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TAXONOMY, PHYLOGENY, AND GEOGRAPHY OF NEOSCORTECHINIA HOOK. f. EX PAX (EUPHORBIACEAE)

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SUMMARY

Six species are recognized in *Neoscortechinia*, two more than before, because *N. angustifolia* is raised to species level and *N. forbesii* is split into *N. philippinensis* (new combination) and *N. forbesii* s.s. The varieties of *N. kingii* are united. The genus *Cheilosa*, which closely resembles *Neoscortechinia*, is kept separate and it is used as the outgroup in the cladistic analysis of *Neoscortechinia*. The latter analysis resulted into a cladogram, which shows a first branching off of the sister species *N. angustifolia* and *N. sumatrensis*, followed by a subsequent branching off of *N. nicobarica*, *N. philippinensis*, and finally *N. forbesii* and *N. kingii*. Four of the six species show a wide-spread distribution in W Malesia (*N. kingii*, *N. nicobarica*, *N. philippinensis*, and *N. sumatrensis*) and *N. forbesii* is wide-spread in E Malesia. Only *N. angustifolia* has an endemic distribution (NE Borneo) and is vicariant with its sister species. The distribution of *N. forbesii* may be due to dispersal combined with a vicariance event.

INTRODUCTION

The genus *Scortechinia* was established by J.D. Hooker (1887), unfortunately two years after Saccardo already used this name for a genus of fungi. Pax (1897) noticed this error and renamed Hooker's genus *Neoscortechinia*; a name which still honours the late Father Scortechini, a famous plant collector in Perak (Malaysia). Pax & Hoffmann (1919) made new combinations in *Neoscortechinia* for two of the three species of Hooker (one, *Scortechinia forbesii*, was a *nomen nudum*), and for a species of Merrill and one of Elmer. Merrill (1912), independently, described the genus *Alcinaeanthus*, which is congeneric with *Neoscortechinia*, as he found out in 1916 when he transferred his species to, then still, *Scortechinia*.

Before this revision started, the species *N. forbesii*, *N. kingii*, *N. nicobarica*, and *N. sumatrensis* were known. *Neoscortechinia kingii* and *N. sumatrensis* were subdivided into two varieties each. In this revision all species are still recognized, but *N. forbesii* has been subdivided into two species, *N. philippinensis* in W Malesia and *N. forbesii* in E Malesia (see the section Biogeography). One of the varieties of *N. sumatrensis* has been raised to species level (*N. angustifolia*), and the varieties of *N. kingii* are not recognized any more (see note under *N. kingii*). *Neoscortechinia angustifolia* is recognized as a species, because the differences with *N. sumatrensis* are pronounced (much larger, obovate, less pilose leaves) and usually more obvious than the differences between *N. forbesii*, *N. nicobarica*, and *N. philippinensis* (for the latter see note 3 under *N. forbesii*).

Merrill (1912) already indicated that *Neoscortechinia* (*Alcinaeanthus* in his revision) could best be placed in the Gelonieae. Pax & Hoffmann (1919) did likewise and placed the genus in the tribe Gelonieae subtribe Geloniinae. Airy Shaw (1975) grouped *Neoscortechinia* together with *Cheilosa* in the Cheiloseae, to show how distinct *Neoscortechinia* is (Hooker, 1887, even discussed the possibility that it could belong to another family, but this was based on inadequate information).

Airy Shaw (1971) mentioned that *Neoscortechinia* resembles *Cheilosa* very closely, and suggested that both genera should perhaps even be united. However, the differences between both genera are quite large, especially in comparison with the small differences among the species of *Neoscortechinia*. *Cheilosa* differs from *Neoscortechinia* in the number of locules, 3 versus 2, the number of anthers, 9 or 10 versus 5–8 (9), the absence of glands in the inflorescence and on the base of the leaves, the presence of a style (absent in *Neoscortechinia*), the thicker-walled fruits, and the usually shorter male inflorescences. Therefore, both genera are kept separate.

CHARACTERS

Indumentum

The species are at least pilose on the young parts and in the inflorescences. *Neoscortechinia sumatrensis* is most pilose with the leaves also hirsute to subhirsute. Its sister species, *N. angustifolia*, has glabrous leaves, but still strongly hirsute inflorescences. Next in line is *N. nicobarica* with subpilose leaves and very pilose (though glabrescent) inflorescences. The other three species have (sub)glabrous leaves and (sub)sericeous inflorescences.

Leaf size and shape

Neoscortechinia angustifolia has the largest leaves, much larger than the other species, the shape is obovate. Usually the species show (ovate to) elliptic leaves or elliptic to obovate leaves.

Glands

Most species, except *N. kingii*, have two glands at the upper side of the leaf base. These glands may be small and indistinct and therefore several leaves have to be checked, otherwise *N. philippinensis* will be confused with *N. kingii*.

Nervation

Neoscortechinia nicobarica has a different type of nervation with many, usually not strongly arching nerves (Fig. 1). This, together with the usually broad leaf base, the stronger pilosity, and the more distinct teeth along the leaves, are the main differences with *N. philippinensis*.

Glands in the inflorescences

The inflorescences usually show glands at the base of the bracts to the flowers and the bracts to the cymules (bracts at the base of the last side branches), usually more clearly so in female than in male inflorescences. These glands are homologous with bracteoles. Sometimes the glands are absent and bracteoles are present at both sides of the bract, or the bract shows two teeth at the basal parts of its margin. Glands and bracteoles may be present in the same inflorescence, but never together, a bract either has glands or bracteoles (or nothing).

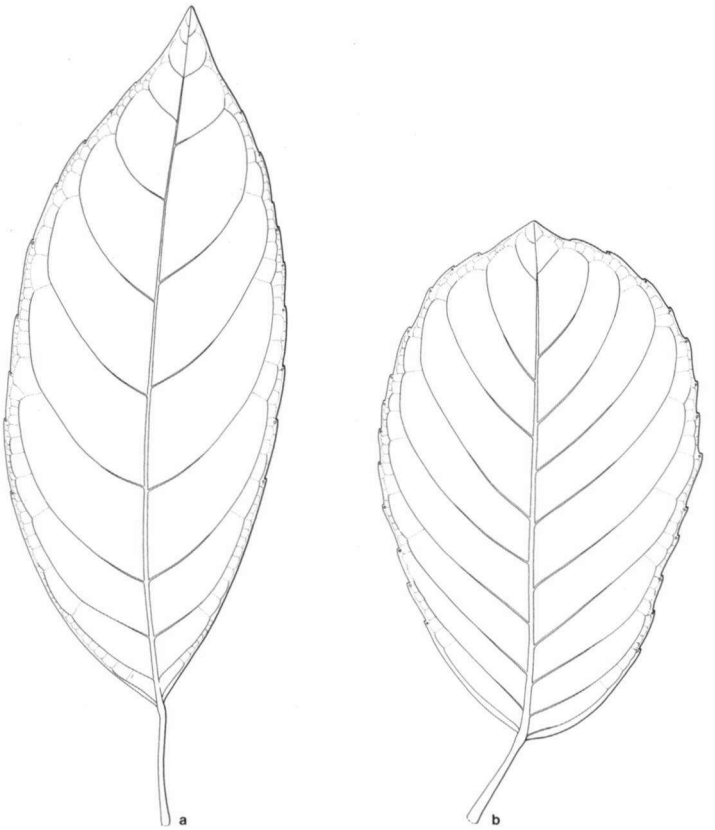

Fig. 1. Leaf shapes, lower surface. — a. *Neoscortechinia philippinensis* (Merr.) Welzen, less and more strongly arching nerves, dentation shallow, × 0.5 (*SAN (Charington) 17354*, L). — b. *Neoscortechinia nicobarica* (Hook. f.) Pax & K. Hoffm., many, less arching nerves, dentation pronounced, × 0.5 (*KEP FRI (Ang Khoon Cheng) 27665*, L).

Stamens

The stamens are free at the base of the filaments, not united as shown by Hooker (1887). This misunderstanding may have been caused by the small hirsute scales, which are present between the filaments on the receptacle. The anthers are opening latro-introrsely, but more latrorsely in *N. forbesii*, where the anthers are also much larger than in the other species.

Fruit

The fruits are 2-locular, but usually 1-seeded, whereby the septum is pressed against the endotesta and the impression of a 1-locular fruit is raised. The fruit wall breaks up into four equal parts during dehiscence, after which the seed(s) are shed and the column will be the only remaining part of the fruit, together with the sepals. The column will be bent when the fruit is 1-seeded, with the septum pressed against the endotesta.

