

translated by Dr. Alexander Bruce, 2 vols; Plea for a Simpler Life, by Dr. George S. Keith, fifth edition; The Evolution of Bird-song, with observations on the influence of heredity and imitation, by Charles A. Witchell.

Messrs. Smith, Elder, and Co.'s list is as follows:—The Spas and Mineral Waters of Europe, with Notes on the Utility of Spa Treatment in various Diseases and Morbid Conditions, by Drs. Hermann Weber and Frederick Parkes Weber; The Treatment of Phthisis, by Arthur Ransome, F.R.S.

Messrs. G. P. Putnam's Sons' announcements include:—The Evolution of Horticulture in New England, a History of the Art of Gardening in New England from its earliest plantation to the present day, by Daniel Denison Slade; A Scientific Demonstration of the Future Life, by Thomson Jay Hudson; Handbook for Hospitals, a manual of practical suggestions, by Abby Howland Woolset.

Messrs. W. H. Allen and Co., Limited, will publish Allen's Naturalists' Library, edited by Dr. R. Bowdler Sharpe, illustrated; British Birds, vols. iii. and iv., by the editor; Butterflies, vol. ii. by W. F. Kirby; Game Birds, vol. ii., by W. R. Ogilvie Grant.

Mr. Young J. Pentland's list contains:—Atlas of the Fundus Oculi, illustrated with figures in colours by W. Adams Frost; The Principles of Treatment, by Dr. J. Mitchell Bruce; The Edinburgh Hospital Reports, vol. iv.; a new edition of Prof. Cunningham's Manual of Practical Anatomy, in 2 vols., with additional illustrations.

Mr. Wm. F. Clay, Edinburgh, has in the press:—The Histopathology of the Diseases of the Skin, by Dr. P. G. Unna, translated from the German with the assistance of the author by Dr. Norman Walker, with double coloured plate containing nineteen illustrations and forty-two additional illustrations in the text.

Mr. Erwin Nägele, Stuttgart, announces Researches on Mimicry on the basis of a Natural Classification of the Papilionidae, by Dr. E. Haase, translated by Dr. C. M. Child, with eight coloured plates, 4to, part ii.

Messrs. Whittaker and Co. will publish immediately:—Future Trade in the Far East, by C. C. Wakefield, fully illustrated, and containing a map showing the latest developments in the trade routes.

The Rebman Publishing Company, 11 Adam Street, Strand, W.C., have ready for immediate publication, Water and Water Supplies, by Dr. J. C. Thresh.

Mr. F. Furchheim, Naples, announces Bibliografia del Vesuvio e del suo Territorio, compiled by Federigo Furchheim.

Mr. David Douglas (Edinburgh) will issue The Vertebrate Fauna of Scotland, vols. vi. and vii.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE recent decision of the Supreme Court of the United States in favour of Mrs. Stamford, and adverse to the Government in its claim for 13,000,000 dollars, means the salvation of the Leland Stamford Junior University, at Palo Alto, California; as Mrs. Stamford will now be able to carry out the munificent plan of endowment, which has been held in abeyance pending the issue of this litigation. The Johns Hopkins University at Baltimore, on the contrary, is seriously crippled by the collapse of the Baltimore and Ohio Railroad system, which has just been put into the hands of a receiver. The University held a large amount of the securities of this line.

THE County Council of Southampton has decided not to levy a rate of a halfpenny in the pound, under the Technical Instruction Act, which had been recommended by the Finance Committee with a view of assisting the Hartley Institution, a school of science and art, in that town. As far as we can gather, Southampton is suffering from a plethora of educational authorities. Besides the Council of the above institution, the Endowed Schools governors and the School Board are also engaged in providing different grades of technical education.

WE notice that on Monday, the 16th inst., a deputation of the Lancashire Committee of the Incorporated Association of Head Masters waited upon the Technical Instruction Committee of the Lancashire County Council, to urge the claims of the secondary schools in the county upon the Committee. They based their claims upon the admitted imperfect education of the students

who presented themselves at the technical schools for instruction, urging that the want of proper preliminary education could be avoided by a liberal offering of scholarships to the secondary schools, which out of the increased income resulting from the augmentation of numbers, could easily ensure a satisfactory introductory training for the future students. Attention was also very properly called to the work of this kind which had been carried out in other counties. Though the chairman expressed a fear that want of funds would prevent very much being done for secondary schools, we are sure, in view of his admission that the Committee agreed that these schools were the proper places for much of the early work in a good system of technical education, that it will not be long before the Lancashire authority does something to meet the claims urged by the deputation.

