THE GENUS EPILOBIUM IN MALESIA (ONAGRACEAE)

PETER H. RAVEN

Department of Biological Sciences, Stanford University, Stanford, Calif., U.S.A.

The genus *Epilobium* (*Onagraceae*) comprises about 200 species, but is best represented at relatively high latitudes. Only eight species of the genus occur in Malesia, but they are interesting phytogeographically and shed considerable light on the overall patterns of differentiation in the genus. Further, it is of particular interest to review this assemblage of species for the following reasons. The only comprehensive treatment of the genus *Epilobium* is that of Carl Haussknecht, who in 1884 published his *Monographie der Gattung Epilobium*. At the time Haussknecht wrote, not a single collection of the genus had been made in Malesia, although three of the eight species in the area had been described from material obtained elsewhere. There has been no attempt to review the species of *Epilobium* found in Malesia as a whole or in any of its subdivisions, although of course new species have been described from the area from time to time.

Of the eight species of *Epilobium* found in Malesia, four are endemic to the area. All of these endemic species are found in New Guinea, but one (*E. prostratum*) also occurs in Celebes and Central Ceram. As might be expected, this is the species which occurs at the lowest elevations in New Guinea, and is the least restricted to alpine grasslands, occurring also in moist, disturbed areas that are moderately shaded, as on roadbanks and along streams. This group of four New Guinea species shows evident affinities with some of those found in the Australasian region. Thus there are four groups of the genus currently recognized as occurring in New Zealand and Australia, all essentially endemic to the Australasian area [Allan, Fl. N. Zealand 1 (1961) 254—281]. Three of the New Guinea species — *E. detznerianum*, *E. hooglandii*, and *E. prostratum* — belong to the group *Microphyllae*, the fourth — *E. keysseri* — to the group *Similes*. Another species of Australia and New Zealand, *E. cinereum*, ranges northward to east Java and the Lesser Sunda Islands (and is also shown in this paper to be introduced in the Hawaiian Islands of Maui and Hawaii).

The remaining three species of *Epilobium* found in Malesia exhibit very different affinities. All are widespread Asian species of very limited distribution in our area. Thus *E. brevifolium* subsp. *trichoneurum* and *E. platystigmatosum* are confined to a relatively small area in the mountains of northern Luzon, and *E. wallichianum* subsp. *wallichianum* has been collected only at a single locality in central Sumatra.

Thus the genus *Epilobium*, despite having only eight species in the area, offers a miniature recapitulation of the main currents of plant migration in Malesia. Asian species reach Sumatra and Luzon, whereas species of Australasian affinities extend northwestward to Celebes and east Java. Curiously, the genus is unknown on Mt. Kinabalu, where it would be expected. When and by what route the distinctive Australasian species reached their area must remain a problem for future evaluation, but the following preliminary notes may be helpful. First, there is no evident affinity between any Asian species and any Australasian one, the major groupes being entirely distinct. Second, there is a remarkable proliferation of species in New Zealand, 50 being recognized in

the latest comprehensive treatment (Allen, op. cit.). Third, the family *Onagraceae* clearly originated in the New World and in the Northern Hemisphere, as indicated by reasons I have developed in detail elsewhere [Raven, Bothalia 9 (1967) 309]. Fourth and finally, there is a relatively rich development of species in South America, and Skottsberg [Schwed. Südpolar-Exp. IV, 4 (1906) 24, tab. I, fig. 3] has described a species from Tierra del Fuego — *E. conjugens* — which he places in the otherwise Australasian group *Sparsiflorae*. All of these lines of evidence suggest that at least some of the distinctive Australasian groups of *Epilobium* may have been derived from South America, presumably in Cretaceous time when Antarctica was last available for colonization. Others may of course have been derived from Eurasian stocks, but if so this must have been a relatively ancient event. The relationships between the assemblages of Australasian species assigned to *Sparsiflorae-Microphyllae*, *Similes*, and *Dermatophyllae* are far from evident. A modern comparative evaluation of the species included in these groups is probably a *sine qua non* for further ellucidation of the problem.

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EPILOBIUM

Linnaeus, Sp. Pl. 1 (1753) 347; Gen. Pl. ed. 5 (1754) 55; Haussknecht, Monographie der Gattung Epilobium (Jena 1884); Raven, Bull. Brit. Mus. Bot. 2 (1962) 327—382.

Perennial herbs, often flowering in the first year, occasionally somewhat woody near the base. *Leaves* (in Mal.) opposite below, spirally arranged above. *Flowers* in the axils of the often greatly reduced upper leaves. *Hypanthium* short (in Mal.) or essentially absent. *Sepals* 4, erect. *Petals* 4, white, pink, or purple, emarginate (in Mal.). *Stamens* 8, in 2 whorls, the epipetalous ones shorter. *Stigma* (in Mal.) clavate or rarely globose, usually surrounded by the shedding anthers at maturity. Ovary 4-locular, the ovules very numerous. *Fruit* a long, slender, loculicidal capsule. *Seeds* very numerous, small, with a chalazal plume of trichomes (coma).

Type species: *E. hirsutum* L.

Distribution. Well represented in temperate regions and at relatively high latitudes; ranging toward the equator in mountainous regions.

Ecology. Characteristic of open, disturbed habitats or grassland, especially where moist; not normally found in the primary forest.

KEY TO THE MALESIAN SPECIES

1. Buds and flowers erect, the inflorescence erect or somewhat drooping.
   2. Stems pubescent only along conspicuously elevated lines running down from the margins of the petioles . . . . . **3. E. wallichianum**

2. Stems pubescent all around.
   3. Upper leaves strongly reduced. Inflorescence slightly nodding (Luzon).
      4. Leaves ovate, 0.4—1.5 cm wide . . . . . **1. E. brevifolium**
      4. Leaves very narrowly elliptic to linear, 0.1—0.5 cm wide . . . . **2. E. platystigmatosum**
   3. Upper leaves not notably reduced. Inflorescence erect (Java, Lesser Sunda Islands, New Guinea).
      5. Plants finely glandular-pubescent; leaves usually ericoid in appearance; petals purplish-rose. **5. E. keysseri**
      5. Plants densely strigulose; leaves broader, not ericoid; petals white or very pale pink. **4. E. cinereum**
1. Buds and flowers drooping, becoming erect in fruit.
   6. Stems with elevated glabrous lines running down from the center of each petiole and elevated pubescent lines from their angles; petals 7—14 mm long. . . . . **6. E. detznerianum**
   6. Stems without elevated lines, uniformly pubescent all around; petals 2.5—8.5 mm long.
      7. Petals 6—8.5 mm long; seeds 1—1.4 mm long . . . . . **7. E. hooglandii**
      7. Petals 2.5—5(—6) mm long; seeds 0.7—0.9 mm long . . . . . **8. E. prostratum**

1. Epilobium brevifolium D. Don, Prodr. Fl. Nepal. (1825) 222, subsp. **trichoneurum** (Hausskn.) Raven, Bull. Brit. Mus. Nat. Hist. 2 (1962) 362. — *E. trichoneurum* Hausskn., Oesterr. Bot. Zeitschr. 29 (Feb. 1879) 54; Monogr. Epilobium (1884) 208; H. Léveillé, Ic. Gen. Epilobium (1910) t. 84. — *E. hookeri* C. B. Clarke, in Hook. *f.*, Fl. Brit. Ind. 2 (May 1879) 585 (lectotype specimen: same as for *E. trichoneurum*, see below). — *E. esquirolii* H. Lév., Bull. Herb. Boiss. II, 7 (1907) 590 (type specimen: Kweichow, China, *Esquirol 607*, not seen). — *E. cordouei* H. Lév., in Fedde, Rep. Nov. Sp. 6 (1908) 110 (type specimen: Majo, Kweichow, China, *Cavalerie 3151*, not seen). — *E. philippinense* C. B. Robinson, Philip. Jour. Sci. 3 (1908) Bot. 209 (type specimen: Mt. Data, District of Lepanto, Luzon, *Merrill 4484*, isotype K).