PHYLOGENY

A phylogenetic analysis was rather difficult, because the species in *Neoscortechinia* only differ in a few, often slightly different characters. As outgroup the genus *Cheilosa* was selected, as this genus is considered to be the only closely related genus (see Introduction). The character states in which *Neoscortechinia* differs from *Cheilosa* are considered to be apomorphies for *Neoscortechinia* as they are exceptional or unique within the Euphorbiaceae. The following characters and character states have been used in the phylogenetic analysis (data of *Cheilosa montana* taken from Van Welzen et al., 1993):

Character 1: *Leaf length*
1 = maximum length > 25 cm
2 = maximum length < 25 cm

Character 2: *Glands at base leaf*
0 = absent
1 = present

Character 3: *Leaf colour of dried leaf*
1 = brown
2 = green

Character 4: *Bract to the inflorescence*
1 = maximum length ≤ 5 mm
2 = maximum length > 5 mm

Character 5: *Length male inflorescence*
1 = length ≤ 5 cm
2 = length > 5 cm

Character 6: *Indumentum of inflorescences*
1 = sericeous / hirsute
2 = glabrous to subsericeous

Character 7: *Glands in inflorescences*
0 = absent
1 = present

Character 8: *Flower pedicel*
1 = length > 0.3 mm
2 = length ≤ 0.3 mm

Character 9: *Number of stamens*
1 = 9 or 10
2 = 5–8 (9)

Character 10: *Number of locules*
1 = 3 locules per ovary
2 = 2 locules per ovary

In the datamatrix only those character states are scored that are present in the greater majority of the specimens, e.g., the occasional 9th stamen in *Neoscortechinia* is ignored, just like the occasional longer male inflorescence in *N. kingii*:

Species \ Characters:	1	2	3	4	5	6	7	8	9	10
Cheilosa montana	1	0	1	1	1	1	0	1	1	1
Neoscortechinia angustifolia	1	1	2	1	2	1	1	1	2	2
N. forbesii	2	1	1	2	1	2	1	2	2	2
N. kingii	2	0	1	2	1	2	1	1	2	2
N. nicobarica	1	1	1	2	2	1	1	1	2	2
N. philippinensis	2	1	1	2	2	2	1	1	2	2
N. sumatrensis	2	1	2	1	2	1	1	1	2	2

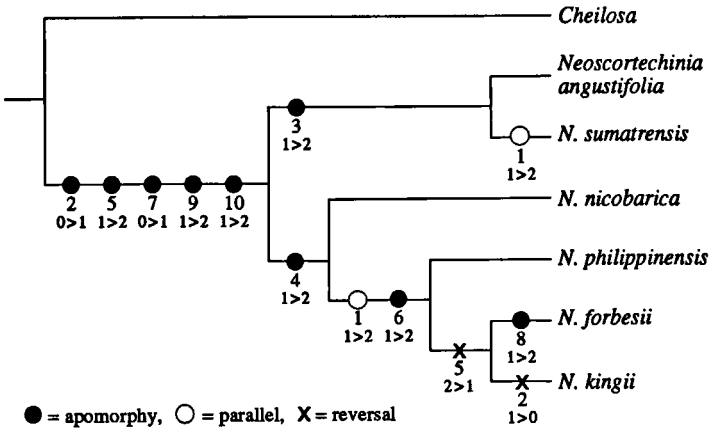

Fig. 2. The cladogram found after an analysis with HENNIG86.

The datamatrix was analysed in HENNIG86 (Farris, 1989) with the option ie*. The resulting cladogram is shown in Figure 2 (13 steps, consistency index 0.76, retention index 0.70). The first branch in the cladogram shows *N. angustifolia* and *N. sumatrensis*, formerly varieties of the same species, to be sister species. All other species subsequently branch off, ending with the split between *N. forbesii* and *N. kingii*. The cladogram shows 3 instances of homoplasy. The change from large to smaller leaves occurred twice (character 1). The glands at the base of the leaves, typical for the whole genus *Neoscortechinia*, disappear in *N. kingii* (character 2); not in the matrix, but confirming the resulting cladogram is the fact that the glands in *N. forbesii* tend to be less well developed, especially in Borneo. The third homoplasy is a reversal for the inflorescence length (character 5), the inflorescences of the male flowers are short in the outgroup, *Cheilosa*, and in the sister species *N. forbesii* and *N. kingii*.

BIOGEOGRAPHY

Most species of *Neoscortechinia* are wide-spread; *N. kingii*, *N. nicobarica*, *N. philippinensis*, and *N. sumatrensis* are W Malesian wide-spread species (see Figs. 4, 6–8), just like *Cheilosa montana*, the outgroup in the phylogenetic analysis. *Neoscortechinia forbesii* is wide-spread in E Malesia (see Fig. 5). The only endemic species is *N. angustifolia*, which is found in NE Borneo (see Fig. 4). All species mainly occur in the everwet areas (Sunda and Sahul Shelfs) and they are mainly absent from Wallacea (Central Malesia), an area with a dry monsoon during part of the year (two species occur in the wet pockets in the Philippines and Sulawesi).

A historical biogeographic analysis cannot be performed, because most species are wide-spread in only two areas (W and E Malesia) and the only endemic distribution (NE Borneo) overlaps with three of the wide-spread ones. However, three remarks can be made about the historical explanation of the distributions.

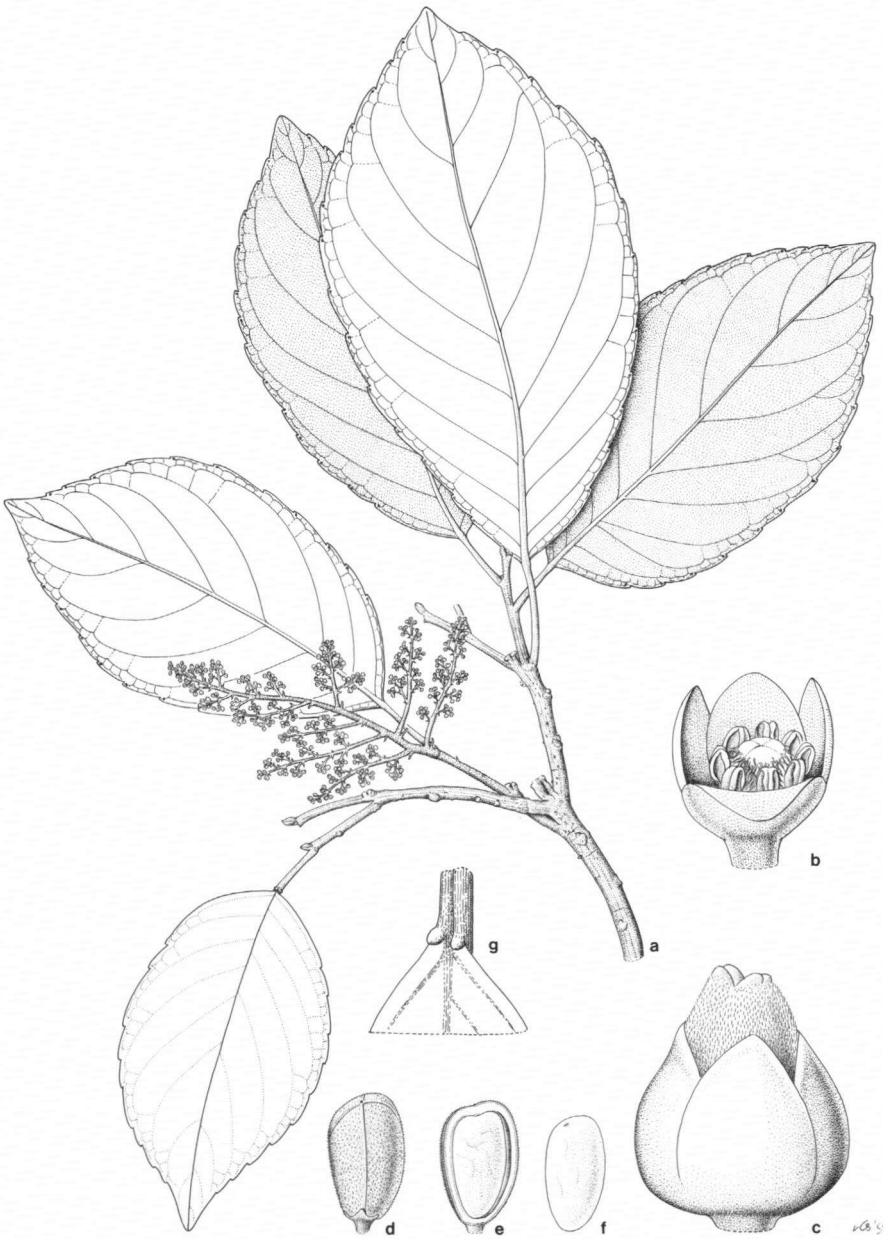

Fig. 3. *Neoscortechinia* Hook. f. ex Pax. a. Habit, × 0.5; b. male flower, × 12.5; c. female flower, × 12.5; d. densely pilose fruit, × 0.5; e. fruit seemingly 1-locular, showing one developed seed, with on the right side the remnant of the second locule, × 0.5; f. seed covered by an aril, × 0.5; g. detail of upper surface of leaf base with 2 glands, × 3 [a, b, d–g: *Neoscortechinia nicobarica* (Hook. f.) Pax & K. Hoffm.; h: *Neoscortechinia philippinensis* (Merr.) Welzen; a, b, g: *Elmer 12884*, L; c: *SAN (Awing) 34800*, K; d–f: *de Wilde & de Wilde-Duyfjes 12814*, L].

