the 'Anthodiata,' under which he placed the Cystidea and Blastoidea as sub-groups. The Blastoidea, no doubt, are readily separated from the true Crinoidea; but the two groups are so closely linked together by the Cystidea, that it is extremely difficult to assert whether certain forms are crinoids or cystids, or whether others are cystids or blastoids. For instance: Caryocrinus and Porocrinus have well-developed free arms, but possess calicine pores; while Hybocystites, on the contrary, has cystidean arms and no calicine pores. Similar transitions connect the Blastoidea with the Cystidea; and it is scarcely doubtful that crinoids sometimes have hydrospires. These difficulties do not seem to be wholly met by Carpenter's arrangement, nor indeed, it must be confessed, by any other as yet devised.

Dr. Carpenter's discussion of the relations of the Neocrinoidea to the Palaeocrinoidea should be studied by every paleontologist who aims at something more than mere empirical descriptions. He ranks the two groups as distinct orders, and points out very clearly their structural differences. In the course of these discussions he directs special attention to the oral plates of the Palaeocrinoidea. These plates, he thinks, are represented by the so-called 'proximals,' or ring of plates surrounding the central piece, which he regards as corresponding to the basals in the abactinal system. He calls the central plate the 'orocentral,' and considers it an actinal representative of the 'dorsocentral,' the terminal plate of the column. From one point of view, this theory appears plausible, considering that there is a dorsocentral in ophiuroids and starfishes enclosed within the ring of basals; but it is difficult to understand what function such a plate could have had in the oral system, since it is to be compared with the base of the column in crinoids, while no echinoderm, at any period of life, or in any group, was ever attached by the oral side.

The limits of this notice do not warrant further mention of the details of the book, much less discussions; but the work challenges admiration in almost every requisite of a scientific treatise. Dr. Carpenter's style is clear, vigorous, and incisive. Those who venture to cross swords with him in scientific disputation will do well to carefully measure their strength; for they will find a most formidable antagonist, fully armed at all points, vigilant to discover, and quick to strike at the weak points of an argument. With all this, it is a pleasure to observe the eminent candor and fairness of his treatment of controverted questions. Those who dispute with him are not allowed to forget that the ultimate aim of all such discussion is not a victory of words, but the discovery of the truth.

NOTES AND NEWS.

THE Chesapeake zoölogical laboratory, as the marine station maintained by the Johns Hopkins university is designated, is established for the present summer session at Beaufort, on the coast of North Carolina. Dr. W. K. Brooks, the director, who was prevented last year by ill health from giving as much time as usual to the laboratory, is fortunately quite restored to his usual strength, and is in full activity at his post. Twelve collaborators are with him, — Messrs. Andrews, Bruce, Haldeman, Hemmeter, Herrick, Howell, Jenkins, McMurrich, Mills, Morrell, Nachtrieb, and Shimek. Several of these are already teachers in various branches of zoölogical science, and all of them are well prepared to make use of the opportunites which are afforded at this station. An unusual number are engaged in original researches. On account of the limited accommodations, the director was unable to receive three other persons who applied for admission. The season of 1885, although uncomfortably hot, has thus far been exceptionally favorable for collection. The weather has been calmer than heretofore in June and July, and specimens were found in June which have usually not appeared until the middle of August. The company, notwithstanding their personal discomfort from the heat, have maintained their full enthusiasm in the work upon which they are engaged; and it now appears as if the eighth session of the laboratory would be more fruitful in results than its predecessors, good as they have been. It is too early to speak of the investigations which are in progress, but reports will be made upon them in one of the Johns Hopkins university circulars to be published in the early autumn.

— A cable message to Harvard college observatory, from Dr. Krueger, at Kiel, announces the discovery at Nice of Tuttle's comet (1858) on its expected return. The position received is as follows: August, 9 6124*d.*, *Gr. M. T.; R. A.*, 7*h.* 23*m.* 43.1*s.; Decl.*, +28° 1′ 24″.

— Prof. J. E. Hilgard, who has just resigned from his position as superintendent of the U. S. coast-survey, was born in Zweibrücken, Germany, in 1825. His father, a lawyer by profession, emigrated to Illinois in 1835, with a family of nine children, and was a man well known for his writings on social questions. J. E. Hilgard was educated as a civil engineer, and in 1845 entered the coast-survey: he was specially interested in geodetic methods and the tides and terrestrial magnetism. In 1863 he was made a member of the National academy of science, and in 1872 took an active part in the international metric commission in Paris, and was made one of its permanent committee; and it was in that year he

made a determination of the difference in longitude of Cambridge and Greenwich by means of the Atlantic cable. At his suggestion, the series of transcontinental triangulations have been run connecting the surveys on the Atlantic and Pacific coasts, — triangulations which are serving for some of the state-surveys now in progress. Professor Hilgard was especially interested in the study of the Gulf Stream; and many will remember his paper upon that subject read at Philadelphia last summer, but not yet published. The success of the coast-survey is largely due to his work; and, since 1881, he has been the superintendent, from which position the misfortunes of ill-health compelled him to resign.

