

After lunch, Prof. D. H. R. Barton introduced Prof. O. Jeger (Zurich), who discussed the structures of a series of oxidation products of the diterpenes manool and sclareol. Many of these had potential values in the perfumery industry, and evidence for the structures suggested was based on numerous physical measurements as well as chemical degradations and correlations with other diterpene degradation products; a notable feature of this symposium was the extensive use which chemists are making of nuclear magnetic resonance measurements in structural problems. Prof. H. C. H. Erdtman (Stockholm) then correlated, so far as was possible, the distribution of terpenes among the various orders of the Coniferae and stressed the taxonomic importance of this group of organic compounds. This extensive survey will have far-reaching effects on biogenetic studies of the terpenes; in the course of the work several new terpenes were discovered and the elucidation of these structures was also described.

In the final session, the two papers presented related to the determination of the structure of the

complex terpenoid bitter principle, clerodin. Prof. Johnson, as chairman, introduced Prof. Monteath Robertson, who described the potentialities of the X-ray diffraction method in the elucidation of structures of molecules containing up to one hundred atoms (other than hydrogen).

Prof. Robertson's colleague, Dr. G. A. Sim, then illustrated the general points by discussing the case of clerodin (as a simple derivative) in detail. This elegant work was only one of several similar topics solved by this method in the Glasgow laboratories. Prof. Barton, in his usual lucid style, then discussed the underlying chemistry of this substance and showed how the structure had been derived on the basis of chemical degradations. His work was also complementary to the nuclear magnetic resonance measurements carried out by Dr. Jackman, who described this aspect of the problem. In the ensuing discussion, Dr. K. H. Overton (Glasgow) outlined his elucidation of the stereochemistry of the bitter principle, columbin.

A. W. JOHNSON

AUSTRALIAN ARID ZONE TECHNICAL CONFERENCE

AN Arid Zone Technical Conference was held at Warburton, Victoria, during December 5-9. It was attended by more than seventy delegates representing a very wide range of organizations and sciences. Several overseas visitors were present as observers, including Dr. P. C. Raheja and Dr. Y. Satyanarayan (Central Arid Zone Research Institute, India), Dr. M. H. Aslan (Desert Range Research Station, Egypt) and Mr. M. U. Khan (Meteorological Service, Pakistan).

The programme was organized into nine major sessions. In Session 1, the physical characteristics of the Australian arid zone were outlined in terms of geology (L. C. Noakes, Bureau of Mineral Resources, Canberra), geomorphology (J. A. Mabbutt, Commonwealth Scientific and Industrial Research Organization (C.S.I.R.O.), Canberra), soils (C. G. Stephens, C.S.I.R.O., Adelaide), vegetation (N. C. W. Beadle, University of New England, Armidale), and climate (H. L. Ashton, Bureau of Meteorology, Melbourne). This material was primarily descriptive in nature and provided a continent-wide background for those scientists not directly active in arid zone problems, or concerned with only one geographical locality in the arid zone.

Sessions 2 and 3 were devoted to the principles and problems of plant and animal production and husbandry, and formed the central basis of the conference. Review papers were presented on plant production (R. O. Slatyer, C.S.I.R.O., Canberra), and utilization (R. M. Moore, C.S.I.R.O., Canberra), and on animal production (W. V. Macfarlane, Australian National University, Canberra), and animal husbandry (G. R. Moule, C.S.I.R.O., Prospect and J. H. Whittam, Animal Industry Branch, Alice Springs) and an additional thirty-four contributed papers covered a wide range of specific subjects within these fields of research. In Session 2 data were presented indicating that the existing communities are relatively inefficient in the conversion of rainfall to plant material, and that this phenomenon is due in part to extreme soil mineral deficiency and the physiological

and ecological characteristics of the individual species, as well as to the low and intermittent rainfall regime. Experimental data were also presented on the possibilities of introducing new plant species and the problems associated with their establishment, persistence and natural dissemination. This information, together with a recognition of the desirability of concentrating water run-off for more effective use, led to the general concept of concentrating effort for increased plant production on the most favoured parts of the landscape, rather than attempting a blanket improvement of the whole countryside.

The management of the pasture communities under grazing is of special importance under arid conditions, partly because of the need to maintain reserves of perennial evergreen species for drought reserve and partly because of the delicate plant-climate balance and the ease with which communities can be damaged by overgrazing. Also, efficient utilization is influenced by property development, particularly by spacing of watering points and fencing. It was considered that the most advantageous developments in this field can only be achieved if the requirements and responses of the animal are also considered. In consequence, integrated studies of both plants and animals, with the development of range condition standards and management procedures, was recommended.

The main form of commercial production in arid areas in Australia appears likely to remain some form of animal production and this will be restricted mainly to sheep and cattle. In Session 3, it was emphasized that there is need for more information about both species, but particularly cattle, and with special reference to adaptation, nutrition and reproduction in the more tropical parts of the zone, where there is at present active development of the cattle industry.

