BLUMEA 32 (1987) 323–341

THE GENUS RUBUS (ROSACEAE) IN MALESIA
3. The subgenus Micranthobatus

C. KALKMAN

Rijksherbarium, Leiden, The Netherlands

SUMMARY

Subgenus *Micranthobatus* is separated again from subg. *Lampobatus* sensu Focke (1911). The c.12 species have a scattered area of distribution, suggesting an old Gondwanan history. In Malesia five species are endemic in New Guinea (incl. New Britain), one is distributed in Borneo, the Philippines and Celebes. Two new species are described and one new variety. A key to the Malesian species is given. Remarks are made about two Australian species.

INTRODUCTION

Section *Micranthobatus* was published by Fritsch (1886) for a small group of Australian and New Zealand species, viz. *R. australis, moorei* and *squarrosus*, all known at the time from very few specimens. As a section it was accepted by Focke (1888), who added *R. parvus* from New Zealand.

In 1888 Focke also described a section *Lampobatus* with few, especially Mexican species. In his large monograph Focke (1911, 1914) united the two sections into one subgenus under the name *Lampobatus*, and enumerated ten species with a very scattered area including Mexico, Jamaica, Madagascar, N.E. India, New Guinea, New Zealand and Australia. Focke noted the affinity of the American species with *'Eubatus'* (subgenus *Rubus*) and in my opinion the original *Lampobatus*-group is best relegated to that subgenus which is very richly developed in South and Central America.

The other part of *Lampobatus* s.l., the original section *Micranthobatus*, can also be placed on the subgenus level, although I am less certain that this is a natural (monophyletic) group than I am for the subgenera treated earlier in this revision for Malesia (see Blumea 27, 1981 and 29, 1984).

The area covered by the subgenus *Micranthobatus* suggests an old Gondwanan origin.

Types or other specimens were seen in or borrowed from the following herbaria: A/GH, BM, BO, G, K, L, MEL, NY, SING, US. Directors and curators have been very co-operative and their help is acknowledged in gratitude.

Subgenus **Micranthobatus** (Fritsch) Kalkman, *comb. nov.*

Rubus sect. *Micranthobatus* Fritsch, Österr. Bot. Zeitschr. 36 (1886) 259; Focke in E. & P., Nat. Pflanzenfam. III, 3 (1888) 30. – Type species: *Rubus moorei* F.Muell., chosen by the present author.

Rubus subg. *Lampobatus* (Focke) Focke, Bibl. Bot. 72 (1911) 212; ibid. 83 (1914) 48; both pro parte, type species of basionym (sect. *Lampobatus* Focke, 1888) excluded. The type species of sect. or subg. *Lampobatus* must, if necessary, be chosen from the Mexican species *R. fagifolius, scandens* or *coriifolius*, being the species not in any way doubted by Focke.

Shrubs, climbing or straggling. Leaves 3- or 5-palmate, rarely (*R. parvus*) unifoliolate. Stipules absent (see note 3) or 1 or 2 on the base of the petiole, early deciduous or persistent. Inflorescences ± elaborate terminal thyrsi or axillary (usually unbranched) racemes in bundles of 2 to 5, rarely solitary. Flowers uni- or bisexual, sex disposition in the plants in most cases incompletely known. Fruits cohering and falling as a whole from the torus, or possibly falling separately.

Distribution. About twelve species, five of which endemic in New Guinea, the others in Australia (2, see p. 334 and 338), New Zealand (2 or 3), Celebes, Borneo and the Philippines (1), N.E. India (1) and Madagascar (1).

Notes. 1. As observed in the previous parts of this revision, there is for many species of *Rubus* a large need for observations on living plants, e.g. on variability, sex disposition, development of fruits. In the present subgenus this is particularly the case.

2. The bundles of racemes are actually compound racemes with an extremely short main axis. The difference between the two inflorescence types in this subgenus is, consequently, not as fundamental as at first sight.

3. The almost complete absence of stipules in a number of species (*R. cordiformis, diclinis, royenii*) is in *Rubus*, and in Rosaceae in general, a rare character. Van Royen (Phan. Mon. 2, 1969, 61) considered the organs to be 'stipule-like appendages' and maintained that in his *diclinis*-group (which comprises the New Guinean species of subg. *Micranthobatus*) true stipules are always absent. It would be interesting to know the very early stages of development on a microscopical level.

KEY TO THE MALESIAN SPECIES

1 a. Leaves trifoliolate 2
b. Leaves 5-foliolate (some leaves, especially the first ones of a twig, may have 4 or 3 leaflets 5
2 a. Inflorescence a large, terminal thyrsus ..... **1. R. clementis**
b. Racemes with 1–15 flowers, axillary, solitary or in bundles of up to 4 3
3 a. Flowers small: sepals 2.5–4 mm long, petals 4–8 mm long ... **2. R. diclinis**
b. Flowers larger: sepals 6–12 mm long, petals 10–20 mm long 4
4 a. Leaflets 10–15 cm long, length/width 1.1–1.5, terminal petiolules 5–7 cm. Collective fruits c. 1.3 cm long ..... **3. R. cordiformis**
b. Leaflets 3–6 cm long, length/width 1.5–2.1, terminal petiolules 0.5–2 cm. Collective fruits c. 5 cm long ..... **6. R. megacarpus**

5 a. Terminal leaflets 4.5–12 by 2–7 cm, with 9–14 pairs of nerves. Racemes solitary or in bundles of 2–5, each with 10–25 flowers. Pedicels 0.5–2 cm. Filaments glabrous. Ovary glabrous or with long hairs, without glands **4. R. royenii**

b. Terminal leaflets 3–5 by 2–3 cm, with 6–8 pairs of nerves. Racemes solitary, lax, with 2–7 flowers. Pedicels 1.5–4 cm. Filaments with many long patent hairs. Ovary densely long hairy and with rather many yellow glands on the dorsal side ..... **5. R. novoguineensis**

1. Rubus clementis Merrill

Rubus clementis Merr., Philipp. J. Sci. 3 (1908) Bot. 139; Elmer, Leafl. Philipp. Bot. 2 (1908) 458. — *Rubus lucens* Focke var. *clementis* (Merr.) Focke, Bibl. Bot. 72 (1911) 213; Merr., Enum. Philipp. Flow. Pl. 2 (1923) 228. — Type: *Clemens 740*, holo in PNH destroyed, iso seen from K, US and (as *Clemens s.n.*) G.

Climbing or scrambling shrubs with up to 20 m long stems. *Stems* almost unarmed or with few curved, up to 1 mm long prickles, with short appressed hairs and minute, shortly stalked glands. *Leaves* trifoliolate. Stipules on the petiole, up to 5 mm above its base, linear, 4–7 by 0.3–1 mm, hairy below, rather persistent. Petioles 5–9 cm; petiolules of terminal leaflets 2.5–4.5 cm, those of lateral leaflets c. 0.5 cm long; petiole and petiolules shortly hairy and with minute glands, petiole and terminal petiolule with few to several prickles, terete but under the insertion of the stipules petiole flat to channeled and broader. *Blades* ovate to elliptic, chartaceous, length/width 1.5–2, terminal ones 8–13.5 by 4.5–9 cm, lateral ones usually slightly smaller or at least narrower, base rounded, margin shallowly and widely serrate, with up to 3 teeth per cm, lower part of blade entire, apex acuminate. *Leaflets* pinninerved with 7–9 pairs of lateral nerves, terminating in the marginal teeth, often one strong tertiary vein arising acropetally near the end of a secondary nerve, also terminating in a tooth, midrib and nerves slightly impressed to flat above, prominent below, venation transverse, indistinct above, slightly prominent below, upper surface sparsely hairy and with some minute glands on midrib and nerves, lower surface sparsely short-hairy on nerves and veins and also with glands. *Inflorescences* terminal (maybe also axillary), richly flowered, hanging thyrsi 'which sway in the breeze' (Merrill, 1908), consisting of up to 20 laterals in the axils of bracts or (the lower ones) leaves, the laterals being (compound) racemes, their last branchings cymose with 2 or 3 flowers, entire thyrsus up to 55 cm long, lower laterals up to 25 cm long; rachises and pedicels densely short-hairy, some small prickles present on the larger rachises; pedicels up to 5 mm, under the fruit up to 10 mm long; bracts in the racemes and under the flowers linear, up to c. 5 mm long, hairy outside, glabrous inside, those under the laterals up to 1 cm long, sometimes tripartite, bracteoles always present in the ultimate cymes, small. *Flowers* unisexual or bisexual (see note 1). *Hypanthium* flat saucer-shaped, 3.5–5 mm across, woolly outside, hairy all over inside. *Sepals* rounded triangular to ovate, equal or inner ones slightly narrower than outer ones, 3.5–5 by 3–4.5 mm, apex obtuse, apiculate to (rarely) acuminate, margins entire, both sides densely short-woolly and sometimes

