

may have become the nucleus direct by a process of vacuolation and differentiation within itself.

In the case of the Cyanophyceæ I have already shown that the central body is a vacuolar structure associated with granules of chromatin, and that sometimes this vacuolation becomes so pronounced in resting cells that we get an appearance as of a limiting membrane between it and the cytoplasm. The granules run together and become associated in such a way as to simulate the spireme thread of an ordinary nucleus. Further, we have in some Cyanophyceæ a differentiation of a nuclein-like substance in the form of the red granules of Butschli at the periphery of the central body, which may be an early stage in the separation of a portion of its substance to perform the special functions of the pyrenoid. The complete separation of this into a definite pyrenoid and the formation around the remainder of a nuclear membrane would give us a differentiation comparable to some extent to what we find in *Euglena viridis*, where we have a reticulate nucleus which divides by a rudimentary process of karyokinesis, in which, so far as we know, there is no definite formation of chromosomes and no longitudinal splitting.

As to when or how the higher differentiation of the nucleus, with its chromosomes, longitudinal division, and spindle figure, arose we do not know. Possibly a careful investigation of the lower forms of the fungi and algæ and such organisms as *Euglena*, and especially the protozoa, may throw light upon this difficult problem.

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

SIR DONALD CURRIE has promised to give 20,000*l.* to the equipment fund of Queen's College, Belfast, provided an equal sum is raised from other sources. It is understood that a considerable portion of this amount has already been promised.

MR. E. TOWYN JONES, demonstrator in chemistry at University College, Bangor, has been appointed assistant lecturer and senior demonstrator in the department of chemistry and physics of the Pharmaceutical Society of Great Britain.

It is announced that Mr. Basil McCrea has given 6000*l.* to found a chair of experimental physics in Magee College, Londonderry, and to provide two scholarships in connection therewith. The gift is conditional upon funds being provided by subscription within six weeks for the erection of a suitable physical laboratory.

WE have received the year-book of the Michigan School of Mines for 1904-5, and an album of views showing the facilities for instruction afforded by the immediate surroundings of the college. Established in 1885, the college is situated at Houghton, in the heart of the great copper mining region of Lake Superior, with the deepest shafts in the world and the most powerful machinery ever employed in mining. The students also have access to the docks, railways, dressing plants, and smelting works. The special facilities for practical training largely account for the success which the institution has attained. There are at the present time 223 students, their average age being 22½ years.

THE metropolitan medical schools will re-open for the winter session on October 2 and October 3, and in many of them inaugural addresses will be delivered. At University College the address will be given on October 2, at 4 p.m., by Prof. Kenwood on "Preventive Medicine: Past and Present"; at King's College on October 3, at 3 p.m., by Prof. Clifford Allbutt, F.R.S., on "Medical Education in London," and an opening lecture on October 4, at 4 p.m., by Prof. Dendy on "The Study of Zoology"; at Charing Cross Hospital on October 2, at 4 p.m., by Sir James Crichton-Browne, F.R.S.; at St. George's Hospital on October 2, at 3 p.m., by Mr. Brudenell Carter; at the Middlesex Hospital on October 2, at 3 p.m., by Dr. R. A. Young; at St. Mary's Hospital on October 2, at 3.30 p.m., by Dr. Wilfred Harris; at the London (Royal Free Hospital) School of Medicine for Women on October 2, at 4 p.m., by Mrs. Bryant, D.Sc.; at the London School of Tropical Medicine on October 10, at 4 p.m., by Dr. Nuttall; at the School of Pharmacy,

Pharmaceutical Society, on October 2, at 3 p.m., by Sir Boverton Redwood; and at the Royal Veterinary College on October 2, at 4 p.m., by Mr. W. Hunter. At Guy's, the London, St. Thomas's, and Westminster hospitals there will be no inaugural addresses, but at the first named Prof. Osler, F.R.S., will open the session of the Pupils' Physical Society with an address on "Some Reminiscences of Sir Thomas Browne" on October 12, at 8 p.m.

