

Several figures would seem to indicate that one of the larger cells of an early stage divides and gives rise to the groups of smaller cells in a later stage. This can scarcely be the case, since the number of cells in the earlier and later stages are about equal, unless a number of the earlier cells atrophy or are resorbed. The loss of four cells, two in the gill region, and two in the region of the fifth body somite, is probable, but even with the addition of these, the number of cells in the last stage examined does not exceed the average number in early stages when the cells are quite large. The reduction in size can, therefore, be explained only by supposing that the individual cells are reduced in size during development. It would be interesting to consider here the causes that lead these sex-cells to again grow and divide. Since, however, this process does not begin in the stages under consideration, this matter must be left till later stages are examined.

BIOLOGICAL STATIONS. By CARL H. EIGENMANN.

The early naturalists noted briefly the animals and plants they saw at home or abroad. A few centuries later they added figures to their enumerations. Later still skins were preserved, and last of all the whole animals were preserved, gathered into large museums, where they soaked and rotted twenty-five years, perhaps, before some one came along to study them. Some of our ornithologists and conchologists, and even some ichthyologists have not yet passed beyond this skin stage in their development. Many others, on the other hand, have passed this last stage and have ceased to content themselves with the catalogueing of specimens and now study the method, whys and wherefores of the things about them.

This school was established when Johannes Müller first dipped a net for pelagic animals. When it was found that the hows, whys and wherefores could best be studied in the lowest creatures, naturalists flocked to the sea shore, at first during their vacations. As methods for study increased and apparatus multiplied permanent Marine Biological Stations were evolved. First of these were the Naples Zoological Station and Agassiz's School at Penikese, both established in 1873. The aims of the two were slightly different. The Naples station was for original investigation. The Penikese school it was hoped would awaken an interest in zoology in America. There are now a large number of stations along the European coast, some large and some small, but it is not the intention to speak of these.

Penikese died with Agassiz. I have lately been on a pilgrimage to the old buildings. The motto "eat, drink and be merry" still hangs in the old dining-hall. On the walls of the lecture-room are the mottoes placed there by Agassiz's pupils: "A laboratory is to me a sanctuary. I would have nothing done in it unworthy its great author." "Study to translate what actually exists. Be courageous enough to say 'I do not know,'" and "Study nature not books." The outlines of the last lecture delivered at Penikese eighteen years ago are still on the blackboard. At this window Dr. Whitman stuffed terns, at the other Dr. Brooks cracked clams and at another Dr. Jordan studied seaweeds.

Penikese had been donated and the buildings erected by a tobacco merchant, Anderson, of New York. It was found that the location was too inaccessible and the fauna of the island too poor so that the \$30,000 buildings were abandoned for less commodious but more favorably situated quarters. There are at present several marine laboratories on the coast of America, and several summer schools which are located on the seashore, and do a certain amount of marine biological work.

In 1881 a number of Boston women established a laboratory at Annisquam, Mass., where students and teachers could work during the summer. These ladies were afterwards instrumental in the foundation of the Marine Biological Association whose laboratory is at Woods Holl on Vineyard Sound.

Alexander Agassiz several years ago built the Newport Marine Laboratory, to which he has frequently invited students. Here the advanced students of Harvard University work during the summer. This laboratory is the best equipped of any in the United States, but it is practically private and has room for but eight students.

The United States Fish Commission, after spending several summers at various places on the Atlantic finally built a permanent station at Woods Holl. This is by far the largest station in America and it was Professor Baird's hope and intention to make it the equal of the famous station at Naples. But the elaborate laboratories, aquaria, docks, boats and large hotel did not attract the men it was hoped to collect.

Another laboratory has lately been established on Long Island, but of this nothing definite can be said yet. Still another has been established by the University of Pennsylvania.

This brings us back to the station of the Marine Biological Association which deserves a better notice.

It is by far the most important in its scope, aims, methods and future prospects. It is chiefly supported by the munificence of Boston people. The buildings consist at present of the laboratory and the newly acquired dwelling house. The north side of the upper floors is divided into small rooms 7x10 feet. Each of these is supplied with a table, an aquarium, sink, shelves and a full set of reagents and glassware. These rooms are occupied by investigators doing independent work and are offered free. The remaining portion of the second floor is occupied by the library, the director's rooms, reagent room and the laboratory of the advanced students. The lower floor by the lecture room and laboratory for students most of whom are teachers at one place or another.

This is the Mecca of the modern school of naturalists, and there are collected, at this place, teachers and students from all the leading institutions.

The laboratories for students are open during July and August. Investigators come earlier and stay later.

In enumerating what has been done on the east coast it is perhaps well to state what may be done on our west coast. Our eastern laboratories necessarily close during winter. On the Southern California coast where the thermometer never records the freezing point ice does not drive the investigator away in winter. The boundless wealth of the fauna and flora together with the favorable climate will doubtless sometime attract to this region a number at least the equal of that now collected at Woods Hole or Naples. At present the sole marine station on the whole coast is my little laboratory at San Diego which is a mile from the shore and the windows of which are now nailed up.

I have before [San Francisco Chronicle, November 30, 1890.] urged the establishment of marine laboratories on the west coast where they can equal the Naples station and it is to be hoped that one may soon be endowed not only for elementary work but for original research with a permanent corps of investigators.

P. S.—Since this was written Timothy Hopkins has endowed a marine laboratory to be established at Monterey, and Adolph Sutro will maintain another at the entrance of San Francisco Bay. Who will utilize the best locality—San Diego?