

Three new species in the Achariaceae from Peninsular Malaysia

C.M. Pannell^{1,2,3}

¹Department of Biology, University of Oxford,
South Parks Road, Oxford, OX1 3RB, UK

²Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, UK

³Queen's University Belfast, Marine Laboratory, 12-13 The Strand,
Portaferry, Co Down, BT22 1PF, UK
caroline.pannell@biology.ox.ac.uk

ABSTRACT. One new species of *Hydnocarpus* Gaertn. and two new species of *Ryparosa* Blume from Peninsular Malaysia are described. *Hydnocarpus perakensis* Pannell is most similar to *H. nanus* King, but its fruits are larger and the leaves are hairy. *Ryparosa suboppositifolia* Pannell is most like *R. acuminata* Merr., but its leaves are not glaucous and it has an indumentum of white medifixed hairs. *Ryparosa reticulata* Pannell is also most like *R. acuminata* Merr., but it differs in its indumentum of numerous adpressed orange-brown T-shaped hairs on the lower leaf surface, the leaves have up to 6 veins that are closer together and less steeply ascending, and the stamen filaments are free, whereas they form a tube in *R. acuminata*.

Keywords. Flora of Peninsular Malaysia, *Hydnocarpus*, indumentum, *Ryparosa*

Introduction

The genus *Hydnocarpus* Gaertn. consists of about 44 species in Sri Lanka, Western Ghats of India, Myanmar, Assam, Thailand, Laos, Cambodia, Sumatra and Peninsular Malaysia (Pannell, in prep.). There are 10 species in Peninsular Malaysia (Pannell, in prep.), including *Hydnocarpus perakensis* Pannell, newly described here.

The genus *Ryparosa* Merr. consists of about 23 species in Thailand, the Andaman and Nicobar Islands, throughout Malesia and Australia (Pannell, in prep.). There are seven species in Peninsular Malaysia (Pannell, in prep.), including two species newly described here.

Both genera formerly belonged to the family Flacourtiaceae, treated for *Flora Malesiana* by Sleumer (1954), for the *Tree Flora of Malaya* by Whitmore (1973), for the *Wayside Trees of Malaya* by Corner (1988), and for the *Manual of Forest Fruits, Seeds & Seedlings* by Ng (1991). Webber & Woodrow (2006) resolved the *Ryparosa javanica* (Blume) Kurz ex Koord. & Valeton complex, Harwood & Webber (2015) revised the family Achariaceae for the *Flora of Thailand*, and a well-illustrated account is included in *Forest Trees of Southern Thailand* by Gardner et al. (2015). The three new species described here were recognised in the course of revising the family Achariaceae for the *Flora of Peninsular Malaysia*.

New species

1. *Hydnocarpus perakensis* Pannell, *sp. nov.*

Like *Hydnocarpus nanus* King, the fruits of *H. perakensis* have a thin, brittle pericarp, but *H. perakensis* is distinguished from *H. nanus* by its larger fruits and hairy leaves.

– TYPE: Peninsular Malaysia, Perak, Kinta Hills Forest Reserve, 300 m, 12 October 1966, Ramli Zainuddin KEP 99751 (holotype KEP [KEP157782]; isotypes A, L [L.2470274], SING [SING0185056]). (Fig. 1)

Small tree to 3 m tall, trunk c. 10 cm diam. **Twigs** reddish brown, smooth, with numerous pale brown patent hairs. **Stipules** on twig either side of base of petiole, lanceolate, c. 5 × 1.5 mm, densely hairy. **Leaves** with petiole to 1 cm long with a medium to dense covering of pale brown patent hairs; lamina elliptic, 6–14 × 2.5–4 cm, base cuneate to rounded, apex acuminate, the acute acumen to 12 mm long, margin entire, with numerous pale brown hairs of varying lengths patent to the leaf surface on veins and reticulation and on lamina in between below, numerous to dense on midrib above; lateral veins 7–12 ascending and curved upwards near the margin. **Flowers** not seen. **Fruits** borne singly in axils of leaves, subglobose, 3.8–4.5 cm diam.; peduncles to 1 cm long, densely covered with short simple hairs and with a few stellate scales interspersed, glabrescent; pericarp yellow, c. 1 mm thick, with c. 6 dark brownish black seeds in the single locule, densely covered with hairs like those on the peduncle, but slightly longer. **Seeds** of irregular shape packed together in the single locule, 17–18 × 8–14 × 9–10 mm.

