

Fig. 12. — *Lumnitzera sepaiensis* Kosterm.

NEW SPECIES OF *PARINARI* Aublet (Rosaceae-Chrysobalanoideae).

by

A.J.G.H. KOSTERMANS *)

The following is an account and description of new species of Asiatic and one Fijian species of *Parinari* Aublet, originally intended to be included into a forthcoming monographic treatment of the Asiatic *Parinari* species.

Dr. Yan Franco (New York Botanical Garden) has informed me, that his revision and new classification of genera of the Chrysobalanoideae will be published soon and consequently I have deferred the publication of my monograph to a later date.

The species here are treated in a conservative way and described as belonging to the genus *Parinari* sensu lato; between brackets I have added the section to which the species belongs.

1. *Parinari* (§ *Eu-Parinari*) *argenteo-sericea* Kosterm., spec. nov.—Fig. 1

Arbor ramulis globosis foliis chartaceis glabris ellipticis vel oblongis basi rotundatis, apice breviter acuminatis, nervo medio supra impresso, subtus prominentibus, costis 11—15 paribus; petiolis brevibus; stipulis lanceolatis acutis caducis; paniculis pendente albo-sericeo-tomentosis, tomento sub-adpresso, floribus gracilibus, staminibus fertilibus 7—8, stylis aequilongis.

TYPE: SAN 16175 (BO)

Tree 25—33 m tall and 25 cm and more in diam.; bark lenticellate, brown; outer bark hard; inner bark red, hard, 1.2 mm thick; cork cambium red; cambium yellow; branchlets dark purplish brown with numerous pale tiny lenticells, glabrous. Leaves glabrous, chartaceous, elliptic to oblong or subovate-elliptic, 4.5 × 9.5 to 7 × 20.5 cm, base rounded, apex shortly, often obscurely acuminate; upper surface glossy, midrib impressed (except for its basal 1—4 mm which shows protruding tissue from the petiole), lateral nerves filiformous, reticulation prominent or inconspicuous; lower leaf surface dull, paler, lateral nerves 11—15 pairs, erect-patent (the lower ones patent), secondary nerves rather lax, prominent; base of leaf below near the petiole insertion rarely with glandular tissue. Stipules lateral, lanceolate (base 2 mm wide), acute, adpressed strigose, especially along its midline outside, 8 mm long, early caducous. Petiole 5—9 mm, glandless.

*) D. Sc., Professor of Botany, Bandung Institute of Technology and of the Faculty of Mathematics and Physics, University of Indonesia, Bogor; Assistant Director Forest Research Institute, Bogor; Scientific collaborator Herbarium Bogoriense.

Panicles axillary and terminal, up to 9—15 cm long, lax, densely white sericeous-tomentellous (hairs more or less adpressed), except for peduncle and main branches which are more laxly white tomentellous; bracts ovate, acute, densely white tomentellous outside, caducous. Pedicels 1—3 mm long; calyx infundibuliformous, gibbose, rather slender, densely white tomentellous, 2—3 mm long; lobes 1.5—3 mm long, ovate-lanceolate or narrowly triangular, densely white tomentellous outside, inside densely pilose; petals spatulate, 2 mm long; fertile stamens 7—8, 1.5 mm long on a 0.5—1 mm high rim, the sterile ones toothlike on an 1 mm high rim; style slightly shorter than the stamens, apex (stigma) truncate, somewhat triangular; ovary with a dense layer of long, white, glossy strigose hairs, which cover (in a reverse direction) also the upper part of the inside of the tube.

DISTRIBUTION: N. Borneo

The species is allied to *P. glaberrima*, from which it may be recognized by the leafshape, number of stamens, the slender flowers and especially by the white indumentum of the inflorescences.

Saba h (N. Borneo), Lahad Datu, Pangaruan Camp site, mile 6% on Kennedy Bay Timber Co's Rd., 15 miles E.E.W. of Lahad Datu, alt. 40 m, March, fl., *Wood, San 16175* (A, BO, BRI, K, KEP, L, SING); Sandakan, Cpt. 17, Sepilok For. Res., 15 miles W. of Sandakan, May, fl., *Wood, San 18535* (A, BO, BRI, K, KEP, L, SING); Sandakan, Jalan Kabili, boundary Sepilok For. Res., alt. 10 m, May, post anthesis, *Singh, San 21399* (BO, K); Pokul R., bank, alt. 7 m., March, buds, *Mail, B.N.B.F.D. 2875* (BO, K).

2. *Parinari* (§ *Cyclandrophora*) *elliptica* Kosterm., *spec. nov.*—Fig. 2

Arbor parva ramulis sparse adpresse strigosis, foliis chartaceis usque ad rigide chartaceis ellipticis utrinque rotundatis vel rarissime basi subacutis, supra glabra nitida prominule reticulata, nervo mediano prominulo, subtus in joliis junioribus sparse adpresse pilosa, mox glabra, prominule reticulata, costis utrinque 6—8; paniculis pervaucifloris, floribus dense minute pilosis, staminibus fertilibus circa 20, petalibus superantibus, stylus filamentorum subaequilongis, apice truncatus.

