

## Five species of *Ficus* (Moraceae) new for Thailand

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ABSTRACT. Five species of *Ficus* L.: *F. araneosa* King, *F. binnendijkii* (Miq.) Miq., *F. depressa* Blume, *F. dubia* Wall. ex King and *F. beccarii* King are newly recorded for Thailand. All species are described and illustrated.

### INTRODUCTION

In 2002 and 2003 a project on the investigation of species diversity of *Ficus* L. in Hala-Bala Wildlife Sanctuary was launched and seven unusual species of *Ficus* were collected from Bala forest, Narathiwat, Thailand (Table 1). The identifications were confirmed using the monumental works of Berg (2003a, 2003b, 2003c, 2003d, 2004), Berg and Corner (2005) Corner (1960, 1961, 1965), King (1887, 1888) and Ridley (1924). Five species are herein identified as new for Thailand (Table 1) and are keyed out to subgenus or section below. The identities of the other two species of sect. *Sycocarpus*, which are likely to be new for Thailand, are still under investigation. Specimens are deposited in the herbarium of the Thailand Natural History Museum (THNHM).

The Bala forest is a part of Hala-Bala Wildlife Sanctuary, in Narathiwat and Yala provinces, peninsular Thailand. The area is adjacent to Balum forest, Perak, Peninsular Malaysia. The vegetation type is tropical evergreen rain forest at an elevation of about 100–950 m.

#### KEY TO SUBGENUS/SECTION FOR THE 5 *FICUS* SPECIES NEW FOR THAILAND

1. Plants monoecious; the fig containing pistillate flowers with different style lengths and staminate (or neuter) flowers; leaves usually spirally arranged Subg. **Urostigma**
1. Plant (gyno)dioecious; the figs containing either staminate and pistillate flowers with short styles or only pistillate flowers with long styles (or also neuter flowers); leaves often distichous or (sub)opposite
  2. Root-climbers, usually with pronounced leaf dimorphy (leaves usually asymmetric), stamens 2 (or 3) Subg. **Synoecia** Sect. **Rhizocladus**
  2. Tree or shrubs without aerial roots and without leaf dimorphy, lamina hairy and/or the margin dentate to denticulate, waxy glands mostly in the axils of lateral veins in the middle of the lamina Subg. **Sycomor** Sect. **Sycocarpus**

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FICUS subgenus SYNOECIA section RHIZOCLADUS

**Ficus araneosa** King in Ann. Roy. Bot. Gard. (Calcutta) 1(2): 136, t. 170. 1888; Ridl., Fl. Malay Penins. 3: 345. 1924; Berg & Corner in Fl. Males. 17(2): 522–523. 2005. Figs. 1, 6A.

Root-climber. Young branches densely covered with grey-villous hairs, old glabrous. Leafy twig 3–3.5 mm thick. Leaves distichous; lamina elliptic to ovate, 6.5–9 x 2.5–3.6 cm, symmetric, coriaceous, apex acute to acuminate, base rounded, margin entire, revolute; upper surface glabrous or tomentose on the midrib, lower surface densely grey-villous; lateral veins 4–5 pairs, the basal pair up to 1/2–3/5 the length of the lamina, tertiary venation reticulate, areoles small; waxy gland in the axils of the basal lateral veins and axils of some other lateral veins; petiole 0.7–1 cm long, densely grey villous, stipules 0.6–0.8 cm long, with dense grey tomentum, caducous. Figs axillary, in pairs or clustered, also on minute spurs just below the leaves; subsessile; basal bracts 0.5–1 mm long, persistent; receptacle subglobose to obovoid, 0.6–0.8 cm. in diameter when fresh, 0.5–0.6 cm in diameter when dry, densely whitish villous, yellow at maturity; apex convex, ostiole 0.5–1 mm in diameter; male flowers ostiolar, with 4 tepals, stamens 2; female flowers with 4 tepals, ovary oblongoid; gall flowers with 4 tepals, ovary ovoid-oblongoid.

Thailand.— PENINSULAR: Narathiwat [Ban Bala, Waeng district, altitude about 100–350 m, 19 April 2003, *Bhanu* 190403-1 (THNHM)].

Distribution.— Peninsular Malaysia (Perak), Sumatra (Sibolangit).

Ecology.— Tropical evergreen rain forest.

FICUS subgenus UROSTIGMA

KEY TO THE NEWLY DISCOVERED SPECIES

- |   |                        |
|---|------------------------|
| 1. Figs pedunculate                             | <b>F. depressa</b>     |
| 1. Figs sessile                                 |                        |
| 2. Receptacle 0.4–0.5 cm in diameter when fresh | <b>F. binnendijkii</b> |
| 2. Receptacle 2–3 cm in diameter when fresh     | <b>F. dubia</b>        |

**Ficus binnendijkii** (Miq.) Miq., Ann. Mus. Bot. Lugd. Bat. 3: 288. 1867; Ridl., Fl. Malay Penins. 3: 336. 1924; Berg & Corner in Fl. Males. 17(2): 633–634. 2005. Figs. 2, 6B.

