

as in water-logged country, or where the inhabitants are not sufficiently advanced to take the necessary precautions, we can scarcely expect the recent observations to be of much use—at least for some years to come. And this limitation must, I fear, exclude most of the rural areas in India.

Where, however, the breeding pools are not very numerous, and where there is anything approaching a competent sanitary establishment, we may, I think, hope to reap the benefit of these discoveries. And this should apply to the most crowded areas, such as those of cities, towns and cantonments, and also to tea, coffee, and indigo estates, and perhaps to military camps.

For instance, malaria causes an enormous amount of sickness among the poor in most Indian cities. Here the common species of mosquitoes breed in the precincts of almost all the houses, and can therefore scarcely be exterminated; but pools suitable for the spotted-winged varieties are comparatively scarce, being found only on vacant areas, ill-kept gardens, or beside roads in very exceptional positions where they can neither dry up quickly nor contain fish. Thus a single small puddle may supply the dangerous mosquitoes to several square miles containing a crowded population: if this be detected and drained off—which will generally cost only a very few rupees—we may expect malaria to vanish from that particular area.

The same considerations will apply to military cantonments and estates under cultivation. In many such malaria causes the bulk of the sickness, and may often, I think, originate from two or three small puddles of a few square yards in size. Thus in a malarious part of the cantonment of Secunderabad, I found the larvæ of spotted-winged mosquitoes only after a long search in a single little pool which could be filled up with a few cart-loads of town rubbish.

In making these suggestions I do not wish to excite hopes which may ultimately prove to have been unfounded. We do not yet know all the dangerous species of mosquito, nor do we even possess an exhaustive knowledge of the haunts and habits of any one variety. I wish merely to indicate what, so far as I can see at present, may become a very simple means of eradicating malaria.

One thing may be said for certain. Where previously we have been unable to point out the exact origin of the malaria in a locality, and have thought that it rises from the soil generally, we may now hope for much more precise knowledge regarding its source; and it will be contrary to experience if human ingenuity does not finally succeed in turning such information to practical account.

More than this, if the distinguishing characteristics of the malaria-bearing mosquitoes are sufficiently marked (if, for instance, they all have spotted wings), people forced to live or travel in malarious districts will ultimately come to recognise them and to take precautions against being bitten by them.

Before practical results can be reasonably looked for, however, we must find precisely—

(a) What species of Indian mosquitoes do and do not carry human malaria.

(b) What are the habits of the dangerous varieties.

I hope, therefore, that I may be permitted to urge the desirability of carrying out this research. It will no longer present any scientific difficulties, as only the methods already successfully adopted will be required. The results obtained will be quite unequivocal and definite.

But the inquiry should be exhaustive. It will not suffice to distinguish merely one or two malaria-bearing species of mosquito in one or two localities; we should learn to know all of them in all parts of the country.

The investigation will be abbreviated if the dangerous species be found to belong only to one class of mosquito, as I think is likely; and the researches which are now being energetically entered upon in Germany, Italy, America and Africa will assist any which may be undertaken in India, though there is reason for thinking that the malaria-bearing species differ in various countries.

As each species is detected it will be possible to attempt measures at once for its extermination in given localities as an experiment.

I regret that, owing to my work connected with *kala-azar*, I have not been able to advance this branch of knowledge as much during my term of special duty as I had hoped to do; but I think that the solution of the malaria problem which has been obtained during this period will ultimately yield results of practical importance.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE *Times* reports that the University of Berlin celebrated on Thursday last the ninetieth anniversary of its foundation by Frederick William III. The oration was delivered by the retiring rector, Dr. Waldeyer, professor of anatomy, who took for his text the question, "Does the University of Berlin fulfil the mission entrusted to it by its founder?" As a contribution to the discussion of this question, he gave a learned and interesting account of the history of anatomical teaching in Berlin. Dr. Waldeyer is succeeded as rector by Prof. Fuchs, the distinguished mathematician.

THE Research Fellowships founded by the Salters' Company and the Leathersellers' Company for the encouragement of higher research in chemistry in its relation to manufactures, tenable at the City and Guilds Central Technical College, being now vacant, the Executive Committee of the City and Guilds of London Institute will, before the commencement of next session, consider applications and elect candidates. The grant made by each of the companies to the Institute for this purpose is 150*l.* a year. Copies of the schemes under which the Fellowships will be awarded may be had on application to the Honorary Secretary of the Institute, Gresham College, Basinghall Street, E.C.