with shortly stalked glands outside, often recorded as red-ringed. *Petals* obovate to elliptic, 5.5–9 by 4–6 mm, hardly or not clawed, apex rounded, glabrous, white. *Stamens* 70–160, glabrous; filaments up to 2.5 mm; anthers 1–1.5 mm long, narrow; staminodes in female flowers 1–2 mm, including the minute (0.5 mm at most) anther rudiment. *Pistils* 30–70; ovary c. 1 mm long, glabrous or with long hairs on the dorsal side near the apex; style 2–3 mm, sometimes with hairs at base; pistillodes in obviously male flower (only one seen, see note 1) 20, 2 mm including 1 mm style. Torus elevated, hairy. *Collective fruit* globular, 1–1.5 cm diam., the fruits densely packed; sepals under the developing fruits closing and enlarging, up to 7 by 5.5 mm; fruits 2.5–3.5 by 1.5–2 mm, exocarp a thin layer when dry, juicy in vivo, sometimes still with some hairs, red to orange-red; endocarp rugose.

Distribution. Northern part of Sumatra, Borneo, Mindanao, Celebes.

Habitat. In forest along rivers and brooks, also in open places in forest or shrubbery, at altitudes from 200 to 1300 m (once: 1800 m).

SUMATRA. Aceh: Mt Goh Lemboh, *van Steenis 8961*. – North: Mt Sibayak, *Lörzing 8499, 15134*.

BORNEO. Sarawak: Third Div., Ulu Mujong, *Ashton S 19628*. – Sabah: Dist. Kalabakan, Seranum, *Fidilis & Sumbing SAN 96080*. Dist. Tawau, Ulu Kuamut, *Free Minjulu SAN 79229*. – Indonesian Borneo: East Kalimantan, W. Kutai, *Endert 2932, 3377, 4565, 4608*; Mt Beratus, *Kostermans 4726*.

PHILIPPINES. Mindanao: Davao Prov.: Lake Lanao, *Clemens 740*. Bukidnon Prov.: Mt Dumalucpihan, *Ramos & Edaño BS 38964*.

CELEBES. North: Minahasa, *Forman 222*. – Central: Sopu Valley, *van Balgooy 3103*.

Notes. 1. The sexual differentiation in this species is probably polygamo-dioecious. I saw five specimens with female flowers possessing staminodes with anther rudiments smaller than 0.5 mm. Only one collection was seen with functional stamens but with styles of only 1 mm. This specimen (*Endert 2932*) can be interpreted as being male. The rest of the material has well-developed stamens (anthers 1–1.5 mm long) and functional-looking ovaries with 2–2.5 mm long styles in the same flowers. From the herbarium it cannot be decided of course that these specimens are bisexual indeed, but it certainly appears so. *Lörzing 8499* has fruits (with staminodes under them) and bisexual looking flowers in one collection, but on separate twigs.

2. The type of *R. clementis* from Mindanao and the only other specimen seen from the Philippines fall entirely within the range of the material from the other islands, none of which had been identified before to the species.

3. *Rubus clementis* is closely related to *R. lucens* Focke from Northeastern India and Focke thought them conspecific. *Rubus lucens* has more narrow sepals and smaller petals. I prefer to keep them apart on the species level. Also related may be *R. myrianthus* Baker from Madagascar. These three species and also *R. cissoides* A.Cunn. from New Zealand differ from the rest of the subgenus by having a large terminal inflorescence, the lower branches of which axillary to the upper leaves. See note 2 under the subgenus description on p. 324.

4. The label of *van Steenis 8961* mentions 'according to natives host of *Rafflesia hasseltii*.' This will be an error.

2. Rubus diclinis F. Muell.

Rubus diclinis F. Muell., Trans. Roy. Soc. Vict. 1 (1889) 5; Focke, Bibl. Bot. 72 (1911) 220; Merr. & Perry, J. Arnold Arbor. 21 (1940) 183, pro parte, see note 1 on p. 332; P. Royen, Phan. Mon. 2 (1969) 69, only var. *diclinis*; Alp. Fl. New Guinea 4 (1983) 2481, only var. *diclinis*. – Type: *MacGregor s.n.*, syntypes from Mt Knutsford and Mt Musgrave, in MEL, only one seen, see note 1; fragment in K.

Rubus tsiri P. Royen, Phan. Mon. 2 (1969) 77, excl. most specimens cited; Alp. Fl. New Guinea 4 (1983) 2486, idem. – *Rubus paradoxus* Ridley, Trans. Linn. Soc. Lond. II, Bot. 9 (1916) 36, nom. illeg., non S. Moore (1878). – Type: *Kloss s.n.* from Mt Jaya (Carstensz). Ridley cited two localities: Camp VIII–IX and Camp XIII–XIV. A specimen from the former locality seen from BM is considered by me to be the holotype. A second specimen in BM marked Camp XI–XIII and a specimen in K marked Camp XI–XII do, strictly taken, not belong to the type.

Climbing or scrambling shrub, branches up to 5 m long, once reported up to 18 m. *Stems* densely ± patently hairy, only tardily glabrescent, with rather many curved, up to 1 mm long prickles and sometimes with shortly (1 mm) stalked glands. *Leaves* 3-foliolate. Stipules very rarely present, 2 on the petiole, up to 4 by 0.5 mm. Petioles 1.5–5.5 cm long; petiolules of terminal leaflets 1–4 cm, those of lateral leaflets 2–8 mm long; petioles and petiolules terete, densely (semi-)patently hairy and with many small, curved prickles. *Blades* elliptic to ± ovate, hard-chartaceous, length/width 1.3–1.7 (see note 4), terminal ones 3–10 by 2–7 cm, lateral ones smaller; base rounded to shallowly cordate, margin serrate with 5–9 teeth per cm, apex acute (see note 4). *Leaflets* pinninerved with (6–)8–12 pairs of lateral nerves, terminating in the margin, midrib impressed above, prominent below, nerves (slightly) impressed above, rather prominent below, venation transverse, slightly impressed to flat above, flat to slightly prominent below; upper surface appressedly scattered hairy all over, more densely and more patently so on midrib and nerves, more or less glabrescent with age, lower surface sparsely to densely (semi-) patently golden to brownish hairy especially on midrib and nerves but also on the smaller veins, very rarely almost glabrous, sometimes minute sessile glands present on the leaves. *Inflorescences* solitary or in small bundles (up to 4) in the leaf axils, simple racemes of up to 15 flowers and up to 8 cm long but mostly shorter; peduncle 0–2 mm long, some empty bracts (bud-scales) present at the base, those persistent during anthesis; pedicels 4–10 mm long; peduncle, rachis and pedicels densely (semi-) patently hairy and with short woolly hairs, sometimes with minute sessile glands, always with small, curved prickles; bracts up to 7 by 4 mm, densely hairy outside, glabrous or with some hairs inside; bracteoles 2, on the pedicel from base to near the flower, like the bracts but smaller, bracts and bracteoles persistent till the fruiting stage. *Flowers* normally unisexual with vestiges of the nonfunctional organs, few specimens appearing functionally bisexual in the herbarium. *Hypanthium* flat, saucer-shaped, 2.5–3 mm across, woolly and with (semi-) patent hairs outside, glabrous within except around the torus. *Sepals* elliptic to tongue-shaped, subequal, 2.5–4 by 1.5–3.5 mm, apex rounded, margins entire, densely woolly on the marginal parts and with semi-appressed straight hairs outside, densely short-woolly inside, minute sessile glands sometimes present on hypanthium and sepals, sepals often reported as pinkish (inside?) or brownish purple. *Petals* elliptic to oblong, 4–8 by (1–)2.5–4.5 mm,