Robust perennial herb 15—40 cm tall, the underground parts not scaly; plants strigulose, the stems pubescent all around. *Leaves* mostly opposite, alternate in and near the inflorescence, the upper ones reduced, strigulose along the veins and margins especially below, the lateral veins evident, ovate, 1—3 × 0.4—1.5 cm, serrate; petiole 1—2 mm long. *Inflorescence* slightly nodding. *Flowers* erect, borne in the axils of reduced upper leaves. *Hypanthium* 1.8—2.4 mm across, 1—1.3 mm deep. *Sepals* 2.5—5.5 mm long, 1—1.3 mm wide. *Petals* obovate, 4.5—8 mm long, 3—5.5 mm wide, rose purple, the notch 1—1.5 mm deep. *Anthers* 1—1.2 mm long; filaments of the longer stamens 1.2—2.5 mm long, those of the shorter 1—1.5 mm long. *Style* 2.5—4 mm long. *Stigma* clavate, 1.8—2.3 mm high, *c.* 1 mm thick, surrounded by the anthers at anthesis. *Capsule* 3.5—7 cm long, on a pedicel 0—1 cm long. *Seeds* 0.9—1.2 mm long, 0.4—0.5 mm thick, papillose, blackish brown, not beaked, obovoid, blunt at both ends, the coma 5—7 mm long, white.

Lectotype specimen: Khasi Hills, Assam, 1500—2000 m, *Hooker & Thomson* (K; isolectotype, BM); cf. Raven, Bull. Brit. Mus. Nat. Hist. 2 (1962) 363.

Distribution. Southeastern Tibet (Chumbi Valley) to Assam, Burma, and western China; in Malesia: northern Luzon.

Ecology. Wet open places, as along streams and by springs, in the mountains.

LUZON. Benguet Prov.: 'Haights in the Oaks,' *Mearns Bur. Sci. 4353* (BO, GH, K, L, NY, US); Mancayan to Banguio, *Ramos & Edaño Bur. Sci. 40515* (BO, L, NSW); Baguio to Ambuklao, *Merrill Bur. Sci. 4379* (K); Mt Santo Tomás, *Williams 1541* (GH, K, NY, US); Baguio, *Hancock 35* (K); Benguet, *Loher 2161* (K, mixture with *E. platystigmatosum*), *Williams 1540* (NY); Pauai, *Clemens 9129* (A), 9201 (A, mixture with *E. platystigmatosum*); Mt Pulog, *Curran et al. Bur. Sci. 16241* (US); Mt Data, *Merrill 4561* (K, NY, US), *Clemens 16385* (UC), *16385a* (UC), *16386* (NY), *Ramos & Edaño 40277* (G).

Epilobium brevifolium subsp. *trichoneurum* is one of three subspecies of a species which ranges from Himachal Pradesh in the Western Himalaya eastwards throughout the Himalaya and southern China to Formosa, northern Luzon, North Vietnam, and northern Burma. In northern Luzon, it occurs together with the other species found in the Philippines, *E. platystigmatosum*, and one plant of the collection *Clemens 16385*, cited above, suggests hybridization between these two entities, which are usually widely distinct morphologically, although doubtless more closely related to one another than to other Malesian species.

2. Epilobium platystigmatosum C. B. Robinson, Philip. Jour. Sci. 3 (1908) 210. — *E. sp. nova?*, Forbes & Hemsley, Jour. Linn. Soc. Bot. 23 (1887) 308 (Patung distr., China, *Henry 1043*, K). — *E. cephalostigma* var. *linearifolium* Hisauti, Jour. Jap. Bot. 14 (1938) 143, fig. 3. — *E. formosanum* Masamune, Trans. Nat. Hist. Soc. Formosa 29 (1 Mar. 1939) 62. — *E. sohayakiense* Koidzumi, Act. Phytotax. Geobot. 8 (5 Mar. 1939) 61.

Slender, perennial herb, 15—40 cm tall, the underground parts not scaly; plants strigulose, densely so in the inflorescence, the stems pubescent all around. *Leaves* mostly opposite, alternate in and near the inflorescence, the upper ones reduced, strigulose along the veins and margins especially below, the lateral veins evident, very narrowly elliptic or linear, 1—3(—4) × 0.1—0.5 cm, weakly and sparsely serrulate; petiole 1—4 mm long. *Inflorescence* slightly nodding. *Flowers* erect, borne in the axils of reduced upper leaves. *Hypanthium c.* 1 mm across, *c.* 0.8 mm deep. *Sepals* 3—4 mm long, 1.2—1.6 mm wide. *Petals* narrowly obovate, 3.3—4.5 mm long, *c.* 2 mm wide, white or pale pink, the notch *c.* 1 mm deep. *Anthers* 0.2—0.3 mm long; filaments of the longer stamens *c.* 1.8 mm long, those of the shorter *c.* 1.2 mm long. *Style c.* 2 mm long. *Stigma* broadly clavate, *c.* 0.8 mm high, *c.* 0.4 mm thick, surrounded by the anthers at anthesis. *Capsule* glabrescent, 3—5 cm long, on a pedicel 0—1.8 cm long. *Seeds* 0.8—1 mm long, 0.3—0.4 mm thick, papillose, not beaked, obovoid, blunt at both ends, the coma 4—6 mm long, white.

Type specimen: Pauai, 2040 m elevation, Benguet Prov., Luzon, Philippines, *Merrill 4744* (isotypes, K, NY, US).

Distribution. Southern Honshu and Skikoku, Japan; Shensi, Hupeh, and Kiangsu Provs., China; Formosa; and Malesia, northern Luzon.

Ecology. Wet open places, as along streams and by springs, in the mountains.

LUZON. Benguet Prov.: Baguio to Ambuklas, *Merrill Bur. Sci. 4358* (K, NY, US); Benguet, *Loher 2161* (K, mixture with *E. brevifolium* subsp. *trichoneurum*; US); Pauai, *Santos Bur. Sci. 31862* (BO, L, NY), *Clemens 9201* (A, mixture with *E. brevifolium* subsp. *trichoneurum*); below Pauai, *Clemens 17820* (UC); Macayan to Baguio, *Ramos & Edaño Bur. Sci. 40510* (BO, MEL); Mt Pulog and vicinity, *Clemens in 1925* (UC); Benguet Subprovince, *Merrill 900* (G, US). Mountain Province: Mt Polis, 2048 m, *Celestinó 7957* (A).

I can find no difference between the species generally known as *E. formosanum* and the supposed Philippine endemic populations of *E. philippinense*. This species is apparently not common on the Asian mainland.

