

STUDIES IN THE CUNONIACEAE. II. THE GENERA CALDCLUVIA, PULLEA, ACSMITHIA, AND SPIRAEANTHEMUM*

R. D. HOOGLAND

Australian National University, Canberra

SUMMARY

A survey is given of the species of these genera:

1. *Caldcluvia* is a genus of 11 species and includes the formerly accepted genera *Ackama*, *Spiraeopsis*, *Betchea*, *Stollaea*, and *Opocunia*. Ten new combinations are proposed to accommodate the species transferred from these genera.

2. The number of species recognised in *Pullea* is reduced to three; a new variety is described.

3. The new genus *Acsmithia* is segregated from *Spiraeanthemum* and comprises 13 species formerly included there and one new species.

4. *Spiraeanthemum* in its reduced circumscription now contains six species, of which one is described here as new and one is accepted to include two subspecies.

INTRODUCTION

The accounts of these genera are preliminary to the treatments which are to appear in the near future in *Flora Malesiana* and *Flore de la Nouvelle Calédonie et Dépendances*. It is hoped that a full account of the Australian *Cunoniaceae* will be published elsewhere and descriptions and other supplementary information will be included there and then. For the Malesian specimens an identification list will be issued in the series published by *Flora Malesiana Foundation*.

CALDCLUVIA D. Don

Caldcluvia D. Don, *Edinb. New Phil. J.* 9 (June 1830) 92; *Endl., Gen. Pl.* (1839) 819; *Benth. & Hook. f., Gen. Pl.* 1 (1865) 652; *Baill., Hist. Pl.* 3 (1871) 378, 450; *Engl. in E. & P., Nat. Pfl. Fam.* 3, 2a (1891) 99; ed. 2, 18a (1928)** 246; *Hutch., Gen. Flow. Pl. Dicot.* 2 (1967) 9. — *Dieterica* Ser. ex DC., *Prodr.* 4 (Sept. 1830) 8. — *Weinmannia* sect. *Dieterica* (DC.) Presl, *Rel. Haenk.* 2 (1831) 50. — Type: *Weinmannia paniculata* Cav. = *Caldcluvia paniculata* (Cav.) D. Don = *Dieterica paniculata* (Cav.) DC.
Ackama A. Cunn., *Ann. Nat. Hist.* 2 (1839) 358; *Endl., Gen. Pl.* (1839) 819; *Benth. & Hook. f., Gen. Pl.* 1 (1865) 653; *Baill., Hist. Pl.* 3 (1871) 380, 452; *Engl. in E. & P., Nat. Pfl. Fam.* 3, 2a (1891) 99; ed. 2, 18a (1928) 244; *Hutch., Gen. Flow. Pl. Dicot.* 2 (1967) 10. — Type: *Ackama rosaefolia* A. Cunn. = *Caldcluvia rosifolia* (A. Cunn.) Hoogl.
Spiraeopsis Miq., *Fl. Ind. Bat.* 1, 1 (1856) 719; *Miq. in De Vriese, Pl. Ind. Bat. Or. Reinw.* (1857) 155; *Benth. & Hook. f., Gen. Pl.* 1 (1865) 653; *Baill., Hist. Pl.* 3 (1871) 380, 452; *Baill., Adansonia* 10 (1871) 152; *Boerl., Handl. Fl. Ned. Ind.* 1, 2 (1890) 443; *Engl. in E. & P., Nat. Pfl. Fam.* 3, 2a (1891) 100; ed. 2, 18a (1928) 244; *Perry, J. Arn. Arb.* 30 (1949) 145; *Hutch., Gen. Flow. Pl. Dicot.* 2 (1967) 11.

* I. The genera *Ceratopetalum*, *Gillbeea*, *Aistopetalum*, and *Calycomis* in *Austral. J. Bot.* 8 (1960) 318–341.

** The families revised by Engler in this volume of the second edition of the *Pflanzenfamilien* were issued as a preprint in 1928; cf. *Diels, Bot. Jahrb.* 64 (1931) 1vi.

- *Dirhynchosia* Blume, Flora 41 (1858) 254; Blume in C. Muell., Walp. Ann. Bot. Syst. 5 (1858) 31 ('*Dichynchosia*'). – Type: *Cunonia celebica* Blume = *Spiraeopsis celebica* (Blume) Miq. = *Dirhynchosia celebica* (Blume) Blume = *Caldcluvia celebica* (Blume) Hoogl.
- Betchea* Schlechter, Bot. Jahrb. 52 (1914) 146; Engl. in E. & P., Nat. Pfl. Fam. ed. 2, 18a (1928) 241; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 10. – Lectotype (Hutch. 1967): *Betchea rufa* Schlechter = *Caldcluvia rufa* (Schlechter) Hoogl.
- Stollaea* Schlechter, Bot. Jahrb. 52 (1914) 154; Engl. in E. & P., Nat. Pfl. Fam. ed. 2, 18a (1928) 244; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 10. – Type: *Stollaea papuana* Schlechter = *Caldcluvia nymanii* (K. Schum.) Hoogl.
- Opocunonia* Schlechter, Bot. Jahrb. 52 (1914) 159; Engl. in E. & P., Nat. Pfl. Fam. ed. 2, 18a (1928) 248; Perry, J. Arn. Arb. 30 (1949) 143; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 11. – Type (lectotype Hutch. 1967): *Opocunonia kaniensis* Schlechter = *Caldcluvia nymanii* (K. Schum.) Hoogl.

The species brought here together in the genus *Caldcluvia* are so similar in their flowers and fruits that their segregation in several genera as hitherto accepted is inconsistent with the level of generic distinctions elsewhere in the *Cunoniaceae*. The most significant characters these species have in common are: valvate sepals; entire petals; apparently obdiplostemonous bisexual flowers; loosely connate carpels separating while dehiscing with a ventral split.

All genera listed here in synonymy were still maintained by Engler (1928) with as key characters: carpel number 3 – 5, occasionally 2, versus 2; leaves trifoliolate or pinnate, versus simple; flowers hermaphrodite, versus unisexual; disk entire, versus 10-lobed; seeds several, acuminate, fusiform, smooth, versus few, sparsely hirsute; fruit capsular, versus indehiscent. Only the species referred to *Betchea* have the larger number of carpels, but they are otherwise very similar to *Spiraeopsis*, in which Perry (1949) included all the species described from New Guinea, and *Ackama*, to which C. T. White (Proc. Roy. Soc. Queensl. 47, 1935: 10) reduced the only species described from Australia. The character of simple or unifoliolate versus compound leaf is of little consequence in the *Cunoniaceae* and both types occur also within the genera *Ceratopetalum*, *Weinmannia*, and *Pancheria*. Unisexual flowers are not found in any of the species concerned, though pronounced proterandry in some does give at times the impression of the presence of unisexual flowers, in particular when, as is frequently the case, the flowers of a single inflorescence or even of the several inflorescences of a branch develop simultaneously. The depth of the incision between the lobes of the disk (the degree of impression of the filaments into the outer edge of the disk) varies a great deal between the species concerned, as it does amongst species brought together in the genus *Weinmannia*. The fleshy, one-seeded fruit ascribed to *Opocunonia* by Schlechter on the authority of Pulle is not further documented anywhere and is clearly erroneous for this species, which is now the most frequently collected one amongst the New Guinea species.

The only valid character remaining is found in the seeds, through which the species formerly referred to *Ackama*, including the one transferred there from *Betchea*, can be contrasted against all others. These species are so strikingly similar in all other characters to those hitherto included in *Spiraeopsis* that their segregation from the other species now brought together here under *Caldcluvia* would clearly be artificial.

In its flower and fruit *Caldcluvia* is similar to *Weinmannia* from which it differs most strikingly in the structure of its inflorescence, this being many-branched paniculate to corymbose. *Weinmannia* has a simple raceme or raceme-like inflorescence or a compound inflorescence consisting of a small number of similar partial inflorescences attached to a short central axis. Other differences between the

two genera are the valvate sepals in *Caldcluvia* as against imbricate ones in *Weinmannia*; predominantly 5-merous flowers in *Caldcluvia* as against predominantly 4-merous ones in *Weinmannia* (in which genus only in New Caledonia and Madagascar species with usually 5-merous flowers are found); and generally narrow-based petals in *Caldcluvia* as against broad-based ones in *Weinmannia*.

Distribution. One species in South America (southern Chile and near its border with Argentina), one in New Zealand (northernmost part of North Island only), two in eastern Australia, one from the Philippines and Celebes through the Moluccas, New Guinea, and the Bismarck Archipelago to the Solomon I., and six in New Guinea, one of which also in New Britain.

KEY TO THE SPECIES OF CALDCLUVIA

- 1a. Ovary 2-celled, at most an occasional flower on the same plant with a 3-celled ovary 2
- b. Ovary 3–5-celled, at most an occasional flower on the same plant with a 2-celled ovary 7
- 2a. Leaves simple (unifoliolate). *South America*. 7. *C. paniculata*
- b. Leaves trifoliolate or pinnate, at most an occasional unifoliolate leaf on the same plant. *SW. Pacific and Malesia*. 3
- 3a. Sepals covered on outside by dense tomentum of multi-radiate stellate hairs or bundles of hairs which completely (except sometimes near apex) conceals underlying surface of sepal 4
- b. Sepals on outside with open tomentum of simple hairs, at most a few close together, generally directed towards apex of sepal, with underlying surface visible in many places (incl. near base), or sepals on outside completely glabrous 5
- 4a. Venation distinctly sunken on upper surface of leaflet; lower side of leaflet without small orbicular gland-like hair clusters. *New Guinea*. 2. *C. brassii*
- b. Venation slightly prominent on upper surface of leaflet; lower side of leaflet (and usually many other parts of plant) with small, orbicular, gland-like hair clusters. *E. Malesia to Solomon I.* 3. *C. celebica*
- 5a. Flowers relatively large (e.g., sepals 1.7–2.8 mm, petals 2.2–3.8 mm, filaments 4.5–9 mm); petals distinctly longer than sepals; each cell of ovary with ~ (c. 40) ovules; fruit with many small glabrous seeds with short terminal wings. *New Guinea*. 6. *C. nymanii*
- b. Flowers relatively small (e.g., sepals 0.9–1.2 mm, petals 0.9–1.3 mm, filaments 0.8–3.5 mm); petals hardly longer than sepals; each cell of ovary with c. 6–14 ovules; fruit with few ellipsoid hirsute seeds. *Australia and New Zealand* 6
- 6a. Leaves (1–)2(–3)-jugate with large (generally 7.5–12 cm long) c. 9–15-nerved leaflets. *Australia*. 8. *C. paniculosa*
- b. Leaves (2–)3–6-jugate, with much smaller (generally c. 2.5–6 cm long) c. 6–11-nerved leaflets. *New Zealand*. 10. *C. rosifolia*
- 7a. Calyx glabrous outside or at most with a few simple hairs; seeds relatively large, ellipsoid, hairy. *Australia*. 1. *C. australiensis*
- b. Calyx stellately hairy outside; seeds small, terminally winged, glabrous. *New Guinea*. 8