1) The two sister species *N. sumatrensis* and *N. angustifolia* (Fig. 4) exclude each other in their distribution. This must be the result of a recent vicariance event due to the rise of the central mountain range in Sabah.
2) Due to the dryer climate and lowered sea level during glacial periods most islands on the Sunda and Sahul Shelf were united by dry land. This may have caused the present wide-spread sympatric distributions of 4 species in W Malesia as a result of dispersal. Any vicariance events which may have led to speciation, cannot be traced anymore. Some dispersal must have been present, otherwise the differences in some of the distributions cannot be explained, e.g., compare the distribution of *N. nicobarica* (Fig. 7), absent in W Borneo, and *N. kingii* (Fig. 6), present throughout Borneo.
3) During one time in the history of *Neoscortechinia*, perhaps during one of the glacial periods, the genus could even spread to E Malesia (not the other way round as the other species, which branch off earlier in the cladogram, are W Malesian). After a break-up, perhaps during an interglacial period, part of *Neoscortechinia* could survive in New Guinea and the Solomons (*N. forbesii* s.s.). *Neoscortechinia* disappeared in the area in between (Moluccas and Sulawesi, except *N. nicobarica*, which is occasionally found in Sulawesi). Therefore, *N. forbesii* is probably the result of dispersal followed by vicariance. Geographical clines between W and E Malesia are still visible. *Neoscortechinia nicobarica* and especially *N. philippinensis* show in E Borneo shorter pedicels and far less glands in the inflorescences; *N. forbesii* (almost) lacks the pedicel, and glands are more or less absent in W New Guinea and only reappear in the Solomons. Because the distribution of *N. forbesii* is disjunct from the rest of the genus and, therefore, has little chance of gene exchange and because it differs in a few characters from the other species, it is regarded to be a separate species.

NEOSCORTECHINIA — Fig. 3

Neoscortechinia Hook. f. ex Pax in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. (1897) 213; Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 52; Backer & Bakh. f., Fl. Java 1 (1963) 497; Airy Shaw, Kew Bull. 26 (1971) 310; Whitmore, Tree Fl. Malaya 2 (1973) 119; Airy Shaw, Kew Bull. Add. Ser. 4 (1975) 177; Kew Bull. Add. Ser. 8 (1980) 175; Kew Bull. 36 (1981) 333; Alph. Enum. Euph. Philipp. Is. (1983) 38. — *Scortechinia* Hook. f. non Sacc. (1885) in Hook., Ic. Pl. 8 (Nov. 1887) pl. 1706, nom. illeg.; Fl. Brit. India 5 (Dec. 1887) 366; Pax in Engl. & Prantl, Nat. Pflanzenfam. III, 5 (1890) 118; Boerl., Handl. Fl. Ned. Indië 3, 1 (1900) 222; Merr., Philipp. J. Sc., Bot. 11 (1916) 75. — Type species: *Scortechinia kingii* Hook. f. [= *Neoscortechinia kingii* (Hook. f.) Pax & K. Hoffm.]. See note 1.

Alcinaeanthus Merr., Philipp. J. Sc., Bot. 7 (1912) 379. — Type species: *Alcinaeanthus philippinensis* Merr. [= *Neoscortechinia philippinensis* (Merr.) Welzen].

Trees, dioecious. *Indumentum* consisting of simple, appressed or patent, short or long hairs, and stellately bundled hairs, at least on the young parts to all-over. *Stipules* early caducous, outside pilose, inside glabrous to pilose. *Leaves* alternate, simple; petiole apically transversely grooved abaxially, basally and apically pulvinate; lamina not punctate, symmetric to asymmetric, base rounded to attenuate, without (*N. kingii*)

or with 2 brown glands on the upper surface; margin subentire to dentate, flat, in every tooth a gland on the lower surface; apex acute to cuspidate; upper surface smooth, (sub)glabrous, darker than lower surface, the latter smooth, glabrous to hirsute; venation pinnate, (flat to) raised above, raised below, nerves looped and closed near the margin, marginal vein present, intercalary nerves often present, tertiary veins (sub)scalariform, quaternary veins reticulate. *Inflorescences* axillary to (pseudo)terminal thyrses, branching 2 or 3 times racemosely, more so in male than in female, male ones bearing far more flowers than the female ones, (sub)sericeous to hirsute; branches in male flat; cymules 1–7-flowered, (basally dichasial to) scorpioid. *Bracts* to the inflorescences involute, hirsute at both sides; bracts to the flowers outside sericeous, inside glabrous, often either with 2 glands or 2 bracteoles at the base in female flowers (and in male flowers). *Pedicels* elongating in fruit. *Flowers* actinomorphic, ± 4-merous, yellow, fragrant. *Sepals* 4 or 5 (6), imbricate with 2 (smaller) outside the other overlapping inner ones; persistent in fruit. *Petals* absent. *Stamens* in male flowers only, 5–9; filament flat; anther basifixed, opening latro-introrsely (to latrorsely) with a lengthwise slit, thecae separated by a connective. *Disc* absent. *Receptacle* with small hirsute scales between the stamens. *Pistillode* in male flowers reduced to 2 or 3 hirsute bracts. *Pistil* 2-locular, hirsute; ovules 1 per locule, epitropous, descending, anatropous, subapically attached to the column; funicle flat; aril developing as two lobes around ovule; style absent; stigmas 2, split into 2 (or 3) lobes, apex of latter sometimes slightly split. *Fruit* a rhegma, ellipsoid, grey, densely puberulous outside, inside glabrous, sutures as 4 longitudinal ribs when immature, falling apart into 4 equal parts, septum pressed against the endotesta when 1-seeded, column remaining after dehiscence; wall up to 1(–2) mm thick, woody; endotesta membranous. *Seed* 1 (or 2) per fruit, ovoid (or with one flat side if 2-seeded), smooth, glabrous, black, covered by a thin, red, fleshy aril. *Embryo* flat, surrounded by 1–1.5 mm thick endosperm; cotyledons laterally beside each other; plumule and radicle apically on embryo.

Distribution – Six species are known, all more or less endemic to *Malesia*, four are wide-spread in W Malesia, of which one up to the Nicobar Islands and one has once been found in Burma; one species is endemic in NE Borneo, and one is widespread over New Guinea and the Solomons.

Notes – 1. Hooker (1887) described *Scortechinia* in honour of the late Father Scortechini, Soc. Jes., who collected in Perak, Malaysia. However, a few years earlier Saccardo has used the same name for a new fungi genus and Hooker's name is a later, illegitimate name, which had to be renamed as is done by Pax (1897) using the name *Neoscortechinia*.

2. The distinction between the species is difficult, especially between *N. nicobarica* and *N. philippinensis* (lead 6). Sometimes, as in lead 3, the overlap may seem rampant, but the species against which *N. angustifolia* keys out have different types of indumentum or have different parts pilose and they usually possess much smaller leaves.

KEY TO THE SPECIES

1a. Base of the leaves with 2 glands at the upper side (check several leaves!) ... 2
b. Base of the leaves without 2 glands ..... **3. N. kingii**
2a. Flower pedicel more than 0.3 mm long; anthers 0.3–0.5 by 0.3–0.4 mm, opening latro-introrsely. – W Malesia 3
b. Flower pedicel absent or up to 0.3 mm long; anthers 0.5–0.8 by 0.4–0.7 mm, opening more latrorsely. – E Malesia, Solomons ..... **2. N. forbesii**
3a. Leaves 4.2–30 by 2–12.5 cm, index 1.8–2.9(–3.4). Petioles glabrous to hirsute, lower surface of leaves glabrous to hirsute, inflorescences (sub)sericeous to hirsute. – W Malesia (incl. NE Borneo) 4
b. Leaves 16.5–38 by 5.5–11.5 cm, index 2.6–3.3. Petioles (sub)glabrous, lower surface of leaves (sub)glabrous, inflorescences sericeous. – NE Borneo **1. N. angustifolia**
4a. Lower surface of leaves glabrous to (sub)pilose on the basal part of the midrib and the basal nerves. Inflorescences (sub)sericeous to pilose 5
b. Lower surface of leaves hirsute to subhirsute on at least a few of the nerves. Inflorescences hirsute ..... **6. N. sumatrensis**
5a. Petioles (sub)pilose. Leaves: veins usually slightly arching, (7) 8–12 per side, almost no intercalary veins (Fig. 1b), base rounded to acute, margin usually with distinct teeth. Inflorescences pilose ..... **4. N. nicobarica**
b. Petioles (sub)glabrous. Leaves: veins arching, 6–8(–10) per side, intercalary veins present (Fig. 1a), base acute to attenuate, margin usually with indistinct teeth. Inflorescences (sub)sericeous ..... **5. N. philippinensis**

1. Neoscortechinia angustifolia (Airy Shaw) Welzen, *stat. nov.*

Neoscortechinia sumatrensis S. Moore var. *angustifolia* Airy Shaw, Kew Bull. 16 (1963) 368; Kew Bull. Add. Ser. 4 (1975) 179. — Type: *Kanis 4272* (K holo; iso L), British North Borneo (Sabah), Tawau, Umas-umas.

Tree up to 20 m high, dbh up to 35 cm. *Bark* smooth, brownish to yellow brown, up to 8 mm thick; inner bark reddish to yellowish. *Sapwood* white to light yellow to pale brownish yellow. Flowering *branches* 3–5 mm thick, young ones pilose. *Stipules* triangular, 1.2–1.5 by 0.5–1 mm. *Leaves:* petiole 2.8–6.8 cm long, round in transverse section, (sub)glabrous; lamina obovate, 16.5–38 by 5.5–11.5 cm, index 2.6–3.3, (thin-)coriaceous, symmetric, base (rounded to) cuneate to attenuate, with glands, margin laxly dentate, flat, teeth short, apex acuminate to cuspidate, very apex acute, upper surface greenish when dry, lower surface (sub)glabrous, venation with 8–10 nerves per side, seldom with intercalated nerves, nerves arching. *Inflorescences* sericeous; main branch up to 23 cm long. *Bracts* to the inflorescences triangular, 2.5–5.5 by 0.8–2 mm; bracts to the male and female cymules with glands; bracts to the flowers triangular to ovate, 0.4–0.9 by 0.3–0.6 mm, only outside pilose, with glands, often also in male flowers. *Pedicel* 0.3–0.9 mm long in flower. *Male flowers* 2–2.2 mm in diam., female flowers not seen. *Sepals* 4 or 5, ovate, 1.2–1.8 by 1.2–1.8 mm, (sub)glabrous outside in male flowers, subsericeous in female flowers.

