

George Beilby's statement that the point of view of the engineer is not so far removed from that of the ordinary intelligent person that the latter cannot grasp, in a general way, his aims and objects; but the thoughts and aims of the chemist are for the most part quite inscrutable to the vast majority of his fellow-men. Since the chemist's views are so much further removed from everyday notions and conceptions than are those of the engineer, it is wiser first to imbue the mind of the student thoroughly with the more difficult, because less ordinary, point of view.

On the other hand, many of the speakers seemed to advocate that chemists should be trained as chemical engineers—that is, primarily to design and control chemical plant; and that the factor of cost in relation to chemical processes should not be overlooked. From the point of view of the chemical manufacturer, it was urged that the main requirement of the industry was men fully equipped with a real knowledge of chemistry: the individual with mechanical aptitude would without difficulty be able to learn enough to think as an engineer, and appreciate engineering problems.

In addition to the scheme outlined by Prof. Donnan for the training of the would-be works chemist in engineering, papers were contributed by Mr. C. H. Darling on the training in physics given at the Finsbury College, and by Mr. J. W. Hinchley on the course at the Imperial College. The former course is designed to make the student acquainted with the type of instrument he will later meet with in works, but it was recognised by Mr. Darling that the young chemist who is to be of the maximum use to his employer must, in addition to the possession of specific knowledge, have his ideas running in the right grooves.

HIGH-SPEED TELEGRAPHY.

THE report of the committee appointed by the Postmaster-General in December, 1913, to consider the question of high-speed telegraphy has now been issued in the form of a White Paper (Cd. 8413, price 3d.). Unfortunately the work of the committee was interfered with by the outbreak of war in August, 1914, which cut short a series of tests designed to show the best results which various competing systems could produce under identical conditions. In the absence of comparative statistics the complete examination of all the claims of rival inventions is impossible, but as such minute statistical comparisons would be mainly valuable in connection with further investigation, the considerations on which the committee's recommendations have been framed should suffice for the present.

The question before the committee resolved itself into a rivalry between automatic high-speed systems on one hand, and the multiplex on the other, though the inventions of Mr. Creed and the advent of various keyboard perforators affected the situation of the former. Automatic high-speed systems were fully reviewed, but the conclusion arrived at by the committee is that for ordinary commercial telegraph work between the main centres of the British Post Office service the inventions based on the multiplex method are superior, as they conduce to economy in staff, are subject to fewer serious stoppages and delays than automatic systems, and necessitate less spare plant and less costly maintenance. The fundamental principles of nearly all multiplex instruments are based on the Baudot system, invented more than thirty years ago. Ten years later it assumed, in the hands of the original inventor, practically its present

form. Although some of its main principles had been anticipated by earlier inventors, Baudot was the first who combined them into a system of practical utility, and the production of the system may be regarded as marking an epoch in the history of telegraphy. The leading features of the Baudot system are: (1) its method of obtaining synchronism; (2) its direct transmission from keyboard to line; (3) its cadence and speed; (4) its direct printing on slip.

Of the multiplex systems at present available, the Western Electric is said to have given the best results, and the committee recommends that a number of quadruple duplex installations of this apparatus be ordered. Seven or eight sets should suffice, as although present conditions favour the rapid application of systems with the greatest output, it is desirable to avoid too great a dislocation of working, and to allow time, so far as possible, for other makers to demonstrate their capabilities. Page- or column-printing is preferable to tape-printing on the busiest routes, and the Western Electric Company's page-printing on a continuous roll of paper, cut off after each message, is quite satisfactory. The committee does not consider it desirable that either page- or column-printing should be adopted throughout the service to the exclusion of tape-printing, while the Creed receiving apparatus is recommended for use in the Post Office news service. The application of printing methods to the less important circuits should be kept steadily in view, and early trials of the one-way and two-way installations of the Western Electric, and of the light line printer of the Automatic Telephone Manufacturing Company, are recommended. The committee was impressed with the possibility of two-way working with one operator at each end, both to signal their messages simultaneously to the other end, and then both to gum the tape. An hourly load can be carried in this way equivalent to the average Morse load with two operators at each end, and having the additional advantage of printing the telegrams. The committee predicts that the introduction of multiplex methods for news work will call for serious consideration in the near future, and it urges that the application of these systems, to give simultaneous communication on one wire between each one of three or possibly more offices, should be kept in view as multiplex methods are extended.

HEREDITY AND DISEASE.

IN the lately issued Bulletins Nos. 16 and 17 of the Eugenics Record Office (Cold Spring Harbour, New York) Prof. C. B. Davenport and Dr. Elizabeth B. Muncey discuss "Huntington's Chorea in relation to Heredity and Eugenics" and "The Hereditary Factor in Pellagra." Nearly a thousand cases of the chorea "can be traced back to some half-dozen individuals who migrated to America during the seventeenth century." The disease manifests itself in various sets of symptoms—nervous tremors, dementia, etc.,—most of which act as dominants. Though the hereditary nature of the disease has been recognised for generations, "there is no clear evidence that persons belonging to the choreic lines voluntarily abstain to any marked degree from, or are selected against, in marriage." With regard to pellagra, there appears to be a distinct hereditary predisposition to infection; nearly half the children of a pair of susceptible parents are themselves susceptible.