Distribution. Only recorded from Peninsular Malaysia where it is known from Perak (Kinta Hills Forest Reserve) and Terengganu.

Ecology. Hill forest, to 300 m.

Additional specimens examined. PENINSULAR MALAYSIA: **Terengganu:** Sungei Loh, near Kuala Datok, 60 m, 6 Jul 1968, Cockburn FRI 10750 (KEP [KEP157760], L [L.2470397]).

2. *Ryparosa suboppositifolia* Pannell, *sp. nov.*

Similar to *Ryparosa acuminata* Merr. in its subopposite leaves but differing in the lower leaf surface not glaucous and indumentum of white medifixed hairs (lower leaf surface glaucous and indumentum of orange-brown simple hairs, sometimes interspersed with a few medifixed hairs in *R. acuminata*). – TYPE: Peninsular Malaysia, Negri Sembilan, Kuala Pilah, Pasoh Forest Reserve, Plot 1, 2 December 1975, Mat Asri FRI 21651 (holotype KEP [KEP89952]). (Fig. 2)

Tree to 24 m tall, trunk 30(–39) cm diam., crown uneven and bushy; bole straight, fluted, with small or steep buttresses. **Bark** smooth, shallowly fissured, slightly pitted or flaking in angular scales 3–4 cm across, reddish brown or blackish brown with