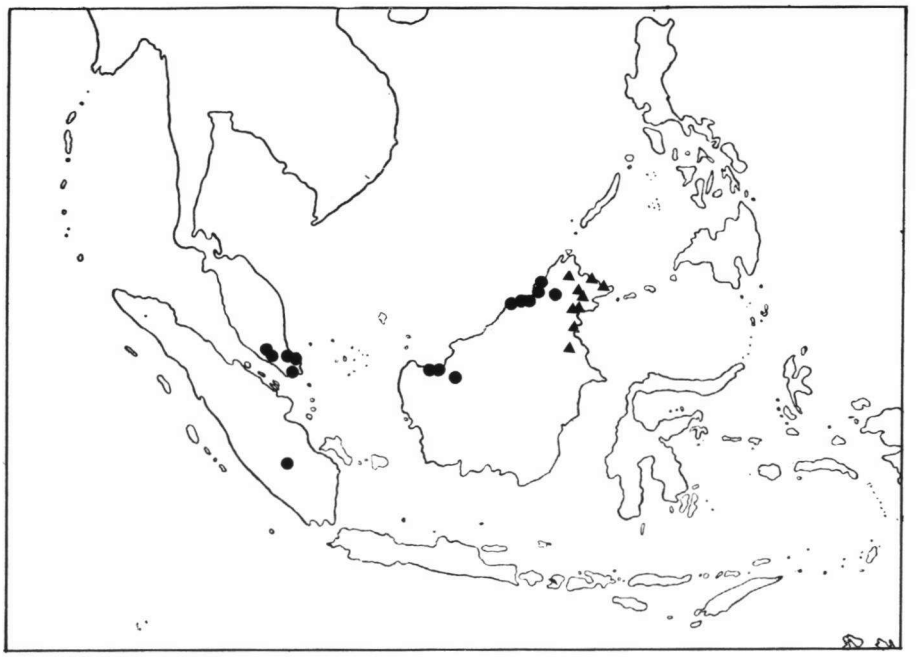

Fig. 4. The distribution of *Neoscortechinia angustifolia* (Airy Shaw) Welzen (triangles) and *Neoscortechinia sumatrensis* S. Moore (dots).

Stamens 5 or 6; filament 0.4–0.5 mm long, especially basally hirsute; anther c. 0.3 by 0.3 mm. *Ovary* not seen. *Fruit* only immaturely seen, c. 2 by 1.1 cm. *Seed* immature, c. 1.6 by 0.8 cm.

Distribution – Borneo (E Sabah, NE Kalimantan). Fig. 4.

Habitat & Ecology – Found on low, undulating hills in primary forest, logged forest, secondary forest, along paths and rivers. Soil: black sand, sandstone, lime. Altitude 10–300 m; fl. Mar.–July; fr. June–Oct.

Vernacular names – Borneo: talu talu (Murud); tambalikan (Brunei).

2. **Neoscortechinia forbesii** Hook. f. ex S. Moore

Neoscortechinia forbesii Hook. f. ex S. Moore, J. Bot. (Brit. & For.) 62 (1924) 54, see note 1; Airy Shaw, Kew Bull. 16 (1963) 369, p.p. (E Malesian specimens); Kew Bull. Add. Ser. 7 (1980) 175, p.p. (E Malesian specimens); Whitmore, Guide For. Brit. Sol. Is. (1966) 70. — [*Scortechinia forbesii* Hook. f. in Hook., Ic. Pl. 8 (Nov. 1887) pl. 1706, nom. nud.; Merr., Philipp. J. Sc., Bot. 11 (1916) 76, nom. nud.; Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 53, nom. nud]. — Type: *Forbes 434* (K holo; iso A, BM, L), New Guinea, Sogeri Region.

Neoscortechinia nicobarica auct. non Pax & K. Hoffm.: Airy Shaw, Kew Bull. 20 (1967) 413; Kew Bull. Add. Ser. 7 (1980) 176, p.p. (E Malesian specimens).

Tree up to 36 m high, dbh up to 75 cm; sometimes buttresses up to 2.4 m high by 1.5 m long. Outer *bark* light (reddish) brown and/to grey, smooth, peeling with

small to large flakes, covered with irregularly lenticellar pustules, c. 0.5 mm thick; inner up to 8 mm thick, yellow to (light to dark) brown to red or with alternate orange and pink layers. *Wood* whitish to yellow(-brown), quite hard, sapwood indistinct. Exudate absent to clear to yellow. Flowering *branches* 2–4 mm thick, young parts slightly sericeous. *Stipules* triangular, 1.2–1.6 by 0.7–0.8 mm. *Leaves:* petiole 1.2–5.7 cm long, round in transverse section, subglabrous; lamina elliptic (to obovate), 5.5–20 by 2.5–10.5 cm, index 1.4–2.4, coriaceous, symmetric, base broadly attenuate to attenuate, with glands, margin subdenticulate to laxly dentate, flat, teeth short, apex acuminate, very apex rounded (to acute), upper surface brown when dry, lower surface (sub)glabrous, venation with 7 or 8 (9) nerves per side, with intercalated nerves, nerves arching. *Inflorescences* (sub)sericeous; main branch up to 9 cm long. *Bracts* to the inflorescences triangular, 2.4–4.3 by 0.3–1.1 mm; bracts to the cymules with bracteoles or with glands; bracts to the flowers triangular, 0.8–2 by 0.5–1.3 mm, only outside pilose, often with small glands, also in male flowers. *Pedicel* absent to up to 0.3 mm long in flower. *Male flowers* c. 2 mm in diam., female ones 2.3–3.8 mm in diam. *Sepals* 4, ovate, 1.3–2.3 by 1.4–2.6 mm, outside and margin slightly pilose. *Stamens* 6(–8); filament 1–1.2 mm long, especially basally subhirsute; anther 0.5–0.8 by 0.4–0.7 mm, opening more or less latrorsely. *Ovary* 2–2.6 by 1.4–1.6 mm; lobes of stigma 0.3–0.7 mm long, apex sometimes slightly split. *Fruit* 2.1–2.8 by 1.4–1.7 cm (1-seeded) to 2 cm (2-seeded). *Seed* 1.7–2.3 by 1.1–1.2 cm. *Embryo:* cotyledons 11–13 by 6.2–9 mm; plumule and radicle c. 2 mm long.

Distribution – Solomon Islands and in Malesia: New Guinea. Fig. 5.

Habitat & Ecology – On flat to steep, sometimes inundated country in primary, secondary, and mixed hill forest with *Anisoptera* (Dipterocarpaceae), *Elaeocarpus*, and *Sloanea* (Elaeocarpaceae), along swamps or water. Soil: sand, clay, (limestone). Rare to rather common. Altitude sea level up to 670 m; fl. Apr.–Dec.; (young) fr. whole year through.

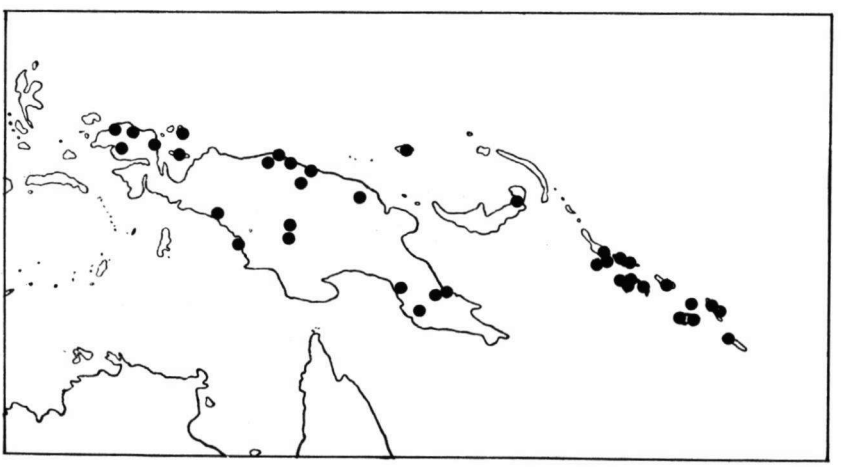

Fig. 5. The distribution of *Neoscortechinia forbesii* Hook. f. ex S. Moore.

Vernacular names – Irian Jaya: airem (Manawee); djang (Bko); kir, koeh (Asmat); mansambree (Biak); na (Kebar); rokohop (Digoel); sikain (Tehid); wolok (Mooi). Papua New Guinea: alimboombu (Rabaul); bambam, sambaia, wawak, yehaye (Amele); bambam, gini, panama (Bilia); boko'au, gokoa, magubu, waskia (Faita); dumpahop, garus, parankok (Dumpu); iku aunga (Bush Mekeo). Solomon Islands: aiasila (Kwara'ae; Whitmore, 1966).