TYPUS: *Parham s.n.* (K)

Small tree, 7—8 m high; branchlets slender with minute, scattered, adpressed, strigose hairs; branches blackish or grey with numerous tiny lenticells, glabrous. Leaves chartaceous to rigidly chartaceous, elliptical, 4 x 6 to 9.5 x 15 cm, both ends rounded (rarely base acutish); upper surface glossy, glabrous, densely, prominulously reticulate, midrib slightly prominent, lateral nerves very slender; lower surface more dull, glabrescent (near the base adpressed strigose hairs subpersistent), midrib strongly

prominent, lateral nerves 6—8 pairs, slender, prominent, slightly arcuate-patent, reticulation prominulous with rough veins. Petiole about 5 mm long, glandless. Stipules aciculate, 10 mm long, caducous.

Panicles depauperate, raceme-like, few-flowered, hardly and shortly branched, densely adpressed grey-strigose, slender, up to 7 cm long; bracts caducous. Pedicel 2—5 mm long. Calyx slender, about 5 mm, densely adpressed-strigose, infundibuliformous, lobes ovate-elliptic, obtuse, up to 5 mm long, outside densely sericeous, inside less; petals not seen. Fertile stamens about 20, up to 9 mm long, on an 1 mm high rim, sterile ones on the rim represented by short teeth, ovary densely adpressed strigose; style glabrous, as long as the stamens, apex (stigma) truncate.

DISTRIBUTION: Fiji Islands

VERNAC. NAME: Makita leka

In leaf-shape the species resembles *P. latifrons* from the Malay Peninsula, but the apex is always rounded, moreover it has far less lateral nerves.

The local name is Makita leka which means the short makita; makita is the name for the common *P. laurina*.

According to Parham from the kernel an oil is obtained.

Fiji Islands, Viti Levu, Vunidawa, sheltered valley, alt. 70 m, Jan., fl., *Parham, s.n.* (K); Naitasiri, alt. 30 m., ster., *Peni Turaga s.n.* (K); locality not indicated, fl., *Home U2* (K).

3. *Parinari* (§ *Eu-Parinari*) *metallica* Kosterm., *spec. nov.*—Fig. 3

Arbor mediocris foliis rigide chartaceis vel coriaceis ellipticis obtusis vel obscure breve acuminatis supra pernitida metallica, subtus glabra, perdense areolata, areolis parvis venis latis, costis 10—13 paribus; petiolis longis; paniculis axillaribus foliis brevioribus ferrugineo pilosis, staminibus fertilibus 8; stylus filamentis aequilongis.

TYPUS: *Ashton, Brun. 3267* (SAR).

Understory tree ca 16 m tall, 25 cm in diam., clear bole to 12 m; bark smooth, purplish; crown broad lanceolate; branchlets stout, crooked, dark brown, lenticellate; the youngest ones adpressed strigose, soon glabrous. Leaves rigidly chartaceous to coriaceous, elliptic, 3.5 x 8 to 9 x 17 cm, base rounded or shortly acute, apex very shortly acuminate, but usually obtuse, upper surface very glossy with a grey metallic sheen, midrib flat, lateral nerves filiform, prominulous, secondary nerves prominulous, but usually inconspicuous; lower surface in young leaves with a dense layer of woolly cobweblike, brown hairs, soon glabrous; in adult leaves a very dense and intricate areolation present with flat topped veins and hardly any interspace, which is pilose, midrib strongly prominent, lateral nerves 10—

13 pairs, erect-patent, straight (curved at margin), prominent. Petioles 12—20 mm long, glabrescent, becoming corky. Stipules ovate-lanceolate, acute, densely brown pilose, ca 8 mm long, early caducous.

Panicles axillary, rather narrow, little branched, densely brown tomentellous, 4—10 cm long; base surrounded by numerous bud scales; bracts early caducous. Flowers cream; in dried conditions rusty pubescent; calyx gibbose, 2—3 mm long; lobes lanceolate, acute, 1 mm long; petals lanceolate, glabrous, slightly longer than the calyx lobes; fertile stamens about 8; filaments ca 2 mm long; staminodial ones represented by short teeth; rim short; ovary densely silky strigose; style glabrous as long as the stamens, stigma truncate.

DISTRIBUTION: Brunei

Characteristic are the grey metallic upper surface, the long petioles, the obtuse leaves with the extremely dense areolation and the short axillary inflorescences.

The species falls within the alliance of *P. sumatrana* Bth.

Brunei: Andulau For. Res., undulating hills, yellow sandy loam, alt. 50 m, July, fl., Ashton, *Brim.* 3267 (BO, K, L, SAR); Bukit Teraja, mile 21%, alt. 300 m, yellow, sandy clay, Sept., fl., Ashton, *Brun.* 673 (BO).

4. *Parinari* (§ *Cyclandrophora*) *nannodes* Kosterm., *spec. nov.*,—Fig. 4

Parinari *asperulum* (non Miquel) Ridley, *Fl. Malay Pen.* 1: 670. 1922, quoad cit. specim. Ridley 2603 (SING) et *Curtis's.n.* (SING).

