school since 1865 with great success, will retire from his post at the close of this session.

DR. W. SOMERVILLE, professor of agriculture and forestry at the College of Science, Newcastle-upon-Tyne, in connection with the University of Durham, has been elected to the new professorship of agriculture in Cambridge University.

PARTICULARS concerning British, Continental and Canadian Universities, with special reference to institutions having courses open to women, are given in a "Handbook" compiled by Dr. Isabel Maddison for the Graduate Club of Bryn Mawr College, and published by the Macmillan Company, New York. We notice that Queen's College, London, which celebrated its jubilee last year, has been omitted. As the volume is primarily intended to indicate colleges for women students, the omission of a college of this kind possessing a Royal Charter is unfortunate.

THE departmental committee appointed by the Lord President of the Council to consider the question of the reorganisation of the Education and Science and Art Departments consists of Sir Horace Walpole, K.C.B (chairman), Sir G W. Kekewich, K.C.B., Secretary of the Education and Science and Art Departments, Captain W. de W. Abney, C.B., principal assistant-secretary of the Science and Art Department, Mr. S. Spring Rice, C.B., of the Treasury, and Mr. W. Tucker, C.B., principal assistant-secretary of the Education Department.

THE ninth summer meeting of University Extension Students will be opened at Oxford on July 29. Many prominent members of the University have arranged to take part in the meeting. In the scientific section Prof. Gotch will deal with "The Physiology of Sensation," Prof. Sollas will lecture on "The Geology of Oxford," Prof. H. A. Miers on "The Growth of a Crystal," Mr. H. N. Dickson, New College, on "The Influence of Climate," Mr. G. C. Bourne, University lecturer in Anatomy, on "The Growth of the Living Organism," Mr. G. J. Burch on "Wireless Telegraphy," and Dr. Arthur Ransome on "Microbes and Disease."

MR. A. F. STANLEY KENT has been appointed professor of physiology in University College, Bristol. Mr. Kent received his scientific training at Oxford, which he left upon being appointed demonstrator of physiology in Owens College, Manchester. In 1889 he was invited by Sir J. S. Burdon-Sanderson to take charge of the histological department at Oxford, to lecture on special points in physiology, and to assist in the teaching of general physiology. Since 1892 he has been assistant lecturer in physiology and histology at St. Thomas's Hospital, and has carried out a number of researches, the results of which have been published in various journals, proceedings, and reports.

SECONDARY as well as elementary schools are now beginning to appreciate the advantage of having upon their staff one or more teachers who thoroughly understand the application of the theory and practice of hygiene in school life; and the desirability of emphasising the necessity of this knowledge in the code for elementary schools is now being pressed upon the Education Department by memorials from several important bodies. To encourage the systematic study of the subject, the Council of the Sanitary Institute have decided to arrange a thorough theoretical and practical examination, which will be open to both classes of teachers and to those preparing as teachers. The first examinations will be held during February and June next year.

THE first of a series of articles dealing with the provision made by local authorities for the technical education of miners appears in the July number of the *Record* of Technical and Secondary Education, the information given having reference to the County Councils of Cornwall, Durham, Northumberland, and the West Riding of Yorkshire. The permanent schools of mining in Cornwall are at Camborne and Redruth, in the centre of the Cornish mining district, and they thus afford exceptional facilities for the acquisition of a practical as well as a theoretical knowledge of mining and its allied subjects. As regards the provision of practical work other than that concerned with elementary scientific principles, the Committee of the Redruth School have made arrangements with the managers of neighbouring mines for the practical instruction of the students. The Committee of the Camborne School adopt the same system to some extent, but are also themselves the owner of a portion of a mine, having purchased the same in 1897 for the use of students. Cornwall thus furnishes a unique instance of educational procedure by reason of this purchase of a mine by a local school committee.

As the result of a conference between representatives of the London School Board and London County Council, having for its object the prevention of overlapping of classes, the representatives of the former body have resolved to recommend the Board to adopt the following proposals among others:—(1) The School Board will limit its instruction in science and art in all its evening schools to such grades as can be conveniently taught in its premises, and will look to the Technical Education Board to give the advanced instruction in the premises under their control. (2) The School Board will not conduct classes in technological subjects, and will not offer instruction specially intended for university degrees. (3) The School Board proposes to conduct preparatory classes in elementary experimental science, in elementary freehand, geometrical, and model drawing, and in the drawing of simple pieces of mechanism; in mensuration and workshop arithmetic, and in algebra, to enable pupils to understand the meaning of an algebraical formula. (4) The School Board proposes to conduct evening classes in manual training, woodwork, and metal-work as part of a general education, and as preparatory to commercial workshops, but to refer students who are members of specific trades, and require trade teaching, to the Polytechnics and Technical Institutes.

SCIENTIFIC SERIALS.