- 8a. Leaflets densely velutinous below, the tomentum consisting of a closed underlayer of very short pale hairs from which short stellate hairs emerge; flowers (4- or) 5-carpellate. **5. *C. fulva***
- b. Leaflets fairly densely stellate-hairy, the intervenium mostly clearly visible between hairs, to glabrous below; flowers (3- or) 4-carpellate 9
- 9a. Flowers minute (e.g., sepals *c.* 0.6–0.8 mm long); younger branches and peduncles with tomentum consisting of long (up to 3 mm) simple hairs and/or very short (up to 0.1 mm) stellate hairs, or glabrous **9. *C. papuana***
- b. Flowers small (e.g., sepals *c.* 0.9–1.2 mm long); younger branches and peduncles with \pm dense tomentum consisting of very short or longer (up to 1.0 mm) stellate hairs 10
- 10a. Leaflets fairly large (generally 8–17 by 2.5–8 cm); tomentum on lower side of leaflets with stellate hairs 0.2 mm long or longer, sometimes with some small, orbicular, gland-like hair clusters **11. *C. rufa***
- b. Leaflets fairly small (generally 4–7 by 1.5–3.2 cm); tomentum on lower side of leaflets with stellate hairs up to 0.1 mm long and with some longer simple hairs, and always with conspicuous, small, orbicular, gland-like hair clusters. **4. *C. clemensiae***

1. *Caldcluvia australiensis* (Schlechter) Hoogl., *comb. nov.*

- Betchea australiensis* Schlechter, Bot. Jahrb. 52 (1914) 150. — *Ackama australiensis* (Schlechter) C. T. White, Proc. Roy. Soc. Queensl. 47 (1935) 10. — T y p e : *J. Dallachy s.n.*, northern Queensland, Rockingham Bay (B).
- Ackama muelleri* var. *pleiocarpa* F. Muell., Vict. Natur. 8 (1891) 46. — T y p e : *S. Johnson s.n.*, northern Queensland, Mulgrave River (MEL).
- Ackama quadrivalvis* C. T. White & Francis, Queensl. Dept. Agric. Bot. Bull. 22 (1920) 15. — T y p e : *J. M. Fraser s.n.*, northern Queensland, Atherton Dist. (BRI; iso K, NSW).

Distribution. Australia: northeastern Queensland, found widely on the Atherton Tableland and its eastern slopes and also extending North to the McIlwraith Range and South to the Paluma Range.

Ecology. In rain forests, mainly from *c.* 400 up to 1550 m and mainly in the valleys and along the creeks.

Notes. 1. The type specimen in B is a duplicate distributed from the Melbourne herbarium. As there are in MEL at least three collections by J. Dallachy from different localities and collected on different dates it is impossible to say with certainty that other duplicates in A, BM, BO, BRI, FI, L, M, P, SING, U, W are isotypes, though without doubt most of these are. The only exact locality for a Dallachy specimen is Seaview Range, the mountain range inland from Rockingham Bay; the locality 'Rockingham Bay' can generally not be trusted for Dallachy specimens as this indicates his place of residence rather than a collecting locality.

2. *L. S. Smith 4204* (BRI) is a seedling of a *Cunoniaceae*, probably this species. It differs from mature plants by the hirsuteness of the leaflets, peduncles, branches, and stipules, the distinctly serrate margins of the leaflets, and their rather thinner texture.

2. *Caldcluvia brassii* (Perry) Hoogl., *comb. nov.*

- Spiraeopsis brassii* Perry, J. Arn. Arb. 30 (1949) 147. — T y p e : *L. J. Brass 4852*, southeastern New Guinea, Central Prov., Mt. Tafa (A; iso BO, BRI, NY, US).

Spiraeopsis pubescens Perry, J. Arn. Arb. 30 (1949) 148. — Type: J. & M. S. Clemens 3429, northeastern New Guinea, Morobe Prov., Yoangen trail (A; iso B, G, L).

Distribution. New Guinea: restricted to the eastern half of the island where it is widespread along the central cordillera, in the Sarawaket Range, and on Mt. Bosavi.

Ecology. Often common in lower montane rain forest or in low forest of the transition zone between this and subalpine grassland, also in secondary growth following felling or on old landslide areas, from 1400 to 3300 m altitude.

Note. Perry distinguished *Spiraeopsis brassii* from *S. pubescens* by its leaves being trifoliolate as against 5-foliolate in *S. pubescens*, the slightly larger capsules usually with shorter stellate tomentum, and the minutely papillose seeds. While most specimens seen have either 3-foliolate or 5-foliolate leaves, a few show both on the same branchlet, even sometimes within the same leaf-pair. Generally speaking it appears that 3-foliolate leaves with denser tomentum on the lower side of the leaflets occur at the higher altitudes and in lower, more open forest, whereas 5-foliolate leaves with less dense tomentum on the lower side of the leaflets are found at the lower altitudes and in tall rain forest.

In the species of *Caldcluvia* and other Cunoniaceous genera with a similar dehiscent fruit immature fruits readily open out in the herbarium, thereby giving the impression of maturity. This explains why a wide range of sizes is found amongst dehiscent capsules within the one species. The papillose seed in the type of *Spiraeopsis brassii* represents the mature state of the seed wall. Similar papilli are found in the seeds of *Caldcluvia celebica*. In immature seeds, as in the type of *Spiraeopsis pubescens*, they are not yet developed.

3. *Caldcluvia celebica* (Blume) Hoogl., *comb. nov.*

Cunonia celebica Blume, Bijdr. Fl. Ned. Ind. (1826) 868; DC., Prodr. 4 (1830) 12 (with exclusion of the specimen cited which is *Weinmannia*). — *Spiraeopsis celebica* (Blume) Miq., Fl. Ind. Bat. 1, 1 (1856) 719. — *Dirhynchosis celebica* (Blume) Blume, Flora 41 (1858) 254. — *Dichynchosis celebica* (Blume) Blume in C. Muell., Walp. Ann. Bot. Syst. 5 (1858) 31. — Lectotype: C. G. C. Reinwardt 1549, Celebes, Lukon and Rumangan Mts. (L: 908.239–204; iso U).

Spiraeopsis philippinense Elmer, Leafl. Philip. Bot. 8 (1915) 2826. — Type: A. D. E. Elmer 14157, Philippines, Mindanao, Prov. of Agusan, Cabadbaran (Mt. Urdaneta) (L, lecto; iso A, B, BISH, BM, FI, G, GH, K, NSW, NY, U, US, W, Z).

Spiraeopsis glabrescens Perry, J. Arn. Arb. 30 (1949) 149. — Type: M. S. Clemens 7052A, northeastern New Guinea, Morobe Prov., Sambanga (A; iso B, L).

Betchea spec. (Schlechter 14635 in note under *B. rufa*) Schlechter, Bot. Jahrb. 52 (1914) 149.

Distribution. From the Philippines and Celebes through the Moluccas, New Guinea, New Britain, and New Ireland to the Solomon I. as far as Guadalcanal. In the Philippines in southeastern Luzon, Leyte, Negros, and Mindanao; in the Moluccas in Ternate and Halmahera; in New Guinea widespread in the eastern half of the island but in the western half found only in the Arfak Mountains and near the eastern border of Irian Jaya.

Ecology. The species occurs in both primary forest and secondary growth, sometimes as one of the first woody invaders of secondary grassland. The known altitudinal range throughout is approximately between 500 and 2000 meters, extending to 2800 m in New Guinea and down to 100 m in the Solomon I.

Note. There are three sheets in L which can be identified as being associated with the original description of *Cunonia celebica*. Two of these, under the name

Spiraea arborea R. [cf. Reinw. *ex* Miq. in De Vriese, Pl. Ind. Bat. Or. Reinw. (1857) 156 *pro syn.* and Reinw. (ed. De Vriese) Reis Oostel. Ged. Ind. Arch. (1858) 594, *nom. nud.*], are numbered *Reinwardt 1549* and of these the sheet with the flowering specimens (indicated 'mas'; the flowers are in the young, male flowering stage) has been chosen as the lectotype; the other sheet of *Reinwardt 1549* (indicated 'femina') is in the fruiting stage.

4. *Caldcluvia clemensiae* (Perry) Hoogl., *comb. nov.*

Spiraeopsis clemensiae Perry, J. Arn. Arb. 30 (1949) 149. – **T y p e:** *M. S. Clemens 7568*, northeastern New Guinea, Morobe Prov., Sattelberg area, Masak River (A; iso B '7558').

D i s t r i b u t i o n . Restricted to a fairly small area in northeastern New Guinea.

E c o l o g y . In lower montane forest, as canopy tree or more commonly in second storey, secondary forest, and low mossy forest; between 2100 and 2850 m.

5. *Caldcluvia fulva* (Schlechter) Hoogl., *comb. nov.*

Betchea fulva Schlechter, Bot. Jahrb. 52 (1914) 148. – *Spiraeopsis fulva* (Schlechter) Perry, J. Arn. Arb. 30 (1949) 147. – **T y p e:** *C. Ledermann 12160*, northeastern New Guinea, East Sepik Prov., Schrader Mountain (B).

Betchea aglaiaeformis Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 106, fig. 2. – *Spiraeopsis aglaiaeformis* (Kanehira & Hatusima) Perry, J. Arn. Arb. 30 (1949) 147. – **T y p e:** *R. Kanehira & S. Hatusima 13907*, western New Guinea, Arfak Mountains, Anggi, near Iray, Lake Giji (FU, *n.v.*; iso A).

D i s t r i b u t i o n . Fairly widespread in New Guinea.

E c o l o g y . Mainly in mixed lower montane forest; also in open forest, in secondary growth, and on forest margin; between 1600 and 2900 m.

N o t e . The species is readily distinguished from all others in the genus by the dense pale-fulvous tomentum which completely covers the intervenium on the lower side of the leaflets, and which was referred to by Schlechter and by Kanehira & Hatusima. Their descriptions differ, however, in the significant character of style (carpel) numbers, indicated as 5 for *Betchea aglaiaeformis*, but misleadingly as 3 for *B. fulva*. The flowers of the type specimen of the latter have, like all other specimens of the species, mostly 5, sometimes 4, and only rarely 3 carpels.

6. *Caldcluvia nymanii* (K. Schum.) Hoogl., *comb. nov.*

Ackama nymanii K. Schum. in K. Schum. & Lauterb., Nachtr. Fl. Deut. Schutzgeb. Südsee (1905) 272. – *Opocunonia nymanii* (K. Schum.) Schlechter, Bot. Jahrb. 52 (1914) 159. – **T y p e:** *E. D. A. Nyman 543*, northeastern New Guinea, Morobe Prov., Sattelberg (B).

Stollaea papuana Schlechter, Bot. Jahrb. 52 (1914) 154, fig. 6. – **L e c t o t y p e:** *C. Ledermann 8724*, northeastern New Guinea, East Sepik Prov., April River (B; iso K).