Arbor, parva ramulis gracilibus minutissime (sub lente) puberulis et adpresse longe strigosis, foliis rigide chartaceis glabris nitidis lanceolatis vel oblongis vel plerumque ovato-lanceolatis vel ovato-oblongis, basi in petiolum contractis breve acuminatis, apice conspicue acuminatis vel caudatis, supra laevia nervo mediano gracilibus prominulis costis utrinque 10—12 prominulis, subtus nervo mediano sparse adpresse strigosis mox glabris prominentibus, costis arcuatis prominentibus, rete laxioribus prominulis; petiolis parvis glabris eglandulosis; inflorescentiis axillaribus dense adpresse sericeis, spiciformibus, floribus pro genere magnis tubo longo cylindrico gracilibus, staminibus fertilibus ca 18 longe exsertis, stylus filiformibus glabris staminibus superantibus.

Small tree, 7—10 m tall, 7.5—15 cm in diam. Branchlets very slender, the youngest ones covered with a dense layer of dark brown minute hairs and glossy adpressed long strigose hairs. Leaves rigidly chartaceous, oblong or lanceolate or ovate-oblong, 3 x 7 cm to 5 x 13 (—18) cm, base contracted into the petiole, shortly acuminate; apex conspicuously long and slenderly acuminate or caudate-acuminate; both surfaces glossy, upper surface

in mature leaves smooth, often sub-bullate, midrib and the slender lateral nerves prominulous in a groove; lower surface with a prominent midrib with adpressed strigose hairs (soon glabrous) and 10—12 slender, prominulous, arcuate, lateral nerves; secondary nerves prominulous, forming a lax, smooth reticulation. Petiole 2—4 mm long, soon glabrous, glandless and becoming corky. Stipules narrowly lanceolate, acute, outside laxly adpressed strigose or glabrous, tip with a hairbrush, inside glabrous, 8—10 mm long, lateral of the petiole, enveloping the strigose axillar bud, caducous.

Inflorescences axillary, spike-like, densely adpressed golden-brown sericeous, 3—7 cm long (flowers included), in bud with numerous large bracts and bracteoles; peduncle short; the densely sericeous flowers almost sessile with a deciduous, ovate, acute, 7 mm long bract at the base of the almost missing pedicel and a narrowly lanceolate, 3—4 mm long bracteole at the base of the calyx tube (this bracteole still present at anthesis). Calyx tube very slender, cylindrical, 10—12 mm long; calyx lobes oblong-ovate, acute, fleshy, unequal, ca 7 mm long, inside densely, minutely puberulous; petals white, usually spatulate, rarely ovate, 8—12 mm long, base gradually narrowed; fertile stamens pale blue or purplish, about 18—20, ca 12 mm long on a short rim; style filiformous, glabrous, 15 mm long with a minute, capitellate stigma.

Fruit ellipsoid, 25 x 12 to 40 x 15 mm, base with an obscure neck, apex rounded, dark rusty brown, pustular (almost like the fruit of *Euphoria* species); outer crusty layer very thin; followed by a radial, fibrous layer of 2—2.5 mm and a very thin seedcoat enveloping the single ruminant seed, which fills completely the large central cavity.

TYPUS: *Beccari P.B.* 2955 (BO)

DISTRIBUTION: The Malay Peninsula, Borneo in well-drained forests; rather common.

The species is closely related to *P. latifrons* Kosterm., but has narrower leaves with less lateral nerves and a caudate acumen.

The species is related to *P. scabrum*, but has differently shaped leaves which are more smooth and glossy; the veins (on the upper surface) have also rough pits. Young leaves are reticulate on both surfaces and are not bullate.

Malay Peninsula: Penang, buds, *Curtis s.n.* (SING); Pahang: Gabing Bintang, Sept., buds, *C.F.* 3920 (SING); *ibid.*, Taliang R., July, fr., *Ridley* 2603 (SING); Negri Sembilan: Mt. Angi, Oct., fl., *Symington, F.D.* 2S3U3 (SING); *ibid.*, Dec, fl., *Holtum* 9893 (BO, SING); *ibid.*, Dec, fl., *Osman, F.D.* 23722 (SING); *ibid.*, Dec, fl., *Tachun, F.D.* 23680 (SING); Johore: Sg. Kayu Ara, Mawai-Jumaluang Rd., low, May, fl., *Corner, S.F.N.* 29329 (BO, SING); *ibid.*, April, fl., *Corner, S.F.N.* 3724.5 (BO, SING); *ibid.*, Mt. Pulai, March, fl., *Sinclair, S.F.N.* 39511 (SING); Borneo: Sarawak: Mt. Matang, Dec, fl., fr., *Beccari P.B.* 2955 (BO) et 2510 (BO, G); *ibid.*, 100—500 m,

Sept., buds, *Jacobs 554,3* (B, BH, BO, CANB, G, K, L, S, SAR, US); Kuching, Semengoh For. Reserve, near tree 918, alt. 100 m, Sept., young-fr., *Jugah s.n.* (A, BO, K, C, SAR); *ibid.*, near tree 3598, Aug., fl., *Bosli, S. 1U922* (A, BO, K, L, SAN, SAR, SING); *ibid.*, Sept., fl., *Bojeng bin Sitam 9378* (BO, K, L, SING); Sabah (N. Borneo), hillside, Aug., buds, *Keith, B.N.B.F.D. 6225* (L).