A COPY of the twenty-third annual "Catalogue" of the Agricultural and Mechanical College of Texas has been received. All the departments of the College appear to be well equipped, and the buildings and grounds are of a very extensive character. The course of work at the College is designed to enable young men "to obtain that education and training which will fit them to take a leading part in the material development of the State; to become scientific farmers and horticulturists, familiar with the properties and needs of soils, the laws of plant growth, the principles of breeding, and, in general, with rational methods based on the revelations of modern science; to become mechanical engineers, draughtsmen, chemists, civil engineers, competent to fill responsible positions in these callings—men fitted not only to meet demands made upon them, but to create such demand by pointing the way to progress and development."

THE Royal Naval Engineering College at Keyham was visited by members of the Institution of Mechanical Engineers during the recent meeting at Plymouth, and the excellent opportunities afforded for the efficient training of the engineer students, who are being instructed both theoretically and practically to enable them to become engineer officers in the Royal Navy, were seen. For the last eleven years Keyham has been the only Admiralty training ground for these officers. An entry is made once each year, during the first or second week in July, following a competitive examination held by the Civil Service Commissioners in the previous April. The period of training is five years. Throughout this time they undergo an educational course at the Royal Naval Engineering College under Prof. A. M. Worthington, F.R.S., whilst their practical training is obtained in the dockyard at Keyham, and the work they perform is as far as possible real. In a paper read before the Institution of Mechanical Engineers, Mr. R. Mayston pointed out that the facilities afforded at Keyham for the acquirement of a thoroughly practical training place the Royal Naval Engineering College in the foremost rank as an institution for obtaining a sound knowledge of mechanical engineering. The fact that as soon as possible after entry the student is employed on useful work, the various courses of instruction which are arranged to render the knowledge of marine engineering obtained as complete and as comprehensive as possible, the facilities afforded for acquaintance with running machinery, the constant contact throughout the training with experienced workmen, the frequent opportunities afforded for obtaining information from the officers who have charge of the training, all go to indicate that nothing is spared to make the training of the engineer student as complete as possible. It may, indeed, be accurately said that Keyham College furnishes an example of what technical education should mean, namely, a wise combination of theoretical and practical work.

HER Majesty's Commissioners for the Exhibition of 1851 have made the following appointments to Science Research Scholarships for the year 1899, on the recommendation of the authorities of the respective Universities and Colleges. The scholarships are of the value of 150*l.* a year, and are ordinarily tenable for two years (subject to a satisfactory

report at the end of the first year) in any University at home or abroad, or in some other institution approved of by the Commissioners. The scholars are to devote themselves exclusively to study and research in some branch of science, the extension of which is important to the industries of the country. A limited number of the scholarships are renewed for a third year where it appears that the renewal is likely to result in work of scientific importance.

	Nominating institution	Scholar
1	University of Glasgow	Robert John Tainsh Bell
2	University of St. Andrews	James C. Irvine
3	Mason University College, Birmingham	Henry Leonard Heathcote
4	University College, Bristol	Winifred Esther Walker
5	Yorkshire College, Leeds	Frederick William Skirrow
6	University College, Liverpool	Charles Glover Barkla
7	University College, London	Harriette Chick
8	University College, London	Henry James Tomlinson
9	Owens College, Manchester	Frank Austin Lidbury
10	Durham College of Science, Newcastle-upon-Tyne	William Campbell
11	University College, Nottingham	Louis Lownds
12	University College of Wales, Aberystwyth	James Travis Jenkins
13	University College of North Wales, Bangor	Robert Duncombe Abell
14	Queen's College, Belfast	William Caldwell
15	McGill University	William Brown McLean
16	University of Melbourne	Bertram D. Steele

The following scholarships granted in 1898 have been continued for a second year on receipt of a satisfactory report of work done during the first year:—

	Nominating institution	Scholar	Place of study
1	University of Glasgow	James Frank Bottomley	Owens College; to proceed to University College, London
2	University of Aberdeen	Alexander Findlay	University of Leipzig
3	Mason College, Birmingham	A. H. Reginald Buller	Botanical Institute, Leipzig; to proceed to University of Munich
4	Yorkshire College, Leeds	Harry Thornton Calvert	University of Leipzig
5	University College, Liverpool	Ernest Brown	Central Technical College, South Kensington
6	Owens College, Manchester	James Henry Smith	Owens College (permitted under special circumstances)
7	Durham College of Science, Newcastle-upon-Tyne	Arthur William Ashton	University College, London
8	University College, Nottingham	Austin Henry Peake	Cavendish Laboratory, Cambridge
9	Royal College of Science for Ireland	Robert L. Wills	Cavendish Laboratory, Cambridge
10	Queen's College, Galway	Hugh Ryan	University of Berlin
11	University of Toronto	William Gabb Smeaton	University of Leipzig
12	Dalhousie University, Halifax, Nova Scotia	Ebenezer Henry Archibald	Harvard University

