$20, and one very noted objective for which the maker asks $60 is offered for $27.20.

We also notice the production of a 1–10th objective of 180° aperture, by a maker of reputation, which is sold at $25. A subscriber recently called at our office and stated that a 1-6th by the same maker, also sold at $25, divided the 19th band of Nobert's plate.

We mention these facts to show the variations in the present cost of microscope objectives, which must be perplexing to inexperienced purchasers. The regular price of a first-class 1–10th, of 180°, is about $85, and it would be interesting to compare the $25 article and note results; and it would also be useful to note how the cheaper glasses perform their work, as compared one with another.

As any expression of opinion on the merits of these objectives would be useless, without they were personally tested by us, we refrain from offering any advice on the subject. Microscope objectives are not struck in a die like medals, but are the result of manual operation, in which the individuality of the artist may be recognized and developed. In art the relative merits of the master are appreciated by the connoisseur, and a standard of value established; the same rule applies to optical instruments when perfection of work is aimed at. When Professor Asaph Hall discovered the satellites of Mars, it was necessary to have a telescope which would show an object six miles in diameter at a distance of 35,000,000 miles; when called upon to perform this feat, Clark's 32-inch objective responded in a manner which enabled Professor Hall to make one of the most important of recent astronomical discoveries. To appreciate this performance of the Washington telescope, we may state that it was equivalent to a person stationed at New York seeing an object at Boston which was two inches in diameter.

Such is the class of work we desire to find in microscopic objectives; probably there are only one or two men in this country able to produce it; but it is difficult to speculate as to what the future may bring forth.

WALKER PRIZES IN NATURAL HISTORY.

The Boston Society of Natural History offers a first firize of $60 to $100, and a second of $50, for the best memoirs, in English, on the following subjects: For 1881, The Evidences of the Extension of Tertiary Deposits seaward along the cost of Massachusetts; for 1882, The Occurrence, Microscopic Structure, and use of North American Fibre-plants (treating especially of the fibres employed by the native races); for 1883, Original Unpublished Investigations respecting the Life-History of any Animal. Prizes will not be awarded unless the papers are deemed of adequate merit.

THE ODONTORNITHES.

EXTINCT TOOTHED BIRDS OF NORTH AMERICA.

We merely desire in this place to acknowledge the receipt of the monograph, on the *Odontornithes*, an extinct order of toothed birds of North America, prepared by Professor O. C. Marsh, and published by order of the United States Government.

A review of this work is now in course of preparation by one well able to present Professor Marsh's discoveries in all their integrity, and we propose to publish the same with illustrations, which will convey to the readers of "SCIENCE" a fair estimate of the value of this work, which is considered by many to be one of the most important contributions to science, issued by the National Government at Washington.

Reserving our review of Professor Marsh's monograph for a future occasion, we now offer his own explanation regarding the work, as conveyed in a few introductory remarks:

"The remains of birds are among the rarest of fossils, and very few have been discovered except in the more recent formation. According to present evidence, the oldest known birds were imbedded in the Jurassic deposits of Europe, which have yielded three individuals belonging to the genus *Archæopteryx*, so well preserved that the more important characters can be determined. The only other remains of birds found in the Mesozoic of the Old World are a few specimens from the Cretaceous of England, which are too fragmentary to throw much light on the extinct forms they represent.

"The earliest traces of birds hitherto found in the strata of this country are from the Cretaceous, although we may confidently predict their discovery in the Jurassic beds, if not at a still lower horizon. There is at present no evidence whatever that any of the three-toed impressions in the Triassic, described as the foot prints of birds, were made by birds; and the proof now seems conclusive that nearly all of them are the tracks of Dinosaurian reptiles, bones of which occur in the same deposits.

"In the Cretaceous beds of the Atlantic coast, and especially in the green-sand region of New Jersey, various remains of birds have been found and described by the writer. These fossils, although often in excellent preservation, occur mainly as isolated bones, and hence their near affinities have not as yet been determined with certainty.

"Along the western slope of the Rocky Mountains, and especially on the adjoining plains in Kansas and Colorado, there is a series of Cretaceous strata remarkably rich in vertebrate fossils. The deposits are all marine, and, away from the mountains, they lie nearly horizontal. They have suffered much from erosion, and are still wasting away, especially along the river valleys. These beds consist mainly of a fine yellow chalk and calcareous shale, both admirably adapted to preserve delicate specimens, and here have been found the extinct birds which form the subject of the present memoir.

"The geological horizon of the known *Odontornithes* is in the Middle Cretaceous and corresponds to the strata named by the writer the "Pteranodon beds." The latter are included in sub-division number three, in Meek and Hayden's section. The accompanying fossils are Mosasauroid reptiles, which are very abundant; Plesiosaurs allied to Pliosaurus; Pterodactyles of the genus *Pteranodon;* and many fishes. With these occur Rudistes, and occasionally Ammonites, Belemnites, and various other Cretaceous invertebrates.

"The first bird fossil discovered in this region was the lower end of the tibia of *Hesperornis*, found by the writer in December, 1870, near the Smoky Hill River in Western Kansas. Specimens belonging to another genus of the *Odontornithes* were discovered on the same expedition. The extreme cold, and danger from hostile Indians, rendered a careful exploration at that time impossible.

"In June of the following year, the writer again visited the same region, with a larger party, and a stronger escort of United States troops, and was rewarded by the discovery of the skeleton which forms the type of *Hesperornis regalis*, Marsh. Various other remains of *Odontornithes* were secured, and have since been described by the writer. Although the fossils obtained during two months of explorations were important, the results of this trip did not equal our expectations, owing in part to the extreme heat (110° to 120° Fahrenheit, in the shade) which, causing sun stroke and fever, weakened and discouraged guides and explorers alike.