Tree up to 35 m tall, hemi-epiphytic, secondarily terrestrial. Leafy twig 1.5–2 mm thick, glabrous. Leaves alternate, lamina ovate to lanceolate, 3.5–8.5 x 1.3–2.5 cm, subcoriaceous to coriaceous, apex acuminate, the acumen obtuse to acute, base acute to obtuse, margin entire, both surfaces glabrous; lateral veins 5–7 pairs, the basal pair up to 1/5–2/7 the length of the lamina, tertiary venation parallel to the lateral veins and minutely reticulate, waxy gland at the base of the midrib; petiole 0.4–1 cm long, 1–1.3 mm thick, glabrous, blackish when dry; stipules 0.6–1.1 cm long, glabrous, caducous. Figs axillary, in pairs, sessile; basal bracts 3, 0.5–1 mm long, glabrous, persistent; receptacle globose (subglobose when young), 0.4–0.5 cm in diameter when fresh, 0.3–0.4 cm in diameter when dry, glabrous, white(?) at maturity, apex slightly concave, ostiole 1–1.5 mm in diameter; male flowers pedicellate, scattered all over the receptacle, tepals 3, stamen 1; female flowers sessile, tepals 3, ovary ellipsoid; gall flower sessile, tepals 3, ovary ovoid.

