

effect¹:—"I observed at table the under surface of a half round of boiled salt beef, cooked the day before, to be specked with several bright carmine-coloured spots, as if the dish in which the meat was placed had contained minute portions of red currant jelly. Suspecting what these might turn out to be, I directed the beef to be placed aside. On examination the next day the spots had spread into patches of a vivid carmine-red stratum of two or more inches in length. With a simple lens the plant appears to consist of a gelatinous substratum of a paler red, bearing an upper layer of a vivid red hue, having an uneven or papillated surface. The microscope shows this stratum to consist of generally globose cells, immersed in, or connected by, mucilaginous or gelatinous matter. The cells vary in size, and contain red endochrome; they seem to consist of a single cell-membrane, and contain a nucleus. Treated with sulpho-iodine they become blue."

As to its place in the organic kingdom, Mr. Stephens was of opinion that it was a *Palmella* closely allied to *Palmella cruenta*, but distinct, the cells or granules of the latter differing from it, not only in their colour but size, being very much smaller than those of *P. prodigiosa*. As to its propagation, he further remarks that it seems to extend itself by elastically spurting a sort of jet or column of red particles, which Berkeley compared to a jet of blood from an artery, and by this method it was suggested that the extraordinary rapidity with which a large surface becomes covered can be explained. The vitality of the cells is not impaired (within a certain time) by desiccation, even at a high temperature, and when dry they retain their germinating powers for a considerable period.

The spherical cells are filled with a reddish oil, which gives to them a peach-blossom tint, and when transferred to raw meat they assume a splendid fuchsia-colour, resembling spots of blood. The plant is only developed in the dark, and the nitrogen necessary for its nutriment must be derived from the air, especially when developed upon bread. About 1886 an epidemic appearance on the Continent was attributed to this source. Pieces of cooked meat presented a singular carmine-red colouration, and stained vividly the fingers or linen with which they came in contact. These phenomena prevailed regularly for a period of three months. Food cooked over-night was found the next morning covered with red patches, and it then underwent rapid alteration. Coincident with a sudden and considerable fall in the temperature the epidemic ceased, and did not reappear.²

Presenius records the result of his examination of this organism, in his "Beitrag," to the effect that "he took four boiled potatoes, and placed them in a drawer, having previously rubbed two of them slightly here and there with the red substance. After about twenty-four hours, the two potatoes which had not been rubbed, and which had not been in immediate contact with the other two, were affected with fresh spots of the red substance, whilst the spots upon the two which had been rubbed had increased in extent. The spots showed themselves in the form of irregular groups of blood-red drops of different size, which in some places were distinct, and in others had run into one another. The individual bodies of which the spots consist are mere molecules, their diameter varying from one two-thousandth to one four-thousandth of a line. They are mostly round, occasionally oval, and sometimes slightly constructed in the middle, by way of preparation for increase by division into two small round cells. By far the greater number of them, when brought under the microscope in a drop of water, remain at rest—they lie close together in large numbers; when they are more dispersed in the fluid they have a motion which is not distinguishable from ordinary molecular motion. When the drop of water moves they are carried mechanically over the stage like other molecules, and when this motion ceases they remain at one spot in a sort of quivering state until a fresh current carries them in another direction. If the eye be kept carefully upon a part of the stage where the small bodies are thinly dispersed, it will be observed that they passively follow the current of the water, nor, when the current has become sluggish, or has even altogether ceased, are individual bodies ever seen to detach themselves from the group, and take a contrary direction, which real monads would do with great activity."

The present determination of this organism, according to some, is *Micrococcus prodigiosus*, but according to others it is

¹ H. O. Stephens, on *Palmella prodigiosa* in *Annals of Nat. Hist.* vol. xii. December, 1853.

² *Pharmaceutical Journal*, January 29, 1887, p. 610.

