

So Mr. Clark ceased to regard the group as decadent or degenerate, and became convinced that recent Crinoids play as important a rôle in the economy of the sea-floor as do the other Echinoderms. He has written his monograph, therefore, under the influence of a study of recent forms rather than of extinct forms.

The present instalment contains a general introduction, a history of investigation, a most elaborate glossary, and a general account of Crinoid structure which is strongest as regards skeletal parts, dealing rather sketchily with the "innards" and the development. We regret to see that the learned author defends the extraordinary view that Echinoderms are affiliated to Crustaceans and to barnacles in particular. To support this by "the very close correspondence between the development of the larvæ of the Echinoderms and that of the larvæ of certain types of Crustaceans," or by the correspondence between the crustacean eye and the asteroid eye, or by comparing the genital plates of a sea-urchin to the protopodites of the walking legs of a crayfish, or indeed by any of the arguments used, seems to us an extraordinary perversion of morphological judgment. Attention should be directed to the numerous graphic figures drawn by Miss Violet Dandridge for the text.

#### CHEMISTS AND THEIR TRAINING.

**S**PEAKING at the thirty-eighth annual general meeting of the Institute of Chemistry, held on March 1, Sir James Dobbie, the president, referred briefly to the work of the institute during the war and the importance of the services of professional chemists to the nation, particularly in the production of munitions and other material of war. His address is here summarised.

Both in the interests of the profession and of the industries of the country, the institute has encouraged by every means possible the production of laboratory requirements of all kinds hitherto obtained almost entirely from Germany and Austria. In co-operation with the Society of Public Analysts, steps have been taken to ensure supplies of satisfactory chemical reagents, and a number of British firms have undertaken their manufacture according to standards prescribed by a joint committee of the two societies.

The work of the Glass Research Committee of the institute has been remarkably successful. At the end of six months' work formulas were produced for practically all the various kinds of glass required in chemical operations, in addition to glasses for miners' lamps, pharmaceutical ampoules, and X-ray tubes. A number of manufacturers who have taken up these industries are now able to supply immediate requirements, and there is good reason to expect that within a short while they will have completely mastered the technique involved in the production of such articles. The credit for this achievement is due to Prof. Herbert Jackson, of King's College, London, assisted by Mr. T. R. Merton. The work of the committee has received the recognition of the Advisory Council on Scientific and Industrial Research, from whom grants have been received for the furtherance of investigations with a view to the determination of formulas for other glasses required for scientific purposes, including certain forms of optical glass.

As to the necessity for taking adequate measures for equipping ourselves for the economical struggle which must ensue when peace is restored, the discussions which have taken place on the subject have revealed a wide divergence of views, both as to the cause of the unsatisfactory position in which we found ourselves and the steps required to remedy it. In chemical in-

dustries, however, it is generally agreed that the relations between chemical science and chemical manufactures should be more intimate in the future than they have been in the past. That condition can be fulfilled only if the country possesses an ample supply of highly trained chemists. Dr. Beilby has expressed the belief that the remarkable development of chemical industry in Germany resulted much more from the large command of chemists and engineers of sound professional training than from the possession of an even larger supply of research chemists of mediocre ability. That opinion should not, however, be taken as giving the impression that the value of research is to be underrated. So far as the supply of chemists of sound professional training is concerned, we can face the future with some confidence, particularly as the facilities for training chemists have been remarkably increased. It has to be admitted, however, that the great public schools are, for the most part, unsympathetic towards the study of science, and, even when they are excellently equipped for the purpose, the results are meagre and unsatisfactory.

As to the older universities, it must be allowed that Cambridge has lately achieved an extraordinary measure of success in adapting its teaching to the needs of modern times, while the fact that Oxford is rousing herself to meet her responsibilities is shown by the terms of a memorandum issued by the Natural Sciences Board in support of a reform in the regulations for the honours degree in chemistry, whereby research will become a compulsory part of the curriculum. What must be advocated is a system of general education on broad lines throughout, including both classics and science, up to the proper age for specialisation. Should the expectation of the country in this matter not be realised, the inevitable result will be that schools established on more modern lines will gradually replace the old public schools as the training ground of the leaders of the nation.

The council of the institute is about to give further consideration to the problem of promoting a more complete organisation of professional chemistry in the interests of the industries of the country. Chemistry is a comparatively young profession, which is gradually establishing itself in the knowledge and the good opinion of the community. It will be successful in this in proportion as it attracts men of strong character and individuality, efficient and capable of holding their own as professional men. As it gains in strength its services will become more widely recognised and will meet with the same appreciation as that accorded to the older learned professions. The fact that the title chemist has long been identified in this country, alone of all European countries, with the craft of pharmacy is responsible for much of the confusion existing in the public mind, but the public is learning at present so much about the work of the chemist that we need not despair of seeing the day when it will be common knowledge that while in law all pharmacists are chemists, all chemists are not pharmacists.

We extract from the report of the council a statement as to the work on glass research to which Sir James Dobbie referred in his address.

The Advisory Council on Scientific and Industrial Research has allotted the institute a grant of 400*l.* for one year's research work on laboratory glass of various kinds, and a grant of 500*l.* for research on optical glass, covering a period up to March 31, 1916. The grants are made on certain conditions, providing for the use of the results by British firms on terms to be arranged between the Advisory Council, the Glass Research Committee, and the manufacturers concerned. The Glass Research Committee has lately for-

warded to the Advisory Council reports on formulas for:—Blue enamel for sealing metallic wire into glass; lead glass suitable for electric light bulbs; lead glass, similar to above, but avoiding potassium carbonate; opal glass designed to join perfectly with glass made to the committee's formulas Nos. 1 and 10; high-temperature thermometer glass; a leadless opal glass which unites with No. 19 and can be worked with it as an enamel backing for thermometers, etc.; thermometer glass for ordinary temperatures.

