

for a few hundred miles of distance. It is quite within possibility it may yet be conducted across the Atlantic.

As regards other inventions, we are still in want of more simple means for recording telegraphic messages. Since the coherer fell out of use the reception is mostly conducted by ear. Somewhat elaborate photographic methods, suitable for large land stations which employ the Einthoven string galvanometer, have been introduced, but what is still required is a means of calling up the operator and of recording the message on board ship which is at least as sensitive as the telephone plus the human ear, for ordinary shipboard communication.

The receiver current is, however, very small, and available power is at most a few microwatts in the form of a current of a few microamperes.

There are, therefore, innumerable practical and scientific problems in connection with radio-telegraphy which await solution. These require mathematical, physical, and radio-telegraphic knowledge of a high order to overcome them.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. F. R. MILLER has been appointed lecturer in physiology in McGill University, Montreal.

THE requests provided by the will of the late Mr. Thomas Bartlett, of Liverpool, include one of 20,000*l.* to the University of Liverpool for the purpose of establishing scholarships of the value of 40*l.* per annum for engineering students.

At its meeting on October 28, a letter was read by M. Liard to the council of the University of Paris from Mr. Andrew Carnegie, offering to the University the last 4000*l.* necessary for equipping the new Institute of Chemistry, in course of erection in the Rue Pierre Curie, Paris.

THE Royal Agricultural College, Cirencester, having been recognised as the centre for advisory work in forestry in the counties of Cornwall, Devon, Somerset, Gloucestershire, Wiltshire, Monmouthshire, Herefordshire, and Worcestershire, Prof. H. A. Pritchard has been appointed technical adviser, and Mr. A. D. Hopkinson lecturer in forestry and forest mycology. The vacancy caused by the promotion of Prof. R. G. Stapledon to the post of research botanist at University College, Aberystwyth, has been filled by the appointment of Mr. C. B. Saunders (London), who has for some years been lecturer in biology at Holmes Chapel Agricultural College.

PROF. A. KULIABKO, of the University of Tomsk, Siberia, informs *The Times* of the inauguration at Tomsk, on October 20, of an institution, founded by the munificence of Peter Makoushin, which aims at the instruction on a large scale of the people of Siberia. The institution in question is called the House of Science, and is meant to be a popular university, where anyone may obtain instruction, from the elementary to the secondary standard, free of charge. It includes also a section for instruction of the kind usually given at universities. The institution will give hospitality to the conferences of teachers in elementary schools; it will contain a library to be used free of charge; special evening classes will be held; while the dissemination of knowledge of sanitation and hygiene will have a leading place in the programme. A museum of practical knowledge and many other means of instruction will render the Tomsk House of Science a boon to Siberia.

THE calendar of the University of Sheffield for the session 1912-13 provides another striking example of

the efforts being made by the authorities of modern universities to keep in close touch with the educational needs of the industrial centres in which they are located. At Sheffield, for instance, in addition to the comprehensive faculty of pure science, there is a faculty of applied science, in which, under suitably arranged conditions, the degrees of bachelor, master, and doctor of engineering, or bachelor, master, and doctor of metallurgy, can be secured. Students who for various reasons do not graduate in the faculty of applied science may, by attendance at day or evening classes, on complying with the regulations, secure an associateship in engineering or in iron and steel metallurgy. In mining and architecture, too, diploma courses have been arranged. It is interesting to note that arrangement has been made with the Imperial College of Science and Technology by which the University of Sheffield is recognised as being in association with the Imperial College for such of their students as may desire to specialise in the study of the metallurgy of iron and steel for the associateship of the Royal School of Mines. To meet the special needs of women a two-years' course of work in the University and the Sheffield Training College of Domestic Science has been inaugurated, and a diploma in domestic science is awarded to successful students at the end of the course. While the applied subjects are encouraged so successfully, the other departments of university work are in no way neglected, and the faculties of arts, medicine, law, and so on, are equally complete.

THE council of King's College, London, has received from the Rev. A. C. Headlam the intimation of his intention to resign the office of principal and dean of the college at the end of the present year. In the House of Commons on Monday, Sir E. Cornwall asked the President of the Board of Education whether his attention had been directed to the letter from the Rev. A. C. Headlam to the Bishop of London, dated October 11, in which Dr. Headlam alleged, as one of the reasons for his resignation, peremptory and arbitrary action on the part of the Board in requiring the removal of the college to another site; and whether he would state on what ground the Board had made such requirement without first consulting either the college or the Senate of the University on the subject. In reply, Mr. J. A. Pease said:—"I have seen the letter referred to. The Board have expressed their concurrence with the opinion of the Advisory Committee on University Grants that the present site of King's College does not admit of such extension as will enable the college to take its proper place in the University. The Board have indicated their readiness to receive a deputation from the Senate of the University of London upon the question of site, but apart from this they have taken no action in the matter, and they have made no requirement. There is no foundation whatever for the charges of discourtesy and peremptory and arbitrary action contained in the letter referred to. The Board and their Advisory Committee have no intention of interfering with the conditions of freedom and independence which are necessary to enable a university to perform its proper functions."

