proposed to enter a first-degree course in a biological subject*.

It was felt to be essential, in view of the increasing emphasis on the experimental aspects of biology, that such pupils should acquire an understanding of the basic sciences—chemistry, mathematics and physics. They should preferably study biology, but the Panel would not exclude from a university course those whose only background was a sixth-form knowledge of the three other subjects. "Intending biology students should be taught to practise the scientific discipline of observation and deduction, and to despise that pointless accumulation of facts and terms which sometimes passes for scientific education and they should be given training in clear, purposeful and accurate descriptive writing in their own language". The Panel was impelled by two main considerations to pronounce against botany and zoology and the current biology, and in favour of a single, revised course in biology, which should stress the underlying principles of the subject and show the fundamental similarities of living things as well as the fundamental differences between plant and animal.

The present chaotic system of examinations at Ordinary, Advanced and Scholarship levels, with different requirements from each Board, is critically considered, and so useful proposals are made towards a more rational system. The approach of the teacher to the syllabus is largely determined by the type of examination paper which is set. Although the marking of a large number of scripts by many examiners is not easy, and this has led to the use of questions which can be marked quickly and precisely, these questions may not be of the type best suited to selecting the best candidates.

At present, selection for entry to university is made on the basis of Advanced-level performance, supplemented by an interview. The latter occasionally reveals that a student with good marks depends on a particularly good memory and that this kind of entrant usually fails to maintain his performance in the university. It was felt that the introduction of Scholarship-type questions would enable a distinction to be made between the fundamentally sound pupil and the 'memory-man'. In general, there is a remarkable parallelism between the weaknesses, difficulties and suggested remedies in all the subjects. Very useful suggestions are made towards the teaching of fundamental principles, and the eschewing of the unintelligent learning of masses of factual snippets. The report of the Panel is so detailed and yet succinct that further summary is not possible.

This report throws into relief the need for other investigations. Each university can have its own pre-requisites for entry to its courses, and, in this matter, there are differences in standard and scope between science subjects. This makes difficulties for the sixth-former who, in the hope of securing entrance to a university, applies to a number of them. While it is impossible, and if it were possible it would be undesirable, to secure uniformity in this matter, much wastage of effort (even clerical effort), confusion and disappointment result.

It is hoped that other universities will issue similar reports, for the matter is both socially important and urgent. Although it is outside the terms of reference of the present report, there is a more general problem of a parallel nature which is receiving some attention in an inquiry of which the results are awaited. Too many sixth-form students, who seem to promise much, fail to do well at the university. This is a source of disillusion, a wastage of brain-power and money, and a failure to meet social needs, which needs careful investigation and, if possible, a remedy.

There are other matters which should be considered, though these are outside the scope of the present report. For example, there is the failure of the less-than-brilliant sixth-form student to adjust himself quickly enough when he comes to the university with its short terms and social temptations presented by the Students' Union, the failures to use the vacations adequately and the early dates of the examinations in the last undergraduate year. The shortages of good sixth-form teachers, particularly of science and mathematics, and even of good examiners are other, but nevertheless important, matters.

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* University of Birmingham. Report of an Enquiry into the Suitability of the General Certificate of Education Advanced Level Syllabuses in Science as a Preparation for Direct Entry into First Degree Courses in the Faculty of Science. Pp. v+212. (Birmingham: The University, 1959.)

THE NEEDS OF UNIVERSITY STUDENTS

IN a memorandum submitted to the University Grants Committee, the National Union of Students describes its attitudes to the problems involved in university expansion. Because of their direct experience, the views of the National Union of Students are likely to be of greatest significance where it discusses the needs of students. It has recently suggested, for example, that if adequate and suitable accommodation, which may be of many different kinds, cannot be provided near at hand for the whole student population, then neither the expansion of an existing university nor the establishment of a new one should be allowed (Memorandum to the University Grants Committee on the Expansion of University Education, 1960–1970. Pp. 12. London: National Union of Students of England, Wales, and Northern Ireland, 1960). Insufficient attention has been paid to this problem in the past, with consequent harmful effects on the undergraduate, as a person and as a student, and upon the community of which he is a member.

While there is a variety of different types of accommodation which fulfil the needs of students, great benefit is derived from time spent in residence. Ideally, halls of residence should be composed of comparatively small units of ten to fifteen rooms, each providing a small kitchen and a discussion room. The units are often well arranged on staircases with small groups of rooms on each floor. There might be three such units on each of three or four sides of a small court, so that each block provided accommodation for some 150 students. There is, however, a considerable range of ways in which good residential accommodation can be provided; the student flats at King's College, Newcastle, and the Studentenhaus at West Berlin University are examples of such

variations. There is considerable scope for experiment in this field.