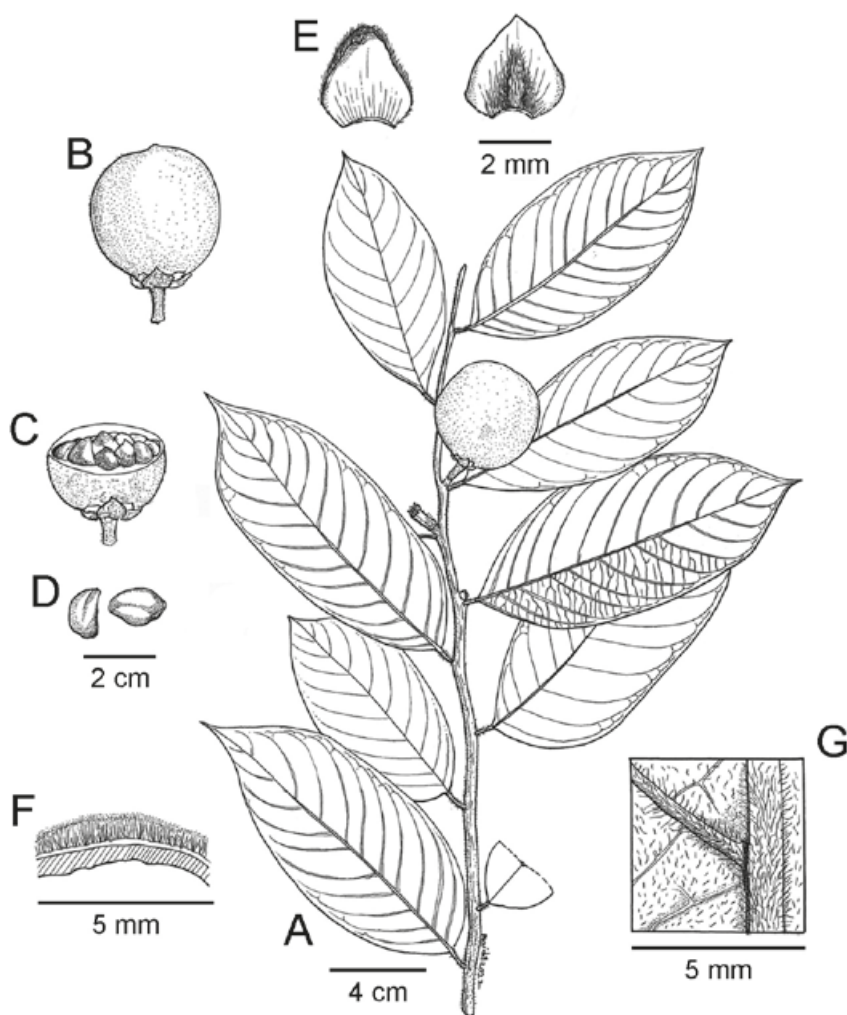


Fig. 1. *Hydnocarpus perakensis* Pannell. **A.** Leafy shoot with fruit. **B.** Fruit. **C.** Half-fruit showing seeds. **D.** Seeds. **E.** Inner and outer surfaces of sepals. **F.** Section through pericarp showing the dense indumentum of simple patent hairs. **G.** Lower leaf surface showing the indumentum of simple hairs. All from *Cockburn FRI 10750*. Drawn by Mohamad Aidil B. Noordin.

large lenticels, inner bark brown, pink, yellow or reddish brown. **Sapwood** pale brown or yellowish brown, smelling strongly of bitter almonds. **Twigs** dark greyish brown, densely covered with adpressed pale brown simple hairs, glabrescent. **Leaves** borne on long straight twigs, subopposite, occasionally with a short side-branch in the axil of one of the leaves; petiole 0.5–2 cm long, with pulvinus at both ends, the distal one curved, densely covered with adpressed pale brown simple hairs when young, glabrescent; lamina elliptic, 8.5–18 × 3–9 cm, cuneate at base, acuminate at apex, the obtuse acumen to 7 mm long, margin entire, dull brown or brownish green when dry, with numerous