gradually narrowed towards base, apex obtuse or emarginate, patently hairy inside and sometimes also outside, white or pale pink. *Stamens* 18–40, glabrous; filaments up to 4.5 mm; anthers 0.6–1 mm long, dorso-versatile; staminodes in female flowers small and ± petaloid without anther rudiment, up to 1.5 mm, sometimes almost invisible. *Pistils* 10–20; ovary 0.6–1.5 mm long, densely to sparsely hairy or glabrous (see note 5); style up to 1.5 mm, glabrous or rarely with some hairs at base; stigma oblique; pistillodes in male flowers less than 1 mm including style rudiment. *Torus* elevated, densely hairy. *Collective fruit* up to 1 cm diameter when dry, in living state up to 1.5 cm, the fruits well separated; sepals spreading; fruits up to 5(–7) by 4 mm when dry; exocarp probably rather thick and fleshy in vivo, rather thin when dry, hairy or glabrous, dark red to even black, endocarp rugose.

Distribution. All over New Guinea, from Vogelkop Peninsula to Owen Stanley Range.

Habitat. In montane forest, clearings, forest edges, secondary forest, shrubberies, at altitudes from 1750 to 3470 m, rarely lower. See graph 2.

Vernacular names. Tsiri (Ialibu); mail (Kundiawa), pakiero (Kapauku lang.), igigl (Wabag), mama'ane (Tari).

Uses. Once (*Clunie & Larivita LAE 63150*) the leaves were reported as 'used in smoking'.

New Guinea. Irian Jaya. Vogelkop Peninsula: Anggi Lakes, *Sleumer & Vink BW 14039, BW 14215*. – Snow Mts: Wissel Lakes, *Eyma 5270, Vink & Schram BW 8621*; Mt Wichmann, *Pulle 987, 1053*; Lake Habbema, *Brass 9133*; Mt Jaya (Carstensz), *Kloss s.n.* — Papua New Guinea. West Sepik Prov.: Hindenburg Range, *Vink 17630*; Star Mts, *Veldkamp 6714, Vinas LAE 59585*. – East Sepik Prov.: Victor Emanuel Range, *van Royen 11350*. – Morobe Prov.: Cromwell Mts, *Hoogland 9364*; Wau, *Fallen 552*; Mt Kaindi, *Womersley NGF 19431*; Mt Salawaket, *Hartley 11281*; Sattelberg, *Clemens 1298, 9504 bis*; Ogeramnang, *Clemens 4553*. – Western Highl. Prov.: Kopiago Subprov., *Womersley c.s. NGF 37297*; Wabag, *Womersley NGF 11323*; Minj Subprov., *van Royen NGF 18267*. – Chimbu Prov.: Kundiawa Subprov., *Vandenberg NGF 39514, NGF 39580*. – Eastern Highl. Prov.: Mt Wilhelm, *van Balgooy 204a, 505, Brass 30127*; Fatima River, *Grubb & Edwards 378*. – Southern Highl. Prov.: Ialibu, *Womersley & Woolliams NGF 12391, NGF 37001*; Mt Giluwe, *Clunie & Larivita LAE 63150, Womersley & Leach LAE 55267;* Mendi Subprov., *Leach LAE 56187*; Tari Subprov., *Frodin NGF 28434*. – Central Prov.: Murray Pass, *Brass 4712, Ridsdale NGF 36950*. – Milne Bay Prov.: Mt Dayman, *Brass 22796*; The Gap, *Carr 15087*; Mt Knutsford, *MacGregor s.n.*

Notes. 1. Some doubt remains about the naming of this species. *Rubus diclinis* F. Muell. was based on specimens collected by MacGregor on Mt Knutsford and on Mt Musgrave, both in the eastern end of New Guinea. Von Mueller's description generally fits the species as recognized here, based on more than 30 specimens. There is one puzzling element, however, in the original description where the filaments are said to be 'ciliolated'. Focke (1911) repeated 'filamenta pubescentia' and mentioned both mountains. In the present subgenus hairy filaments have only been observed by me in the few specimens of *R. novoguineensis* (p. 337) and in *R. megacarpus* (p. 339). Van Royen (1969) cited both syntypes, but in his description of *R. diclinis* the filaments are said to be glabrous. Investigation of the type specimens in MEL was called for, but Dr. Churchill could locate only one of the syntypes, viz. a MacGregor specimen from Mt Knutsford (MEL sheet nr. *31354*). It was kindly

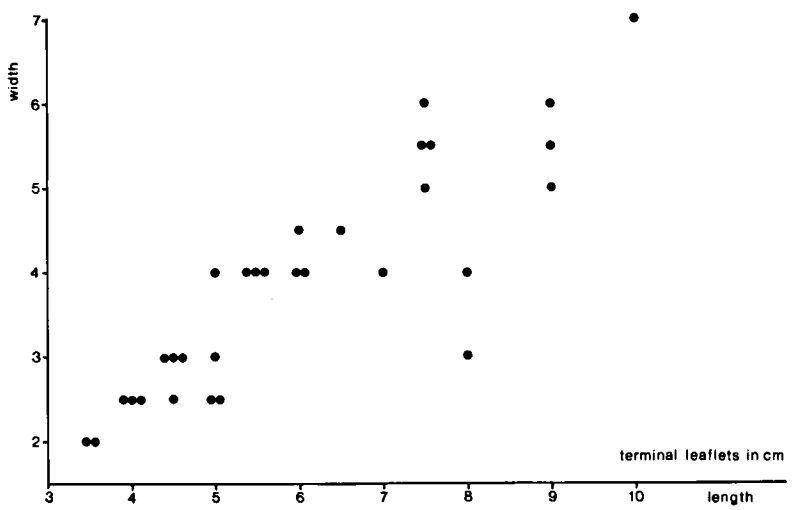
sent on loan to me. The specimen is in a rather bad condition and possesses only one empty inflorescence and a few, partly broken leaves. The specimen, as far as can be judged, fits in with my opinion of *R. diclinis* except for the shortly stalked glands on the rachis of the inflorescence and on the pedicel-remnants which I never observed in *R. diclinis* (but which are normal in *R. novoguineensis*). In my opinion the Mt Knutsford specimen is best interpreted as being a slightly deviating representative of *R. diclinis*, regrettably a type, but showing some introgression from *R. novoguineensis* which is also known from the Owen Stanley Range. The specimen certainly does not belong to the last-mentioned species, which is 5-foliolate.

2. Van Royen (1969) had a much wider concept of *R. diclinis* and quite a different opinion on the circumscription of *R. diclinis* and *R. tsiri*. He separated these species on the glabrous (*tsiri*) or hairy (*diclinis*) leaflets and included specimens with 3- and 5-foliolate leaves in *R. diclinis*. A more satisfactory classification is reached when more weight is given to the number of leaflets than to the indument. Regrettably the type of *R. tsiri* belongs to *R. diclinis* as delimited in the present paper, which makes a new name necessary for *R. tsiri: R. royenii* (p. 333).