Opocunonia kaniensis Schlechter, Bot. Jahrb. 52 (1914) 160, fig. 8 A–G. – **L e c t o t y p e:** *R. Schlechter 17898*, northeastern New Guinea, Madang Prov., Kani Mountains (B; iso P, UC).

Opocunonia trifoliolata Schlechter, Bot. Jahrb. 52 (1914) 161, fig. 8 H–N. – **T y p e:** *C. Ledermann 12896*, northeastern New Guinea, East Sepik Prov., Fels Spitze (B; iso BM, K, L).

Opocunonia papuana Kanehira & Hatusima, Bot. Mag. Tokyo 56 (1942) 108, fig. 4. – **T y p e:** *R. Kanehira & S. Hatusima 11756*, northwestern New Guinea, Chaban, c. 3 km inward of Nabire (FU, *n.v.*; iso A).

Opocunonia? n. sp.? Schlechter, Bot. Jahrb. 52 (1914) 161.

Distribution. Widespread in New Guinea (except the Vogelkop Peninsula) and New Britain.

Ecology. In lowland and lower montane rain forest from 30 to 2800 m, above 1500 m often one of the major constituents of the forest; also sometimes in secondary forest or in the forest edge and occasionally planted as a roadside or village tree.

Notes. 1. A variable species, mainly in number of leaflet pairs, leaflet size, and nature of tomentum. The flowers are variable in size but otherwise quite uniform in their characteristics; the most variable character apart from size is found in the density of the tomentum on calyx and ovary, but neither has ever been seen to be completely glabrous, and the description by Schlechter of glabrous ovaries in *Opocunonia kaniensis* and *O. trifoliolata* is erroneous.

2. Trifoliolate leaves are not uncommon but often occur on the same specimen and even the same branchlet as bijugate ones. The type of *Opocunonia trifoliolata* has trifoliolate leaves (and an occasional bijugate one) with leaflets of medium size (c. 6 by 2.5 cm). Larger leaflets are found mainly in bi- or trijugate leaves. Particularly small leaflets, such as e.g. those found on some Carr collections from The Gap (southeastern New Guinea, on the boundary of the Central and Northern Districts) at 2100 m, may be associated with exposed habitats.

3. The density of the short strigose tomentum on the branches of the inflorescence and on the calyx varies to some extent. The type of the species is amongst the more extreme strigose-hairy specimens sighted, with the ultimate inflorescence branches completely covered, the outside of the calyx less so but still more than usual. In its vegetative parts the specimen's tomentum is less extreme.

4. An interesting series of specimens from the southern side of the Bismarck Range from the Southern Highlands to near Goroka have a much more hirsute, more dense, and longer tomentum in their branchlets and leaves. These are the only specimens which fall clearly outside the general range of variation and may deserve varietal rank. The flowers are so typically in agreement with those of the other specimens included in the species that I have no hesitation in referring them to *Caldcluvia nymanii*.

5. *Stollaea papuana* was described on the basis of three collections of which I saw *Ledermann 8724* (not quite open flowers) and *7604* (fruits only, though the specimen was reportedly also in flower). *Ledermann 8724*, the lectotype and obviously the basis for Schlechter's fig. 6A, consists of a flowering branch with a particularly rich young inflorescence, such as is found also in other specimens, e.g. *Von Römer 839*, *Brass & Versteegh 12540*, and *NGF 42691*. In both syntypes the leaves are rather more hirsute, with short erect hairs, than usual (as can be seen for petiole and rachis in Schlechter's illustration), though by far not as densely so as in the collections from the Bismarck Range just mentioned. As to tomentum *Hoogland & Craven 11069* from Mt. Hunstein and *Darbyshire & Hoogland 8391* from the Aitape area agree well with these specimens.

6. *Opocunonia papuana* represents a rather small-flowered form well within the variability of the species. *O. kaniensis* is the most usual form of the species, with generally rather sparse tomentum.

7. *Caldcluvia paniculata* (Cav.) D. Don

Weinmannia paniculata Cav., Ic. Descr. Pl. 6 (1801) 44, t. 565; Kunth, Nov. Gen. Sp. Pl. 6 (1823) 41 ed. folio = 49 ed. quarto; Presl, Rel. Haenk. 2 (1831) 50. — *Caldcluvia paniculata* (Cav.) D. Don, Edinb. New Phil. J. 9 (1830) 92; Poepp. & Endl., Nov. Gen. Sp. Pl. 1 (1835) 9, t. 16; Gay, Hist. Fis. Pol. Chile Bot. 3 (1848) 47; Reiche, Fl. Chile 3 (1902) 2; Pampan., Ann. di Bot. 2 (1905) 59; Kunkel, Willdenowia 4 (1968) 340, fig. 5. — *Dieterica paniculata* (Cav.) Ser. ex DC., Prodr. 4 (1830) 8. — T y p e : collector not indicated (? Ruiz & Pavon), 'Habitat ad littora maritima prope urbem Talcahuano in regno Chilense, floretque Februario'. (Née herb. in MA, n.v.).

Weinmannia corymbosa Ruiz & Pavon, Fl. Peruv. Chil. 4 (before 1830) t. 330 fig. b; cf. Anal. Inst. Bot. Cavanilles 12 (1953) 138, t. 330 fig. b. — T y p e : H. Ruiz & J. A. Pavon s.n., Chile, 'Habitat in silvis Conceptionis Chile ad Palomares, Hualpen, Talcahuano, Mochita, Chihuayante locis humidis' (1953 l.c.) (MA, n.v.; iso FI).

Weinmannia chilensis DC., Prodr. 4 (1830) 665. — T y p e : E. Poeppig 109, Chile, Talcahuano (G–DC; iso BM, P, W).

C. paniculata var. *mochaena* Kunkel, Willdenowia 4 (1968) 342, fig. 5. — T y p e : Kunkel M 194, Chile, Isla La Mocha, Cerro Huesto (B).

D i s t r i b u t i o n . Chile, widespread on Chiloe Island and on the mainland from Llanquihue Province to Concepcion, and in Argentina near the Chilean border in the extreme NW. of Chubut, the extreme W. of Rio Negro, and the extreme SW. of Neuquén Provinces.

E c o l o g y . In rain forest and in particular on creek banks or in swamp vegetation, from near sea level to 900 m.

N o t e s . 1. Ruiz & Pavon's vol. 4 was never published as such but separate copies of the plates were distributed at some time before 1830 when *Weinmannia corymbosa* was cited by D. Don in synonymy under *Caldcluvia paniculata*. As the plate of this species includes analytical drawings of both flowers and fruits, this constitutes valid publication under the Code. The text published in 1953 cites *Weinmannia paniculata* Cav. in synonymy.

2. Kunkel's var. *mochaena* represents a small-leaved form of little taxonomic consequence.

8. *Caldcluvia paniculosa* (F. Muell.) Hoogl., *comb. nov.*

Weinmannia paniculosa F. Muell., Fragm. Phytogr. Austral. 2 (1861) 126. — *Weinmannia paniculata* F. Muell., Fragm. Phytogr. Austral. 2 (1860) 83, non Cav. 1801. — *Ackama muelleri* Benth., Fl. Austral. 2 (1864) 444. — *Ackama paniculata* Engl. in E. & P., Nat. Pfl. Fam. 3, 2a (1891) 99. — *Windmannia paniculosa* (F. Muell.) Kuntze, Rev. Gen. Pl. 1 (1891) 228. — *Ackama paniculosa* Beuzeville & C. T. White, Proc. Linn. Soc. New S. Wales 71 (1947) 237, without indication of basionym. — T y p e : H. Beckler s.n., New South Wales North Coast, Cloud's Creek, Clarence River (MEL 532193).

Ackama muelleri var. *hirsuta* Maiden & Betche, Proc. Linn. Soc. New S. Wales 37 (1912) 246. — L e c t o t y p e : J. L. Boorman s.n., New South Wales North Coast, Dorrigo (NSW 40990; iso NSW 40990, BRI 2643).

Ackama mollis Schlechter, Bot. Jahrb. 52 (1914) 66. — T y p e : J. F. Wilcox s.n., New South Wales North Coast, Clarence River (B; iso MEL).

D i s t r i b u t i o n . Australia, northeastern New South Wales N. of Ourimbah (near Gosford) to southeastern Queensland S. of Gympie, mostly E. of the Dividing Range, and an outlying occurrence in the Eungella Range (near Mackay).

E c o l o g y . Common in rain-forest areas, especially along creeks and in secondary growth; also in wet sclerophyll forest, e.g. in *Eucalyptus acmenioides* communities.

Notes. 1. *Ackama muelleri* var. *hirsuta* and *Ackama mollis* represent a hirsute form of the species occurring in the centre of its area, in particular on the Dorrigo plateau. Its taxonomic and ecological significance is still inadequately understood.

2. Trifoliolate leaves are relatively rare; most of the leaves of the type specimen, however, are trifoliolate (9, against one 5-foliolate); 3-jugate leaves are very rare.

9. *Caldcluvia papuana* (Pulle) Hoogl., *comb. nov.*

Ackama papuana Pulle, Nova Guinea 8 (1912) 645. — *Betchea papuana* (Pulle) Schlechter, Bot. Jahrb. 52 (1914) 150; Nova Guinea 12 (1917) 491. — *Spiraeopsis papuana* (Pulle) Perry, J. Arn. Arb. 30 (1949) 150. — Type: L. S. A. M. von Römer 819, southwestern New Guinea, foothills of Hellwig Mountains (U; iso B, L).

Betchea myriantha Schlechter, Bot. Jahrb. 52 (1914) 150. — *Spiraeopsis myriantha* (Schlechter) Perry, J. Arn. Arb. 30 (1949) 150. — Type: C. Ledermann 8469, northeastern New Guinea, East Sepik Prov., Mount Hunstein (B).

Spiraeopsis pometiiformis Ridley, Trans. Linn. Soc. II, Bot. 9 (1916) 37. — Type: C. B. Kloss s.n., southwestern New Guinea, Utakwa River to Mount Carstensz (BM; iso K).

Distribution. Fairly widespread in New Guinea.

Ecology. In lower montane forest, extending down into foothill forests, between 450 and 2350 m; also in secondary forest of the same zone.

Notes. 1. The species is variable in the density of the tomentum in its various parts, and to some extent in the nature of the tomentum where two types, hirsute with single fairly long hairs and short-hirsute with stellately grouped hairs, may occur separately or jointly.

2. Two collections from the Telefomin area, *Kalkman 5316* and *LAE 59576*, stand out because of their particularly long hirsute tomentum in branches, leaves, and inflorescences. They are included here for the time being, but when more material is available to study this species it may be justified to give them separate status at varietal or specific level.

