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THE GENUS DACRYDIUM IN MALAYA (GYMNOSPERMAE)

DAVID J. DE LAUBENFELS
Dept. of Geography, Syracuse University, 343 H. B. Crouse Hall, Syracuse, New York 13210, U.S.A.

When Corner described the genus *Dacrydium* in Malaya in 1939 he recognized four kinds, three species and a marked variety, but he expressed considerable doubt about their distinctiveness because the available specimens showed all degrees of variation of leaves between one species and another. He finally concluded that *D. comosum* was, in fact, unmistakable, because of its large needles, but that his variety *subelatum* of *D. beccarii* lay exactly between that species and *D. elatum*. During a recent collecting trip to Malaya, I was able to distinguish four distinct species and to identify the cause of the confusion which Corner described.

The confusion in distinguishing Malayan species of *Dacrydium* results primarily from a misinterpretation of the form of *D. elatum*. This species is characterized by imbricate scale leaves in the adult form but with spreading acicular leaves in the juvenile form. Before I had seen living specimens of this species I was under the impression that the change in leaf form was abrupt and stated this in print (1969). There are many herbarium specimens with sharply contrasting juvenile and adult branches often actually attached to one another. In fact, there is a gradual change as a plant matures to shorter more adpressed leaves and different individuals mature at different rates. Trees with mature leaves, however, frequently bear occasional shoots with juvenile leaves making possible the collection of both juvenile and mature leaves attached on the same specimen. I myself collected specimens of this type before I realized what this collection strategy suggests to the herbarium user. Not only is there a gradual change in leaf form as a plant matures, but it is also common for a plant to become fertile before the transition is complete. Fertile specimens with spreading needles are well known throughout the range of this species including areas where it is the only *Dacrydium* species present. A male specimen, for example, *Balansa 596* (K), comes from Tonkin; both male and female with spreading leaves as well as scale-leaved specimens were carefully assembled by *Abbe & Smitinand* (*9459*, *9460*, *9461*, A) from Phu Kradang in Thailand; and I myself collected a female specimen, *de Laubenfels P532* (A, L, SING), at Ulu Kali in Malaya.

The type specimen of *Dacrydium beccarii* variety *subelatum* came from a prominent oft-collected old tree on Pine Tree Hill (Fraser's Hill) which is sterile. It is a specimen of *D. elatum* with not fully mature types of leaves in spite of its age. The fact that this old tree is stubbornly sterile is significant. It may be aberrant in retaining the partially juvenile leaves so long but its form is well within the range of the species *D. elatum* making the taxon *D. beccarii* variety *subelatum* a synonym of *D. elatum*.

Widely distributed as a dominant form in dry high-mountain scrub of Malaya and Sumatra as well as possibly elsewhere is a heretofore unnamed species of *Dacrydium*. Most of the specimens other than the type cited by Corner for his *D. beccarii* variety *subelatum* belong to this species which I will name *D. medium*. There is a superficial resemblance between *D. medium* and the type of variety *subelatum*, but they are actually quite different. In the case of *subelatum* the length of leaves is distinctly variable, being

longest on some short side branches and much shorter on primary shoots. The leaves of *D. medium* are notably uniform and not shorter on primary shoots. There is also a marked difference in ecology with *subelatum* being a forest three while *D. medium* grows in the open, rising above a low scrub. The seed complex on plants of the form of *subelatum* is completely exposed above a cluster of very reduced leaf-like bracts while the seed complex of *D. medium* is nested among unreduced leaf-like bracts. Pollen cones are likewise quite distinct.

Dacrydium medium de Laubenfels, *sp. nov.*

Arbor vel frutex 1—20 m alta, ramosissima. Folia plantarum iuvenilis acicularia, ad 20 mm longa, ad formam adultam paulatim convertentes; folia plantarum adultarum robusta, apiculata, densa, 3—8 mm longa, 0.5—0.6 mm lata. Strobili masculi cylindracei, terminales vel laterales, 7—9 mm longi, 2.5 mm diametri; squamae elongatae, 2 mm longae. Strobili feminei ad apicem ramulorum saepe brevi, folia minora; folia ad basem seminis longiora, 2—3 mm longa; semen protrudendum, 5 mm longum.

