insect relationship to food plants is dictated by token or nutrient stimuli, whether oligophagy is based on attraction or repulsion and whether taste or smell is more important. Behavioural, and particularly physiological, experiments seem to indicate that all these factors are involved. The inflow of data to the central nervous system relating to stimulation by food plant substances is complex, and hence neither the mechanism of discrimination nor the basis of preference can be a simple one. Prof. Dethier pointed out that the regulation of the initiation, termination and frequency of feeding had received less attention than the problem of selection. In some insects, for example the fly, the process is driven by sensory input and is terminated by sensory adaptation, while the frequency of feeding is controlled by an as yet unknown mechanism; on the other hand, in other insects such as the locust, endogenous central activity appears to influence the initiation of feeding.

Dr. A. Manning (Edinburgh) described sexual behaviour and defined it as "specialized behaviour patterns which form the normal preliminaries to mating". He pointed out that elaborate sexual behaviour occurs in some insects but not in others and raised the problem of 'female coyness'. He considered three possible functions of courtship: appeasement and synchronization, physiological maturation, and sexual isolation, and concluded that various combinations of the foregoing functions must have been involved in the evolution of 'female coyness'. He felt that a direct origin of the movements used in courtship from modified pre-copulation movements was often plausible, and pointed out that the ritualism of insect sexual behaviour had followed a course very similar to that found in vertebrates. As to the organization of sexual behaviour, he emphasized that the data were so meagre that little generalization could be made, but that sexual behaviour seems to depend more on the sex of the brain than on that of the lower centres.

Dr. J. D. Carthy (London) spoke on insect communication, which could be said to occur whenever a sensory signal caused a change in the behaviour of an animal. He pointed out that in most cases the receiver is informed of the physiological state, the sex, the species and often the position of the sender, that the language is often private to the species and that dialects may occur which are specific to a group of individuals in a neighbourhood. He examined the range and type of visual, acoustic, tactile and chemical communication and brought forward examples showing how these may be combined to increase the total sum of information passed.

Prof. E. O. Wilson (Harvard), in dealing with the behaviour of social insects, deliberately minimized the functional aspects of this behaviour in order to pay close attention to theoretical considerations of its evolution. In examining its origin, he supported the view of Hamilton that true sociality, mostly limited to the Hymenoptera, had arisen because of the haplo-diploidy prevalent in that order, which, since it resulted in greater genetic similarity between siblings than between parents and offspring, favoured the development of altruistic

behaviour. Sociality in the termites, he felt, was associated with obligatory protozoan symbiosis, thus taking the view that true sociality was made possible through pre-adaptations which themselves had nothing to do with sociality. Prof. Wilson went on to examine fitness in insect societies and indicated, for example, that worker inefficiency, including mass behaviour that is the opposite of social facilitation, is widespread in the social insects and yet makes a positive contribution to colony fitness. On balance, however, he concluded that the question of altruism above the individual level remains open.

The final paper was given by Dr. J. S. Kennedy (Cambridge) and the arrangements for this were of an experimental nature in that Dr. Kennedy was asked to talk on "Some Outstanding Questions in Insect Behaviour", drawing largely on points raised by the preceding speakers and thus promoting wide-ranging general discussion to end the symposium. Dr. Kennedy treated four main topics: the origin of social behaviour, communication and 'female coyness', orientation behaviour, and the control of responsiveness. As regards the origins of social behaviour Dr. Kennedy disagreed with Prof. Wilson and suggested that the long-standing theory of parental care as the basis of social behaviour was still adequate. The ensuing lively discussion touched on the value of parental care, the influence of food-sharing, the significance of symbiosis and the evolution of altruistic and selfish behaviour. On balance, while it was conceded that the phenomena of haplo-diploidy and symbiosis may have played some part, parental care won the day as being likely to afford a sufficient basis for the evolution of sociality.

As regards 'female coyness', Dr. Kennedy asked if this was widespread and enquired whether 'male coyness' was also involved, and whether in any case the term was not a misinterpretation of the delaying function of the behaviour which may be necessary so that both males and females can complete internal processes essential to mating. The discussion emphasized the paucity of data on the subject, although the interesting suggestion was made that there was selective value to the behaviour if it was considered as an extension to normal pre-copulatory communication which establishes specific recognition.

On orientation, Dr. Kennedy asked whether the system of Jander did in fact correspond to the 'natural structure' of the behaviour; the discussion did not elucidate this point and served to emphasize the continuing lack of any adequate structure for the classification of insect behaviour.

The final problem discussed by Dr. Kennedy was the control of responsiveness in insects in various behavioural situations, and raised the important issue of the separation of endogenous activity, or 'drive', from reflex activity—the stimulus-response system. The general tenor of the discussion was that the past approach to this problem, based on an 'either-or' choice of these two concepts, had been misleading; the actual system probably involved characteristics of both.

All the papers and the ensuing discussions are to be published shortly in a fully bound volume by the Royal Entomological Society.

P. T. HASKELL

FOREST NURSERIES

FOREST nurseries became important in British forest practice with the introduction of exotic conifers in the latter part of the eighteenth century for large-scale reforestation work on private estates. But they assumed even greater importance after the creation of the Forestry Commission in 1919 with its declared policy of afforestation. At the present time the plant requirements of the State forest service and of private estates and commercial enterprises are enormous and nursery practice has become a scientific matter. This has developed greatly in the past

twenty years. Before that, nurseries were mainly the agricultural type where fertility was maintained by farm-yard manure in some cases but mainly by ploughing-in green crops and the use of fallows and rotational practice. However, it was found that the best conditions were not being obtained for growing coniferous seedlings. These were required in greater quantities than ever and in less time than the usual 3-4 years to produce a plant suitable for afforestation purposes. Some experimental work had been done by the Forestry Commission, but in 1944 it

was decided to set up a "Sub-Committee on Nutritional Problems in Tree Nurseries" the terms of reference of which were "to assess the problems underlying the nutrition of forest trees in nurseries and to suggest any desirable extensions already in progress".

