XI. BARK MORPHOLOGY AS AN AID TO FOREST-RECOGNITION AND TAXONOMY OF DIPTEROCARPACEAE

Different trees have different sorts of bark, the variation is of two main kinds. The bark of an individual changes as it grows, and there are differences between mature trees of different species.

The recognition of large trees in tropical forest depends on living as opposed to herbarium characters and amongst living characters bark is important. Botanists are slowly coming to realise that living characters are of importance to taxonomy and can supplement the characters visible on herbarium sheets but often hard to see in the forest (Corner 1940, Symington 1943, Henderson & Wyatt-Smith 1956). At present many living characters are used empirically if at all.

The study of a group of trees should start in the forest. Living characters should be fully noted, following for instance the scheme of Wyatt-Smith (1954). Later when in the herbarium the botanist comes to assess his collections, his field notes on living characters are a valuable part of the total information on which he must base his taxonomy. Once he has glimpsed the natural taxonomy from his own fully annotated collections he can go on to study those herbarium sheets of other workers which have less than adequate notes, and which therefore are less useful data. The larger the plant the more inadequate the herbarium material, and the more important is this enlightened approach.

In the present survey the morphology of mature bark of 112 species in 7 genera of Malayan and Bornean Dipterocarpaceae has been examined to put bark morphology on a scientific basis then to assess the value of bark characters in taxonomy.

It has been discovered that significant differences in bark structure are either macroscopic or at the pocket lens level; there are only very slight differences in the fine detail observable under the microscope in sections.

The bark tissues are analysed into four component systems which vary independently and interact to produce the features of bark surface and slash valuable in the forest. Inherited variation is distinguished from environmental.

The various observed interactions of the components are called the Bark Manifestations and they can be grouped in these Dipterocarps into seven main Bark Types. There are gross differences in the components between the Types but only slight differences between the Manifestations of each Type.

The Bark Types are named after a feature conspicuous in the forest: each Type occurs in several genera. The Types are: Smooth, Dippled, Shallow Fissured, Scaly, Deep Fissured,

Surface Rotten, and Laminate. The Bark Manifestations on the other hand are each restricted to one genus or natural group of species.

It is thus at the level of the Bark Manifestation that bark is of potential value to taxonomy. Manifestations of a Bark Type differ slightly in structure and surface appearance, for instance periderms differ in colour, texture and degree of penetration by fibres. Bark like wood varies mainly at the generic level. Nevertheless some single species can be distinguished on peculiar features similar to those just described.

Once the foregoing principles had been established it proved possible to throw light on a number of outstanding problems of taxonomy in Dipterocarpaceae. For example the relationships of the ten new undescribed species from Borneo was predicted; the generic separation of Balanocarpus heimii from Hopea was shown to be unreasonable; Hopea beccariana in Borneo was shown possibly to represent a different taxon from what was thought to be the same species in Malaya.

Because of commercial importance of the family, Malay foresters have already developed forest-recognition of Dipterocarpaceae to a high degree and only a few more species were distinguished as a result of this critical study. A comprehensive scheme and glossary for bark description was developed, more systematic than those existing. With the aid of this the botanist can give a description of bark at one of several levels of detail to suit his purpose.

Comparison of findings in Dipterocarpaceae with previous work on bark suggests that the bark of trees in many families is similarly constructed and that variation is commonly as wide as in Dipterocarpaceae[+]) (Thorenaar 1926, Francis 1951, Holdheide 1951). This survey therefore points the way towards fuller use of bark in the taxonomic study of large tropical trees, and in groups less well known than Dipterocarpaceae bark can be used much more than at present in forest recognition.

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[+]) In a later paper close similarity in bark construction is demonstrated between Dipterocarpaceae and the European Fagaceae Fagus sylvatica, Quercus robur, and Castanea sativa.

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