the universities adopt and develop their own Indian languages, India will not succeed either in the dissemination of knowledge among the Indian people or in the stimulation of research and the creation of new ideas. There was no desire to minimize the importance of the English language and for keeping abreast of science and technology; where knowledge of a foreign language was essential, English was particularly convenient in India. Dr. Shrimali also stressed the importance of the university's function to seek truth and to advance the frontiers of knowledge. This function of research gave substance to teaching and brought the student into contact with the process of discovery, and he welcomed the recent decision of the Indian University Grants Commission to meet the major part of expenditure on the establishment of schools of advanced studies at universities. He also thought it might be necessary to re-group or federate some existing departments in order to strengthen research.

Dr. D. S. Kothari, chairman of the Indian University Grants Commission, who also referred to the medium of instruction, insisted that it was important that the introduction of regional languages should not exclude the use of English in university life and work. More and more instruction would be through the medium of English as the undergraduate proceeded, but it was also important to produce books and literature, particularly scientific

and technical, in the regional languages. Dr. Kothari suggested that the central problem in higher education in India was to raise standards and reduce wastage, and for this energetic steps to improve the quality and strength of the teaching staff, to make good books available at reasonable prices, and to provide reading seats in libraries and hostels were essential. As regards expansion, an increase was needed not so much in pure science as in medicine, engineering and especially in agriculture and veterinary science. Other matters which received attention at the Conference and were discussed briefly in this address included the shortage of teachers, staff appointments, assistance to outstanding teachers, standards of education, the establishment of new universities and centres of advanced study and collaboration between universities and other institutions.

Sri Jawaharlal Nehru also welcomed the use of regional languages as the medium of instruction, but emphasized the desirability of at least one other foreign language besides English if the student was to be in touch with modern thought. He insisted especially on the need to maintain quality, which should never be sacrificed to quantity, and finally referred to the importance of the scientist having some understanding of the humanities and of the non-scientist having some understanding of science.

FREEDOM FROM HUNGER CAMPAIGN: COMBATING DEFICIENCIES OF PROTEIN

MORE than a half the world's population lives in the Far East on a quarter of the total food produced. This is made up of only one-fifth of the world's animal and fish protein and less than one-half of land crops. In contrast to this, 29 per cent of the world's population living in Europe, Oceania and North America has available to it 57 per cent of total supplies, 69 per cent of animal and fish protein and 38 per cent of land crops. The situation in other less-developed regions is also unsatisfactory. These are among the broad conclusions reached in the *Third World Food Survey** recently published by the Food and Agriculture Organization, Rome.

So far as the position in Africa, the Near East and Latin America is concerned, the survey points out that these regions share of the total available food is approximately in proportion to their share of the world's population. It stresses, however, that diets there are low in all-important animal protein and the population is growing at a faster rate than food supplies.

The Food and Agriculture Organization's short-term targets for the developing regions provide for an increase of 5-6 g of animal protein to a total of 15 g per person per day, amounting to 22 per cent of total proteins. The long-term target is 21 g, which is equivalent to 28 per cent of the total.

In the preface to the survey, Mr. B. R. Sen, director-general states "If we are to achieve a reasonable improvement in the level of nutrition, then world food supplies will have to be increased by more than 50 per cent. . . .

By the year 2000 it is expected that the world population will be at least double the present figure, while the population in the less-developed countries will have increased by 150 per cent. . . .

"These figures give some indication of the magnitude of the task confronting us, and indicate how timely and urgent is the Freedom from Hunger Campaign".

The annual report for 1961-62 of the Central Food Technological Research Institute of Mysore, India†, refers to a vigorous programme being pursued in the production and development of protein-rich foods. The Institute's work in this field, based on high-protein low-fat oil-seed meals which are plentiful in India, has been recognized by the joint Protein Advisory Group of the World Health Organization, the Food and Agriculture Organization and the United Nations International Children's Emergency Fund. This has led to the offer by the U.S. National Institutes of Health of the PL 480 funds for the intensification of work on vegetable protein supplements. The report summarizes the research carried out at the Institute in a large number of fields, including biochemistry and nutrition, engineering, processing and storage, infestation control, microbiology, sanitation and packaging.

* Food and Agriculture Organization of the United Nations. Freedom from Hunger Campaign—Basic Study No. 11: *Third World Food Survey*. Pp. vi+102. (Rome: World Health Organization; London: H.M.S.O., 1963). 7s. 6d.; 1 dollar.

† Central Food Technological Research Institute, Mysore. Annual Report 1961-62. Pp. ix+153. (Mysore: Central Food Technological Research Institute, 1963).

APICULTURAL RESEARCH

AS research into bees and beekeeping has expanded and become progressively more scientific it has grown increasingly obvious that a new journal in English was needed for research work which was too technical for the popular beekeeping Press. The Bee Research Association has for some years past published *Bee World*, which contained a mixture of scientific and more popular

articles, plus news items and the very valuable *Apicultural Abstracts*; but the Association has, however, recognized that a separate journal could usefully be devoted to scientific work alone. As a result it has now commenced the publication of the *Journal of Apicultural Research**.

* *Journal of Apicultural Research*, Vol. 1. (Southall, Middx.: Hon. Treasurer, Bee Research Association, 60 North Road, 1963.) 40s. per annum.