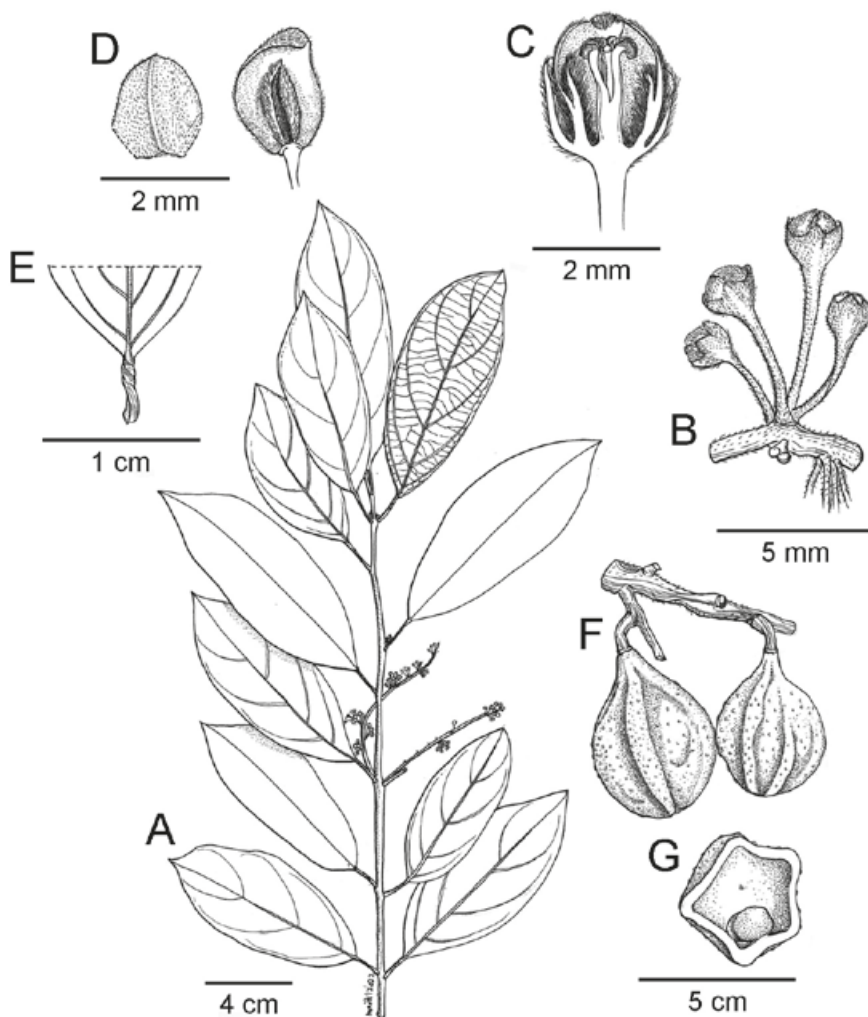


Fig. 2. *Ryparosa suboppositifolia* Pannell. **A.** Leafy shoot with male inflorescences. **B.** Part of male inflorescence. **C.** Longitudinal section of male flower. **D.** Outer and inner surfaces of petal of male flower. **E.** Petiole with twisted distal pulvinus. **F.** Fruits. **G.** Cross section of fruit. A–E from Selvaraj FRI 11132; F, G from Suppiah FRI 14766. Drawn by Mohamad Aidil B. Noordin.

to scattered white simple and medifixed (T-shaped) hairs adpressed to lower surface; lateral veins (4–)5–6 pairs, curved and diverging from the midrib at a wide angle, not anastomosing, midrib and lateral veins slightly depressed and reticulation barely visible or slightly prominent above, midrib prominent and lateral veins subprominent below and reticulation barely visible. **Male inflorescences** axillary racemes, 7–11.5 cm long; peduncle to 2 cm long; rachis with regularly spaced fascicles of 2 or 3 short branches each bearing 2–6 flowers; branches 1.5–2 mm long; each branch subtended by a triangular bract c. 1×1 mm; the peduncle rachis and branches with numerous

adpressed simple reddish brown hairs. **Male flowers** c. 3.5 mm diam., pedicel c. 0.5 mm long; the rachis, bracts, pedicels and outside of calyx densely covered with reddish brown or orange-brown simple hairs; calyx cup-shaped divided to about halfway into 5 subrotund lobes; petals 5, suborbicular, concave, c. 2×2 mm, each with a large petal scale lying on the inner surface, the scale c. 1.5×1.5 mm and densely covered with pale orange-brown simple hairs; androecium c. 2.5×2 mm, staminal tube c. 1 mm diam., divided to about halfway into separate filaments, anthers ellipsoid, c. 0.5×0.5 mm, medifixed and both ends recurved over the apex of the filament, the narrow inner surface of each filament densely covered with pale orange-brown simple hairs. **Female inflorescences** supra-axillary, simple spikes, c. 4.5 cm long, sessile; bracts, pedicels and outside of calyx with numerous reddish brown simple hairs. **Female flowers** c. 4×7 mm, pedicel c. 1.5 mm long, subtended by a small triangular bract c. 1×1 mm; calyx c. 2.5×5 mm, divided for three quarters of length into 4 broad rounded lobes; petals 5, elliptic, concave, c. 4×3 mm, with a medium to dense covering of simple pale yellowish brown hairs, with a large petal scale lying on the inner surface of each petal, the scale densely covered with hairs similar in colour to those on the petals, but longer; staminodes 4, consisting of a short vestigial filament, c. 1×0.5 mm, ovoid, glabrous, adpressed to ovary at the base; ovary c. 3×1.5 mm, narrowly ellipsoid, with 5 longitudinal lobes, densely covered with pale yellowish brown simple hairs, with three broad, cordate, sessile stigmas reflexed and lying parallel with the apical surface of the ovary, ovules 3. **Infructescences** borne on twigs on stout glabrous peduncles 4–10 cm long. **Fruits** c. 6.5×4 cm, obovoid, irregularly lobed, with a short stipe at the base, pedicel c. 1.4 cm long; pericarp brown or blackish brown, thick and woody when dry, yellow with a rough surface when fresh, glabrous, with numerous round orange-brown lenticels. **Seeds** 1 or 2.

Distribution. Only known from Peninsular Malaysia, where it is recorded from Perak (Gunong Bubu), Selangor (Ulu Gombak FR and Bt Lagong FR), Negeri Sembilan (Pasoh FR and Jelebu), Pahang (Kampong Aur) and Johor (Endau-Rompin State Park).

Ecology. Lowland forest to 460 m.

Vernacular name. *Stempul*.