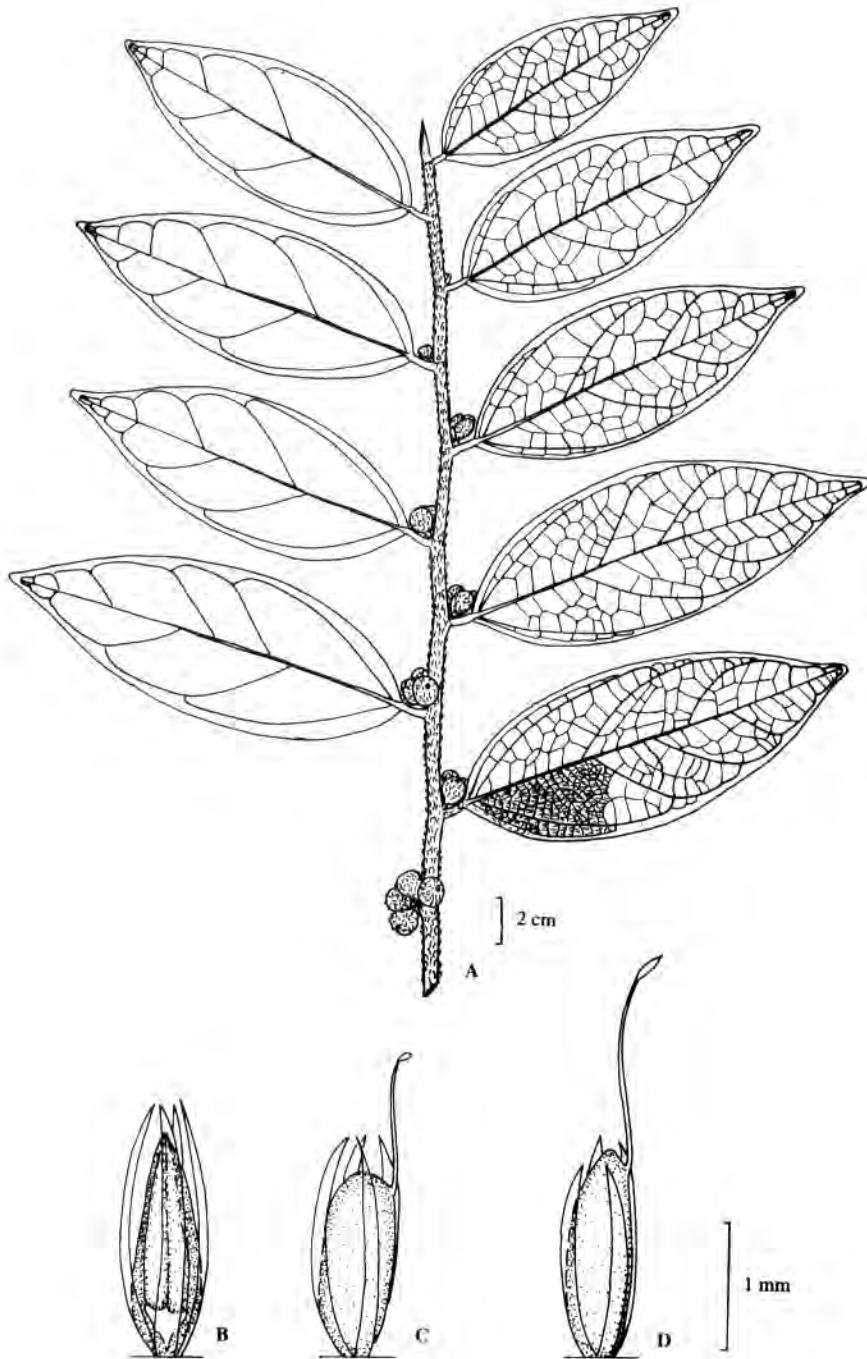


Figure 1. *Ficus araneosa* King: A. branch with syconia; B. male flower; C. gall flower; D. female flower.

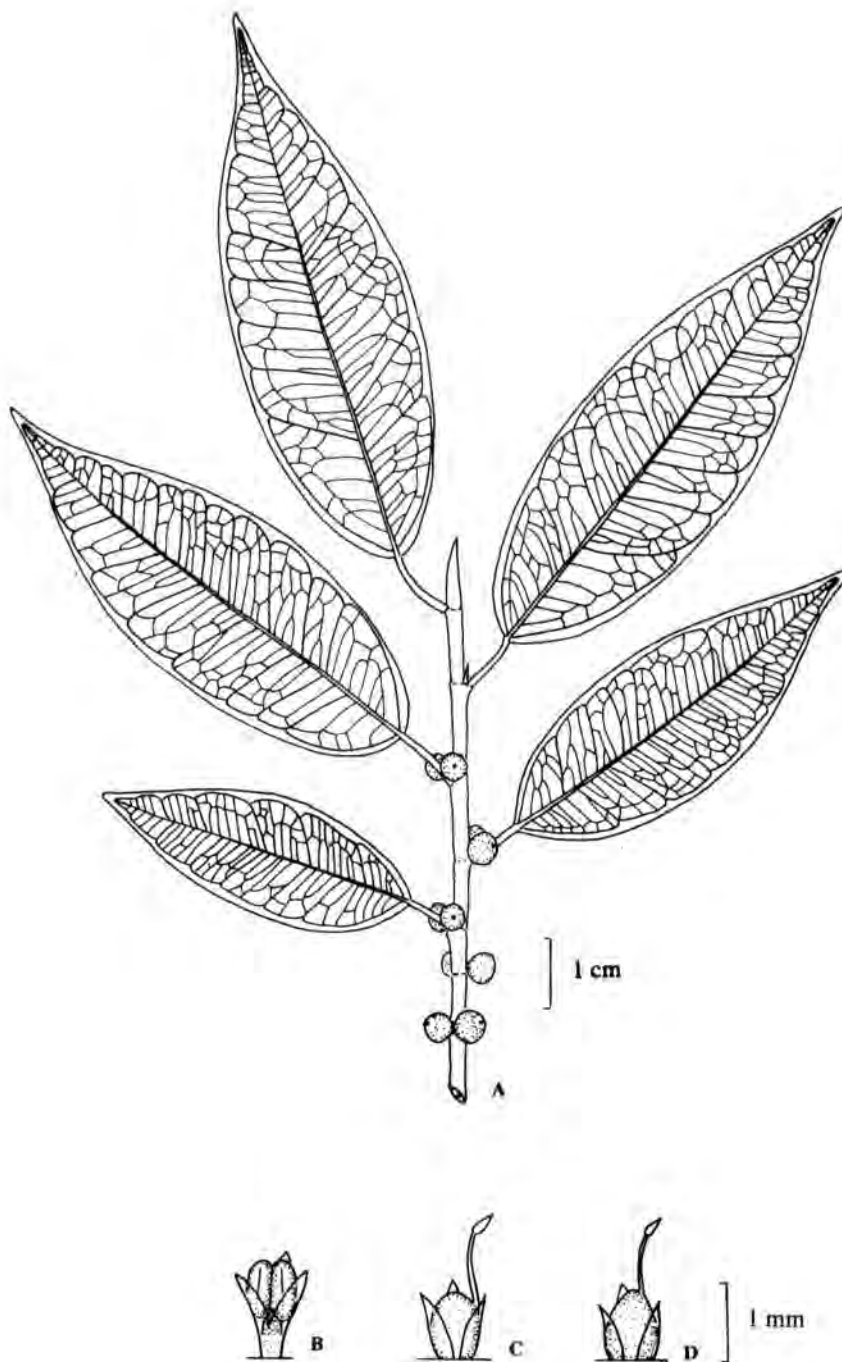


Figure 2. *Ficus binnendijkii* (Miq.) Miq.: A. branch with syconia; B. male flower; C. gall flower; D. female flower.