3. Epilobium wallichianum Hausskn., Oesterr. Bot. Zeitschr. 29 (1879) 54, subsp. **wallichianum**; Raven, Bull. Brit. Mus. Nat. Hist. 2 (1962) 365. — *E. nepalense* Hausskn., Oesterr. Bot. Zeitschr. 29 (1879) 53, *pro parte*; Monogr. Epilobium (1884) 218, *pro parte*; H. Léveillé, Ic. Gen. Epilobium (1910) t. 120. — *E. duclouxii* H. Lév.,

Fedde Repert. Nov. Sp. 6 (1908) 110; Ic. Gen. Epilobium (1910) t. 144 (type specimen: San-Chan near Tchen-Hiong, Yunnan, *Mey 500*, not seen).

Erect perennial herb 15—50 cm tall, from a long rhizomatous base from which leafy shoots arise; plants strigulose, more densely so above, with elevated pubescent lines running down from the sides of the petioles, the stems thick and hollow. *Leaves* opposite in lower half of the plant, alternate above, the margin and veins densely strigulose, narrowly ovate or lanceolate, subacute at the apex, obtuse at the base, sharply and densely serrulate, 1.5—4 × 0.5—1.5 cm; petiole short but distinct, up to 2 mm long. *Inflorescence* densely strigulose with an admixture of glandular trichomes, somewhat nodding in bud. *Hypanthium c.* 2 mm across, *c.* 0.8 mm deep. *Sepals c.* 5 mm long, *c.* 2 mm wide, apiculate. *Petals* obovate, *c.* 8 mm long, 3.5—4 mm wide, pale violet, the notch shallow, *c.* 1 mm deep. *Anthers* 1.3—1.5 mm long; filaments of the longer stamens *c.* 2 mm long, those of the shorter *c.* 1 mm long. *Style* 3—3.5 mm long. *Stigma* globose, *c.* 1.5 mm thick, surrounded by the anthers at anthesis. *Capsule* densely strigulose with an admixture of erect, glandular trichomes, erect, 5—9.5 cm long, on a pedicel 1—2 cm long. *Seeds* 1.2 mm long, 0.6 mm thick, coarsely papillose, dark brown, the coma 6—7 mm long, white, tinged with brown at the base.

Lectotype specimen: Lachen, 2750—3050 m, Sikkim, 3 Aug. 1849, *Hooker* (K); cf. Raven, Bull. Brit. Mus. Nat. Hist. 2 (1962) 365.

Distribution: Himalayan Region from western Nepal to Yunnan, south to the Khasi and Naga Hills, and in Malesia in central western Sumatra, at 1980 m elevation.

Ecology. Along riverbanks in the mountains.

SUMATRA. Central Western Sumatra, Mt. Kerintji, northwest slope, 1980 m, *Bünnemeyer 10509* (BO).

The species is reported here for the first time from Malesia, where it reaches its southern limits.

4. Epilobium cinereum A. Rich., Essai Fl. N. Z. (1832) 330. — *E. junceum* Forst. *ex* Spreng., Syst. Veg. 2 (1825) 233, *nom. illegit.* — *E. sarmentaceum* (*non* Hausskn.) Back. & Bakh., Fl. Java 1 (1963) 262.

Robust, erect, clumped perennial herb, 15—100 cm tall, the underground parts not scaly; plants densely strigulose, the stems pubescent all around. Lowermost *leaves* opposite, the rest alternate, densely strigulose, especially below and along the veins, the lateral veins evident, narrowly lanceolate, 0.6—3 × 0.2—0.5 cm, coarsely serrate, subsessile. *Inflorescence* erect. *Flowers* erect, borne in the axils of upper leaves. *Hypanthium c.* 1 mm across, *c.* 1 mm deep. *Sepals* 3—5.5 mm long, 0.8—1.6 mm wide. *Petals* obovate, 3—5 mm long, 2—3.2 mm wide, white or very pale pink, the notch *c.* 1 mm deep. *Anthers* 0.7—1 mm long; filaments of the longer stamens 2—2.8 mm long, those of the shorter 1—1.8 mm long. *Style* 1—3 mm long. *Stigma* clavate, 1.5—2.7 mm high, 1—1.5 mm thick, surrounded by the anthers at anthesis. *Capsule* 3—5(—6) cm long, on a pedicel 0—2 cm long. *Seeds* 0.9—1.2 mm long, 0.35—0.45 mm thick, finely papillose, brown, not beaked, obovoid, blunt at both ends, the coma 5—8 mm long, white. Gametic chromosome number, $n = 18$.

Type specimen: Bay of Islands, New Zealand.

Distribution. New Zealand, eastern and southeastern Australia, and neighbouring islands, and in Malesia in east Java and the Lesser Sunda Islands; introduced in the Hawaiian Islands, on Maui and Hawaii.

Ecology. Montane grassland, 1400—3500 m.

JAVA. Mt Tengger, near Ngadisari, 2100 m, *Koorders 37663* (BO, K, L, NSW); *Koorders 37664* (BO, L); Mt Tengger, 2100—2200 m, *Coert 18.92* (BO).

LESSER SUNDA ISLANDS. Lombok: 2000 m, *de Voogd 2599* (BO, GH, K, L); G. Rindjani, N.-helling, 1800—2600 m, *van der Veen 6* (BO), top zone, 3500 m, *van der Veen 34* (BO). Sumbawa: *Zollinger 3360* (BM, GH, L). Timor: Mt Moetis, *de Voogd 2270* (BO, L). Portuguese Timor: Huato-Builico, N. W. of Mt Tatamailau, *van Steenis 18376* (BM, BO, L); Letfoho, 1450 m, *Walsh 472* (BM), *502* (BO).

Epilobium cinereum is the most widely distributed member of the group *Similes*, a complex of the Australasian region that badly needs detailed study. Its distribution in east Java and the Lesser Sunda Islands is quite in accord with its derivation. Its chromosome number, based on New Zealand material, was reported by Hair [Trans. Proc. Roy. Soc. N. Z. 71 (1942) 272].

The same species occurs in the Hawaiian Islands, specifically Maui (where it was collected as early an 1909, *Faurie 847*) and Hawaii (first collected in 1931), where it is undoubtedly introduced. Curiously, it has been referred usually to *E. oligodontum* Hausskn., (cf. Degener & Degener, Fl. Haw., family 276, 8 Aug. 1960), a Japanese entity now referred to the synonymy of *E. pyrricholophum* Franch. & Sav., which bears no resemblance to *E. cinereum*. Therefore, I cite the following specimens to document the occurrence of this species in the Hawaiian Islands:

HAWAIIAN ISLANDS. Maui: Haleakala, 1500 m and above, *Faurie 847* (BM, G); N. of Olinda, 'comparatively rare but extremely common at higher elevations,' *Degener 2255* (GH, K, US); Paliku, Haleakala, *Degener 12591* (BM, GH, LAE, US); slopes of Haleakala between top of Halemauu trail and end of road at Puu Nianaiau, rocks of crater rim, 2430 m, *Fosberg 9983* (US); E. of Olinda, 1300 m, *Hitchcock 14918* (US). Hawaii: Dry lava, summit of volcanic cones, 2600 m, Puu Hualalai, Kaupulehu, *St. John et al. 11436* (K, US).

A second introduced species of *Epilobium*, the North American *E. adenocaulon* Hausskn., occurs in the Hawaiian Islands. It is illustrated by Degener & Degener (loc. cit.); their account confuses the two species. I have seen only the following collections: Hawaii, near Volcano House, Kilauea, roadside weed, not common, 26 June 1929, *Degener 8193* (GH); Kilauea For. Res., Puna, 23 July 1967, *Degener 31315* (DS).