— Mr. Bosworth Smith has been appointed mineralogist for the Madras presidency. The local government order says he is "to create in the Central museum a perfect index to the mineral wealth of the presidency, and to begin a mineralogical survey in consultation with Dr. Bidie and such other officers as government may instruct him to communicate with."

— The commander of the German gunboat Prinz Adelbert reports that on the 10th of February last, at half-past one A.M., in the roadstead of Aucon, two short earthquakes were felt which lasted ten seconds, and were noticed very perceptibly on board ship. The disturbance seemed to travel from south-west to north-east. The first sound heard was like that of steam let off under water, and escaping to the surface. This soon increased to a thundering, rolling noise, like the sound of river-ice breaking up. The damage done by this convulsion of nature was very insignificant on shore, and no casualties have been reported at sea.

— The German Seewarte has received a bottle which was set afloat by the German bark Suahali, Capt. Fröhling, on the 18th of November, 1883, in 0° 40′ north latitude, and 21° 40′ west longitude. On the 4th of February, 1885, four hundred and forty-four days later, this was picked up in the neighborhood of the life-saving station at Fort Laundersdale in the Straits of Florida, in about 26° 10′ north latitude, 80° 05′ west longitude. The end of the bottle's drift was about thirty-seven hundred and forty nautical miles distant from where it was set afloat, in a N. W. by W. ½ W. direction. It is more probable that instead of taking that direction which leads through the Providence Channel, and then across the strongest part of the Gulf Stream, the bottle first drifted with the equatorial current west-north-west, then north from Trinidad into the Caribbean Sea, south of Jamaica, and by Cape San Antonio into the Gulf of Mexico, and finally with the Gulf Stream through the Straits of Florida to the place where it was found. According to this hypothesis, the drift was about forty-five hundred and fifty nautical miles for the four hundred and forty-four days, which makes an average daily distance of ten miles and a quarter. The Seewarte has also received a bottle which was thrown overboard from the German bark Suahali, on the 9th of December, 1884, in 44° 02′ north latitude, and 13° 16′ west longitude. It was found on April 8, 1885, at Buen in Ponte Vedra Bay, west coast of Spain, in about 42° 19′ north latitude, and 8° 45′ west longitude. So the bottle had probably drifted, in a hundred and twenty days, two hundred and twenty-three miles S. E. by E. ½ E.

— The crystalline form of quartz grains in some sandstones has been seen by many observers, while especial attention was called to these forms in the Wisconsin sandstones by Rev. John Murrish in 1870 and later. Mr. H. C. Sorby, in 1880, showed that such crystal forms were produced by the deposition of secondary quartz upon the irregular rounded surfaces of worn quartz grains. For the Wisconsin sandstones, the subject was taken up by Rev. A. Young, and later by Messrs. R. D. Irving and C. R. Van Hise, who have published an extended and valuable paper (*Bull. U. S. geol. surv.*, No. 8), with full illustrations, relating to the enlargement both of quartz and felspar grains; and for this the thanks of all micro-mineralogists and lithologists are due. Our authors conclude that their results prove that most, if not all, of the ancient quartzites, as well as many of the quartziferous schists, are composed in the main of fragments cemented together by a secondary siliceous cement.

— By the gift of the Hon. Elbert E. Fairman, LL.D., of Warsaw, N.Y., all that remains of the collection of birds made by the famous John J. Audubon is now in possession of Amherst college, Massachusetts. There are about six hundred skins of birds in the collection, some of which are labelled in the handwriting of Audubon himself, and many of which are the typical specimens by which the species were determined. As the collection has been stored in camphor chests for the last few years, and the skins were unmounted and old, many of them could not be advantageously mounted. About one hundred of them, however, have been handsomely put up by Prof. H. A. Ward of Rochester, and are now well exhibited in the Appleton cabinet of the college. Also there have been added to this collection by the same donor several of the rarer California birds, which have been discovered since the death of Mr. Audubon.

— The Paris students, according to *Nature*, are making extensive preparations for celebrating the one hundredth birthday of Chevreul, the veteran chemist, who has been a member of the Academy of sciences since 1826.

— A movement is on foot in Christiania, says *Nature*, at the instance of the Society for the promotion of the Norwegian fisheries, for the establishment in the Christiania fiord, near Dröbak, of a biological station for the hatching of sea-water food-fish and salmon, in consequence of the great success of other stations along the coast.

— The American ornithologists' union will hold its next meeting in New York on Tuesday, Nov. 17.

— The expedition which the Norwegian government despatches this summer to the coast of Finland is to ascertain whether there are banks or fishing-grounds far from the coast. Hitherto all fishing has been confined to the shore.