

a Biological Study of Oakgalls and Gallflies," authorised translation, by C. R. Straton.

Messrs. LONGMANS, GREEN AND Co. have in preparation:—"Agricultural Analysis, a Manual of Quantitative Analysis for Students of Agriculture," by Frank T. Addyman; "The Outdoor World, or the Young Collector's Handbook," by W. Furneaux, with 546 illustrations, including 16 coloured plates; "Eskimo Life," by Fridtjof Nansen, author of "The First Crossing of Greenland," translated by William Archer, with illustrations.

Camille Flammarion's "Popular Astronomy" is being translated by Mr. J. Ellard Gore, and will be published by Messrs. CHATTO AND WINDUS. This firm will also publish "The Sagacity and Morality of Plants: a Sketch of the Life and Conduct of the Vegetable Kingdom," with coloured frontispiece and 100 illustrations; "Our Common British Fossils, and Where to Find Them, a Handbook for Students," with 331 illustrations; "The Playtime Naturalist," with 366 illustrations.

The volumes on scientific subjects announced by Messrs. RIVINGTON, PERCIVAL AND Co. are:—"The School Euclid," by Mr. Daniel Brent; "The Beginner's Text-Books of Science"; "Chemistry," and "Heat," by Mr. G. Stallard; "Geology" and "Physical Geography," by Mr. C. L. Barnes; "Electricity and Magnetism" and "Mechanics (Treated Experimentally)," by Mr. L. Cumming; "Light," by Mr. H. P. Highton; "Practical Physics," in three parts, by Prof. W. F. Barrett; "Practical Lessons and Exercises in Heat," by Mr. A. D. Hall.

In the list of books about to be published by Messrs. W. H. ALLEN AND Co. we find:—"The Naturalist's Library," each section rewritten by well-known naturalists, edited by Dr. R. Bowdler Sharpe, in 20 vols.; "Handbook of British Hepaticæ, containing Descriptions and Figures of the Indigenous Species of Marchantia, Jungermannia, Riccia, and Anthoceros," by Dr. M. C. Cooke, author of "A Manual of Structural Botany," &c.; "The Flowering Plants of Western India," by the Rev. Alexander Kyd Nairne.

Messrs. KEGAN PAUL AND Co. announce a new volume of "Modern Science Series": "The Fauna of the Deep Sea," by Sydney J. Hickson, Downing College, Cambridge (with illustrations); also a new volume of the "International Scientific Series": "The Dispersal of Shells: an Inquiry into the Means of Dispersal possessed by Fresh-water and Land Mollusca," by H. Wallis Kew, with a Preface by Dr. Alfred Russel Wallace, F.R.S., &c. (with illustrations).

Messrs. GEORGE BELL AND SONS propose to issue Vol. iii. of the "British Fungus-Flora, a Classified Text-book of Mycology," by George Masee, author of "The Plant World," with numerous illustrations; "The Elements of Applied Mathematics, including Kinetics, Statics, and Hydrostatics," by C. M. Jessop; "Elementary Analytical Geometry," by the Rev. T. G. Vyvyan.

Messrs. FREDERICK WARNE AND Co. announce:—"The Royal Natural History," edited by Richard Lydekker, with preface by P. L. Sclater, illustrated with seventy-two coloured plates, and upwards of sixteen hundred wood engravings, by W. Kuhnert, J. Wolf, T. Specht, Gambier Bolton, P. J. Smit, &c., to be issued in monthly parts, beginning this month.

Messrs. METHUEN AND Co. will add to their University Extension Series a popular introduction to modern physical astronomy, entitled "The Vault of Heaven," by R. A. Gregory; and "Meteorology; the Elements of Weather and Climate," by Mr. H. N. Dickson.

From Messrs. A. AND C. BLACK will come "Investigations in Microscopic Foams and on Protoplasm," by Prof. O. Bütschli, translated from the German by E. A. Minchin, illustrated; and the remaining two parts of Prof. Newton's "Dictionary of Birds."

