

MOTLEYIA, A NEW GENUS OF THE RUBIACEAE FROM BORNEO

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SUMMARY

The monotypic genus *Motleyia* (Rubiaceae) and the species *M. borneensis* are described on material from NW. Borneo. It is similar to *Prismatomeris*, from which it differs by the morphology of stipules, leaves, flowers, fruits and pollen grains and the occurrence of colleter inside the calyx limb.

INTRODUCTION

While preparing a taxonomic revision of the genus *Prismatomeris* Thw., I came across a number of undetermined or misidentified collections of a new species of Rubiaceae. Flowers and unripe fruits in different stages of development were abundant. Though rather similar to *Prismatomeris*, the species could not be included in this genus. The stipules, leaves, flowers, fruits and pollen grains are also different from those found in *Prismatomeris*. The species does not fit into any other known genus and therefore must be placed in a new genus.

So far it seems to have been collected only in Sabah and Sarawak on NW. Borneo. Probably it occurs also in the badly underinvestigated virgin forests of Indonesian Borneo. The urgent need for conservation and research on this island cannot be over-emphasized.

I have named the genus in order to commemorate Mr. J. Motley, who was the first botanist that collected this new species in the middle of the 19th century.

MOTLEYIA J. T. Johansson, *gen. nov.*

Generi Rubiacearum *Prismatomeris* affinis, a quo imprimis differt stipulis majoribus, tubo calycis intus colleteribus numerosis, lobis corollae obtusioribus, stylo longiore, luminibus pollinum granorum majoribus et columellis luminorum pluribus. – Arbor ramulis porcatis cortice externo caduco. Rhaphides numerosae. Stipulae lignescentes, profunde 2-lobatae; lobi anguste triangulares, acuti. Folia decussata, petiolata, integra; nervi in pagina inferiore prominuli; domatia absentia. Inflorescentiae umbelliformes, terminales, multiflorae; bractee 2, basi inflorescentiae affixae, denticulatae, colleteriferae; flores pedicellati. Calyx campanulatus; calycis limbus denticulatus, intus colleteribus numerosis. Corolla hypocrateriformis, 5-lobata, glabra; lobi valvati,

ovati, late acuti, triquetri. Stamina 5, inclusa, tubo corollae supra medium inserta, glabra; antherae anguste oblongae, glabrae, introrsae, infra medium dorsifixae. Pollinis grana 3-colporata, sphaerica, sexinio reticulato, luminibus magnis columellis numerosis. Stylus teres, filiformis, glaber; stigma cum summa parte styli exsertum, 2-lobatum lobis plus minusve erectis. Ovarium 2-loculare loculis 1-ovulatis. Drupa 2-seminalis, globosa vel subglobosa. – Typus generis: *Motleyia borneensis* J. T. Johansson.

Small to medium-sized trees. Young branches with 2 longitudinal ridges running from between petioles at one node to leaf axils of next lower node. *Bark* glabrous or puberulous on distal parts of young branchlets; epidermis on young branches yellowish brown or chestnut-brown, smooth and shiny, splitting and peeling in flakes from older branches. *Raphides* abundant. *Stipules* (fig. 1b) persistent on young branches, early lignified, narrowly triangular, dark brown or chestnut-brown or yellowish brown; stipular lobes basally connate in pairs between base of petiole, sometimes slightly bifid or laterally denticulate, apex narrowly or broadly acute, as young with colleters; lobes often converging and eventually overlapping in leaf axil; stipules subtending peduncle shorter than lower stipules and often with somewhat larger and more numerous denticles; colleters abundant inside basal part of stipules. *Leaves* decussate on vertical branches, distichous on horizontal branches, petiolate, entire; venation brochidodromous, with primary and secondary veins prominent on abaxial side of lamina; stomata paracytic; domatia absent; bacterial nodules not seen. *Flowers* in terminal, umbel-shaped, pedunculate or sometimes sessile, many-flowered cymes; bracts of inflorescence 2, at apex of peduncle, denticulate, with colleters along margin; flowers pedicellate; pedicels simple or sometimes 2 pedicels partially or completely connate; ovaries simple or sometimes 2 ovaries connate. *Calyx* including ovary campanulate; calyx limb usually 5-dentate, persistent in fruit, with numerous cushion-shaped colleters on inner side; calyx teeth triangular, acute. *Corolla* hypocrateriform, 5-lobate, glabrous; lobes valvate, ovate, broadly acute at apex, with a longitudinal ridge on distal part of adaxial side. *Stamens* 5, included, inserted with free part of their filaments above middle of corolla tube; filaments glabrous; anthers included, erect, narrowly oblong, glabrous, introrse, dorsifixed below middle, dehiscent along their whole length by longitudinal slits; connective not prolonged. *Pollen grains* tricolporate, spheroidal; sexine reticulately sculptured; lumina large with numerous luminal processes. *Disc* annular, present between base of corolla tube and base of style, persistent in fruit. *Style* terete, filiform, glabrous. *Stigma* exserted together with uppermost part of style, 2-lobed; lobes minutely papillose, more or less erect, obtuse. *Ovary* inferior, 2-locular; locules 1-ovuled; funicle inserted above middle of septum; ovule anatropous, apotropous, ascending. *Drupe* globose to subglobose, 2-seeded; mesocarp carnosae; endocarp thin.