5. *Parinari* (§ *Eu-Parinari*) *parva* Kosterm., *spec. nov.*—Fig. 5

Arbor mediocris ramulis juvenilis dense ferrugineo-tomentellis, foliis chartaceis, ellipticis vel oblongis, magnis, basi rotundatis apice breve acuminatis, supra glabra, nervo mediano piano, subtus glabrescentibus prominulo-reticulatis, areolis dense pilosis, costis 11—21-paribus, petioli brevis; stipulis magnis; paraculis racemiformibus brevibus, dense tomentellis, bracteis subsistentibus; staminibus fertilibus 8, stylus staminibus aequilongis; fructus ellipsoideus, gracilibus.

TYPUS: *Boden Kloss 14676* (K)

Tree, 8—10 m tall and 20 cm in diam. with dense, few-branched crown; bark dark grey, grey-mottled, smooth; bole fluted; branchlets glossy, dark purplish brown, lenticellate, the youngest branchlets densely rusty tomentellous. Leaves chartaceous, elliptic to oblong, 5.5 x 11 to 10 x 21 cm (to 11 x 30 cm), base rounded, apex shortly acuminate with sharp tip; upper surface glabrous (pilosity on midrib often sub-persistent), midrib flat, lateral nerves filiformous, regulation obscure; lower surface prominently reticulate (veins not broad and not flattened above), areoles filled with a mat of white, cobweb-like hairs; midrib prominent, adpressed pilose, lateral nerves prominent, 11—21 pairs, widely spaced, erect-patent, straight (except at margin), adpressed pilose. Petioles short, about 5—8 mm long, densely pale brown pilose; glands not seen. Stipules lateral, ovate-lanceolate, acute, 5—6 mm wide at base, 6—25 mm long, densely, shortly pilose and ribbed outside.

Panicles short (up to 5 cm long), hardly and shortly branched, raceme-like, densely pale brown tomentellous; bracts present at anthesis, those at the base of the ramifications ovate, acute, 5 mm long. Pedicels short, densely tomentellous, 1—1.5 mm long. Flowers dull pale-brown, calyx tube 3 mm long, lobes slender, ovate-lanceolate, acute, 1—1.5 mm long, densely, shortly pilose. Petals white.

Infructescence 1.5—4 cm long with a single fruit, pilose. Fruit ellipsoid, rather slender, up to 2 x 4 cm, flattened laterally, sulcate, apex unequally emarginate and truncate, completely covered by a grey brown, scab-like substance.

DISTRIBUTION: Malay Peninsula, Sumatra.

The species is close to *P. sumatrana* by the characteristics of the fruit and stipules; it differs by the larger, chartaceous leaves, the number of

lateral nerves, the pilosity of the leaves, the smaller and more slender fruit; the leaves are never ovate-elliptic as in *P. sumatrana*. The species is also near *P. elmeri* by the shape and size of the inflorescence with the persistent bracts, but the leaves are different.

Malay Peninsula: Pahang, Sg. Tahan, July., buds, *Kiah, S.F.N. 31720* (SING); *ibid.*, Aug., fr., *Holtum, S.F.N. 20065* (BO, E, SING); Sumatra: Mentawai Isl., Isl. Sipora, vicinity of Sioban, Oct., fl., *Iboet 368* (BO); *ibid.*, Oct., fl., *Boden Kloss H676* (BO, K); Palembang, Lematang Ulu, Oct., fr., *Lambach 1229* (BO, K, L).

6. *Parinari* (§ *Eu-Parinari*) *rigida* Kosterm., *spec. nov.*—Fig. 6

Arbor parva ramulis dense ferrugineo-tomentosis foliis rigide coriaceis ellipticis vel oblongis magnis, basi rotundatis apice breve acuminatis, supra glabra nitida subbullata, nervo mediano piano, subtus dense prominule reticulata, areolis albo-piloso, costis utrinque 20.

TYPUS: *S.F.N. 40773* (SING).

Tree 5 m tall; branchlets densely rusty tomentose; branches grey, smooth. Leaves rigidly coriaceous, elliptic or oblong, 6 x 17.5—8.5 x 25 cm, base rounded, apex shortly acuminate with sharp tip; upper surface glossy, glabrous, slightly bullate, midrib flat, lateral nerves filiformous; lower surface in young leaves rusty tomentellous; in adult leaves prominently reticulate with a matting of cobweblike white hairs in the areoles; veins not broadened, not flat topped, roughish; midrib strongly prominent, densely, minutely pilose, glabrescent, lateral nerves prominent, rather widely spaced, about 20 pairs, erect-patent, slightly curved (strongly curved at margin); in young leaves glandular tissue present on the lower leaf base surface at both sides of the base of the midrib. Petioles stout, 5—8 mm long, bearing orbicular glands, in older leaves petioles corky, glandless.

DISTRIBUTION: Only known from the type locality.

As *Parinari* species are mainly characterized by their leaves. I venture to describe this species, which seems to be very close to *P. parva* Kosterm., from which it mainly differs by its thick, rigidly coriaceous leaves.