5. Epilobium keysseri Diels, Bot. Jahrb. 62 (1929) 486; Hoogland, Blumea, Suppl. 4 (1958) 223.

Clumped erect perennial herb 12—60 cm tall, often ericoid in aspect, somewhat woody at the base, the underground parts not scaly; plants finely glandular-pubescent. Lowermost *leaves* opposite, the rest alternate, coriaceous, subglabrous, the lateral veins obscure, the margin revolute, narrowly elliptic to elliptic, 0.5—1.3 × 0.1—0.2(—0.4) cm, with a few coarse teeth on each side, subsessile. *Inflorescence* erect. *Flowers* erect, borne in axils of upper leaves. *Hypanthium* 1—2 mm across, 0.7—1 mm deep. *Sepals* 3—5.6 mm long, 1—2.5 mm wide. *Petals* obovate, 4.5—8 mm long, 2.8—4 mm wide, purplish-rose, the notch 1.5—2 mm deep. *Anthers* 0.7—1 mm long; filaments of the longer stamens 1.8—2.5 mm long, those of the shorter 0.5—1.5 mm long. *Style* 2.5—4 mm long. *Stigma* clavate 1.5—2 mm high, 0.5—0.7 mm thick, surrounded by the anthers at anthesis. *Capsule* 3—6 cm long, glabrescent, on a pedicel 1—2.5 cm long. *Seeds* 0.9—1.2 mm long, 0.4—0.6 mm thick, papillose, brown, with a short pellucid beak, the coma 5—7 mm long, white. Gametic chromosome number, $n = 18$.

Lectotype specimen: Sarawaket Range, Morobe Dist., Terr. of New Guinea, 2400—3000 m, *Keysser* (BM; original material at B destroyed).

Distribution. Endemic to New Guinea: West New Guinea (Mt. Wilhelmina), Papua (Mt. Giluwe southeast to Mt. Simpson) and Terr. of New Guinea (Western and

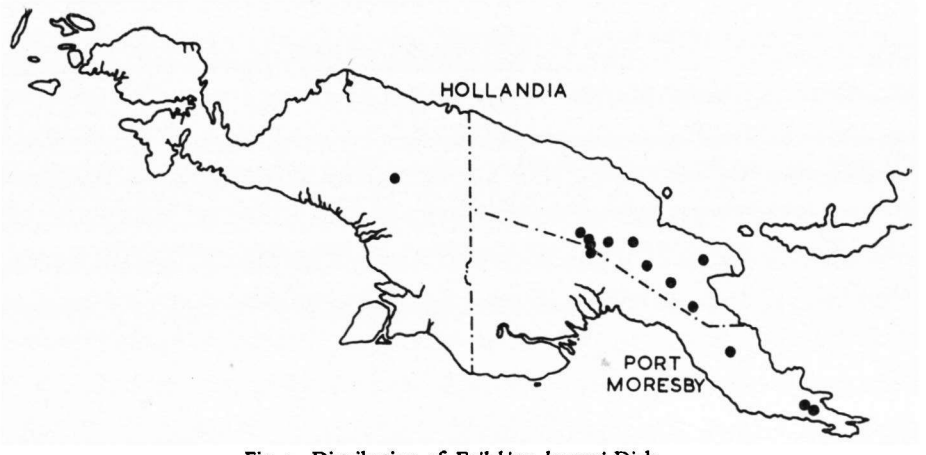

Fig. 1. Distribution of *Epilobium keysseri* Diels.

Eastern Highlands, Sarawaket Range and Mt. Amungwiwa, near Wau). — Fig. 1.

Ecology. Alpine and subalpine grasslands and meadows, occasionally epiphytic on treefern trunks, from about (1600—) 2300 to 3800 m elevation. Flowers throughout the year, but most abundantly from June to August.

NEW GUINEA. West Irian. Mt Wilhelmina and vicinity: Lake Habbema, 3225 m, *Brass 9148* (A, BO, BRI, L), *9546* (A, BM, BO, BRI, LAE), *9592* (A, BO, L); 11 km N.E. of Wilhelmina-top, 3400 m, Mt Wilhelmina, *Brass & Meyer-Drees 9750* (A, BO). Papua. Southern Highlands District: W. summit grasslands of Mt. Giluwe, *c.* 10.300 ft, *Schodde 1747* (L, LAE). Central District: Mt Albert-Edward, 3680 m, *Brass 4289* (A, BO, BRI, L, US); Murray Pass, Wharton Range, 2840 m, *Brass 4197* (A, BO, BRI), *4547* (BRI, NY), *4701a* (A, BO, BRI, US; all mixed with *E. prostratum*). Milne Bay District: N. slopes of Mt. Dayman, Maneau Range, 2230—2240 m, *Brass 22225* (A, L, LAE); Mt Maneau, 7500 ft, *Cruttwell 531* (K), *532* (K), *750* (K, LAE), *751* (K, LAE); Mt Aniata, 9600 ft, *Cruttwell 1045* (K), *1046* (K); Tunayo, 8500 ft, *Cruttwell 1347* (LAE); Mt Simpson, 9000 ft, *Cruttwell 49* (K). Territory of New Guinea. Western Highlands District: Near Kepilam village, Lagaip Valley, *c.* 8500 ft, *Hoogland & Schodde 7407* (LAE); Yobobos grassland area, source of Lagaip River, *c.* 8500 ft, *Hoogland & Schodde 7525* (L, LAE); Porget Logging Area, Merimanta, 7000 fr. *Womersley NGF. 11063* (A, BRI, K, LAE); Lake Iviva, Wabag–Laiagam Road, 8300 ft, *Womersley NGF. 15296* (LAE); Sirunke Swamp, 18 mi from Wabag, 8000 ft, *Womersley in 1965* (DS, LAE); N. slopes of Sugarloaf complex, along Wapu River, *c.* 9500 ft, *Hoogland & Schodde 7025* (A, BM, LAE, NSW, US); near Mt Giluwe, *Shaw-Meyer in 1951* (BM); near Tomba village, S. slope of Mt Hagen Range, *c.* 2650 m, *Hoogland & Pullen 6013* (A, BM, BRI, L, LAE), *Saunders 650* (A, BM, BRI, L, LAE, US); Wahgi-Jimmi divide, *Womersley NGF. 5318a* (LAE). Eastern Highlands District, Mt Wilhelm and vicinity: Komanemamibuno, *c.* 2900 m, *Borgmann 213* (L, LAE); Mt Wilhelm, 3350 m, *Borgmann 16* (L, LAE); E. slopes of Mt Wilhelm, 3560 m, *Brass 29843* (A, L, LAE, US), *29997* (A, L, LAE, NY, US), *30179* (L, LAE, US), *30180* (L, LAE), 3470 m, *Brass 30123* (A, L, LAE, NY, US), *30124* (L, LAE, US), 9000—10000 ft, *Keogh in 1953* (LAE); Lake Aunde, E. slopes of Mt Wilhelm, 3500 m, *Hoogland & Pullen 5671* (A, BM, BRI, L, LAE), *Borgmann 4* (L, LAE), *van Royen NGF. 15195* (BRI, LAE), *Millar 14654* (BRI, LAE), *v. Balgooy 317* (L), *Womersley NGF. 8940* (A, BM, BO, BRI, K, L, LAE); moraine below lakes of Mt Wilhelm, 10900 ft, *Waller ANU. 8* (LAE); Lake Piunde, Mt Wilhelm, 11870 ft, *Womersley NGF. 8827* (BRI, mixed with *E. detznerianum*); E. side of Lake Tekeh Pangwa, 3800 m, *v. Balgooy 808* (L); Guraguragukl, 3450 m, *v. Balgooy 830* (L); Pengagl Creek, *van Royen NGF. 15108* (LAE). Eastern Highlands District, general: Mt Michael, 3290—3650 m, *Brass & Collins 31237* (L, LAE), *Womersley NGF. 11475* (BRI, LAE); Mt Piora, 10500 ft, *Henty & Carlquist 16595* (BRI, LAE, RSA). Morobe District, Sarawaket Range: Mt Sarawaket, 7—8000 ft, *Clemens 5314* (A), 8—9000 ft, *Clemens 6095* (A), *c.* 10000 ft, *Hartley 11127* (L); Mt Enggom, near crest, 11900 ft, *van Royen NGF. 16199* (L, LAE); without definite locality, 3400—3800 m, *Keysser* (BM). Morobe District, Mt. Amungwiwa, 11400 ft, *Womersley NGF. 19015* (LAE). New Guinea, locality not placed: Lake Maiolo, 1600 m, *Gillison 388* (DS).