Motleyia borneensis J. T. Johansson, *spec. nov.* – Fig. 1, 2.

Arbor, ad c. 14 m alta. Stipulae c. 3–14.5 mm longae. Petioli 11–28 mm longi. Folia elliptica vel obovata vel ovata, chartacea vel subcoriacea, 7.5–27 cm longa, 3–10.5 cm lata, glabra, acuta vel acuminata acumine ad c. 2 cm longa; nervis secundariis 7–13. Inflorescentiae multiflorae;

pedicelli simplices vel 2-ramulosi, 3–14 mm longi et 0.6–1.2 mm lati, puberuli. Ovaria simplicia vel bina connata. Calycis tubus 1.8–2.4 mm longus et c. 3 mm latus, dentibus ad 1.3 mm longis. Corollae tubus 21–22 mm longus et c. 2 mm latus; lobis 9–11 mm longis et c. 2.5 mm latis. Stamina 8.5–9.5 mm infra apicem tubi corollae affixa; filamenta 0.4–0.6 mm longa; antherae 2.7–3.3 mm longae. Stylus 24–26 mm longus; stigma 2.3–3.3 mm longum. — *T y p u s*: *Hose 87* (K holo; A, K, L, UC iso), Borneo, Sarawak, Baram District, March 1885.

Tree, to c. 14 m. *Stipules* c. 3–14.5 mm long. *Petiole* 11–28 mm long. *Leaves* 7.5–27 by 3–10.5 cm, elliptic, obovate or ovate, chartaceous to slightly coriaceous, glabrous; base usually narrowly cuneate, sometimes broadly cuneate; apex acute or usually acuminate with acumen to c. 2 cm long; pairs of secondary veins 7–13. *Flowers* 17 to more than 40 in each cyme; pedicels 3–9 mm long and 0.6–0.7 mm