Notes – 1. *Neoscortechinia forbesii* has been a *nomen nudum* for a long time, even the description of S. Moore (1924) can hardly be called a description, but it contains more than just label data. The proper description is by Whitmore (1966). The species has usually been confused with *N. philippinensis* (see note 3 for the differences).

2. The specimens of the Solomon Islands are often slightly different; usually the teeth along the leaf margin are more distinct, just like the glands on the leaf base and the glands at the base of the flower bracts. The leaf apex is usually more acute and the nerves show a sharper angle with the midrib than the New Guinean specimens.

3. The differences between *N. forbesii*, *N. nicobarica*, and *N. philippinensis* are slight. *Neoscortechinia forbesii* is different in having (sub)sessile flowers, larger anthers, and flower bracts that are higher than wide (in the others lower than wide or as high as wide), but this species resembles *N. philippinensis* most. Both more or less appear to be glabrous or (inflorescence) sericeous at most, and the nerves are arching with intercalary nerves in between. *Neoscortechinia nicobarica* appears to be more pilose, usually has more nerves, which are less arching. The leaf base of *N. nicobarica* is often rounded to obtuse, but can be acute, in the sympatric *N. philippinensis* it is always acute to attenuate, and in the allopatric *N. forbesii* the base ranges from broadly to narrowly attenuate.

4. The specimen *BSIP 9715* nicely shows the homology between the bracteoles and the glands in the inflorescence, flower bracts either show the glands or the bracteoles at their base.

3. Neoscortechinia kingii (Hook. f.) Pax & K. Hoffm.

Neoscortechinia kingii (Hook. f.) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 52; S. Moore, J. Bot. (Brit. & For.) 63, Suppl. (1925) 100; Burkill, Dict. Econ. Prod. Malay Pen. 2 (1935) 1542; Airy Shaw, Kew Bull. 16 (1963) 371; Whitmore, Tree Fl. Malaya 2 (1973) 120; Airy Shaw, Kew Bull. Add. Ser. 4 (1975) 178; Kew Bull. 36 (1981) 334. — *Scortechinia kingii* Hook. f. in Hook., Ic. Pl. 8 (Nov. 1887) pl. 1706; Hook. f., Fl. Brit. India 5 (Dec. 1887) 366; Merr., Philipp. J. Sc., Bot. 11 (1916) 76; J. Str. Br. Roy. As. Soc. (1921) 346; Ridley, Fl. Malay Pen. 3 (1924) 251. — *Neoscortechinia kingii* (Hook. f.) Pax & K. Hoffm. var. *kingii*: Airy Shaw, Kew Bull. 16 (1963) 371; Kew Bull. Add. Ser. 4 (1975) 178. — Lectotype (here proposed): *Beccari PB 1164* (K holo; iso A, BM, G, P; FI, n.v.), Sarawak.

Neoscortechinia kingii (Hook. f.) Pax & K. Hoffm. var. *pedicellata* Airy Shaw, Kew Bull 16 (1963) 371; Kew Bull. Add. Ser. 4 (1975) 178. — Type: *Haviland & Hose 3659* (K holo; iso BM, K, L), Sarawak, Kuching (duplicates numbered *a–k*).

Tree up to 27 m high, girth up to 1.2 m, dbh up to 28 cm; sometimes with stilt roots and buttresses, latter up to 0.7 m high. Outer *bark* brown to red-brown to grey, smooth to minutely fissured, flaking with patches of 1–2.5 by 10–15 cm; inner bark up to 4 mm thick, brown to red, granular or fibrous and/or laminated. *Sapwood*

whitish to yellowish to brownish yellow; heartwood brown. Flowering *branches* 2–4 mm thick, young ones pilose. *Stipules* triangular, 0.8–1.2 by 0.3–0.7 mm. *Leaves*: petiole 0.5–3.2 cm long, reniform in transverse section, (sub)glabrous; lamina elliptic to obovate, 2.3–17 by 1.3–7 cm, index 2–3, coriaceous, symmetric to asymmetric, base cuneate, without glands, margin usually entire to in upper 2/3rd irregularly crenulate to sometimes dentate, flat, teeth short, apex (emarginate to) rounded to cuspidate, very apex rounded (to mucronulate), upper surface dark brown when dry, lower surface (sub)glabrous, venation with 5 or 6 nerves per side, with intercalated nerves, nerves slightly convex. *Inflorescences* subsericeous; main branch often short, less than 5 cm to up to 17.5 cm long. *Bracts* to the inflorescences triangular, 1–3.5 by 0.7–0.8 mm; bracts to the cymules with bracteoles or with glands; bracts to the flowers triangular, 0.4–0.7 by 0.5–1 mm, only outside pilose, often with small glands, also in male flowers. *Pedicel* 0.9–2.8 mm long in flower, to up to 4.5 mm long in fruit. *Male flowers* 2–3 mm in diam., female flowers c. 2.5 mm in diam. *Sepals* 4, ovate, 1.2–1.5 by 1.2–2.3 mm, glabrous to subglabrous outside, greenish to cream with brown hairs, margins yellow. *Stamens* 5–7; filament 0.5–1.2 mm long, glabrous, cream; anther c. 0.3 by 0.4 mm, bright yellow. *Ovary* c. 2 by 1.6 mm, cream; lobes of stigma c. 0.5 mm long. *Fruit* 2.8–3.4 by 1.4–1.7 cm. *Seed* 1.8–2.4 by 1–1.1 cm. *Embryo:* cotyledons 11–13 by 4–5 mm; plumule and radicle 2.1–2.5 mm long.

Distribution – Malesia: Malay Peninsula (incl. Singapore), Central Sumatra, Borneo (S Kalimantan, Sarawak, Brunei). Fig. 6.

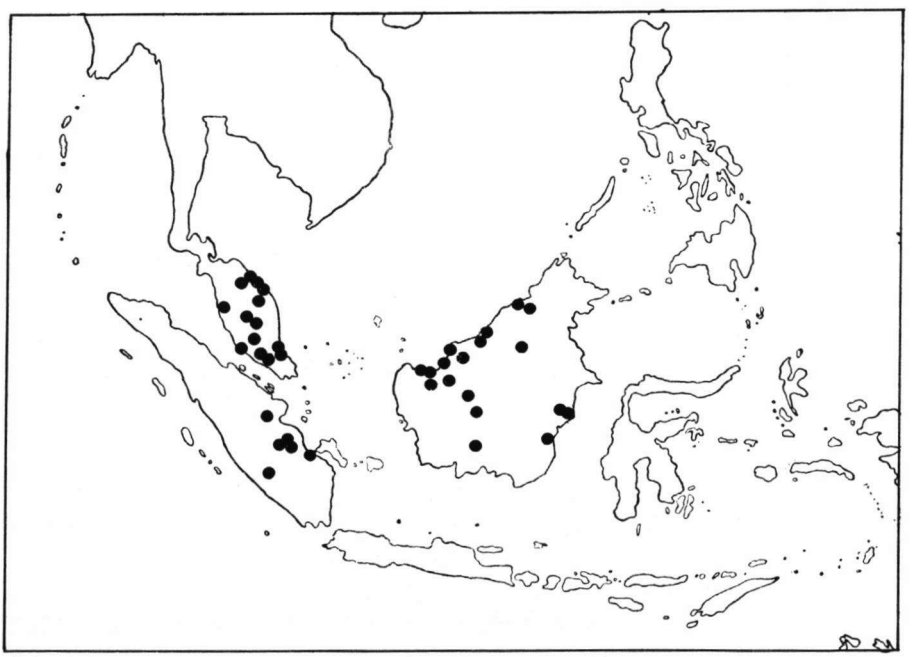

Fig. 6. The distribution of *Neoscortechinia kingii* (Hook. f.) Pax & K. Hoffm.

Habitat & Ecology – Found mainly on low undulating hills, but also on steep ridges in primary (Dipterocarp) forest, secondary forest, peat swamp forest, and kerangas. Soil: clayey loam, sand, sandy loam. Locally abundant. Altitude sea level up to 800 m; fl. & fr. throughout the year, in Peninsular Malaysia half a year earlier than in Borneo.

Uses – Good firewood.

Vernacular names – Malay Peninsula: tembatu (Ridley, 1924); jelawai bukit (Burkill, 1935); jintek-jintek. Sumatra: meresik. Borneo, Sarawak: bantas, berias, medang, maras or meras (Malay); nyabrit (Kayan); buloh manok (P.).

Note – The distinction between the two varieties, as made by Airy Shaw (1963) on the basis of the length of the peduncles and the hairiness and the length of the inflorescences, could not be confirmed and therefore both varieties were united.

4. Neoscortechinia nicobarica (Hook. f.) Pax & K. Hoffm. — Figs. 1b; 3a, b, d–g

Neoscortechinia nicobarica (Hook. f.) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 53; Airy Shaw, Kew Bull. 16 (1963) 369; Whitmore, Tree Fl. Malaya 2 (1973) 120; Airy Shaw, Kew Bull. Add. Ser. 4 (1975) 178; Kew Bull. 36 (1981) 334; Alph. Enum. Euph. Philipp. Is. (1983) 39. — *Scortechinia nicobarica* Hook. f. in Hook., Ic. Pl. 8 (Nov. 1887) pl. 1706, nom. nud.; Hook. f., Fl. Brit. India 5 (Dec. 1887) 366; Boerl., Handl. Fl. Ned. Indië 3, 1 (1900) 222; Merr., Philipp. J. Sc., Bot. 11 (1916) 76. — Type: *Novara Expedition s.n.* (CAL? holo, n.v.), Nicobar Islands.

