

SCIENCE :

A WEEKLY RECORD OF SCIENTIFIC
PROGRESS.

JOHN MICHELS, Editor.

PUBLISHED AT

229 BROADWAY, NEW YORK.

P. O. Box 3838.

SATURDAY, MARCH 5, 1881.

MICROSCOPES AND THEIR OBJECTIVES.

WE are told by one maker of microscopes that he has orders in advance which will prevent his undertaking new work for at least four months from the present time. Supposing his statement to be true, and we heartily trust it is, it would appear to show that the number of those undertaking microscopical investigations is largely on the increase, and as the probabilities are that many of those now investing their money in microscopes and objectives, are doing so with little experience to guide them in their selection, it may be useful at this moment to take a review of the microscope market.

The purchase of the microscope stand and the objectives to use with it will be considered separately. They are usually purchased together, but there is no reason for doing so, and we would like to see each handled by a distinct branch of trade. To make a good microscope stand needs only the skill of a good worker in brass, under suitable direction. On the other hand, the manufacture of objectives, and the other optical parts of a microscope, requires the skilled labor of an optician.

In regard to the microscope stand, we would state that many improvements have been recently made, so that to avoid being saddled with one which may be considered obsolete, it would be as well to go directly to one who manufactures his own stands, and direct him to make one to order; by so doing, the additional advantage will be secured of obtaining an instrument specially suited for particular work—a very important point.

The temptation is great to name one or two microscope stands which, in our opinion, are perfect in

workmanship, designed on the best model and, withal, quite moderate in price; but to do so would court misinterpretation of our motives; so we may state that such firms as Bausch & Lomb, Beck, Bullock, Grunow, Schrauer, Slidel, Zentmayer, are all reliable American manufacturers, and that most of these firms now produce such an instrument as we would advise, at a cost of about 40 to 50 dollars for a Monocular stand, not including accessory apparatus or objectives. We have just seen an instrument, for the latter price, having perfection of workmanship and the latest improvements.

In regard to microscope objectives, the greatest caution should be employed by the inexperienced at this moment, for after twenty-five years experience in purchasing objectives, the present price-lists of opticians appear to us a perfect chaos of quotations.

In the first place, the objection has been raised by purchasers that object glasses of a certain focal length and stated aperture, vary in their linear magnifying power, among different makers, so that a quarter-inch which, for instance, should give 200 diameters with an A eye-piece, is found to be a 4-10, allowing only 120 diameters if purchased of another maker, or perhaps it will give 225 diameters similar to a 1-5th, when obtained from a third manufacturer—even when the conditions are alike. This, no doubt, originated in one of the tricks of the trade. A makes a 1-4th which, in resolving power, equals the 1-6th of B; in consequence, A claims at once a superiority of workmanship, and perhaps secures a reputation for objectives, when, if the truth was known, the 1-4th was in fact a 1-6th.

It must be remembered also that all objectives vary in quality even from the same maker, and that one may be given to an inexperienced person which is very far from the supposed standard of excellence; with some makers not more than one in twelve would be accepted by an expert.

Lastly, there appears to be a feeling that considerable improvements are imminent in the manufacture of objectives, rendering those of yesterday commercially valueless. If we may judge by a price list just forwarded, a panic appears to have commenced among those holding objectives made as recently as four years ago. By a circular, we are informed that the objectives of one of the most esteemed makers are now offered at prices 50 per cent. lower than those charged by the maker. "These lenses are of the *best quality* and *perfectly new*," "simply to close out our stock of these objectives." This offer is made by an optician in the same city with the original maker. Objectives which cost \$150 can be had for \$75, and others as follows: \$110 for \$55, \$50 for \$30. \$40 for

\$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 prize 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 coast 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 *Archaeopteryx*, 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.