Bacillus prodigiosus, and consequently one of the *Schizomycetes*. It has been pointed out that as the temperature rises this *Bacillus* loses its power of forming a pigment, and if it is grown on potato or bread-paste, in an incubator at blood heat, instead of at the temperature of the room, the colour is gradually lost, and the culture no longer smells of herring brine, but the power of forming lactic acid from milk-sugar, with the accompanying precipitation of the casein, is frequently considerably increased; so that it would appear that the energy required for the building-up of the pigment substance was, in this case, diverted into another channel, and lactic acid, and perhaps other substances, are produced in place of the usual pigment.¹

The reappearance of this organism in this country, during the late hot weather, and especially on cooked potatoes, gives interest to its history, and is sufficient apology for these observations.

M. C. COOKE.

FORTHCOMING SCIENTIFIC BOOKS.

THE autumn publishing season has opened with announcements of forthcoming books to suit all requirements. From this year's list we see that many works of high scientific importance are in the press, but the chief feature is the large number of text-books announced. The work of the Technical Instruction Committees of our County Councils has naturally resulted in the preparation of books on various arts and handicrafts, and since the authors of these books are usually well versed in the technicalities of their subjects, it may be presumed that the 'prentice hand will derive benefit from their literary efforts.

The following books are announced by Messrs. MACMILLAN AND CO.:—The Collected Works of Thomas Henry Huxley, F.R.S., in monthly volumes, from October 1. Vol. i. "Methods and Results" (just published); vol. ii. "Darwiniana"; Vol. iii. "Science and Education"; vol. iv. "Science and Hebrew Tradition"; vol. v. "Science and Christian Tradition"; Vol. vi. "Hume." "Systematic Survey of the Organic Matters," by Drs. G. Schultz and P. Julius, translated and edited, with extensive additions, by Arthur G. Green, Examiner in Coal Tar Products to the City and Guilds of London Institute. "Text-Book of the Diseases of Trees," by Prof. R. Hartig, translated by Dr. R. Somerville, Lecturer on Agriculture at Durham College of Science, with a preface by Prof. H. Marshall Ward, F.R.S., with numerous illustrations. "Methods of Histological Research," for the use of students and physicians, by Er. C. V. Kahliden, Lecturer in the University of Freiburg, translated by H. Morley Fletcher. "Materials for the Study of Variation in Animals." Part i. "Discontinuous Variation," by William Bateson, Balfour Student and Fellow of St. John's College, Cambridge, illustrated. "Handbook of British Marine Fauna," vol. i. Tunicata, Polyzoa, and Echinodermata, by Prof. W. A. Herdman, F.R.S., with numerous illustrations. "The Romance of the Insect World," by Miss L. N. Badenoch, with illustrations. "A Text-Book of Pathology," systematic and practical, by Prof. D. J. Hamilton, vol. ii. "Handbook of Public Health and Demography," by Edward F. Willoughby, Diploma in State Medicine of the London University, and in Public Health of Cambridge University. "The Practitioner," an index to vols. 1-50 of the *Practitioner*, a journal of therapeutics and public health. The three following volumes have been designed to suit the requirements of the examinations of the Department of Science and Art:—"Organic Chemistry for Beginners," by Dr. G. S. Turpin; "Physiology for Beginners," by J. E. Marr, F.R.S., and Alfred Harker, M.A.; "Physiology for Beginners," by Prof. Michael Foster, F.R.S., and Dr. L. E. Shore. "Geometrical Conic Sections," by Charles Smith. "Geometrical Conic Sections," by Asutosh Mukhopadhyay, Fellow of the University of Calcutta. "Geometrical Conics," Part ii., the Central Conic, by John J. Milne and R. F. Davies. "Elementary Trigonometry," by H. S. Hall, Master of the Army Class, Clifton College, and S. R. Knight. "Sketches in Sport and Natural History," by the late Dr. George Kingsley; "The Beauties of Nature," by the Right Hon. Sir John Lubbock, Bart., F.R.S., new edition without illustrations; "The Theory of Heat," by Thomas Preston, with illustrations; "Researches on the Propagation of Electrical Force," by Prof. Heinrich Hertz, of Bonn, authorised translation by Prof. D. E. Jones, with preface by Lord Kelvin, P.R.S.,

¹ Dr. G. S. Woodhead, "Bacteria and their Products" (1891), p. 9.