The following are among the educational announcements of Messrs. BLACKIE AND SON:—"Text-book of Heat," by Dr. C. H. Draper; "Students' Introductory Handbook of Systematic Botany," by J. W. Oliver; "Elementary Hydrostatics and Pneumatics," by R. Pinkerton.

Messrs. W. AND R. CHAMBERS will add to their list:—"Electricity and Magnetism," by Prof. Cargill G. Knott; "Organic Chemistry," by Prof. Perkin; "Elementary Science," by S. R. Todd; "Navigation," by J. Don.

Among Messrs. WILLIAMS AND NORGATE's forthcoming books is "A Pocket Flora of the Edinburgh District," by C. O.

Sonntag, of the Edinburgh High School, with an Analytical Key to Orders and Genera.

Messrs. J. HUGHES AND Co. announce "Honours Physiology," by R. A. Gregory and H. G. Wells, and a second edition of Prof. Walker Overend's "Elements of Physiology."

The RELIGIOUS TRACT SOCIETY announce "The Romance of Electricity," by John Munro, with illustrations.

TRILOBITES WITH ANTENNÆ AT LAST!

MR. W. D. MATTHEW¹ is to be warmly congratulated on being the first to describe Trilobites with visible antennæ. His detailed and illustrated description of a rich find (some sixty specimens) of *Triarthrus Beckii* with antennæ, made by Mr. Valiant in the Hudson River shales near Rome, N.Y., must naturally cause excitement among biologists all over the world.

The complete absence of all traces of visible antennæ, and, further, the failure of Walcott, after the most patient research by means of sections, to discover any antennal system at all, have resulted in the Trilobites remaining without abiding home in the zoological system. They have been Isopods, PhyllopoDs, and even Arachnida. And now, at last, Trilobites have been found with very pronounced antennæ! The first question we naturally ask is, what light do these antennæ throw upon the affinities of this mysterious group?

According to the description, these organs are long, many-jointed, typical crustacean antennæ. "They come out close together from just under the centre of the anterior border of the head shield." . . . "Their point of origin seems to be under the front part of the glabella, as they can be traced a little way under the head shield, where they almost coalesce, then turn upwards and outwards and disappear." . . . "Just over the spot where they come out, the anterior margin of the head shield is arched slightly upwards, seemingly to give room for them to play to and fro."

From these details we deduce the following:—

(1) All Trilobites had antennæ, which except, as far as we know, in the case of *Triarthrus Beckii* alone remained shut in under the head shield.

(2) These ventrally placed antennæ were inserted, approximately, one on each side of the labrum.

It seems to me that these natural conclusions from the facts go far to establish the relationship between the Trilobites and the Apodidæ originally maintained by Burmeister, and recently elaborated by the present writer ("The Apodidæ," "Nature Series," 1892). But however weighty the arguments (amounting, it seemed to me, to a proof) in favour of this relationship, the inability actually to demonstrate the existence of the antennæ was a felt weakness. That weakness has now been finally removed, and my arguments have been fully confirmed, by the finding that the Trilobites had antennæ in practically the same position as the anterior pair in the Apodidæ.

The Trilobites may therefore take a firm place at the root of the Crustacean system, with the existing Apus as their nearest ally.

The modern Crustacea, with their two pairs of antennæ arranged in a group with the eyes at the most anterior end of the body, have then to be deduced from primitive forms in which the antennæ were placed ventrally at the sides of the labrum, and were shut in under a large head shield. *Triarthrus Beckii* shows us one attempt to bring the antennæ forward. A pair of antennæ (presumably the anterior pair) lengthened considerably, and, without apparently changing their places of insertion, projected from under the head shield through a median groove. In spite of this actual discovery, I still think that the method of attaining the same end proposed by me (*loc. cit.*) was the method finally adopted. I suggested two grooves, one on each side of the median line, along which the antennæ moved bodily to the front. This would allow both pairs to act as anterior feelers, whereas the method adopted by *Triarthrus* would apparently only allow one pair to do so. Further, the piece between the grooves would account for the rostrum, which we know was very early developed. The antennæ in the early Phyllopod *Ceratiocaris papilio* were not long and filiform as in the Trilobite *Triarthrus*, but look exactly like a pair of Apus antennæ moved bodily to the front.

