>Notopelagica.</i> |
| realm. | { | |

The Arctalian realm is characteristic from the development of the Phocine Phocids, the Odobænids or 'Trichechidæ' and the Delphinapterine Delphinids. The North Atlantic and North Pacific 'sea-regions' are distinguished from each other by features of much inferior importance.

The Tropicalian realm is remarkable for the development of the existing Sirenians and likewise of numerous Delphinine Del-

*See Dall in SCIENCE (n. s.), V., 843, May 28, 1897.

†*Berardius bairdii* Stejneger, Proc. U. S. Nat. Mus., VI., 75, 1883.

phinids, and it is also the home of Phocids more nearly related to the Phocines than the Lobodontines (though often associated with the later), but of a more generalized type than either and probably entitled to subfamily distinction—the Monachinae. The subdivisions of this realm, so far as the marine cetaceans are concerned, are of very subordinate importance, and the restrictions of the Monachine seals and different families of Sirenians are the most noteworthy characteristics.

The Notalian realm is specialized by the development therein of a peculiar subfamily of seals—the Lobodontine Phocids.

These three realms were distinguished as early as 1875 and named in 1877.* They are well fitted for the expression of the facts of distribution of the marine mammals, but for those respecting other classes two transition realms appear to be advisable—the Pararctalian and Antarctic, and doubtless two others—the Pelagalian and Bassalian—should also be recognized. If the last are adopted most of the cetaceans should rather be relegated to the Pelagalian realm. I venture to add the opinion that the realms thus advocated are much better comparable with Dr. Sclater's land-regions than are his own sea-regions.

THEO. GILL.

MR. T. L. SCLATER, in his very interesting paper, 'On the Distribution of Marine Mammals' (SCIENCE, May 14, 1897), makes the following remarks on the seals of the Galápagos (p. 742): "There are well founded traditions of eared seals having been formerly met with in the Galápagos, while they still occur on the coast of Peru and Chili."

Two species of seals are found on the Galápagos, as has been stated by J. A. Allen† in the extensive work on the North American Pinnipeds. *Otaria jubata* (Forster) and *Arctocephalus australis* (Zimmermann), of both speci-

mens, have been collected by the Hassler expedition (1872), which are preserved in the Museum of Comparative Zoology, Cambridge, Mass.

Otaria jubata (Forster) is still quite common on the Galápagos. I have met it on Chatham, Charles, Hood, Gardner, Barrington, South Albemarle, Duncan, Jervis and James. They are found in considerable numbers, especially on Hood and Gardner, Barrington and Duncan. On the latter some of the rocks, where they move about, are polished absolutely smooth.

I have not seen any specimens of *Arctocephalus australis* (Zimmermann), but whether they are extinct or not I do not dare to say.

The presence of *Spheniscus mendiculus* (Sundevall), a penguin peculiar for the Galápagos is interesting.

The most extensive data on the seals of the Galápagos and the seals of the South Pacific and Antarctic Ocean are given by Benjamin Morrell (a narrative of four voyages to the South Sea and South Pacific Ocean, Indian and Antarctic Ocean from 1822 to 1831. 8°. New York, 1832).*

The seals have been mentioned already by the first discoverer of the Galápagos, Fray Tomás de Berlanga, † obispo (bishop) de Castilla del Oro, on the 10th of March, 1535. He had the order from the Emperor Charles V. to report on the government of Pizarro and to write a description of Peru. The 23d of February, 1535, he sailed from Panama. For seven days the wind was favorable, but after that a calm set in for eight days and the very strong currents drifted the vessel far out to the sea. The 10th of March they sighted an island and, having only water for two days more, they anchored to look for water and fodder for the horses. There they found nothing but seals, sea-turtles and land tortoises so big that each could bear a man on its back, and many iguanas, which are like snakes. ("No hallaron sino lobos marinos y tortugas y galápagos tan grandes, que llevable

*In 1823 he took in a period of two months about five thousand fur-seal skins (*Arctocephalus*) from the Galápagos.

† Marcos Jiménez de la Espada. Las Islas de los Galápagos y otras más poniente. Sociedad Geográfica de Madrid. 1892. pp. 1-5.

*See SCIENCE (n. s.), III., 515, 1896.