The account of the work carried out between 1945 and 1962 by a joint research effort between staff of the Rothamsted Experimental Station and the Research Branch of the Forestry Commission is embodied in *Forestry Commission Bulletin* No. 37*.

Volume 1 comprises the text and the main tables and Volume 2 contains detailed supporting tables, but this second volume is not needed for reading the first. The initial volume contains three main parts. First, there is a historical account of nursery practice in Britain since the 1920's. The objects and scope of the investigation are defined and notes are provided on sites and experimental methods. The second part, and by far the largest,

is concerned with seed-bed experiments and these are well described and supported by adequate tables. The third part deals with experimental work on transplants and this required extension experiments.

Histories of individual nursery sites and notes on silvicultural techniques are included in the appendix and there are useful supplementary papers on microfauna and microflora. There are eight pages of coloured plates and they can only be described as superb. They bring out in a most certain way what each plate is meant to show. Indeed, the whole publication maintains that high standard associated with Forestry Commission bulletins.

Volume 2 will have a limited demand, but Volume 1 is a valuable contribution to the understanding of forest nursery problems and to the improvement of techniques in raising young trees for afforestation and re-forestation purposes. As planting is likely to be the means most used for many years to come in regenerating Britain's forests, it is obvious that good forest nursery practice is of the greatest importance.

C. J. TAYLOR

* Forestry Commission. Bulletin No. 37. *Experiments on Nutrition Problems in Forest Nurseries*. By Blanche Benizian. Vol. 1. Pp. xi + 251 + 25 plates. 50s. net. Vol. 2. Pp. v + 265. 20s. net. (London: H.M.S.O., 1965.)

PERUGIA UNIVERSITY MEDICAL SCHOOL

NEW LECTURE HALL OF PATHOLOGY

By Prof. LUCIO SEVERI

Director, Institute of Morbid Anatomy

ON June 27, 1965, Lord Florey, president of the Royal Society of London and Provost of Queen's College, Oxford, opened the new Lecture Hall of Pathology in Perugia, Monteluca. At the same time he delivered the first Cesare Massari lecture entitled "The Anatomy and Physiology of Small Blood Vessels".

The ceremony was attended by the Magnifico Rettore of Perugia University, members of the Perugia University Medical School, participants in the third Perugia quadrennial international conference on cancer ("Lung Tumours in Animals"), and other distinguished guests from many Italian universities.

Science in Perugia

It Italy, as elsewhere, there is an ever-growing and deeply felt concern about the training of scientists and technologists. In Perugia, scientists and technologists are graduating in large numbers, certainly in greater numbers than at any other time. These numbers, however, are not satisfactory, since scientists and technologists comprise only about one-third of the student population—the lowest point of a progressive percentage decrease over the past 26 years. The numbers of students in pharmacy, agriculture and veterinary medicine are not increasing, although these faculties are traditional in the University of Perugia; however, the Faculty of Science, founded during the academic year 1951–52, is steadily developing. It is difficult to give figures, as classification is, to some extent, subjective, especially in a university where everyone has his own ideas on how disciplines should be grouped together. Nevertheless, Table 1 gives some figures.

Of the figures given in Table 1, scientists represent the proportions shown in Table 2.

Medicine in Perugia

The Perugia University Medical School is fortunate: although it is situated within the city boundaries, it lies on Monteluca hill (1,500 ft. above sea-level) facing east; it dominates the valley of the Tiber and looks on to Assisi and the Appenines (snow-capped for the greater part of the year). The development of medical studies has followed a normal pattern, as can be seen from Table 3.

The Medical School has steadily expanded its facilities since the end of the Second World War. New buildings have been provided for those departments dealing with general pathology and morbid anatomy, orthopaedics, paediatrics (with a Poliomyelitis Department), surgery and dentistry. A large six-storeyed block has been built for the Institutes of Biology, Physiology, Anatomy, Pharmacology, Forensic Medicine and Hygiene. Small lecture rooms have been set aside for seminars and tutorials in each Institute and there is a large common lecture hall sufficient for 300 students. Probably the most interesting development in the field of research in the Perugia Medical School has been the growth of the Division of Cancer

Table 1. TOTAL STUDENTS (ALL SUBJECTS)*

	Undergraduate	Postgraduate	Total
1938–39	615	—	615
1949–50	2,558	—	2,558
1954–55	2,606	86	2,692
1959–60	3,906	289	4,195
1964–65	6,130	248	6,378

* The student enrolment figures quoted in the text were taken from the University of Perugia Year Books for the academic years 1938–39, 1949–50, 1954–55, 1959–60 and 1964–65.

Table 2

	I	II	III	Total scientists	Total students	Total scientists expressed as a percentage of total students
1938–39	—	263	201	464	615	75.4
1949–50	—	1,242	464	1,706	2,558	66.7
1954–55	142	1,019	346	1,507	2,692	56.0
1959–60	273	1,090	337	1,700	4,195	40.5
1964–65	496	1,356	315	2,167	6,378	34.0

Group I. Students in mathematical, physical and biological sciences, with degrees in physical sciences, natural sciences and chemistry.

Group II. Students in medical sciences (including medicine, pharmacy and veterinary medicine).

Group III. Students in agriculture.

Table 3. STUDENTS IN MEDICINE

	Undergraduate	Postgraduate	Total
1938–39	177	—	177
1949–50	579	—	579
1954–55	617	86	703
1959–60	607	289	896
1964–65	842	248	1,090