SARAWAKODENDRON, A NEW GENUS OF CELASTRACEAE

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During my trip to Malaysia in 1966, sponsored by the Netherlands Foundation for the Advancement of Tropical Research (WOTRO), for doing field work on *Anacardiaceae*, a new tree genus was found in Sarawak belonging to the family *Celastraceae* which I have revised for the Flora Malesiana series I, volume 6.

While camping at the Nyabau Forest Reserve, Bintulu, Sarawak, with the field team of the Forest Department, I examined and collected a number of interesting plants. The area is quite near the sea coast and the type of forest is intermediate between *kĕrangas* (heath forest) and dipterocarpaceous forests. One day, the plant collector Mr Sibat ak Luang guided me to see a flowering tree of *Anisophyllea ferruginea* Ding Hou (*Rhizophorac.*). On the way I picked up one fallen flower from the forest floor just a few metres from the camp. With its characteristic fleshy disk and three stamens, I thought it might belong to *Salacia* (*Celastrac.*). I showed the flower to Sibat and asked him to look for the plant. He pointed to a tree, *c.* 12 m tall, beside me. I could hardly believe it, because the Malesian *Salacia* species are mostly lianas. He climbed the tree and obtained a fertile branch for me. I examined the material and the flower in my hand was evidently from that tree. To my surprise, the leaves were distinctly alternate, while those of the *Salacia* species are mostly decussate.

I asked Mr Ilias Paie, the leader of the field team, who knows many Sarawak plants, whether he knew the tree in question. One boy chopped off a piece of the bark which contains a kind of golden yellowish substance and named it '*kĕrupok*', the common name for *Kokoona* and *Lophopetalum*, both *Celastraceae*. Mr Ilias also agreed that was a tree of that family. When I asked them whether they had seen or collected specimens of such a tree before, no one was certain.

Because of the habit, the phyllotaxy, and the golden yellowish substance in its bark, which are unusual for *Salacia*, I was anxious to know the structure of the fruit for fixing its identity. The tree was specially numbered as 28.6.66 (28 June 1966) to facilitate later collections if needed. Subsequently I located four more trees of the same species all only a few metres from the camp.

After having returned to Kuching, I told Dr P. S. Ashton, then the Forest Botanist, and Dr J. A. R. Anderson, the Deputy Conservator of Forests, about the thrilling find. One day Dr Ashton asked me to take a look at unnamed Sarawak specimens, about twenty sheets, in the herbarium, in the hope that I might recognize one or two of them. To my delight I found two specimens (marked *SA 133*) of which one had fortunately one broken flower glued to the sheet and a small paper bag containing fragments of flowers and a young elongate fruit, which matched the new plant. The fruit did not look like that of *Salacia* as it appeared to be a capsule. In addition, there was another similar specimen, *S 18685*, bearing also bare inflorescences, which was collected at Bako, Limbang Distr., by E. F. Brunig in 1958.

I was anxious to have ripe fruits. Dr Ashton kindly made arrangements with the District Forest Office at Bintulu to keep an eye on the tree for fruits. In August, he sent his well trained and keen collector, Mr Jugah anak Kudi, to make a special trip to collect