10. *Caldcluvia rosifolia* (A. Cunn.) Hoogl., *comb. nov.*

Ackama rosaefolia A. Cunn., Ann. Nat. Hist. 2 (1839) 358; Hook. f., Fl. Nov. Zel. 1 (1853) 79; Handb. New Zeal. Fl. (1867) 60; Kirk, For. Fl. New Zeal. (1889) 113, t. 63; Stud. Fl. New Zeal. (1899) 139; Cheeseman, Manual New Zeal. Fl. (1906) 137 & ed. 2 (ed. W. Oliv.) (1925) 497; Ill. New Zeal. Fl. (1914) t. 42; Allan, Fl. New Zeal. 1 (1961) 347. — *Weinmannia rosaefolia* [A. Cunn. 1839 *pro syn.*] (A. Cunn.) A. Gray, U. S. Explor. Exped. Bot. Phan. 1 (1854) 671; Atlas (1856) t. 84. — Lectotype (Allan 1961): *A. Cunningham s.n.*, New Zealand, North Island, near Hokianga River (BM).

Distribution. North Island of New Zealand, apparently restricted to the northwestern peninsula N. of c. 36° S latitude.

Ecology. In forests, on forest margins, and on streamsides in lowland up to c. 300 m.

11. *Caldcluvia rufa* (Schlechter) Hoogl., *comb. nov.*

Betchea rufa Schlechter, Bot. Jahrb. 52 (1914) 148, fig. 4 A–G. — *Spiraeopsis rufa* (Schlechter) Perry, J. Arn. Arb. 30 (1949) 147. — Lectotype: R. Schlechter 17780, northeastern New Guinea, Madang Province, Kani Mountains (B; iso K, P, UC; all as 17780a).

Spiraeopsis canariifolia Ridley, Trans. Linn. Soc. II, Bot. 9 (1916) 37. — Lectotype: C. B. Kloss s.n., south-western New Guinea, Utakwa River to Mt. Carstensz, Camp III–VIII, Dec. 12, 1912 (BM; iso K).

Distribution. New Guinea, scattered from Mt. Carstensz eastward.
Ecology. In lower montane forest between 750 and 3100 m; also in secondary forest, particularly at the lower altitudes.

PULLEA Schlechter

Pullea Schlechter, Bot. Jahrb. 52 (1914) 164, fig. 9; Engl. in E. & P., Nat. Pfl. Fam. ed. 2, 18a (1928) 260, fig. 151; Perry, J. Arn. Arb. 30 (1949) 163; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 9. – **Lectotype** (Hutch. 1967): *Pullea mollis* Schlechter.

Distribution. Three species of which one in northeastern Australia, one in northeastern New Guinea, and one throughout New Guinea and in Fiji. The occurrence in the Solomon I. reported by Whitmore, Guide For. Brit. Sol. I. (1966) 59, is erroneous (based on wrongly named specimens of *Spiraeanthemum*).

KEY TO THE SPECIES OF PULLEA

- 1a. Ovary with six ovules per cell. *Australia*. **1. P. stutzeri**
- b. Ovary with four ovules per cell. *New Guinea and Fiji*. **2**
- 2a. Plant generally densely hirsute with up to 0.5 mm long erect hairs. Calyx lobes obtuse at apex **2. P. mollis**
- b. Plant sparsely to moderately densely strigose-hirsute or villose with up to 0.2 (rarely 0.5) mm long \pm appressed hairs. Calyx lobes rounded at apex
3. P. glabra

1. *Pullea stutzeri* (F. Muell.) Gibbs

Callicoma stutzeri F. Muell., Fragm. Phytogr. Austral. 5 (1865) 31. – *P. stutzeri* (F. Muell.) Gibbs, Contr. Arfak Mts. (1917) 142. – *Callicoma stutzeri* f. (vel var.) *subpubescens* Domin, Bibl. Bot. 89 (1925) 155. – **Neotype**: *J. Dallachy s.n.*, northeastern Queensland, Mount Macalister, 3 April 1867 (MEL 532195).

Callicoma stutzeri f. (vel var.) *glabrifolia* Domin, Bibl. Bot. 89 (1925) 155. – **Type**: *K. Domin s.n.*, 'In den Regenwäldern bei Harvey's Creek, 1. 1910' (PR, n.v.).

Distribution. Northeastern Queensland: widespread on the Atherton Tableland and in the lowlands to the East, extending North to Mt. Finnigan and South to Garrawalt in the Seaview Range.

Ecology. In rain-forest areas, commonly in forest edge or on creek or river banks but also inside tall rain forest, from sea level up to 1500 m altitude.

Notes. 1. There are in the Melbourne herbarium a number of Dallachy collections from the Rockingham Bay area, none of which is clearly identifiable with the protologue 'In valli Dalrymple's Gap ad sinum Rockingham's Bay. *Dallachy*.' For this reason I am unable to indicate even a lectotype, and I have chosen as neotype a clearly localised collection made soon after the description of the species.

2. *P. stutzeri* appears to differ consistently from the other species of the genus by the number of ovules per cell. From *P. glabra* as found in New Guinea it differs in having larger, generally clearly crenate leaves in which respect it resembles some specimens of the Fijian *P. perryana*, here included in *P. glabra*.

2. *Pullea mollis* Schlechter

P. mollis Schlechter, Bot. Jahrb. 54 (1912) 165, fig. 9. — Type: *C. Ledermann 11396*, northeastern New Guinea, East Sepik Prov., Mt. Hunstein (B).

Distribution. Only known from Mt. Hunstein and the Garaina area in northeastern New Guinea.

Ecology. In lower montane rain forest from 1300 to 2100 m.

Note. Amongst the New Guinea species described by Schlechter, Perry, and others *P. mollis* stands out by the hirsute tomentum on branches, lower surface of the leaves, hypanthium, and lower side of calyx lobes. In addition the shape of the calyx lobes, these being triangular-ovate, at the base very little narrower than at their maximum width, and with clearly obtuse apex, is quite distinct from that in *P. glabra* where they are elliptical or obovate, at the base distinctly narrower than at their maximum width, and with rounded apex.

3. *Pullea glabra* Schlechter

P. glabra Schlechter, Bot. Jahrb. 52 (1914) 166; Nova Guinea 12 (1917) 492. — Lectotype: *A. A. Pulle 787*, southwestern New Guinea, Mount Hellwig (B; iso B, BO, CANB, K, L).

P. papuana Gibbs, Contr. Arfak Mts. (1917) 141. — Type: *L. S. Gibbs 5576*, western New Guinea, Anggi Lakes, ♀ Lake (BM; iso K, L).

P. decipiens Perry, J. Arn. Arb. 30 (1949) 163. — Type: *Brass & Versteegh 13115*, northwestern New Guinea, Idenburg River, Bernhard Camp (A; iso L, LAE).

P. versteeghii Perry, J. Arn. Arb. 30 (1949) 164. — Type: *Brass & Versteegh 11146*, northwestern New Guinea, Bele River 18 km NE. of Lake Habbema (A; iso L, LAE).

P. clemensiae Perry, J. Arn. Arb. 30 (1949) 165. — Type: *M. S. Clemens 9068*, northeastern New Guinea, Morobe Prov., Samanzing (A; iso L).

P. perryana A. C. Sm., J. Arn. Arb. 33 (1952) 148; Parham, Pl. Fiji Isls. (1964) 78, fig. 32 & ed. 2 (1972) 122, fig. 34; A. C. Sm., Contr. U. S. Nat. Herb. 37 (1967) 71. — Type: *B. H. Tothill 472*, Viti Levu, Suva, Central Road (K; iso BISH, K, US).

Distribution. ? Moluccas (Morotai), throughout New Guinea, and Fiji.

Notes. 1. Characters used by Perry (1949) for the differentiation between species of *Pullea* other than *P. mollis* are often hard to define and become even less clear when the substantial number of additional collections now available are taken into consideration. The descriptions of the two earlier described species, using somewhat different terminology than that used by Perry, have led her to describe two new species where differences were clearly less substantial than she assumed in the absence of the relevant type specimens: *P. versteeghii* Perry is similar to *P. glabra* Schlechter, whereas *P. decipiens* Perry resembles *P. papuana* Gibbs. *P. clemensiae* represents a local variant with particularly dense sericeo-strigose tomentum in its young parts, becoming little distinct when fully developed.

2. The degree of prominence of the reticulate venation is hard to define or measure. In its most pronounced state, found between 1250 and 2400 m altitude in New Guinea, it is usually tied to thickly coriaceous leaves, rounded at apex, and with at most vaguely undulate margin; in an extreme form these leaves become bullate. Less prominent reticulate venation in less thickly coriaceous leaves with obtuse to acute apex and with coarsely crenate margin is generally found between 300 and 1000 m, with intermediates from 750–1500 m altitude.

3. A sterile collection from Morotai in the Moluccas (*Kostermans 1296*) agrees well with New Guinea material of *P. glabra* and is tentatively placed here.

4. I can find no clear differential character to separate the Fijian specimens from the Malesian ones and have consequently placed *P. perryana* A. C. Sm. in synonymy under *P. glabra*. The type specimen has particularly large leaves, larger than any from Malesia, but most later collections from Fiji do not share this character and some, e.g. *A. C. Smith 7613*, fall even within the lower part of the size range amongst their Malesian counterparts.

5. A number of collections from eastern New Guinea are unusual in having their leaves verticillate, in whorls of 3 or 4, rather than opposite. Other characters agree well, even to the extent of repeating much of the variation found amongst specimens with opposite leaves. The occurrence of verticillate and opposite leaves within the one taxon is highly unusual in the *Cunoniaceae* below the genus level, the only other cases known to me being a suspected teratological case in *Acsmithia* and the occurrence in cultivation of occasional branchlets with verticillate leaves in *Ceratopetalum gummiferum* Sm. and *Cunonia capensis* L. However, the similarity of the specimens under consideration and opposite-leaved specimens of *P. glabra* is so striking that their inclusion in this genus and species appears unavoidable. To emphasise the unusual nature of this variation, these specimens are here accepted as representing a distinct variety.

KEY TO THE VARIETIES

Leaves opposite (decussate) **3a. var. glabra**
 Leaves verticillate in alternate whorls of 3 or 4 **3b. var. verticillata**

3a. var. glabra

P. glabra Schlechter – *P. papuana* Gibbs – *P. decipiens* Perry – *P. versteeghii* Perry – *P. clemensiae* Perry – *P. perryana* A. C. Sm.

Distribution. As for the species.

Ecology. In primary forest, often also on creek banks, occasionally in secondary forest; in New Guinea generally between 750 and 2400 m, occasionally in the lowlands down to 50 m (Japan), in Morotai at 1000 m, in Fiji from 200 to 650 m.

3b. var. verticillata Hoogl., *var. nov.*

Differt a var. *glabra* foliis verticillatis verticillis 3- vel 4-foliatis. – **Type:** Pullen 206, northeastern New Guinea, Western Highlands Prov., northern slope of Mt. Olga (L; iso A, B, BM, CANB, K, LAE, US, also sent to [not seen] BISH, BO, BRI, G, MEL, P, PNH).