Additional specimens examined. PENINSULAR MALAYSIA: **Perak:** Kuala Kangsar, Bubu FR, Gunong Bubu, Compt 47, 17 Jun 1969, *Selvaraj FRI 11132* (K, KEP [KEP157839], SING [SING0185362]). **Terengganu:** Besut, G. Tebu FR, Block B, Compartment 64, 11 Nov 1971, *Zainudin FRI 17926* (KEP [KEP157842], SING [SING0185363]). **Pahang:** 6 miles south of Kampong Aur, 18 Feb 1971, *Suppiah FRI 14766* (KEP [KEP157825], SING [SING0185364]). **Selangor:** Bukit Lagong FR, 275 m, 17 Dec 1960, *Ahmad KEP97713* (K, SING [SING0185365]); Gombak, Ulu Gombak FR, New Highway, 5th mile, 22 Feb 1978, *Pannell 1018* (FHO, KEP [KEP157840]). **Johor:** Mersing, Endau-Rompin S.P., Sungai Kemamuk, $2^{\circ}32'N$ $103^{\circ}23'E$, 50 m, 23 Nov 2011, *Yao et al. FRI 65636* (FHO, KEP [KEP207677]); Labis FR, $2^{\circ}22'59"N$ $103^{\circ}1'59"E$, 24 Feb 1989, *Khairuddin 32846* (KEP [KEP157834, KEP157984]).

3. *Ryparosa reticulata* Pannell, **sp. nov.**

Similar to *Ryparosa acuminata* Merr. but differing in its indumentum of numerous adpressed pale orange-brown medifixed hairs on the lower leaf surface (vs indumentum of orange-brown simple hairs, sometimes interspersed with a few medifixed hairs, in *R. acuminata*), 5–6 veins (vs 4–5 in *R. acuminata*) that are closer together and less steeply ascending, more prominent intercostals, brown lower leaf surface when dry (vs pale and glaucous in *R. acuminata*), stamen filaments free (vs they form a tube in *R. acuminata*), and fruits borne on old twigs (vs axils of the leaves in *R. acuminata*). – TYPE: [Peninsular Malaysia, Selangor-Pahang border], Ginting Simpah [Genting Sempah], 600 m, 24 November 1926, *E.J. Strugnell FMS 12138* (holotype SING [SING0185327]; isotypes K, SING [SING0185329]).

Tree to 12 m tall. **Twigs** pale brown, longitudinally channelled, with numerous pale orange-brown simple hairs. **Leaves** alternate; petioles 1.5–3.5 cm long, with pulvinus at each end, often bent at the distal one; lamina elliptic, oblanceolate or obovate, 8–18 × 3–8 cm, base cuneate or rounded, apex acuminate, the obtuse acumen c. 0.5 cm long, margin thickened and entire, lower surface brown when dry, with numerous pale orange-brown medifixed (T-shaped) hairs adpressed to the lower surface; lateral veins 5–6, ascending and curved near the margin, not quite anastomosing, reticulation patent to midrib and lateral veins, midrib and lateral veins slightly depressed and reticulation slightly prominent above, midrib and lateral veins prominent below and reticulation subprominent. **Male inflorescence** on twigs to 6 mm diam., a pendent raceme, to 27 cm long, with numerous pale brown simple hairs. **Male flower** bud subglobose, c. 1.5 × 1.5 mm, pedicel c. 1.5 mm long, subtended by a single ovate concave hairy bract c. 1 × 1 mm; calyx subglobose, with 4 shallow lobes, numerous simple hairs adpressed on outside at base, with few in upper half; petals 4, scales 4 opposite petals and densely hairy; stamens 4, free, with thick filaments, the anthers curved and reflexed to lie parallel with the filament. **Infructescences** on old twigs, each with one fruit; peduncle 2–2.4 cm long. **Fruits** 3–7 cm diam.

Distribution. Only known from Peninsular Malaysia, where it is recorded from Perak (Taiping Hill) and the Selangor-Pahang borders (Genting Sempah) in Peninsular Malaysia.

Ecology. Forest at altitudes of 600–750 m.

Additional specimens examined. PENINSULAR MALAYSIA: **Perak:** Taiping Hill, 750 m, 17 Feb 1917, *Nur SFN 2379* (K, SING [SING0185328]).

Notes. Free stamens are unusual in the genus *Ryparosa* but are also found in *R. kostermansii* Sleumer and *R. hirsuta* J.J.Sm. from Borneo (S. Zmarzty, pers. comm.).

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