The fact that these formulas are available has been reported to British glass-makers, from whom a large number of applications have been received and are now under the consideration of the authorities.

With regard to research on optical glass, the Advisory Council has asked that the Glass Research Committee shall keep in touch with the National Physical Laboratory, to which a grant has also been allotted. The primary object of the work of the laboratory will be "the study of the process and condition of melting and producing glass of good optical quality with special reference to refractories and electric furnace methods, with a view to putting the whole process of manufacture on a practical scientific basis."

The line of investigation undertaken by the Glass Research Committee of the institute is "the study of certain specific optical glasses urgently required for industrial purposes, with a view to their early production by manufacturers."

#### REPORTS OF CARNEGIE FOUNDATIONS.

A COPY of the year-book for 1915 of the Carnegie Institution of Washington has reached us. As usual, the bulky volume, which this year runs to 429 pages, contains not only detailed particulars of the large amount of scientific research carried out under the auspices of the institution, but full information of the income and expenditure of the corporation. The total financial receipts for the year 1915 amounted to 243,000*l.*, bringing up the grand total received since the inauguration of the institution in 1902 to 2,331,300*l.* The expenditure during 1915 may be summarised as follows:—Investments in bonds, 41,240*l.*; large projects, 154,100*l.*; minor and special projects, research associates and assistants, 21,914*l.*; publications, 9340*l.*; and administration, 9645*l.* The following list shows the departments of investigation to which the larger grants were made and the amounts allotted during the year:—

Department of Botanical Research ...	£ 8,123
Department of Economics and Sociology ...	600
Department of Experimental Evolution ...	9,784
Geophysical Laboratory ...	17,833
Department of Historical Research ...	6,280
Department of Marine Biology ...	3,830
Department of Meridian Astronomy ...	5,276
Nutrition Laboratory ...	9,013
Division of Publications ...	2,000
Solar Observatory ...	44,026
Department of Terrestrial Magnetism ...	28,262
Department of Embryology ...	6,436
Total ...	£141,463

A table showing the growth and extent of the institution's publications shows that, since 1902, two hundred and ninety-nine volumes, embracing a total of more than 79,000 pages of printed matter, have been issued.

The executive committee of the Carnegie Trust for the Universities of Scotland has submitted to the trustees its report on the administration of the trust for the year 1914-15.

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Under the third quinquennial scheme of distribution, which came into operation on October 1, 1913, a sum of 203,250*l.*, or 40,650*l.* per annum, was allocated among the Scottish universities and colleges. Of this sum 21,250*l.* was applicable towards providing books, etc., for libraries; 160,750*l.* towards the cost of new buildings and of permanent equipment; while 21,250*l.* was assigned towards endowments for lectureships and other general purposes.

The operations of the trust under the research scheme were affected considerably by the war, though the expenditure for the year under the scheme reached 6957*l.* During the year six fellows and nine scholars were engaged on military duty, and in these cases the fellowship or scholarship has been kept open in case the recipient should be able subsequently to resume research work. Notwithstanding adverse conditions, the experts have been able to report favourably upon the work accomplished during the year.

For the academic year 1915-16, seventeen fellowships and thirty-three scholarships were awarded, and fifty-three grants were made. Four of these fellowships and nine of the scholarships were awarded to graduates who are at present engaged on military duty, and they, too, are being held over in the hope that the holders may be able to take up their research work again at a later date.

In the laboratory of the Royal College of Physicians the effect of the war has also been felt, and the ordinary activities have to a large extent given place to special work adapted to the circumstances of the time.

During 1914-15 the expenditure of the trust on assistance in payment of class fees has been further diminished by the war, which has depleted the Scottish universities of so many of their students. As compared with a sum of 41,789*l.*, which was paid on behalf of 3901 individual beneficiaries for 1913-14, the expenditure for the year under review was 33,847*l.* on behalf of 3246 individual students. During the year a sum of 704*l.* was voluntarily refunded by or on behalf of eighteen beneficiaries for whom class fees had been paid by the trust. This is the largest sum yet received in this way in any one year.

The report is provided with four appendices dealing respectively with: the grants to universities and colleges, the post-graduate study and research work done by the fellows and scholars, the amount of the assistance rendered to students, and an abstract of the financial account for the year. The list of publications by fellows, scholars, and grantees received by the committee during the year runs to about six pages, and an examination of it shows that very many branches of science have derived benefit from the trust, which is being admirably administered.

#### THE SUPPORT OF THE HIMALAYA.<sup>1</sup>

THE major prominences of the earth's surface are in some way compensated by a defect of density underlying them, with the result that they do not exert the attractive force, either in a vertical or in a horizontal direction, which should result from their mass. A study of the distribution of this compensation shows that there is a general balance between it and the topography, such that the weight of any vertical column through the crust of the earth is, on the average, constant, whatever may be the elevation of the surface. To this condition the term *isostasy* has been applied, which does not merely denote a static condition, but implies a power of adjustment of the compensation to the variation in load produced by surface-denudation and transport.

<sup>1</sup> Abstract of a lecture delivered before the Geological Society of London on February 2 by Mr. R. D. Oldham, F.R.S.