patents in numerous countries proves their practical utility. That the work of the Institute is not directed solely to the private profit of the contributing firms is indicated by the list of contributions on smoke-abatement, research on which has helped to clarify Pittsburgh's notorious atmosphere. A possible criticism of the list is that it would have been preferable to restrict the entries to contributions of scientific interest to the exclusion of articles of a propagandist character, important as the work of propaganda undoubtedly is in relation to scientific research. For example, the article published in the *Ice Cream Trade Journal*, entitled "Scientific Research Proves its Value to Industry," was probably of ephemeral interest only.

Insect Flagellates and Disease—A Study in Adaptation.[1]

FLAGELLATES of the family Trypanosomidæ are for the most part parasites of the intestinal tract of invertebrates, chiefly insects. Infection is contaminative, one insect infecting itself from encysted stages of the flagellate voided in the fæces of another. In African sleeping sickness the trypanosome lives both in the tse-tse fly and in man. It seems clear that originally these pathogenic flagellates were limited entirely to insect hosts, as the majority of the members of the family still are.

It is found that certain lizards acquire an intestinal infection presumably by devouring infected insects. The flagellates finally adapt themselves to life in the lizard's intestine, whence in some cases they invade the blood stream. If the insect which causes the intestinal and blood infection when devoured by the lizard be one which sucks the blood, then such an insect might infect itself from the blood. The original contaminative method of infection of the insects from one another may still persist, though it may be no longer necessary. If it were lost a condition of affairs like that in *Trypanosoma lewisi* would be reached. The flea ingests trypanosomes from the blood of the rat, and later voids trypanosomes in its fæces, which when eaten by the rat lead to infection. The infection is associated with development in the hind gut of the flea. In the case of sleeping sickness, trypanosomes taken up from the blood of man by the tse-tse fly develop in the anterior part of the alimentary tract and are inoculated into the skin when the fly feeds. Infection of man is inoculative and not contaminative as in the rat. The flagellate in the fly has moved from a posterior to an anterior station, or else the tse-tse fly is not the original invertebrate host. Surra of horses is transmitted by tabanid flies in a purely mechanical manner. The fly bites an infected animal, and if it feeds again within a few minutes on another animal, the trypanosomes which remain alive on or in its proboscis are inoculated. The chances of survival of the flagellate would be greater if it could establish itself in the fly as a definite infection. It is possible that this has occurred in the tse-tse fly; it would explain the development in the anterior part of the intestine. In kala azar and oriental sore it has been shown that the parasites taken up by Phlebotomus develop in the anterior part of the intestine. Assuming that the sand fly is the transmitter of these diseases, it has yet to be determined how the flagellates are inoculated into human beings.

Flagellates have also adapted themselves to life in plants. Studying such infections in Central America, Strong has noted that plant bugs which harbour flagellates infect not only a Euphorbia but also a lizard which devours it. The inoculation of the flagellate from the lizard's intestine into the skin of a monkey caused an ulcer in which rounded forms of the flagellate persisted for more than two weeks. Though Strong's work undoubtedly requires confirmation, it illustrates how insect flagellates, originally confined entirely to the insect host, have adapted themselves to higher animals and plants and associated with the development of a complicated life history, have in many cases led to the production of definite disease.

[1] Substance of a paper read by Dr. C. M. Wenyon, C.M.G., C.B.E., F.R.S., to the Royal Society of Edinburgh on Oct. 24.

The Statistics of Accident Investigations.

AN important article has appeared in the *Journal of the Royal Statistical Society* (vol. 90, Part 3, 1927) on practical applications of the statistics of repeated events, particularly to industrial accidents, part of which had been read by Miss Newbold before the Society on April 26 last. Several times in these pages, articles dealing with accident investigations have been reviewed, and it is useful to have this very able summary of a number of separate lines of attack as well as the statistical details and tables. Research workers sometimes fail to understand some of the simpler laws of causation and reproduce their results in such a way as to render interpretation difficult or impossible. Averages are assumed without evidence to be what they seem to be, and comparisons are made between incomparable groups.

Miss Newbold's work shows the difficulties that confront the statistician when data have to be treated scientifically. She begins by a historical review of accident work and incidentally points out how complex are the problems involved. She considers the question first abstractly, looking upon an accident simply as an event, and assumes that we have a record of the numbers of such events happening to different people in certain periods of time and that the external conditions are uniform. Even with these assumptions, there arises the question as to whether the distribution of events among the individuals is a purely chance one, and if it is not, to what extent are the underlying peculiarities masked by chance variations and how far we are able to strip off the mask and see the form of these peculiarities.

This involves a discussion of the mathematical treatment of such data and a consideration of alternative methods. To know if a high accident rate in a department is due to a few people or to general conditions alike for all is of practical importance but is difficult to determine. On the whole, from a consideration of the work done so far, there is some indication that the same people are likely to incur both small and major accidents. Results, however, are not sufficiently definite to provide a basis for administrative proposals, but the weight of the gradually accumulating evidence and the improvement in statistical technique show clearly that the work is worth pursuing.

The discussion which followed the reading of the paper is also valuable, representing different points of view. Dr. M. Greenwood gave some details of how during the War the study of accidents began and the gradual development of the problem. Mr. D. R. Wilson spoke about the improvement in machinery during recent years, so that no longer was it necessary to 'wait and see' in order to determine if a machine was dangerous or not. He expressed the hope that the time would come when we should be able to know

beforehand those who were likely to get accidents and so prevent them from entering certain occupations. Dr. Millais Culpin gave some actual examples of how a man's temperament expressed itself in accidents and showed from his own researches that in different groups of people a considerable proportion possessed symptoms which would render them liable to accidents should they be exposed to risk.