The following scholarships granted in 1897 have been exceptionally renewed for a third year:—

	Nominating institution	Scholar	Place of study
1	University of Glasgow	James Muir	Engineering Laboratory, Cambridge
2	University of St. Andrews	Harry McDonald Kyle	Gatty Marine Laboratory, St. Andrews, Laboratoire Arago, Banyuls-sur-mer; Königliche Biologische Anstalt, Heligoland
3	University College, Bristol	Charles Henry Graham Sprankling	Owens College, Manchester
4	Yorkshire College, Leeds	Harold Albert Wilson	Cavendish Laboratory, Cambridge
5	University College of South Wales and Monmouthshire	Maria Dawson	Botanical Laboratory, Cambridge
6	University of Melbourne	Walter Rosenhain	Engineering Laboratory, Cambridge

In connection with the article on the duties of provincial professors, which recently appeared in these columns, it is worthy of note that, according to the *Hochschul-Nachrichten*, 22 per cent. of the professors in the German universities are engaged in lecturing or laboratory supervision two to six hours a week, and 51 per cent. from seven to twelve hours. Of the associate professors 60 per cent. are engaged from two to six hours per week, and of the privatdozenten 82 per cent. Only 4 per cent. of all privatdozenten are engaged in lecturing or laboratory supervision more than twelve hours a week. As *Science* remarks, the leisure of the German associate professors and docents explains in large measure the amount of research work accomplished in German universities.

SCIENTIFIC SERIAL.

American Journal of Mathematics, vol. xxi, No. 3, July. —This number opens with a long memoir (64 pp.) by Dr. L. E. Dickson, entitled "Determination of the Structure of all Linear Homogeneous Groups in a Galois Field which are defined by a Quadratic Invariant." This is an attempt at a complete determination of this important type of groups. Dr. Dickson's work is familiar to the students of "groups" in this country by his papers in the *Quarterly Journal* (on the first hypoabelian group generalised, 1898), in the *American Bulletin* (the structure of the hypoabelian groups, July 1898, also of the *Bulletin* for February and May 1898), and in the *Proc. of the Lond. Math. Soc.* (the structure of certain linear groups with quadratic invariants, vol. xxx, pp. 70-98). Two new systems of simple groups are obtained in the present memoir, and thereby some results in the earlier papers are correlated and completed. (References are freely given to results obtained by other workers in this field.)—Upon the ruled surfaces generated by the plane movements whose centres are congruent conics tangent at homologous points, by Dr. E. M. Blake. The movements considered are thus defined. Upon a plane α' containing a conic C' moves a coincident plane α , containing a conic C congruent to C' , in such a manner that C and C' are always tangent at homologous points, *i.e.* C and C' are the centrodes of the movement. The locus of a point rigidly attached to α is a curve of the fourth order when C and C' are central conics, and of the third order when they are parabolas. The locus is in a plane parallel to α' , and the same distance from it that the generating point is from α . The locus of a straight line carried by α and making an angle with it, is a quartic scroll when the centrodes are central conics, and a cubic scroll when they are parabolas. The object of the paper is to describe the forms of these scrolls, and the character and situation of their nodal lines and pinch-points. The results are to be regarded (1) as furnishing a method of mechanically generating certain cubic and quartic scrolls, and (2) as exhibiting the totality of line-loci of the movements considered. These results are believed, by the author, to be new.—The remaining two papers are by J. C. Gashan, and their nature is indicated by their titles, *viz.* "Quinquisition of the Cyclotomic Equation" (read, in abstract, at the British Association meeting of August 29, 1897, *cf.* Prof. Cayley's paper on the subject in vol. xii. of the *L. Math. Soc. Proc.*), and on the m fold section of the cyclotomic equation in the case of m prime. (Useful references are given to previous memoirs on the subject.)—Accompanying this number is an index to volumes xi.-xx.—The editorial staff is announced to consist of Prof. Newcomb, with the co-operation of A. Cohen, Frank Morley, Charlotte A. Scott, and other mathematicians.—This is strong enough for any work that may be placed before it.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 15.—"On the Waters of the Salt Lake of Urmi." By R. T. Günther, M.A., and J. J. Manley, Daubeny Curator, Magdalen College. Communicated by Sir John Murray, F.R.S.

This paper contains an account of a physical and chemical investigation of the waters of the great salt lake of Urmi in Azerbaijan, North-west Persia. Samples of the water were