The new journal is edited by Dr. Eva Crane, director of the Bee Research Association, with Dr. James Simpson of the Bee Department at Rothamsted Experimental Station acting as associate editor. They are assisted by an international Editorial Advisory Board of nine members well known in different fields of bee research. The stated policy of the journal is to cover all aspects of subjects relating to bees (*Apis* and other bees), and also research on methods and equipment for the management of bees and their products. This is carried out satisfactorily in the first issue.

The general presentation of the journal is acceptable, since it has clear print and tables, and diagrams of a suitable size. All the papers in the first issue are concisely written, which perhaps emphasizes the impression that the proportion of short contributions is rather high. However, this might have been largely remedied if two of them (by W. P. Nye and M. W. Pedersen; and B. Furgala) had been placed in a separate section for preliminary reports, since the first gives rather inconclusive results of two experiments on the relationship between nectar sugar concentration and alfalfa pollination, while the second promises more data and a fuller discussion of the subject—the residual activity of fumagillin in relation to *Nosema* infections—in another paper. It is also a little difficult to see why two short papers by M. V. Smith have not been combined, although the editors may be following a policy of separating descriptions of apparatus from experimental work where possible. In this case, one paper is a report of experiments culminating in the successful transportation of honey-bee brood from Britain to the United States by air, with the object of importing new stock into the United States, and the other describes the portable incubator used for this purpose. Another minor point is that one wishes that some diagrams had been included in the very detailed and clear description of the pre-pupal and pupal ecdyses of the honey-bee by S. Cameron Jay, but no other matters concerning the actual presentation of this journal call for any comment.

As stated earlier, the scope of the first issue is wide, and the remaining papers cover the genetics, behaviour and biology of bees, and the antibactericidal properties of honey. The latter paper is a brief one by D. Adcock on the destructive effect of catalase on the “inhibine” and peroxide values of various honeys. J. Woyke has a paper on the hatchability of “lethal” eggs of honey-bees, in which he reports fairly normal hatching rates in these eggs but rapid removal of the young larvae by the workers. There is a very useful description of a controlled environment flight room for the study of behaviour inside and outside the hive, together with records for pollen collecting activities in the room at different light intensities (W. P. Nye). J. B. Free shows that geraniol, although it is the principal volatile constituent of honey-bee scent gland secretion, is not nearly so attractive as scent-gland odour itself, and therefore concludes that the attractiveness of the latter depends partly on other constituents.

In a paper describing the events following construction of the queen cell in honey-bee colonies N. E. Gary and R. A. Morse give results demonstrating the extreme variability which exists in the rearing and replacement of queens; it is apparent that swarming or superseding does not necessarily follow queen rearing. The longest paper is by Cécile Plateaux-Quénu on the biology of *Halictus marginatus*, which she claims to have a type of social organization previously unknown in insects. Workers and queen are morphologically indistinguishable, and both are capable of mating, although for most of the developmental cycle of the colony (5–6 years) they have no contact with the males. Various aspects of social life in this bee are considered, and although more numerical data could have been desired, it is an interesting description.

In conclusion, it can be said that the first issue of the *Journal of Apicultural Research* augurs well for the future, and that, once it has become properly established, it should be a valuable publication.

M. DELIA ALLEN

SPECTROGRAPHIC ANALYSIS AS AN AID TO DIESEL ENGINE MAINTENANCE

THE replacement of the steam engine as the traditional motive power by Diesel locomotives has now become familiar on British Railways, and in fact in many other countries this transition is all but complete. The economic arguments in favour of this change are that the Diesel unit offers to the railways greater efficiency, lower fuel costs and greater availability. Technically these advantages may to some extent be offset by the much greater complexity of the Diesel as compared with the steam locomotive, and problems of maintenance of the complicated machinery involved in the oil-driven engines are constantly arising. The risk of accidental damage to Diesel mechanisms, involving sudden breakdowns with their attendant disruption of operating railway schedules, equally heavy repair costs, is very real. One way of control in prevention of these contingencies has been found by routine spectrographic analysis of Diesel engine crankcase oil. An informative account of this procedure is contained in the well-designed house organ of the British Petroleum Co., *B.P. Magazine* (No. 8; 1963), in an illustrated article by J. K. Lock and P. R. Mason, respectively, of the lubricants and analytical sections of the B.P. Research Centre, Sunbury-on-Thames, where such spectrographic facilities are available as are similarly developed at the Company's Centre at Melbourne, Australia.

As with other internal combustion engines, normal wear in a Diesel engine over a period of time occasions entrance

in the crankcase oil charge of minute metal particles. In this case, however, there is little if any sedimentation or sludge as ordinarily understood; the metal particles are so small that they are measured in parts per million; conventional methods of chemical analysis are not applicable to their identification because of their low concentration. In such cases spectrographic technique supplies the answer. “If regular samples of the crankcase oil charge are taken and analysed for these metal contents, a normal pattern of wear can be recognized for any one engine, performing a specified duty. If, however, a fault develops in the engine that causes an increase in wear, this pattern of wear is disturbed and can be recognized at an early date.” The authors continue: “. . . the value of the service is that it permits small faults to be recognized and rectified, whereas if these faults were allowed to progress without rectification, serious damage and an expensive repair bill might ensue”. Normally, nine elements are determined spectrographically in these crankcase oils: iron, copper, lead, tin, silicon, chromium, boron, aluminium and silver. The significance of the determination of each of these elements in the oil and their interpretation in terms of Diesel engine wear and tear constitute an expert enquiry. This article conveys impressively the substance of the technique involved.

H. B. MILNER