THE latest report of the Technical Instruction Committee of the Derbyshire County Council is very refreshing reading. The pamphlet is prefaced by an explanation of what the Committee considers to be the proper scope of technical education. It is rightly affirmed that a complete system has two main objects: (1) to provide for those who may naturally be expected to occupy positions of control, *i.e.* the "managers"; (2) to provide for the class from which individuals are constantly rising to positions of control, *i.e.* the "men." Recognising that the recent industrial developments of Germany are in a very large measure due to the scientific training of the managers and foremen, the Derbyshire Committee very early turned its attention to the secondary schools, as being the institutions where this class receives its early education. Very much has been done to improve the standard and nature of the instruction given in the grammar schools of the country. In giving help to these educational establishments it has in every case been insisted upon that it is desirable only to give a general education in English and languages, and to add a solid groundwork of mathematics, drawing, and pure science, without dealing with their application to specific industries. At the same time it has not been lost sight of that those students who will naturally pass on to occupy positions of high responsibility, must receive special courses of instruction at technical schools and higher educational institutions. In dealing with the requirements of the "men," the Committee have wisely decided that the teaching in elementary schools is best supplemented by a course of object-lessons in elementary science. To ensure this being well done, classes for elementary school teachers have been organised, with a view to teaching them how to give instruction in this way. The scholar's education can then be suitably continued in evening schools and science and art classes, which have been arranged in each district according to its needs. For the more advanced study which is necessary for most of the first class of students and for a considerable proportion of the second, who themselves desire it, a technical school is naturally stated to be of great importance. Instead of attempting to found such an institution themselves, the Committee have decided that the wisest course is, by a careful system of grants, scholarships, and exhibitions, to utilise the excellent colleges of Nottingham, Sheffield, Manchester and Derby, which all border upon their administrative county.

In addition to the above work, we would especially notice the initiation of the Midland Dairy Institute, the inauguration of a Department of Mining at Firth College, Sheffield, the establishment of local classes in "hosiery" at Heanor, in "calico printing, bleaching, &c.," at New Mills, and in the principle of design at various centres. The year's work is a decidedly successful one, and we hope to see several other counties following the logical and scientific methods of procedure which the Derbyshire Committee have laid down.

### SCIENTIFIC SERIALS.

THE *Quarterly Journal of Microscopical Science* for February, 1896, contains:—On the early development of *Amia*, by Bashford Dean (Plates 30–32). *Amia calva*, possibly the sole survivor of the race of the Mesozoic Ganoids, claims our special interest as the nearest ancestral form of some, if not of all, of our recent Teleosts. In embryology the Ganoid and the Teleost still stand widely separate; there has even been a tendency to look upon these kindred forms as representing different phyla, early divergent from a primitive chordate ancestor. This, therefore, renders the details given by Dr. Dean

of special interest. About the general habits of this fish, he thinks it unnecessary to write much, as Fülleborn's notes, so recently published, are but confirmed; but we are glad that he has added some on the breeding habits, which are illustrated with sketches of the nest and of the cloud of young fry attended by the male. The author concludes that the early development must certainly be regarded as furnishing abundant evidence of intermediate characters; to the Ganoids, on the one hand, and to the Teleosts, on the other. These ontogenetic nearnesses become, accordingly, of the greatest interest, since they confirm the results of the structural study of recent and fossil forms upon the Amioid descent of Teleosts.—On *Kynotus cingulatus*, a new species of earthworm from Imerina in Madagascar, by W. Blaxland Benham (Plates 33 and 34). This interesting species is remarkable for the great number and small size of the segments composing the body; there were three anterior portions sent for examination, each about 225 mm. in length; each piece consisted of some three hundred or more segments; the whole worm being probably about 450 mm. to 500 mm. in length; it possesses a clitellum of relatively enormous dimensions, with most peculiar "claspers."—Notes on the ciliation of the ectoderm of the amphibian embryo, by R. Assheton (Plate 35), describes the distribution of the cilia over the surface of the bodies of the tadpoles of *Rana temporaria* and *Triton cristatus*. As the author notes, the existence of a ciliated embryo among craniate vertebrates seems often to be overlooked.—On the ontogenetic differentiations of the ectoderm in *Necturus* (Study II.).—On the development of the peripheral nervous system, by Julia B. Platt (Plates 36-38). Even if we assume *Necturus* to be a monotypic genus, it would have been advisable for the authoress to have cited a specific name for the Batrachian, whose peripheral nervous system she has so painstakingly elaborated. The summary, occupying two pages, is too long to be cited, and does not admit of being further condensed; we note that "although delicate protoplasmic prolongations connecting cell with cell initiate the specialised coordination of the nervous system, a common reticulum, such as Sedgwick describes, into which nuclei migrate, does not exist in *Necturus*" [*lateralis*]. This number contains a title and index to Volume xxxviii.

### SOCIETIES AND ACADEMIES.

#### LONDON.

Royal Society, February 13.—"On the Behaviour of Argon and Helium when submitted to the Electric Discharge." By Dr. J. N. Collie and Prof. William Ramsay, F.R.S.

Some years ago, Natterer published the results of experiments on the passage of electricity through various gases and vapours at the ordinary atmospheric pressure; he found that the length of the spark, or the "spark-gap" varied in length in a manner approximately proportional to the number of atoms in the molecule of the gas; thus in mercury gas the distance was very much greater than that obtained in hydrogen, oxygen, nitrogen, or other diatomic gases; and in these, the spark-gap was longer than in substances of more complex molecular constitution.

