THE GENUS *PYRENARIA* (THEACEAE) IN MALESIA

(Flora Malesianae Precusores LVIII, Part One)

by

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I. INTRODUCTION

In 1828, C.L. Blume describe a new genus *Pyrenaria*. It was based on a Javanese plant, *Pyrenaria serrata* Bl. He mentioned that it has the general characters of the Rosaceae, notably the 'pomaceous' fruit with 5 locules and each locule possessing two 1-seeded 'pyrenes', hence the generic name *Pyrenaria*, and that the structure of its calyx and the mode of stamen insertion are similar to those of the Theaceae.

The drupaceous fruit of some *Pyrenaria* has a thick, soft-woody wall and remaining green or yellowish on the tree for some time, superficially it resembles a small pear or apple. But it is developed purely from the superior ovary of a hypogynous flower with no receptacular tissue involved, thus different from a true pomaceous fruit which is developed from the inferior ovary of a perigynous flower. Furthermore, the "stones" inside the fruit described by Blume as pyrenes are genuine seeds as there is no endocarpous tissue involved. For these reasons, *Pyrenaria* is classified under the family Theaceae by taxonomists from J.D. Choisy, F.A.W. Miquel, to this day.

Previously it is generally recognized that there are about 15 species of *Pyrenaria* distributed in western Malesia and S.E. Asia (e.g. Airy-Shaw in 7th ed. of Willis Dict., 1966). In 1972, the present writer described two new *Pyrenaria* from Malaysia which differ from other species in their dry, thin-woody or cartilaginous, partially dehiscent fruit. This fruit character has somewhat bridged the gap of *Pyrenaria* and *Tutcheria*. The latter genus with about 10 species is confined to Eastern Asia. its fruit is thin-walled and dehisces ± regularly into 3-5 valves, usually with 3–5, sometimes 2 seeds in each chamber. Apart from the number of seeds per locule, the main difference between these two genera lies in the nature of pericarp. It is understood today that their number of seed is slightly overlapping, and that their nature of pericarp is not basically different. Moreover, their internal seed structures and and seedling characters are not only in common, but also unique among the family Theaceae. Therefore, it has been proposed to merge *Tutcheria* with *Pyrenaria* (see H. Keng, in Gard. Bull. Sing. 26 (1972) 130-133).

I am grateful to the Commissioner and staff of the Botanic Gardens, Singapore for the herbarium and library facilities, to the Director and staff of the Rijksherbarium, Leiden, for the loan of the entire collection of *Pyrenaria* and *Gordonia*, to the Directors and staff of Herbarium Bogoriense, Bogor, Forest Herbarium, Bangkok, Forest Research Institute, Kepong for the loan of some critical specimens, and to the Directors and staff of Royal Botanic Gardens, Kew, the Arnold Arboretum, Harvard University, Cambridge, the University of California Herbarium, Berkeley, and the New York Botanic Garden, New York for supplying photographs of some type specimens or patiently answering my queries.

I also would like to thank Professor Dr. C.G.G.J. van Steenis for going through the manuscript of this paper and for his valuable comments, Dr. Ding Hou for supplying the xerox copies of literature, and my wife, Mrs. Ro-siu Keng for preparing the illustrations of this paper andd for her encouragements.

II. A GENERAL ACCOUNT OF THE TAXONOMIC CHARACTERS

All the Malesian species are of small stature, varying from shrubs to small spreading trees, normally below 10 m, rarely reaching 15 m in height, It is interesting to note that some fruiting herbarium specimens were, according to collectors, collected from bushes as low as 3 m tall.

The terminal buds, in general, are hairy, so are the young branches of most species. The older branches may be hairy or glabrous. The large branches on the trunk are always dense and spreading, thus the crown tends to be broadly rounded.

The leaves are mostly alternate, petiolate, and well-spaced on the branches; sometimes the base of petioles are twisted, thus all the blades are somewhat distichously arranged. In *P. pahangensis* the leaves are so closely spirally arranged in intervals that they are seemingly in whorls. Petioles and the lower side of blades in most species are pubescent in various degrees. One rather constant character is that in some species, the leaves after drying, turn brownish, while in others, remain greenish.

The flowers are borne in the leaf axils. Occasionally if the terminal bud of a branchlet remains dormant, the flower on the uppermost leaf axil becomes seemingly terminal. Truly terminal flowers as found in the genus *Camellia* do not seem to exist in the Malesian species of *Pyrenaria*. In some cases, the internodes are shortened, and the subtending leaves to the flowers are somewhat reduced in size, consequently these flowers, often 2–3 together, appear in a cluster (e.g. in *P. tawauensis* and *P. viridifolia*).

Each flower is usually associated with one bract and two bracteoles. In *P. villosula*, for example, the peduncle is long (to 1–1.5 cm), and the bract is linear lanceolate and is inserted in a short distance away from the bracteoles which are cordate or suborbicular in shape, thus they are clearly differentiated. However, in most of the other species, the peduncles are in general extremely

short, the bract and bracteoles are ± similar and approximate, and are thus indistinguishable. Furthermore, the distinction between bracteoles and sepals which are usually 5–6 in number, is usually not clear. Generally there is a tendency of gradually increasing in size from the lowermost sepal upwards.

Two basic types of flower-buds are found in the Malesian species. In one kind, (e.g. in *P. acuminata, P. villosula, P. johorensis,* etc.), for most part of the petals, except their narrow or broad folded margin, like the sepals, are exposed in bud. Externally the texture, colour and even indumentum of the petals (except their folded margin) are similar to those of the sepals. Superficially they resemble the perulate* flowers of some E. Asiatic species of *Camellia* but in fact they are different. In another kind, (e.g. in *P. serrata, P. tawauensis,* etc.), the petals are usually thin and glabrous and largely enclosed by the sepals in bud, and are thus clearly differentiated.

The petals are usually 5–6 in number, greenish white, white or pale yellow in colour, slightly joined at the base. The number of stamens within a flower is very large. In an extreme case such as in *P. villosula,* the number of stamens per flower is 100–120. They are arranged in 3–6 series and more or less fused at the base and also briefly adnate to the base of corolla. The anthers are divergently attached, and both anthers and filaments are glabrous in all the Malesian species examined.

The gynoecia consist of a hispid ovary and a single style or several styles. The styles are hairy or glabrous, mostly 5 in number, they are either fused to form a simple unit (e.g. *P. johorensis*) or completely free to the base (e.g. *P. tawauensis, P. viridifolia*). Intermediate forms include those of which nearly the lower half of the styles are fused, and the upper half being free, and those of which the lower three fourth or so are fused, and the upper one fourth being free. An extraordinary case was observed in *P. wrayi,* of which the five styles are completely fused below but are partially fused above in the combination of '3 + 1 + 1' or '2 + 1 + 1 + 1' and thus appear in three or four branches, a situation reminding the diadelphous or polydelphous androecium of some Papilionatae and other taxa.

The fruit of the Malesian species, as mentioned earlier, are either drupaceous or capsular. Texture of the pericarp in mature fruits is varying from soft woody, leathery, woody to cartilaginous. Fruits of those species with a soft woody or leathery pericarp tend to remain succulent and indehiscent even after falling on the forest floor. While the fruits of those species with a thick or thin woody or cartilaginous pericarp, on the contrary, tend to dehisce along the loculicidal sutures rom above (sometimes also along the septicidal sutures from beneath) and expose, then discharge the seeds. Judging from the overall situation in the subfamily Camellioideae, it is suggested that the development of succulent drupaceous fruits in many species of *Pyrenaria* is probably an ecological adaptation to delay the process of seed germination or to convert into animal dispersal.

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* Sealy (Rev. Gen. *Camellia*, p. 16) defines the term perulate as follows: "..... the bracteoles and sepals are not distinguishable from one another, but together for a single series of about 10 overlapping scales which protect the rest of the flower until anthesis".

The seeds are semiglobose or wedge-shaped and with a round back or flattened and with a ridged back, often variously angulate as moulded by the confinement of the seed chamber and also due to muture compression. The testa is thick and hard, usually lustrous chestnut except the large prominent scar (the ventral hilum) which is white or greyish. They are exalbuminous. The embryo consists of a pair of thin and very large cotyledons which are tightly folded and contorted and twisted, a partly exposed radicle, and a tiny plumule which is completely buried in the cotyledons. During germination, these two cotyledons gradually emerge from the seedcoat, then rapidly unroll and spread out to perform the function of photosynthesis on the usually gloomy forest floor (see H. Keng in Gard. Bull.Sing. 26 (1972), *plate* 3, *fig. e, f & g,* facing p. 132).

III. TAXONOMIC TREATMENT

Pyrenaria Blume, Bijdr. (1827) 1119 (Type species: **Pyrenaria serrata** Bl. from Java); Choisy in Mém. Soc. Phys. Hist. nat. Genève (Mém. Fam. Ternstroem. Camell.) 14 (1855) 83; Miq. Fl. Ind. Bat. 1 (1859) 493; et Suppl. 1 (1861) 484; Benth. in B. & H. Gen. Pl. 1 (1862) 185; Dyer in Hook. f. Fl. Brit. Ind. 1 (1872) 289; Kurz, Fl. Burm. 1 (1877) 104; King in J. As. Soc. Beng. 59 (1890) 199; Melchior in E. & P. Pfl. Fam. ed. 2, 21 (1925) 138; Back & Bakh. f. Fl. Java 1 (1963) 321; H. Keng in Gard. Bull. Sing. 26 (1972) 127.

Eusynaxis Griff. Notul. 4 (1854) 560, t. 603 (Type species: *Eusynaxis barringtonifolia* Griff. from India = **Pyrenaria barringtonifolia** (Griff.) Seem.).

Tutcheria Dunn in J. Bot. 46 (1908) 324, et 47 (1909) 197; Nakai in J. Jap. Bot. 16 (1940) 708 (Type species: *Tutcheria spectabilis* (Champ.) Dunn from Hong Kong = *Tutcheria championi* Nakai = **Pyrenaria championi** (Nakai) H. Keng).

Shrubs or small trees. Leaves alternate, spirally arranged, serrate, chartaceous or coriaceous. Flowers bisexual, axillary, solitary, sometimes 2–3 congested in a cluster, shortly pedunculate or subsessile; bracteoles usually 2; sepals mostly 5–6, unequal; petals 5–6, shortly fused at the base; stamens numerous, in 3–6 rows, briefly connate at the base and often adnate to the corolla; anthers versatile; ovary mostly 5–6 loculate, 2–3 (–7) ovulate per locule; styles mostly 3–5 free or partly to totally connate. Fruit drupaceous or capsular; pericarp softwoody, leathery or cartilaginous, indehiscent, partly dehiscent or dehiscent. Seeds 2–3, sometimes to 4 or 5 or 1 in each locule, hemispheric or flattened ovoid, often variously angulate, exalbuminous, with a prominent hilum on the ventral side; testa woody or crustaceous; embryo large, with two thin, foliaceous cotyledons clasping and crumpling together.