THE second volume of the report of the Commissioner of Education for the year 1903 has now been received from Washington. The bulky volume of some 1300 pages is largely concerned with statistics, full data being provided concerning every grade of educational institution. Dealing with the income of colleges and universities, the report shows that in the United States the State and municipal aid to higher education during 1903 amounted to 1,591,000*l.*, of which 1,034,000*l.* was granted for current expenses and 557,000*l.* for buildings and other special purposes. The total value of all gifts and bequests reported during the year to the commissioner by universities and colleges amounted to 2,950,000*l.* The three institutions receiving the largest sums for the year under consideration were:—University of Chicago, 487,500*l.*; Harvard University, 351,300*l.*; and Barnard College, 225,600*l.* The universities and colleges in the States of the North Atlantic and North Central divisions continue to receive the greater portion of benefactions, more than 90 per cent. of the total amount being reported by them in 1903. Dr. John Eaton, who was formerly United States Commissioner of Education, contributes biographical sketches of American educational benefactors and of American citizens whose lives were devoted to educational work, and this brightly written section of the volume affords another indication of the way in which the men of wealth in the United States are encouraged by those in authority to interest themselves in educational progress.

THE polytechnics and technical institutes of London will open shortly for the winter session, and the issue of new calendars and syllabuses has begun already. The session of Birkbeck College will commence, we learn from its new year-book, on October 2, when Sir Edward Fry will deliver the inaugural address. Afterwards the class-rooms and laboratories will be opened for inspection, and an exhibition of work will be held in the school of art. The work of Birkbeck College is conducted in close relation with the University of London, courses of study for examinations of the university being provided under recognised teachers of the university. In addition to evening classes in almost every department of learning, there are day courses of work which give instruction in practical and theoretical science, in classics, in modern languages, in commercial subjects, and in English literature. The moderate fees will enable students of limited means to take advantage of the lectures and laboratory work which have been arranged at this central institution. The syllabus of classes at the Sir John Cass Technical Institute has also been received, and supplies gratifying evidence of the excellent provision of scientific and technical instruction which is available in Aldgate. It is satisfactory to find that in addition to systematic courses of lectures, special attention is given to laboratory work with a view to bring home to students the general and fundamental principles of science in association with the work and products with which they are more immediately concerned in their daily life.

#### SOCIETIES AND ACADEMIES.

LONDON.

**Royal Society, July 20.**—"A New Formation of Diamond," By Sir William Crookes, F.R.S.

Assuming the following data for carbon—boiling point 3870° ab., melting point 4400°, critical temperature 5800°, critical pressure 2320 ats.—the Rankine or Van der Waals formula calculated from the boiling point and critical data gives for a temperature of 4400° ab. a pressure of 166 ats. as the melting-point pressure.

Making similar estimates for other temperatures, it appears that above a temperature of 5800° ab. no amount of pressure will cause carbon vapour to assume liquid form, whilst at 4400° ab. a pressure of above 17 atmo-

spheres would suffice to liquefy some of it. Between these extremes the curve of vapour pressure is assumed to be logarithmic.

In their researches on the gases from fired gunpowder and cordite, Sir Frederick Abel and Sir Andrew Noble obtained in closed steel cylinders pressures as great as 95 tons to the square inch, and temperatures as high as 4000° C. According to a paper recently communicated to the Royal Society, Sir Andrew Noble, exploding cordite in closed vessels, has obtained a pressure of 8000 atmospheres, or 50 tons per square inch, with a temperature reaching in all probability 5400° ab.

By the kindness of Sir Andrew Noble, the author has been enabled to work upon some of the residues obtained in closed vessels after explosions, and he has submitted them to the same treatment that Moissan's granulated iron had gone through. After several weeks he removed the amorphous carbon, the graphite, the silica, and other constituents of the ash of cordite, and obtained a residue among which, under the microscope, crystalline particles could be distinguished. Some of these particles, from their crystalline appearance and double refraction, were silicon carbide; others were probably diamonds. The whole residue was dried and fused at a good red heat in an excess of potassium bifluoride, to which was added during fusion 5 per cent. of nitre. The residue, after thorough washing and then heating in fuming sulphuric acid, was washed, dried, and the largest crystalline particles picked out and mounted.

From the treatment these crystals have undergone, chemists will agree that diamonds only could stand such an ordeal; on submitting them to skilled crystallographic authorities the author's opinion is confirmed.