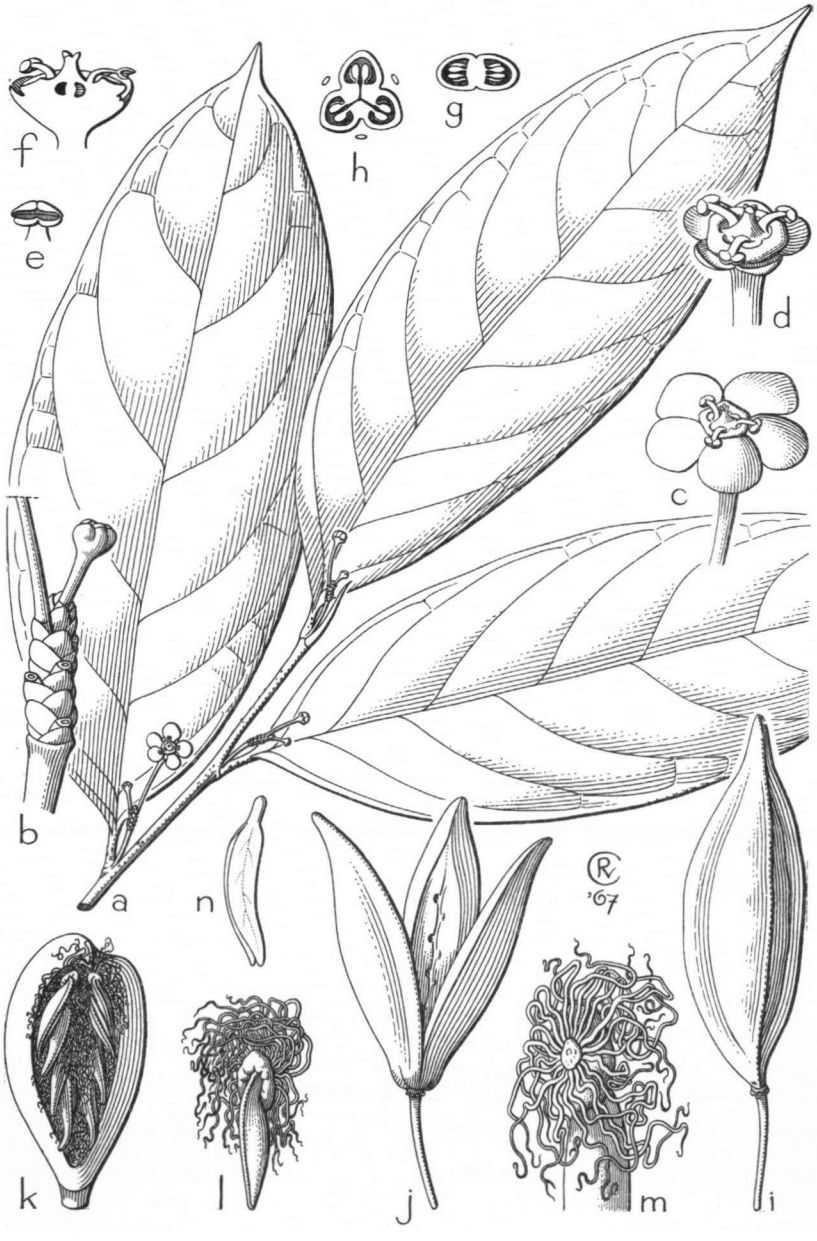

Fig. 1. *Sarawakodendron filamentosum* Ding Hou — a. Habit, × 2/3; b. inflorescence, × 4; c. flower, × 2; d. flower with petals removed, × 3; e. stamen, × 8; f. longitudinal section of flower shown in d, × 3; g. longitudinal section of ovary, × 8; h. cross section of ovary with position of stamens indicated, × 8; i. fruit, × 2/3; j. dehiscent fruit with one valve showing scars of seed attachments, × 2/3; k. one fruit valve with attached descendent seeds, × 2/3; l. seed, × 1; m. basal part of seed seen from beneath, × 2; n. cotyledons, × 2 (a—h. *Ding Hou 333*; i. *Jugah anak Kudi S 24897*; j—n. *Jugah anak Kudi S 24898*).

that. On August 20th, Jugah made good collections of both flowering and fruiting specimens as well as spirit preserved material. Early September, Dr Anderson brought the fixed material to Kepong, Malaya, when he was there for a meeting while I was away on a collecting trip to Kedah and Penang.

When I saw the complete material of flowers, fruits, and seeds of the new plant, I was surprised to find that the plant seemed to share characters with several genera of *Celastraceae*, e. g. *Lophopetalum*, *Kokoona*, and *Salacia*. However, its seed bearing a fleshy, round cushion or caruncle-like aril at the chalazal end with filamentous appendages around the funicle is quite different from the seed structure of Malesian *Celastraceae* (cf. Hou, 1963 & 1964). It doubtless represents a new genus of the *Celastraceae*.