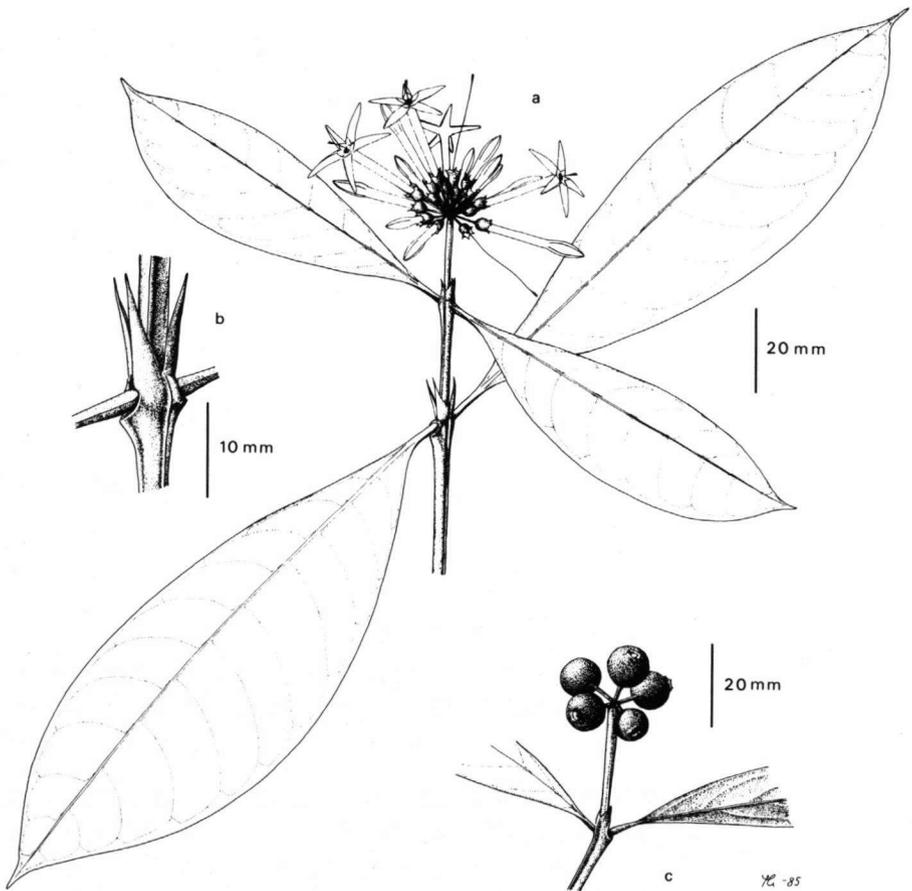


Fig. 1. *Motleyia borneensis* J. T. Johansson. a. Flowering branch; b. stipule; c. part of fruiting branch (a, b *Hose 87*; c *Sibat anak Luang S 22823*).

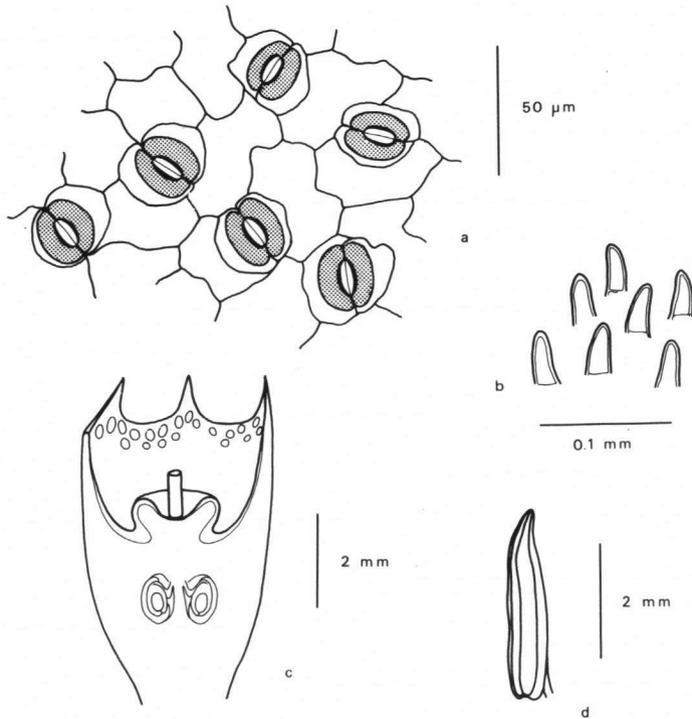


Fig. 2. *Motleyia borneensis* J. T. Johansson. a. Part of abaxial side of lamina with stomata; b. papilla-shaped unicellular hairs of pedicel; c. calyx and ovary in longitudinal section, colleter on upper part of calyx limb; d. stamen (a Dewol & Talib SAN 80437; b, c Hose 87; d Mohidin S 21665).

in diameter in flower, to 14 mm long and 1–1.2 mm in diameter in fruit, simple or sometimes 2 pedicels connate. Peduncles and pedicels with dense to sparse 0.03–0.04 mm long unicellular papillar hairs. *Ovary* glabrous or sparsely puberulous. *Calyx tube* 1.8–2.4 mm long, c. 3 mm in diameter, glabrous or sparsely puberulous, with numerous colletes inside the limb; calyx teeth less than 0.05 mm to 1.3 mm long, with colletes on inner side. *Corolla tube* 21–22 mm long, c. 2 mm in diameter; corolla lobes 9–11 mm long, 2.5 mm wide; tube 2–2.3 times as long as lobes. *Filaments* 0.4–0.6 mm long, inserted in corolla tube 8.5–9.5 mm from orifice; anthers 2.7–3.3 mm long. *Style* 24–26 mm long; stigma 2.3–3.3 mm long. Ripe fruits not seen.

Distribution. Only known from N. Sarawak and SW. Sabah on Borneo (fig. 4).

Ecology. Virgin and secondary lowland rain forests at 100–200 m. Fl. Jan., March.