Whether the remarkable resemblance of the Isopods to the

¹ "On the Antennæ and other Appendages of *Triarthrus Beckii*." (*American Journal of Science*, August, 1893.)

Trilobites is due to direct descent, or is a case of convergence, cannot here be discussed.

We shall wait with impatience for further details of these important discoveries, inasmuch as there seems great promise that the soft black shale to which we owe the fine preservation of the antennæ has also preserved for us further details of the organisation of these interesting fossils. The fragments of limbs shown in the drawings make us eager for more.

H. M. BERNARD.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

AN influential and well-attended Conference on Secondary Education was opened on Tuesday in the Examination Schools, Oxford. The subjects considered were the need of various types of secondary education in England, with special reference to (1) the curricula and gradation of first grade schools (classical and modern), second grade schools, and higher grade board schools respectively; (2) the provision of preparatory schools for the upper grade of secondary schools; and (3) the relation between secondary schools and the Universities.

MR. A. AUSTEN LEIGH, Provost of King's College, Cambridge, was admitted Vice-Chancellor on September 30. Dr. Peile, in resigning office, commented on the events of the University year. He called special attention to the straitened finances of the scientific departments, and trusted that help might be obtained from external sources. The departments of Engineering, Geology, Astronomy, and Pathology appear to be those most urgently in need of additional resources. The Senate would be asked to appoint a syndicate for conducting Examinations in Agricultural Science, being strongly moved thereto by the County Councils and the Royal Agricultural Society. The Galileo Tercentenary at Padua, the Harvey Centenary in Cambridge, and the appointment of Mr. H. Y. Oldham as University Lecturer in Geography, in the room of Mr. Buchanan, were sympathetically referred to.

MR. R. A. SAMPSON, Fellow of St. John's College, and Isaac Newton Student in Astronomy, Cambridge, has been appointed Professor of Mathematics in the Durham College of Science, Newcastle.

A NEW course of lectures on "The Physiology of the Special Senses, chiefly the phenomena of Vision," will be given this term by Dr. W. H. R. Rivers, of St. John's College, Cambridge, beginning on Monday, October 16. The lectures will be accompanied by practical work in the Psychophysical Laboratory.

THE Technical Instruction Committee of the Bolton County Council has issued a syllabus of day and evening classes for the session 1893-4. The youth of Bolton can obtain instruction in many of the arts and most of the sciences at their Technical School, and judging from the well-equipped workshops illustrated in the syllabus, excellent courses of manual training are given.

THE Entrance Scholarships in Science at St. Bartholomew's Hospital have recently been awarded. The scholarship of £75 in biology and physiology has been given to E. C. Morland, of Owens College, Manchester; the scholarship of £75 in chemistry and physics has been gained by R. H. Bremridge; the junior open scholarship of £150 in biology, chemistry, and physics has been gained by H. A. Colwell; and the preliminary scientific exhibition has been awarded to J. E. Robinson. The Jeffereson exhibition in classics and mathematics has been gained by G. V. Bull.

A DIGEST of the University Extension Science Lectures, to be delivered this autumn, shows that the movement is doing good work in many parts of the country. In connection with the Cambridge University Extension Syndicate, nine courses will be delivered on Botanical subjects, seven on Natural History, seven on Hygiene and kindred matters, six on Chemistry, and two on the History of Science, while single courses have been arranged in Agriculture, Electricity, and Geology. The programme of the London Society for the Extension of University Teaching shows six courses on Chemistry, four on Astronomy, three on Geology, and the same number on Hygiene. The Oxford University Extension Delegacy have made arrangements for the delivery of sixteen courses on Chemistry, twelve on Hygiene, nine on Agriculture, four on Astronomy, three on Geography, three on Geology, two on Electricity, two on Physiography, one on Light, and one on the Forces of Nature.

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SCIENTIFIC SERIALS.