Distribution. East New Guinea, less widespread than var. *glabra*.

Ecology. In lower montane forest or mossy forest between 1450 and 2700 m, occasionally also in regrowth.

ACSMITHIA Hoogl., *gen. nov.*

Spiraeanthemum A. Gray, Proc. Amer. Acad. Arts Sci. 3 (May 1854) 128; Bot. U. S. Explor. Exped. 1 (June 1854) 666 & Atlas (1856) t. 83 B; Ann. Sci. Nat. Bot. IV, 4 (1855) 176, excluding the lectotype

species, and in the sense of the following authors: C. Muell., Walp. Ann. Bot. Syst. 5 (1858) 23, *p.p.*; Brongn. & Gris, Bull. Soc. Bot. France 9 (1862) 73; Ann. Sci. Nat. Bot. V, 1 (1864) 373; Benth. & Hook. *f.*, Gen. Pl. 1 (1865) 650, *p.p.*; Seem., Fl. Vit. (1865) 110, *p.p.*; Baill., Hist. Pl. 3 (1872) 374, 448; Engl. transl. 3 (1874) 372, 445, *p.p.*; Engl. in E. & P., Nat. Pfl. Fam. 3, 2a (1891) 97, *p.p.*, fig. 55A; F. M. Bail., Queensl. Fl. 2 (1900) 537; Schlechter, Bot. Jahrb. 52 (1914) 139; Engl. in E. & P., Nat. Pfl. Fam. ed. 2, 18a (1928) 237, *p.p.*, fig. 137; Guillaum., Bull. Soc. Bot. France 87 (1941) 245; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138; A. C. Sm., J. Arn. Arb. 33 (1952) 139, *p.p.*; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 8, *p.p.*

Acsmithia Hoogl., gen. nov. ex affinitate *Spiraeanthemi* A. Gray, differt foliis verticillatis, stipulis angustis, floribus hermaphroditicis.

T y p u s : *Acsmithia pulleana* (Schlechter) Hoogl.

The existence of two distinct groups within the genus *Spiraeanthemum* A. Gray was first commented upon by A. C. Smith in his account of the *Cunoniaceae* of Fiji and Samoa in J. Arn. Arb. 33 (1952) 139. The group which includes Smith's lectotype for the genus, *S. samoense* A. Gray, is characterised by opposite leaves and unisexual dioecious flowers, the other group, absent from Samoa and in Fiji represented only by *S. vitiense* A. Gray, by verticillate leaves and hermaphrodite flowers. The other species described from Fiji, the New Hebrides, and the Solomon I., and recently also discovered in New Britain, appear to belong with the first group whereas those described from New Caledonia, Australia, and New Guinea fit in with *S. vitiense*. The consistent combination of these two basically unrelated characters in the manner indicated offers within the context of generic concepts in the *Cunoniaceae* ample justification for the acceptance of generic status for the two groups recognised by A. C. Smith. The as yet unnamed second genus is here named *Acsmithia* to honour A. C. Smith's outstanding contribution to the botany and plant geography of the Pacific Islands.

A similar situation exists in two other Cunoniaceous genera, both endemic to New Caledonia: *Codia* J. R. & G. Forster with opposite leaves and hermaphrodite flowers and *Pancheria* Brongn. & Gris with verticillate leaves and unisexual dioecious flowers. The acceptance of these two genera as distinct has never been challenged. The intrinsic independence of the two characters is further emphasised by the fact that in *Spiraeanthemum sensu stricto* opposite leaves are associated with unisexual dioecious flowers whereas in *Codia* the same leaf character is associated with hermaphrodite flowers, in *Pancheria* verticillate leaves are associated with the same floral characters.

Only in one collection of *Acsmithia verticillata* (Versteegh BW 3004 in L) the presence of some branches with opposite leaves has been observed. In this specimen branching is particularly heavy, and while some of the branches have their leaves verticillate in whorls of 3, others have them clearly opposite (decussate), whereas in a few branches some leaves are only subopposite and without interpetiolar stipules. The excessive branching on the specimen suggests that we may have here a case of teratological modification.

Geographically the two genera overlap only in Fiji where the centre of development of *Spiraeanthemum* (3 species) is found, whereas *Acsmithia* is represented only by one. *Spiraeanthemum* extends eastward with a single species in Samoa and westward through the New Hebrides (one species, in common with the Solomon I. and New Britain) and Solomon I. (2 species) to New Britain (one species) where it approaches within a few hundred kilometers the known occurrence of *Acsmithia* in New Guinea. *Acsmithia* ranges from Fiji through New Caledonia and northeastern

Queensland to New Guinea and the Moluccas, with the greatest concentration of species in New Caledonia (8), followed by New Guinea (4), and with a single species only in the Moluccas (in common with New Guinea), NE. Australia (endemic), and Fiji (endemic).

The number of ovules per carpel was generally found to be constant 1, 2, or 4 within each of the species in New Caledonia and Fiji. These species are, in addition, well defined on relatively minor but notably consistent characteristics of tomentum. In Australia *A. davidsonii* has within the same individual 2, 3, or 4 ovules per carpel. In New Guinea 3 of the 4 species accepted have 2 ovules per carpel and one has 4. The associated tomentum characters are less clear-cut than in the New Caledonian species, especially as concerns *A. integrifolia* and *A. reticulata*, but I have accepted these as distinct species even though the only clear diagnostic character lies in the ovule number. In species with 2 ovules per carpel there is sometimes an occasional carpel with 3, in those with 4 ovules per carpel an occasional one with 3, 5, or rarely 6. All species of *Spiraeanthemum sensu stricto* have 2 ovules per carpel.

KEY TO THE SPECIES OF ACSMITHIA

- 1a. Each carpel with a single ovule only. *New Caledonia, Fiji*. 2
- b. Each carpel with 2–4(–6) ovules. *New Caledonia, Australia, New Guinea* 7
- 2a. Flowering twigs (excluding inflorescence itself) glabrous or nearly so; terminal bud glabrous, rarely somewhat hairy, generally distinctly resinous. *New Caledonia, Fiji*. 3
- b. Flowering twigs fairly densely strigose and hirsute when young; terminal bud densely strigose on lower side of stipules and young leaves, not resinous. *New Caledonia*. 10. *A. pubescens*
- 3a. Leaf-blades decurrent at base almost to the twig, consequently leaves with very short or without wingless petiole. *New Caledonia*. 4
- b. Leaf-blades decurrent at base for short distance only; wingless petiole distinct (at least 5 mm long) 5
- 4a. Leaves *c.* 2–2¹/₂ times as long as wide, rounded to obtuse at apex and base 5. *A. elliptica*
- b. Leaves *c.* 3–4 times as long as wide, ± acute at apex, distinctly so and long-decurrent at base. 9. *A. pedunculata*
- 5a. Leaves *c.* 1¹/₂–2 times as long as wide, rounded to obtuse at apex and base, not or hardly bullate. Venation only slightly prominent below 6
- b. Leaves small to large, *c.* 3.5–18 by 1.2–7.5 cm, *c.* 2–4 times as long as wide, obtuse to acute at apex, acute at base, the smaller ones *c.* 6–8-nerved, the larger ones 8–12(–15)-nerved; coriaceous, often bullate. Venation distinctly prominent below. *New Caledonia*. 4. *A. densiflora*
- 6a. Leaves small, *c.* 4–6(–10) by 2.5–3.5(–5) cm, *c.* 4–6-nerved, coriaceous. *Fiji*. 14. *A. vitiensis*
- b. Leaves larger, *c.* 6–18 by 4.5–11 cm, *c.* (6–)7–9-nerved, papyraceous. *New Caledonia* 2. *A. brongiartiana*
- 7a. Tomentum of twigs dense, relatively long persistent, consisting of *c.* 0.2–0.6 mm long patent hairs. *New Guinea*. 8

- b. Tomentum of twigs dense to open (nearly glabrous), consisting of \pm appressed or very short (less than 0.1 mm) patent hairs. *New Caledonia, Australia, and New Guinea* 9
- 8a. Leaves hirsute on midrib and nerves, the tomentum \pm persistent, below; villose on intervenium, the tomentum evanescent, on both sides. Calyx outside rather sparsely hirsute or strigose-hirsute throughout **11. A. pulleana**
- b. Leaves glabrous or with few usually caducous hairs on midrib and nerves below; intervenium glabrous on both sides. Calyx glabrous or at most very sparsely strigose near base only **8. A. parvifolia**
- 9a. Number of stamens irregular, as many as sepals or one or two more. *New Caledonia* **1. A. austro-caledonica**
- b. Number of stamens twice as many as sepals, at most an occasional flower with one or two more or missing 10
- 10a. Pedicel above articulation as densely hirsute or strigose as below it, or more densely so. Calyx distinctly (though often sparsely) puberulous with 0.1 mm long hairs throughout below. *New Caledonia* **13. A. undulata**
- b. Pedicel above articulation distinctly less hairy than below it, generally glabrous or nearly so. Calyx glabrous below or with very few strigose hairs near base only 11
- 11a. Number of ovules per carpel variously 2, 3, or 4 in the same plant. *Australia* **3. A. davidsonii**
- b. Number of ovules per carpel nearly consistently 2 (then only an occasional carpel with 3) or 4 (then only an occasional carpel with 3, 5, or rarely 6 ovules) 12
- 12a. Number of ovules per carpel nearly consistently 2. *New Guinea* **12. A. reticulata**
- b. Number of ovules per carpel nearly consistently 4 13
- 13a. Petiole 3–10(–13) mm long. Carpels 2–4, usually 3. *New Guinea* **6. A. integrifolia**
- b. Petiole 15–20 mm long. Carpels 4 or 5. *New Caledonia*. **7. A. laxiflora**

1. *Acsmithia austro-caledonica* (Brongn. & Gris) Hoogl., *comb. nov.*

Spiraeanthemum austro-caledonicum Brongn. & Gris, Bull. Soc. Bot. France 9 (1862) 74; Ann. Sci. Nat. Bot. V, 1 (1864) 374; C. Muell., Walp. Ann. Bot. Syst. 7 (1868) 910 (*sphalm.: caledonicum*); Pampan., Ann. di Bot. 2 (1905) 51; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138, *p.p.*; Bull. Soc. Bot. France 87 (1941) 245; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138. — *A. austro-caledonica* Hoogl. *ex* Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 39, invalid name (genus not previously published), *p.p.* — T y p e : *E. Vieillard 568*, New Caledonia, mountains near Balade (P; iso BM, G, K, P).

Spiraeanthemum austro-caledonicum var. *pauciflorum* Brongn. & Gris, Bull. Soc. Bot. France 9 (1862) 74; Ann. Sci. Nat. Bot. V, 1 (1864) 374; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138. — T y p e : *E. Vieillard 578*, New Caledonia, Mt. Poila (P).

D i s t r i b u t i o n . New Caledonia.

