

can be no question of their being exceptional artefacts or distortions, such as may sometimes simulate almost anything. Division of the mononuclear variety of leucocytes is produced and studied the most easily.

In films in my possession numerous examples of dividing mononuclears fixed at all stages demonstrate (together with observations of the jelly preparations) the following steps in the process. In a few minutes after the blood is drawn from the subject and mounted the round, so-called nucleus becomes oval and then kidney- or bean-shaped, leading on rapidly to the outline of two circles cutting each other, and, lastly, touching each other in a "figure of eight." When the process is about half complete, and if the direction of division is parallel to the surface of the jelly or glass, another phenomenon is seen. About four to eight finger-like processes, radiating from the point midway between the centres of the two circles, are protruded or divided off, giving the whole body roughly the appearance of an ant, of which the head and abdomen are simulated by the two spheres and the legs by the processes just mentioned. Such forms are numerous and characteristic; but, of course, when the direction of division happens to lie at an angle to the surface, they are foreshortened, or may be distorted by the pressure of the jelly. As the division proceeds the processes are retracted into each daughter sphere, until the final figure of eight is produced.

If polychrome methylene blue is put in the jelly the cells become coloured progressively as the division advances. At first, after a few minutes, the so-called cytoplasmic, or Altmann's, granules take a purple tinge; then the so-called nucleus becomes a pale blue, and last of all the so-called nucleolus is stained, after which, apparently, the cell dies. As the so-called nucleus proceeds to take the hour-glass and figure-of-eight forms, strands of coloured substance are seen, especially in the fixed films, passing between the two daughter spheres, and such connections are maintained until complete dissociation occurs. The behaviour of the so-called nucleolus is not easy to follow, because, as just noted, it does not stain until the cell dies and further division is checked. On the other hand, the behaviour of the so-called cytoplasmic granules must be described as very curious. In the middle of the division they are found to number about eight (when they can be easily counted) and to lie, each one, at the end of one of the finger-like processes mentioned above; and appearances suggest that half of each granule is distributed to one daughter cell and the other half to the other daughter cell. No distinct chromosomes are seen at any stage *inside* the so-called nucleus; and there appears to be no sign of astral fibres, though perhaps the finger-like processes may be interpreted as being bunches of these fibres which have not been rendered individually visible by the process of staining employed. On conclusion of the process the so-called cytoplasmic granules appear to be equally distributed between the two daughter cells, and to place themselves on the outer surface of the so-called nucleus of each, that is, in the position in which they were seen in the original parent cell. Apparently asymmetric forms are also frequently seen, but need not be described here.

Such seem to me to be the facts as observed by myself in preparations shown or given to me by Mr. Ross and Dr. Cropper. I will not touch here upon the similar divisions of the so-called polymorphonuclear leucocytes, which have also been already described and figured by Mr. Ross. Nor will I attempt to reconcile the observations with current cytological teaching, even as regards the division of leucocytes. Very probably different methods of staining may bring them, at least partly, into closer conformity. Though engaged for years in the study of blood I have never seen these forms before, nor, indeed, have I ever seen in any ordinary preparation what could certainly be called a dividing leucocyte. I have been shown bodies claimed to be such; but these are admittedly so rare that they are open to the usual logical fallacies connected with very exceptional observations. The observations here referred to are not open to these fallacies. As I have said, the dividing forms are so numerous and characteristic that we can have no doubt that they really are dividing forms—whatever other observations or theories may be on record. It seems to me, therefore, that we are now compelled to

admit two new facts:—(1) that large numbers of human leucocytes can be made to divide *in vitro*; and (2) that this division occurs entirely, or at least specially, in the presence of certain chemical substances.

In 1900 J. Loeb showed that parthenogenesis can be induced in the eggs of sea-urchins (Arbacia) by the addition of a definite proportion of MCl_2 to sea water; and since then many workers have studied such phenomena among other animals, while Wassilieff has used hyoscyamine, nicotine, and strychnine for similar researches. The independent observations now recorded would appear to extend cognate principles to body cells by showing that the division of leucocytes may be suddenly forced on at a great rate and in a few minutes by the absorption or presence of appropriate chemical agents, and may perhaps be inhibited by other chemical agents. The author added some remarks on the application of these observations to the genesis of tumours, and a discussion followed.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. W. Bateson, F.R.S., honorary fellow of St. John's College, Cambridge, and director of the John Innes Horticultural Institution at Merton, Surrey, has been appointed the next Herbert Spencer lecturer. The subject of the lecture, which is announced to be given on Wednesday, February 28, 1912, will be "Biological Fact and the Structure of Society."