The long-disputed question of the influence of poison on germ-cells has received another contribution in Dr. Raymond Pearl's paper on the effect of continued

administration of certain poisons to the domestic fowl, with special reference to the progeny (Proc. Amer. Phil. Soc., lv., 1916, pp. 243-58). This is an abstract of three papers from the Maine Agricultural Experiment Station, and a fuller memoir is promised later. A new feature in this research is that "the foundation stock used came from pedigreed strains of two breeds, Black Hamburgs and Barred Plymouth Rocks . . . whose genetic behaviour under ordinary circumstances may be predicted with a degree of probability amounting practically to complete certainty." The birds were treated by inhalation with ethyl alcohol, methyl alcohol, or ether, and examination of the offspring gave the surprising result that "out of twelve different characters for which we have exact quantitative data, the offspring of treated parents taken as a group are superior to the offspring of non-treated parents in eight characters." Dr. Pearl does not consider that his results contradict those of the experiments by which several recent workers—such, for example, as Laitinen and Stockard—have established the degenerate nature of the offspring of many alcoholised mammals. He points out that the strength of treatment may be such as to exercise a selection among the germ-cells, so that, through the elimination of feeble sperms and ova, a larger proportion than usual of vigorous gametes in the narcotised animals take part in the production of zygotes, whereas with a stronger treatment all the gametes are injuriously affected. It is likely that the germ-cells of birds may be less affected than those of mammals by such influence, and Dr. Pearl is certainly justified in asking for caution in transferring these results to problems of human inheritance, though he is apparently willing to accept at their face-value the much-disputed statistics of Elderton and Pearson, so loudly acclaimed as an excuse for alcoholic indulgence among mankind.

G. H. C.

THE U.S. NATIONAL RESEARCH COUNCIL.

UNDER the pressure of conditions of war, national advantage is being taken of the services which science can render, through committees or by the appointment of men of science to posts in Government departments. Definite problems have to be solved, and attention has to be concentrated upon them, though this means that the freedom which is the prime characteristic of exploration in scientific fields is necessarily restricted. In the United States at present there is no necessity of this kind; and the National Research Council is, therefore, free to develop a plan in which purely scientific investigation takes its essential place, without consideration of immediate problems of national defence and industrial demands. The council has recently sent a circular to the chief educational institutions in the United States recommending the formation of research committees such as have been established already at the Massachusetts Institute of Technology and certain other institutions at its suggestion. The obligations of men of science towards national defence and industry are not overlooked, but it is equally important to provide for the free scientific research upon which great developments will depend in the future as in the past. "We must not forget," says the council, "that pure science, not directly stimulated by patriotic impulse for national service or the promise of financial reward from industrial profits, should be accorded the encouragement which enlightened leaders of industry are so willing to concede as its due." We subjoin an abstract of the main points dealt with in the circular from which this quotation is taken.

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Research Committees in Educational Institutions.

A very large proportion of the scientific research of the United States is conducted in the laboratories of educational institutions. It is now widely appreciated that contact with knowledge *in the making* is the most effective means of seizing and holding the student's attention. And it is also recognised that no greater injury can be done to the cause of science than to compel a promising investigator, fresh from the researches of his graduate years, to relinquish all hopes of further studies because of the complete absorption of his time and energy by other duties.

It is with the fullest appreciation of the difficulties which financial limitations involve, and with a sincere desire not to interfere with the just demands of the teacher's profession, that the National Research Council invites the co-operation of educational institutions in the promotion of research at this critical period in our national progress. We believe it to be feasible, without decreasing the efficiency of the university, the college, or the professional school as teaching institutions, to increase greatly their contribution to knowledge through research. Indeed, we do not hesitate to say that if a portion of the time now given to teaching were devoted to investigation, and if the courses of instruction were so altered as to take full advantage of this change, the educational efficiency of the institutions in question would be materially enhanced. In extending a request for the formation of research committees in educational institutions of high standards, which accord serious support to scientific research undertaken by the faculty and advanced students, we beg to direct attention to some of the possibilities which lie open to committees of this character.

Before sending out a general invitation, a preliminary test of the plan has been made in certain institutions. The Massachusetts Institute of Technology, Yale University, the University of Chicago, North-western University, and Throop College of Technology have already established research committees to co-operate with the council. In each case these committees are composed of the president of the institution, two or three leading members of the board of trustees who are interested in research, six or more faculty members engaged in research, and two or more members of the alumni occupied with research or interested in its promotion. Following the example, at least for the present, of similar organisations abroad, the council has directed its activities to the promotion of research in chemistry, physics, engineering, mathematics, astronomy, geology and palæontology, geography, botany, agriculture, zoology and animal morphology, physiology, medicine, hygiene, psychology, and anthropology. There is no reason, however, why other departments of research should not be represented on the research committees of educational institutions wherever this appears desirable.

In view of the importance of encouraging research on the part of members of the faculties of colleges which do not undertake graduate instruction, the invitation of the council is not limited to universities and other institutions now giving specific recognition to research. It is highly important to encourage competent men to continue the work of research begun in their university career, and a sympathetic research committee could help greatly in this respect. Even the existence of such a committee should serve as a valuable stimulus to men who properly look for some measure of encouragement. In small institutions powerful support can be given to research by a body of men who genuinely appreciate its significance.