A genus with about 30 species, occurs from East India, Burma, Thailand, Vietnam, South China to Riukiu and Taiwan, and southwards to Malesia (The Malay Peninsula, Sumatra, Borneo, Java and possibly the Philippines). Most species are described from S. China (formerly under *Tutcheria*) and the Malay Peninsula.

About 8 or 9 species are found in Malesia.

KEY TO THE SPECIES

A. Leaves 3–5 congested into a false whorl, drying brown or dark brown; fruit capsular, partially dehiscent (Malay Peninsula). ..... 3. *P. pahangensis*

A. Leaves spirally arranged on twigs, one at each node, well-spaced, drying greenish yellow or brown; fruit drupaceous or capsular,

B. Bract subtending the flower leafy, lanceolate, 1–2 cm long; branchlets densely covered with brown or yellow hair; leaves drying brown; flowers pedunculate (peduncles 1–1.5 cm long); fruit drupaceous, indehiscent (Sumatra, Malay Peninsula). ..... 6. *P. villosula*

B. Bract subtending flower usually much smaller (less than 3 mm long); branchlets glabrous or pubescent; leaves drying greenish yellow or brown; flowers sessile or pedunculate; fruit drupaceous or capsular,

C. Fruit drupaceous, with succulent, indehiscent pericarp,

D. Branchlets densely covered with brown or dark brown hair; leaves drying brown or dark brown; sepals lanceolate; style solitary, briefly 5-branched near the tip (Sumatra, Malay Peninsula). ..... 1. *P. acuminata*

D. Branchlets glabrous, glabrescent or covered with short yellowish brown hair; leaves drying greenish yellow or brown; sepals deltoid, cordate or ovate,

E. Leaves drying greenish yellow; young branchlets glabrescent; styles 5, free to the base; fruit depressed at the top with 5 bosses around the depression (Malay Peninsula). ... . 7. *P. viridifolia*

E. Leaves drying brownish or dark brown; young branchlets glabrous or adpressed with short, yellow hispid hair; style 1, branched from the middle above or not branched (or 5 or 6 and fused at base); fruit round or flat at the top, with only one style-base in the centre,

F. Style 1, branched or not, if branched, the branches remaining free, not partially fused (var. *serrata* in Sumatra and Java, var. *masocarpa* in Borneo, and var. *kunstleri* in Malay Peninsula). ..... 4. *P. serrata*

F. Style 1, branched, the branches partially and laterally fused (Malay Peninsula). ..... 8. *P. wrayi*

C. Fruit capsular, with dry, cartilaginous or thin woody pericarp, dehiscing loculicidally or partially so; branchlets glabrous or nearly so; leaves drying greenish yellow,

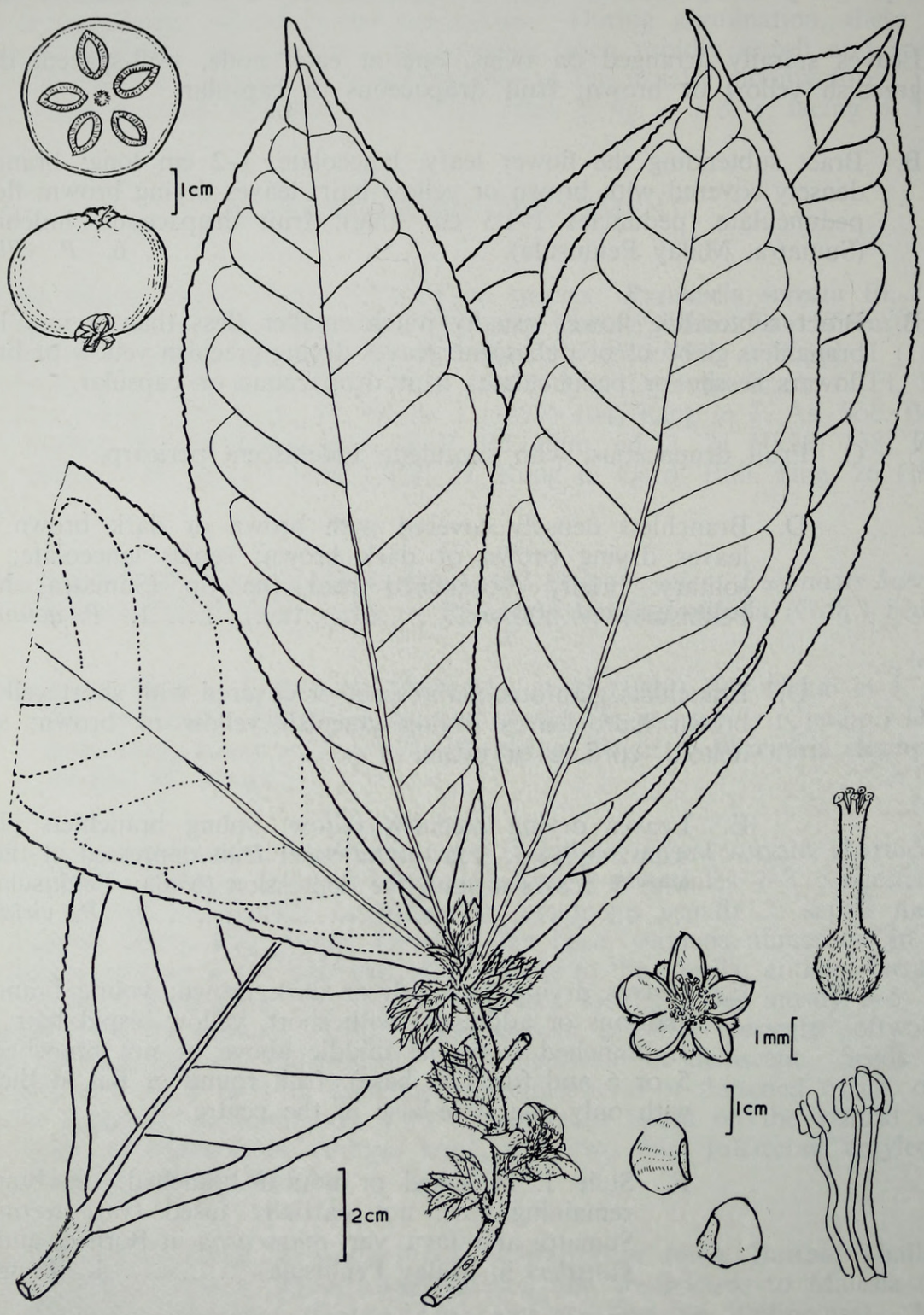

Fig. 1. *Pyrenaria acuminata* Planch. ex Choisy
Flowering branch, flower, floral parts, fruit and seed (based on *Jumali 6027*, supplemented by *Ridley 4798*).

G. Flowers large (corolla 3.5–4 cm across), lower part of petals exposed in bud, thickened; style solitary, not branched (Malay Peninsula). ..... 2. *P. johorensis*

G. Flower smaller (corolla 2.5–3 cm across), petals thin, enclosed in calyx; styles 5, free to the base (Borneo and Sumatra). .... 5. *P. tawauensis*

1. **Pyrenaria acuminata** Planch. ex Choisy in Mém. Soc. Phys. Hist. nat. Genève (Mém. Fam. Ternstroem. Camell.) 14 (1855) 84; Miq. Fl. Ind. Bat. 2 (1857) 493 (excl. *Cuming n. 2423*); Dyer in Hook. f. Fl. Brit. Ind. 1 (1872) 290; King in J. As. Soc. Beng. 59 (1890) 200; Ridl. Fl. Mal. Pen. 1 (1922) 200; H. Keng in Gard. Bull. Sing. 26 (1972) 132, *pl. 3, a-g*, et in Ng, Tr. Fl. Mal. 3 (1978) 290, *f. 6*.

Ternstroemia ? *macrophylla* Wall. Cat. 3663 (in Herb. Linn. Soc.), *nom.*
Gordonia (*Camellia*?) *acuminata* Wall. Cat. 3664 (in Herb. Kew), *nom.*

Shrub or small tree, 5–12 m tall. Young branches covered with yellowish grey hispid hair; older branches sericeous. Bark greyish brown, smooth or patchy. Leaf-blades narrowly elliptic, sometimes narrowly obovate, acuminate or shortly caudate, base attenuate, 14–24 (–30) cm long, 4–6.5 (–8.5) cm wide, chartaceous, drying brownish, the margin finely surrulate for most part except near the base, the midrib impressed above and elevated below, the side veins 9–12 pairs; puberulous above, sericeous below, with long hispid hair on the midrib; petioles 0.8–2 cm long, hispid. Flowers axillary, solitary or 2–3 congested together; peduncle 2–3 mm long, hispid; bract and bracteoles 3, lanceolate, 3–5 mm long, hispid; sepals 5–6 subequal, broadly lanceolate, 7–8 mm long, apex acute, coriaceous, densely sericeous externally; corolla 3–3.5 cm across, pale yellow; petals mostly 5, broadly ovate to suborbiculate, 1.4–1.7 cm long, apex often abruptly acute, thin coriaceous, concave, sericeous externally except the broad margin which is glabrous and thin. Androecium 5–6 mm long, the filaments glabrous, in 5–6 rows united at the base. Gynoecium 8–10 mm long; style 1, stout, puberulous, briefly 5 (–6) branched near the tip; ovary globose, 3–4 mm across, densely sericeous. Fruit depressed globose, 3–4 cm across, green to blackish, succulent, soft woody, indehiscent.

Distribution. The Malay Peninsula (from Penang, Perak southwards to Johore and Singapore) and Sumatra (Upper Riau Islands).

Malay Peninsula (numerous specimens, only representative ones are cited below). Penang, *Ridley 3115* (SING). Perak, *Dr. King's collector 10141* (SING), *17929* (L). Kelantan, Bukit Baka, *Md. Shah & Ahmad Shukor 3206* (SING), Tamagan, *Md. Shah & Kadim 488* (SING). Pahang, Lesong For. Res. *Y.C. Chan FRI 19826* (L), *Samsuri Ahmad & Ahmad Shukor 413* (SING). Selangor, Kuala Lumpur, *Ridley s.n.* in Dec. 1920 (SING), *C. Curtis 2321* (SING). Negri Sembilan, Sg. Manyala, *Wyatt-Smith KFN 76187* (L), Sembilan *Rahim Ismal KEP 109429* (L). Malacca, *Ridley 1624* (SING), *A.C. Maingay 190* (L). Johore, Kluang, *K.M. Kochummen FRI 2835* (L, SING), Labis, *Md. Shah & Sanvis 2113* (SING). Singapore, Chua Chu Kang, *Ridley 106701* (SING), Bukit Timah, *Nagdiman 34535* (SING).

Sumatra. Upper Riau Islands, Pakanbaru, *E. Soepadmo 16 & 151* (L).

Ecology. In lowland forests, more common below 100 m, occasionally, ascending to 1300 m; ecologically very versatile, in dense jungle, on ridge top, in swamp forest or along stream. Fl. & Fr. year round.