Malay Peninsula: Trengganu, 34th mile Trengganu-Besut Rd. (West side), lowland forest, Sept., ster., *Sinclair & Kiah, S.F.N. U0773* (E, SING),

7. *Parinari* (§ *Eu-Parinari*) *ashtonii* Kosterm., *spec. nov.*—Fig. 7

Arbor mediocris foliis rigide coriaceis, ovato-oblongis sensim acuminatis basi in petiolum contractis supra glabris peritidis obscure bullatis

subtus perdense areolatis nerviis perlatis, areolis parvis profundis albopilosis, costis 13—17 paribus, petiolis crassis, brevis; fructus irregulariter, ellipsoideus, obtusis, parte basilibus constrictis.

TYPUS: Ashton, S. 17281 (BO)

Tree 10—17 m tall, up to 20 cm in diam.; bark smooth, white mottled. Branchlets glabrous, dark purplish brown with tiny rather obscure lenticells, the youngest ones minutely adpressed-pilose. Leaves rigidly coriaceous, ovate-oblong, 3 x 9 to 6 x 13 cm, base contracted into the petiole, apex gradually narrowed, acuminate, tip sharp; upper surface glossy, glabrous, midrib impressed (except near its base), lateral nerves filiform, impressed; reticulation dense, slightly bullate; lower surface areolate, but the nerves not flat, densely white cobweblike, adpressed pilose (on the midrib adpressed strigose), midrib strongly prominent, lateral nerves 13—17 pairs, prominent, straight, erect-patent, curved at the margin; secondary nerves filiform, prominulous, parallel. Petiole rather stout, pubescent, glabrescent, ca 10 mm long, often with two small, dark round, slightly protruding glands on the upper surface, about the middle of the petiole.

Inflorescence with 2 rows of bud-scales at its base. Sepals ovate-lanceolate 5 mm long; sterile stamens represented by broad, obtuse, almost 2 mm long, pubescent teeth, inserted on a thin, 1 mm high rim. Infructescence up to 13 cm long. Fruit irregularly ellipsoid, obtuse, 5 cm long, 3.5 cm in diam., with a pronounced basal neck; fruit more or less completely covered by a pale brown scaly substance.

DISTRIBUTION: Heath forest in Sarawak

The species is related to *P. oblongifolia*, from which it differs by its leaf shape, the fewer lateral nerves and the different areolation of the lower leaf surface; the fruit are smaller and of a different shape. The two known collections are from heath forest.

Borneo: Sarawak; Bako National Park, sandstone plateau ca. 70 m alt., white sandy soil, June, fr., Ashton, S. 17281 (A, BO, FHO, K, L, SAN, SING); 1 st. Div. Sampadi For. Res. off Batang Kayan, kerangas (heath forest) ridge, Aug., ster., Sinclair & Kadim bin Tassim 10402 (BO, E, K, L, SAR, SING).

8. *Parinari* (§ *Cyclandrophora*) *latifrons* Kosterm., *nom. nov.*

Parinarium latifolium (non Exell) Henderson in Garden's Bull. Straits Settl. 7: 102. 1933, typus: Haniff, S.F.N. 21119 (K), basionym.

