

## UNIVERSITY FINANCE IN BRITAIN

IN issuing *Returns from Universities and University Colleges in receipt of Exchequer Grant, Academic Year 1962-1963\**, the Universities Grants Committee, in contrast to the practice of the previous four years, has omitted a general survey of its activities: a separate publication is promised later in the year.

The number of full-time students at university in Britain increased to 119,004, compared with 113,143 in 1961-62, and of these 17,868 were in the Universities of Oxford and Cambridge, 23,338 were in the University of London, 49,464 in other English universities and colleges, 7,761 in the University of Wales and 20,573 in the Scottish universities. There were 13,375 students from overseas, 7,602 of whom were from within the Commonwealth (6,893 of whom were postgraduate); since 1953-54 the proportion of overseas students has risen from 9.9 per cent to 11.3 per cent. Of the full-time students, 29.1 per cent were in colleges or halls of residence, 51.6 per cent in lodgings and 19.3 per cent at home; these figures compare with 28.1, 40.9 and 31.0 per cent, respectively, in 1953-54. The proportions continue to vary widely in different universities and for men and women: in Scotland only 9.4 per cent of men and 18.5 per cent of women are in colleges or halls of residence, while 45.9 per cent of men and 42.1 per cent of women are at home.

Of the 87,654 full-time men students, 24.2 per cent were in arts and 11.8 per cent in social studies; 27.9 per cent in science; 19.0 per cent in technology and 10.9 per cent in medicine; for the 31,350 women students the corresponding figures are: 52.2; 10.4; 23.4; 1.1; and 9.7. Of the 20,793 postgraduate students, 3,755 were taking postgraduate courses in teacher training; the remainder were distributed as follows: arts, 3,691; social studies, 2,144; science, 6,323; technology, 3,027; medicine, 1,251; and agriculture, 429. Of 33,677 full-time students entered for the first time in 1962-63, 32,147 were reading for a first degree and 1,530 for a first diploma; 9,721 were women; 10,791 were in arts and 4,339 in social studies; 9,224 in science; 4,965 in technology and 2,756 in medicine. Over the past 10 years

\* University Grants Committee. *Returns from Universities and University Colleges in receipt of Exchequer Grant, Academic Year 1962-1963*. Pp. v+46. (Cmd. 2456.) (London: H.M. Stationery Office, 1964.) 5s. 6d. net.

the increases in science and technology have been proportionally almost twice as great as in arts.

The proportion of State-assisted students was 88.4 per cent compared with 87.1 per cent in 1961-62 and 71.9 per cent in 1953-54, ranging from 93.2 per cent for Wales, 92.8 per cent at Cambridge, 90 per cent at Oxford, 92.2 per cent at other English universities and colleges (excluding London) to 82.8 per cent for Scotland. There were 16,424 part-time students (4,890 from overseas) and of those 12,768 were in English and 3,429 in Scottish universities. Of the 23,886 first degrees obtained, 16,435 were honours degrees; of the total 29.2 per cent were in science, 12.5 per cent in applied science, and 8.3 per cent in medicine. Full-time teaching and research staff, excluding Oxford and Cambridge, increased to 13,801 (12,786 in 1961-62) and 27.6 per cent are now in science, 14.3 per cent in technology, 16.2 per cent in medicine and 8.7 per cent in social studies; 11.7 per cent were professors, 6.6 per cent readers, 12.7 per cent senior lecturers and 46.7 per cent lecturers. Including Oxford and Cambridge the full-time academic staff totalled 14,132.