Thailand.— PENINSULAR: Narathiwat [Ban Ya De, Sukhirin district, altitude 450 m, 14 Dec. 2002, *Bhanu* 141202–6 (THNHM); Ban Phukhaothong, Sukhirin district, altitude 150 m, 16 June 2003, *Bhanu* 160603–1 (THNHM)].

Distribution.— Peninsular Malaysia, Java, Borneo.

Ecology.— Tropical evergreen rain forest.

Note.— In Bala, forest this species is always hemi-epiphytic.

**Ficus depressa** Blume, Cat. 35 (1823); Berg & Corner in Fl. Males. 17(2): 650–651. 2005. Figs. 3, 6C.

Climber, or hemi-epiphytic treelet. Leafy twig 3–4 mm thick, angular, glabrous. Leaves spirally arranged; lamina ovate to oblong, 8–14 x 3–6 cm, coriaceous, apex acute to acuminate, base obtuse to rounded, margin entire and undulate; upper surface glabrous, lower surfaces hairy on the midrib, mainly in the axils of lateral veins, lateral veins 8–10 pairs, the basal pair up to 1/7–1/5 the length of the lamina, tertiary venation reticulate; waxy gland at the base of the midrib; petiole 1.7–2.5 cm long, 1–2 mm thick, glabrous; stipules 1.5–2 cm long, glabrous, caducous. Figs axillary, in pairs or solitary, peduncle 2.5–4.5 cm long, 2–2.5 mm thick, glabrous, basal bracts 3, caducous; receptacle ovoid, 2.2–2.5 cm in diameter when fresh, 1.5–2 cm in diameter when dry, glabrous, pale green to yellow(?) at maturity, apex protruding and ending in three lobes, ostiole 3–5 mm in diameter; male flowers pedicellate, scattered all over the receptacle, tepals 3, stamen 1; female flowers sessile, tepals 3, lanceolate, ovary ovoid, style long, gall flowers tepals 3, ovary globose, style shorter than in the female flowers.

Thailand.— PENINSULAR: Narathiwat [Wildlife Research Station, Waeng district, altitude 270 m, 22 April 2003, *Bhanu* 220403 – 1 (THNHM)].

Distribution.— Peninsular Malaysia, Sumatra, Java, Bali, Sumbawa, Sumba, Borneo and the Philippines.

Ecology.— Tropical evergreen rain forest.

Notes.— In Bala forest, the species is hemi-epiphytic or a climber and the figs remain greenish at maturity. This species resembles the climber *F. globosa* Blume in which the fig receptacle is globose and smaller.

**Ficus dubia** Wall. ex King, Ann. Roy. Bot. Gard. (Calcutta) 1(1): 46, t. 56. 1887; Ridl., Fl. Malay Penins. 3: 333. 1924; Berg & Corner in Fl. Males. 17(2): 653–654. 2005. Figs 4, 6D.

Tree up to 30–35 m tall, hemi-epiphytic, secondarily terrestrial. Leafy twig 3–4.5 mm thick, glabrous. Leaves spiral; lamina elliptic to ovate or to oblong, 10–13 x 4.5–6 cm, coriaceous, apex acute to short-acuminate, base obtuse to rounded, margin entire; both surfaces glabrous, lateral veins 7–9 pairs, the basal pair up to 1/6–1/4 the length of lamina, tertiary venation reticulate; waxy gland at the base of the midrib; petiole 2–3 cm long, 1.5–2 mm thick, glabrous, black when dry; stipules 0.8–1.5 cm long, glabrous, caducous. Figs axillary, in pairs, sessile, basal bracts 3, unequal in size, 2–4 mm long, glabrous, persistent; receptacle subglobose to globose, 2.5–3.5 cm in diameter when fresh, 1.5–2 in diameter when dry, with pseudo-stalk 1.2–1.3 cm long, glabrous, at first green to red then black at