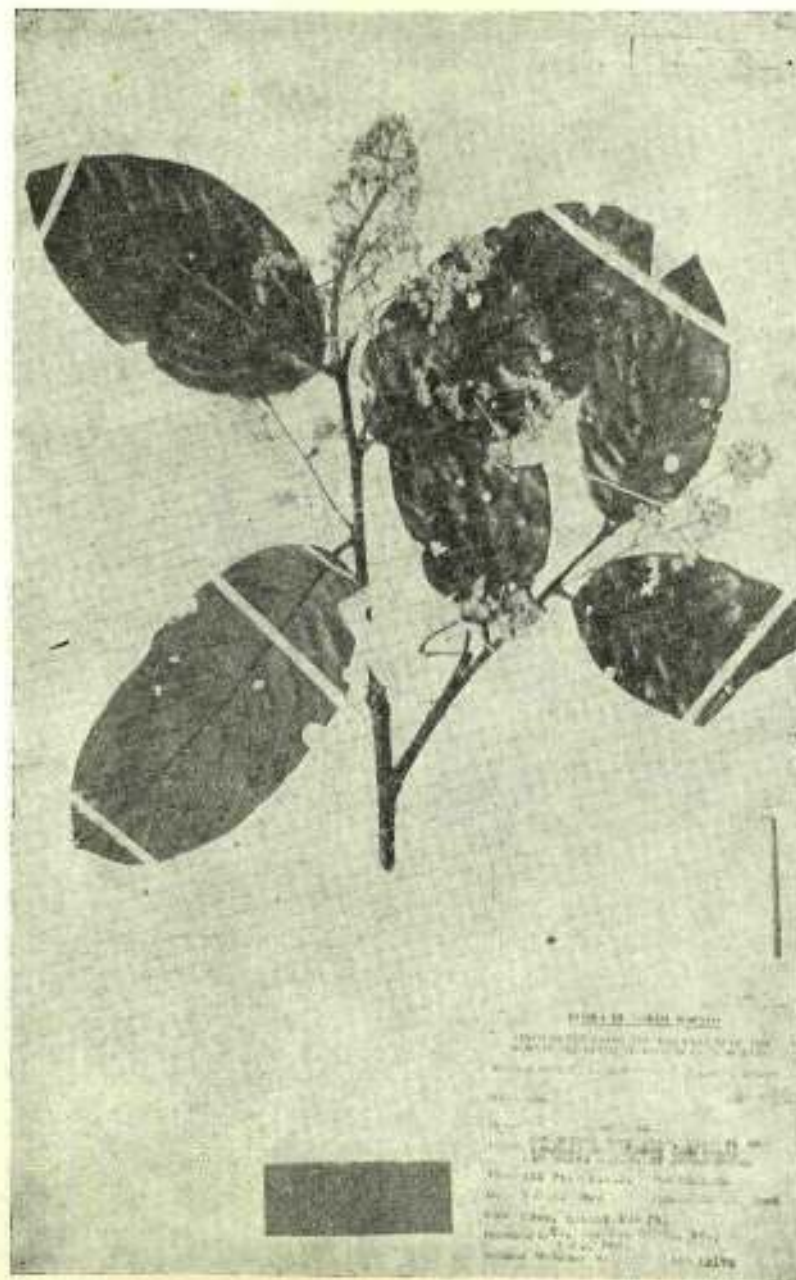
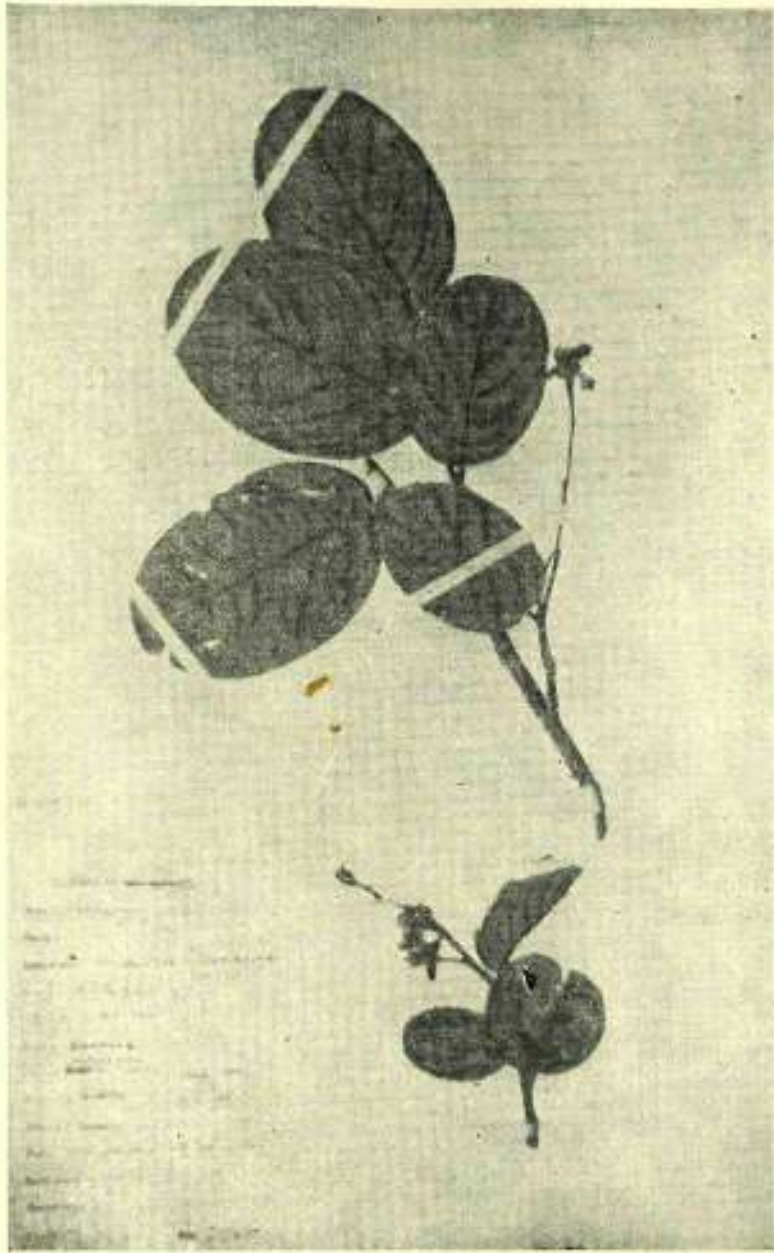


Fig. 1. — *Parinari arffenteo-sericea* Kosterm.



. Fig. 2. — *Parinari elliptica* Kosterm.



Fig. 3. — *Parinari metallica* Kosterm.



Fig. 4. — *Parinari nannodes* Kosterm.