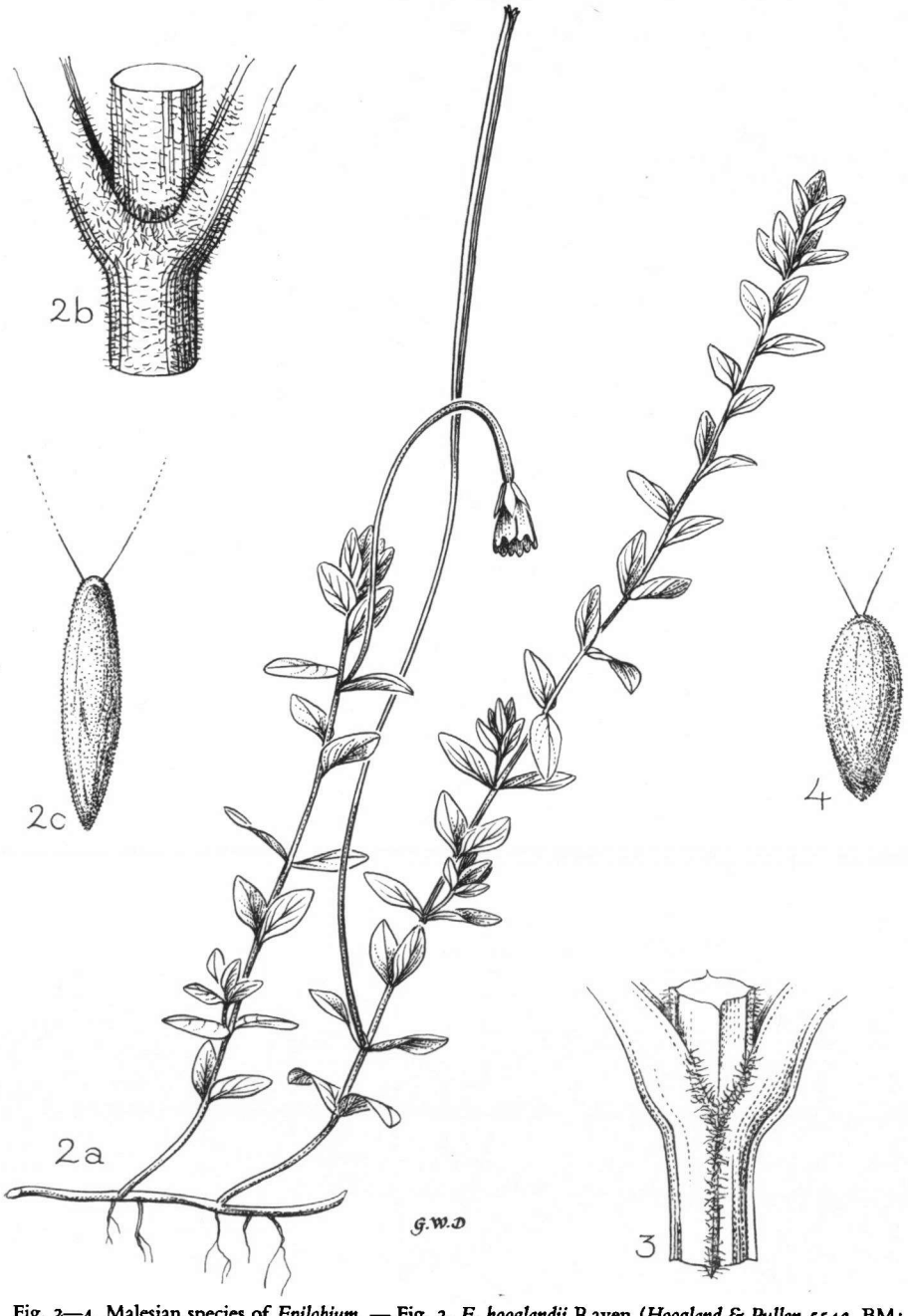

Fig. 2—4. Malesian species of *Epilobium*. — Fig. 2. *E. hooglandii* Raven (*Hoogland & Pullen 5540*, BM; isotype). a. Habit, b. stem with petioles, c. seed, with base of coma. — Fig. 3. *E. detznerianum* Schlechter *ex* Diels (*Hoogland & Pullen 5687*, BM), stem with petioles. — Fig. 4. *E. prostratum* Warb. (*Womersley, Floyd & McKee 6103*, BM). Fig. 2a, × 1; figs. 2b, 3, × 10; figs. 2c, 4, × 30.

Vernacular names: *aingum* (Tomba; *Saunders 650*); *gonema* (Chimbu; *van Royen 15108*); *papai* (Enga, Poio; *Hoogland & Schodde 7025*); *tamitam* (Mendi; *Schodde 1747*).

Epilobium keysseri is a distinctive species but clearly a member of the Australasian assemblage assigned by Haussknecht (Mon. Epilobium. 1884) to his group *Similes*. Most plants, with their narrow leaves, are distinctly ericoid in appearance, and thus parallel representatives of many other typically non-ericoid groups that occur in alpine and subalpine regions of New Guinea. Its gametic chromosome number was reported by Borgmann (Zeitschr. Bot. 52: 124, 143 . 1964) from material of his nos. *231*, *4*, and *16*, cited above.

6. Epilobium detznerianum Schlechter *ex* Diels, Bot. Jahrb. 62 (1929) 485. — *E. papuanum* Ridley var. *alpestre* Ridley, Trans. Linn. Soc. Bot. II, 9 (1916) 58 (lectotype specimen, Camp XIV, West Irian = Mt. Carstensz at snowline, *Boden Kloos in 1913*, BM). — *E. papuanum* (*non* Ridl.) Hoogland, Blumea, Suppl. 4 (1958) 228. — **Fig. 3.**

Clumped perennial herb 3—15 cm tall, the underground stems not scaly; plants mostly glabrous, with elevated, strigulose lines running down from the margins of the petioles and glabrous ridges running down from back of petioles. *Leaves* mostly opposite, alternate in the inflorescence, coriaceous, the lateral veins obscure, broadly elliptic or ovate, obtuse at apex and base, entire, 0.3—1 × 0.2—0.7 cm; petiole 1—1.5 mm long, short but distinct. *Flowers* nodding, the ovaries erect, borne in the axils of upper leaves. *Hypanthium* 1.5—3 mm across and about as deep. *Sepals* 4.5—7 mm long, 1—2.5 mm wide. *Petals* obovate, 7—14 mm long, 3—6 mm wide, bright purplish rose, the notch *c.* 2 mm deep. *Anthers* 0.8—1.2 mm long; filaments of the longer stamens 4—5.5 mm long, those of the shorter 3.3—4.5 mm long. *Style* 5.5—8 mm long. *Stigma* broadly clavate, 1.3—1.7 mm high, *c.* 1 mm thick, surrounded by or held just above the anthers at anthesis. *Capsule* erect, subglabrous, 4—5 cm long, on a pedicel 2.5—8.5 cm long. *Seeds* (0.9—)1—1.5 mm long, 0.5—0.7 mm thick, not beaked, finely papillose, pale brown, the coma *c.* 8 mm long. Gametic chromosome number, $n = 18$.