Symons's Monthly Meteorological Magazine, July.—Meteorological extremes: Pressure. Mr. Symons has undertaken to give, in alternate numbers, a list of extremes of the various meteorological elements. The task is by no means easy, as the information is scattered, in many books and languages, and some of the statements will no doubt lead to useful criticisms. The highest recorded barometric pressures (reduced and corrected) are 31·78 inches at Irkutsk, January 14, 1893; 31·72 inches at Semipalatinsk, December 16, 1877; and 31·62 inches at Barnaul, December 14, 1877. Dr. Woeikof doubts the accuracy of the first reading, *inter alia*, because the temperature for reducing *up* to the freezing point had been taken at − 51°·34 F., and had been assumed to prevail from Irkutsk to the sea. He maintains that the reading of 31·62 inches at Barnaul is really the best established barometrical maximum as yet on record. The reduction to sea-level from stations some thousands of miles from the nearest sea renders the statements more doubtful than readings taken near the sea-shore. The highest readings in the British Isles are 31·108 inches at Octertyre, and 31·106 inches at Fort William, both on January 9, 1896. The highest reading in the neighbourhood of London since 1858 (the date of commencing observations at Camden Square) is 30·934, January 9, 1896. The lowest pressures are those referred to in NATURE, vol. xxxv. p. 344, viz. 27·135 on September 22, 1885, at False Point on the coast of Orissa. In the *Quarterly Journal* of the Royal Meteorological Society, vol. xiii. p. 212, Mr. C. Harding pointed out that for comparison with English standards a further subtractive correction of 011 inch has to be applied, which would make the lowest reading 27·124 inches. The next lowest reading occurred at Octertyre on January 26, 1884, viz. 27·332 inches. The lowest reading at Camden Square is 28·295, December 9, 1896.

Bulletin of the American Mathematical Society, July.—The asymptotic lines of the Kummer surface, by Dr. J. I. Hutchinson, was read at the April meeting. These curves have been discussed by Klein and Lie, Reye, Segre and Rohn from the point of view of line geometry. This notelet gives a simple solution by making use of the parametric representation of the Kummer surface in terms of hyperelliptic functions.—On a definitive property of the covariant, by C. J. Keyser, was read at the same meeting. The writer refers to three proofs, due to Jordan, Elliott and Fiske respectively.—Yet another paper read at this meeting was the known finite simple groups, by Prof. L. E. Dickson. This is in part a *résumé* of previous work done by the author, and gives a table which should aid in the determination of the status of a newly-discovered simple group.—Reviews follow, viz. of Schoenflies' "Geometrie der Bewegung in Synthetischer Darstellung," and of Speckel's "La Géométrie du Mouvement Exposé: Synthétique," by Prof. F. Morley; a short notice of the second edition of the second volume of Weber's "Lehrbuch der Algebra," by Prof. Pierpont. Shorter notices

are Teixeira's "Corso de Analyse infinitesimal: Rudio's Verhandlungen der ersten internationalen Mathematiker-Kongresses in Zürich," vom 9 bis 11 August, 1897; Klein's lectures on the mathematical theory of the top; Moritz Cantor's "Politische Arithmetik oder die Arithmetik der täglichen Lebens"; and Virgilii and Garibaldi's "Introduzione alla Economia Matematica."—Prof. J. Pierpont gives a short note on elliptic functions, which discusses the simplest and most natural way of presenting the theory.—Notes, new publications as usual, and the index follow.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 15.—"A Preliminary Note on the Morphology and Distribution of the Organism found in the Tsetse Fly Disease." By H. G. Plimmer and J. Rose Bradford, F.R.S., Professor Superintendent of the Brown Institution. (From the Laboratory of the Brown Institution.)

These observations are the result of an inquiry entrusted to us by the Tsetse Fly Committee of the Royal Society, at a meeting of the Committee on March 16, 1899.

The material for our investigations was obtained in the first place from a dog and a rat, inoculated with the blood of a dog suffering from the disease, by Mr. H. E. Durham, at Cambridge.

The organism found in the Tsetse Fly disease was discovered by Major Bruce, R.A.M.C., F.R.S., and was classed by him as a Trypanosoma. These belong to the order Flagellata, and, according to Bütschli, to the sub-group Monadina.

We will, in the first place, describe the adult form of the organism, such as is met with most frequently in the blood of a susceptible animal affected with the disease.

A. *Description of the Adult Form of the Trypanosoma.*

In freshly drawn blood examined as a hanging drop, or as a very thin layer in a cell, the adult form of the Trypanosoma can be easily studied. The latter method is the better, as the organism can be better seen and more accurately examined, in the thin, uniform layer of fluid than in the rounded drop. The easiest method of examining the blood in this way is to make, with a red-hot platinum loop and a small piece of paraffin, a thin ring of paraffin on an ordinary glass slide; the drop of blood is placed in the centre of the ring and a cover-glass placed on it, the thin layer of paraffin preventing pressure. If it be desired to keep the blood for continuous examination, it should be drawn into a graduated Pasteur pipette, and one-tenth part of a 5 per cent. solution of sodium citrate should be drawn up after it, then the blood and citrate solution should be carefully mixed in the bulb; the tube should then be sealed up, and drops can be taken from it as desired.