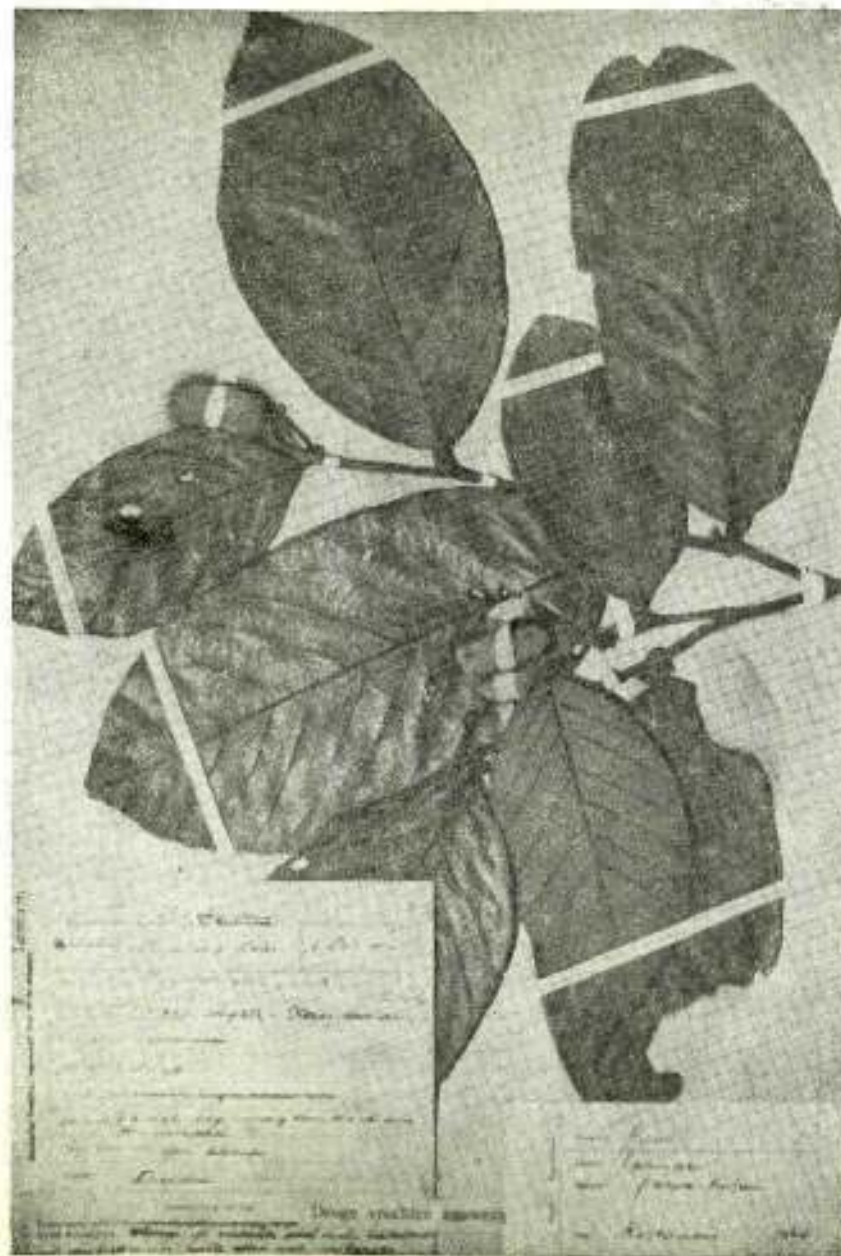


Fig. 5. — *Parinari parva* Kosterm.