Alchornea arborea Elmer, Leafl. Philipp. Bot. 4 (1911) 1274. — *Alcinaeanthus arboreus* (Elmer) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, vii (1914) 415. — *Scortechinia arborea* (Elmer) Merr., Philipp. J. Sc., Bot. 11 (1916) 75. — *Neoscortechinia arborea* (Elmer) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 52; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 456; Heyne, Nutt. Pl. Ned. Ind. 1, 3rd ed. (1950) 965; Salvosa, Lex. Philipp. Trees (1963) 115. — Lectotype (here proposed): *Elmer 13067* (L holo; iso BM, G, K, NSW), Philippines, Palawan, Puerto Princesa (Mt Pulgar).

Scortechinia paniculata Ridley, Fl. Malay Pen. 5 (1925) 332. — *Neoscortechinia paniculata* (Ridley) Burkill, Dict. Econ. Prod. Malay Pen. 2 (1935) 1542. — Type: *CF (Foxworthy's coll.) 4035* (K holo), Malaysia, Pahang, Sungei Yong, Kwala Lipis.

Neoscortechinia spec.: Merr., Pl. Elmer. Born. (1929) 165 (*Elmer 21220*).

[*Neoscortechinia kingii* (Hook. f.) Pax & K. Hoffm. var. *paniculata* Corner ex Backer & Bakh. f., Fl. Java 1 (1963) 498, nom. nud.]

Tree up to 36 m high, dbh up to 50 cm; buttresses often present, up to 2 m high, up to 1 m long. *Bark* smooth to scaly, whitish grey-brown to black-brown, c. 1 mm thick, with lenticels; inner pale to yellowish to orange to brown, granular, laminated, or gritty and mottled, hard, brittle, up to 8 mm thick. Cambium red. *Wood* yellowish white, hard. Flowering *branches* 3–6 mm thick, young ones pilose. *Stipules* triangular, 1.8–2.2 by 0.5–0.8 mm. *Leaves*: petiole 1.2–6 cm long, round in transverse section, (sub)pilose; lamina (ovate to) elliptic (to obovate), 5–30 by 3–12.5 cm, index 1.5–2.9, coriaceous, symmetric, base rounded to acute, with glands, margin dentate (to subdentulate), flat, teeth short, apex (acute to) acuminate, very apex rounded (to acute), upper surface brown when dry, lower surface (sub)pilose on the basal part of the midrib and the basal nerves, venation with (7) 8–12 nerves per side, usually without intercalated nerves, nerves usually hardly arching. *Inflorescences* pilose;

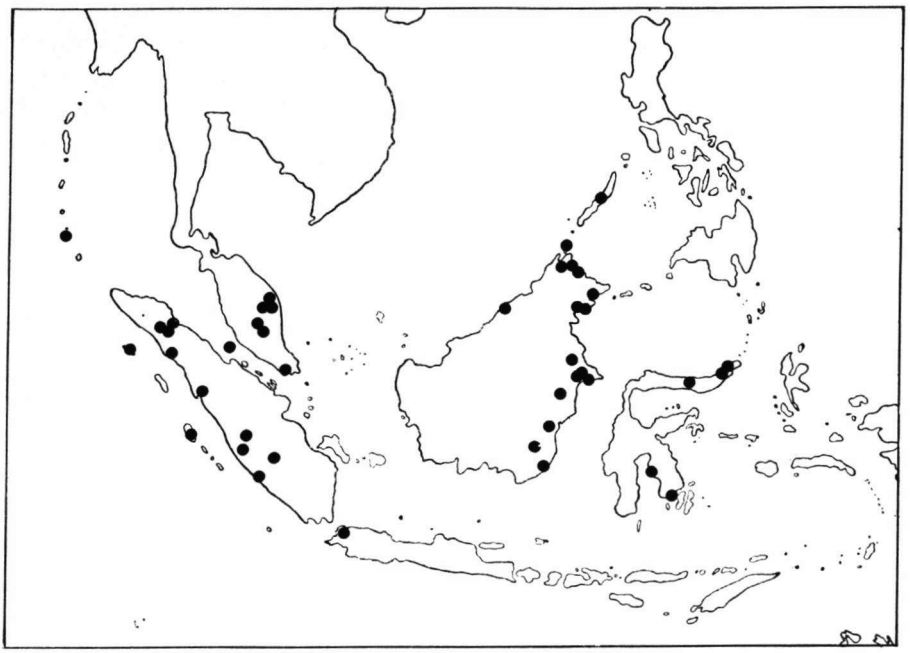

Fig. 7. The distribution of *Neoscortechinia nicobarica* (Hook. f.) Pax & K. Hoffm.

main branch up to 23 cm long. *Bracts* to the inflorescences triangular, 2–4.5 by 0.6–1 mm; bracts to the cymules with bracteoles or with glands; bracts to the flowers triangular, 0.7–1.2 by 0.7–1.2 mm, only outside pilose, with glands. *Pedicel* 0.5–1.6 mm long in flower, subglabrous. *Male flowers* 2–2.5 mm in diam., female flowers c. 4.2 mm in diam. *Sepals* 4 or 5, ovate, 1.3–2.5 by 1.4–2.5 mm, glabrous to subglabrous outside. *Stamens* 6–9; filament 0.3–0.7 mm long, especially basally hirsute; anther c. 0.3 by 0.3 mm. *Ovary* c. 2.5 by 2.8 mm; lobes of stigma c. 0.8 mm long, (apex slightly split). *Fruit* 3.2–3.7 by 1.8–2 cm (1-seeded) or 2.7 cm (2-seeded). *Seed* 2.3–2.4 by 1–1.2 cm. *Embryo*: cotyledons c. 18 by 10 mm; plumule and radicle not seen.

Distribution – Nicobar Islands and in Malesia: Malay Peninsula (excl. Singapore), Sumatra, W Java, mainly E Borneo (Sabah, N Sarawak, E Kalimantan), Philippines (Palawan), and NE and SE Sulawesi. Fig. 7.

Habitat & Ecology – On flat to sloping, sometimes periodically inundated country in primary forest, secondary forest, in belukar, freshwater swamps, along water, and on ridges. Soil: clay, limestone, loam, sand, sandstone. Rather common, scattered. Altitude: sea level up to 600 m; fl. Mar.–Nov., fr. June–Jan. Fruit eaten by Orang utan.

Uses – The wood is not very durable, but it is easy to manufacture and is therefore used on Simalur I. (Sumatra) for the production of planks and beams (Heyne, 1950).

Vernacular names – Malaysia: perupoh jantan (Ridley, 1925); salah (Batek). Sumatra: bantana, daoe, batin batin (Tapah; Heyne, 1950), lala-lalar etem (Simalur I.); sekoenjit (Bengkulen area). Java: menteng monjet (Sunda). Borneo: ancharirak (Sungei); belanti, keminting boeaja (Malay); buk-manuk (Dusun Banggi); salapidang (Bassap Dyak); balanti; baniran; moeloebomban. Philippines: magong (Samar-Leyte Bisaya; Salvosa, 1963).

Notes – 1. The species is somewhat variable. The pilosity of the plant may vary, and especially vegetative specimens showed a loss of hairs, making their identification difficult. The teeth along the leaf margin are less distinct in Sumatra; the specimens in Borneo often show smaller leaves and flowers with 4 or 5 sepals, instead of 4. In Borneo and the Philippines, the glands at the base of the flower bracts become smaller; a geographical cline also seen in *N. philippinensis*.

2. See note 3 under *N. forbesii* for the differences between *N. forbesii*, *N. nicobarica*, and *N. philippinensis*.

5. **Neoscortechinia philippinensis** (Merr.) Welzen, *comb. nov.* — Figs. 2a; 3c

Alcinaeanthus philippinensis Merr., Philipp. J. Sc., Bot. 7 (1912) 380. — Neotype (here proposed): *R.S. Williams 2884* (NY holo; iso A, NY), Philippines, SE Mindanao, Santa Cruz Prov. See note 1.

Alcinaeanthus parvifolius Merr., Philipp. J. Sc., Bot. 9 (1914) 461. — *Scortechinia parvifolia* (Merr.) Merr., Philipp. J. Sc., Bot. 11 (1916) 76. — *Neoscortechinia arborea* (Elmer) Pax & K. Hoffm. var. *parvifolia* (Merr.) Pax & K. Hoffm. in Engl., Pflanzenr. IV, 147, xiv, add. VI (1919) 52. — *Neoscortechinia parvifolia* (Merr.) Merr., Enum. Philipp. Flow. Pl. 2 (1923) 456; Salvosa, Lex. Philipp. Trees (1963) 115. — Type: *BS (Ramos) 20586* (PNH† holo; iso BM, K, US), Philippines, Luzon, Prov. Laguna, San Antonio.

Neoscortechinia coriacea Merr., Pl. Elmer. Born. (1929) 164. — Type: *Elmer 21078* (PNH† holo; iso A, BM, G, K, L, MO, UC), British North Borneo (Sabah), Elphinstone Prov., Tawao.