† Allen, Joel Asaph: History of North American Pinnipeds; A Monograph of the Walruses, Sea-Lions, Sea-Bears and Seals of North America; U. S. Geol. and Geogr. Surv. of the Territ.; F. V. Hayden, Geologist-in-Charge. Miscellaneous publications—No. 12, Washington, 1880, p. 208, 210-211, 367, 769-770.

cada uno un hombre encima, y muchas iguanas, que son como sierpes.")

G. BAUR.

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THE article of Mr. Sclater in *SCIENCE*, May 14th, on the distribution of the Seals, Sirenians and Cetaceans, disregards the more recent publications on zoogeography, especially marine zoogeography. It begins with a somewhat indefinite statement, that 'most of the recent writers on Geographical Distribution have confined their attention to terrestrial mammals, or, at any rate, have but casually alluded to the marine groups of that class.' I may be allowed to state that the deficiency of our knowledge of the distribution of marine animals induced me, nearly two years ago, to publish a book,* which is particularly intended to supply this lack. It seems, however, that Mr. Sclater never has seen this book. Mr. Sclater seems also to be unacquainted with many other writings on the same subject, published since Wallace. I mention only the names of A. Agassiz, G. Baur, T. N. Gill, Guenther, v. Ihering, J. Murray, Neumayr, Pfeffer, J. Walther. The natural consequences of this neglect are most evident.

I do not think it worth while to enter into a closer examination of the theoretical views of Mr. Sclater, since all these points have been discussed by myself and others so extensively that anybody who has followed these discussions will see at once that his theoretical views are far from being in conformity with current theories. I shall state, however, a few points in the article referred to, by which it is proved conclusively that he did not consult most of the writers quoted above.

1. The term 'life-district' ('Lebensbezirk,' 'domaine biologique') seems to be completely unknown to Mr. Sclater; otherwise he would have treated the Cetaceans separately from the Seals and Sirenians. (Compare J. Walther, Ortmann, Chap. 3.)

2. The importance of the action of temperature-conditions has been completely overlooked by him; otherwise the effect of temperature should be shown in his sea-regions. (Compare Gill, Pfeffer, Ortmann, p. 37.)

3. The distinction of autochthonts, immi-

grants and relicts (compare Guenther, Ortmann, p. 34) is unknown to Mr. Sclater; otherwise he would have assigned a different value to the eared seals inhabiting the northern Pacific in comparison with the other seals; *Phoca* and *Trichechus* are autochthonts, while the *Otariidæ* are immigrants.

4. It is impossible to distinguish properly any distributional regions, which depend merely on a particular group of animals. The outcome will always be unsatisfactory. The regions created by Mr. Sclater are a striking evidence of the inconveniences of this method, as I have already pointed out in the beginning of Chap. 4 (p. 44-45) of my book. I mention only one instance: the fact that *Trichechus* and *Phoca* are found in the northern parts of both the Atlantic and Pacific Oceans is in no way represented in Mr. Sclater's division, although this fact is a very characteristic one, and, indeed, is the rule for the distribution of littoral polar animals. This rule is justified and supported by the physical conditions of the polar seas. Nevertheless, Mr. Sclater does not pay any attention to it, and frames his regions with regard to exceptional cases. (Compare eared seals, above, under 3.)

5. The definition of the Mid-Pacific Sea-region of Mr. Sclater is insufficient. In fact, he does not give any limits, nor any characteristics of this region.

6. The relations of his Indian Sea-region to his Mid-Atlantic Sea-region, due to the geological conditions of former times, and still exhibited in the distribution of the Sirenians, are not referred to at all, and of course no attempt has been made to explain them. (Compare Ortmann, p. 67 f.)

7. Mr. Sclater concludes that the distribution of the *Otariidæ* proves a connection of South America with Africa by land. I should suggest to him to read the papers of v. Ihering on this subject (*Archhelenis*), before he tries to bring the distribution of the eared seals in connection with this old continent. The old *Archhelenis* has positively nothing to do with the distribution of the sea lions; the latter are late Tertiary, while the *Archhelenis* was chiefly Mesozoic! The absence of any *Otariidæ* in the middle and northern Atlantic is exclusively due to temperature conditions.