Type specimen: Sarawaket Range, Morobe District, Territory of New Guinea, 2400—2800 m, *Keysser 35* (B, destroyed). Neotype, with same locality, *Keysser 2* (BM).

Distribution. Endemic to New Guinea: West New Guinea (Mt. Carstensz and Mt. Wilhelmina) and Territory of New Guinea (Sirius Plateau, Mt. Wilhelm and Sarawaket Range). — Fig. 5.

Ecology. Alpine and subalpine grasslands and meadows from about 3000 to 4500 m elevation. Flowers throughout the year but perhaps most abundantly in August and September.

NEW GUINEA. West Irian. Mt. Carstensz and vicinity: Camp XII to XIII, Utakwa River, *Boden Kloos in 1913* (BM, K); Nusulanarong Valley, Camp XIII, 10300 ft, *Boden Kloos in 1913* (BM, K); Camp XIII to XIV, Tsingarong River at 10900 ft, *Boden Kloos in 1913* (BM, K); Mt. Carstensz, 3200—3600 m, *Wissel 184* (BO), 4000—4100 m, *Wissel 19* (BO), *c.* 4400 m, *Wissel 111* (BO), *116* (BO). Mt. Wilhelmina and vicinity: Lake Habbema, 3225 m, *Brass 9206* (A, BM, BO, BRI, L); between Lake Habbema and Wilhelmina-top, 3440 m, *Brass 9408* (A, BO, L), 3560 m, *Brass & Meyer-Drees 9615* (A, BO, L), 3400 m, *Brass & Meyer-Drees 9686* (A, BO, L), 3560 m, *Brass & Meyer-Drees 10016* (A; growing with *E. hooglandii*, no. *10015*); Wilhelmina-top, N. slopes, 3950 m, *Brass & Meyer-Drees 10043* (A, BM, BO, BRI, K, L LAE), *10045* (A, BO); Quarles Valley, 3800 m, *Versteeg 2525* (BO, L). Territory of New Guinea. Sepik District: Sirius Plateau, Telefomin, 10000 ft, *Craig 70* (DS). Eastern Highlands District, Mt. Wilhelm and vicinity: small gulley leading to Bende Valley, 4250 m, *v. Balgooy 911* (L); head of Bende Valley, 4150 m, *v. Balgooy 914* (L, mixture with *E. hooglandii*); ridge S. of Lake Piunde, 3950 m, *v. Balgooy 305* (L); Lake Piunde, 11870 ft, *Womersley NGF. 8827* (A, BM, BO, BRI, mixture with *E. keysseri*, K, L, LAE, NSW); summit region of Mt. Wilhelm, 4350 m, *v. Balgooy 470* (L); Mt. Wilhelm, 11000—11500 ft, *Semple & Rayner in 1953* (MEL), E. slopes, 3560 m, *Brass 30157* (A, BO, L, NY, US), *30176* (L, US),

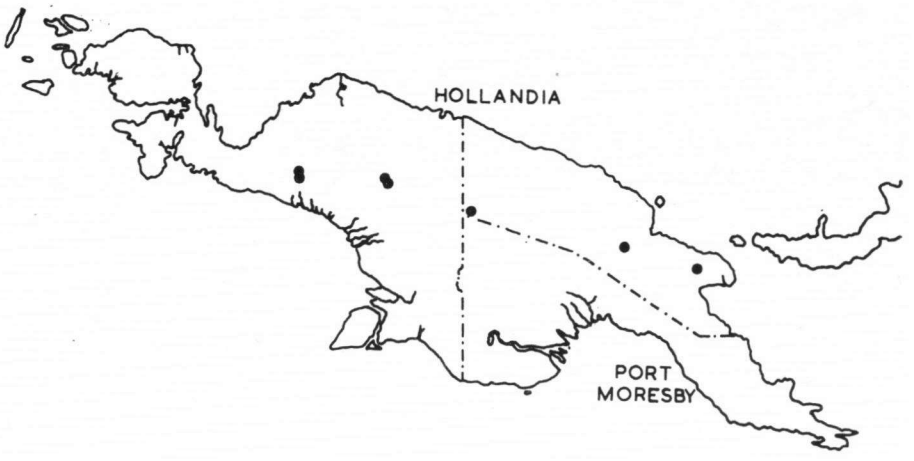

Fig. 5. Distribution of *Epilobium detznerianum* Schlechter *ex* Diels.

3400 m, *Borgmann 55* (L; with *E. hooglandii*, no. *29*); S. of Lake Aunde, E. slope of Mt. Wilhelm, *c.* 3600 m, *Hoogland & Pullen 5687* (A, BM, BRI, G, K, L, LAE, MEL, US). Morobe District, Sarawaket Range: Upper Zaran Creek, S. W. slopes of Mt. Enggom, 11000 ft, *van Royen NGF. 16183* (L, LAE).

Epilobium detznerianum is an attractive alpine species which reaches the highest elevations of any species of the genus in New Guinea. It is more condensed in habit than *E. hooglandii*, in general, and differs conspicuously from that species in the glabrous ridge decurrent from the center of each petiole and the elevated pubescent lines decurrent from the edges of the petioles. Even in the absence of type material, the original description is unequivocal as to the identity of the species being described. This species grows sympatrically with *E. hooglandii* and with *E. keysseri*, but no intermediates have been seen. Its chromosome number was reported from *Borgmann 55*, cited above, by Borgmann, Zeitschr. Bot. 52: 143. 1964.

Together with its close relatives *E. hooglandii* and *E. prostratum*, *E. detznerianum* is clearly a member of the assemblage assigned by Haussknecht (Mon. Epilobium. 1884) to his group *Microphyllae*, the other representatives of which are found in New Zealand and Australia.