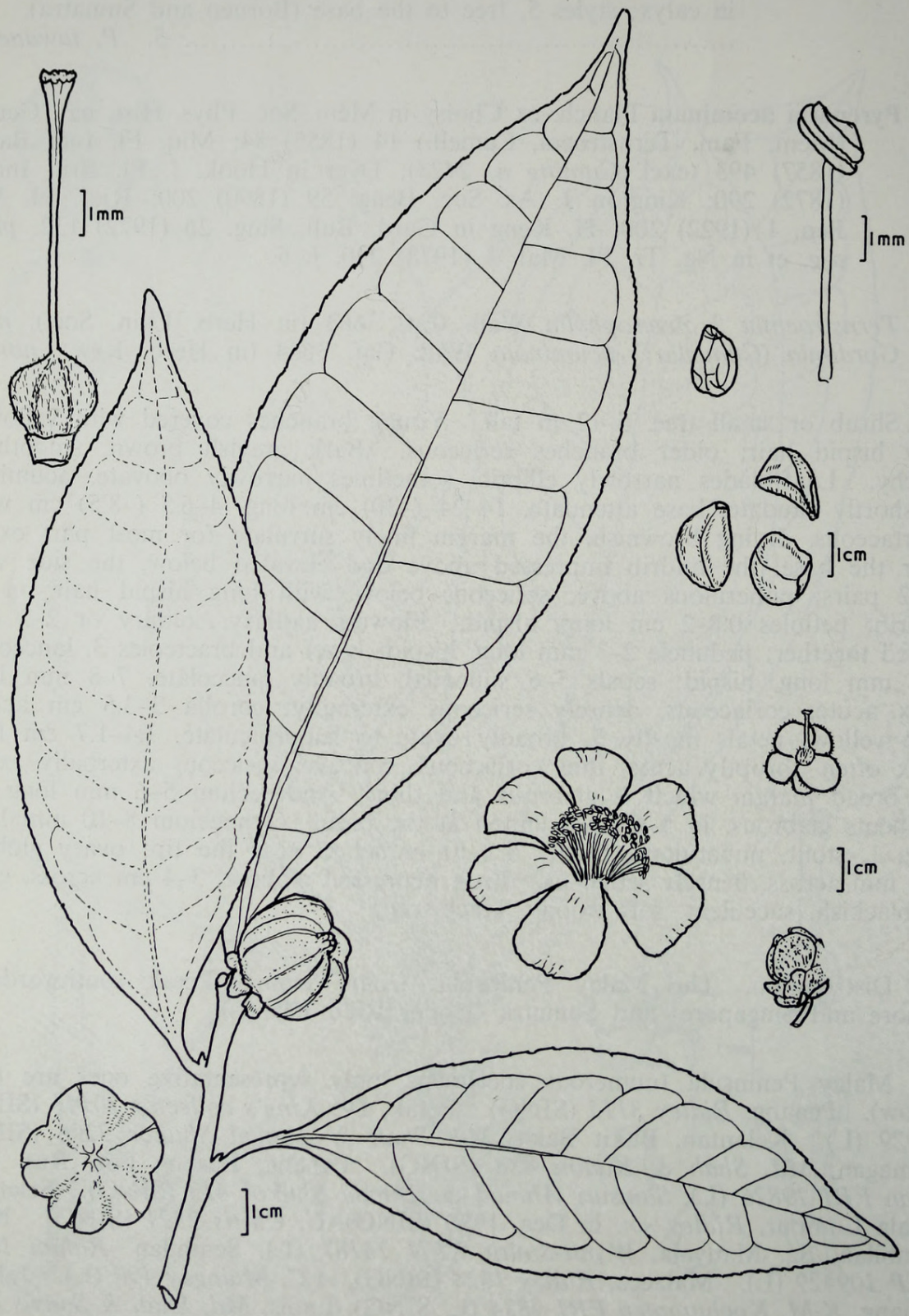

Fig. 2. *Pyrenaria johorensis* H. Keng
Fruiting branch, flower, floral parts, fruit and seed (based on *Burkill 2606*, supplemented by *Ogata 105 007*).

Note. This is the commonest species of *Pyrenaria* in the Malay Peninsula. It can be easily recognized by its dense crown, stout branches and branchlets, the large leaves and especially that most parts are beset with dark brown to black hair.

Miquel (l.c.) cited *Cuming n. 2423*, a specimen erroneously said to be from the Philippines as belonging to this species; it was likely collected in Malaya, but is not available for the present study.

2. **Pyrenaria johorensis** H. Keng, sp. nov.

Pyrenaria sp. A. H. Keng in Ng, Tr. Fl. Mal. 3 (1978) 291.

Arbor ad 17 m alta; ramuli primo puberuli. Folia subcoriacea, elliptica vel anguste elliptica, 7–17 (–23) cm longa, 3.5–6 (–9) cm lata, acuta vel acuminata, basi cuneata, supra glabra, subtus puberulosa, nervis lateralibus 7–10; petiolo circ 1 cm longo. Flores axillares, solitarii vel 2–3 congesti, pedunculis subsessilis vel 2–3 mm longis; sepala cordata vel suborbiculata, 6–8 mm lata, coriacea; corolla ad 3.5–4 cm diametro, alba (ex Ogata); petala oblonga vel latiobovata, 1.5–2 cm longa. Stamina 6–8 mm longa, glabra, basi breviter connata et petalis adnata. Gynoecium ad 1 cm longum, stylo 6–8 mm longo. Capsula cartilaginosa, subglobosa, 5-lobata, ad 3.5 cm diametro.

Shrub or small slender tree, to 17 m tall; young branches hispid, tomentose or puberulous; older branches dark brown; glabrescent. Leaf-blades thin coriaceous, drying greenish yellow, elliptic or narrowly elliptic, sometimes narrowly obovate, 7–17 (–23) cm long, 3.5–6 (–9) cm wide, the margin undulate and remotely serrulate, the midrib impressed above, and elevated below, side veins 7–10 pairs, inconspicuous, glabrous above, puberulous or tomentose, sometimes also slightly glaucous beneath; petiole 0.5–1.2 cm long, hispid. Flowers in upper axils, solitary or 2–3 together; peduncles 2–3 mm long or subsessile; bracteoles 2, deltoid, 2–3 mm long, silvery tomentose externally; sepals 5–7, unequal, leathery, cordate to suborbicular, 6–8 mm long; corolla 3.5–4 cm across, white (*Ogata 105007*); petals 5–6, oblong to broadly obovate, 1.5–2 cm long, concave, the central basal part (exposed in bud) thin leathery, sericeous externally, the margin (folded in bud) thin membranaceous, glabrous. Stamens 6–8 mm long, glabrous, the filaments united at the base in several rows, and adnate to the corolla. Gynoecium about 1 cm long; style 1, 6–8 cm long, glabrous; stigmas 5 inconspicuous; ovary globose, shallowly 5-ridged, densely sericeous. Fruit globose, broadly 5-lobed, apex depressed, about 3.5 cm across, green, flushed bronze; pericarp thin (to fairly thick) cartilaginous, dehiscing loculicidally. Seeds mostly 2 in each locule, reddish brown.

Distribution. The Malay Peninsula (Johore).

Type: *K. Ogata KEP 105007* (SING, isotype KEP). Malay Peninsula, Johore, Labis Forest Reserve, March 30, 1968.

Paratypes: Malay Peninsula. Johore, Labis. *Samsuri Ahmad 284* (L, SING); Sungie Kayu, *Kiah SFN 32077* (SING); Gunong Blumut, *Whitmore FRI 8830* (L); G. Pulai, *H.M. Burkill 2606* (SING), *Henderson SFN 28153* (SING), *Sinclair SFN 39521* (SING).

Ecology. In primary forest, on ridge or on steep hill side, alt. 50–600 m. Fl. Nov., Feb.-March; Fr. May-June.

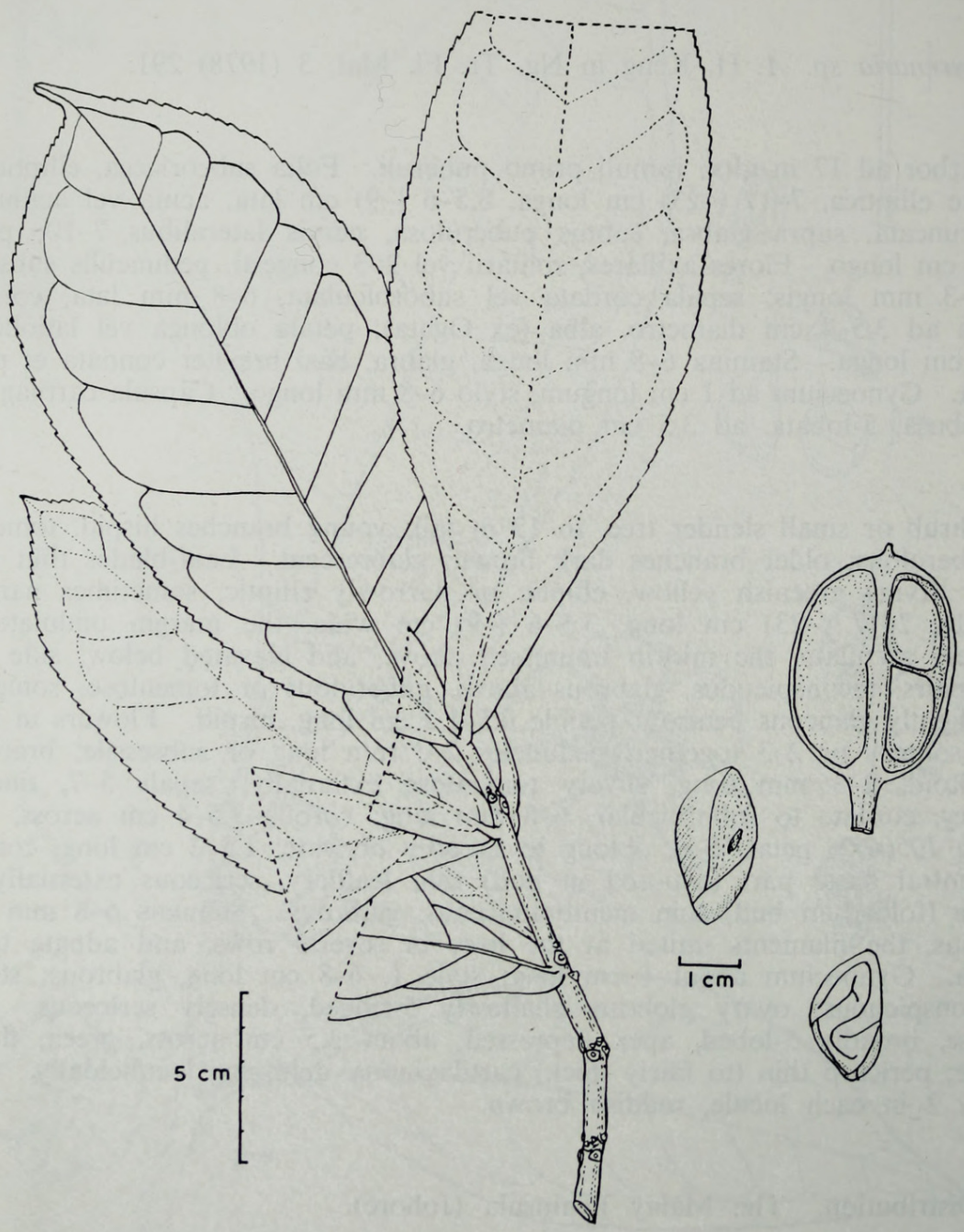

Fig. 3. *Pyrenaria pahangensis* H. Keng
Habit sketch, fruit and seed (Based on *Corner s.n.* in Sept. 9, 1937, supplemented by *Haniff & Nur 8067*). (reproduced from H. Keng, 1972)

Note. This species can be distinguished from others by the relatively large flowers (corolla to 4 cm across, probably the largest among the Malesian species) and by the shallowly 5-lobed fruit with thin cartilaginous pericarp, dehiscing loculicidally and exposing the reddish brown seeds inside. Confined to S. Johore of the Malay Peninsula.