Sarawakodendron Ding Hou, *gen. nov.* — **Fig. 1.**

Arbor. Folia alterna, petiolata, stipulis parvis, caducis. Inflorescentiae axillares, solitariae, simplices, pedunculatae, pauciflorae, bracteis decussatis, condensatis, persistentibus. Flores hermaphroditi, axillares, solitarii, pedicellati. Calyx 5-partitus, lobis imbricatis. Petala 5, imbricata. Discus carnosus, complanatus. Stamina 3, antheris extrorsis, transverse dehiscentibus. Ovarium disco semi-immersum, triloculare, ovulis in quoque loculo c. 8, biseriatis; stigmata 3. Capsula trigona, 3-locularis, valvis crassis. Semina descendentia, anguste ellipsoidea, arillo carnoso, orbiculari, longe filamentoso.

Typus: *Sarawakodendron filamentosum* Ding Hou.

The generic name is derived from Sarawak where the tree was found.

The new genus shares characters with *Salacia*, *Lophopetalum*, and *Kokoona*. It is also closely allied to *Polycardia* of Madagascar. However, it can be easily distinguished from all these genera by the anisomerous number of stamens and by the seed which has a cushion- or caruncle-like aril at the chalazal end bearing filaments around the funicle.

Sarawakodendron filamentosum Ding Hou, *sp. nov.* — **Fig. 1.**

Arbor 7—12 m altus, trunco 9—14 cm diam. Folia chartacea, fracta fila resinosa praebentia, stipulis triangularibus, c. ½ mm longis; lamina elliptico-oblonga vel -lanceolata, 11—24 cm longa, 4—9½ cm lata, basi cuneata, apice breviter acuminata, subintegra, nervis 6—7, petiolo ⅝—1 cm longo. Inflorescentiae 1—2½ cm longae; pedunculus ⅝—1½ cm longus, bracteis semiorbicularibus vel subtriangularibus, ⅝—1½ mm longis, 1½—2½ mm latis; pedicelli 1½—2 cm longi. Calyx carnosus, lobis semiorbicularibus, 1½—2 mm longis, 1 mm latis, toto margine leviter erosis. Petala carnosa, suborbicularia, c. 5 mm diam., integra, venosa. Discus carnosus, complanatus, leviter 5-angularis, c. 4 mm diam. Stamina 3, c. 1½ mm longa. Pistillum c. 1 mm longum. Capsula anguste ellipsoidea, 6—8½ cm longa, 2½—3½ cm lata. Semina anguste ellipsoidea, 21—24 mm longa, 4—5 mm lata, arillo 5—7 mm diam., filamentis 1½—2 cm longis.

A tree, 7—12 m tall, 9—14 cm ∅. Young branches, petiole, midrib, and floral parts containing sulphur-yellow kautchuk particles. Leaves and pedicels with resinous threads shown on breaking. Stipules triangular, *c.* ½ mm long, slightly erose. *Leaves* chartaceous, alternate, elliptic-oblong to -lanceolate, 11—24 by 4—9½ cm; base cuneate; apex short-acuminate; margin subentire; nerves 6—7 pairs; petiole ⅝—1 cm. *Inflorescences* axillary, 1—2½ cm long, almost in every leaf axil, solitary, simple, with condensed decussate bracts, few-flowered. Peduncle ⅝—1½ cm. Bracts rather fleshy, persistent, semi-orbicular or slightly triangular, ⅝—1½ by 1½—2½ mm, slightly erose. Pedicels 1½—2 cm, articulated near the base, the part below the articulation slightly swollen. *Flowers* light orange, occurring in the axil of one bract of each decussate pair along the inflorescence from

base to apex in a clockwise or anticlockwise sequence; floral parts rather fleshy. *Calyx lobes* imbricate, semi-orbicular, 1½—2 by 1 mm, slightly erose at the margin. *Petals* imbricate, suborbicular, *c.* 5 mm ∅, entire, with distinct reticulate venation and light brownish strips or dots. Disk flat, *c.* 4 mm ∅, slightly 5-angular, the angles opposite the calyx lobes. *Stamens* 3, *c.* 1½ mm, inserted at the base of the pistil, reflexed at anthesis; anthers transverse-oblong, transversely dehiscent, extrorse. *Pistil* 3-angular, the free part *c.* 1 mm long, the angles alternate with the stamens; stigmas 3. Ovary 3-celled. *Ovules* 8 in each cell, axial, in two series, horizontal, anatropous. *Fruit* a thick cariaceous, hard, capsule, narrow-ellipsoid, 3-angular, 6—8½ by 2½—3⅛ cm, gradually narrowed towards both ends, loculicidally dehiscing into 3 valves, suture surface of the valves 6—7 mm wide. *Seeds* 6—8 in each cell, descending, narrow-lanceolate, 21—24 by 4—5 mm, albuminous; aril (?) fleshy, suborbicular, cushion- or caruncle-like, 5—7 mm ∅, at the chalazal end, which bears filaments, 1½—2 cm long, simple or dichotomously branched, arising from its base around the funicle and then turning upward. *Embryo* narrow-lanceolate, 18 by 4 mm; cotyledons foliaceous, free.