THE *American Meteorological Journal* for August contains an important investigation on the movements of the air at all heights in cyclones and anticyclones, as shown by cloud observations made at Blue Hill Observatory. A record was made of the kind of each cloud visible, its direction of motion and relative velocity, and the observations, classified into five levels, were plotted by means of arrows on maps prepared for the purpose. The increased velocity of the wind near the centre of the cyclone and the decreased velocity near the centre of the anticyclone are distinctly shown. The arrows also show that the inclination of the wind to the centres of the two is not the same on all sides. In the cyclone the winds blow most nearly tangential south-east of the centre, and most nearly inward north or north-east of the centre; while in the anticyclone the winds are most tangential north-west of the centre, and most nearly outward south or south-east of the centre. In the cumulus region the cyclonic and anticyclonic circulation are still visible, but the general westward drift has become much stronger, while above that region that circulation is entirely masked by the drift. The diagrams also show that the currents do not all turn to the right as one ascends into the atmosphere, as is usually stated; when the winds have a northerly component, they show that the currents turn to the left as one ascends. The tables show that the circulation of the air is much more rapid in the higher regions than near the earth's surface, both in cyclones and anticyclones.

Bulletin de l'Académie Royale de Belgique, No. 8.—Determination of the constant of aberration, of the parallax of Polaris, of the velocity of the solar system, and of the constants of diurnal nutation, by means of the latitude observations of Gyléen and Peters at Pulkowa, by F. Folie. A further discussion of the evidence for diurnal nutation claimed as discovered by the author, and other deductions from the Pulkowa latitude observations. Among the latter is the R. A. of the apex of the sun's way, 277° , the positive parallax of $0''.05$ for Polaris, and the negative correction for the constant of aberration, $0''.037$, which harmonises the velocity of light and the parallax of the sun.—Correct determination of the constant of aberration by observations in the prime vertical, by the same author. This shows that the accepted formula for the reduction of prime vertical observations is faulty, and substitutes a corrected one.—Researches on the mono-carbon derivatives, by Louis Henry. This portion of the researches contains a preliminary account of the ammoniacal derivatives of methyl aldehyde.—On a simple method of measuring retardation in minerals cut in thin plates, by G. Cesaro. A compensating quartz prism is placed between the microscope and the mineral, and moved across the field by means of a screw permitting a displacement of 0.05 mm. The tints utilised for the determination of the amount of retardation experienced by the extraordinary ray are those known as sensitive tints, which easily change from a bluish to a reddish violet.—On the nutrition of the echinoderms, by Marcellin Chapeaux. The author maintains that the amibocytes of the coelomic cavity of starfishes play an important part in the continuation of the process of digestion originated by the radial glands. Small drops of the oils emulsified by the radial glands traverse the epithelium and enter the body cavity. They are then absorbed by the amibocytes, and their duplication is carried out in the interior of these phagocytes, under the influence of an acid ferment.

Bulletin de la Société des Naturalistes de Moscou, 1892, No. 4.—Contributions to the fauna of the Aral Steppes, by A. Nikolsky. List of mammals and birds collected or noticed in the Steppes, with very short remarks.—*Astragalus Uralensis*, a new species, by D. Litwinow.—On the cold of January, 1893, note by B. Sresnewskij.—To the memory of N. I. Koksharoff and A. W. Gadolin, by W. Vernadsky. An excellent summary of Gadolin's work.

1893, No. 1.—On some ecto- and ento-parasites of the Cyclopidæ, by Dr. W. Schewiakoff (with a plate). A new species, *Trichophrya cordiformis*, is described, also the ento-parasitic slimes of the cyclopidæ.—On the anatomy of *Siredon pisciformis*, by W. Zykoff (with a plate).—Notes on a new skull of *Amynodon*, by Marie Pavloff (with a plate). The skull has been received from America, and was found in the miocene of the Black Hills, South Dakota.—Catalogue of Lepidoptera of the Government of Kazan (third paper), by L. Krulikovski, containing the Noctuæ.—On the molecular