2. *Acsmithia brongniartiana* (Schlechter) Hoogl., *comb. nov.*

Spiraeanthemum vitiense var. *macrophyllum* Brongn. & Gris, Bull. Soc. Bot. France 9 (1862) 73; Ann. Sci. Nat. Bot. V, 1 (1864) 373; Pampan., Ann. di Bot. 2 (1905) 50; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 139. — *Spiraeanthemum brongniartianum* Schlechter, Bot. Jahrb. 40, Beibl. 92 (1908) 25; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 286; Bull. Soc. Bot. France 87 (1940) 245; Fl. Anal.

Syn. Nouv.-Caléd. (1948) 139. — *A. brongniartiana* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 39, invalid name. — Lectotype: *E. Vieillard 341*, New Caledonia, Diaoué (P; iso A).

Distribution. New Caledonia.

3. *Acsmithia davidsonii* (F. Muell.) Hoogl., *comb. nov.*

Spiraeanthemum davidsonii F. Muell., Australas. J. Pharm. 2 (1887) 85; Bot. Centralbl. 30 (1887) 355; F. M. Bail., Syn. Queensl. Fl. Sec. Suppl. (1888) 23; Queensl. Fl. (2) (1900) 537; Hyland, Key Common Rain For. Trees Townsville Cooktown (1971) 86. — Lectotype: *W. A. Sayer & A. Davidson 20 B.K.*, northeastern Queensland, Mt. Bellenden-Ker (MEL 1010525).

Distribution. NE. Queensland: Atherton Tableland from near Millaa Millaa N. to Mt. Spurgeon, and lowlands to the East.

Ecology. In rain forest, from near sea level up to c. 1550 m (summit area of Mt. Bellenden Ker).

Note. There are in the Melbourne herbarium eight sheets of specimens collected by Sayer or Sayer & Davidson on Mt. Bellenden Ker in January 1887. Of the three numbered Sayer & Davidson collections the only flowering one has been indicated as lectotype; both other numbered collections are in fruit.

4. *Acsmithia densiflora* (Brongn. & Gris) Hoogl., *comb. nov.* — Fig. 1.

Spiraeanthemum densiflorum Brongn. & Gris, Bull. Soc. Bot. France 9 (1862) 74; Ann. Sci. Nat. Bot. V, 1 (1864) 374; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138; Bull. Soc. Bot. France 87 (1941) 246; Fl. Anal. Syn. Nouv.-Caléd. (1948) 139. — *A. densiflora* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 39, invalid name. — Type: *E. Vieillard 566*, New Caledonia, mountains near Balade (P).

Spiraeanthemum vitiense auct. non A. Gray: Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 139, *p.p.* (mostly).

Spiraeanthemum rubescens auct. non Bak. f.: Guillaum., Bull. Soc. Bot. France 87 (1941) 245; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138, etc. — *A. rubescens* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 40, invalid name, as to collections cited.

Spiraeanthemum pedunculatum auct. non Schlechter: Guillaum., Bull. Soc. Bot. France 87 (1941) 245, as to specimens.

Spiraeanthemum comptonii auct. non Bak. f.: Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 8 (1959) 141.

Distribution. New Caledonia.

5. *Acsmithia elliptica* (Pampan.) Hoogl., *comb. nov.*

Spiraeanthemum ellipticum Vieill. ex Pampan., Ann. di Bot. 2 (1905) 50; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138; Bull. Soc. Bot. France 87 (1941) 245; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138. — *A. elliptica* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 40, invalid name. — Type: *E. Vieillard 2643*, New Caledonia, Hianguen (G-DC, lecto; iso A, BM, G-BOIS, GH, K, L, MEL, NY, P, Z).

Distribution. New Caledonia.

6. *Acsmithia integrifolia* (Pulle) Hoogl., *comb. nov.*

Spiraeanthemum integrifolium Pulle, Nova Guinea 8 (1912) 646. — Lectotype: *L. S. A. M. von Römer 936*, southwestern New Guinea, foothills of Hellwig Mts. (L; iso BO).



Fig. 1. *Acsmithia densiflora* (Brongn. & Gris) Hoogl. — Habit, $\times \frac{1}{2}$; flower details, $\times 3$; detail of lower side of leaf, $\times 1\frac{1}{4}$.

Spiraeanthemum lanceolatum Perry, J. Arn. Arb. 30 (1949) 142. — Type: *L. J. Brass 13615*, north-western New Guinea, Idenburg River, Bernhard Camp (A; iso BRI, L).

Distribution. Moluccas and western New Guinea.

Ecology. In lowland and lower montane rain forest, in the undergrowth, or in the canopy of mossy forest, from 150 to 2200 m.

7. *Acsmithia laxiflora* Hoogl., *spec. nov.*

A. austro-caledonica auct. non (Brongn. & Gris) Hoogl.: Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 39, as to the specimen *Hürlimann 1783*.

Species nova *A. undulatae* proxima, differt ramulis et inflorescentiis sparsim et decidue strigosis, sepalis glabris, et foliis majoribus et latoribus. — Type: *H. Hürlimann 1783*, New Caledonia, Route de Gomen above Oubatche (Z; iso A, NY, P).

Distribution. New Caledonia, only known from the type specimen.

Ecology. In secondary vegetation affected by fire, on gneissic soil at 450 m altitude, flowering in August.

Notes. 1. This specimen differs from *A. undulata*, the only other species from New Caledonia known sofar with 4 ovules to each carpel, in the much sparser and deciduous tomentum of \pm appressed hairs (patent in *A. undulata*) on the branches and in the inflorescence, and the glabrous calyx lobes. In view of the significance of these characters, because of their uniformity in all known New Caledonian species of the genus, the specimen must be regarded as representing an as yet undescribed species. The epithet *laxiflora* has been chosen because of the for the genus unusually open inflorescence. The lax appearance of the inflorescence is further enhanced by the relatively narrow sepals and long stamens.

2. From *A. austro-caledonica* the species is distinguished by the number of ovules (2 in *austro-caledonica*), by the strictly diplostemonous androecium (number of stamens irregular in *austro-caledonica*), by the larger leaves, and by the same characters of tomentum which distinguish it from *A. undulata*.

8. *Acsmithia parvifolia* (Schlechter) Hoogl., *comb. nov.*

Spiraeanthemum parvifolium Schlechter, Bot. Jahrb. 52 (1914) 140, fig. 1 A–E; Steen., Bull. Jard. Bot. Buitenz. III, 13 (1934) 196 (*sphalm.: parviflorum*). — Type: *C. Ledermann 12761*, northeastern New Guinea, East Sepik Prov., Felsspitze (B).

Distribution. New Guinea, scattered from the Arfak Mts. to Mt. Simpson.

Ecology. In primary and disturbed forests and on forest edges between 500 and 2000 m.

9. *Acsmithia pedunculata* (Schlechter) Hoogl., *comb. nov.*

Spiraeanthemum pedunculatum Schlechter, Bot. Jahrb. 40, Beibl. 92 (1908) 25; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138; Bull. Soc. Bot. France 87 (1941) 246; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138. — *A. pedunculata* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 40, invalid name. — Type: *A. Le Rat 268A*, New Caledonia, southern part (B).

Spiraeanthemum comptonii Bak. f., J. Linn. Soc. Bot. 45 (1921) 305; Guillaum., Bull. Soc. Bot. France 87 (1941) 246; Fl. Anal. Syn. Nouv.-Caléd. (1948) 138. — T y p e : *R. H. Compton 353*, New Caledonia: Plaine des Lacs (BM).

D i s t r i b u t i o n . New Caledonia.

10. *Acsmithia pubescens* (Pampan.) Hoogl., *comb. nov.*

Spiraeanthemum pubescens Pampan., Ann. di Bot. 2 (1905) 50; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138; Bull. Soc. Bot. France 87 (1941) 245; Fl. Anal. Syn. Nouv.-Caléd. (1948) 139. — *A. pubescens* Hoogl. ex Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 40, invalid name. — L e c t o t y p e : *Deplanche 374* (Pampan. 1905 *sphalm.* 376), New Caledonia, high valleys of Pouébo (G-DC; iso BM, K, P, W).

Spiraeanthemum rubescens Bak. f., J. Linn. Soc. Bot. 45 (1921) 305. — *A. rubescens* Guillaum., Mém. Mus. Nat. Hist. Nat. n.s. Bot. 15 (1964) 40, invalid name, as to synonym only. — T y p e : *R. H. Compton 735*, New Caledonia, Mt. Koghi (BM).

Spiraeanthemum austro-caledonicum auct. non Brong. & Gris: Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138, *p.p.*

D i s t r i b u t i o n . New Caledonia.

11. *Acsmithia pulleana* (Schlechter) Hoogl., *comb. nov.*

Spiraeanthemum pulleanum Schlechter, Bot. Jahrb. 52 (1914) 140; Nova Guinea 12 (1917) 491, t. 191. — T y p e : *K. Gjellerup 1214*, western New Guinea, Arfak Mts., Anggi Lake (B; iso BO, L, U).

Spiraeanthemum bullatum Gibbs, Contr. Arfak Mts. (1917) 142. — T y p e : *L. S. Gibbs 5543*, western New Guinea, Arfak Mts., Anggi Lakes (BM; iso K).

D i s t r i b u t i o n . New Guinea, scattered from the Vogelkop Peninsula to Mt. Albert Edward.

E c o l o g y . In various vegetation types from 700 to 2650 m altitude.

N o t e s . 1. The types and all subsequent collections from the Anggi Lakes area, Arfak Mountains, have deeply bullate, rather small leaves. Specimens from the nearby Nettoti Range, collected between 1800 and 1950 m, have similar leaves, but those from the Kebar Valley S. of the Nettoti Range, collected between 700 and 900 m, have slightly larger non-bullate leaves. The specimens from Bernhard Camp, Idenburg River, collected between 1780 and 1800 m and cited by Perry (J. Arn. Arb. 30, 1949: 141) are intermediate in size and only slightly bullate. Some of the collections from eastern New Guinea agree well with these specimens but one is clearly distinct in having leaves substantially larger than usual (*Street & Manner 174*, Jimi Valley, at 1600 m). This is included here on the basis of the diagnostic characters of the species, but when more collections are available it may prove to be recognisable as a distinct taxon.

2. In two collections from the Arfak Mountains (*Sleumer & Vink BW 14175 & 14233*) nearly all the flowers of the inflorescences seen are sterile through chloranthly with only a few flowers normally developed in flower or fruit.

3. *Foreman & Wardle NGF 45571* is aberrant in having particularly small leaves (c. 1–2 by 0.8–1.5 cm, with only 3 or 4 pairs of nerves) with the tomentum less dense than usual for the species. The tomentum on the lower side of the sepals agrees well with that generally occurring in the species and the sepals are not glabrous as in

A. parvifolia, to which species the collection is more similar in its leaves. When more material is available this specimen too may prove to represent a distinct taxon.

12. *Acsmithia reticulata* (Schlechter) Hoogl., *comb. nov.*

Spiraeanthemum reticulatum Schlechter, Bot. Jahrb. 52 (1914) 140, fig. 1 F–K. — Type: *C. Ledermann 10941*, north-eastern New Guinea, East Sepik Prov., Mt. Hunstein (B).