illustrated; "A Text-book on Electro-Magnetism and the Construction of Dynamos," by Dugald C. Jackson, Professor of Electrical Engineering, University of Wisconsin; "The Mechanics of Hoisting Machinery, including Accumulators, Excavators, and Pile Drivers," by Dr. Julius Weisbach and Prof. Gustav Hermann, with 177 illustrations, authorised translation from the second German edition, by Karl P. Dahlstrom, Instructor in Mechanical Engineering at the Lehigh University; "Hydrostatics," by A. G. Greenhill, F.R.S., Professor of Mathematics to the Senior Class of Artillery Officers, Woolwich; "Essays in Historical Chemistry," by Prof. T. E. Thorpe, F.R.S.; "The Rise and Development of Organic Chemistry," by the late C. Schorlemmer, F.R.S., translated and edited by Prof. Smithells, Yorkshire College, Leeds; "Popular Lectures and Addresses," Vol. ii., contributions to Geology, by Lord Kelvin, P.R.S.; "The Life of Sir A. C. Ramsay," by Sir Archibald Geikie, F.R.S.; "A Text-book of the Physiological Chemistry of the Animal Body, including an Account of the Chemical Changes occurring in Disease," by Dr. Arthur Gamgee, F.R.S., Brackenbury Professor of Physiology in the Owens College, with illustrations, Vol. ii.; "Boot and Shoe Manufacture," by C. W. B. Burdett, Head Master City and Guilds of London Leather Trade Schools, with numerous illustrations; "Lead Work," by W. R. Lethaby, with illustrations; "Gold-Milling," with illustrations, by H. Louis; "Elementary Course of Practical Science," by Hugh Gordon.

THE CAMBRIDGE UNIVERSITY PRESS announce:—"The Scientific Papers of John Couch Adams," Vol. i., edited by Dr. William Grylls Adams, F.R.S., &c., Professor of Natural Philosophy in King's College, London, late Fellow of St. John's College, Cambridge, with a memoir by Dr. J. W. L. Glaisher, F.R.S., &c., Fellow of Trinity College, Cambridge; "A Treatise on Spherical Astronomy," by Sir Robert S. Ball, F.R.S., Lowndean Professor of Astronomy and Geometry; "A Treatise on the Theory of Functions of a Complex Variable," by Dr. A. R. Forsyth, F.R.S., Fellow of Trinity College, Cambridge; "Plane Trigonometry," by S. L. Loney, Part i., up to and including the Solution of Triangles, is published separately; "Solutions of the Examples in a Treatise on the Elements of Statics and Dynamics," by S. L. Loney, late Fellow of Sidney Sussex College, Cambridge; "Elementary Hydrostatics," by John Greaves, Fellow and Lecturer of Christ's College; "The Steam Engine and other Heat Engines," by J. A. Ewing, F.R.S., Professor of Mechanism and Applied Mechanics in the University of Cambridge; "Elementary Palæontology for Geological Students," by Henry Woods; "Practical Physiology of Plants," by F. Darwin and E. H. Acton. Pitt Press Mathematical Series:—"Euclid's Elements of Geometry," Books v. and vi., by H. M. Taylor, Fellow and formerly Tutor of Trinity College, Cambridge; "Solutions to the Exercises in Euclid," Books i-iv. (Pitt Press Mathematical Series, by H. M. Taylor), by W. W. Taylor. The Cambridge University Press are also about to publish a series of Natural Science Manuals, which will cover a wide field, some of the books being adapted for beginners, whilst others will deal with special topics, and will be useful only to more advanced students. The series will be divided into two sections, a Biological and a Physical. The former will be published under the general editorship of Mr. Arthur E. Shipley, Fellow and Tutor of Christ's College, Cambridge; it will include "A Manual of Invertebrate Palæontology," by Mr. H. Woods, Demonstrator of Palæobotany at Cambridge, which is now ready; "A Text-book on the Practical Physiology of Plants," by Mr. Francis Darwin, of Christ's College, and Mr. E. Hamilton Acton, of St. John's College, which is in the press; "Works on Physical Anthropology," by Prof. Alexander Macalister; "On the Vertebrate Skeleton," by Mr. S. H. Reynolds, of Trinity College; "On Fossil Plants," by Mr. A. C. Seward, Lecturer in Botany in the University, and "An Introduction to the Study of Botany," by Mr. Francis Darwin, which are in preparation. Other volumes will shortly be announced. The volumes of the Physical Series already arranged for include three by Mr. R. T. Glazebrook, F.R.S., Assistant-Director of the Cavendish Laboratory, on "Light and Heat," "Electricity and Magnetism," and "Mechanics and Hydrostatics"; these will be elementary text-books, based on the Practical Courses of Physics for Medical Students at the Cavendish Laboratory. The volume on "Light and Heat" is in the press, and the other volumes are in preparation.