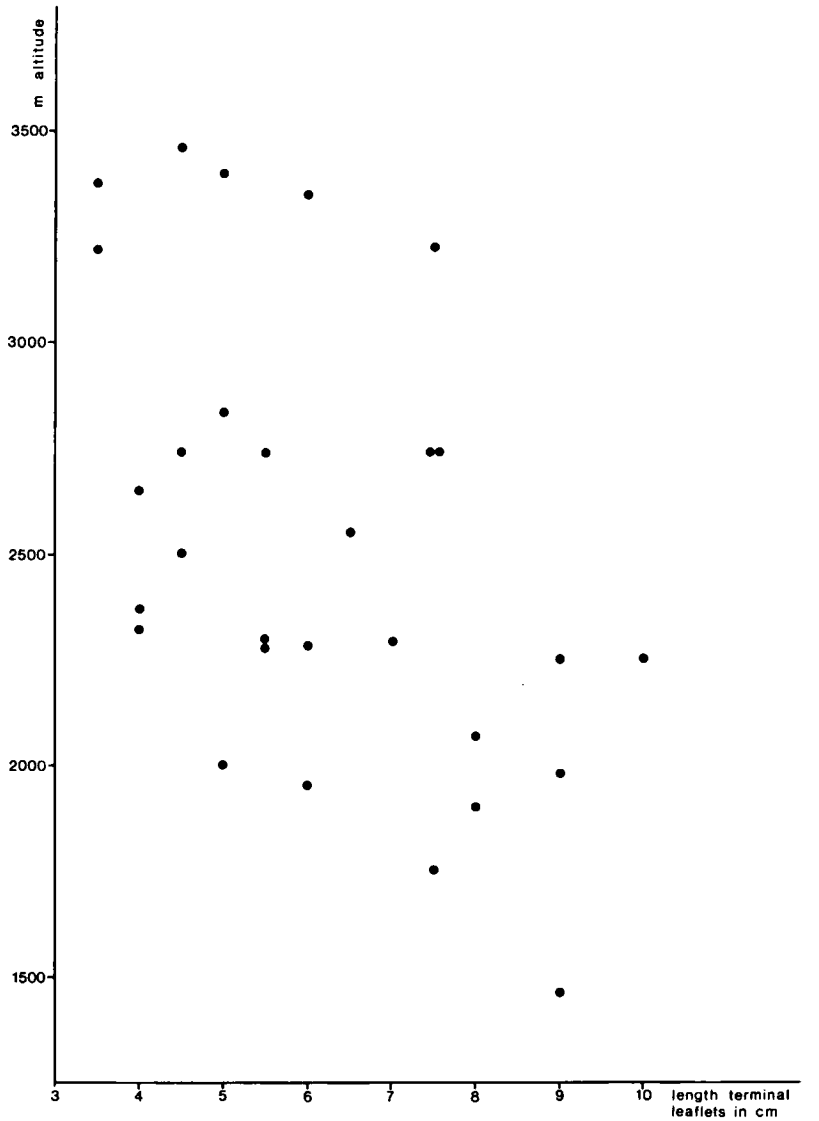
Rubus diclinis sensu P. Royen was divided by him into four varieties, one of which (var. *ikilimbu*) has to be transferred to *R. royenii*. Two other varieties (var. *novoguineensis* and var. *papuana*) I consider to be separate species and this only leaves Van Royen's type variety in *R. diclinis* sensu mihi.

3. The species as delimited here, shows some variation in leaflet dimensions. In graph 1 length and width of the terminal leaflets have been entered and it is obvious that a subdivision into a variety with larger and one with smaller leaflets is untenable. From graph 2 it is obvious that a clinal relationship exists between altitude and leaflet length: smaller leaflets at higher altitudes. The spread, however, is considerable.

A more or less dense indumentum is not correlated with altitude. Almost glabrous leaflets occur very rarely at low as well as high altitudes.



Graph 1



Graph 2

4. Two specimens, otherwise fitting into this species, show deviating leaves. In *Sleumer & Vink BW 14039* the leaflets are long caudate (up to 1.5 cm) and have a much larger length/width index: 2.4–2.7. It may represent an undescribed taxon. *Frodin NGF 28434* has also caudate leaves (up to 1 cm), but the index does not deviate so strongly: 1.8–2.0.

5. Ovaries and fruits show a disturbing range of variation in their indumentum. In about half of the female specimens the ovary or fruit is densely hairy (only two specimens with ripe fruits). In the other half the ovary is sparsely hairy, the fruit (6 specimens of which 3 ripe) has few hairs or is glabrous. I could not find any supporting character justifying the recognition of two groups.

3. **Rubus cordiformis** Kalkman, *spec. nov.*

Rubus diclinis F. Muell. var. *papuanus* Focke, Bot. Jahrb. 54 (1916) 72 (doubtful, see note 1); Merr. & Perry, J. Arnold Arbor. 21 (1940) 183, in obs., excl. cited specimens; P. Royen, Phan. Mon. 2 (1969) 72; Alp. Fl. New Guinea 4 (1983) 2484; all citations as var. '*papuana*'. – Types: *Ledermann 11990, 13009*, not found, probably destroyed, neotype designated by Van Royen (1969): *Brass 30932* , holo in A, iso seen from BO, K, L, NY. Neotypification not accepted by the present author (see note 1).

Frutex. Folia trifoliolata, foliola ovata, basi cordata, 10–15 ad 8–12 cm. Racemi solitarii vel 2–3 fasciculati, axillares, laxi, usque ad 20 cm longi. Flores magni, unisexuales, sepala 6–7 ad 4–7 mm, petala 10–17 ad 4–10 mm, stamina 40–60, pistilla c. 60, ovaria hispida. Fructus conferti, hispidi. – Typus: *Brass 30932*, holo in A, iso seen from BO, K, L, NY.

Climbing or scrambling shrub, stems up to 6 m long. *Stems* densely patently hairy, with rather many, slightly curved prickles of 1–1.5 mm long, and with small, subsessile or up to 1 mm stalked glands; shoots at their base with a number of large cataphylls. *Leaves* trifoliolate. Stipules never seen. Petioles 5–12 cm long; petiolules of terminal leaflets 5–7 cm, those of lateral ones 1–2 cm long; petioles and petiolules terete (or rarely the petiole slightly flattened at base), densely hairy and with subsessile and stalked glands like the branches, with many small curved prickles. *Blades* ovate, chartaceous, convex in vivo and the basal part usually folded back in dry material, length/width 1.1–1.5, terminal ones 10–15 by 8–12 cm, lateral ones slightly smaller; base cordate, the basal incision 0.5–1 cm deep, margin irregularly dentate with 3–7 teeth per cm, apex acuminate. *Leaflets* pinnately (pedately) nerved with 6–9 pairs of lateral nerves, terminating in the margin, the lowermost nerves with some strong basiscopic side-nerves, midrib, nerves and veins impressed above, prominent below, venation transverse; upper surface patently hairy all over, lower surface rather densely patently hairy on midrib, nerves and smaller veins, usually with glands on all nerves. *Inflorescences* solitary or 2 or 3 in the axils of leaves or (once seen) of cataphylls, usually simple racemes but sometimes partly branched through the development of flowers from the bracteoles, racemes with up to 10 flowers, up to 20 cm long, very lax; peduncle only up to 2 mm long, with some empty triangular bracts at very base (budscales); pedicels 2–5.5 cm long; peduncle, rachis and pedicels densely patently hairy, with glands and with small curved prickles; bracts 4–10 by 1–5 mm, densely patently hairy and with glands outside, appressed-hairy inside; bracteoles 2, on the pedicel, usually not opposite, slightly smaller than the bracts, bracts and bracteoles persistent during anthesis. *Flowers* unisexual, plants probably dioecious. *Hypanthium* flat, saucer-shaped, 4–5 mm across, outside densely hairy, inside glabrous except around torus. *Sepals* elliptic, 6–7 by 4–7 mm, subequal or inner ones slightly narrower than outer ones, apex obtuse, entire, on the outside the marginal

parts woolly and otherwise with many long patent hairs and also with glands, inside woolly. *Petals* elliptic, 10–17 by 4–10 mm, gradually narrowing towards the base, apex obtuse, long hairy at base inside, sometimes also with some hairs outside, white (once reported as cream-coloured). *Stamens* 40–60, glabrous; filaments up to 7 mm; anthers 1–1.5 mm long, dorso-versatile; staminodes in female flowers minute. *Pistils* c. 60 (only one female specimen seen); ovary densely hairy; style 1 mm, glabrous; pistillodes in male flowers c. 30 (?), minute to small, at most 1.5 mm long, of which 1 mm style, ovary rudiment densely hairy. *Torus* slightly elevated, hairy. *Collective fruit* ellipsoid, c. 1.3 by 1 cm when dry, the fruits closely packed; sepals spreading under the ripening fruits; fruits 4 by 3 mm, exocarp a thin layer when dry, hairy in upper part, colour unknown; endocarp rugose.