University and Educational Intelligence.

CAMBRIDGE.—The late Miss McArthur, formerly of Girton College, has left the residue of her estate, stated to be not less than £4000, to the University for the award of a prize or prizes for the encouragement of the study of economic history.

C. Rimington, Emmanuel College, has been re-elected to the Benn W. Levy research studentship in biochemistry.

The Financial Board has proposed to the University the purchase of the Balfour Laboratory from Newnham College, with the view of its being adapted to meet the needs of the Faculty of Geography.

Dr. R. Chodat has been appointed to represent the University at the celebration of the seventieth birthday of Prof. A. Pictet in Geneva, and Prof. Inglis for the coming centenary of the Institution of Civil Engineers.

The governing body of Emmanuel College offers to a research student, commencing residence at the University in October 1928, a studentship of the annual value of £150, tenable at Emmanuel College for two years, and renewable, in exceptional circumstances, for a third year. Preference will be given to a candidate who has already completed at least one but not more than two years of research. The studentship will be awarded in July, and applications should be sent so as to reach the Master of Emmanuel (The Master's Lodge, Emmanuel College, Cambridge, England) not later than June 30.

EDINBURGH.—At the meeting of the University Court on Nov. 14, it was announced that Lady Lyell of Kinnordy has presented to the Department of Geology valuable collections of minerals, rocks, and fossils, together with cabinets for keeping them. In addition, Lady Lyell has given many geological books, papers of historical interest, and a collection of autographed letters from scientific workers of note to the late Sir Charles Lyell.

LONDON.—Messrs. J. Lyons and Co., Ltd., have contributed 250 guineas towards the establishment of the proposed chair of dietetics.

Dr. J. A. Braxton Hicks has been appointed as from Sept. 1 last to the University readership in pathology tenable at the Westminster Hospital Medical School. Dr. Hicks was educated at Epsom College (1896-1902) and Westminster Hospital Medical School. In 1907 he obtained the M.B., B.S. degrees with honours in pathology, and in 1910 the M.D. degree in pathology of London and the D.P.H. (Cambridge). Since 1910 he has worked in the Department of Pathology at the Westminster Hospital and Medical School, and since the laboratories were enlarged under the John Burford Carlill Bequest, he has been director of the laboratories at the Hospital and Medical School.

The King has approved the appointment of Prof. W. R. Halliday, professor of ancient history in the University of Liverpool, to be Principal of King's College, as from Jan. 1 next, in succession to Dr. Ernest Barker, who has resigned.

OXFORD.—Profs. E. S. Goodrich and F. A. Lindemann have been appointed by the heads of the scientific departments to serve on the Radcliffe Library Advisory Committee.

The Board of the Faculty of Medicine has elected Mr. Arthur P. Dodds-Parker, of Magdalen College, a member of the committee for the control of the Lewis Evans Collection.

Prof. A. G. Tansley, Sherardian professor of botany, delivered his inaugural lecture on "The Future Development and Functions of the Oxford Department of Botany" on Nov. 22.

The King has approved the appointment of Sir Edward Farquhar Buzzard to be Regius professor of medicine in the University, as from Jan. 1 next, in succession to Sir Archibald Garrod, who has resigned.

ST. ANDREWS.—The University Court has appointed Mr. D. E. Jones to be reader in geology in the University.

THE governors of Loughborough College invite applications for the award of five open scholarships in the Faculty of Engineering, each of the value of £75 per annum. The scholarships are open to British subjects from any part of the Empire, and are tenable at Loughborough College, Leics., England, for the period of the full diploma course. The entrance examination for the session 1928–29 will be held on April 24, 25, and 26, 1928. All applicants must be not less than sixteen years of age on Oct. 1, 1928. Further particulars and application forms may be obtained from the College Registrar.

THE Council of the Royal Meteorological Society, with the view of encouraging the study of weather in schools, invites teachers to send in essays on that subject, for which three prizes will be given. The Council considers that the essay should include a description of the work which is actually being carried out or has been carried out by the teacher and his class. The essays should be limited to 2000 words, but may be accompanied by examples of pupils' work. They should be received by the Society not later than June 30, 1928. It is hoped to publish the winning essay or essays in the *Quarterly Journal* of the Society. The essays should be forwarded to the Royal Meteorological Society, 49 Cromwell Road, London, S.W.7.

ACCORDING to the statement for the year 1926–27 issued by the Rhodes Trust, there were 187 Rhodes Scholars in residence that year, of whom 93 were from the British Empire and 94 from the United States; 64 completed or gave up their scholarships. Of those in residence, 4 were taking mathematics, 32 natural science or medicine, and 2 forestry or agriculture. Sir Robert Borden, sometime Prime Minister of Canada, was the Rhodes Memorial Lecturer for the year and delivered three lectures on "Canada in the Commonwealth"; the lecturer for 1927–28 will be Dr. Abraham Flexner, of the Rockefeller General Education Board, New York. During the past year the Rev. M. R. Ridley was appointed to the first Rhodes Travelling Fellowship; two further appointments, for which resident fellows, tutors, and lecturers at Oxford are eligible, will be made early in 1928. Information on the Rhodes Scholarships and Fellowships can be obtained from the offices of the Trust, Seymour House, Waterloo Place, London, S.W.1; in the United States, from President Aydelotte, Swarthmore College, Swarthmore, Pennsylvania; in Canada, from Mr. J. M. Macdonnell, National Trust Company, Limited, Montreal, P.Q.; in Australia, from Dr. J. C. V. Behan, Trinity College, Parkville, Victoria; in South Africa, from Mr. P. T. Lewis, Court Chambers, Keerom Street, Cape Town.