7. Epilobium hooglandii Raven, *sp. nov.* — *E. pedunculare* (*non* A. Cunn.) F. von Mueller, Trans. Roy. Soc. Victoria I, 2 (1889) 7. — *E. detznerianum* (*non* Schltr. *ex* Diels) Hoogl., Blumea Suppl. 4 (1958) 228. — **Fig. 2.**

Herba perennis caespitosa, ramis decumbentibus, partibus erectis 10—25(—45) cm longis; plantae inferne secus lineas prominulas e petiolorum marginibus decurrentes, superne densius uniformeque glanduloso-pubescentes, inflorescentiis pilis strigulosis additis. *Folia* plerumque opposita, superiora alterna, subcoriacea, venulis lateralibus in sicco ± conspicuis, late elliptica usque ovata, apice basique acuta vel obtusa, integra vel dentibus paucis instructa, 0.5—1.3 × 0.3—0.9 cm; petiolus 1—3 mm longus, distinctus. *Flores* nutantes, in axillis foliorum superiorum formati; ovaria erecta. *Hypanthium* 1.4—2 mm latum, 1—1.2 mm altum. *Sepala* 3—4 mm longa, 1—1.6 mm lata. *Petala* 6—8.5 mm longa, 2.5—4.5 mm lata, roseo-purpurea. *Antherae* 0.7—1 mm longae; staminorum longiorum filamenta 3—6, breviorum 2—4 mm longa. *Stylus* 2.5—6 mm

longus. *Stigma* clavatum, 2—2.5 mm longum, 1—1.2 mm crassum, antheris anthesi circumdatum. *Capsula* erecta, glabrescens, 5—8 cm longa; pedicellus 4—12 cm longus. *Semina* 1—1.4 mm longa, 0.3—0.45 mm lata, leviter papillosa, brunnea; coma alba, 5—8 mm longa. Numerus chromosomatum gameticus $n = 18$.

Clumped perennial herb with decumbent branches, the erect portions 10—25 (—45) cm long; plants glandular pubescent along elevated lines running down from the margins of the petioles below, more densely and uniformly so above, and with an admixture of strigulose pubescence in the inflorescence. *Leaves* mostly opposite, alternate in the inflorescence, subcoriaceous, the lateral veins more or less visible in dried material, broadly elliptic to ovate, acute or obtuse at the apex and base, entire or with a few teeth on the margins, 0.5—1.3 × 0.3—0.9 cm; petiole 1—3 mm long, short but distinct. *Flowers* nodding, the ovaries erect, borne in the axils of upper leaves. *Hypanthium* 1.4—2 mm across, 1—1.2 mm deep. *Sepals* 3—4 mm long, 1—1.6 mm wide. *Petals* 6—8.5 mm long, 2.5—4.5 mm wide, pink to purplish rose, the notch *c.* 1.5 mm deep.

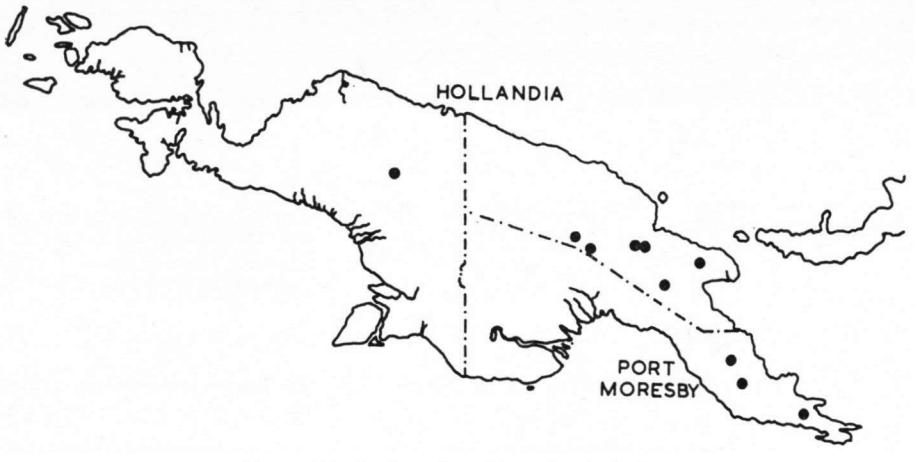

Fig. 6. Distribution of *Epilobium hooglandii* Raven.

Anthers 0.7—1 mm long; filaments of the longer stamens 3—6 mm long, those of the shorter 2—4 mm long. *Style* 2.5—6 mm long. *Stigma* clavate, 2—2.5 mm long, 1—1.2 mm thick, surrounded by the anthers at anthesis. *Capsule* erect, glabrescent, 5—8 cm long, on a pedicel 4—12 cm long. *Seeds* 1—1.4 mm long, 0.3—0.45 mm thick, finely papillose, brown; coma 5—8 mm long, white. Gametic chromosome number, $n = 18$.

Type specimen: New Guinea, Territory of New Guinea, Eastern Highlands District, near Kerigomma camp, Goroka subdivision, in peaty grassland on slope, particularly along creek, *c.* 3000 m. Flowers pink, 5 July 1956, *Hoogland & Pullen 5540* (L; isotypes, A, BM, BRI, G, K, LAE, MEL, NSW, US).

Distribution. Endemic to New Guinea: West Irian (Mt. Wilhelmina), Papua (Wharton Range southeast to Mt. Aniata) and Territory of New Guinea (Western and Eastern Highlands and Mt. Sarawaket). — Fig. 6.

Ecology. Alpine and subalpine meadows and occasionally in moist forested areas; *c.* 2000—4150 m elevation. Flowers throughout the year but perhaps most abundantly in June and July.

NEW GUINEA. West Irian. Mt. Wilhelmina and vicinity: 7 km N. E. of Wilhelmina-top, 3560 m, *Brass & Meyer-Drees 10015* (A, BM, BO, BRI, K, L, LAE), 11 km N. E., 3400 m, *Brass & Meyer-Drees 9814* (A, BO, L). Papua. Central District: Wharton Range, 11100 ft, *Giulianetti & English in 1897* (K); Owen Stanley Range, 13000 ft, *MacGregor in 1889* (BRI, K, MEL, NSW). Milne Bay District: Mt. Aniata, 9600 ft, *Cruttwell 1047* (K), 1048 (K). Territory of New Guinea. Western Highlands District: swamp adjacent to Lake Iviva, Wabag-Laiagam road, 8300 ft, *Womersley NGF. 15291* (LAE, NSW); Kandep-Lagaip divide, 20 miles from Laiagam, 9500 ft, *Womersley in 1965* (DS, with *E. prostratum*); plateau N. of Mt. Giluwe, 7300 ft, *Shaw Mayer in 1951* (BM). Eastern Highlands District, Mt. Wilhelm and vicinity: Lake Aunde, *c.* 3500 m, *Womersley NGF. 8962* (A, BO, BRI, K, L, LAE), *Hoogland & Pullen 5676* (A, BM, L, LAE), *Millar 14648* (BO, LAE, NSW), *v. Balgooy 325* (L); Mt. Wilhelm, 9000—10000 ft, *Keogh in 1953* (LAE), 3400 m, *Borgmann 29* (L, with *E. detznerianum*, no. 55); E. slopes of Mt. Wilhelm, 2770 m, *Brass 30341* (A, L, LAE, NY, US), 3560 m, *Brass 29841* (LAE), *30176* (LAE); Guraguragukl Valley, Mt. Wilhelm, 3650 m, *v. Balgooy 874* (L); head of Bende Valley, 4150 m, *v. Balgooy 914* (L, mixture with *E. detznerianum*); E. side of Lake Tekeh Pangwa, Mt. Wilhelm, 3800 m, *v. Balgooy 815* (L). Eastern Highlands District, general: Mt. Otto, S. slopes, 2200 m, *Brass 30825* (A, K, LAE, NY, US, mixture with *E. prostratum*); Mt. Piora, 10500 ft, *Henty & Carlquist 16599* (BRI, LAE, RSA). Morobe District: Mt. Sarawaket, *c.* 10000 ft, *Hartley 11178* (L).

Vernacular names: *dirimpia* (Chimbu: Masul); *monami* (Mairi: Mondo). Both names obtained for the type collection.