3. **Pyrenaria pahangensis** H. Keng in Gard. Bull. Sing. 26 (1972) 129, *pl. 2, fig. 2,* et in Ng, Tr. Fl. Mal. 3 (1978) 291.

Shrub or small tree, 3–4 m tall; young branches stout, glabrescent. Leaves 3–5 in a false whorl, on and near the upper part of branches; leaf-blades membranaceous, drying brownish, elliptic to narrowly oblong-oblanceolate, 23–38 cm long, 8–15 cm wide, acute or shortly caudate, the base cuneate and subcordate; shining, glabrous above, puberulent or glabrescent beneath; lateral veins 7–9 pairs, oblique to nearly perpendicular, curved and merged into the submarginal vein, rather faint above, distinct and slightly elevated beneath, margin remotely serrulate, nearly entire below the middle; petiole pulvinoid, 2.5–5 mm long. Flowers not seen. Fruits broadly ovoid or subglobose, 3–4.5 cm long and 2.5–4 cm across, usually 3-loculate; pericarp very thin, cartilaginous, partly dehiscent along the sutures. Seeds usually 2 in each locule, 1.5–2 cm long, 1.2–1.8 cm broad, dorsally convex-rounded, shining chestnut brown.

Distribution. The Malay Peninsula (Pahang).

Malay Peninsula. Pahang, Sungei Tahan, E.J.H. Corner s.n. (Type SING), Teku, Gunong Tahan, *Mohd. Haniff & Mohd. Nur SFN 8067* (SING).

Ecology. In lowland forest, near stream. Fr. Sept. (One collection).

Note. This species is characterized by its sub-verticillate, short petiolate leaves with a subcordate base, and by its 3-loculate fruit with thin cartilaginous and partly dehiscent pericarp.

4. **Pyrenaria serrata** Bl. Bijdr. (1827) 1120.

3 varieties are recognized.

KEY TO THE VARIETIES

A. Corolla 1.5–2 cm across; fruit 3–4.5 cm across,

B. Fruit 4–4.5 cm across; young branchlets covered with yellow or yellowish brown hair (Sumatra and Java) ..... 4a. var. *serrata*

B. Fruit 3–3.5 cm across; young branchlets glabrous or glabrescent (The Malay Peninsula) ..... 4b. var. *kunstleri*

A. Corolla 1–1.2 cm across; fruit 2–2.5 cm across; young branchlets puberulous (Borneo) ..... 4c. var. *masocarpa*

4a. var. **serrata**

Pyrenaria serrata Bl. Bijdr. (1827) 1120; Korth. Kruidk. (1842) 146, *t. 30;* Miq. Fl. Ind. Bat. 2 (1857) 493; K. & V. in Med. Lands P. Tuin 16 (1896) 297; Koord., Exk. Fl. Java 2 (1912) 610, et Atlas 3 (1915) t. 582; Merr. Contr. Arn. Arb. 3 (1934) 106; Back. & Bakh. f. Fl. Jav. 1 (1963) 321.

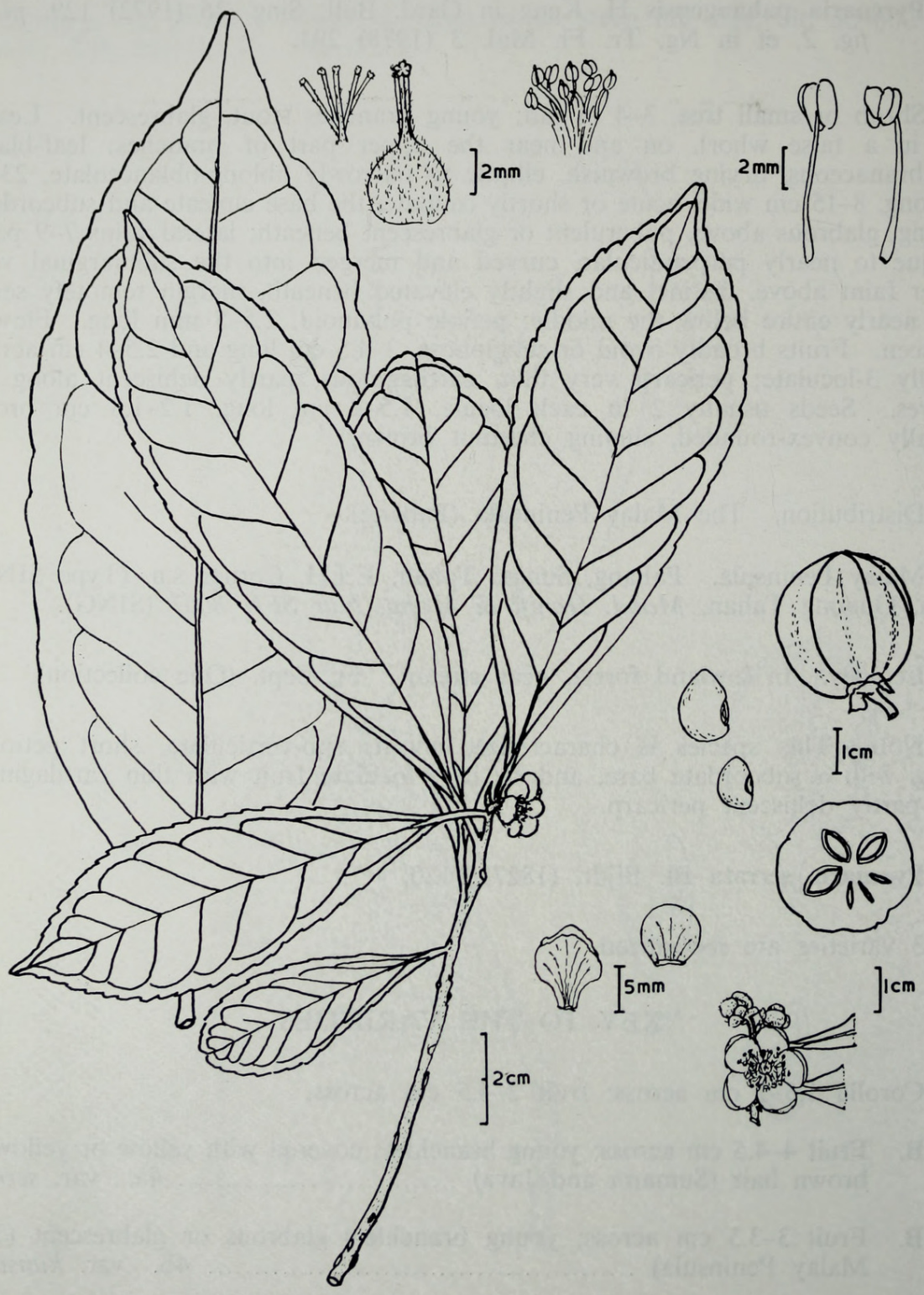

Fig. 4a. *Pyrenaria serrata* Bl. var. *serrata*
Flowering branch, flower, floral parts, fruit and seed (based on *Koorders 27983*, supplemented by *Kosterman 23898*).

Pyrenaria lanceolata T. & B. in Tijd. Ned. Ind. 27 (1864) 40.

P. lasiocarpa Korth. Kruidk. (1842) 147.

P. oidocarpa Korth. Kruidk. (1842) 147.

Small tree to about 15 m tall; young twigs slender, covered with yellow or yellowish brown hair; older branches greyish brown, glabrescent. Leaf-blades narrowly obovate to oblanceolate-elliptic, 8–20 (–24) cm long, 3–7 (–10) cm wide, acuminate or obtuse, base attenuate, chartaceous or thin coriaceous, during brown, glabrescent above, puberulent or glabrescent beneath, the margin serrulate or serrata except both ends, the midrib impressed above and elevated below, the side veins 9–13 pairs, conspicuous below; petiole 1–1.2 (–1.5) cm long, puberulous. Flowers in upper axils, solitary or 2–3 crowded together; peduncles 2–4 mm long, puberulous; bracteoles 2, silvery puberulous, deltoid, 2–3 mm long; sepals 5–6, broadly orbicular to reniform, subequal, 5–7 mm long, coriaceous, sericeous externally; corolla about 2 cm across, white, with orange yellow centre; petals 5–6, orbicular to ovoid, 8–10 mm long, thin leathery, concave, sericeous externally. Androecium 5–7 mm long, the filaments glabrous, connate below. Gynoecium 6–7 mm long; styles 5, connate at the base, hispid; stigmas 5–6, very short; ovary globose, 3–4 mm across, densely sericeous. Fruit ovoid-globose, 4–4.5 cm across, glabrescent, bluntly 5–6-ridged, indehiscent.

Distribution. Sumatra and Java.

Sumatra. Sumatra, *H.O. Forbes 1968, 2462, 2479, 2896* (L); Palembang, *Forbes 2850* (L); Lake Ranau, *Forbes 2109* (L); Palembang, N. side of Lake Ranau, *Steenis 3398* (L); Atjeh, Gajo Lands, *Steenis 9982* (L); Benkoelen, Kapahiang, *De Voogd 1245* (L).

Java. G. Salak, *Blume s.n.* (Herb. Lugd. Bat. no. 925, 250-501, Lectotype.) (L); Preanger, G. Karang, *Buwalda 3665* (L); Tjisalak, Tasih, *Dransfield 1173* (L); W. Java, *Forbes 1081* (L); Tjibodas, G. Gede, *Forman 93* (L); Java, *Junghuhn 94, 231, 415, 418, 433, 444, 445* (L); *G. Salak, Koorders 24184, 24353* (L); Java, *Koorders 8184, 8185, 8187, 8188* (etc) (L); Java, *Koorders & Valeton 8184, 8185, 8187, 8188* (etc) (L); Poeloesari, Bantam, *Koorders 8193* (L); Kedoe, G. Andoeng, *Koorders 27983* (L); Tjiandjur, G. Besar, *Kostermans s.n.* (in May, 1968) (L), Puntjak Pass, *Kostermans 23898* (L); Tjibodas, *Pleyte 24* (L); *Meijer 1452* (L); G. Salak, *Reinwardt s.n.* (in Dec. 1822) (L); Preanger, G. Patoeha, *Steenis 6999* (L); Preanger, G. Besar, *Winckel 292* (L); Java, *Zollinger 2123* (L).

