

equilibrium, and other papers treated of the ring formula for benzene, the use of the spectroscope in the determination of atomic weight (Runge), fluorescence and chemical constitution (Richard Meyer), &c.

In the section of applied chemistry, Prof. König spoke of the determination of fibre, cellulose, and lignin in plants, and of the decomposition of fodder by microbes, and Dr. Marquart, of Cassel, gave an account of Dr. Schenck's red-phosphorus. This variety is produced at a comparatively low temperature—about 180°—by heating a solution of yellow phosphorus in phosphorous bromide. It is precipitated out of the solution, and must be filtered off and washed with carbon disulphide to free it from yellow phosphorus. Its point of inflammation is that of ordinary red phosphorus, but it is in a state of such fine division as to be readily set on fire by rubbing if it be mixed with potassium chlorate; at the same time it gives off no fumes, and is therefore harmless to operatives who dip matches. The light red powder is soluble in caustic soda (for it probably contains an atom of replaceable hydrogen), and is reprecipitated by acids. Dr. Marquart spoke especially of the future of this substance in the manufacture of matches which ignite when rubbed on any surface, and which, at the same time, are without danger to workpeople.

In the section of geophysics, Dr. Mansing exhibited an apparatus for determining the ebb and flow, and also the direction and velocity, of currents, and likewise the pressure in deep water. The apparatus is electrically connected with a ship, and registers for thirty days. The advantage over apparatus which registers only in shallow water is obvious. Dr. Nippolt read a paper on terrestrial magnetic variations, citing observations made partly by himself, but mainly by others. The curves which he obtained point to changes which occur simultaneously at different spots of the earth's surface; he interprets such changes as significative of changes in the internal nucleus of the earth, and of displacements of the relative positions of the earth's crust and the magma which he believes to exist in the interior. Prof. Krebs treated of subaqueous volcanic regions, and suggested that they may be points of connection between the sea-water and the earth's internal magma; he advocated that their position and nature deserve careful investigation on account of danger to passing ships. In another paper Dr. Krebs believed he had found an explanation of the inundations in Silesian Austria, in certain long areas of low barometric pressure from which regions of low pressure in Silesian Galicia can be deduced.

Dr. Wolkenhauer, in the geographical section, spoke of the oldest German maps, which he ascribed to the fifteenth and sixteenth centuries. The oldest maps are by Erhard Etzlaub; those of Cuza, which were formerly believed to have been published in 1491, appear to be as late as 1530. The attendance in this section was very small, owing to the meeting this year of geographers at Cologne.

In the botanical section the most important papers were by Prof. Kohl, who offered a proof that the central bodies of the Cyanophyceæ cells possess the properties of cell nuclei, and he expressed the belief that in the closely allied Schizomycetæ a similar proof could be found. Numerous experiments on Mycorrhizen, an account of which was given by Prof. Möller, proved that the existence of fungi on the roots of plants must be regarded as a case of parasitic existence, but not of symbiosis. Prof. Drude, who has made numerous experiments in the botanic garden at Dresden, contended that mutation cannot be sharply distinguished from variation, as De Vries believes, but that the difference is only one of degree. To prove his contention, he exhibited living specimens of *Oenothera Lamarckiana*, grown from seed which De Vries had given him.

In the zoological section only one meeting was held, at which lectures were delivered by Prof. Klunziger, Dr. Thilo, Dr. Eysell, and Dr. Basse. They were illustrated by demonstrations, but appear not to have contained any specially new matter.

The anthropological section excited a good deal of interest. Among the more important papers was one by Prof. Hagen, in which he demonstrated that the eight months' fœtus of the Malay and Melanesian races differed from the European fœtus by the shortness of the body compared with the limbs, and the greater diameter of the body in the region of the false ribs, &c. The Melanesian fœtus

showed peculiarities from which he deduced the conclusion that the genus man became differentiated from other mammals at a very early period of history. On the other hand, Prof. Schwalbe, from investigation of the frontal sutures of apes and their comparison with those of man, contended that there is a close relationship to be observed between man and old-world apes. Prof. Gojanovic-Kramberger had examined human remains recently discovered in Croatia—the so-called *Homo crapinensis*—and concluded from his researches that in the Ice age two races were alive; the differences in the form of the jaws and teeth, the shape of the collar-bone, the upper arm and parts of the skull, were adduced as proof of his view. One of these races, he believed, showed analogy with the owner of the Neanderthal skull and the skeleton from the grotto of the Spy, so far as the morphological relationship could be traced.

One of the sections dealt with the teaching of mathematics and science in schools, and there Prof. Grimsell demonstrated the use of new apparatus designed to illustrate terrestrial magnetism and the mechanical equivalent of heat, and he showed a lantern which gave good images with an ordinary incandescent gas flame. Prof. Schotten gave a lecture which was largely attended, and at which much discussion took place on the suitability of zoology as a school subject. While most of the speakers agreed on its being easily taught and useful, doubt was expressed whether it was wise to add another subject to the already heavy load which a German boy is expected to carry. On the whole, the latter opinion was the more widely held.