Messrs. CHARLES GRIFFIN AND Co.'s announcements in-

clude:—"A Text-book of Ore and Stone Mining for the Use of Mine-owners, Mine-managers, Prospectors, and all interested in Ore and Stone Mining," by Dr. Clement Le Neve Foster, F.R.S., Professor of Mining, Royal College of Science, H.M. Inspector of Mines; a new Metallurgical series, edited by W. C. Roberts-Austen, C.B., F.R.S., Chemist and Assayer of the Royal Mint, Professor of Metallurgy in the Royal College of Science. (1) "Introduction to the Study of Metallurgy," by the Editor; third edition. (2) "Gold (The Metallurgy of)," by Thos. Kirke Rose; (3) "Copper (The Metallurgy of)," by Thos. Gibb; (4) "Iron and Steel (The Metallurgy of)," by Thos. Turner; (5) "Metallurgical Machinery: the Application of Engineering to Metallurgical Problems," by Henry Charles Jenkins; (6) "Alloys," by the Editor. Technological Manuals: "Oils, Fats, Waxes, and Allied Materials, and the Manufacture therefrom of Candles, Soaps, and other Products," by Dr. C. R. Alder Wright, F.R.S.; "Agricultural Chemistry and Analysis: A Practical Handbook for the Use of Agricultural Students," by Dr. J. M. H. Munro, Professor of Chemistry, Downton College of Agriculture; "Dairy Chemistry: A Practical Handbook for Dairy Managers," by H. Droop Richmond; "Cements: A Practical Handbook on their Manufacture, Properties, Testing," &c., by Gilbert R. Redgrave; "Petroleum: A Treatise on the Geographical Distribution, Geological Occurrence, Chemistry, Production, and Refining of Petroleum; its Testing, Transport, and Storage; and the Legislative Enactments relating thereto; together with a Description of the Shale Oil Industry," by Boverton Redwood, assisted by Geo. T. Holloway. With maps and illustrations. The special features of Mr. Redwood's work will be (1) the hitherto unpublished descriptions of undeveloped sources of petroleum in various parts of the world; and (2) that the testing, transport, and storage from the point of view of legislation, and the precautions which experience in this and other countries has shown to be necessary in the interests of public safety. "A Text-book of Physics: including Properties of Matter, Heat, Sound and Light, Magnetism and Electricity," by Dr. J. H. Poynting, F.R.S., late Fell. of Trinity Coll., Cambridge; Prof. of Physics in the Mason Coll., Birmingham, and J. J. Thomson, F.R.S., Fell. of Trinity Coll., Cambridge; Prof. of Exper. Physics in the Univer. of Camb.; "The Mean Density of the Earth: An Essay to which the Adams Prize was adjudged in 1893 in the University of Cambridge," by Dr. J. H. Poynting, F.R.S., in large 8vo, with bibliography, illustrations in the text, and lithographed plates; "Marine Engineering Rules and Tables (A Pocket-book of): for the use of Marine Engineers, Naval Architects, Designers, Draughtsmen, Superintendents, and all engaged in the design and construction of Marine Machinery, Naval and Mercantile," by A. E. Seaton and H. M. Rounthwaite, with illustrations; "Gas, Oil, and Air Engines: A Practical Text-book on Internal Combustion Motors without Boiler," by Bryan Donkin, with illustrations; "Sewage Disposal Works," by W. Santo Crimp. Second edition, with additional plates; "Engineering Drawing and Design: A Practical Manual for Engineering Students," by Sidney H. Wells, Principal, Battersea Polytechnic Institute, late of Dulwich College. Part I.—Geometry: Practical, Plane, and Solid. Part II.—Machine and Engine Drawing and Design. Complete in one vol., with numerous illustrations and folding-plate; "Applied Mechanics (An Advanced Text-book of)," by Prof. Jamieson, Glasgow and West of Scotland Technical College, with very numerous illustrations.