Distribution. Papua New Guinea.

Habitat. Scrub and forest (margins), from c. 1500 to c. 3200 m altitude.

Vernacular names. Kindekambukl (Hagen), mail (Kundiawa).

NEW GUINEA. Papua New Guinea. Western Highl. Prov.: Nondugl, *Womersley NGF 5332*. – Chimbu Prov.: Kundiawa Subprov., *Vandenberg NGF 39589*. – Eastern Highl. Prov.: Goroka Subprov., *Pullen 436*; Mt Wilhelm, *Philipson 3379*; Mt Otto, *Brass 30932*. – Cen-tral Prov. (?): Lala River, *Carr 15808*.

Notes. 1. Focke (1916) described his var. *papuanus* in a rather problematic way. He wrote, after a minimal and remarkably uninformative description: "Ob die vorgefundenen Unterschiede der Neu-Guinea-Pflanze von dem typischen *R. diclinis* aus Neusüdwales beständig sind, läszt sich bei dem geringen vorliegenden Material noch nicht beurteilen; vorläufig zeigen sich nur die gröszeren und schmaleren Blättchen deutlich verschieden ...", translated: "Whether the differences between the New Guinea plant and the typical *R. diclinis* from New South Wales are consistent cannot yet be judged because of the small amount of material; for the time being only the larger and narrower leaflets seem to be distinctly different ..."

The type specimens mentioned (*Ledermann 11990* and *13009*) were probably destroyed in Berlin, they were not seen by Merrill & Perry, Van Royen, or myself.

The reference to material from New South Wales is incomprehensible: *R. diclinis* has never been recorded from Australia and Merrill & Perry's explanation (*l.c.*) is erroneous.

It is improbable that the Ledermann specimens, if they were found, would belong to the taxon as delimited here (which is identical with Van Royen's circumscription, although on another level). Focke's mention of narrower leaflets and the measurements in his description (7–9 by 4–5 cm, with obviously a length/width index of c. 1.8) are very unlike the present taxon. That is why I consider var. *papuanus* Focke as a *nomen dubium* and Van Royen's neotypification as being 'in serious conflict with the protologue' (art. 8). It seemed expedient to choose Van Royen's neotype as the holotype for the new species.

Merrill & Perry (1940) referred to *Clemens 4553* and *10343* as being possibly Focke's var. *papuanus*; in my opinion they are typical *R. diclinis*.

2. Van Royen placed this species (as a variety) under his widely conceived *R. diclinis*. It is certainly related to his var. *diclinis*, the only of his four varieties which I

left in *R. diclinis* (p. 327). The differences in the shape of the leaflets and in the dimensions of the flowers are, in my opinion, sufficient to warrant recognition on the species level, although introgression from *R. diclinis* can be detected in a number of specimens.

4. Rubus royenii Kalkman, *spec. nov.*

Rubus tsiri auct. non P. Royen; P. Royen, Phan. Mon. 2 (1969) 77, excl. type (see p. 327); Alp. Fl. New Guinea 4 (1983) 2486, idem. – Type: *Brass 30919*, holo in L, iso seen from A, K, NY.

Rubus diclinis F. Muell. var. *ikilimbu* P. Royen, Phan. Mon. 2 (1969) 75; Alp. Fl. New Guinea 4 (1983) 2486. – Type: *Hoogland & Pullen 6179*, holo in L, iso seen from A, also present in CANB and other herbaria.

Rubus moorei (non F. Muell.) auct.: Merr. & Perry, J. Arnold Arbor. 21 (1940) 184, in obs. The specimens mentioned, *Brass 10773* and *13083*, belong to var. *royenii*.

Frutex. Folia 5-foliolata, plerumque estipulata; foliola elliptica, terminalia 4,5–12 ad 2–7 cm, basi non profunde cordata vel obtusa, nervis secundariis utroque 9–14. Racemi usque ad 5 fasciculati, raro solitarii, axillares, 6–15 cm longi, 10–25 floribus. Flores unisexuales, filamenta glabra, ovaria glabra vel hispida, eglandulosa, numeri dimensionesque partium floralium variabiles. Fructus collectivus usque ad 2 cm diametro. – Typus: *Brass 30919*.

Climbing, scrambling or trailing shrub. Stems up to 6(–10) m long, with rather many, up to 1(–2) mm long, straight to slightly curved prickles, variously hairy, sometimes with bristles or glands (see descriptions of varieties), lateral shoots with a number of large cataphylls (budscales) at base. *Leaves* palmately 5-foliolate, occasionally a 4- or 3-foliolate leaf present. Stipules absent except sometimes in var. *hispidus*. Petioles 3–11 cm; petiolules of terminal leaflets 1–5 cm, those of lateral leaflets 0.3–2 cm long; petiole and petiolules more or less distinctly flattened above, in the largest leaves grooved, with many small, curved prickles, further indumentum as the stems. *Blades* elliptic (to ovatish in var. *ikilimbu*), chartaceous, length/width 1.5–2.3, terminal ones 4.5–12 by 2–7 cm, lateral ones smaller; base shallowly cordate to rounded, margin (dentate-) serrate with 2–5 teeth per cm, apex acute to acuminate. *Leaflets* pinninerved with 9–14 pairs of lateral nerves, terminating in the margins, rather often forking, lowermost ones (in var. *ikilimbu*) sometimes with some strong basiscopic side-nerves and pedate, midrib impressed above, prominent below, nerves flat to impressed above, prominent below, venation transverse, from flat and hardly visible to slightly impressed above, flat to rather prominent below, nerves sometimes reported as brown or reddish in the living state; indumentum various (see descriptions of varieties), midrib below with prickles. *Inflorescences* in bundles of up to 5 in the leaf axils, in var. *ikilimbu* sometimes solitary, simple racemes of up to 25 flowers, 6–15 cm long; peduncle 0–1 cm, at base with a number of empty bracts, pedicels 4–18 mm, rachis and pedicels densely hairy and with small curved prickles, in var. *ikilimbu* also with stalked glands; bracts 3–7 by 1–4 mm, hairy outside (in var. *ikilimbu* also glandular), hairy to almost glabrous inside, bracteoles 2, on the pedicel from its base to close under the flower, bracts and bracteoles persistent till the fruiting state. *Flowers* unisexual with vestiges of the other sex, plants prob-

ably dioecious, measurements and numbers of flower parts see descriptions of the varieties. *Hypanthium* flat, saucer-shaped, densely hairy outside, sometimes with prickles, in var. *ikilimbu* sometimes glandular, glabrous inside except around torus. *Sepals* ± elliptic, equal, apex obtuse, margins entire, densely hairy outside on the marginal parts, woolly inside, calyx often reported as pinkish. *Petals* elliptic, gradually narrowed towards the base, apex obtuse to emarginate, with long hairs inside, white to pink. *Stamens* glabrous, anthers dorso-versatile; staminodes in female flowers minute. *Ovary* glabrous or with long hairs in upper part; pistillodes in male flowers minute. *Torus* (slightly) elevated, hairy. *Collective fruit* ± globular, up to 2 cm across, fruits probably late in attaining their final dimension; sepals spreading under the ripe fruit; fruits with thick exocarp, dark red to black, and with rugose endocarp.

