ated with the ease of rotation of segments of the molecule about bonds in the chain. This is partly controlled by steric effects, and partly by more deep-seated effects associated with bonding electrons. Exactly how these determine molecular flexibility is still uncertain, but it is now recognized which groupings confer flexibility and which rigidity. An interesting feature is that certain unsaturated hydrocarbon polymers (*cis*-polybutadiene and natural rubber) are more rubbery than a simple saturated hydrocarbon such as polyethylene, despite the fact that rotation about double bonds is highly restricted and might be expected to increase stiffness. This apparent anomaly reflects, however, the extra flexibility of C—C bonds adjacent to double bonds which more than compensates for the rigidity of the latter. The third factor, crystallization, depends on the detailed nature and regularity of polymer structure and also on physical conditions. No high polymer is wholly crystalline, but certain fibres are nearly so; natural rubber, which is amorphous when unextended, owes its strength to the considerable degree of crystallization which develops on stretching to breaking point. Crystallization is a particular and powerful form of intermolecular interaction and therefore parallels the first factor considered in producing stiffness and hardness and especially strength. It is important to remember that all these factors are dependent upon temperature—as must be borne in mind in any classification of a substance as a rubber, plastic, or fibre. Working conditions 100 deg. C. hotter or cooler than conventional temperatures call for major changes in the usual designations.

Dr. Bunn then proceeded to illustrate how knowledge of this kind can be applied and how variations in the above factors can be traced systematically. Some effects of modifying linear chains with 'branches', of cross-linking, and of co-polymerizing different monomers in different proportions were described. Attention was directed to the 'non-additivity' of the properties of co-polymers with respect to the individual components owing to the complex interplay of the structural factors. This is apparent even in the simplest hydrocarbon systems, where a co-polymer of ethylene and propylene, being non-crystalline, is a soft, rubbery material very different from crystalline polyethylene and polypropylene, which are quite hard and rigid plastics.

L. BATEMAN

PSYCHOLOGICAL AND OCCUPATIONAL ASPECTS OF AGEING

THE aim of the symposium on ageing arranged at the Dublin meeting of the British Association by Section J (Psychology) on September 5 was to present a sample of the work being done in Great Britain by psychologists and sociologists. Prof. L. S. Hearnshaw (professor of psychology in the University of Liverpool and honorary director of the Medical Research Council group for research on occupational aspects of ageing) was in the chair, and in his introductory remarks gave a brief historical sketch of the development of research into the psychology of ageing in Great Britain, and an outline of the work in progress at the Medical Research Council group at

Liverpool. Prof. Hearnshaw referred to the presidential address, delivered to Section J by Dr. Wynn Jones at the Norwich meeting of the British Association in 1935, on "Personality and Age", which was the first contribution to the subject by a psychologist in Britain; to the work of the Nuffield Foundation; and in particular to that of the Cambridge unit directed by Mr. A. T. Welford during 1946–56. The rising interest in ageing was a natural outcome of the changing age-structure of the population. Not only is the number of persons over sixty-five increasing, but the proportion of the working force between fifty and sixty years of age is also rising. Research must be directed, therefore, not only to the study of old age, but also to the process of ageing from middle life onwards.

Prof. Hearnshaw concluded with a brief progress report on the main lines of work of the Medical Research Council group in Liverpool, which is concerning itself with three matters in the first instance. First, it is attempting to get reliable information, which at present, surprisingly, does not seem to exist, on changes in the main sensory modalities with age. Work is at present in progress on hearing. It is hoped to establish norms of deterioration with age, and to throw light on the effects of such deterioration for general psychological and occupational adjustment. Secondly, the group is concerning itself with those problems included under the general heading of 'rigidity'. There is a certain amount of miscellaneous evidence, partly anecdotal, on the increasing rigidity and lack of flexibility in the ageing person; but the psychological processes remain obscure, and their elucidation seems to be of both theoretical and practical importance. Thirdly, the group is concerned with industrial studies of ageing with especial reference to the attitudes of the ageing person himself and of others towards him.

D. B. Bromley (Liverpool) followed, with an account of his investigations on the effects of age on intellectual processes. Lehmann in the United States has demonstrated that the peak years for creative intellectual output are in the age-range 30–35, that thereafter output decreases faster for quality than for quantity, and that very high-grade intellectual achievement falls most rapidly of all. In Bromley's experiments various tests of intellectual performance were administered to 256 subjects, ranging in age from the twenties to the eighties and forming three matched age-groups with mean ages of approximately 27, 47 and 67 years, respectively. The results were broadly in agreement with Lehmann's conclusions. High-grade intellectual output appears to decline with age, unlike low-grade output (namely, illogical, bizarre or other types of erroneous response), which shows a relative increase. Not only do older people tend to have fewer good ideas, but they also show a diminution of critical capacity and are less able to judge the value of the ideas they do have. Though capable of reproducing acquired knowledge and skills fairly satisfactorily, the older person is inferior in tasks involving new learning, speed of response, and complex material. There is also a decline in 'incidental memory' or 'latent learning', that is, memory for details incidental to and not required by the main task in hand. Bromley suggested that this finding, if valid, might be of some significance, since a great many advances in scientific research had been made as a result of incidental observations. One of the

reasons why older people make fewer outstanding and original contributions to intellectual achievement may be that their capacity for benefiting from incidental experiences is reduced.