#### PARIS.

**Academy of Sciences, September 11.**—M. Troost in the chair.—Remarks on the present condition of solar researches and on the means of improving them: H. Deslandres. The author proposed in 1893 that automatic apparatus should be established at suitable spots capable of registering the surface of the sun and the successive layers of its atmosphere. As this has so far not been realisable, on account of the expense, suggestions are now put forward for the correlation of the work of the observers actually engaged in solar research, and these suggestions will be submitted to the International Union at the meeting to be held at Oxford.—On a differential equation of the fourth order: Gaston Darboux.—On some properties of the  $\alpha$  rays of radium: Henri Becquerel. The author showed, two years ago, that the bundle of  $\alpha$  rays behaves as homogeneous in the magnetic field, and also that the trajectory of the particles in a plane normal to the field, instead of being a circle, is a curve the radius of curvature of which goes on increasing with the length of the trajectory. The recent work of Bragg and Kleeman and of Rutherford is discussed, especially the hypothesis of the slowing down of the particles used by the latter to explain the experimental results obtained when a series of aluminium screens is interposed in the path of the rays. The author has repeated his original experiments with the addition of aluminium screens, and the results confirm his views. On this account M. Becquerel thinks that the hypothesis of Rutherford regarding the loss of velocity of the particles must be rejected.—On the total eclipse of the sun of August 30: G. Rayet. An account of the results obtained by the expedition from the Observatory of Bordeaux at Burgos, Spain. The weather was bad, and interfered with the work of several of the observers. In spite of this, however, two good images of the corona were obtained by M. Courty with the photographic equatorial. M. Esclangon was able to follow the variations in the polarisation during the eclipse.—On the method of using captive and pilot balloons at sea: Prince of Monaco. Details are given of the mode of launching the balloons and of maintaining them at heights fixed on beforehand. The observations were carried out in the Mediterranean and in the trade winds region of the Atlantic, the maximum height attained being 14,000 metres.—On the eclipse of August 30, and on the polarisation of the solar corona:

Georges Meslin. The proportion of polarised light is sensibly the same in the polar and equatorial regions—it is about 50 per cent. Elliptical polarisation could not be detected.—On two particular cyclic systems: A. Demoulin.—On the generalisation of algebraical continued fractions: M. Auric.—On Monge's problem: M. Zervos.—On the physical units of albuminoid material and on the part played by lime in its coagulation: G. Malftano. By repeated coagulation it was found to be impossible to free the albumin entirely from inorganic substances, and the author regards the precipitate as aggregates of molecules, associated with electrolytes. It is probable that the mechanism of peptonisation consists essentially in a change in the nature of the salts which are associated with these aggregates.—The influence of the eclipse of August 30 on some plants: Ed. Bureau. *Acacia dealbata* proved to be the most sensitive to light, and during the eclipse executed the nocturnal movements, whilst other species of "sleeping" plants were unaffected.—On the evolution of the liver: Camille Spiess.—The vibration of the eyelids in renal affections: G. Ullmann. This has proved a valuable sign in affections of the kidney, and is present at the earliest stages.—The direct solution of the silicates from arable earth and the experiments of Daubrèe: L. Cayeux. The author controverts the views of Delage and Lagatu on this subject, and holds that the experiments of Daubrèe have been wrongly interpreted by these authors.—The waterspout of August 28 at Saint-Maur and at Champigny (Seine): Th. Moureaux.—On the meteorological observations made at Constantine during the eclipse of August 30: Henry de la Vaulx and Joseph Jaubert.—On the phenomenon of moving shadows: Lucien Libert.—An earthquake shock registered at Grenoble, September 8: MM. Kilian and Paulin.

#### NEW SOUTH WALES.

**Linnean Society, June 28.**—Mr. T. Steel, president, in the chair.—Description of a new species of *Actinotus* from eastern Australia: R. T. Baker.—Revision of the Australian *Curculionidæ* belonging to the subfamily *Cryptorhynchidæ*, part vii.: A. M. Lea.—Descriptions of five new species of *Cicindela* from tropical Australia: T. G. Sloane.

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