The following courses of lectures and laboratory instruction in mathematics, astronomy, and physical science have been announced for next term, which begins on Monday, January 22, 1912:—Prof. Esson, F.R.S., will lecture on the comparison of analytic and synthetic methods in the geometry of conics; Prof. Love, F.R.S., on rigid dynamics; Prof. Elliott, F.R.S., on elliptic functions and on the theory of numbers; Prof. Clifton, F.R.S., on optics and acoustics; Mr. J. Walker, on double refraction and polarisation of light. Practical instruction in physics will be given by Prof. Clifton, Mr. J. Walker, Mr. I. O. Griffith, Mr. O. F. Brown, and Mr. G. H. Clough. Prof. Townsend, F.R.S., will lecture on electromagnetic induction; Mr. E. S. Craig, on mechanics and physics. Practical instruction in the electrical laboratory will be given by Mr. F. B. Pidduck, Mr. E. S. Craig, Mr. H. T. Tizard, Mr. S. Smith, and Mr. W. B. Gill. Prof. C. F. Jenkin will lecture and give practical instruction on strength of materials and thermodynamics; Mr. D. R. Pye will lecture on drawing, for engineering students; Prof. H. H. Turner, F.R.S., will lecture on elementary mathematical astronomy.

DR. H. BASSETT, demonstrator and assistant lecturer in chemistry at the University of Liverpool, has been appointed professor of chemistry at University College, Reading.

DR. W. R. BOYCE GIBSON, lecturer in philosophy at the University of Liverpool, has been appointed by the council of the University of Melbourne to the chair of mental and moral philosophy.

THE President of the Board of Education has appointed Mr. L. A. Selby-Bigge, C.B., to be permanent secretary of the Board when that post is vacated by Sir Robert Morant, K.C.B., on his appointment to the Insurance Commission. Since 1908 Mr. Selby-Bigge has been principal assistant secretary of the elementary branch of the Board.

THE council of the Royal Horticultural Society has requested the following gentlemen to act as a committee to inquire into the desirability of establishing a National Diploma in Horticulture, and to recommend what steps, if any, should be taken for the purpose:—the Rt. Hon. A. H. Dyke Acland, Prof. W. Bateson, F.R.S., Mr. E. A. Bowles, Mr. F. J. Chittenden, Prof. J. B. Farmer, F.R.S., Mr. C. R. Fielder, Mr. W. Hales, Mr. J. Hudson, Prof. Keeble, Sir Daniel Morris, Lieut.-Colonel D. Prain, F.R.S., Mr. H. J. Veitch, and Mr. W. P. Wright.

THE London County Council has arranged to hold its sixteenth annual Conference of Teachers on three days, Thursday, January 4, Friday, January 5, and Saturday,

January 6, 1912. The meetings will be held at Birkbeck College, Bream's Buildings, Chancery Lane, E.C. There will be addresses and discussions under the heads of specialisation in schools; chalk, brush, and pencil work in elementary schools; the doctrine of formal training (mental discipline); the treatment of backward children; and educational experiments in schools. No charge will be made for admission to the conference. Application for tickets of admission should be made to the Chief Inspector, London County Council, Education Offices, Victoria Embankment, W.C.

It is announced in the issue of *The London University Gazette* for November 29 that a donation of 1000*l.* has been made by Mr. and Mrs. Walter Baily, in celebration of their golden wedding, for the purpose of rearranging and decorating the interior of a portion of University College. From the same source we learn that the Galton Laboratory Appeal Fund now amounts to 262*l.* 15*s.* 6*d.* The list of donations, many of which are conditional on the buildings being commenced within two years, includes gifts of 500*l.* from Mr. W. E. Darwin, and Prof. Karl Pearson, F.R.S., and Mrs. Pearson; 250*l.* each from Prof. Arthur Schuster, F.R.S., and Mr. E. G. Wheler; and 100*l.* each from the Earl of Rosebery, Viscount Iveagh, Mr. A. F. Butler, Major Leonard Darwin, the Hon. Rupert Guinness, and Major E. H. Hills, F.R.S.

An interesting experiment is being tried by the local education authority of Plymouth with the view of arousing an interest in the study of science among the children in its schools. On December 8 Mr. C. Carus-Wilson lectured to five thousand children in the Plymouth Guildhall, taking "Volcanic Outbursts" as his subject. Each child paid one penny for admission to the lecture, and it is expected that no contribution from the rates will be necessary to meet the expenditure incurred. The children seem to have been thoroughly interested, and the education authority is likely to arrange a series of similar lectures in the future. Descriptive accounts of natural phenomena, when judiciously illustrated, appeal to most children, and many men of science trace their first enthusiasm for their subject to a good lecture, supplemented by telling experiments. The Plymouth experiment deserves to be copied in other large towns.

