scribes the photographic technique used. The pictures obtained represent the highest perfection of micro-photography yet reached, especially as applied to protoplasmatic structures. The reproductions are very good, but are not equal to the original negatives in delicacy and clearness.

The forty phototypes by themselves suffice to give a complete history of the maturation, fertilization and early segmentation of the ovum. Although they are less clear than many published drawings, these figures unquestionably take their place as the best we yet have, for their partial lack of distinctness is more than atoned for by their absolute accuracy and freedom from that element of personal interpretation which is unavoidable in every drawing, no matter how conscientiously made.

Each phototype is accompanied by a separate explanation of the details shown. This explanation, when necessary, is aided by diagrams inserted in the text.

To the whole is prefixed an abundantly illustrated '*General Introduction*,' in which Professor Wilson gives a summary of our present knowledge of the history of the ovum, so far as it has any bearing on the problems of fertilization. It would be very difficult to surpass this introduction, owing to its felicitous combination of terseness, clearness and completeness.

The work takes its place at once as a classic, and is certainly one of the most notable productions of pure science which have appeared in America. It will be valuable to every biologist, be he botanist or zoölogist, be he investigator or teacher. There will be many to congratulate the author upon his signal success.

CHARLES S. MINOT.

A Monograph of the Order of Oligochæta. FRANK EVERS BEDDARD. Oxford, Clarendon Press. 1895. New York, Macmillan & Co. 4°, pp. xii+769. 5 plates, 52 wood cuts.

Mr. Beddard's Monograph of the Oligochæta has been awaited with no little interest by naturalists, and is the third comprehensive work dealing with the earthworms and their allies. The older work of Vejdovsky (1884) was largely morphological in character and confined chiefly to forms studied by the author, while the extensive work of Vaillant (1889–90) deals with the subject more from the systematic side, embracing descriptions of all known forms, but does not include references to literature published later than 1886. The present monograph is an attempt to bring together our knowledge of the entire subject up to the time of publication. It treats of both structure and systematic relationships and incorporates the large list of publications that have appeared during the last decade. No acconnt, however, is given of the embryology of the group, owing, the author tells us in his preface, 'to Prof. Vejdovsky's recently [1889–90] published Entwicklungsgeschichtliche untersuchungen, which go into the matter with all details.' The author recommends this work to 'those who are desirous of ascertaining what is known about the embryology of the Oligochæta.' It is to be regretted that Mr. Beddard did not include the embryology in his general plan and give us a complete treatise on the Oligochæta. Even an abstract of Vejdovsky's work would have added greatly to the value of the volume for the English reader.

The work is divided into two parts, the first (pp. 1–155) dealing with the anatomy and geographical distribution; the second, or systematic portion, comprising classification, phylogeny and descriptions of genera and species. The anatomical portion treats more of the grosser anatomy, comparatively little space being given to histological matters. We miss more particularly an account of the finer anatomy of the nervous system, the knowledge of which has been enriched by the recent researches of Von Lenhossèk and Retzius. The part devoted to the discussion of the nephridia is, to our mind, the most complete in the morphological portion of the work.

The author divides the Oligochæta into three groups; (1) Aphaneura, (2) Microdrili, (3) Megadrili. The Aphaneura correspond to Vejdovsky's group of the same name, while the Microdrili and Megadrili are equal in value to the old divisions Limicolæ and Terricolæ of Claparède, with the exception that the Aeolosomatidæ are separated from the Limicolæ and constitute the first group or Aphaneura. The names Microdrili and Magadrili thus have a broader application than Benham's use of them. Among

the Microdrili the Lumbriculidæ, Tubificidæ and Naidomorpha are united into the superfamily Lumbriculides; the Perichætidæ, Cryptodrilidæ and Acanthodrilidæ constitute the superfamily Megascolicidæ among the Megadrili. The three groups include about 125 genera and 650 species, divided between thirteen families. Vejdovsky's family of the Chætogastridæ is abandoned, the genus Chætogaster being placed in the Naidomorpha, and no mention is made of the doubtful family of Discodrilidæ of the same author, with its single representative, the leech-like parasitic Branchiobdella, while the Criodrilidæ of Vejdovsky are absorbed by the Geoscolicidæ.

It is to be deplored that numerous inaccuracies occur. Many of these, no doubt, are due to careless proof-reading, but some are of a graver sort, and of a kind to shake the readers confidence in the entire trustworthiness of the work. On page 110 we read that "there are as a rule but a single pair of glands [spermiducal glands] in the Megascolicidæ; but exceptions are known; thus with the exception of *Acanthrodrilus monocystis* the Acanthodrillidæ have always two pairs opening onto the seventeenth and eighteenth segments," but Fig. 45 shows that in five species of Acanthodrilus the spermiducal gland pores lie in segments XVII and XIX; further in the definition of the genus Diplocardia (also an Acanthodrilid) we read page 548 'spermiducal gland pores on XVIII, XX.' Again in the definition of the genus Diplocardia we see 'setæ paired, absent from segment XIX on which lie the male pores,' and turning to the definition of Diplocardia communis we find 'male pores on XVIII, XX.' This is worse than confusing. Occasional inaccuracies as to authorities also occur; for example on page 314, where the genus Distichopus is accredited to Verrill instead of to Leidy.

Great praise is due to the author for the exhaustive bibliography he has collected, however we feel compelled to censure him for the way in which it is put together, and we claim a certain right to do this since he tells us, at the beginning of his bibliography, that 'with a few exceptions (marked with an asterisk) every quotation has been verified by myself.' To begin with, we consider dates in bibliographical references to be of very great importance, but we find that only a very small percentage of the titles of the great list here given bear any date at all, and many of these are wrong. In addition to the omission of dates there are inaccurate details, the effect of which is to send one astray. One is not much aided by a reference without a date, to Vol. II., which should read Vol. XIX., as in Bergh (3); such references are unfortunately many. Again under Rosa (28) we are referred to 'ibid,' i. e., Ann. Mus. Civ. Genova, X., whereas the paper referred to appeared in Boll. Mus. Zool. Torino. II. T. Reichard appears for J. Reighard, and Lumbriculidæ for Lumbricidæ. Such slips are not confined to the bibliographical list; for example on page 711 we are referred to Rosa, Boll. Mus. Zool. Torino [no volume] 1872, when it should be twenty years later, in 1892. These examples are taken at random. There is no list of corrigenda. There is an index to genera and species only, and one is dependent upon a brief table of contents for other references. The imprint of the Clarendon Press is sufficient warrant for the typography and press work, which is of the highest order.

In conclusion, we would say that Mr. Beddard has undertaken a great task and has done it fairly well; he deserves the thanks of all students of the Oligochaets. A general synoptic key or table would have been a welcome addition for the student in the determination of species, while a careful revision of the manuscript would have made the book much more satisfactory. As it is, Mr. Beddard has given us an extremely valuable contribution to this branch of the Annelida.

W. McM. WOODWORTH.
FRANK SMITH.

A Manual of Qualitative Chemical Analysis, by E. P. HARRIS, PH. D., LL D., Professor of Chemistry in Amherst College. New Edition thoroughly Revised and Corrected. Amherst, Mass. 1895. 315 pages.

In most colleges the course in chemistry begins with lectures or recitations on the non-metals, generally combined with laboratory work, and this is followed by laboratory work in qualitative analysis. A question may be raised as to whether qualitative analysis is