Ecology. From lowland to hill forest, alt. 200 to 2,500 m. Fl. & Fr. Jan.-Dec.

Note. About a dozen specimens of this plant, collected by Reinwardt, Hasselt and Blume, on loan from Leiden, bear Blume's handwritings. Among them, I selected the one collected by Blume himself from Gunong Salak (spelt as Sallak) (Herb. Lugd. Bat. No. 925, 250-501) as the lectotype. It is interesting to note from the early labels, Blume originally intended to name this plant *Melodendrum montanum* Bl. (variously spelt as *Melodendron montana* Bl.), a binomial apparently was never published.

Three other names, viz. *Pyrenaria lanceolata* T. & B., *P. lasiocarpa* Korth. and *P. oidocarpa* Korth., were all based on specimens collected from Java. S.H. Koorders, after intensively studied the living and herbarium materials, reached

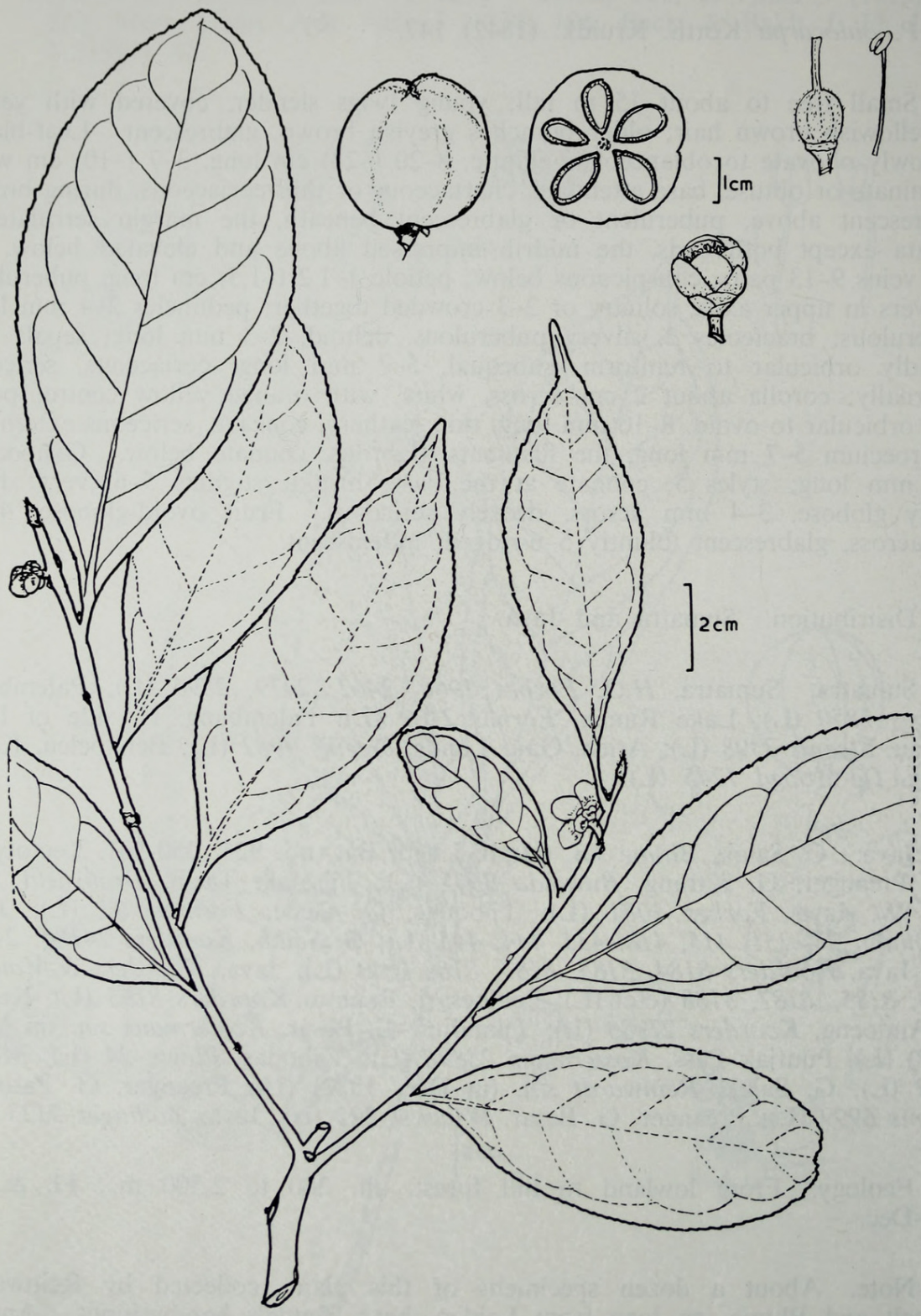

Fig. 4b. *Pyrenaria serrata* Bl. var. *kunstleri* (King) H. Keng
Flowering branch, young flower, floral parts and fruit (based *King's collector 3948*, supplemented by *Guard s.n.* in May 1904).

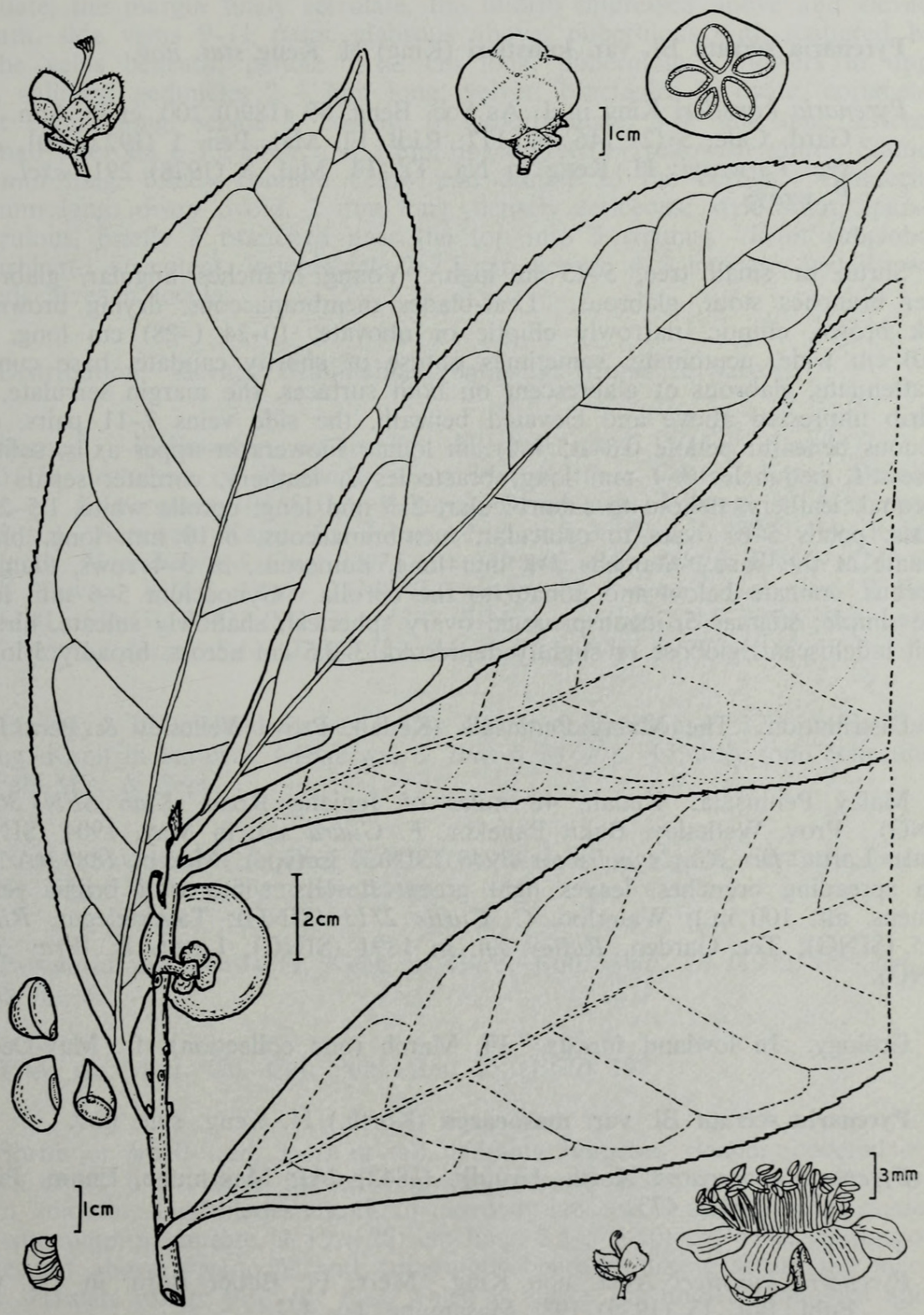

Fig. 4c. *Pyrenaria serrata* Bl. var. *masocarpa* (Korth.) H. Keng
Fruiting branch, flower, floral parts, fruit and seed (based on *Ahmad Damit 27041*, supplemented by *Anderson & Ilias 28700*).

the conclusion (Exk. Fl. Java 2 (1912) 610) that "Nur 1 ziemlich vielgestaltige Art in Java, dort nicht bis in das Hochgebirgsgebiet aufsteigend", thus reducing all these three names to *Pyrenaria serrata* Bl. This view is accepted by Backer and Bakhuizen van den Brink f. and others.

4b. **Pyrenaria serrata** Bl. var. **kunstleri** (King) H. Keng *stat. nov.*

Pyrenaria kunstleri King in J. As Soc. Beng. 59 (1890) 200, et in Ann. Bot. Gard. Calc. 5 (2) 146, pl. 177; Ridl. Fl. Mal. Pen. 1 (1922) 201, *excl. syn. P. wrayi;* H. Keng in Ng, Tr. Fl. Mal. 3 (1978) 291, *excl. syn. P. wrayi.*

Shrub or small tree, 5–15 m high. Young branches angular, glabrous; older branches stout, glabrous. Leaf-blades membranaceous, drying brown or dark brown, elliptic, narrowly elliptic or obovate, 10–24 (–28) cm long, 3–9 (–10) cm wide, acuminate, sometimes obtuse or shortly caudate, base cuneate or attenuate, glabrous or glabrescent on both surfaces, the margin serrulate, the midrib impressed above and elevated beneath, the side veins 7–11 pairs, conspicuous beneath; petiole 0.8–1.5 (–2) cm long. Flowers in upper axils, solitary, subsessile, peduncles 3–4 mm long; bracteoles 2, leathery, cordate; sepals 5–6, subequal, leathery, deltoid to suborbicular, 2–3 mm long; corolla white, 1.5–2 cm across; petals 5–6, ovate to orbicular, membranaceous, 6–10 mm long, briefly connate at the base. Stamens 7–8 mm long, numerous, in 3–4 rows, filaments glabrous, connate below and adnate to the corolla. Gynoecium 5–6 mm long; style simple; stigmas 5, inconspicuous; ovary spherical, shallowly sulcate, hirsute. Fruit indehiscent, globose or slightly depressed, 3–3.5 cm across, broadly 5-lobed.