After the meeting the members made excursions to objects of interest in the neighbourhood of Cassel. About seventy chemists and physicists visited Göttingen and inspected the laboratories of Profs. Nernst, Voigt, Rieke, and Wiechert; the last has been created only a few years, and is devoted to the investigation of the problems of "terrestrial physics." It is furnished with seismographs, instruments for investigating terrestrial magnetism, atmospheric electricity, &c., and good work is already being done in it. It is a handsome building at some distance from the town, and it may be held up as an example of the way in which the Germans leave no stone unturned to be first in the investigation of natural phenomena of all kinds. Some of the associates, chiefly medical, visited Marburg, in order to inspect Prof. von Behring's institute for the study of tuberculosis. The buildings and equipment must be characterised as magnificent. Here, again, is an instance of the cooperation of the scientific man and the manufacturer, for Dr. von Behring was for long scientific adviser to the firm of Höchst, which erected the laboratories, and undertook the manufacture of the antitoxin serum. Would that a similar spirit of cordial cooperation between English men of science and "practical" men could become more common.

W. R.

FORTHCOMING BOOKS OF SCIENCE.

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Mr. T. Fisher Unwin gives notice of:—"Big Game Shooting and Travel in South and East Africa," by F. R. H. Findlay, illustrated; "The Mystics, Ascetics and Saints of India," by J. C. Oman, illustrated; "Bird Life in Wild Wales," by J. A. W. Bond, illustrated.

Messrs. Whittaker and Co. will issue:—"Electric Traction, a Practical Handbook on the Application of Electricity as a Locomotive Power," by J. H. Rider; "Electric Lighting and Power Distribution," by W. P. Maycock, vol. ii.; "Friction and its Reduction," by G. U. Wheeler; and new editions of "The Dynamo," by C. C. Hawkins and F. Wallis; "Electricity in its Application to Telegraphy," by T. E. Herbert; and "The Alternating Current Circuit and Motor," by W. P. Maycock.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The election of a professor of physiology in succession to Sir Michael Foster will take place on November 6, and the election to the chair of mechanism and applied mechanics, vacant by the resignation of Prof. Ewing, on November 14. Candidates are requested to communicate with the Vice-Chancellor.

Mr. J. M. Dodds, Peterhouse, and Mr. E. W. Barnes, Trinity, have been appointed moderators, and Mr. A. Berry, King's, and Mr. A. S. Ramsey, Magdalene, examiners for the mathematical tripos, 1904.

Mr. J. E. Wright, senior wrangler 1900 and Smith's prizeman 1902, and Mr. H. A. Webb, third wrangler 1902, have been elected to fellowships at Trinity College.

THE Duke of Norfolk has contributed 8000*l.* towards the endowment of a university in Sheffield, if the charter be granted. Sir F. Mappin, Sir H. Stephenson, and the Sheffield Corporation Tramways committee have also each given 5000*l.*

In some American colleges there is a system by means of which the work done throughout the various terms of the college course is taken into account in awarding a student a degree. The plan adopted is known as the credit system. Thus in the current "Year Book" of the Michigan College of Mines, there is published an outline list of courses of instruction arranged in order of sequence, and under each main subject is given the number of attendances which must be made at the classes in different branches of that subject in order to secure certain credits. To take two instances, under the heading mathematics we find "spherical trigonometry, six times a week, five weeks; to count as three-tenths of a credit." Or, under physics, "light, six hours a week, twelve weeks; to count as two-tenths of a credit," and so on. By some such plan in this country regularity of attendance by students at their classes would be quite assured.

MR. S. D. CHALMERS has been appointed head of the new department of technical optics at the Northampton Institute, Clerkenwell. Evening classes in technical optics were started at the Northampton Institute as part of the work of the Applied Physics Department in the session 1898-99. In the first session the students largely consisted of those who desired to take the examinations of the Spectacle Makers' Company, and the work was confined to lectures and laboratory work. In the following session an optical workshop was added, and an increasing number of students engaged, professionally or otherwise, in optical work have in recent years been enrolled as students. Owing to the assistance of the London Technical Education Board, it has now become possible to separate the department of technical optics from that of applied physics, and place it in charge of a responsible head who can devote his whole time to its organisation and development.

THE following entrance scholarships in connection with medical schools have been awarded:—St. Mary's Hospital Medical School—natural science scholarship, 145*l.*, G. E. Oates, St. Paul's School; natural science scholarships, 78*l.* 15*s.*, (1) J. E. L. Johnston, Epsom College and St. Mary's Hospital, (2) W. E. Haigh, Bradford Technical College; natural science scholarship, 52*l.* 10*s.*, D. W. Daniels, Wyggeston Schools, Leicester; university scholar-