

CONTRIBUTIONS OF THE RIJKSHERBARIUM TOWARDS THE PLANT-GEOGRAPHY OF MALESIA AND THE PACIFIC

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The first substantial contribution of the Rijksherbarium towards the plant geography of Malesia and the Pacific was made by the German born J. G. Hallier in his paper 'Über frühere Landbrücken, Pflanzen- und Völkerwanderungen zwischen Australien und Amerika'. In this paper he suggested that recent land connections had existed in the tropical Pacific from Japan over Hawaii to California and south to Peru and another connection in the south Pacific. His arguments besides botanical were also ethnographical and linguistic.

H. J. Lam was not only responsible for the promotion of taxonomic research. He added chapters on phytogeography to his revisions of the *Sapotaceae* and *Burseraceae*. His papers on the subject always had a philosophical quality. He once compared phylogeny with a stream of potentialities of the genoplasm drifting in time: the genorheithrum (1938). Lam also wrote plant-geographical essays on areas with special interest: Talaud, Celebes (1945) and especially New Guinea (1934). As regards his ideas about past connections between Borneo-Philippines-Celebes-Moluccas-New Guinea he owed much to Merrill. Lam was a follower of Wegener's continental drift theory and he pleaded with fellow taxonomists to accept this as a working hypothesis to explain distribution patterns in the Malesian archipelago (1930). Many of his papers were in Dutch, especially of course those meant for a general (Dutch) public, such as his chapter on phytogeography in Weevers' book (1939) 'Het leven der planten' (The life of plants). He took care, however, to publish his more important ideas in English as well. Among many things Lam will be remembered for initiating a series of distribution maps of Pacific plant taxa: 'Pacific Plant Areas', which was to contain critical annotated maps. These should be a valuable asset to botanists, paleontologists, ethnobotanists and others. This plan was first suggested in 1939 during the sixth Pacific Science Congress at Berkeley, but World War II held up execution of the project. As chairman of the 'Standing Committee on Pacific Plant Areas' Lam gave a progress report after the war (1953). Realization of the project was to be achieved by Van Steenis, his successor both as director of the Rijksherbarium and as chairman of the Standing Committee.

C. G. G. J. van Steenis, like Lam, started his botanical career in Bogor. He is no doubt the most prolific and influential of Dutch phytogeographers. His first great work in the field of plant-geography is his study on the origin of the Malesian mountain flora (1934–36). He came to the conclusion that the Malesian mountain flora had reached the archipelago along three migration routes, which have since become known as the Sumatra, the Luzon, and the Papuan tracks. He also found an explanation for the fact that montane species only occur on mountains surpassing a

certain minimum height where, however, they often descend to much lower altitudes. He called this the 'elevation effect'. On sufficiently high mountains the species have a zone of permanent establishment from where their diaspores may reach lower (or higher) zones but where they do not flower (1961a). This was also found in Swiss alpine plants investigated by the student W. Backhuys (1969). The distribution of drought plants is another subject treated by Van Steenis. He found by correlating species areas with rainfall patterns that seven drought classes could be distinguished among monsoon plants. Species requiring severe drought were found to be disjunct between SE. Asia and S. Malesia with an area of mostly everwet rainforest in between. He argued (1961b) that the gap was bridged by drought 'stepping stones' during the Pleistocene. An important paper is his chapter 'Concise plant-geography of Java' in Backer and Bakhuizen v. d. Brink, *Flora of Java* 2, 1965, written with the assistance of Mrs. A. F. Schippers-Lammertse. It treats such topics as floristics, vegetation, altitudinal zonation, drought plants, climate etc. Van Steenis is also the first author to study floristic plant-geography based on the total indigenous flora and using the genus as the basic working unit instead of selected species. By studying the distribution of genera in the Malesian archipelago he found three main plant-geographical boundaries (*Flora Males.* I, 1, 1950). These boundaries ('demarcation knots') are not overstepped in either way by relatively large numbers of genera. Thus were established the limits of the 'Flora Malesiana' area: Malesia. A further subdivision within Malesia is also given. Supplementary papers were written by C. Kalkman (1955) for the Lesser Sunda Islands and by M. M. J. van Balgooy (1960, 1971) for the Pacific, Kalkman showed that the flora of the Lesser Sunda Islands is a depauperized version of the Javanese one, only sparingly supplemented by eastern (Australian) elements.

The ideas of Van Steenis on historical phytogeography are to be found in several papers of which only those on the Kinabalu (1964) and on *Nothofagus* (1971) need be mentioned. A condensation of this thoughts can be found in his extensive paper on the land-bridge theory in botany (1962). To explain the distribution of plants over the earth, especially between the tropical regions, the idea of random long-distance dispersal is rejected, and short-distance dispersal over land (continuous or isthmian) is vigorously defended. Van Steenis's dictum has always been that plant-geographers should not climb on the bandwagon of some geophysical theory. If botanical facts agree with a geophysical model that is fine, if not, geophysical theory should be reconsidered. This is the opposite of Lam's standpoint. Van Steenis made a great contribution to Pacific plant-geography by realizing the publication of 'Pacific Plant Areas' mentioned before. So far three volumes have appeared containing 293 original maps and an extensive annotated bibliography of published maps for which due recognition should be given to Mrs. M. J. van Steenis-Kruseman. Apart from this the revisions by members of the Rijksherbarium staff provide a huge body of plant-geographical facts often illustrated with accurate maps (e.g. M. Jacobs' treatment of *Capparaceae* in *Fl. Mal.* I, 6, 1960 or C. den Hartog's *Sea-grasses of the world*, 1970) and sometimes with extensive data on fossil distribution (e.g. C. F. van Beusekom's paper on *Meliosma*, 1971). Other important papers by Van Steenis are his studies on the origin of island floras and on the distribution of mangrove genera. Articles on the plant-geography of S. Malesia, E. Malesia and with Mrs. D. Beintema-Hietbrink on Ceylon are in press.

Van Balgooy studied the distribution of Phanerogam genera in the Pacific and worked out a hierarchical subdivision of the flora. It appears that the greater part of

the tropical Pacific as far east as Hawaii and Marquesas floristically belongs to Malesia. New Zealand and adjacent islands are placed in the Australian Kingdom and so is New Caledonia, albeit in a high hierarchical rank. He also wrote a paper on floristic diversity of islands and edited the third volume of *Pacific Plant Areas* of which series he is the current editor.

J. Muller's palynological studies are valuable contributions to plant geography. Many of his papers deal with tertiary deposits of Borneo and give an insight into floristic composition of peat swamp forest, eastward migration of mangrove components (1964) and the former presence of northern hemisphere taxa now absent from Malesia (1966). An important contribution to paleobotany is his review of palynological evidence for the differentiation of Angiosperms (1970).

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H. J. Lam (1892–1977)
Director 1933–1962
Photo in archives Kon. Ned. Bot. Ver., c. 1941