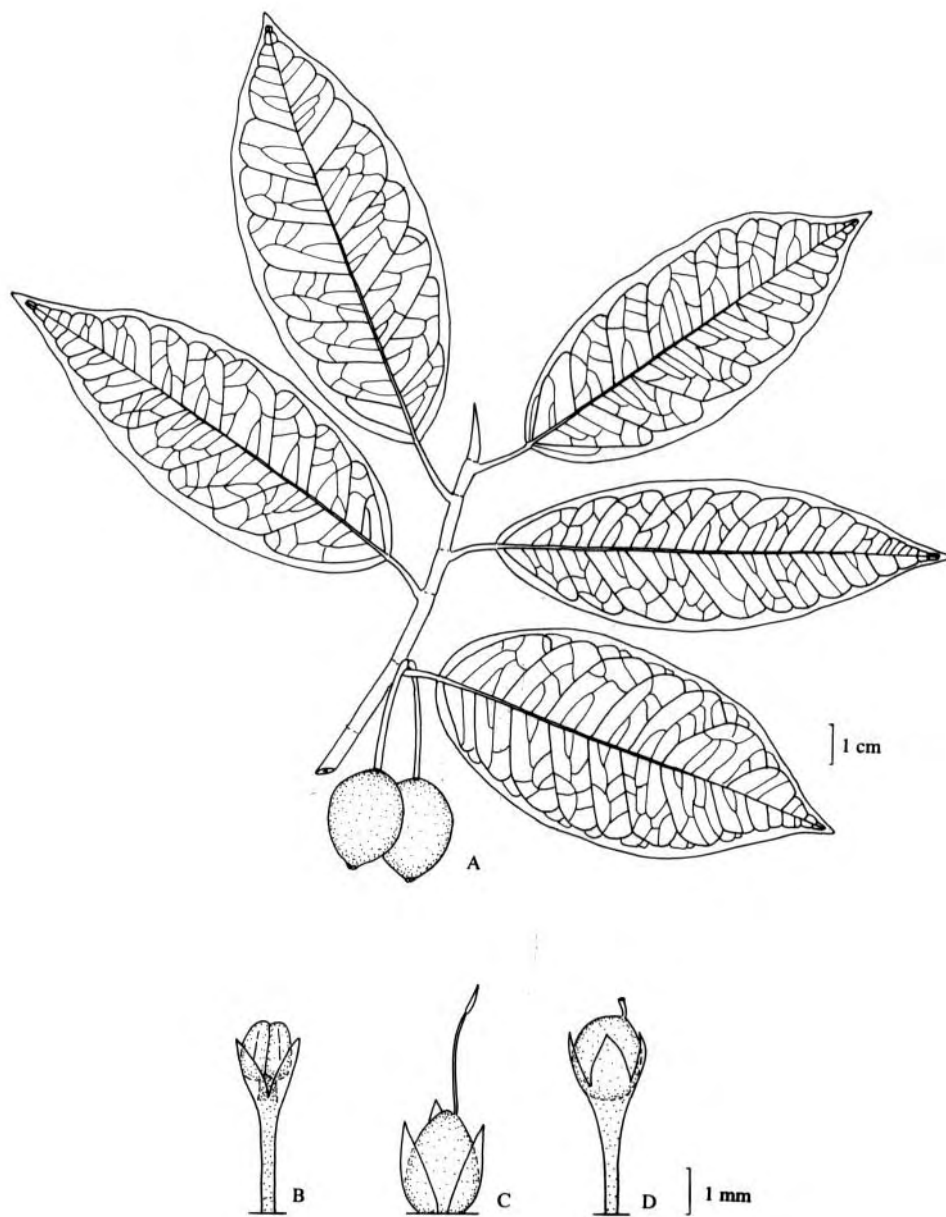


Figure 3. *Ficus depressa* Blume: A. branch with syconia; B. male flower; C. female flower; D. gall flower.

maturity, apex concave, ostiole 2–3 mm in diameter; male flowers pedicellate, scattered all over the receptacle, tepals 3–4, stamen 1; female flowers usually sessile, tepals 3–4, ovary red-dotted; gall flowers pedicellate much longer than in the female flowers, style short.

Thailand.— PENINSULAR: Narathiwat [Ban Bala, Waeng district, altitude about 100 m, 7 Nov. 2002, *Bhanu* 071102–1 (**THNHM**); Ban Phu Khao Thong, Sukhirin district, altitude about 500 m, 23 April 2003, *Bhanu* 230403–2 (**THNHM**)].

Distribution.— Peninsular Malaysia (Penang to Singapore), Sumatra, Brunei, Sabah.

Ecology.— In tropical evergreen rain forest.

Notes.— In Bala forest, the species is always hemi-epiphytic and the figs finally turn black at maturity. *Ficus dubia* is similar to *F. kurzii* King but the receptacle of *F. dubia* is larger than that in *F. kurzii* (usually 1.5–2 cm in diameter when fresh).