Neoscortechinia forbesii auct. non Hook. f. ex S. Moore: Airy Shaw, Kew Bull. 16 (1963) 369; Whitmore, Tree Fl. Malaya 2 (1973) 120; Airy Shaw, Kew Bull. 26 (1971) 310; Kew Bull. Add. Ser. 4 (1975) 177; Kew Bull. 36 (1981) 334; Alph. Enum. Euph. Philipp. Is. (1983) 38. — All concerning the W Malesian specimens.

Neoscortechinia nicobarica auct. non Pax & K. Hoffm.: Chatterjee, Kew Bull. 4 (1950) 564.

Tree up to 30 m high, dbh up to 50 cm, girth up to 1.5 m; buttresses often present, up to 1.5 m high, up to 1 m long. *Bark* smooth to scaly to fissured, whitish grey to brown to black-brown, c. 1 mm thick; inner whitish to yellowish to pinkish red to brown, striated, brittle, up to 10 mm thick. Cambium yellow. *Wood* white-cream to yellow to light brown; heart wood black-brown. Flowering *branches* 2–4 mm thick, young ones pilose. *Stipules* triangular, c. 1.6 by 0.4 mm. *Leaves*: petiole 0.8–5 cm long, round in transverse section, (sub)glabrous; lamina elliptic to obovate, 4–22 by 2–9.5 cm, index 1.8–3.4, coriaceous, symmetric, base acute to attenuate, with glands, margin subentire with a few very short teeth to laxly dentate, flat, teeth short, apex (rounded to) acute to acuminate, very apex acute, upper surface brown when dry, lower surface (sub)glabrous, venation with 6–8(–10) nerves per side, with intercalated nerves, nerves arching. *Inflorescences* (sub)sericeous; main branch up to 19 cm long. *Bracts* to the inflorescences triangular, 1–4.2 by 0.3–0.5 mm; bracts to the cymules with bracteoles or with glands; bracts to the flowers triangular, 0.4–1.2 by 0.4–1.2 mm, only outside pilose, in female flowers with small glands (or brac-

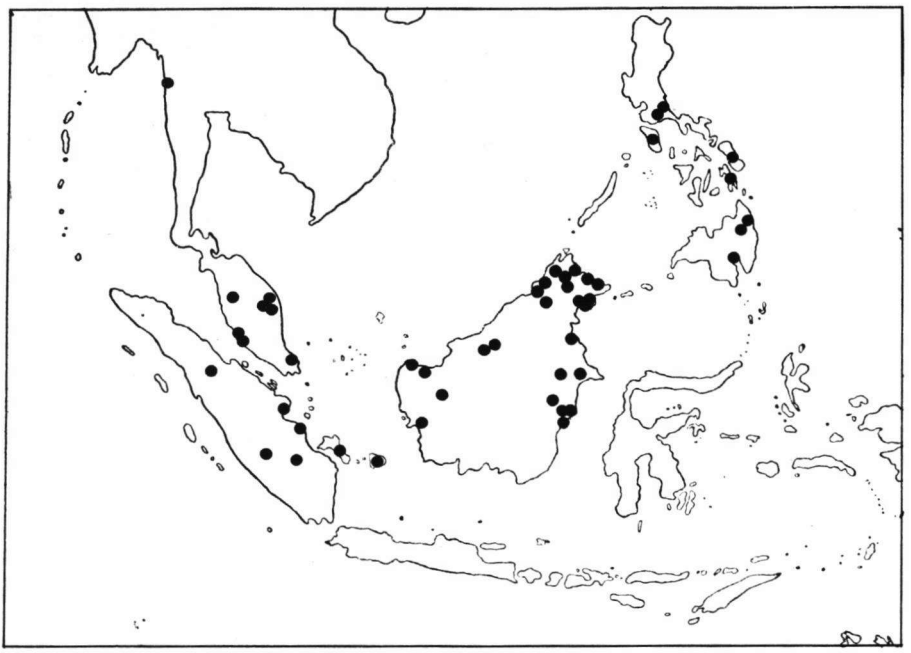

Fig. 8. The distribution of *Neoscortechinia philippinensis* (Merr.) Welzen.

teoles in the Philippines and Borneo). *Pedicel* 0.5–2.2 mm long in flower. *Male flowers* 2.3–3.2 mm in diam., female flowers 1.8–2.8 mm in diam. *Sepals* 4 or 5, ovate, 0.7–2 by 1.2–2.5 mm, seldom outside sericeous. *Stamens* 5–8; filament 0.5–1.2 mm long, basally pilose; anther 0.3–0.5 by 0.3–0.4 mm. *Ovary* 1.3–1.7 by 1.6–2.2 mm; lobes of stigma 0.4–0.5 mm long. *Fruit* 1.8–4.1 by 1.1–1.9 cm (1-seeded)or 2.3 cm (2-seeded). *Seed* 1.4–3 by 0.9–1.4 cm. *Embryo:* cotyledons 11–17 by 5–8.5 mm; plumule and radicle 2–3.5 mm long.

Distribution – Burma (*Russell 1918*; Chatterjee, 1950) and in Malesia: Malay Peninsula (excl. Singapore), Sumatra, Borneo and E and N Philippines. This species may be present in Thailand (Airy Shaw, 1971). Fig. 8.

Habitat & Ecology – On flat to undulating country in primary (mixed Dipterocarp) forest, secondary forest, mixed fresh water swamp forest, riverine forest, and along mangrove. Soil: black soil, silty clay, granite, loam, sand, sandstone. Altitude: sea level up to 1500 m; fl. throughout the year, mainly Dec.–Sept., fr. throughout the year, mainly Apr.–Dec. Fruits favourite food of primates (*van Balgooy & van Setten 5633*).

Vernacular names – Malay Peninsula: beki (Johore). Sumatra: kajoe lobang (E coast); medang brembang (Biliton I.); telapak kira (Bangka I.); pantja hutan. Borneo: agar-agar (Sandakan region); djaentihan (SE Borneo); kayu karing (Kedayan); loch-uan (Mangalong); rambai (Sungei). Philippines: magong-liitan (Tagalog; Salvosa, 1963).

Notes – 1. The original type (*FB 11815*) is probably destroyed when PNH burnt down. A neotype is selected, because no duplicates of *FB 11815* were found. The neotype, *R.S. Williams 2884*, is also mentioned by Merrill in his first description of this species.

2. This species is quite variable, the leaves can vary from coriaceous to very coriaceous, especially in Borneo. In the Philippines, the dentation is usually more distinct, while in Borneo and the Philippines the pedicel becomes shorter and the glands in the inflorescences can be absent.

3. See note 3 under *N. forbesii* for the differences between *N. forbesii*, *N. nicobarica*, and *N. philippinensis*.

6. Neoscortechinia sumatrensis S. Moore

Neoscortechinia sumatrensis S. Moore, J. Bot. (Brit. & For.) 63, Suppl. (1925) 99; Airy Shaw, Kew Bull. 16 (1963) 368; Whitmore, Tree Fl. Malaya 2 (1973) 119; Airy Shaw, Kew Bull. Add. Ser. 4 (1975) 179; Kew Bull. 36 (1981) 334. — *Neoscortechinia sumatrensis* S. Moore var. *sumatrensis*: Airy Shaw, Kew Bull. 16 (1963) 368; Kew Bull. Add. Ser. 4 (1975) 179. — Type: *Forbes 3162* (BM holo; iso A, K, L), Sumatra, Palembang, Boekit Boekoe, near Napal Litjin, R. Rawas.

Tree up to 33 m high, girth up to 1 m; buttresses sometimes present, c. 33 cm high, 2.5 cm thick. Outer *bark* smooth to rough, lenticellate, dark brown to brown-greenish to grey with brown patches to whitish; inner bark yellow to brown. *Sapwood* white. *Flowering branches* 2–4 mm thick. *Stipules* 2.5–10.5 by 0.6–1.5 mm. *Leaves:* petiole 0.8–5.5 cm long, round in transverse section; lamina elliptic to obovate, 6.6–23.5 by 3.4–8.5 cm, index 1.9–3.5, (thin-)coriaceous, symmetric, base (rounded to) acute to attenuate, with glands; margin subdentulate to dentate, flat, teeth short, apex acuminate to caudate, very apex (rounded to) acute, upper surface glabrous except for a few basal hairs, yellowish light green when dry, lower surface subhirsute on the veins to hirsute, venation with 6–8 nerves per side with few intercalated nerves, nerves arching. *Inflorescences* hirsute, main branch up to 20 cm long. *Bracts* to the inflorescences triangular, 3–7 by 0.5–1.3 mm; bracts to the cymules with (large) glands, often also small ones in the male flowers; bracts to the flowers ovate, 0.7–1.3 by 0.3–0.8 mm, only outside pilose, with 2 glands in female flowers (and male flowers). *Pedicel* 1.2–2.5 mm long, hirsute. *Male flowers* 2–2.5 mm in diam.; female flowers 3.3–4.5 mm in diam. *Sepals* 4 or 5 (or 6), (ob)ovate, 1–2.2 by 1.2–2.3 mm, glabrous to subglabrous outside in male flowers, outside pubescent in female flowers. *Stamens* (5 or) 6–8; filament c. 0.4 mm long, glabrous; anther c. 0.3 by 0.4 mm. *Ovary* c. 2.3 by 2.3 mm; lobes of stigma c. 0.4 mm long, slightly split at the apex. *Fruit* 1.7–3.3 by 1.1–2.1 cm. *Seed* 1.5–2.6 by 0.9–1.3 cm. *Embryo:* cotyledons 9–11 by 5.2–8 mm; plumule and radicle c. 2 mm long.