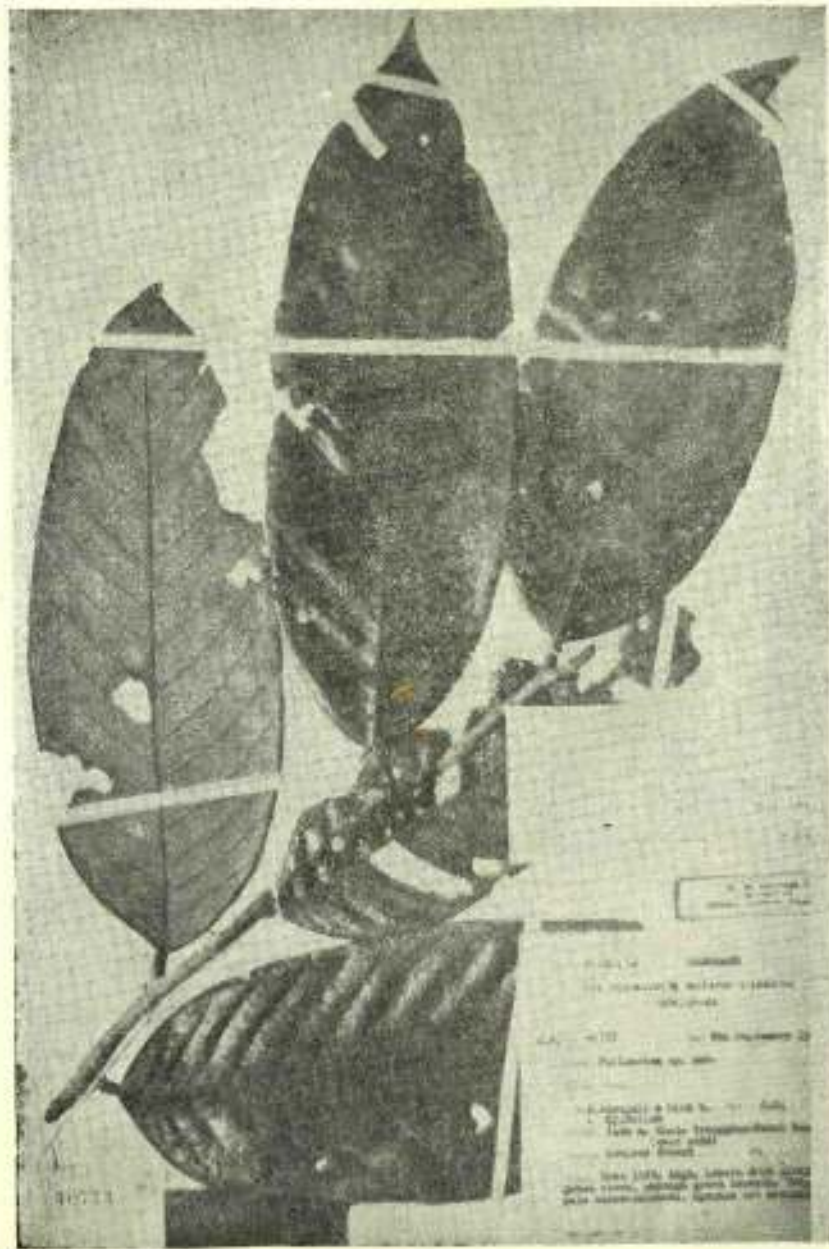


Fig. 6. — *Parinari rigida* Kosterm.

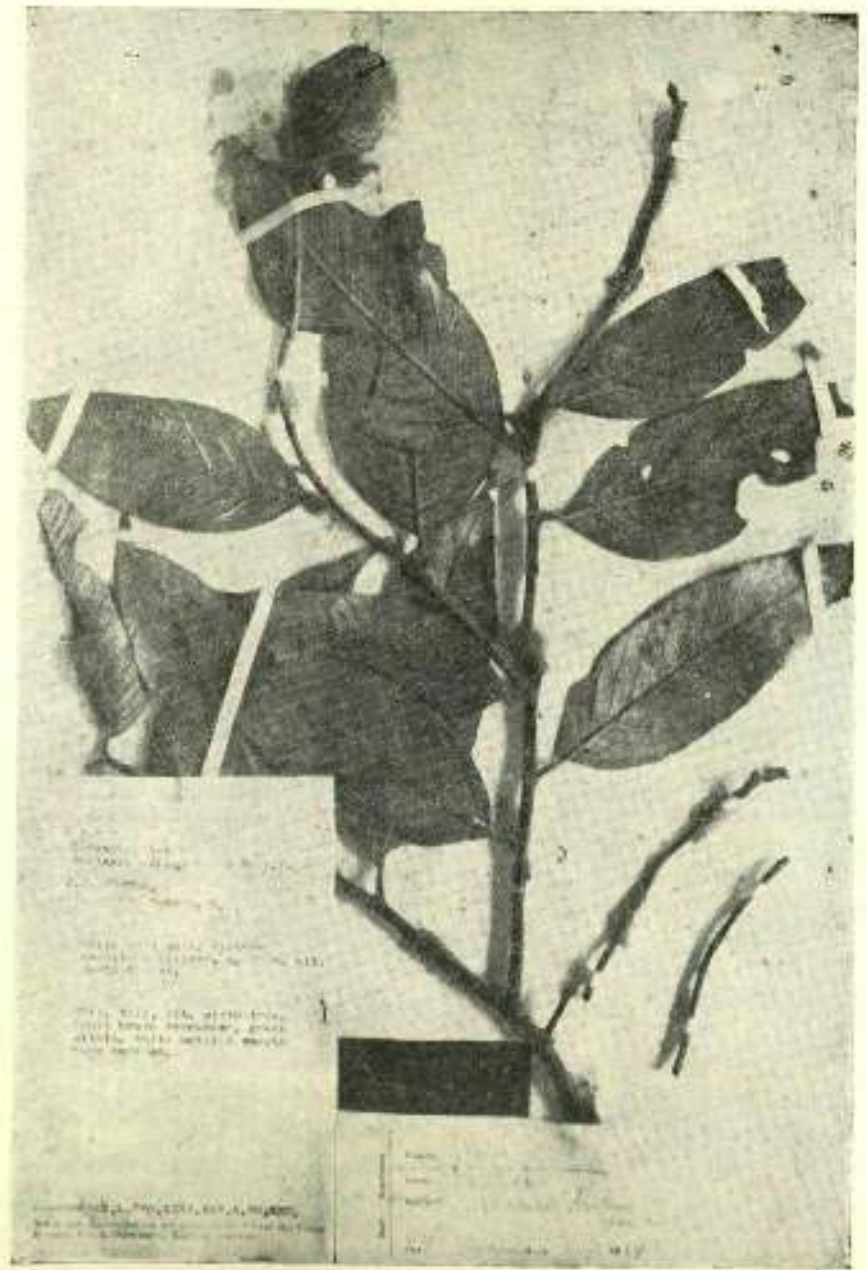


Fig. 7. — *Parinari ashtonii* Kosterm.