As any widespread change in the level of nutrition in the more arid areas will probably be a slow process, emphasis was placed on the need to breed better adapted and better producing animals, either by selection within the genetic material already in the country or by introducing new genes. Evidence was

given of advances in the first field, and it was also indicated that the determination of selection criteria could be assisted by more basic physiological study, one particular example being potassium-levels in the blood.

To a large extent, the cattle population of the arid area and to a lesser extent the sheep population, exist as a series of wild herds and flocks. While property management aims at bringing them under better control, management practices are introduced against a background of almost complete lack of quantitative information on the ecology of the herds and flocks, their drinking and grazing habits, reproductive patterns, the nature and time of mortalities, and their individual, group and herd behaviour. It was recommended that a detailed study of these, using ecological and behavioural approaches developed by wild-life ecologists, should be encouraged.

Sessions 4-7 dealt with aspects of water and included a review paper (R. Powles, Soil Conservation Service, Condobolin) and contributed papers on soil and water conservation, underground water, irrigation and special aspects such as the suppression of evaporation from water storages, the sealing of earth dams, demineralization, and the significance of advection phenomena in arid zone irrigation areas. The importance of evaluating quantitatively the distribution and nature of occurrence of the limited water resources was emphasized. For maximum effectiveness it was suggested that such an inventory should reveal the dynamic characteristics of individual aquifers and catchments, and since it is impossible, at present, to envisage the appraisal of all water resources in this manner, it was proposed that a

systematic approach should be adopted in which selected type situations within defined landscape patterns (land systems) could be studied and the results extrapolated as widely as possible.

Session 8 dealt with human settlement in arid regions and included contributions on demography (W. D. Borrie, Australian National University, Canberra), human function (W. V. Macfarlane, Australian National University, Canberra) and human organization (R. K. Macpherson, University of Sydney) in the Australian arid zone. It was apparent that there is a tendency in Australia to take arid zone environments for granted with all their physical disabilities and other stresses on human beings. The conference stressed that much could be done to make living conditions more acceptable.

The conference was impressed by the advantages following from the combined discussion of arid problems by the representatives of many different disciplines and stressed the need to define, in biological terms, the problems of plant and animal production specific to the arid zone ecosystem. Perhaps the main impression gained was a general confidence among delegates that research would achieve more efficient production from arid and semi-arid areas. There was much evidence of research having entered a phase in which quantitative data were becoming available to replace subjective estimates. This particularly applied in such fields as mineral resources, hydrology, microclimatology, geomorphology, plant and animal physiology, animal breeding, economics and human physiology.

C. S. CHRISTIAN
R. O. SLATYER

FUTURE OF NATURAL FAUNAS

THE twenty-sixth annual meeting of the Association of British Zoologists was held at the Zoological Society of London on January 7 under the presidency of Prof. C. M. Yonge. The theme of "Looking Ahead—The Future of Natural Faunas" was introduced by Sir Julian Huxley, who described and illustrated, by means of colour slides, what he had seen on his recent visit to East Africa. The central problem there, he said, was essentially one of human ecology. The fauna was a relic of the pre-human ecological climax and still presented a unique array of types in which some twenty-five or more species appeared to be collaborating in exploiting a number of exceptionally brittle habitats. The advent of pastoralism had brought many problems in its train and the situation was aggravated by the African, who thought of cattle as a symbol of wealth and prestige rather than as a source of protein. Recent studies by a number of investigators, including Fulbright Scholars, had shown that the land could be induced to yield more protein per acre from game than from cattle. In South Africa, a depleted fauna was being given some encouragement in game 'farms' from which there was a large demand for animals for re-stocking purposes. Sir Julian emphasized the importance of the tourist trade as an economic factor of conservation and he pointed out that parks were already being recognized as a source of tribal pride. The future of the fauna of East Africa was certainly in the balance, but the situation was not nearly as bad as he thought it would

be when he went out there. Sir Julian concluded by directing attention to the conference at Arusha in Tanganyika in September, which was being organized by the International Union for the Conservation of Nature and other agencies with the object of influencing African public opinion towards conservation and the wise use of natural resources, including wild life.

Mr. Max Nicholson (director-general, Nature Conservancy) said that apart from the virtually unpredictable effects of human population pressure during the next forty years, the future of the British fauna depended to a great extent on climatic changes. These might include some brought about by the agency of man such as a barrage across the Bering Strait, the break-up of Arctic pack-ice by atomic means, the reversal of flow of some of the big Russian rivers and the flooding of depressions in the Sahara. The consequent rise in ocean-levels and the effects on the course of the Gulf Stream might well induce a Mediterranean type of climate in Britain. Birds could be regarded as sensitive indicators of climatic change, and it was significant that the rook and green woodpecker were steadily moving north. Although it was possible that no species would be lost in the next forty years, there was a tendency towards the replacement of a broad range of specialized species by a narrow range of adaptable species. Among the outstanding hazards to which the fauna was subject were the exploitation of waterways, marshland and estuaries, pollution by oil and toxic