THE Government of India recently decided, we learn from *The Pioneer Mail*, that the time had come to endeavour to connect Indian educational institutions more closely with business firms, railways, and other employers of labour, to inquire how the former can better meet the requirements of the latter, and to point out the way to further employment of Indians in them. For this inquiry Colonel Atkinson and Mr. Dawson were selected as having special practical experience. They have completed their investigations and issued a report. The great need which the report

emphasises is that education should be made more practical, not only in technical institutes, but also in primary and secondary schools. Among special recommendations made in the report, the following may be noted:—(1) That the present system under which State technical scholarships are granted to Indians for education in technical institutions in England and elsewhere should be discontinued. That suitable stipends should be granted to Indians who have completed successfully their theoretical and practical education in India to enable them to be apprenticed for practical experience with firms of repute in England. (2) That minor technical institutes should be placed under the control of one central institution in each province. (3) That the education of skilled workmen should only be carried up to vernacular reading, sufficient elementary arithmetic for accounts and sufficient knowledge of drawing to understand a dimensioned sketch. (4) That the most promising method of training skilled workmen is to establish manual training schools for children in big centres and near big workshops; the boys to be apprenticed in workshops from the ages of twelve to fourteen years. During the apprenticeship they are to be obliged to attend afternoon classes to complete their literary education, and finally to obtain some theoretical knowledge of their work.

SOCIETIES AND ACADEMIES.

LONDON.

Institution of Mining and Metallurgy, October 17.—Mr. Edward Hooper, president, in the chair.—J. W. Ashcroft: The flotation process, as applied to the concentration of copper ore at the Kylloe Copper Mine, New South Wales. As a consequence of the oxidised ore at this mine being practically exhausted, the original method of treatment was found to be inadequate, and the present management introduced an experimental flotation process with the view of obtaining a better recovery and higher grade concentrate. As first planned, the plant for this flotation process was divided into a grinding section and a flotation section, and the paper deals at length with the defects which manifested themselves in the first experimental stages, and with the rearrangements dictated by experience. The chief defects were the excessive amount of oversize in the feed of the stirring boxes, the excessive dilution of the pulp, the irregularity of the overflow from the flotation chambers due to the irregularity of the feed and of the speed of the impellers, and a want of proper means to control the supply of oil. To remedy these, the grinding pans were altered to the positive feed type, and were arranged to discharge on to revolving screens, so as to keep the feed to the flotation machine more even in size; the pulp thickener was moved and placed between the screens and the flotation machine so as to keep an even feed to the stirring boxes and to regulate its density; the flotation machine was controlled by a sensitive governor to keep the speed of the stirrers constant, and an apparatus was devised to secure an even flow of oil. The results of this reorganisation proved satisfactory, and this paper gives interesting details of costs of operation, &c., and some observations on the successful working of the process.

Physical Society, October 25.—Prof. C. H. Lees, F.R.S., vice-president, in the chair.—Prof. H. Nagaoka and T. Takamine: The constitution of mercury lines examined by an echelon grating and a Lummer-Gehrcke plate. The authors have photographed the principal lines of mercury, using an echelon spectroscope crossed by a Lummer-Gehrcke plate. They find that the 5790 line consists of eight, the 5769 line of four, the 5461 line of nine, the 4359

of eleven, the 4078 of six, and the 4047 of seven components, the positions of which in general agree with those found by recent observers. They point out a simple relation between the distances of the components from the principal line in each case, and a further relation between the quotient of each of these distances by the wave-length of the principal line, which holds for all the lines.—Prof. H. Nagaoka: Note on the mutual inductance of two coaxial circular currents. Methods are given for the rapid calculation of the mutual inductance of two coaxial circular currents. Maxwell's first formula is converted into theta-functions, and then expanded in a Jacobian q series. The logarithmic values of this series for various values of q have been tabulated in a previous paper by the author. When the circles are near one another a series for M is given in terms of q_1 , where q_1 is the complement of q . In this paper the author treats Maxwell's second formula in a similar way. A table of the values of these series found, computed to six decimal figures by T. Tishima, is given.—S. E. Hill: The absorption of gases in vacuum tubes. This paper is an account of experiments carried out to determine whether the absorption of gases caused by passing a discharge for some time through vacuum tubes is the result of a chemical action or is a mere physical absorption. In order to eliminate all electrode complications, the electrodeless discharge was used throughout. The bulbs examined were of soda, lead, Bohemia and Jena glass. The absorptions were noted at different pressures and curves plotted. Continued passage of a discharge causes a "saturation" effect in all the glasses. After two months none of the bulbs had recovered any of their absorptive power. That chemical actions are present is shown by peculiar deposits on the necks of the bulbs, these being unfortunately too small for analysis. The conclusion arrived at is that the disappearance is not due to physical absorption, but to definite chemical action.

MANCHESTER.

Literary and Philosophical Society, October 15.—Mr. Francis Jones, vice-president, in the chair.—A. Adamson: An apparatus which can be used for the exact trisection of an angle.—D. M. S. Watson: The larger Coal Measure amphibia. The author described the skulls of *Loxomma Allmani* and *Anthracosaurus Russellii* (Pteroplax), now preserved in Newcastle-on-Tyne Museum. The skulls had been previously described by Embleton and Atthey, but the important structure of the palate had not been made out. This was described in detail, and compared with that of other Carboniferous amphibia. It was shown that a solid, bony palate, with an articular connection between the large pterygoids and the basisphenoid, was characteristic of the group. The palatines and pre-molars bear large teeth with a characteristic mode of replacement. The pre-maxillæ and maxillæ are confined to the margin of the palate, and bear smaller teeth. The large vacuities of the later Stegocephalia are absent. The skulls present remarkable resemblance to those of Seymouria and also of the Crossopterygian fishes. The relations of the quadrate were clearly determined, and seemed to indicate that the tetrapod skull was not autostylic in the ordinary sense.

PARIS.

Academy of Sciences, October 28.—M. Lippmann in the chair.—E. Jungfleisch: Inactive and racemic dilactylic acids. The crude acid arising from the interaction of sodium ethyl lactate and ethyl α -chloropropionate is neutralised with magnesium hydroxide. The inactive magnesium salt, being much less soluble in hot or cold water than the racemic form, separates first. The crystallographic properties of these salts and of the corresponding acids are described.—Édouard