Distribution. New Guinea, New Britain.

Habitat. Open places and forest, up to 3400 m, rarely collected below 1200 m.

Notes. 1. As is apparent from the synonymy, this species is composed from two elements: (a) most of what Van Royen called *R. tsiri* (but not the type specimen), and (b) one of the varieties of Van Royen's *R. diclinis*, which is better in place here (see also note 2 under var. *ikilimbu*, p. 336).

Van Royen did not distinguish varieties in his *R. tsiri* but in my opinion the bristly specimens can be recognized as a separate variety.

The species as conceived here, does no contain a type specimen of any species name. The epithet chosen honours the work that P. van Royen accomplished to further the knowledge of New Guinean mountain plants.

2. Closely related to this species are *R. novoguineensis* (see there, note 3, p. 338), *R. moorei* s.s. (see note 4 under *R. novoguineensis*, p. 338), and what has been called *R. moorei* F. Muell. forma *glabra* C.T. White. I prefer to keep this latter taxon apart, as well from typical *R. moorei* as from the three varieties of *R. royenii*. Like *R. novoguineensis*, it is most closely related to the var. *ikilimbu* of *R. royenii*.

A short diagnosis of the Australian taxon *'glabra'*, that to my knowledge has no epithet on specific or varietal level, follows:

Stems (almost) glabrous. Stipules absent. Blades of leaflets elliptic-oblong, length/width 2.1–2.7, upper surface glabrous, lower surface with some hairs on midrib and when very young on the nerves, with domatia (bushels of hairs) in the nerve axils. Inflorescences 1–3 in the leaf axils, simple or sparsely branched racemes with up to 15 flowers, up to 9 cm long. Flowers unisexual. Sepals 3.5–5 mm long, hypanthium and base of sepals outside with small prickles. Petals 11–13 by 5.5–6 mm. Stamens 40–60, glabrous. Pistils 40–c. 50, ovary glabrous but with many glands on the backside. Staminodes in female and pistillodes in male flowers minute. Fruits not seen.

It seems to me quite certain that this taxon is a different species from *R. moorei* sensu stricto (forma *sericea* sensu C.T. White), shortly described under note 4 to *R. novoguineensis* (p. 339). *'Glabra'* differs from *'sericea'* in having almost glabrous leaves with domatia, in the absence of stipules, in the richer inflorescences, and in the glands on the ovaries. The comparison, it must be admitted, is handicapped by the insufficiency of the material, female flowers lacking for *'sericea'* and fruits for *'glabra'*. This is also the main reason for me not to include this Australian taxon in

the New Guinean *R. royenii* although in the present state of knowledge no easy differentiating key character can be given except the domatia.

KEY TO THE VARIETIES

1 a. Long non-glandular bristles of 3–4(–5) mm long on stems, petioles and petiolules ..... **c.** var. **hispidus**
b. Bristles absent..... 2
2 a. Stalked glands absent. Leaves glabrous to sparsely hairy on both sides. Flowers small: sepals 3–4 mm long, petals 5–7.5 mm long, stamens 20–40, pistils 10–30 ..... **a.** var. **royenii**
b. Stalked glands on stems, petioles, inflorescences and pedicels. Leaves hairy on upper surface, densely so on midrib and large nerves, lower surface densely soft-hairy on all nerves and veins. Flowers larger: sepals 3.5–5 mm long, petals 8–10 mm long, stamens 45–60, pistils c. 50 ..... **b.** var. **ikilimbu**

a. var. royenii

Stems, petioles and petiolules sparsely hairy to glabrous. Blades of leaflets on upper surface sparsely hairy on midrib and large nerves to glabrous, on lower surface sparsely hairy on midrib and nerves to almost glabrous. Hypanthium 2.5–3 mm across; sepals 3–4 by 2.5–3 mm; petals 5–7.5 by 2.5–3.5 mm, (pinkish- or cream-) white; stamens 20–40, filaments c. 2.5 mm, anthers c. 1 mm long; pistils 10–30. Collective fruit c. 7 mm across, fruits up to 4 by 3.5 mm (probably not the final dimensions in fully ripe state). See also note 2.

Distribution. New Guinea, from Arfak Mts to Mt Suckling.

Habitat. Forest (margins), secondary forest and scrubberies, stream banks, at altitudes from 670 to 3340 m, most collections from 1900 m or higher.

New Guinea. Irian Jaya. Arfak Mts, *Kanehira & Hatusima 13734*; Wandammen Peninsula, *Schram BW 13369*; Lake Habbema, *Brass 10773*; Idenburg R., *Brass 13083*. — Papua New Guinea. West Sepik Prov.: Star Mts, *Veldkamp 6301*. – Morobe Prov.: Edie Creek, *Womersley & Sleumer NGF 13956*; Mt Kaindi, *Durand & Nelson 115*. – Western Highl. Prov.: Wahgi-Jimi Divide, *Womersley NGF 5177*; Jimi valley, *Henty & Streimann NGF 38929*. – Eastern Highl. Prov.: Kainantu, *Millar NGF 22730*; Mt Otto, *Brass 30919*. – Southern Highl. Prov.: Mt Ialibu, *Stevens & Foreman LAE 55836*. – Central Prov.: Sogeri, *Schodde 2959*. – Milne Bay Prov.: Mt Suckling, *Veldkamp & Stevens 5889*.

Notes. 1. The distinction between var. *royenii* and var. *ikilimbu* is, as can be glanced from the key, not too sharp. The differences in hairiness of leaflets and dimension of flowers are not correlated with altitude.

2. Two collections from low altitudes (*Schram BW 13369* from 900 m, *Schodde 2959* from 670 m) have larger flowers than the remainder of the specimens: sepals up to 5 by 4.5 mm, petals up to 8.5 by 6 mm, pistil(lode)s 60–70. These deviations have not been entered in the diagnosis. The fruiting specimen *Brass 13083*, also from low altitude (850 m), does not show these floral characters.

b. var. **ikilimbu** (P. Royen) Kalkman, *comb. nov.*

Rubus diclinis F. Muell. var. *ikilimbu* P. Royen, Phan. Mon. 2 (1969) 75. – Type: see synonymy of species.

Stems, petioles and petiolules densely soft-hairy and often with stalked glands, their stalks up to 1 (rarely to 2.5) mm long. Blades of leaflets on upper surface hairy all over, densely so on midrib and larger nerves, more or less glabrescent, on lower surface densely patently soft-hairy on all nerves and veins. Inflorescence rachis and pedicels with stalked glands. Hypanthium 3.5–4.5 mm across, sometimes with stalked glands outside; sepals 3.5–5 by 2.5–3.5(–5) mm; petals 8–10 by 4–5 mm, pink; stamens 45–60, filaments up to 2.5 mm, anthers 1.2–1.5 mm long; pistils c. 50 (only one female flowering collection seen). Collective fruit up to 2 cm across (dry), fruits up to 8 by 5.5 mm (dry).

Distribution. Papua New Guinea.

Habitat. Secondary forest and shrubbery, altitudes from 1280 to 2560 m.

Vernacular names. Parinau (Wabag), garangga (Fiyugi lang.).

New Guinea. Papua New Guinea. Western Highl. Prov.: Upper Wahgi valley, *Hoogland & Pullen 6179*; Wabag, *Flenley ANU 2071*. – Eastern Highl. Prov.: Kainantu, *Millar NGF 22712*; Fatima R., *Millar NGF 40789*. – Central Prov.: Boridi, *Carr 13201, 14636*; Goilala, *van Royen NGF 20206*.

Notes. 1. Stems are used for making rope, leaves are smoked (*Flenley 2071*).

2. The obvious likeness between this taxon and the not-bristly form of this species has prompted me to remove var. *ikilimbu* from *R. diclinis*.