Spiraeanthemum idenburgense Perry, J. Arn. Arb. 30 (1949) 141. — Type: *L. J. Brass & C. Versteegh 11938*, northwestern New Guinea, Idenburg River, 15 km SW. of Bernhard Camp (A; iso BM, K, L, LAE).

Spiraeanthemum novoguineense Perry, J. Arn. Arb. 30 (1949) 142. — Type: *L. J. Brass 11860*, northwestern New Guinea, Idenburg River, 15 km SW. of Bernhard Camp (A; iso BM, L, LAE).

Distribution. New Guinea, scattered from the Wissel Lakes area to Misima I. in the Louisiade Archipelago.

Ecology. Lower montane rain forest and low mossy forest between 900 and 2500 m; in Misima I. in lowland rain forest at 350 m.

Notes. 1. The type of *Spiraeanthemum reticulatum* is a small-leaved specimen in fruit with richly developed infructescences with fairly densely hirsute peduncle and branches. The venation is rather more distinctly prominent below than in most other collections. The number of ovules per carpel is 2, not 4 as indicated by Schlechter, and generally only one of these develops into a mature seed. The carpels have a rather open tomentum of rather thin appressed hairs, *c.* 0.25 mm long. *Hoogland & Craven 10991*, from the type locality, agrees well with the type in all aspects mentioned.

2. Vegetatively *Brass 12693* is a similar specimen, as already indicated by Perry, who included it in the present species (J. Arn. Arb. 30, 1949: 141), but the number of ovules per carpel is here 4 and the tomentum on the carpels is much denser. Because of the ovule number, this collection is presently included in *A. integrifolia*.

3. The type and paratypes of *Spiraeanthemum novoguineense* have larger leaves and relatively few-flowered inflorescences with fairly sparsely hirsute peduncle and branches. These collections have 2, rarely 3, ovules per carpel, of which generally only one develops into a seed. The carpels are almost glabrous, with the few hairs present found near the suture. *Brass 27417* is more similar to the type of *Spiraeanthemum reticulatum* in having leaves intermediate in size and many-flowered inflorescences. *Versteegh BW 3004* has small broad leaves (some nearly orbicular), fairly rich inflorescences with rather sparsely hirsute peduncle and branches, and fairly open tomentum on the carpels. *Eyma 4456*, like *BW 3004* collected in the Wissel Lakes area, is similar except for having dense tomentum on the carpels.

4. The type of *Spiraeanthemum idenburgense* is a large-leaved specimen with ample inflorescence, not essentially different from *BW 3004*. The leaves of the holotype in A are particularly large; in the isotypes leaf size is already much closer to the usual size in the species.

5. With this degree of variation and the relatively small number of collections available it is impossible to arrange these into a number of \pm clearly defined taxa. When more ample material becomes available, and with critical study at the population level, it may be possible to evaluate the variability and the significance of ovule number more clearly. For the time being the acceptance of two variable species, *A. integrifolia* with 4 and *A. reticulata* with 2 ovules per carpel, appears to be the most satisfactory arrangement.

13. *Acsmithia undulata* (Vieill.) Hoogl., *comb. nov.*

Spiraeanthemum undulatum Vieill., Bull. Soc. Linn. Normandie 9 (1865) 342; Guillaum., Ann. Mus. Col. Marseille II, 9 (1911) 138; Bull. Soc. Bot. France 87 (1941) 246; Fl. Anal. Syn. Nouv.-Caléd. (1948) 139. — **T y p e**: *E. Vieillard 2078*, New Caledonia, near Wogap, on river banks (CN, *n.v.*; iso A, B, BM, FI, G, GH, K, L, MEL, NSW, NY, P, UC, W, Z).

D i s t r i b u t i o n. New Caledonia.

14. *Acsmithia vitiensis* (A. Gray) Hoogl., *comb. nov.*

Spiraeanthemum vitiense A. Gray, Proc. Amer. Acad. Arts Sci. 3 (May 1854) 128; Bot. U. S. Explor. Exped. 1 (June 1854) 669; Atlas (1856) t. 83 B; Ann. Sci. Nat. Bot. IV, 4 (1855) 177; Seem., Fl. Vit. (1865) 111; A. C. Sm., J. Arn. Arb. 33 (1952) 140; Parham, Pl. Fiji Isls. (1964) 82; ed. 2 (1972) 122. — **T y p e**: *U. S. Exploring Expedition*, Fiji Islands, at Sandalwood Bay, Vanua-Levu & Muthuata (lecto A. C. Sm. 1952: US 47621; iso B, GH, K, NY, P).

D i s t r i b u t i o n. Fiji Islands: Viti Levu, Vanua Levu, and Ovalau.
E c o l o g y. Rain forest from 250 to 1200 m altitude.

SPIRAEANTHEMUM A. Gray

Spiraeanthemum A. Gray, Proc. Amer. Acad. Arts Sci. 3 (May 1854) 128; Bot. U. S. Explor. Exped. 1 (June 1854) 666; Atlas (1856) t. 83 A; Ann. Sci. Nat. Bot. IV, 4 (1855) 176, *p.p.*, as to the lectotype species; C. Muell., Walp. Ann. Bot. Syst. 5 (1858) 23, *p.p.*; Benth. & Hook. *f.*, Gen. Pl. 1 (1865) 650, *p.p.*; Seem., Fl. Vit. (1865) 110, *p.p.*; Baill., Hist. Pl. 3 (1872) 374, 448, *p.p.*; Engl. transl. 3 (1874) 372, 445, *p.p.*; Engl. in E. & P., Nat. Pl. Fam. 3, 2a (1891) 97, *p.p.*; ed. 2, 18a (1928) 237, *p.p.*; A. C. Sm., J. Arn. Arb. 33 (1952) 139, *p.p.*; Hutch., Gen. Flow. Pl. Dicot. 2 (1967) 8, *p.p.* — **L e c t o t y p e** (A. C. Sm. 1952): *Spiraeanthemum samoense* A. Gray.

After the exclusion of those now referred to *Acsmithia* Hoogl. (see above) the number of species of the genus accepted here amounts to six. Four of these were extensively treated by A. C. Smith in his account of the *Cunoniaceae* of Fiji and Samoa (1952). One species has been described from the New Hebrides and to this I have attached as subspecifically distinct the species previously described from the Solomon I., which also occurs in New Britain. A sixth species is here described as new, known only from Bougainville in the Solomon I. Finally, one collection from New Britain that cannot be placed satisfactorily in the known taxa may represent another new taxon, which is not named here in view of the inadequate material available (cf. the note under *S. macgillivrayi*).

As here construed, *Spiraeanthemum* includes one species in Samoa, three in Fiji, one in the New Hebrides, Solomon I. and New Britain, and one endemic to Bougainville I. Excellent descriptions of the Fijian species are found in A. C. Smith (1952) and a description of the species reaching Malesia in New Britain will appear in Flora Malesiana. The following enumeration should be read in conjunction with these two publications.

ENUMERATION OF THE SPECIES**1. *Spiraeanthemum bougainvillense* Hoogl., *spec. nov.***

A speciebus notis differt tomento dense hirsuto vel strigoso-hirsuto diu persistenti ramulorum, stipularum (in superficiebus ambabus), petiolorum, et ramularum inflorescentiarum. — **T y p e**: *R. Schodde (& L. A. Craven) 3768*, Solomon I., Bougainville, lower slope of Lake Loloru crater, c. 28 km N.

of Buin at 780 m (CANB; iso sent after study to A, BISH, BRI, E, G, K, L, LAE, MEL, P, TNS, US).
 Paratypes: *M. M. Cole* 107, *L. A. Craven* (& *R. Schodde*) 127, *R. Schodde* (& *L. A. Craven*) 3850, *Kajewski* 2082.

Tree up to *c.* 30 m tall, 90 cm diam. *Branches* ± densely hirsute with *c.* 0.4–0.8 mm long, erect, long-persistent hairs. *Leaves* elliptic to ovate, *c.* 8–16 by 5–9 cm, 12–16-nerved, at apex broadly acute, mostly short-acuminate, at base obtuse, very short decurrent, with shallowly serrate margin; ± densely short hirsute on midrib, less densely so on nerves, sparsely so to glabrous on intervenium above and below. *Petiole* 18–32 mm. *Stipules* broad-ovate, up to 10 by 9 mm, densely strigose-hirsute with hairs to *c.* 0.8 mm long on both sides. *Inflorescences* up to 14 by 10 cm, up to *c.* 500-flowered; peduncle and branches densely strigose-hirsute (hairs to *c.* 0.5 mm). *Flowers* with distinctly articulated 0.5–2.0 mm long pedicel sparsely hirsute above articulation. *Calyx* 1.3–2.2 mm long, glabrous or at most with a few hairs near base; lobes ovate, 0.6–1.2 mm wide, broad-acute. *Stamens* in ♂ flowers with 2.8–3.2 mm long filament and anther *c.* 0.3 by 0.4 by 0.2 mm. *Disk* lobes in ♂ flowers 0.8 mm long, 0.25 mm wide at base, 0.3–0.4 mm at apex, with many stiff hairs up to 0.7 mm long in apical area and along adaxial ridge; in ♀ flowers 0.5–0.7 mm long, 0.2–0.3 mm wide at base, 0.3–0.5 mm at apex, glabrous or with few short (to 0.3 mm) stiff hairs at apical edge. *Ovary* 2–5-, usually 4-celled; carpels *c.* 0.8–1.2 by 0.3–0.4 mm, strigose-hirsute with up to 0.4 mm long hairs, style 0.5–1.0 mm long. *Follicles* elliptic-obovoid, *c.* 2.5–3.0 by 0.7–0.8 mm; seeds ellipsoid, *c.* 1.0 by 0.3 mm, with terminal wings 0.5–1.0 mm long.

Distribution. Solomon I.: known only from Bougainville.

Ecology. Lower montane rain forest between 700 and 950 m altitude.

Notes. 1. In *Spiraeanthemum* as in its segregate *Acsmithia* (at least as far as the non-Malesian species are concerned) the species are mostly characterised by the nature of the tomentum which appears to be homogeneous within and clearly distinguishable between the species. It is mainly on the basis of this character that the present species is separated from the only other species found in the Solomon I. (including Bougainville), *S. macgillivrayi*. This situation is quite comparable to that in the Fijian I. where the three species accepted by A. C. Smith differ primarily in tomentum but show relatively insignificant differences in floral parts.

2. The suggestion by Perry that *Kajewski* 2082, included in her new species *S. kajewskii* (J. Arn. Arb. 30, 1949: 139), was taken from new growth is in no way supported by any field annotation of that or any subsequent collection. New growth may differ in leaf size and texture and also in the nature of the leaf margin, but not in the nature of the tomentum.

2. *Spiraeanthemum graeffei* Seem.