Of the recurrent income of £86,402,542 (£74,112,891 in 1961-62), £60,599,826 was from Treasury grants (70.1 per cent) and £655,150 from grants from Government departments; £8,575,430 (9.9 per cent) from fees; £2,087,756 (2.4 per cent) from endowments; £1,636,623 (1.9 per cent) from local authority grants; £506,820 from donations and subscriptions; £9,522,729 (11.0 per cent); £8,229,163 for 1961-62) from payments for research. For English, Welsh and Scottish institutions the respective totals are: £69,578,663; £4,547,139; and £12,276,940. Non-recurrent Treasury grants amounted to £36,481,214 (£28,638,256 in 1961-62) and of this £22,773,670 was in respect of building work, £3,795,906 professional fees, £8,493,852 furniture and equipment and £1,417,786 site and property purchases. Of the recurrent expenditure of £85,379,145 (£74,119,781 in 1961-62), 6.7 per cent was on administration, 41.9 per cent on salaries and superannuation of teaching staff, 12.0 per cent on departmental wages (technicians and laboratory assistants), 14.5 per cent on departmental and laboratory maintenance, 3.0 per cent on repairs and maintenance of buildings and 11.0 per cent on rates, insurance, heat, light, etc.

## RHEOLOGICAL RESEARCH IN BRITAIN

THE science or engineering graduate who enters industry has some understanding of the processes of deformation and flow in solids and liquids, but this is usually restricted to the cases of ideally elastic solids, ideally plastic solids and Newtonian liquids. His knowledge of the creep and plastic flow in real solids and of the elastic and thixotropic effects displayed by non-Newtonian liquids is rudimentary. An understanding of these complex phenomena is essential, however, to the successful development of many industrial processes and to the manufacture of finished products with optimum mechanical characteristics. The situation would be improved by a greater emphasis on rheological topics in university courses, although it may be argued that the experimental techniques and mathematical theory involved are too specialized for extensive treatment in undergraduate teaching.

It cannot be said, however, that improvements in formal teaching will solve the problem entirely, because many of the problems confronting the industrial rheologist

involve questions which are still matters of active research; and information on these, if published at all, appears scattered over an enormous range of technical, scientific and mathematical journals. In this connexion, the British Society of Rheology has for many years carried out a useful function by bringing together scientists from industry, the research associations and the universities in order to discuss problems of mutual interest in this field. It has, nevertheless, become apparent that in some directions research is being duplicated by different firms and institutions while in other directions it is almost entirely neglected. The Society, therefore, decided in 1963 to extend its activities by making information on active work more readily available, by ascertaining those directions in which further research is urgently required and by encouraging projects designed to fill the gaps in existing knowledge. It was a fortunate coincidence that at the same time the National Engineering Laboratory was considering the publication of a survey of rheological research in Britain, and the Society was able to co-operate in this work. The

survey has now been published as *Rheological Research in Britain, 1964*\*. It presents the information obtained by sending out nearly 600 copies of a questionnaire, and the replies give a clear picture of the very large amount of research in progress. Although only a few lines are devoted to each project, the survey runs to more than a hundred pages, being, in fact, the longest report so far published by the National Engineering Laboratory.

In this survey, a total of 226 establishments are listed, divided fairly evenly between universities, Government-owned and Government-aided institutions, and industrial laboratories. There is an index of these establishments and another of the individual research workers. A third index, devoted to materials under investigation, shows the extremely wide range of present-day rheology. It runs through from adhesives to zirconium, via bananas and barytes, coke and cream, earth and eggshells, glaciers and graphite, mud and muscle, plutonium and pesticides, semen and sewage, wheat and wood, and a hundred other substances. The tabulated information has been analysed, and a series of histograms shows the distribution of interest between materials, between phenomena, between methods of approach and between processes. The first of these shows, for example, the predominant interest of industry

\* Department of Scientific and Industrial Research: National Engineering Laboratory. Report No. 165: *Rheological Research in Britain, 1964*. (A Survey made jointly by the British Society of Rheology and the National Engineering Laboratory.) By A. Y. McLean and A. T. J. Hayward. Pp. 1+103. (East Kilbride, Glasgow: National Engineering Laboratory, 1964.)

in polymers and multi-phase materials, while university interest is more generally distributed with some concentration on idealized materials. On the other hand, the interest in phenomena displayed by the universities runs nearly parallel with the industrial interest, although the latter is rather more concentrated on the non-Newtonian viscosity of liquids and the former on the plasticity of solids. Of the methods of approach, that of continuous shear viscometry and rheometry is the most generally used, but this is closely followed by theoretical methods and then by tensile and compressive testing. The extent of the industrial interest in the theoretical approach is quite remarkable, being equal to that shown by the universities. Another surprising feature is the smallness of the interest shown by industry in individual processes (such as extrusion, mixing, flow through pipes and channels) in comparison with the interest in fundamental phenomena.