Distribution. The Malay Peninsula (Kedah, Prov. Wellesley & Perak).

Malay Peninsula. Kedah, 48 miles of Jeniang Road, *Kiah SFN 36151* (SING). Prov. Wellesley, Bukit Panekor, *F. Guard s.n.* in May, 1904 (SING). Perak, Larut, *Dr. King's collector 3948* (SING, isotype), March, 1883 (A tree with spreading branches, leaves light green; flowers white with bright yellow stamens, alt. 100 m.); Waterloo, *C. Curtis 2713* (SING); Tasekfelegur, *Ridley 7025* (SING); Tea Garden, *Ridley s.n.* in 1891 (SING); Larut, *L. Wray 3059* (SING).

Ecology. In lowland forests. Fl. March (one collection); fr. May-Dec.

4c. **Pyrenaria serrata** Bl. var. **masocarpa** (Korth.) H. Keng, stat. nov.

Pyrenaria masocarpa Korth. Kruidk. (1842) 147; Masamune, Enum. Phan. Born. (1942) 473.

Pyrenaria kunstleri Auct. non King: Merr. Fl. Elmer Born. in Un. Cal. Publ. Bot. 15 (1929) 198; Masamune, l.c. 472.

Pyrenaria parviflora Ridley in Kew Bull. (1933) 487; Masamune, l.c. 473. Syn. nov.

Shrub or small tree, 6–10 m tall. Young branches stout, angulate, puberulous; older branches glabrous. Leaf-blades membranaceous, drying brown or dark brown, elliptic or narrowly elliptic or narrowly obovate, 10–20 (–28) cm long, 3–6 (–10.5) cm wide, acute or abruptly acuminate, base acute or abruptly attenuate, the margin finely serrulate, the midrib impressed above and elevated beneath, side veins 9–11 pairs. glabrous above, puberulous with scattered hair on the veins beneath; petiole 1–1.2 cm long, puberulous. Flowers in upper axils, solitary; peduncles 2–4 mm long, velvet; bracteoles 2, ovate, coriaceous, about 2 mm long; sepals 5, cordate to suborbiculate, 3–4 mm long, sericeous externally; corolla 1–1.2 cm across, white tinged green or yellowish white. Stamens 4–5 mm long, briefly connate below and adnate to the corolla. Gynoecium 4–5 mm long; ovary ovoid, 2 mm long, densely sericeous; style stout, sparsely puberulous, briefly 5 branched near the top into 5 stigmas. Fruit subglobose or turbinate, succulent, indehiscent, 2–2.5 cm across, 4–5 loculate, usually with 2 seeds in each locule.

Distribution. Borneo (Kalimantan, Sarawak, Brunei & Sabah).

Borneo. Kalimantan, no locality, *Korthals s.n.* (L) (*Herb. Lugd. Bat. no. 908251-14,* lectotype of *Pyrenaria masocarpa* Korth.); Central Kutei, Pedohon River, *A. Kostermans 10615* (L); Belanjan River, near Tabang, *A. Kostermans 10662* (L). Sarawak, Kapit, Bt. Tiban, *Anderson & Ilias S 28700* (L); Kalabit Highlands, *Nooteboom & Chai 02075* (L). Brunei, *P.S. Ashton BRUN 5222* (L). Sabah, Tawao, *A.D.E. Elmer 21148* (L, isotype of *Pyrenaria parviflora* Ridley), *211453* (L, SING), *20422* (SING), *21377* (SING), *J. Singh SAN 22837* (L), Lahad Datu, *Ahmad Damit SAN 27041* (L), *Muin Chai SAN 31740* (L).

Ecology. In lowland forests below 100 m; ascending to 1300 m in Bukit Tibang, Kapit in Sarawak (*Anderson & Ilias S 28700*). Fl. July (one collection); Fr. Feb.-May & Sept.

Note. *Nooteboom & Chai 02075* from Kalabit highlands, Sarawak, possess sharply ridged fruit and smaller leaves.

5. **Pyrenaria tawauensis** H. Keng in Gard. Bull. Sing. 26 (1972) 129, *pl. 1, & fig. 1.*

Thea sp. Merr. Un. Cal. Publ. Bot. 15 (1929) 198.

Shrub or small tree, 3–10 m tall. Young branches slender, covered with greyish short hair; older branches greyish brown, glabrescent. Bark greyish brown, smooth. Leaf-blades elliptic or narrowly lanceolate, acuminate or caudate, base attenuate or cuneate, 9–15 (–28) cm long, 2.5–5 (–10) cm wide, chartaceous, glabrescent above, verrucous and puberulous beneath, drying green, the margin finely serrulate except near the base which is entire, the midrib impressed above and elevated below, the side veins 8–12 pairs, merged near the margin; petioles 0.6–1 cm long, slender, puberulous. Flowers subterminal and in upper axils, solitary or 2–3, (rarely more) congested together; peduncles 2–3 mm long, hispid; bract and bracteoles 2–3, orbicular deltoid, 2–3 mm long; sepals 5–6, subequal,

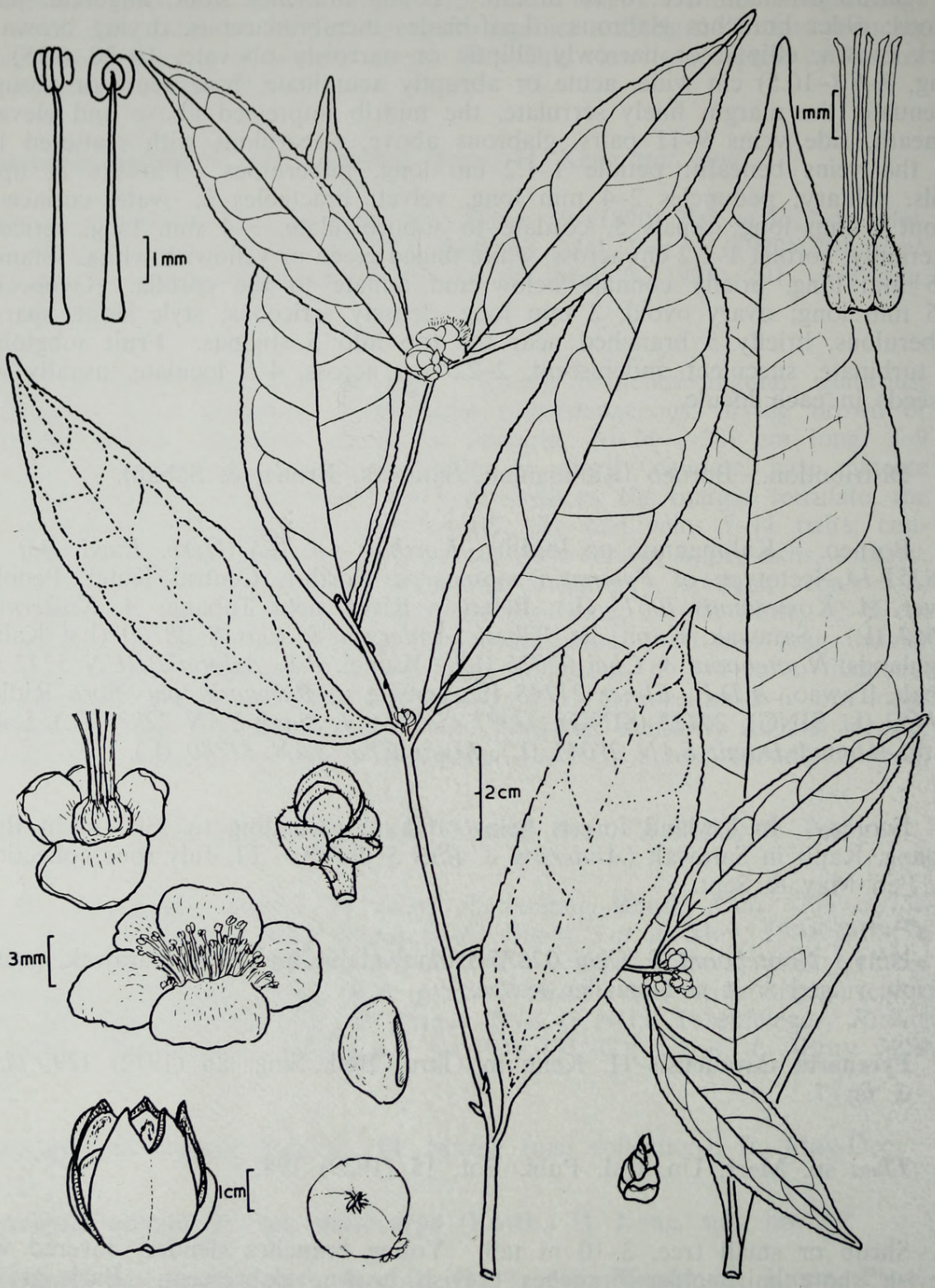

Fig. 5. *Pyrenaria tawauensis* H. Keng
Flowering branch, flower, floral parts, fruit and seed (based on *Shea & Chow 75725*, supplemented by *Singh 24163*).

deltoid to suborbicular, 4–6 mm long, coriaceous, densely sericeous externally; corolla 2.5–3 cm across, white; petals 5–6, broadly oblong to suborbiculate, 1.2–1.5 cm long, thin membranaceous, concave. Androecium 7–8 mm long, the filaments very slender and delicate, glabrous, in 2–3 rows and united beneath.

Gynoecium about 1 cm long; styles 5, long and slender, completely free at the base, each arising from a protuberance near the top of the ovary, glabrous except near the base; ovary globose, 3 mm across, densely sericeous. Capsule broadly ovoid to depressed globose, 3–4.5 cm across, fruit wall thin woody, finally loculicidally dehiscing from the top downwards.

Distribution. Sumatra and Borneo (Sabah & Kalimantan).

Sumatra. Loendoet, Koealoe (E. Coast) *H.H. Bartlett 7630* (L).

Borneo. Sabah (numerous specimens, only representative ones are cited below), Kalabakan (Gunong Rara), *Shea & Chow SAN 75723, 75725* (L); Kundasan, *K. Cox 908* (L); Mt. Kinabalu, *Chew, Corner & Stainton 1902* (L), *Chew & Corner RSNB 4653* (L), *J. & M.S. Clemens 29619, 31968* (L); Ranau, *H. Taipin SAN 42503* (L), *J. Singh SAN 24163* (L); Sandakan, *J.A. Wing, SAN 39013* (L), *Leopold & Kokoh SAN 76654* (L), *G.H.S. Wood SAN 16005* (L), *W. Meijer SAN 21219* (L); Tawau, *G.H.S. Wood SAN 16482* (SING, type, L, isotype), *A.D.E. Elmer 21628, 21832* (L), *A. Baker SAN 17350* (L); Tenom, *Masirom SAN 43242* (L). Kalimantan, Tarakan, *W. Meijer 1860, 2460* (L).