Under ordinary conditions of illumination the Trypanosoma, as seen in the blood, appears to consist of a uniform, homogeneous mass of protoplasm, of worm-like form, with at one end a thick, stiff extremity, and at the other a long, wavy flagellum. It is generally in active motion, and this is seen to be caused by the rapid lashing movement of the flagellum, and by the rapid contractions and relaxations of the mass of protoplasm forming the body, and by the movements of an undulating membrane which is attached to one surface of the body, and which appears to undulate synchronously with the contractions of the protoplasmic body. This membrane is, excepting at the free edge, very transparent, and can be seen much better in citrated blood which has been thickened by the addition of a small drop of 1 per cent. gelatine solution, when its contour and attachments can be much better made out, owing to the slower rate of vibration effected by the thickened medium.

The general shape of the Trypanosoma, when rendered quiescent by this means, but not killed, is that of a long oval, with one end blunt and the other continued into the flagellum; the membrane is then seen to be attached to one side of the body; it begins a little in front of the blunt end of the organism, and is continued at the end into the flagellum.

But with better illumination, such as a very oblique pencil of rays, or, better still, with monochromatic light (green or blue), the protoplasm is seen not to be homogeneous. The organism appears then as a highly refractive body, and near the middle, or between it and the flagellate end, is seen a large dark body much more refractive than the rest of the protoplasm; this is the macronucleus. Near the thick, stiff end of the body a tiny still more refractive body (with monochromatic light nearly black) is seen, which is the micronucleus. The addition of a drop of 5 per cent. acetic acid makes both of these bodies much more distinct. At the stiff end of the Trypanosoma, in varying relation to the micronucleus, is seen a vacuole. There is no suggestion of a mouth or of any organs, but the protoplasm with the most careful illumination appears not to be uniform, which suggests an alveolar structure, as described by Bütschli. With the ordinary simple stains (hæmatoxylin, fuchsin, methylene-blue, thionin) the differentiation is not much better than can be observed by careful illumination of living unstained organisms, as these stains are with these, and similar organisms, too diffuse to be of any service. Acting on a method which Ehrlich originated in 1889, and which Romanowsky modified in 1891, and which has still been further elaborated by Ziemann in 1898, we have used a mixture of methylene-blue and erythrosin, which has enabled us to follow the different stages of the Trypanosoma with certainty. This method depends on the fact that when a basic and an acid stain are mixed together in certain proportions, a third neutral body is formed, which has a specific colour reaction with chromatin. By the use of this method we have been able to trace the various stages of the organism in the blood and organs of the affected animals, which is not possible with the ordinary stains, these being useless for many of the forms to be presently described. With this method the macronucleus of the Trypanosoma is stained a clear, transparent, crimson lake, the micronucleus a deep red, and the protoplasm a delicate blue; these reactions are constant throughout all the stages of its life-history.

The protoplasm of the adult Trypanosoma does not stain uniformly, as does that of some of the other forms, but there are parts faintly stained and parts unstained, which is again in favour of the alveolar structure mentioned above. The vacuole is quite distinct as a clear round space when the organism is stained by this method.

The macronucleus is generally of an oval or elongated shape, and it may be either uniform in colour, or in the form of fine threads; this latter is seen especially in those forms which show other signs of division. The micronucleus is seen as an intensely stained round dot, or as a short rod, this latter form again being seen in those forms which show other signs of approaching division. With the highest powers (1·5 apochromatic objective and 18 compensating eyepiece of Zeiss) we have not been able to make out any special structural characters in this body. The flagellum is not stained by this method, but if the preparation has been well fixed, it is easily visible; the vibratile membrane also is unstained, and can be generally better studied in specimens stained by simple stains, preferably thionin.

As regards the movements of the organism, in preparations where no pressure is exercised, they can be seen moving either with the flagellum or with the blunt end in front; but we think that the commoner mode of progression is with the flagellum forward.

The size and length of the body varies very much with the period of the disease at which the blood is examined and with the kind of animal. The largest forms we have seen have been in rats' blood, just after death, and the smallest in rabbits' blood, early in the disease.

B. *Distribution of the Trypanosoma.*

(1) *In the Body of Normal Animals.*

(*a*) *In the Blood.*—We have found the flagellate form in the greatest numbers in the blood of the mouse, towards the end of the disease. In the rat also they occur in great numbers, and in both these animals they can be found in the blood on the fourth or fifth day. In the dog large numbers can be seen in the blood from the sixth day. In the cat they are fewer in number in the same lapse of time than in any of the animals before mentioned.

The rabbit seems to be the most refractory animal of any we have as yet used, and the Trypanosoma are found in the blood in small numbers only, and at very uncertain intervals.

(*b*) *In the Lymphatic Glands.*—In the superficial glands nearest to the point of inoculation the flagellate organism can be found earliest. In the rat the Trypanosoma can be found in the nearest superficial gland in twenty-four hours after inoculation. We have not found that generalisation of the organism in the lymphatic glands occurs until nearly the end of the disease, when the organism is present in very large numbers