

## VEGETATION OF THE HUMID TROPICS

A SYMPOSIUM on "Humid Tropics Vegetation", sponsored jointly by Unesco and the Council for Sciences of Indonesia, was held during December 12-15 in the new Academy of the Ministry of Agriculture at Tjiawi near Bogor (formerly, Buitenzorg). Spacious accommodation delighted the delegates, mountain air fanned the discussions, and the wooded plain of Bogor made a fitting prospect. It was successor to the symposium on "Tropical Vegetation" held by Unesco in Kandy in March 1956. To judge from the strenuous programme, the full attendance, the vigorous exchange of views, and the unanimous decision to request a third symposium for 1960, the second was as successful as the first. Great credit for the organization must be given to Dr. Lennart Mattsson (director, Unesco South-East Asia Science Co-operation Office), Prof. Kusnoto Setyodiwiryono (director, Kebun Raya, Indonesia), Prof. Sadikin (director, Academy of Agriculture, Tjiawi), and Mr. Anwari Dilmy (director, Herbarium Bogoriense). Twenty-seven delegates attended from: Australia, Sarawak and Brunei, Cambodia, Ceylon, India, Pakistan, Singapore, Thailand, United Kingdom, United States, the Food and Agriculture Organization, and Indonesia.

Opening addresses on the first morning were given by Prof. Kusnoto Setyodiwiryono, Prof. Sarwono Prawirohardjo (president, Council for Sciences of Indonesia), Mr. Hutasoit (secretary general, Ministry of Education and Culture), and Dr. Mattsson. They set the tone of sincere appreciation of science which enabled the delegates, in the ensuing reception, to meet at once on common ground. In the afternoon and on the following days thirty-one papers were presented. These had been duplicated, bound, and distributed to delegates on arrival, so that the author was allowed some twenty minutes to review his theme and there was ample time for discussion. On the first afternoon, Prof. Kusnoto Setyodiwiryono introduced the subject of the "Flora Malesiana", as the backbone of botanical research in South-East Asia; it led to a number of resolutions concerning the progress of floristic botany in adjacent regions. Several reports were then given on ecological studies since the Kandy symposium.

The second day opened with Dr. F. R. Fosberg's (United States) presentation of a detailed classification of humid tropical vegetation based on plant characteristics without admixture of climatic and edaphic determinants. Such a purely botanical approach was welcomed, and his extensive and valiant key to vegetational categories will certainly be tested throughout the tropics. Prof. H. B. Gilliland (Singapore) described his method of evaluating and classifying secondary forests in Singapore. He championed a phase in ecology which foresters had neglected and bravely evoked the outspoken criticism which made this and succeeding discussions basic and fruitful. Dr. R. G. Robbins (Australia) gave a vivid account of vegetational mapping in eastern New Guinea by air survey and ground reconnaissance; probably no ecological work has been undertaken so rapidly and, as it appeared, so satisfactorily

on so large a scale; it provided a reliable picture for land-utilization where no other survey was adequate. Mr. R. A. de Rosayro followed with a detailed account of aerial photography applied to forestry problems in Ceylon. Here, the smaller area permitted analysis with sample plots on the ground; it seemed clear that the virgin forest was in a state of dynamic equilibrium between associations dominated by *Mesua* or *Doona* and by mixed associations between them and *Shorea*. This novel theory provoked much comment; the greater variety of trees in Malaysian forests would obscure the effect. Dr. Y. Satyanarayan (India) described his method of evaluating dominance in Bombay forests by estimating crown-coverage. Dr. Robbins presented a paper by B. W. Taylor and R. O. Whyte (Food and Agriculture Organization) in which they developed the idea of a 'land-type' composed of 'land-units' as an exploitable entity; though intended for agrarian use, it became evident as discussion proceeded that such compound topographical concepts could well be applied to vegetation. Mr. Wyatt-Smith (Malaya) closed this part of the programme dealing with ecological methods by describing the Malayan forester's method of quantitative assessment of forest composition and structure. He emphasized the necessity for reconciling metric and British systems of enumeration with respect to quadrat-size and trunk-measure; a detailed resolution was afterwards taken up to this effect.

The third morning was given to papers on tropical peat-swamps, particularly of Borneo, as presented by J. H. R. Anderson, P. Shaw Ashton and A. J. G. H. Kostermans. To me this was the most interesting part of the programme for I had spent several years endeavouring to explore such forest in Malaya. To Unesco must go the credit for having first brought together experts on this peculiar, and intricate, vegetation so difficult of access. These papers and the ensuing discussion should be perused by all interested in tropical forests because the peat-swamps are an integral step in lowland forest succession; they are being exploited, and there is urgent need of study before axe and poison can destroy them for ever. Yet it was evident that here, as in many other cases, discrepancies arose not from errors in observation or from misunderstanding but from profound differences in the phytogeographical, geological and topographical nature of the regions considered, and that more intensive local study should precede generalization. In the afternoon, Mr. Kasin Suvatabandhu (Thailand) gave an account of Thailand forests, which are of great interest because of their marginal position both in the ecology and the floristics of the humid tropics; he pointed out that there was as yet no adequate definition of the humid tropics. Dr. Robbins concluded this session with a provocative new classification of mountain vegetation derived from his researches in the central highlands of eastern New Guinea. As this adds a new range to ecological knowledge of tropical mountains, his conclusions will be widely discussed. He proposed to get rid of the term 'mossy forest' and a resolution to this effect was approved; but reflexion leads me to conclude

that this meaningful expression is still applicable where mountains do not partake in a 'central highland'.