3. Demarcation against var. *royenii* is unsharp. A single specimen (*van Royen NGF 20206*) shows transition to var. *hispidus* in having bristles on the stems, although shorter than is usual in the latter variety.

c. var. **hispidus** Kalkman, *var. nov.*

Differt a varietatibus alioribus ramis, petiolis et petiolulis dense hispidis, setae rectae, 3–4(–5) mm longae, eglandulosae. – Typus: *Sayers & Millar NGF 19884* , holo in L, iso seen from A, duplicates according to the label also in BO, BRI, CANB, K, LAE, NSW, SING.

Stems covered with many reddish to brown, 3–4(–5) mm long, straight (non-glandular) bristles, otherwise sparsely short-hairy to glabrous. Stipules usually absent as in other varieties, few seen in very young leaves, 1 or 2 on the petiole, linear, 3–7 by 0.8–1 mm. Petioles and petiolules densely hairy and with bristles. Blades of leaflets on upper surface glabrous even when young, on lower surface sparsely short-hairy on midrib and nerves and sometimes with minute sessile glands on the surface. Hypanthium 1.5–2.5 mm across; sepals 2–3 by 1.8–3 mm; petals 4.5–6.5 by 2–3 mm, white; stamens 14–20, filaments up to 1.5 mm, anthers c. 1 mm long; pistils 10–20. Collective fruit up to 1.5 cm across (living), fruits growing to 6 by 4.5 mm.

Distribution. Papua New Guinea, New Britain.

Habitat. In forest, forest edges, disturbed places, shrubberies, at altitudes from c. 2400 to 3400 m, rarely collected lower, down to c. 1800 m.

Vernacular names. Momani (Tari), tsiri (Mendi), iki-limbu, igig (Enga).

NEW GUINEA. Papua New Guinea. Western Highl. Prov.: Mt Hagen Dist., *Millar & Holttum NGF 18615; Vinas & Veldkamp LAE 59830*; Kubor Range, *Pullen 5009*; Laiagam, *Flenley ANU 2526*; Wabag Dist., *Hoogland & Schodde 6937*; Kuna, *Streimann & Kairo NGF 27704*; see note 2. – Chimbu Prov.: Gumine, *Millar NGF 38350*. – Eastern Highl. Prov.: Mt Wilhelm, *van Balgooy 424, 891, Borgmann 203, Sayers & Millar NGF 19884*. – Southern Highl. Prov.: Mt Giluwe, *Coode & Wade NGF 32541, Schodde 1896*; Tari Dist., *Frodin NGF 28275, Gillison NGF 25187*, 25195, *Kalkman 4879, 5021, 5038*.

BISMARCK ARCHIPELAGO. New Britain. Mt Lululua, *Stevens & Isles LAE 58450*.

Notes. 1. Three specimens from Western Highlands Province (*Flenley ANU 2526, Hoogland & Schodde 6937, Streimann & Kairo NGF 27704*) are deviating in possessing a dense felt of curly hairs on the entire lower surface of the leaflets. In the New Guinean species of the present subgenus this kind of indumentum is only shown by *R. megacarpus* (p. 339). There is no evidence for a hybrid origin of the three deviating specimens.

2. For the specimen *Borgmann 203* the chromosome number 2n=28 was established by Borgmann, Zeitschr. f. Bot. 52 (1964) 124.

5. Rubus novoguineensis Merr. & Perry

Rubus novoguineensis Merr. & Perry, J. Arnold Arbor. 21 (1940) 183. – *Rubus diclinis* F.Muell. var. *novoguineensis* (Merr. & Perry) P. Royen, Phan. Mon. 2 (1969) 75; Alp. Fl. New Guinea 4 (1983) 2484. – Type: *Brass 4337*, holo in A, iso seen from K and NY.

Scrambling or trailing shrub, branches to 2 m long (one record only). *Stems* densely patently hairy and with few stalked glands (stalks up to 1.5 mm) when young, glabrescent, prickles rather many, curved, up to 2 mm long. Cataphylls several at base of laterals, large, up to 1 cm, sometimes also transitions to normal leaves. *Leaves* palmately 5-foliolate, the first leaves of a branch sometimes 4- or 3-foliolate. Stipules only present in very young leaves, probably not on all, 2, on the petiole, 3–5 mm long, less than 1 mm wide, hairy and sometimes glandular, leaving no scars. Petioles 2.5–5.5 cm, flattened above only at base; petiolules of terminal leaflets 1–2 cm, those of lateral leaflets 0.5–1 cm long; petioles and petiolules sparsely to moderately hairy, with rather many strongly curved prickles and when young also with subsessile glands which disappear almost completely with age. *Blades* elliptic, chartaceous, length/width 1.6–2, terminal ones 3–5 by 2–3 cm, lateral ones slightly smaller; base rounded to slightly cordate, margin serrate with 3–4 glandular teeth per cm, apex rounded. *Leaflets* pinninerved with 6–8 pairs of lateral nerves, terminating in the margin, midrib and nerves impressed above, prominent below, venation transverse, flat and indistinct on either side; upper surface sparsely hairy, mainly on midrib and nerves, lower surface densely (semi-)patently hairy on midrib and nerves when young and with fewer hairs in between, glabrescent, with few prickles on the midrib and when very young with subsessile glands. *Inflorescences* solitary in the axils of existing or fallen leaves, lax, simple racemes of 2–7 flowers, 5–7.5 cm long; a serial bud above the raceme; peduncle 1–2 cm, with a number of empty bracts at

base; pedicels 1.5–4 cm; rachis and pedicels sparsely to more densely hairy, with some to many prickles, with some sessile glands and with few to many stalked glands as on the stems; bracts under the flowers up to 6 by 2 mm, hairy outside, subglabrous inside; bracteoles 2 in basal part of pedicel, as the bracts but smaller. *Flowers* unisexual and plants dioecious (see note 1). *Hypanthium* flat, 3–3.5 mm across, appressedly hairy outside and with many subsessile to stalked glands, sometimes with one prickle. *Sepals* elliptic, 3.5–7 by 3–6 mm, inner ones slightly smaller than outer ones, apex obtuse, entire, outside hairy and glandular as hypanthium, inside densely silky, once the sepals recorded to be purplish. *Petals* few seen, 5–7 by 3.5–7 mm, gradually narrowing to the base, apex rounded to slightly emarginate, hairy on both sides or only inside, pale green to white. *Stamens* 14–20; filaments up to 2.5 mm, with many long patent hairs; anthers up to c. 1 mm, dorsifix, glabrous; staminodes in female flowers only minute excrescences. *Pistils* 17–25 in a compact globe; ovary c. 1.5 mm, densely long patently hairy and with rather many yellow glands on the backside; style 0.8–1 mm, glabrous; pistillodes in male flowers less than 1.5 mm including the less than 0.5 mm long style, densely hairy. *Torus* flat, hairy. *Collective fruit* 1–1.5 cm in diameter when dry, up to 2.5 cm in vivo according to one label, ± globular, the fruits well separated; sepals spreading; fruits 5–7 by 4–4.5 mm; exocarp thick with appressed hairs and on the dorsal side also with some to many stalked glands; endocarp rugose; colour of fruit only once noted, brown.

Distribution. Papua New Guinea, only known from Central Province.

Habitat. In forest on more open places and in forest margins, at altitudes from 3400 to 3680 m.

NEW GUINEA. Papua New Guinea. Central Prov.: Mt Albert Edward, *Brass 4337, Croft & Vinas LAE 61465*; Mt Scratchley, *Stevens & Coode LAE 51476*.

Notes. 1. The sexual segregation situation in this species does not become quite clear from the few specimens collected, with only few flowers on each sheet. Stevens & Coode state on their label *51476* that the plants were dioecious; on the specimen in A there are distinctly female flowers and fruits, but in the L specimen I saw apart from a possibly functionally male flower also a flower with both stamens and ovaries looking functional.

The two other collections are, respectively, probably male (*Croft & Vinas LAE 61465*) and certainly female (*Brass 4337*). Possibly the species is polygamodioecious.