Ecology. In primary forest, often in humid ravines; common in lowland, but also collected from subalpine forest as high as 2800 m (*Chew & Corner RSNB 4653*). The alpine form, however was said to have light yellow flowers (*K. Cox 908, Chew, Corner & Stainton 1902*), also their leaves are smaller and with thicker fruit wall (*Chew & Corner RSNB 8023*). Fl. & Fr. year round.

Note. Merrill (l.c.) referred two fruiting specimens, *Elmer 21628, 21832*, both collected from Tawau (as Tawao) to *Thea* sp. He noted that their fruits were different from those of *Thea lanceolata* Pierre and was not sure about the genus.

My previous description was based on fruiting material only. A large number of good flowering specimens, incl. *Shea & Chow 75725, Wood SAN 16005* and others (all from Leiden) became available for this study. Based on them the description and illustration are prepared.

6. **Pyrenaria villosula** Miq. Fl. Ind. Bat. Suppl. (1861) 484.

Shrub or small tree, 3–10 m tall; young branches covered with yellow or brown hispid or velutinous hair; older branches dark brown, sericeous; bark brown or black, smooth, eventually cracked. Leaf-blades membranaceous, drying brownish, elliptic or narrowly elliptic, 15–20 (–23) cm long, 4–6.5 (–9.5) cm wide, acute or acuminate, sometimes caudate, base cuneate, margin finely serrulate, the midrib slightly impressed above, elevated below, the side veins 9–11 pairs; papillate and puberulous above, sericeous and pilose below, especially on the midrib and nerves; petiole 1–1.5 cm long, hispid, swollen. Flowers axillary, solitary; peduncles 1–1.5 cm (to 2 cm in fruit) long; bract 1, linear lanceolate, to 1 cm long; bracteoles 2; sepals 5–6, unequal, broadly lanceolate cordate to suborbicular, 2–4 cm long, coriaceous, densely sericeous externally; corolla 1.5–2 cm across, creamy white (*Mohd. Shah 1316*); petals 5–6, suborbiculate, 7–8 mm

long and wide, slightly clawed at base, concave, thick coriaceous in the centre, sericeous on the back, the margin glabrous, thinner and with irregular projections. Stamens 4–6 mm long; filaments glabrous, in 4–5 rows united at the base and adnate to the base of corolla. Gynoecium 5–6 mm long; style 1, pubescent, 5-branched near the top for about one-fourth of its length; ovary

Fig. 6. *Pyrenaria villosula* Miq.
Flowering branch, flower, floral parts, fruit (based on *Mohd. Shah 1316*, supplemented by *H. Keng et al. 8834*).

depressed globose, 3–4 mm across, densely sericeous. Fruit depressed globose or ovoid, the apex either slightly flattened with a small apical point or conical, succulent, indehiscent. Seeds usually 2 in each locule, chestnut brown, shining.

Distribution. Sumatra and the Malay Peninsula.

Sumatra. Pasumah, 1200 m, *H.O. Forbes 2191, 2973, 2470b* (L); Landaran Agong, Korinchi, 800 m, *Robinson & Kloss 186* (SING); Sungei Pagu, *J.E. Teysmann 657 HB* (isotype, BO); Asahan, *B.A. Krukoff 4228* (SING).

Malay Peninsula. Pahang, Taman Negara (formerly King George V Nat. Park), *Balgooy 2449* (L), *Everett FRI 14430* (L, SING), *Keng et al. 8834* (SING), *Mohd. Shah 1316, 1502* (L, SING), *Mohd. Shah & Md. Noor 1877* (L), *Ahmad Shukor & Samsuri Sarih 2707* (L, SING), *Whitmore FRI 20129, 20166* (L), *Wyatt-Smith KEP 71957* (L); Raub, *Burkill & Md. Haniff SFN 16809* (SING). Kelantan, near Tarang, *Whitmore FRI 4470* (L). Malacca, Bukit Bruang, *R. Denny 1191* (SING).

Ecology. In lowland and hill forests, by river or along ridges, or in disturbed forests; alt. 50 to 1200 m. Fl. & Fr. year round.

Note. Young branches and underside of the leaves of this species are beset with brown to black hair; superficially they resemble those of *P. acuminata*. Most of the Malayan specimens of this plant were in fact identified under that name. While preparing an illustration of *P. acuminata*, my wife first drew my attention to the differences. Further examination reveal that this plant can be readily distinguished from *P. acuminata* by the following features: (1) Leaves are comparatively smaller, and branches more slender; (2) peduncles are of 1–1.5 cm (in fruit to 2 cm) long; (3) sepals are broadly lanceolate, cordate to orbiculate; and (4) the style is slender, branched at the top for about one fourth of its length. In my original manuscript, it was described as a new species.

At my request, Dr. Kuswata, keeper of the Herbarium Bogoriense, kindly lent me the type-duplicate of *P. villusola* Miq. Although it is a sterile specimen, yet the vegetative characters match extremely well with the Malayan material. Several other old collections from W. and S.W. Sumatra cited above (formerly identified under different names) are also proved to belong to this species.

Variations in leaf venation (especially the angles between lateral vein and midrib) and shape of fruit (from depressed globose to almost ellipsoid) of some specimens are notable.

7. **Pyrenaria viridifolia** Symington ex H. Keng, sp. nov.

Pyrenaria garrettiana Auct. *non* Craib: H. Keng in Ng, Tr. Fl. Mal. 3 (1978) 290.

Frutex 3–10 m altus; ramulis glabratis. Folia ellitica vel angusti-elliptica, apice acuminata vel acuta, basi attenuata vel cuneata, 10–20 cm longa, 3.5–6 cm lata, membracea, margine serrulata, nervis lateralibus circa 10–12; petiolo 5–7 mm longo. Flores axillaris, solitarii, sessilis; sepala 5–7 deltoidea vel suborbiculata,

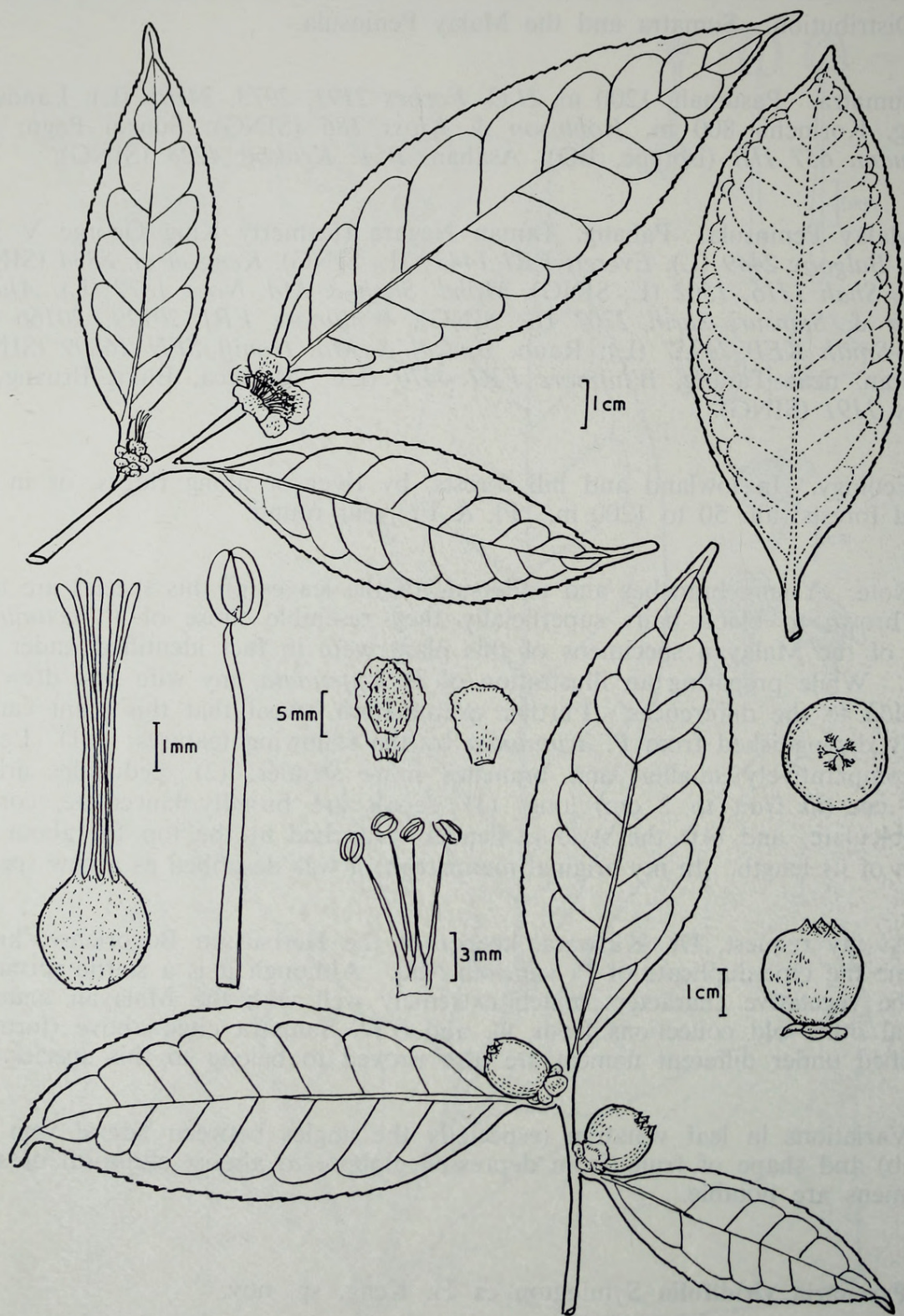

Fig. 7. *Pyrenaria viridifolia* Symington ex H. Keng
Flowering and fruiting branches, floral parts and young fruit (based on *Jaamat 28126, 27579*).

4–5 mm longa, coriacea; corolla ad 2–3 cm diametra, creamea; petala obovata, 1.2–1.4 cm long; stamina 1–1.2 cm longa, glabra, basi breviter connata et petalis adnata; gynoecium 8–10 mm longum, stylis libris approximatis, circa 5–6 mm longis, ovario globoso, 2–3 mm diametro, externe sericeo. Fructus immaturus, globosus, apice convacus.

