the specimens open firmly. This may be done by using trays of galvanized iron with four or more loops of metal soldered on the sides to which ordinary heavy rubber bands are attached. To these rubber bands are tied small fishhooks which have had their barbs filed off. These hooks are to be fastened to any part of the anatomy so as to hold the specimen firmly, or to pull certain parts to the desired position. If a plain tray without the side loops is used, the rubber bands may be fastened to the ends of strong strips of cloth. The cloth is placed under the tray, one piece at the top and the other at the bottom, and if the strips are of the proper length, the rubber bands and hooks will be in relatively the same position as when they are fastened to rings along the edge of the pans. Removing the barb allows the hook to be withdrawn at any time without injuring the specimen. Care should be used not to stick the hooks in the hand, for owing to the strength of the rubber bands, the hook would make an ugly wound should it slip.

The advantages of this method are the saving of time and the lack of trouble, for we have a self-adjusting holder, as the rubber band allows for any change to be made in the position of the specimen or any of its parts. As compared to the old methods, it neither incurs the expense and the time of adjusting, as is the case with chains and hooks, nor the unreliability and unsteadiness as in the case where string and bent pins are used for this purpose.

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SCIENTIFIC BOOKS

Papers from the Department of Marine Biology of the Carnegie Institution of Washington. Vol. 9, pp. iii + 362, 105 pls., 14 figs., 1918.

In this handsome and very important volume there is a great deal of information that is of the highest value to the biologist, geologist, paleontologist and oceanographer. In fact, there is so much of value that this notice can mention but a few of the results that are most interesting to the reviewer. There are eleven papers, of which the largest is by T. W. Vaughan on "Some Shoal- water Corals from Murray Island (Australia), Cocos-Keeling Islands, and Fanning Island" (185 pp. and 73 pls.). The other authors are Alfred G. Mayer, M. I. Goldman, Albert Mann, Joseph A. Cushman, M. A. Howe, R. B. Dole and A. A. Chambers, R. C. Wells and L. R. Cary.

The shoal-water corals of the Great Barrier Reef of Australia described by Vaughan in the systematic part of his paper, amount to 149 forms and 38 genera, 1 genus and 15 species being new. Certain species range from the east coast of Africa on the west to the Hawaiian and Fanning islands on the east. Great pains have been taken not only to determine the proper names, but to give ecologic conditions as well. The illustrations are the finest we have ever seen of the skeleton of corals, and as the photographs are not retouched, the heliotypes look as natural as the corals themselves. Many of Dana's types are figured.

The ecology of the Murray Island corals near the northern end of the Great Barrier Reef is described at length in the first paper by Mayer, which is a very important one.

More than forty species were studied, with a view to determine the factors of their distribution. These factors, in the order of their importance, are: temperature, silt, the effects of moving water, and the struggle for existence between the species. All corals appear to be wholly carnivorous. Whenever the water is agitated, cool and free from silt, the reef-flat is wide and covered with an abundance of living corals, but where the water is calm, hot and depositing silt faster than the corals can remove it from themselves, the reef-flat is narrow and the corals deficient. Much silt kills corals in about two days. In a square 50 feet on a side, there occurred two living corals from 375 to 425 feet from shore, while in the same area, at from 1,400 to 1,500 feet out from land, there were 1,833 heads. Four genera constitute 91 per cent. of the corals present.

In regard to annual rate of growth among the stony corals there are some interesting facts. Some of the identical coral heads of

Thursday Island measured and photographed by Saville-Kent were remeasured by Mayer twenty-three years later. These results show that large coral heads may increase as much as two inches in diameter per year, while some kinds do not grow beyond a certain specific size. The average annual growth appears to be about one inch, though in the Floridian reefs the rate of increase is less.

Mayer states that stream waters pouring outward from forested volcanic shores are alkaline and thus can not dissolve limestone by reason of their "acidity." Thus the Murray-Agassiz solution theory of the formation of atolls is not supported. Holothurians are a potent factor in dissolving the materials that go to make reef limestones, which they swallow, and the effects of currents in scouring are important factors tending to convert fringing reefs into barrier reefs.

The problem of the precipitation of $CaCO_3$ in the ocean and the possibility of its solution there is discussed in the light of the latest evidence, and the conclusion is reached that in the shoal waters of the tropics, ocean-water does not dissolve calcium carbonate, but that the contrary process—precipitation by both inorganic and organic (bacterial) agencies—is taking place. Conditions in the deep sea, and perhaps in the cold waters of high latitudes, are different.

In the Murray Island reef sediments, Vaughan states that the dominant rock makers are (1) corals (34 to 42 per cent.); (2) coralline algæ (32 to 42 per cent.); (3) molluscs (10 to 15 per cent.); foraminifers (4 to 12 per cent.) and alcyonarians. Other marine animals are unimportant in their skeletal additions.

Cary shows that, in the Tortugas area, the gorgonians are also very important reef builders and therefore great rock contributors, since nearly 20 to 36 per cent. of their bodies consists of calcareous spicules. As almost all of these colonies die a violent death, and on the average all those living within 30 feet of water are replaced in five years by other colonies, he calculates that at least one ton of spicules or limestone is added per year to each acre of reef ground. In fact, when the gorgonians are common, they are more important as limestone makers than are even the stony corals.

Charles Schuchert

SPECIAL ARTICLES

A METHOD OF DEMONSTRATING THE DIFFERENCE-TONES

If a Rayleigh inductometer bridge be connected up, and a telephone receiver A be in series with the alternating e.m.f., the demonstration of the difference-tone is an exceedingly simple matter. Let the bridge be balanced for a high frequency F', say about 2,500; this tone will therefore not reach the ears if the balancing receivers be of the double, head-strap variety. Now whistle a scale into the receiver A. Since the bridge is not balanced for the new frequency, the whistle "gets through" into the balancing receivers. But one also hears another tone which slides down as the whistle slides up the scale. If between the balancing receiver and the bridge a good amplifier be connected, then the balancing receiver may be a "loud-speaking receiver" (such as are now used for announcing trains in large stations, etc.) and the apparatus is suitable for class demonstration. The great advantage of this arrangement is that we are not confined to any two fundamentals, as in the case of forks.

The phenomenon is unquestionably slightly complicated by the action of one alternator on the other, but I had not the time to see to what extent the extra tone differs from $F'-F''$.

The writer offers the above as a lecture experiment in physics and psychology, being under the impression that it has not been reported before.

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORT OF THE TREASURER FOR 1918

In conformity with Article 15 of the constitution and by direction of the council, the treasurer has the honor to submit the following report for the period December 15, 1917, to December 16, 1918, both inclusive.