* *Grundzüge der marinen Tiergeographie*, Jena, 1896.

8. In conclusion I should like to direct attention to the final statement of Mr. Sclater. Having made the (incorrect) supposition that the late-Tertiary group of the eared seals has been checked in its northward advance in the Atlantic by a connection of South America and Africa, he says that "all these facts, *with the one exception* of the supposed Atlantic barrier, would tend in favor of the *now generally accepted* doctrine that the principal masses of land and water are not of modern origin, but have existed mainly in their present shapes *throughout all ages*." No less than three errors are contained in this single sentence, namely: 1. It is impossible to derive from the distribution of a group of Tertiary animals any conclusions as to the shapes of the principal continental masses *throughout all ages*. 2. This statement would hold for the Tertiary time only if we consider that the connection of South America and Africa, which is supposed by Mr. Sclater, is no important feature. Mr. Sclater admits that this Atlantic barrier forms an exception to the rule; but, I should say, such an exception throws the whole rule aside. 3. It may be that Mr. Sclater himself has accepted the 'doctrine' of the persistency of the continents, but I protest most vigorously against calling such a 'doctrine' *generally accepted*. A dogma (and this would be the proper name for it) that has been contradicted by students in zoogeography, such as Baur, Beddard, Neumayr, v. Ihering and others (and I should add, which is rejected by almost *all* geologists) cannot be regarded as 'generally accepted.'

The distribution of the Seals and Sirenians, it is true, has never been investigated from a scientific standpoint, but there are only a few distributional features which seem to be anomalous at first sight (Sirenia, Otariidæ), and even these may be explained readily. The Sirenia point to conditions existing in the beginning of the Tertiary period, and it is well known that this group existed in the Eocene epoch. The distribution of the Otariidæ is analogous to what has been called (improperly) 'bipolar' distribution. They represent the somewhat rare case of an Antarctic group of littoral animals which has crossed the tropics along the western coast of America and reached the northern Pacific.

As to the latter fact I refer to a special paper published by me recently, which is especially devoted to this peculiarity of distribution.*

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PRINCETON UNIVERSITY, June, 1897.

THE POTTER'S WHEEL IN AMERICA.

My neglect to mention the *Kabal*, pointed out in Mr. Mercer's letter (SCIENCE, p. 919), was not an oversight, but for two reasons: First, as he mentions, because the word with that meaning does not occur in the Maya dictionaries of the sixteenth century; and secondly, because the *Kabal* is not a potter's wheel in its results or in a technical sense.

This is shown in Mr. Mercer's own work, 'Hill Caves of Yucatan,' p. 77, where he quotes Captain Maler as saying that he 'had found no trace of the potter's wheel in the old specimens of pottery,' anywhere in Yucatan. Mr. Mercer brought no potsherds from ancient deposits to contradict this; and according to his own words the *Kabal*, as used to-day, does not give 'the regularity of outline' which is the artistic aim of the potter's wheel. (P. 164, note.)

D. G. BRINTON.

SCIENTIFIC LITERATURE.

The Cambridge Natural History. Edited by S. F. HARMER, M.A., and A. E. SHIPLEY, M.A. Vol. II., Flatworms, etc. Macmillan & Co. 1896. 8vo. Pp. xii+560, 257 figs.

Volume II. of the Cambridge Natural History, the third of the series to make its appearance, deals with those classes which are usually grouped together as Worms or Vermes, and Polyzoa. The different classes are treated by specialists whose names are familiar in connection with the subjects assigned to them. The work is shared by seven authors, as follows: Platyhelminthes and Mesozoa, by F. W. Gamble, pp. 1-96, Figs. 1-47; Nemertinea, by Lilian Sheldon, pp. 97-120, Figs. 48-61; Nemathelminthes and Chaetognatha, by Arthur E. Shipley, pp. 121-194, Figs. 62-105; Rotifera, Gastrotricha and Kinorhyncha, by Marcus Hartog, pp. 195-238, Figs. 106-120; Archiannelida, Polychæta and Myzostomaria, by W. Blaxland Benham, pp. 239-344, Figs. 121-186; Oligo-

* Zool. Jahrb. Syst., Vol. 9, 1896, pp. 571-595.