Shrub or small tree, 3–10 m tall. Young twigs very slender, bluntly angulate, glabrescent. Leaf-blades elliptic or narrowly elliptic, acuminate or acute, 10–20 cm long, 3.5–6 cm wide, the margin finely serrulate or sometimes crenate for most part except near both ends which are entire, membranaceous, drying green, the midrib impressed above and elevated below, the side veins 10–12 pairs, merged near the margin, glabrous above, pubescent beneath; petiole 5–7 mm long, adpressed with short hair. Flowers in upper axils, solitary, sessile or subsessile; bracteole 2, deltoid, 2–3 mm long; sepals 5–7, subequal, deltoid to orbicular, 4–5 mm long, coriaceous, sericeous externally; corolla 2-3 cm across, light yellow; petals 5–6, obovate or broadly oblong, 1.2–1.4 cm long, membranaceous, concave; androecium 1–1.2 cm long, the filaments slender, glabrous, in 3–4 rows, united at the base; gynoecium 8–10 mm long; styles 5, 5–6 mm long, completely free, glabrous; ovary globose, 2–3 mm across, densely sericeous. Immature fruit globose, apex depressed, with 5 bosses (of stylar bases) bordering the depression.

Distribution. The Malay Peninsula (Pahang).

Type: Malay Peninsula. Pahang, Sungie Lemoi, Tanah Rata, *Jaamat FMS 28126* (KEP), Sept. 9, 1931 (flowers yellow).

Paratypes: Malay Peninsula. Pahang, S. Trolak, Ulu Telom, *Jaamat FMS 27576* (KEP); S. Telom, *Jaamat FMS 27598* (KEP); Ulu Telom, *H.C. Dolman 27601* (KEP).

Vern. Names: *Kebit* (Sakai), *Segachok* (Sakai).

Ecology. In jungle near stream, alt. around 1,500 m. Fl. Aug.-Sept. (two collections).

Note. In my treatment of the Theaceae for the Tree Flora of Malaya, vol. 3 (1978), this plant was tentatively identified as *Pyrenaria garrettiana* Craib, a species of Thailand, mainly because of the young fruit on *Jaamat FMS 27576* with five separate bosses around the depressed top. After comparing the authentic specimens of the latter species on loan from Thailand, it is realized that they are different. In *P. viridifolia*, the young branches are glabrescent, the flowers are sessile or subsessile, and the bract and bracteoles subtending the flowers are smaller than the sepals; while in *P. garrettiana*, the young branches are beset with yellowish brown hair, the flowers are distinctly pedunculate (to 5 mm long) and the bract and bracteoles are leafy, lanceolate, often much larger (1–2 cm long) than the sepals.

8. **Pyrenaria wrayi** King in J. As. Soc. Beng. 59 (1980) 201, Ann. Roy. Bot. Gard. Calc. 5 (1896) 147, *pl. 178*.

Pyrenaria kunstleri Auct. *non* King: Ridl.. Fl. Mal. Pen. 1 (1922) 201, p.p.; H. Keng in Ng, Tr. Fl. Mal. 3 (1958) 291, p.p.

Shrub. Young branches adpressed with yellow hispid hair or merely puberulent towards the tip. Leaf-blades mostly narrowly elliptic or oblanceolate, acuminate, base attenuate or cuneate, 10–17 (–20) cm long, 4–5.5 (–6) cm wide,

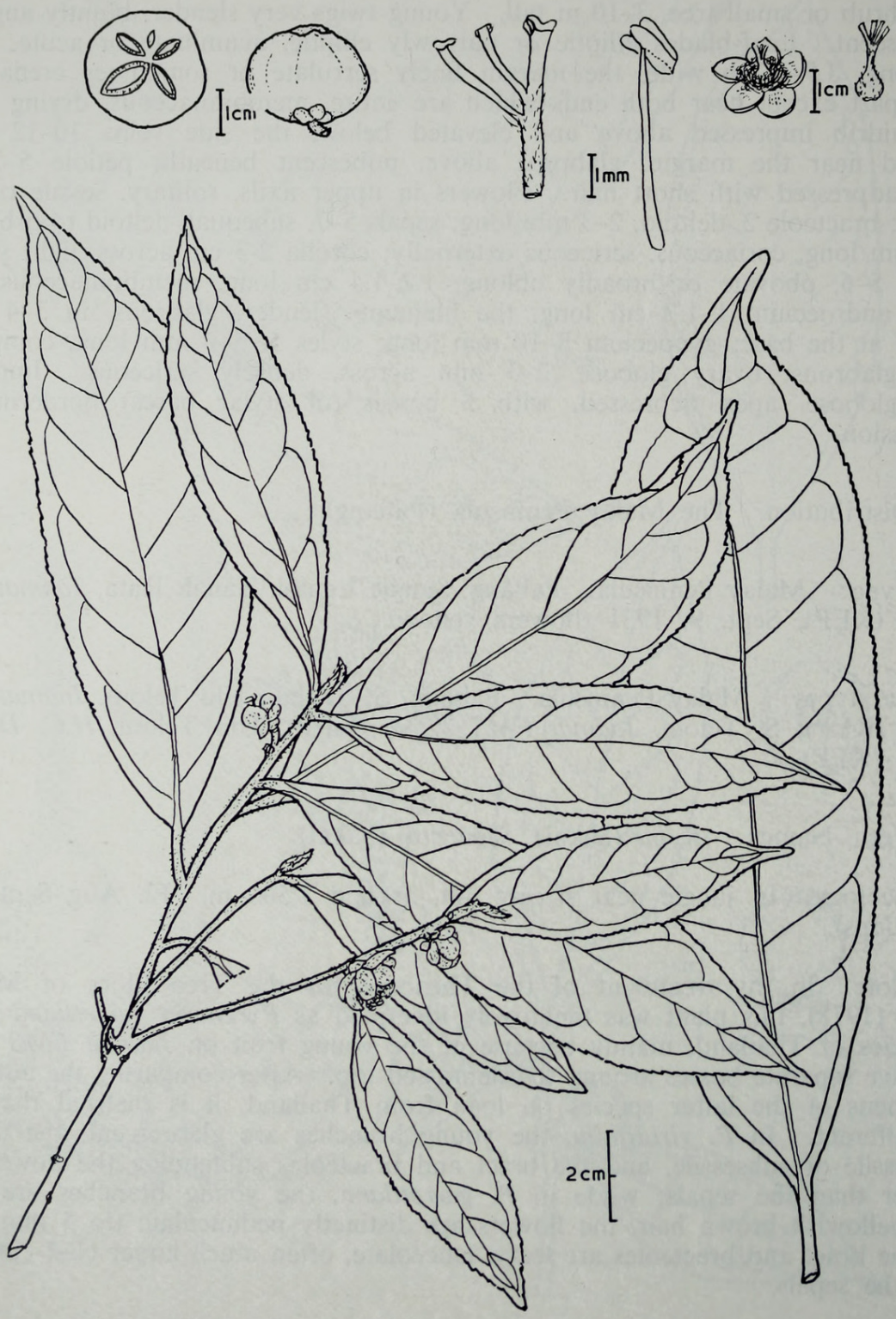

Fig. 8. *Pyrenaria wrayi* King
Flowering branch, flower, floral parts and immature fruit (based on *Burkill & Haniff 12870*).

thin coriaceous, drying brownish, glabrous above, hispid or puberulous beneath, the margin remotely serrate for most part except both ends which are entire, the midrib slightly impressed above and elevated below, the side veins 6–9 pairs; petioles 0.6–1 cm long, hispid or puberulous. Flowers axillary, solitary, peduncles 2–5 mm long; bracteoles 3, deltoid, 2–3 mm long; sepals 5–6, subequal, deltoid to suborbicular, 4–5 mm long, coriaceous, sericeous externally; corolla 1.5–1.8 cm across; petals 5–6, broadly ovate or orbicular, concave, 6–8 mm long, thinner than the sepals, puberulous externally, but with broad glabrous edges; androecium 4–5 mm long, the filaments glabrous, united at the base. Gynoecium 8–10 mm long; styles 5–6, completely fused into one unit for the lower half of their length, the upper half 3–4-branched; ovary globose, sericeous. Immature fruit depressed globose, 2.5 cm across, apex depressed.

Distribution. The Malay Peninsula (Perak).

Malay Peninsula: Perak. Without locality, *Scortechini 634* (L), *637* (SING) (type duplicates), *Wray 3241* (SING) (type duplicate); Gunong Hijau, Maxwell's Hill, *Burkill & Md. Haniff 12870* (SING), *Md. Shah & Sidek 1091* (SING).

Ecology. In hill forest at about 1000–1400 m. Fl. Dec.-Feb.

Note. The duplicates of type specimens of this species available for study are all with small flower buds only. The general appearance of their branches and leaves resembles closely those of *P. serrata* var. *kunstleri*. King's statement that the style is 3-branched, and the ovary is 6-loculate seems rather improbable, and his illustration of the style (l.c.) was obviously based on the dissection of a tiny bud. For these reasons, in my previous treatment (in Ng, Tr. Fl. Mal. 3: 291, 1978), I followed Ridley to reduce *Pyrenaria wrayi* to a synonym of *P. kunstleri*.

Recently we examined a good flowering specimen collected by Burkill & Md. Haniff from Perak. Although it is more hairy than the type specimen, its flower structure, especially the gynoecium fits well with King's description: it has a 5–6 loculate ovary, as shown in the sections of young fruits, but the style is 3- or sometimes 4-branched for about half of the total length. Close examination reveals that the branches are of different diameters: some being simple, while others being a result of fusion of 2 or more branches. This unusual situation somewhat reminds the diadelphia and polyadelphia in the androecia of Leguminosae. Its specific status is therefore restored.

DOUBTFUL AND IMPERFECTLY KNOWN SPECIES

Pyrenaria mindanaensis Merr. in Philip. J. Sc. 20 (1922) 407, En. Philip. 3 (1923) 71.

This species was described on the basis of the following two specimens from the mountains of Mindanao, the Philippines: *Alvarez F.B. 25181* (type) and *Ramos & Edanao B.S. 38839;* both are not available to me. The holotype specimens were obviously destroyed during the War and efforts to locate their duplicates from various institutions were in vain.

In Merrill's original description, he stated that "Fruits ..... usually 2- or 3-celled and with a single seed in each cell, the seeds smooth, slightly compressed, narrowed at both ends, about 1.5 cm long.". It is generally understood that in *Pyrenaria*, the number of seeds per locule is usually 2, very rarely 1, although in the temperate species (which formerly under *Tutcheria*) it may be 3–5; while in *Camellia*, the number of seeds per locule is 1 or sometimes 2. Until the seed character (cotyledons thick, hemispheric in *Camellia*, and thin, crumpled and folded in *Pyrenaria*) is known, it is better to leave it is a doubtful species.

In this connection, it is interesting to note that in his treatment of *Camellia lanceolata* (Bl.) Seemann, Sealy (Rev. Gen. Camellia, p. 144) noted that "the single specimen from Mindanao (i.e. *Ramos & Edanao 36566*, BM) is rather different from the rest in its leaves which are oblong acuminate with blades 9–13.5 cm long and 2.6–4.5 cm wide". This specimen is likely referable to the present species.

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Keng, Hsuan. 1980. "The genus Pyrenaria (Theaceae) in Malesia." *The Gardens' bulletin, Singapore* 33, 264–289.

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