### FICUS subgenus SYCOMORUS section SYCOCARPUS

#### KEY TO THE NEWLY DISCOVERED SPECIES

- |   |                    |
|---|--------------------|
| 1. Receptacle subglobose, longitudinally ridged   | <b>Ficus</b> sp. A |
| 1. Receptacle depressed subglobose to subpyriform, lateral bracts numerous, longitudinal ridge absent | <b>F. beccarii</b> |
| 2. Lamina oblong to lanceolate, 25–35 x 4–5 cm, margin entire   |                    |
| 2. Lamina oblong 21–28 x 8.5–11 cm, margin (sub)entire to obscurely dentate                           | <b>Ficus</b> sp. B |

**Ficus beccarii** King in Ann. Roy. Bot. Gard. (Calcutta) 1(2): 102, t. 130. 1888. Fig. 5, 6E, 6F.

Tree up to 7 m. tall, terrestrial. Leafy twig 2–3 mm thick, densely cinnamomous-tomentose. Leaves distichous; lamina oblong to lanceolate, 25–35 x 4–5 cm, asymmetric to symmetric, chartaceous to subcoriaceous, apex caudate, the acumen filiform, base cuneate to rounded, margin entire; upper surface glabrescent, lower surface densely cinnamomous- to brownish-tomentose on the veins, lateral veins 7–9 pairs, the basal pair up to 1/8–1 / 6 the length of the lamina; tertiary venation scalariform; waxy gland in the axils of the basal lateral vein on the broad side; petiole 0.5 cm. long, 1.5–2 mm thick, densely cinnamomous-tomentose; stipules narrow, 3–4 cm long, caudate, cinnamomous- tomentose, persistent. Figs on slender leafless branches from the base of the trunk, usually up to 3–4 m long, forming roots, densely cinnamomous tomentose when young, glabrous when older, peduncle 1–2 mm long or sub-sessile; basal bracts 3, 1–2 mm long; receptacle depressed, subglobose to subpyriform, 1.5–2.5 cm in diameter when fresh, 1.3–1.5 cm in diameter when dry, lateral bracts numerous, densely yellowish- to brown-tomentose, apex convex to flat, ostiole 3–4 mm in diameter, surrounded by apical bracts, internal bristle absent; male flowers ostiolar, perianth saccate, stamen 1; gall flowers perianth absent, ovary ovate, stigma clavate; female flowers not seen.

Thailand.— PENINSULAR: Narathiwat [Ban Phu Khao Thong, Sukhirin district, altitude about 200–300 m, 18 Aug. 2003, *Bhanu* 180803–1 (**BKF, THNHM**)].

Distribution.— Peninsular Malaysia (Johore to Trengganu), Borneo.

Ecology.— Canopy gaps in tropical evergreen rain forest.