Messrs. SWAN, SONNENSCHNEIDER AND Co.'s forthcoming works are chiefly text-books. We note:—"A Student's Text-book on Botany," by Dr. Sidney H. Vines, Professor of Botany in the University of Oxford, editor of "Prantl's Botany," copiously illustrated; "Text-book of Embryology, Invertebrates," by Drs. Korschelt and Heider, of the University of Berlin, translated and edited by Dr. E. L. Mark, Professor of Anatomy in Harvard University, and Dr. W. M. Woodworth, Instructor in Microscopical Anatomy in Harvard University, Part I., illustrated; "The Cell, its Anatomy and Physiology," by Dr. Oscar Hertwig, of the University of Berlin, translated and edited by Dr. H. J. Campbell, illustrated; "Text-book of Palæontology for Zoological Students," by Theodore T. Groom, illustrated; "Lectures on Human and Animal Psychology," by Wilhelm Wundt, Professor of Philosophy in the University of Leipzig, translated and edited by James Edward Creighton, Instructor in Philosophy to the Cornell University, Ithaca,

New York, and Edward Bradford Titchener, of the Cornell University; "Handbook of Systematic Botany," by Dr. E. Warming, Professor of Botany in the University of Stockholm, translated and edited by M. C. Potter, M.A., Lecturer on Botany and Botany in the Durham College of Science, illustrated; "Town Flowers," by J. W. N., with a preface by Canon Benham and Prebendary Webb-Peploe; "Zoology," by B. Lindsay, illustrated; "Fishes," by the Rev. H. A. Macpherson; "Flowering Plants," by James Britten, editor of the *Journal of Botany*; "Grasses," by W. Hutchinson; "Mammalia," by the Rev. H. A. Macpherson; "The Natural History and Antiquities of Selborne," by Gilbert White, Bennett's edition, with notes by J. E. Harting, illustrations by Bewick, Harvey, &c., new edition.

Messrs. CROSBY LOCKWOOD AND SONS have in preparation and in the press.—"Machinery for Metalliferous Mines: a Practical Treatise for Mining Engineers, Metallurgists, and Managers of Mines," by E. Henry Davies (illustrated); "The Practical Engineer's Year-book for 1894, comprising Modern Engineering Formulæ, Rules, Tables, and Memoranda, in Civil, Mechanical, Electrical, Marine, and Mine Engineering," by H. R. Kempe; "Practical Building Construction: a Handbook for Students Preparing for the Examinations of the Science and Art Department, the Royal Institute of British Architects, the Surveyors' Institution, &c., designed also as a Book of Reference for Persons engaged in Building" (1000 illustrations), by John Parnell Allen; "Concrete: Its Nature and Uses: a Book for Architects, Builders, and Clerks of Works" (with numerous illustrations), by George L. Sutcliffe; "Tramways: Their Construction and Working, embracing a Comprehensive History of the System; with an exhaustive Analysis of the various Modes of Traction, a description of Rolling Stock, and details of Cost and Working Expenses" (with plates and other illustrations), by D. K. Clark, new edition, in one volume, rewritten and revised; New Volumes of Hasluck's Series of "Handybooks for Handicrafts," viz.: "The Woodworker's Handybook: a Practical Manual on the Tools, Materials, Appliances and Processes employed in Woodworking" (with 100 illustrations); "The Metalworker's Handybook: a Practical Manual for use in Technical Classes and Workshops" (with 100 illustrations); "Wall Paper Decoration" (with numerous illustrations), by A. S. Jennings; "An Astronomical Glossary; or Dictionary of Terms used in Astronomy, with Tables of Data and Lists of Remarkable and Interesting Celestial Objects," by J. Ellard Gore.

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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.

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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, Phyllopoths, 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.)