Experiments of a similar nature, carried out by us on some common gases and on argon and helium, gave the results which are summarised in the following table:—

	mm.
Oxygen ... ..	23°0
Air ... ..	33°0
Hydrogen ... ..	39°0
Argon ... ..	45°5
Helium ... ..	Probably 250 or 300

The current was of constant potential and quantity; and the hammer of the coil was kept in a constant position during the experiments. Indeed, on re-testing the spark-gap with air, after the experiments were finished, the original number was reproduced.

On lowering pressure, this spark-discharge changes into a ribbon-like discharge, before the "fluffy" appearance of a so-called vacuum tube becomes visible. It appeared that this change, occurring at a definite pressure, might be measured with fair accuracy. The results of a series of such experiments is to show that the character of the discharge changes for the under-mentioned gases at the pressures stated:—

	mm.
Air ... ..	73 or 74
Hydrogen ... ..	42 " 43
Oxygen ... ..	81

NO. 1377, VOL. 53]

	mm.
Carbon dioxide ... ..	92 or 94
Cyanogen ... ..	23
Nitrogen ... ..	33
Carbon monoxide ... ..	49
Helium ... ..	1270

A tube filled with helium shows all the phenomena of a vacuum tube when containing the gas at atmospheric pressure.

The visibility of the spectrum of one gas in presence of another was next investigated. For a full description of the method of filling the tubes, and altering the pressure, the original paper must be consulted. Only the final results are here reproduced.

#### Amount of Gas detectable in a Mixture.

	Per cent.	
(1) Helium in hydrogen	33	of helium invisible at 2'61 mm. lowest pressure.
(2) Hydrogen in helium	0'001	visible at all pressures.
(3) Nitrogen in helium	0'01	almost invisible.
(4) Helium in nitrogen	10	of helium difficult to detect.
(5) Argon in helium	0'06	still visible at all pressures.
(6) Helium in argon	33	invisible at 2'62 mm. pressure.
(7) Nitrogen in argon	25	" 2'58 " "
	0'42	" 1'7 " "
	0'08	" 0'18 " "
		though just visible at 1'05 mm.
(8) Argon in nitrogen	37	barely visible at any pressure.
(9) Argon in oxygen	2'3	difficult to distinguish at 1'04 mm. pressure.

From these experiments it appears that at high pressures, a discharge passes much more readily through helium than through other gases; but at a low pressure, if passage of current can be inferred from luminosity of spectrum, all other gases convey current more readily than helium does; and nitrogen conveys current more readily than argon. This is probably connected with the known fact that decrease of pressure promotes dissociation. The experiments on the relative luminosity of these gases were made with electrodeless tubes, hence it cannot be objected that the passage of current is determined by the attraction of the material of the electrodes for the gas under experiment.

"On the Absorption of the extreme Violet and ultra-Violet Rays of the Solar Spectrum by Hæmoglobin, its Compounds, and certain of its Derivatives." By Dr. Arthur Gamgee, F.R.S., Emeritus Professor of Physiology in the Owens College, Victoria University.

The investigation, of which the chief results are communicated in this paper, had for its starting-point the observation of the late Prof. J. L. Soret, of Geneva, who showed that, in addition to the absorption bands in the visible spectrum, solutions of the blood-colouring matter are characterised by an intense absorption band in the extreme violet between G and H. The present research has been conducted with the aid of photography, quartz prisms and lenses being employed.

The following are some of the principal results of the investigation:—

I. The compounds of hæmoglobin with oxygen, carbonic oxide, and nitric oxide present, even in highly dilute solutions, an absorption band between Fraunhofer's lines G and H. In the case of oxy-hæmoglobin the mean ray absorbed coincides with  $\lambda 4140$ , that is to say, the centre of absorption is slightly nearer the red end of the spectrum than Soret had stated; this observer placed the centre of absorption at  $\lambda 4101$ . As Soret had indicated, in the case of the compound of carbonic oxide with hæmoglobin, the absorption band is slightly displaced towards the less refrangible end of the spectrum. The combination of hæmoglobin with nitric oxide presents an absorption band occupying precisely the position of that of the CO-compound. In the case of these two compounds, the mean ray absorbed corresponds to  $\lambda 4205$ .

II. When the molecule of dissociable oxygen is removed from oxy-hæmoglobin, either by the action of reducing agents, or by boiling *in vacuo*, the absorption band in the extreme violet is remarkably displaced towards the less refrangible end of the spectrum, the centre of absorption corresponding to  $\lambda 4260$ .

III. The absorption of the extreme violet depends on the iron-containing moiety of the hæmoglobin molecule, for, whereas it is not presented by the albuminous product of the decomposition of the blood-colouring matter, it is characteristic of the acid compounds of hæmatin and of hæmochromogen.