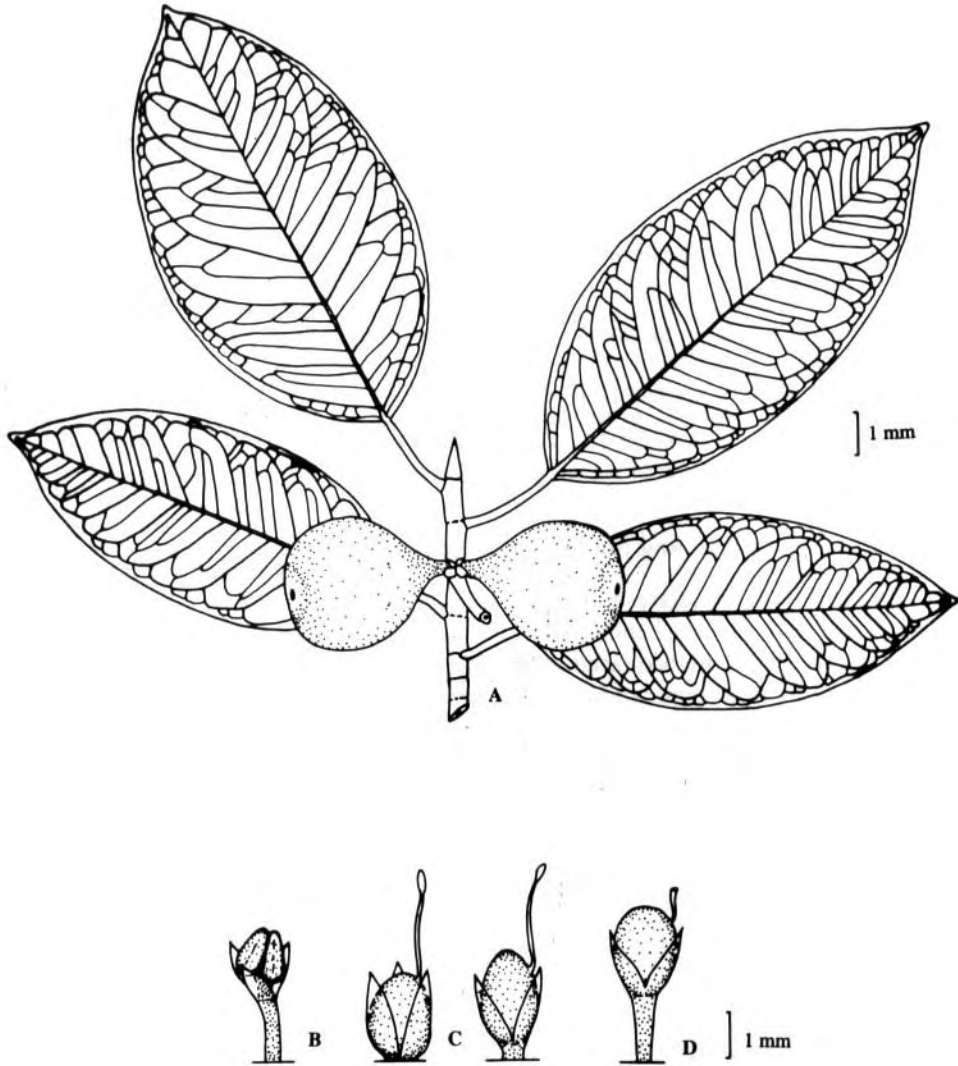


Figure 4. *Ficus dubia* Wall. ex King: A. branch with syconia; B. male flower; C. female flower; D. gall flower.



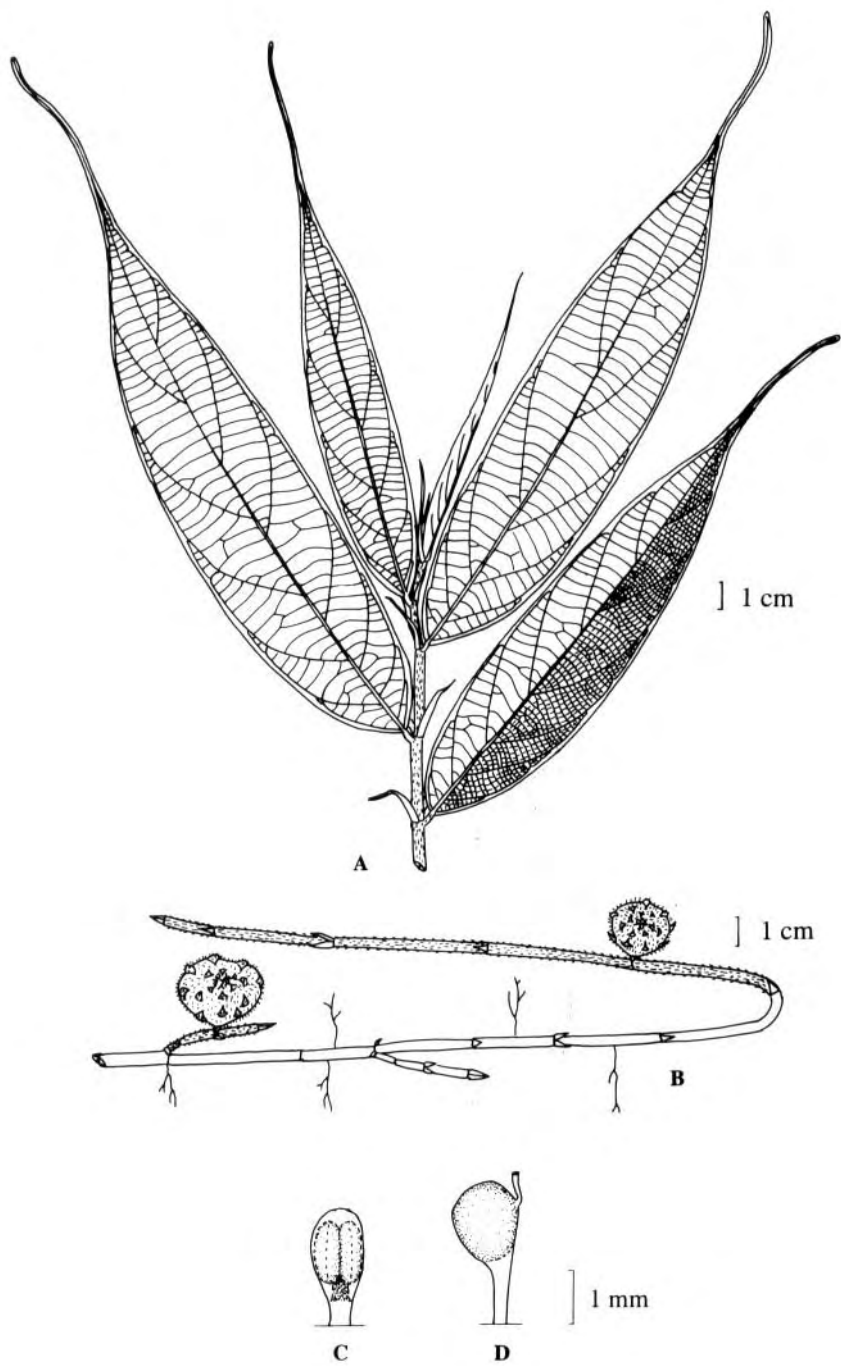


Figure 5. *Ficus beccarii* King: A. branch; B. stolon with syconia; C. male flower; D. gall flower.