When planning residential accommodation, the architect should consult fully with the university authorities and with student representatives to ensure that the most economic as well as the most effective lay-out is obtained, encouraging the corporate spirit of the university as well as facilities for private study and relaxation of the individual student.

Since the provision of enough residential places is economically unattainable in the near future, the Union emphasizes that not all forms of lodging are necessarily suitable for students, who need a quiet room for study, flexible hours and a sympathetic atmosphere. Lodgings that may suit some purposes can be quite unfitted for study. In a small town such as Aberystwyth, where the university dominates the life of the community, students often find that landladies come to understand their needs and take a real interest in providing the right environment for study. If the university atmosphere and community is to develop, all accommodation should be in close proximity to the university centre.

Another important factor is the academic and administrative structure of the university. Apart from the fact that this can determine the success or failure of its development as a community, it will have repercussions on the breaking down of faculty or departmental inter-relationships, which is already taking place through increased specialization ; it will also affect the balance of Faculties and of undergraduate/postgraduate ratios. The structure most conducive to a fully integrated university education is the collegiate structure as will be developed at Bristol. In the expansion of existing universities it may well be desirable to avoid the piecemeal addition of extra sections to the present structure, but rather to change to the collegiate pattern.

All the major buildings of the university—halls, union building, laboratories, libraries, lecture theatres and refectories should be grouped together on one site. It would be valuable if a few small buildings in the various towns selected as new university sites could be leased to the university for use as, say, libraries for the smaller Faculties, and as staff houses where some tutorials could be given ; arrangements might also be made for the designation of a university church within the town. Such facilities should not be allowed to detract from the creation of a single university unit.

There should be some degree of specialization in each university in selected areas of study. Such specialization could build up a reputation, encourage research, simplify application problems, attract interested staff, and might also prevent duplication of capital costs on research equipment. Development should be considered in relation to the paramount need to operate a proper tutorial system.

The major need of students is adequate provision for the development of an active student community. There should be a Students' Union building, providing a meeting place and a centre of student life, which should, where possible, be a separate building.

Where new laboratories are being erected, these should be designed in conformity with good safety regulations. It is also hoped that the need for an adequate and well-equipped clinic is generally recognized. These are already provided in many universities, and will be essential in new universities where the treatment of physical or mental illness should not be left to the care of local doctors who might not be readily accessible.

SENSORY SPECIALIZATION IN RESPONSE TO ENVIRONMENTAL DEMANDS

THE third of a series of Zoological Society of London symposia was held on March 4 under the title "Sensory Specialization in Response to Environmental Demands". It was organized by Prof. O. Lowenstein, and the meeting was held under the chairmanship of Prof. R. J. Pumphrey.

In his introductory remarks, Prof. Lowenstein directed attention to the somewhat Lamarckian ring of the title ; but he envisaged that none of the topics under discussion would make it necessary or desirable to infringe neo-Darwinian orthodoxy. Outlining the rationale of the programme, he went on to point out that two different types of adaptive specialization could usefully be surveyed in this context. The first may affect the whole range of sensory modalities as a means of adapting an animal to a successful integration into a sub-social or social organization. This type is found, for example, in locusts and to a more extreme degree in the social Hymenoptera. The second type of sensory specialization may be confined to one sense organ only, the eye in nocturnal, deep sea, or cave animals, or the ear in animals like bats and cetaceans which find their way about by means of sonar.

A comparative analysis of sensitivity limits may also reveal instances of adaptation to special environmental circumstances. The sensitivity limits of photo-receptors may serve to illustrate this point.

In a paper on the sensory equipment of the migratory locust, Dr. P. T. Haskell (Anti-Locust Research Centre, London) showed that special sensory adaptations are related to the control of steady and stable flight of the swarming insect and to the maintenance of cohesion between locusts in the swarm. 'Dorsal-light' reaction of the compound eye and proprioceptive feed-back from receptors on the cervical hair plates control anti-roll stabilization, whereas anti-yawing responses are elicited by cephalic hair sensilla. Preferred inter-locust distance in the swarm is maintained by an equilibrium between visual attraction and repulsion in response to auditory and other mechanical stimuli.

Fully social organization as shown by the social Hymenoptera involves a number of instances of extreme sensory specialization in the various castes of ants and bees. Dr. H. Kalmus (Galton Laboratory, University College, London) described some new results concerning colour vision and odour discrimination in the honey bee. Whereas scent is an important item of information in bee-to-bee communication, symbols for colour are very likely missing from the 'vocabulary' of the social insects. A discussion of the mechanism of analysis of the plane of polarized light was illustrated by an electron-micrograph of an insect ommatidium. Dr. Kalmus suggested that the chief sensory adapta-