It is not clear from the reports in the daily papers of a meeting held at Brighton on December 12 whether the intention is to establish a university or a university college in the town. *The Times* reports that the meeting was "in furtherance of the movement to make Brighton a university town," while *The Morning Post* states that at the meeting (over which the Mayor of Brighton presided) "the proposal to establish a college of university rank for the county was unanimously approved." There is, of course, a vast difference between the two proposals, but apparently it is a university college which Brighton has in mind, and not a university. Resolutions approving of the principle of the establishment of a university college for Sussex, and the appointment of general and executive committees, were carried unanimously at Tuesday's meeting. The Mayor of Brighton was elected chairman of the executive committee, and Mr. W. H. B. Fletcher, who has taken a prominent part in the educational affairs of West Sussex, vice-chairman.

An interesting account of the way in which American agricultural experiment stations come into contact with the farmer is given in Bulletin 208 of the Agricultural Department of the University of Wisconsin. Crop demonstrations are arranged on twenty farms connected with various public institutions throughout the State, making use of seeds bred at the experiment station, and of methods of cultivation and manures that previous experiments had shown to be advantageous. The fields selected for these demonstrations are, so far as possible, chosen alongside of the public highways, where the operations and results can be seen by the farmer throughout the whole season as he drives to and from town. The local papers also contain accounts from time to time of the work done and the appearance of the crop. Some time during the summer, when the crops are at their best, a demonstration picnic is arranged, to which large numbers of farmers are invited, the average attendance last year

being 320. These meetings occupy an entire day, and a definite programme is arranged dealing with six to eight subjects centring round the field work. The effective feature is the fact that all the practices suggested to the farmer are illustrated in operation on the farm, and the crops are there to show in concrete form what the results have been. The influence of the work is very great, many farmers putting the new methods into operation at once.

THE December issue of *The Reading University College Review* is one which reflects credit on the college. The most interesting feature to readers in general will be the forty pages of notes on the multifarious activities of the institution. From these we learn that the entry of new students for the present session was very satisfactory. The number of students taking degree courses is 114, of whom 44 belong to the faculty of science and 6 to the Department of Agriculture. During the previous session 80 students received instruction in the dairy institute, in which connection it is interesting to record that at the annual meeting of the Berks. and Oxon. Chamber of Agriculture the following resolution was passed:—"The Board of Agriculture having decided to establish a central research station for dairying, we, the Berks. and Oxon. Chamber of Agriculture, strongly urge that University College, Reading, which is already in close touch with agriculturists and farmers in Berks. and the adjoining counties, should be selected as that centre. Our contention is based on the fact that the college is situated in the centre of a large dairying district, and that in Reading it has the headquarters of this Chamber and of the Berks. and Adjoining Counties Dairy Farmers' Association, where it can readily consult the farmers of the district. Believing that such close relations are essential to any scheme of agricultural development, we are anxious to see advantage taken of the exceptional facilities afforded in Reading."

At a dinner of the Clothworkers' Company held on December 6, the President of the Board of Education, replying to the toast of the Houses of Parliament, referred to the generous assistance rendered by the great City companies to the promotion of facilities for higher education in this country. The President said he found that the Goldsmiths' Company contributed 50,000*l.* to the new engineering buildings of the Imperial College of Science and Technology. The Drapers' Company contributed 10,000*l.* to the building fund of the new college at Bangor, and this year the Drapers' Company contributed 23,000*l.* to the physiological laboratory at Cambridge and 15,000*l.* to the University of Sheffield. This year the Clothworkers' Company contributed 5000*l.* to the textile industries department at Leeds University. The Merchant Taylors' Company maintain the Merchant Taylors' School, the Mercers' Company are identified with St. Paul's School, the Fishmongers' Company with the Gresham College, the Skinners' Company with Tonbridge School, and the Haberdashers' Company with Aske's Foundation. The Clothworkers' Company are second in the list of donors to the City and Guilds of London Institute. Words failed him, Mr. Pease said in conclusion, to commend sufficiently their liberality and generosity in the interests of education. The Clothworkers' Company has equipped the textile and dyeing department of Leeds University to the extent of 167,000*l.*, and 75 per cent. of its income is contributed to the promotion of education.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 7.—Sir Archibald Geikie, K.C.B., president, in the chair.—Miss I. B. Sollas and Prof. W. J. Sollas: Lapworthura: a typical brittlestar of the Silurian age; with suggestions for a new classification of the Ophiuroidea.—Leonard Hill and Martin Flack: The physiological influence of ozone. Ozone, in concentrations of one part in a million and more, acts as an irritant to the respiratory tract, and diminishes the respiratory metabolism, as shown by the lessened output of carbonic acid and the diminished fall in body weight, which occur both during the period of administration and for some time after. Concentrations of several parts per million cause acute inflammatory congestion of the lungs, and