Bromley ended his paper with a word of caution. He pointed out that the conclusions reached by psychologists investigating adult intelligence are at best only poor approximations; the tests used are not wholly reliable nor altogether suitable for the purposes to which they have been put; and theories and explanations at present scarcely more than guess-work. Nor are the practical consequences of the findings at all easy to appraise.

The second speaker, S. Griew (Bristol), reported on some recent findings on age and industrial performance obtained by the Unit for Research on Employment of Older Workers, a team which is financed by the Nuffield Foundation. Analysis of the age structure of the workers in a number of light engineering firms showed a remarkable degree of agreement between the rankings of jobs by age, both between different firms and between two different periods (1947 and 1955) in the same firm. There seemed to be a tendency for jobs manned by workers of a certain age in one firm to be manned by workers of a similar age in other firms. Some of the findings of the investigation ran counter to generally accepted views. Thus it is commonly believed that older workers tend to be engaged in non-productive processes, such as work in the tool-room and maintenance. In fact, however, men in these jobs proved to be no older and in some cases significantly younger than those on production work.

The main purpose of the investigations now in hand at Bristol is to determine what is responsible for the differences in average age on various jobs. The unit is following up about 450 men who have required changes of job, trying to discover the reasons for their wishing to change. Secondly, it is comparing the views of younger (20-30 years) and

older (45-55 years) men on their work, their equipment and their firms. Thirdly, samples of work being undertaken by older and younger groups are being subjected to detailed analysis.

Griew referred to a number of points that have already emerged from these investigations. The amount of bodily activity in which younger workers engage is significantly higher than that in which older workers engage, and this applied irrespective of the 'load' of the job. The amount of attention paid visually by older workers to their work seemed to be substantially lower than that paid by younger workers. Another finding, rather hard at present to interpret, is that in the case of older machinists the ratio of the numbers of controls used to the total number present on the machine is invariably higher. He concluded by urging the importance of a sound theoretical foundation for research into the occupational aspects of ageing.

The third speaker in the symposium, C. Fleming (Sheffield), was unfortunately prevented by illness from reading his paper in Dublin. He was to have surveyed community attitudes to population ageing in Great Britain, and the gaps in the present plans for research. In Great Britain attention is still on 'old age' rather than on 'ageing'. Hospitals have developed geriatric services and there has been an increased provision of voluntary and statutory social services for the aged, but preventive geriatrics and constructive medicine are still in an early stage. Research on ageing is still fragmentary and unco-ordinated, and there has as yet been little contribution from sociology, social medicine, and economics. Education for ageing has been lacking in Great Britain in comparison with the United States. There is need for adequate organization in Great Britain for promoting research and community education on ageing. An institute of gerontology, suitably constituted and financed, would facilitate contributions from all disciplines involved. L. S. HEARNSEAW

BIOGEOGRAPHICAL SIGNIFICANCE OF ANEITYUM ISLAND, NEW HEBRIDES

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ANEITYUM, southernmost of the New Hebrides Archipelago, is a small island, about nine and a half miles wide and seven miles long. It is accounted of no economic importance to the Condominium, but is of exceptional value to taxonomists owing to its position between the ancient land of New Caledonia to the west and other Pacific islands to the east. Thus it constitutes a link for those who study the dispersal of species in that region.

Erromango, Tanna and Aneityum, the three southern islands, presumably formed one land-mass in the past, and that this was connected with New Caledonia is evidenced by their Australasian flora and fauna. This refers particularly to Erromango and Aneityum, because Tanna has been subjected to severe volcanic disturbance, and the plants and insects are comparatively uninteresting. There is an active volcano on Tanna to-day. Aneityum is also

volcanic but possesses a far richer fauna and flora, suggesting the permanence of older land. There is a Papuan element in the southern group attributable to a connexion with the northern group during the folding movements of the Miocene-Pliocene Periods. The northern islands, on the contrary, are basically Papuan with an Australasian element due to that same interchange of species. There exists in that archipelago, therefore, a zoo-geographical line analogous to Wallace's Line, and similarly not sharply defined. Aneityum is the crossroads of two distinct trends of migration.

It is an advantage to taxonomists to recognize this line because Pacific species can be traced back to the country of their origin, via the northern New Hebrides and the Solomon Islands to New Guinea in one direction, and via the southern New Hebrides and New Caledonia to Australia in the other.