Distribution – Malesia: Peninsular Malaysia (Malaysia, Singapore), Sumatra, N Borneo (Sarawak, Brunei, W Sabah). Fig. 4.

Habitat & Ecology – Found on low, undulating hills in primary forest, secondary forest, peat swamp forest, logged forest; also along roads and swamps. Soil: yellow sandy loam, black sand, yellow clay. Altitude: sea level up to 250 m; fl. July–Aug. and perhaps Dec., fr. throughout the year.

Vernacular name – Borneo: pudoh (Sipitan Dist.).

Note – Several of the specimens from Singapore and the Malay Peninsula have almost glabrous leaflets below, but some hairs are always present on the midrib and nerves.

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IDENTIFICATION LIST

Material of *Neoscortechinia* studied:

1 = *N. angustifolia* (Airy Shaw) Welzen
2 = *N. forbesii* Hook. f. ex S. Moore
3 = *N. kingii* (Hook. f.) Pax & K. Hoffm.
4 = *N. nicobarica* (Hook. f.) Pax & K. Hoffm.
5 = *N. philippinensis* (Merr.) Welzen
6 = *N. sumatrensis* S. Moore):

A series 519: 1; 656: 5 — Achmad 21: 4; 75: 4; 424: 4; 506: 4; 1267: 4; 1313: 4; 1360: 4; 1380: 4; 1422: 4; 1482: 4; 1564: 4 — Alston 13360: 3 — Ambri & Arifin W 681: 5 — Anderson 8528: 3; 9112: 6; 14369: 3 — Apostol 3643: 4.

van Balgooy & van Setten 5489a: 5; 5633: 5 — bb series 8808: 4; 10804: 5; 12230: 4; 13342: 4; 13357: 4; 13853: 4; 14530: 2; 15112: 5; 18912: 4; 19046: 4; 19175: 4; 19443: 4; 21613: 4; 22086: 2; 24743: 4; 25727: 2; 26222: 5; 27577: 3; 28913: 2; 29053: 5; 29083: 5; 29259: 4; 30607: 2; 31397: 4; 31472: 2; 31586: 4; 31978: 4; 32546: 4; 33110: 4; 34651: 4; 34687: 4 — Beccari PB 1164: 3; PB 2619: 3 — Bogor Botanical Garden IX.A.6: 4; IX.A.6a: 4 — Boschproefstation T.711: 3 — BRUN series 3172: 6 — BS series 20586: 5 — BSIP series 189: 2; 233: 2; 1326: 2; 1550: 2; 2774: 2; 3027: 2; 3060: 2; 3208: 2; 3220: 2; 3698: 2; 3749: 2; 3756: 2; 3890: 2; 3955: 2; 4182: 2; 4239: 2; 4355: 2; 5345: 2; 5441: 2; 5815: 2; 6050: 2; 6159: 2; 6185: 2; 6907: 2; 7411: 2; 7468: 2; 7816: 2; 7817: 2; 8237: 2; 8499: 2; 8501: 2; 8696: 2; 8803: 2; 9123: 2; 9276: 2; 9368: 2; 9715: 2; 9956: 2; 11309: 2; 11405: 2; 11565: 2; 11719: 2; 12778: 2; 12932: 2; 13051: 2; 13146: 2; 13217: 2; 13386: 2; 13495: 2; 13853: 2; 14289: 2; 16495: 2; 17590: 2; 18634: 2; 18878: 2 — Burley, Tukirin et al. 1380: 3; 1607: 3 — Buwalda 6784: 5 — BW series 770: 2; 1153: 2; 1281: 2; 2716: 2; 4958: 2; 5703: 2; 6507: 2; 6558: 2; 7795: 2; 9629: 2; 11161: 2; 11747: 2; 12282: 2.

Castro 4444: 1 — CF series 4035: 4 — Chakraborty 5549: 4.

Elmer 12884: 4; 13067: 4; 13255: 4; 21078: 5; 21220: 4; 21601: 5; 21769: 5 — Endert 2447: 4; 4879: 5.

FB series 6851: 5; 12759: 5; 30344: 5; 30609: 5; 30791: 5 — Forbes 434: 2; 3154: 3; 3162: 6; 3164: 5 — Franken & Roos TFB 1664: 5; TFB 1664a: 5; TFB 1674: 5; TFB 1725: 5 — Frodin 2131: 5.

Gentry & Tagi 33920: 3; 34060: 3 — Grashoff 673: 3 — Griffith KD 5030: 3.

Hallé TFB 373: 5; TFB 3506: 4 — Haviland 1887: 3 — Haviland & Hose 3659: 3 — Hose 395: 6.

Iboet 264: 4.
Ja series 1975: 4.
Kadim & Noor 217: 6 — Kanis 4272: 1 — KEP series 35710: 3; 71322: 3; 0830: 3; 94078: 6; 105142: 3; 105200: 3 — KEP FRI series 1621: 5; 4394: 4; 4445: 3; 6414: 3; 7880: 3; 8048: 3; 8198: 3; 8404: 3; 8422: 5; 8891: 3; 8923: 4; 10610: 3; 10675: 5; 12134: 5; 14523: 5; 16016: 4; 16094: 6; 17624: 6; 17975: 4; 20220: 5; 22156: 6; 23879: 3; 25222: 3; 25656: 3; 27665: 4; 29228: 3 — King's collector 3776: 3 — Koorders 6974: 4 — Kostermans 5051: 4; 5185: 4; 5206: 4; 6473: 3; 6591: 5; 7745: 5; 9982: 3; 10337: 5; 13233: 4; 13292: 4; 13304: 4; 13607: 5; 13970: 1; 21582: 5; 21753: 4; S 95: 3.
LAE series 50614: 2; 51763: 2; 59242: 2 — Laumonier 6358: 4; TFB 372: 5; TFB 1537: 3; TFB 1839: 3; TFB 1863: 3; TFB 3419: 3; TFB 4013: 3; TFB 4058: 4; TFB 4595: 4 — Ledermann 9662: 2; 9670: 2 — Lörzing 14264: 3.
Maingay KD 1247/3: 3; KD 1434: 3 — Maxwell 82-44: 6; 82-150: 6 — Meijer 2524: 1.
NGF series 825: 2; 1210: 2; 1889: 2; 2078: 2; 2846: 2; 17387: 2; 45705: 2 — Nooteboom 4397: 3; 4883: 3; 4922: 3; 5007: 3; 5027: 3; 5037: 3; 5053: 3 — Nur 34109: 5.
Otik 4370: 1.
Pickles 3412: 3 — PNH series 2767: 5; 10229: 5 — Podzorski 773: 5 — Puasa 4554: 5; 4648: 5; 4668: 4 — Pullen 7477: 2.
Rahmat si Toroes 3422: 5 — Ramos 1627: 5 — Ranger 5890: 3 — Regalado & Sirikolo 798: 2 — Rosalina TFB 2720: 3 — Rosli 3354: 3 — van Rossum 71: 5 — RSS series 2570: 2 — Russell 1918: 5.
S series 5845: 3; 11955: 3; 15582: 3; 15749: 3; 16644: 3; 21807: 5; 22412: 5; 23250: 6; 24930: 3; 26912: 6; 29480: 6; 32392: 3; 32679: 5; 37830: 3; 39936: 4; 40574: 5; 43006: 3; 43966: 3 — SAN series 15355: 5; 15376: 5; 15415: 5; 15548: 4; 16344: 1; 16437: 5; 16507: 4; 16770: 5; 17354: 5; 17743: 5; 18567: 1; 18591: 4; 21707: 5; 21720: 5; 22517: 5; 27135: 6; 27256: 5; 30409: 5; 31219: 5; 31350: 5; 34479: 1; 34800: 5; 34879: 5; 34893: 5; 35992: 5; 37513: 1; 38964: 5; 39602: 5; 39720: 5; 40772: 4; 41420: 6; 42144: 4; 44745: 5; 55752: 6; 56164: 5; 58485: 6; 60932: 5; 64961: 4; 65374: 5; 65863: 5; 70283: 1; 70294: 5; 72442: 4; 73204: 6; 88173: 5; 88328: 5; 88863: 5; 91083: 1; 91788: 5; 92092: 1; 92436: 5; 94705: 5; 95412: 5; 95646: 5; 96542: 1; 96876: 5; 97071: 1; 97172: 1; 97364: 1; 111886: 5; 114738: 6 — Sanusi bin Tahir 5508: 3; 9213: 3; 9254: 3; 12323: 3 — Saunders 211: 2; 214: 2; 264: 2; 280: 2; 1089: 2 — Scortechini 36: 3 — SF series 29250: 5; 29283: 6; 29297: 6; 34109: 5; 40162: 3; 40413: 3 — Shah & Ali MS 4157: 6 — Stone & Sidek 12478: 4 — Strugnell 13977: 4.
Thorenaar 2.T.2: 3 — Torquebiau 85: 4.
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Wenzel 643: 5; 649: 5; 944: 5 — de Wilde & de Wilde-Duyfjes 12814: 4; 13854: 4; 15889: 4; 18543: 4; 19438: 4 — Williams 2884: 5.
Yates 1089: 6.

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