The last morning continued with ecological problems. Dr. H. C. Trumble (Food and Agriculture Organization) described the climate of Indonesia in relation to vegetation and showed the necessity for many more meteorological records. His careful analysis should be read in conjunction with the 'land-systems' of Taylor and Whyte, for bioclimatology must complement their biotopography. Dr. Satyanarayan reviewed in detail the vegetation of the Western Ghats, where, as in Thailand, there is a transition from true humid tropical forest to the sub-arid. His account will be a standard reference for phytogeographers. Dr. Robbins then presented a paper by L. J. Webb on the rain-forest of Queensland; the importance of lianes was emphasized in the definition of forests, and the neglect of them shows how much is yet to be added to tropical ecology. Mr. Womersley gave an account of the work of the Botanical Division of Forestry in eastern New Guinea, and a second paper on the *Araucaria* forests in which he developed the theme that they were relics of ancient, even mesozoic, pre-angiosperm vegetation surviving fitfully in some unknown, possibly catastrophic, manner in the invading sea of broad-leaved forest. I think this paper will become a classic. Mr. P. R. Wycherley (Malaya) gave an elegant sketch of the ruderal behaviour of *Croton hirtus*, and a valuable analysis of an acre of forest in Malaya, such as will become a standard of reference for Malaysian ecologists. The afternoon was devoted to problems of silviculture in Indonesia, presented by Mr. Mursaid, and in Malaya, presented by Mr. Wyatt-Smith. Striking differences were

apparent, especially from the methods described for Ceylon by Mr. de Rosayro, and it was clear, again, that generalization could be misleading. In the evening Dr. Fosberg, as *rapporteur général*, gave an able summary of the proceedings, and closing speeches were made by Prof. Kusnoto Setyodiwiryo and Mr. Sudiman (secretary, Council for Sciences of Indonesia).

After the symposium delegates were taken under the leadership of Dr. A. J. G. H. Kostermans (Indonesia) to the mountain garden and nature-reserve of Tjihodas, to the Botanic Garden at Bogor, for a four-day excursion to the nature reserve of Udjong Kulon at the south-west corner of Java, and on a ten-day excursion to central and eastern Java and to Bali. Few delegates, unfortunately, had time for this trip, but that to Udjong Kulon in the research ship of the Kebun Raya gave them the unforgettable scene of Krakatoa, as the ship sailed about 8 a.m. between the new erupting cone and the old forest-clad mountain-side.

As one whose presence was fortunate rather than premeditated, I may make a few detached remarks. Such a small symposium of picked experts, discussing their problems in such hospitable, if remote, circumstances must always be rewarding. Its success depended in no small measure on the accomplishments of a few delegates, particularly Dr. Robbins and Mr. de Rosayro, who entertained us in the evening. At Tjiawi, we had an audience of students, and the proceedings, instead of being merely documented and shelved, may grow up in receptive minds. Malaya gave a good lead in sending both senior and junior delegates. We should remember these ingredients that the next may be as successful. E. J. H. CORNER

## PRECIPITATION IN ALLOYS

FROM the early investigations of Wilm on the age-hardening of aluminium alloys, the study of the decomposition of supersaturated solid solutions has made rapid progress. For the past twenty years the subject has advanced largely through investigators using X-ray diffraction techniques, but within the past two years the pre-eminence of these techniques in this field has been challenged by investigators using the electron microscope to examine metals either directly by transmission or with the aid of extraction replicas. At a conference held at the Institution of Civil Engineers in London on November 28, and organized by the X-ray Diffraction and Electron Microscopy Groups of the Institute of Physics, an opportunity was given for the two groups of investigators to meet, outline their methods of approach and discuss the results obtained.

The conference comprised four principal papers—two devoted to results obtained by X-ray diffraction and two to results obtained by electron microscopy—followed by a general discussion. The first speaker was Prof. A. Guinier (Department of Physics, Conservatoire des Arts et Métiers, Paris), who described the structures of age-hardened alloys in the pre-precipitation stage. He first defined the Guinier-Preston zones in terms of the interface between the zones and surrounding matrix, pointing out the requirements for coherence. He then reviewed the evidence from which it has been possible to deduce the shape, size and structure of zones in various

alloys based on aluminium and containing copper, silver, magnesium, silicon, germanium and zinc. In discussing the structure of zones in relation to the properties of alloys, Prof. Guinier pointed out that a change from a purely metallic to partially covalent or ionic bonding may occur as the zones increase in size and thickness.

The results obtained on the same series of alloys, but after examination by transmission electron microscopy, were described by Dr. J. Nutting (Department of Metallurgy, Cambridge). He showed how the predictions made from X-ray diffraction results have been confirmed by electron microscopy. He then went on to outline how the strain fields surrounding coherent precipitates may be observed and to discuss the transition from coherency to partial coherency at the precipitate-matrix interface. The advantages of the electron metallographic approach in revealing precipitate morphology were stressed and the importance of this morphology in relation to mechanical properties was briefly mentioned. The disadvantages of the electron metallographic approach is that it gives no clear indication of the zone and precipitate structure. The possibility of using selected area transmission electron diffraction was suggested as a means of overcoming this difficulty.

An account of her investigations on precipitation in aluminium alloys when using X-ray diffraction techniques was given by Miss J. M. Silcock (Fulmer Research Institute, Stoke Poges, and Department of