Notes. *Motleyia* is probably closely related to *Prismatomeris*. The longitudinally ridged young branches with their peeling shiny epidermis, the basally connate stipular lobes, the umbel-shaped cymes and the similar flowers (fig. 1a) are characters shared with *Prismatomeris*. There are several differences, however. The leaves are

somewhat thinner in *Motleyia* and the veins are distinctly prominent on the abaxial side. The stipular lobes are larger than those in *Prismatomeris* and become lignified at an early stage. During growth the lobes often converge in the leaf-axil and ultimately overlap one another. A similar development occurs also in *Zeuxanthe*. The upper and lower epidermis of the lamina have been investigated under the light microscope. The cuticle of the adaxial side of the lamina is striated with abundant parallel, narrow, anastomosing striae. Such striation has not been observed on the cuticle of the abaxial side of the lamina. The epidermal cell walls are more or less sinuate or curved. Numerous stomata, 22–26 μm long, are more or less evenly distributed on the intercostal areas of the abaxial side of the lamina. The stomata are paracytic with two subsidiary cells (fig. 2a). In *Motleyia* colleters are abundant at the nodes inside the stipules, on the margin of the stipules and the inflorescence bracts and on the inner side of the calyx limb, but they are absent from the rim of the calyx. They seem to be of the common type in Rubiaceae (Lersten, 1974a, b; 1975) and are more or less finger-shaped to cushion-shaped with central elongate axial cells and an epidermis layer. In *Prismatomeris* colleters occur copiously inside the stipules at the nodes of the branchlets and on the bracts but they are always lacking on the inner side of the calyx tube. In a few species they occur along the calyx rim. The corolla lobes are similar to those in *Prismatomeris*, with a small longitudinal ridge on the distal part of the adaxial side. In *Motleyia* they are more obtuse than in *Prismatomeris* and are less than half as long as the corolla tube. Flowers are present in only two collections (*Hose 87*, *Mohidin S 21665*). Their style is long with the stigma reaching several millimeters beyond the corolla tube. In *Prismatomeris*, which is diheterostylous, the stigma of longistylous specimens does not reach or reaches only slightly beyond the orifice of

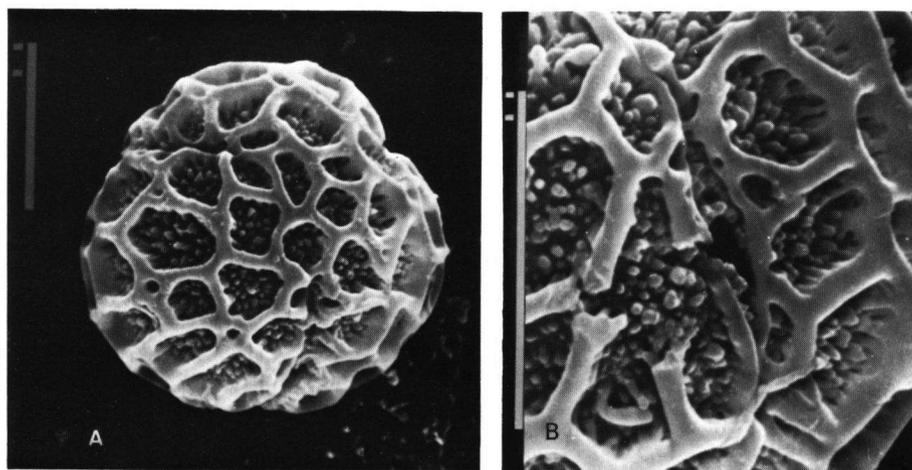


Fig. 3. Pollen grains of *Motleyia borneensis* J.T. Johansson (*Hose 87*). A. oblique polar view; B. aperture. Scale 10 μm .