Holotypus: *de Laubenfels P540* (L).

MALAYA. G. Tahan, Pahang, *de Laubenfels P539*, ♀, 6,000 ft (A, KLU, L), *P540*, ♂ (L, holotype; A, KLU, isotypes), *P541*, j. (A, SING, KLU, L); *Haniff & Nur SF 7994*, ♂, 5,500—7,000 ft (B, K); *Soepadmo 969*, ♀, 5—7,000 ft (A, KEP, KLU); *Ng KEP 1460*, 5,000 ft (KEP), *1461*, j (KEP), *1463* (KEP); *Wooley 8217*, ♀, 5,500 ft (KEP); *Null 169*, ♂, 2,065 m (KLU). G. Tapis, Pahang, *Symington & Kiah SF 28875*, 4,600 ft (B, K); *Cockburn KEP 11028*, ♀, 4,500 ft (KEP). G. Benom, Pahang, *Whitmore KEP 3264*, ♀, 5,000 ft (KEP, SING); *Strugnell 22321*, 5,700 ft (KEP); *Null 247*, ♂, j, 6,700 ft (KLU); *Nur s.n.*, ♂, 5,000 ft (K). Cameron Highlands, Pahang, *Henderson SF 18025*, 5,000 ft (B); *Mead 14648*, 4,800 ft (KEP); *Hamm 61062*, j, 4,000 ft (KEP); *KEP 55849* (KEP). G. Padang, Terengganu, *Moysey 31072*, 4,000 ft (K, KEP, SING), *31841*, 3,800 ft (K, KEP, SING). G. Mandi, Terengganu, *Whitmore KEP 12121*, j, 3,900 ft (KEP). G. Bubu, Perak, *Wray 3875*, ♀, 5,000 ft (A, K). Perak, *Scortechini s.n.*, ♀ (A). G. Jerai, Kedah, *Pennington 7846*, ♂, 3,200 ft (SING); *Stone 8551*, 3,200 ft (KLU); *Poore 1465*, ♀, 3,800 ft (KLU); *Poore & Lethbridge 1466*, ♀, 3,200 ft (KLU). G. Rabong, Kelantan, *Soepadmo & Mahmud 1051*, ♂, 3,500 ft (KLU), *1080*, ♀, 4,800 ft (KLU).

SUMATRA. Atjeh, Gajoland, Putjuk Angasan, *Van Steenis 8357*, ♂, j, 2,600 m (B, L). Atjeh, Takengon, *Ostwald bb9031*, ♀, 1,800 m (B). Road from coast to Tapanuli (Toba Lake), *Bangham 1070*, ♀, 4,100—4,500 ft (A, K, NY). Between Djambu Dolok and Baturangin, *Surbeck 107*, ♀ (A, L).

Possibly also: N. BORNEO. Ranau, *Mujin 33774*, ♀, 5,300 ft (K, L).

In general appearance this new species is very average for the genus, hence the specific name. The most distinguishing characteristic is the greatly elongated pollen cone scales with a linear tip as much as 2 mm long and 0.5 mm wide beyond the pollen sacs. The apex of this elongated tip is furthermore sharply incurved making the tip appear rounded and blunt. Other related species have pollen cone scales which are triangular and acute. The fruit of *D. medium* is dark red. Compared to *D. beccarii* the leaves of *D. medium* are much more robust and generally shorter. The short fertile shoots are only slightly modified from the foliage branches, unlike the strong contrast characteristic of *D. beccarii*. The closest relative of *D. medium* is probably *D. pectinatum* which has a similar growth form on low elevation limestone hills in Borneo. The pollen cone is quite different, however, and the leaves of *D. pectinatum* tend to be distinctly shorter.

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