Figure 6. A. *Ficus araneosa* King; B. *F. binnendijkii* (Miq.) Miq.; C. *F. depressa* Blume; D. *F. dubia* Wall. ex King; E. syconia of *F. beccarii* King; F. branch of *F. beccarii* King.

**Ficus sp.A**

Thailand.— PENINSULAR: Narathiwat [Ban Bala, Waeng district, altitude about 100–170 m, 20 Jan. 2003, *Bhanu* 200103–7 (THNHM)].

Ecology.— Canopy gaps in tropical evergreen rain forest.

**Ficus sp.B**

Thailand.— PENINSULAR: Narathiwat [Ban Bala, Waeng district, altitude about 100–160 m, 20 Jan. 2003, *Bhanu* 200103–5 (THNHM)].

Ecology.— Canopy gaps in tropical evergreen rain forest or disturbed areas.

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Table 1. List of *Ficus* in Hala-Bala Wildlife Sanctuary. Bolded text indicates species new to Thailand.

Subgenus	Section	Species
Urostigma	Urostigma	<i>Ficus caulocarpa</i> (Miq.) Miq.
		<i>F. virens</i> Aiton
		<i>F. altissima</i> Blume
		<i>F. annulata</i> Blume
		<i>F. benamina</i> L.
		<b><i>F. binnendijkii</i> (Miq.) Miq.</b>
		<i>F. callophylla</i> Blume
		<i>F. consociata</i> Blume
		<i>F. crassiramea</i> (Miq.) Miq. subsp. <i>crassiramea</i>
		<i>F. cucurbitina</i> King
		<b><i>F. depressa</i> Blume</b>
		<i>F. drupacea</i> Thunb.
		<b><i>F. dubia</i> Wall. ex King</b>
		<i>F. globosa</i> Blume
		<i>F. kochummeniana</i> C.C.Berg
		<i>F. microcarpa</i> L.f.
		<i>F. pellucidopunctata</i> Griff.
		<i>F. pisocarpa</i> Blume
		<i>F. stricta</i> (Miq.) Miq.
		<i>F. subgelderi</i> Corner
<i>F. subcordata</i> Blume		
<i>F. sumatrana</i> Miq.		
<i>F. sundaica</i> Blume		
<i>F. xylophylla</i> (Wall. ex Miq.) Miq.		
Pharmacosycea	Oreosycea	<i>F. callosa</i> Willd.
		<i>F. vasculosa</i> Wall. ex Miq.
		<i>F. nervosa</i> B. Heyne ex Roth subsp. <i>nervosa</i>
Sycomorus	Sycomorus	<i>F. racemosa</i> L.
		<i>F. auriculata</i> Lour.
		<i>F. variegata</i> Blume
	Hemicardia	<i>F. semicordata</i> Buch.-Ham. ex Sm.
	Sycocarpus	<b><i>F. beccarii</i> King</b>
		<i>F. fistulosa</i> Reinw
		<i>F. hispida</i> L.f.
	<b><i>Ficus</i> sp. A.</b>	
	<b><i>Ficus</i> sp. B.</b>	

Table 1. (continued)

Subgenus	Section	Species
		<i>Ficus lepicarpa</i> Blume <i>F. obpyramidata</i> King <i>F. schwarzii</i> Koord. <i>F. scortechinii</i> King
Ficus	Ficus	<i>F. deltoidea</i> Jack subsp. <i>deltoidea</i> <i>F. ischnopoda</i> Miq.
	Eriosycea	<i>F. chartacea</i> (Wall. ex Kurz) Wall. ex King <i>F. fulva</i> Reinw. ex Blume <i>F. glandulifera</i> (Wall. ex Miq.) King <i>F. grossularioides</i> Burm.f. var. <i>grossularioides</i>
Synoecia	Kissosycea	<i>F. disticha</i> Blume subsp. <i>disticha</i> <i>F. punctata</i> Thunb.
	Rhizocladus	<i>F. laevis</i> Blume <b><i>F. araneosa</i> King</b> <i>F. sagittata</i> J. König ex Vahl <i>F. villosa</i> Blume <i>F. trichocarpa</i> Blume
Sycidium	Sycidium Palaeomorphe	<i>F. heterophylla</i> L.f. <i>F. heteropleura</i> Blume <i>F. parietalis</i> Blume <i>F. pisifera</i> Wall. ex Voigt <i>F. sinuata</i> Thunb. <i>F. subulata</i> Blume <i>F. tinctoria</i> G. Forst. subsp. <i>gibbosa</i> (Blume) Corner