MALAYSIA. Sarawak: Bintulu, Nyabau, in forest intermediate between the *kerangas* and dipterocarpaceous types, *c.* 16 m, 21-6-1966, *Ding Hou 333* (holotype, L; isotype, SAR), 20-8-1966, *Jugah anak Kudi S 24897, S 24898, & S 24899* (L, SAR). — Limbang, Bako, *c.* 30 m, *kerangas* forest, in 1958, *E. F. Brunig S 18685* (SAR). — Without precise locality and data, *SA 133* (SAR).

The epithet of the new species alludes to the uncommon filamentous appendages of the seed.

The inflorescence of the present species appears to be a condensed raceme and internodes of the rachises are invisible. It may be composed of condensed sympodial dichasia which are very common in the *Celastraceae*. Its true structure needs further investigation.

The seed of *Sarawakodendron* is quite unique in having a fleshy aril at the chalazal end with filamentous appendages. So far I found that, e.g., the lacerate aril of *Polycardia* (*Celastraceae*) of Madagascar (cf. Perrier de la Bâthie, 1946, fig II 6), the fimbriate aril of *Tetracera (Dilleniaceae;* cf. Hoogland, 1951*)* and of the American *Crossosoma* (*Crossosomataceae*) (cf. Lawrence, 1951, fig. 165g) bear some resemblance to such appendages. Future morphological and anatomical studies can reveal the true nature of the so-called aril and its appendages here.

Its pollen grains are simple, circular in polar view, suboblate (*c.* 20.4 by 23.6 μ) in equitorial view, tricolporate, isopolar, and similar to those of the general pattern of *Celastraceae* (cf. Erdtman, 1952; van Campo & Hallé, 1959).

THE AFFINITIES OF SARAWAKODENDRON

The floral characters of *Sarawakodendron* are similar to those of *Salacia* of the former *Hippocrateaceae* (cf. Hou, 1964, fig. 36). However, on account of the loculicidal capsule and its seed characters it can easily be excluded from *Salacia* which has drupaceous fruits with exarillate, exalbuminous seeds imbedded in mucilaginous pulp.

Sarawakodendron is closely allied to *Kokoona* and *Lophopetalum* of the *Celastraceae* by the tree habit, bark containing golden yellowish substance, and spindle-shaped, triangular, loculicidal, three-locular capsules with about 8 seeds in two series (cf. Hou, 1963, fig. 8 & 10). But it can be distinguished from those two genera at first glance by the alternate leaves, anisomerous stamens, and unwinged seeds.

From the above concise comparisons between *Sarawakodendron* and other genus or

genera by using even just gross morphological characters, the present new genus appears, in my opinion, to be one of the transition links between the two very closely related families, *Hippocrateaceae* and *Celastraceae*, which have already been treated under one family, the *Celastraceae* (Hou 1963; Robson 1965).

ACKNOWLEDGEMENTS

It is a great pleasure to acknowledge with gratitude the generous grant of WOTRO which enabled me to make a research trip to Malaysia in 1966, resulting among others in the discovery of the present new genus. I greatly appreciated the valuable co-operation of the Sarawak Forest Department, especially the help of Dr J. A. R. Anderson and Dr P. S. Ashton, for sending me their material on loan and making arrangements to collect the necessary fruiting specimens. I am very grateful to Prof. Dr C. G. G. J. van Steenis, Director of the Rijksherbarium, Leiden, for the helpful discussion and his interest in this paper.

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