2. The remark on the label of the Stevens & Coode specimen that in female flowers petals are shorter than sepals and in male flowers the reverse, could not be checked for lack of petals.

3. The present species is obviously related to *R. royenii* and because of the glandular indument most distinctly to its var. *ikilimbu*. It has, however, much smaller leaflets and a smaller number of stamens and pistils. The hairy filaments especially separate the species from *R. royenii*.

4. Another close relative is *R. moorei* F. Muell. from Australia, as was already noted on a herbarium label by C.T. White in 1936. *Rubus moorei* was described in Trans. Phil. Inst. Vict. 2 (1858) 67, and based on a specimen collected by C. Moore

at Clarence River, New South Wales (holotype in MEL, isotype seen in K). It has stipulate leaves which are densely hairy below.

The species was later (C.T. White, Proc. Roy. Soc. Queensl. 53, 1942, 215) divided into two formae: forma *sericea* C.T. White (containing the type) and forma *glabra* C.T. White, differing in indumentum of the twigs and leaflets and in flower dimensions. Later authors (Jacobs & Pickard, Plants of New South Wales, 1981, 187–188; Stanley & Ross, Flora S.E. Queensland 1, 1983, 233) suggested that the two taxa should be assigned specific rank. I agree that both taxa are not conspecific and can be distinguished very well. I have, however, not been able to investigate many specimens although D.M. Churchill from MEL was very cooperative in sending me a representative sample. Especially fruiting specimens are scarce. For completeness' sake I include a short diagnosis of typical *R. moorei*.

Rubus moorei F. Muell. (syn. *R. moorei* F. Muell. forma *sericea* C.T. White; possible syn. *R. moorei* F. Muell. var. *leichhardtianus* Domin, see below). Stems densely hairy. Stipules 2, on the petiole, persistent, linear, c. 1 cm long. Blades of leaflets ± elliptic, length/width 1.5–1.8, upper surface shortly appressed-hairy all over, glabrate, lower surface densely covered with patent long hairs. Inflorescences solitary in the leaf axils, usually simple racemes with up to c. 8 flowers, up to c. 6 cm long. Only male flowers seen. Sepals 4–4.5 mm long, hypanthium and base of sepals outside with small prickles. Petals 9 by 5 mm. Stamens 40–45, glabrous. Pistillodes 'invisible'. Collective fruits c. 1 by 1 cm, with c. 35 closely packed fruits, those 4–5 by 3–4 mm, long hairy at apex.

The most obvious differences with *R. novoguineensis* are the glabrous stamens and the absence of glands on the (ovaries and) fruits.

What has been called *R. moorei* var. *leichhardtianus* Domin may have to be included in *R. moorei*. The variety was described in Fedde, Rep. 12 (1913) 133; see also Focke, Bibl. Bot. 83 (1914) 48. I have seen the type (*Leichhardt s.n.* in herb. F. v. Mueller, from 'Creek Brush to Mr. Archer's Station') from MEL and K, and a second specimen from MEL (unknown coll., Lismore Dist., New South Wales) that seems to be ± identical. These specimens differ in some points from the four specimens I have seen of *R. moorei* s.s., but the value of these differences is hard to judge, only male flowers of var. *leichhardtianus* being known to me.

For a discussion on '*R. moorei* forma *glabra*', see note 2 under *R. royenii*, p. 334.

6. Rubus megacarpus P. Royen

Rubus megacarpus P. Royen, Phan. Mon. 2 (1969) 65; Alp. Fl. New Guinea 4 (1983) 2480. – Type: *Brass 30099*, holo in L, iso seen from A, BO, K, NY.

Scrambling, c. 1.5 m high shrub or climbing with up to 10 m long stems, recorded as sparingly branched. *Stems* densely hairy and with many short (to 1.5 mm) curved prickles, bark flaking on older twigs. Lateral shoots with some cataphylls at base. *Leaves* 3-foliolate. Stipules early falling and also on young leaves seemingly not always present, at some distance from the base on the petiole, filiform to linear, 4–6 by 0.1–0.5 mm. Petioles 1.5–5 cm, flattened above, at least at base; petiolules

of the terminal leaflets 5–18 mm, grooved above, petiolules of lateral leaflets 2–6 mm; petioles and petiolules sparsely to densely hairy and with many curved prickles. *Blades* obovate to elliptic, stiff-coriaceous, length/width 1.5–1.9, 3–6 by 2–3 cm, the lateral ones usually narrower than the apical one with length/width up to 2.1; base obtuse to acute, margin shallowly serrate in upper part only, apex rounded to truncate, with or without apiculus. *Leaflets* pinninerved, with 5–7 pairs of lateral nerves, steeply ascending and terminating in the margin, midrib and lateral nerves impressed above, prominent below, venation transverse, flat to slightly impressed above, well pronounced below; upper surface glabrous, lower surface densely woolly all over (dirty white in vivo) and also with appressed straight hairs on midrib and nerves. *Inflorescence* a simple raceme, with up to 5 flowers, often reduced to only the terminal flower, one raceme per leaf axil, racemes up to 12 cm long; rachis stiff, with a number of empty bracts under the flower(s), densely hairy, unarmed; bracts 5–9 by 1.5–3 mm, persistent after anthesis, densely hairy outside, hairs mainly in the middle inside; bracteoles of lateral flowers at base of the up to 4 cm long pedicel, c. 4 by 2 mm. *Flowers* uni- or bisexual, see note 2. *Hypanthium* flat, saucer-shaped, 6–10 mm across, densely hairy outside, glabrous inside except around torus. *Sepals* broadly ovate, outer ones 9–12 by 8–11 mm, inner ones slightly narrower, apex obtuse and apiculate, entire, outside shortly woolly and with appressed hairs, inside shortly woolly, sepals once reported as pale purplish. *Petals* obovate, 13–20 by 8–13 mm, gradually narrowing towards base, apex obtuse and undulate, densely long-hairy in basal half outside and also long-hairy inside, (pinkish or greenish) white. *Stamens* 70–100; filaments up to 10 mm, with scattered long hairs; anthers up to 2 mm long; staminodes in female flower minute. *Pistils* very many (c. 150); ovary c. 1 mm, densely hairy; style up to 3 mm, glabrous; pistillodes in male flower minute. *Torus* high-elevated, densely hairy. *Collective fruit* large, according to field notes up to 5.5 by 4 cm in vivo, in herbarium seen up to 5 by 3 cm, most of the pistils developing, fruits closely packed, sepals appressed to spreading; fruits up to 9 by 7 mm when dry; exocarp still a thick layer when dry, purplish (once reported), densely covered with (in vivo) grey to whitish hairs; endocarp rugose, the pyrene up to 8 by 6 mm.

Distribution. Papua New Guinea, only known from Mt Wilhelm in Chimbu Province.

Habitat. Alpine shrubberies and mossy forest; altitudes from 3500 to 3750 m.

Vernacular name. Bilkanamail.

NEW GUINEA. Papua New Guinea. Chimbu Prov.: Mt Wilhelm, *van Balgooy 165, 340, 514, 883, Borgmann 371, Brass 30099, Vandenberg NGF 39603, Womersley & Osborn NGF 15326.*

Notes. 1. This seemingly very local species is easily recognizable, not only because of the large flowers and large collective fruits, but also because of the steep venation in the leaflets, most of the nerves reaching the margin above the middle. The glossy glabrous upper surface of the leaflets contrasts strongly with the woolly undersurface. The species does not seem to be very closely related to any other of the species in this subgenus.

2. Of the eight collections examined one had a male flower, two had female flowers, the remaining ones had bisexual flowers. The variation within one plant is still unknown: collector's notes on the subject are absent and in herbarium sheets there are always only one or few flowers available for inspection.

3. The fruits are 'palatable' (*Brass 30099*).

INDEX OF SPECIFIC AND INFRASPECIFIC NAMES

Numbers and letters refer to numbers and letters of accepted species and varieties. New names and combinations are in **bold type**. Synonyms are in *italics*.