The present survey is necessarily incomplete, and it would seem that the coverage is weakest in biology and in the study of metals. It is hoped that it will become a regular publication, and the compilers ask that anyone whose work has been overlooked should inform them so that it may be included in the next edition. In this way the survey should become a really comprehensive guide to those who may wish to seek specialized advice and to those who are concerned with the initiation of new research projects with industrial applications.

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## FAMILIAL TRENDS OF CANCER

SINCE January 1960, the New South Wales State Cancer Council has been conducting a survey of women treated for cancer of the breast in order to determine whether there is a higher incidence of cancer among the relatives of this group than among the relatives of a control group of the same size presumed not to be suffering from cancer. The survey is a sequel to many investigations of hereditary and familial trends of cancer which have been made in Europe, Britain and the United States during the twentieth century.

In the course of the survey carried out by Pamela Siddins\*, each of 99 female patients with breast cancer and each of the 99 other women who formed the control group supplied a history of her family. The incidence of cancer among the siblings, parents, aunts, uncles, cousins and grandparents of the women in each group was determined from hospital records and from the cause of death entered on death certificates. A questionnaire was devised, which sought information concerning the age, marital status, geographical situation, socio-economic position, lactation, order of birth, and menstrual and fertility history of patients and control probands.

Incidence of cancer in family histories was taken as that existing at the time of interview. The ages of the patients included in the survey ranged from 33 years 6 months to 74 years 8 months; these consisted of 84 married women with children, 10 married women without children, and five unmarried women. Of the total number of women interviewed, only about 33 per cent were included in the survey. There were many reasons for unsuitability of probands, the chief reason being the fact that few families had lived in Australia for the required three generations. Many who thought that all their grandparents had died in Australia were later excluded from the survey when official records proved otherwise. It was soon realized that the original plan, which had been to locate all relatives back to great-grandparents, would be impracticable.

At first, the findings suggested that breast and other types of cancer occurred more often in the families of the

patients with breast cancer than in those of the control probands. For analysis, the types of breast cancer encountered in the survey were divided into the following basic classes: scirrhus, encephaloid or medullary, mucous or colloid, adeno- and duct carcinoma, sarcoma, and Paget's disease of the breast. For 12 patients no histological reports were available, because of loss of records or because no biopsy (or other diagnostic surgical measure) had been performed. Adenocarcinoma and scirrhus carcinoma were the types most frequently encountered. The breast cancer probands included three twins, two belonging to a dizygotic pair and one to a monozygotic pair, but in none of the twins of these patients was there evidence of cancer. No case of cancer of the breast in males was encountered among the relatives of the probands. It occurred, however, in sisters of breast cancer probands in five families and in mothers of three probands.

Cancer occurred less frequently in similar relatives of the control probands. Controls interviewed at medical clinics were not aware that the survey was concerned with the incidence of any one disease. Patients and controls from cancer detection clinics, when asked for the illnesses and operations known in three generations of relatives, tended to emphasize the cancers rather than other diseases. Most frequently the incidence of cancer was incorrectly given by the proband—the number of cancers being exaggerated in those families where several cases were known, and underestimated in families whose attention had never been directed to it for any reason.

The information collected was analysed statistically by S. Chorlton, who found that the number of relations per cancer proband ranged from 18 to 190, with a mean of 70.5. Of these, the mean number for whom some reliable medical history was known was 50.8, or 72.1 per cent. For the controls, the average number of relations was 62.4 (range 14-127), of whom medical history was known for 48, or 77 per cent. The number of relatives with some documented medical history amounted to 5,042 (cancer group) and 4,753 (control group). Some form of cancer occurred in 87 out of the 99 families of patients with the disease—

\* New South Wales State Cancer Council Publication No. 9.