S. graeffei Seem., Fl. Vit. (1866) 111; Gibbs, J. Linn. Soc. Bot. 39 (1909) 145; A. C. Sm., J. Arn. Arb. 33 (1952) 141; Parham, Pl. Fiji Isls. (1964) 81; ed. 2 (1972) 122. — Type: *E. Graeffe* 16, *p.p.*, Fiji I., Buke Levu, Ka(n)davu (BM; ?iso K, W).

Distribution. Fiji I., recorded from Viti Levu, Kandavu, and Vanua Levu.

Ecology. In dense forest or forest clearings from 500 to 1200 m.

3. *Spiraeanthemum katakata* Seem. — Fig. 2.

- S. katakata* Seem. [in A. Gray, *Bonplandia* 10 (1862) 36, *nom. nud.*], *Fl. Vit.* (1866) 111, t. 17; A. C. Sm., *J. Arn. Arb.* 33 (1952) 144; Parham, *Pl. Fiji Isls.* (1964) 82, fig. 33; ed. 2 (1972) 122, fig. 35. — *T y p e*: *B. Seemann 196*, Fiji I., Ka(n)davu (BM; iso B, G, GH, K, MEL, P, W).
S. parksii Gillespie, *Bishop Mus. Bull.* 83 (1930) 10, fig. 10. — *T y p e*: *H. E. Parks 20725*, Fiji I., Viti Levu, Tholo North Prov., Nandarivatu (BISH; iso UC).
S. vitiense auct. non A. Gray: Seem., *Bonplandia* 9 (1861) 256; A Gray, *Proc. Amer. Acad. Arts Sci.* 5 (1862) 318; *Bonplandia* 10 (1862) 36.
S. samoense auct. non A. Gray: Gibbs, *J. Linn. Soc. Bot.* 39 (1909) 145.

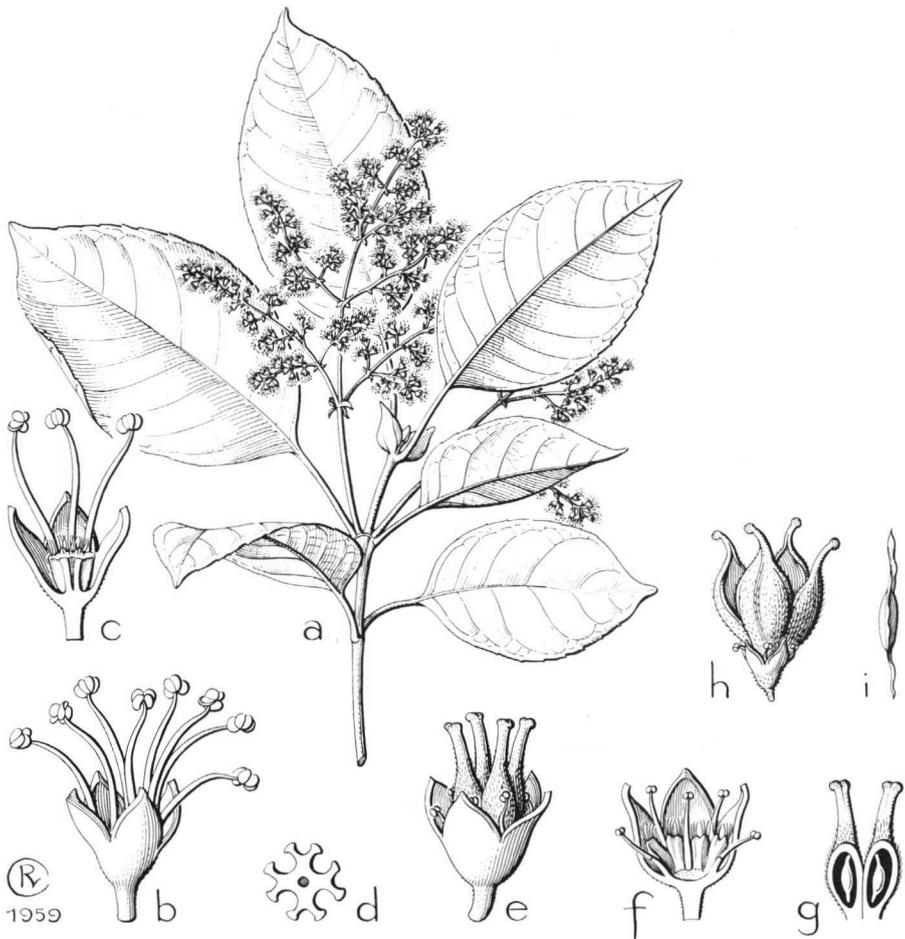


Fig. 2. *Spiraeanthemum katakata* Seem. — a. Habit, $\times 0.6$; b. δ flower, $\times 9$; c. the same in longitudinal section, $\times 9$; d. the same, cross section of disc, $\times 15$; e. f flower, $\times 9$; f. the same in longitudinal section, the pistil removed, $\times 9$; g. the pistil in longitudinal section, $\times 9$; h. fruit, $\times 6$; i. seed, $\times 9$. (a: *R. A. Sykes 313*; b–d: *Greenwood 1220*; e–g: *A. C. Smith 4192*; h, i: *A. C. Smith 4409*.)

Distribution. Fiji I., recorded from Viti Levu, Kandavu (?), cf. A. C. Sm. 1952), Ovalau, Vanua Levu.

Ecology. In a wide range of habitats between 100 and 1200 m altitude.

4. *Spiracanthemum macgillivrayi* Seem.

S. macgillivrayi Seem., Fl. Vit. (1866) 111; Guillaum., Ann. Mus. Col. Marseille VI, 5/6 (1948) 24. – Type: J. McGillivray 59, New Hebrides, Aneityum (BM; iso G, P).

S. ruei Guillaum., Bull. Mus. Nat. Hist. Nat. II, 9 (1937) 286; Ann. Mus. Col. Marseille VI, 5/6 (1948) 24 – Lectotype: E. Aubert De La Rüe s.n., New Hebrides, Ambrym, grand plateau autour du Mont Marum, 650–700 m (P; syntypes A, BM, L, NY, P).

S. kajewskii Perry, J. Arn. Arb. 30 (1949) 139. – Type: S. F. Kajewski 1700, Solomon I., Bougainville, Kupei Gold Field (A; iso BISH, BM, BO, BRI, G, L, P).

Pullea spec. Whitm., Guide For. Brit. Sol. Isls. (1966) 59, 137, 198.

Distribution. New Hebrides, Solomon I., and Bismarck Archipelago (New Britain).

Note. The specimens from the Solomon I. and New Britain differ from those from the New Hebrides in the number of lateral nerves and in the distinctly narrower leaves. The differences are relatively minor but in view of the geographical isolation justify the acceptance of the two entities as subspecies. The following table summarises the differences:

	subsp. <i>macgillivrayi</i>	subsp. <i>kajewskii</i>
length of petiole in mm	(8–)15–30(–35)	10–25(–30)
number of nerves	(5–)7–9(–10)	(7–)10–14(–16)
length of blade in cm	(2.5–)5–11(–13)	(4.5–)6–13(–15)
width of blade in cm	(1.5–)2.5–6(–7)	(2–)2.5–5.5(–6.5)
length/width ratio	$\pm 1^{3/4}$	$\pm 2^{1/4}$

4a. subsp. *macgillivrayi*

S. macgillivrayi Seem. – *S. ruei* Guillaum.

Distribution. Restricted to the New Hebrides: Ambrim, Eromanga, Tana, and Aneityum.

Ecology. In forest from near sea level to c. 1000 m altitude.

4b. subsp. *kajewskii* (Perry) Hoogl., *stat. nov.*

S. kajewskii Perry – *Pullea spec.* Whitm.

Distribution. New Britain and Solomon I.: Bougainville, New Georgia Group, Santa Ysabel, Guadalcanal.

Ecology. Rain forest between 700 and 2250 m altitude.

Notes. 1. Amongst the specimens included here, one (*Whitmore BSIP 1209*) is distinctly more hirsute than the others, with hairs up to c. 1 mm long; as the stipules are quite glabrous above, the specimen has been placed here and not in *S. bougainvillense* where the stipules, apart from being much broader, are hirsute above.

2. Three collections from New Britain fit well in with those from the Solomon I. A fourth one, *Stevens & Isles LAE 58357*, may represent another as yet unnamed species or subspecies with more densely hirsute branches, stipules, and young leaves. In this specimen the leaves are smaller than is usual in *S. macgillivrayi*; as to leaf shape it comes closest to subsp. *kajewskii*, as to number of nerves to subsp. *macgillivrayi*.

5. *Spiraeanthemum samoense* A. Gray

S. samoense A. Gray, Proc. Amer. Acad. Arts Sci. 3 (May 1854) 128; Bot. U. S. Explor. Exped. 1 (June 1854) 667; Atlas (1856) t. 83 A; Ann. Sci. Nat. Bot. IV, 4 (1855) 177; Reinecke, Bot. Jahrb. 25 (1898) 633; Burgerst., Denkschr. Akad. Wiss. Math.-Naturw. Kl. Wien 84 (1908) 113; Setchell, Amer. Samoa (1924) 92; Christophers., Bishop Mus. Bull. 128 (1935) 96; A. C. Sm., J. Arn. Arb. 33 (1952) 146. — Type: *U. S. Exploring Expedition s.n.*, Samoa I., ?Tutuila (lecto A. C. Sm. 1952: US 47620; iso GH, P, US).

S. samoense var. *lanutooi* Rech., Denkschr. Akad. Wiss. Math.-Naturw. Kl. Wien 85 (1910) 286. — Lectotype: *K. & L. Rechingen 706* (Rech. 1910 *sphalm.* 607), Samoa I., Upolu, Mt. Lanutoo (W; iso BM, W).

Distribution. Samoa I.: Savaii, Upolu, and Tutuila.
Ecology. In forest between 500 and 1700 m.

6. *Spiraeanthemum serratum* Gillespie

S. serratum Gillespie, Bishop Mus. Bull. 83 (1931) 11, fig. 11; A. C. Sm., J. Arn. Arb. 33 (1952) 143; Parham, Pl. Fiji Isls. (1964) 82; ed. 2 (1972) 122. — Type: *J. W. Gillespie 4107*, Fiji I., Viti Levu, Tholo North Prov., summit of Mt. Victoria (BISH; iso GH, UC).

Distribution. Endemic to the Fiji I., found only in Viti Levu and Taveuni.
Ecology. In montane forest between 1000 and 1300 m.

Note. As already indicated by A. C. Smith (1952) the differences between *S. serratum* and *S. graeffei* are only slight. I am tentatively following him in retaining them as distinct.

ACKNOWLEDGEMENTS

The manuscript of this study was essentially completed during a stay at Leiden from September 1976 to August 1977. The financial support received from the Organisatie voor Zuiver Wetenschappelijk Onderzoek (Z.W.O.) and the assistance received from the director and staff of the Rijksherbarium are gratefully acknowledged.