"A considerable part of these Cretaceous deposits still remain unexplored, and in the Autumn of 1872, a third expedition through this territory was undertaken by the writer with a small party. Additional specimens of much interest were secured, including the type of the genus *Apatornis*, and one nearly complete skeleton of *Hesperornis*—an ample reward for the hardship and danger we incurred.

"The specimens thus secured by these various expeditions have since been supplemented by important additions, collected in the same general region by different parties equipped and sent out by the writer, who no longer could give his personal supervision to work in that field. The fossil birds procured in this region, since 1870, by these different expeditions, include remains of more than one hundred different individuals of the *Odontornithes*. These are all in the Museum of Yale College, and form the material on which the present volume is based.

"A study of this extensive series of bird remains brings to light the existence, in this class, of two widely-separated types, which lived together during the Cretaceous period, in the same region, and yet differed more from each other than do any two recent birds. Both of these types possessed teeth, a character hitherto unknown in the class of birds, and hence they have been placed by the writer in a separate sub-class, the *Odontornithes*. One of these groups includes very large swimming birds, without wings and with the teeth in grooves (*Odontolcæ*), and is represented by the genus *Hesperornis*. The other contains small birds, endowed with great powers of flight, and having teeth in sockets (*Odontotormæ*), and biconcave vertebræ; a type best illustrated by the genus *Ichthyornis*. Other characters, scarcely less important, appear in each group, and we have thus a vivid picture of two primitive forms of bird structure, as unexpected as they are suggestive. A comparison of these two forms with each other, and with some recent birds, promises to clear away many difficulties in the genealogy of this class, now a closed type; and hence they are well worthy of the detailed description and full illustration here devoted to them.

"The fossil birds now known from the Cretaceous deposits of this country are included in nine genera and twenty species. These have all been described by the writer, and are represented, at present, by the remains of about one hundred and fifty different individuals. This is evidence of a rich and varied avian fauna in America during Mesozoic time, and likewise indicates what we may expect from future discoveries.

"The present volume is the first of a series of Monographs designed to make known to science the extinct vertebrate life of North America. In the investigation of this subject, the writer has spent the past ten years, much of it in the field, collecting, with no little hardship and danger, the material for study, and the rest in working out the characters and affinities of the ancient forms of life thus discovered.

"During this decade, the field work extending from the Missouri River to the Pacific Coast has so predominated as the subject unfolded, that a plan of gradual publication became a necessity. The more important discoveries were briefly announced soon after they were made, but only where the specimens on which they were based admitted of accurate determination. The principal characters of the new groups were next worked out systematically, and published with figures of the more important parts. When the investigation of a group is completed, the results, with full descriptions and illustrations, will be brought together in a monograph. This system has been carried out with the *Odontornithes*, and will be continued with the other groups. The investigation of several of these is now nearly completed, and the result will soon be ready for publication.

"The material is abundant for a series of monographs on the marvelous extinct vertebrates of this country, and the results already attained are full of promise for the future. A somewhat careful estimate makes the number of new species of extinct vertebrates, collected since 1868, and now in the Yale College Museum, about 1000. Nearly 300 of these have already been described by the writer, and some have been noticed or described by other authors, but at least one-half remain to be investigated.

"Among the new groups brought to light by these researches, and already made known by descriptions of their principal characters, are the following, which will be fully described in subsequent volumes of the present series.

"The first Pterodactyles or flying reptiles discovered in this country, were found by the writer in the same geological horizon with the *Odontornithes* described in the present memoir. These were of enormous size, some having a spread of wings of nearly twenty-five feet; but they were especially remarkable on account of having no teeth, and hence resembling recent birds. They form a new order, *Pteranodontia*, from the type genus *Pteranodon*. Of this group, remains of more than six hundred individuals are now in the Yale College Museum—ample material to illustrate every important point in their osteology.

"With these fossils were found also great numbers of Mosasauroid reptiles, a group which, although rare in Europe, attained an enormous development in this country, both in numbers and variety of forms. Remains of more than fourteen hundred individuals belonging to this order were secured during the explorations of the last ten years, and are now in the Museum of Yale College.

"The most interesting discoveries made in the Jurassic formation were the gigantic reptiles belonging to the new sub-order *Sauropoda*, including by far the largest land animals yet discovered. Another remarkable group of large reptiles found in the same formation were the *Stegosauria*. Other Dinosaurs from the same horizon, the 'Atlantosaurus beds,' show that this was the dominant form of vertebrate life in that age, and many hundred specimens of these reptiles are now in the Yale Museum. In a lower horizon of the same formation, the 'Sauranodon beds,' were found the remains of a peculiar new group of reptiles, the *Sauranodontia*, allied to *Ichthyosaurus*, but without teeth.

"In the Eocene deposits of the Rocky Mountains, the writer discovered a new order of huge mammals, the *Dinocerata*. Remains of several hundred individuals were secured, and a monograph on the group will follow the present memoir. In the same formation were found the remains of another new order of mammals, the *Tillodontia*, in many respects the most remarkable of any yet discovered. In the same Eocene deposits were secured the first remains of the fossil *Primates* known from North America as well as the first *Cheiroptera* and *Marsupialia*. Abundant material also was found in the same region to illustrate the genealogy of the Horse, and a memoir on this subject is in course of preparation.

CHOLESTEN.—This compound, $C_{26}H_{42}$, is a white amorphous powder, almost insoluble in alcohol, but soluble in ether. It resembles *c.* cholesterin in its physical and chemical properties.—W. E. Walitzky.