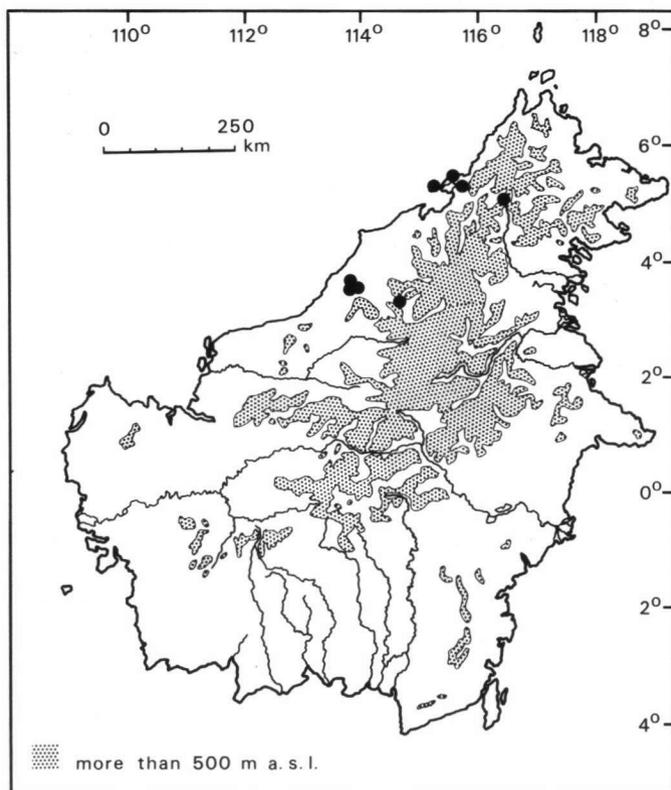


Fig. 4. Collecting sites of *Motleyia borneensis* J.T. Johansson on Borneo.

the corolla. No brevistylous specimens of *Motleyia* have been seen by me, but this genus is probably diheterostylous. Heterostyly is reported from a large number of genera in Rubiaceae (Verdcourt, 1958; Ganders, 1979).

The pollen grains (fig. 3) have been investigated under the light microscope and in scanning electron microscope following acetolysis. The pollen grains are tricolporate, radially symmetrical and isopolar. P and E are c. 20–28 μm and the amb is circular. The aperture consists of a narrow colpus and a lolongate os. The sexine is reticulate and c. 2–3 μm thick at the centre of mesocolpia. The sexine is approximately twice as thick as the nexine. The lumina are c. 1–7 μm in diameter, rounded to angular and provided with up to c. 50–60 luminal processes. The muri are 0.5–1.1 μm wide, straight to sinuate. The pollen morphology resembles that in *Prismatomeris*, but in *Motleyia* the lumina of the sexine are fewer and larger and the number of processes in each lumen is much larger. As in *Prismatomeris* the fruit is a drupe with a carnosous mesocarp and a thin endocarp. I have only seen unripe drupes in *Motleyia*, which have two flattened seeds. In *Prismatomeris* usually only one of the two ovules present in the ovary develops into a seed.

Valvate aestivation, presence of raphides and uniovulate locules are characters connecting *Motleyia* to the subfamily Rubioideae (Bremekamp, 1966). In two collections (*Hose 87*, *Dewol & Talib SAN 80437*) some of the pedicels are partially connate in pairs and in another specimen (*Motley 132*) two of the ovaries are connate and developed into a syncarp. Connate ovaries occur also in *Prismatomeris*, in which several species occasionally or rarely have some of the pedicels and ovaries partially or completely connate in pairs. The connate ovaries represent the main feature uniting the genera of the tribe Morindeae, to which *Prismatomeris* has been assigned. Connate ovaries occur in many genera in different tribes of Rubiaceae (Bremekamp, 1966; Weberling, 1977; Ridsdale, 1978) and the fusion has probably developed independently many times in the family. Thus it is indeed doubtful whether it should be used as a distinguishing character of one particular tribe.

Collections other than the type. — S a b a h: Interior Res., Beaufort Dist., mile 9 Sipitang Road, virgin jungle on ridge hill, May 1963, Madani SAN 35160 (K, L). — Beaufort Dist., Kuala Penyu, Kepayan For. Res., secondary forest, March 1976, Dewol & Talib SAN 80437 (K, KEP, L, SAR). — Keningau Dist., mile 16 Nabawan Keningau Road, side of hill ridge, primary forest, July 1976, Sundaling SAN 83761 (K, KEP, L, SAR). — W. Coast Res., Labuan, Motley 132 (K). — S a r a w a k: 4th Div., G. Subis area, Niah, Jan. 1961, Mohidin S 21665 (K, SAR). — Bukit Mentagai, Bok-Tisam, on ridge, 100 m, May 1965, Sibat anak Luang S 22823 (K, L). — Ulu Sungei Batu, Niah, Miri, on hillside in mixed Dipterocarp forest, 200 m, July 1977, Paie S 39022 (K, KEP, L, SAR).

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