Although *Epilobium hooglandii* was the first species of its genus to be reported from New Guinea (in 1889), it has received no valid name at the specific level until the present. It is closely related to *E. detznerianum*, from which it is easily distinguished by its evenly pubescent stems, and to *E. prostratum*, from which it differs in its larger flowers and seeds. A few collections seem to be intermediate between *E. hooglandii* and *E. prostratum*, but they are in general amply distinct and as well differentiated as most recognized species of the genus. They probably hybridize occasionally where they come into contact.

Epilobium hooglandii grows sympatrically with each of the other three species of the genus found in New Guinea. Its chromosome number was determined by Borgmann (Zeitschr. Bot. 52: 143. 1964) on material of his no. *29*, cited above.

8. Epilobium prostratum Warb., Bot. Jahrb. 16 (1893) 23. — *E. papuanum* Ridley, Trans. Linn. Soc. Bot. II, 9 (1916) 57 (lectotype specimen, Camp IX to X, West Irian, Bandarong River at 5610 ft. to Tsingarong River at 6370 ft., near Mt. Carstensz, 1913, *Boden Kloos*: BM; isolectotype, K). — **Fig. 4.**

Similar to *E. hooglandii*, but differing as follows: habit lax, spreading. *Leaves* 0.4—0.8 × 0.18—0.4 cm. *Hypanthium* 0.8—1.1 mm across, 0.6—0.9 mm deep. *Sepals* 1.5—3 mm long, 0.6—1.4 mm wide. *Petals* 2.5—5(—6) mm long, 1.3—2.5 mm wide, very pale pink to purplish rose, the notch *c.* 1 mm deep. *Anthers* 0.5—0.7 mm long; filaments of the longer stamens 3—4 mm long, those of the shorter 2—3 mm long. *Style* 1.8—3.5 mm long. *Stigma* clavate, 0.8—1.5 mm long, 0.5—0.9 mm thick, surrounded by the anthers at anthesis. *Capsule* 3.5—5 cm long, on a pedical 5—10 cm long. *Seeds* 0.7—0.9 mm long, *c.* 0.3—0.4 mm thick, finely papillose, brown, the coma 5—8 mm long. Gametic chromosome number, $n = 18$.

Type specimen: Finisterre Range, Territory of New Guinea, at *c.* 1200 m, between rocks in a streambed, 15 October 1888, *Hellwig 337* (B, destroyed). Neotype: Territory of New Guinea, Eastern Highlands District, Goroka subdivision, Chimbu Divide, 7600 ft, 16 November 1954, *Womersley, Floyd, & McKee 6103* (L; isoneotypes, A, BM, BO, BRI, K, LAE, NSW).

Distribution. SW. Central Celebes (Rante Mario and Rante Mario-Batoebollong), Moluccas (Middle Ceram), West Irian (Vogelkop Peninsula and the Main Range),

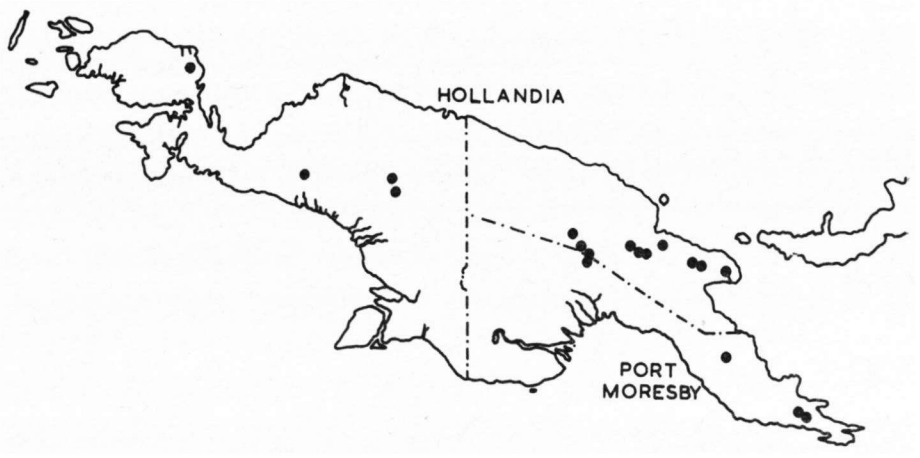

Fig. 7. Distribution of *Epilobium prostratum* Warb. in New Guinea; the species also occurs on Celebes and Central Ceram.

Papua (Southern Highlands southeast to Mt. Simpson) and Territory of New Guinea (Western and Eastern Highlands and Huon Peninsula). — Fig. 7.

Ecology. Moist open places, especially on rocky alluvium bordering streama, from *c.* 1000—3400 m elevation. Flowers throughout the year.

CELEBES. Enrekang Subdivision: Summit of Rante Mario, 3440 m, *Eyma 716* (BO); ridge between Rante Mario and Batoebollong, 3300 m, *Eyma 942* (BM, BO, G, L).

MOLUCCAS. Central Ceram, frequent in the meadow region of the summit, *c.* 2750—3000 m, *Stresemann 246* (BO, L).

NEW GUINEA. West Irian. Vogelkop Peninsula, Angi Lakes Region: In open inundation area of Iray River, Lake Giji, 1900 m, *Kanehira & Hatushima 13731* (A, BO); near Iray, on Angi Gigi Lake, 1920 m, along Iray River, *Sleumer & Vink 4437* (L, LAE). Mt. Carstensz vicinity: Camp X to XI, Tsingarong River, 6300—8075 ft, *Boden Kloos in 1913* (BM). Mt. Wilhelmina vicinity: 9 km N.E. of Lake Habbema, 2800 m, *Brass 10551* (A, BM, BO, BRI, L, LAE). Treub Mts. S. slope, 2400 m, *Pulle 1106* (BO). Papua. Southern Highlands District: Near Ebenda, Anga Valley, *c.* 6500 ft, *Schodde 1582* (L, LAE). Central District: Murray Pass, Wharton Range, 2840 m, *Brass 4701a* (A, mixture with *E. hooglandii*). Milne Bay District: Maneau Range, Nowandowan, 6000 ft, *Cruttwell 785* (K); Mt. Simpson, 9000 ft, *Cruttwell 50* (K). Territory of New Guinea. Western Highlands District: Kandep-Lagaip Divide, 20 mi from Laiagam, 9500 ft, *Womersley in 1965* (DS, with *E. hooglandii*); Sirunke Swamp, 18 mi from Wabag, *c.* 8000 ft, *Womersley in 1965* (DS); Poio Village, Yaki River Valley, *c.* 7500 ft, *Hoogland & Schodde 6934* (A, BM, LAE); Alipe Creek, Kebaka, upper Kaygel Valley, 7620 ft, *Bowers 149* (LAE). Eastern Highlands District: Mt. Wilhelm vicinity, Pengagl Creek, 9500 ft, *van Royen 15117* (BRI, LAE), 2850 m, *v. Balgooy 956* (L); Mt. Wilhelm vicinity, Kamanemamburno, *c.* 2900 m, *Borgmann 230* (L, LAE); Chimbu Road, 2300 m, *McKee 1505* (K); Komamelo Hills, N. of Watabung Patrol Post, Goroka-Kundiawa road, 7800 ft, *Simonett 22* (LAE); Upper Asaro Valley, near Miruma village, *c.* 1900 m, *Hoogland & Pullen 5390* (A, L); Marafunga, 9100 ft, *Miller & van Royen NGF. 15960* (L, LAE); Kanawyroka Creek, 7500 ft, *Miller & van Royen NGF. 15993* (LAE); Mt. Otto, S. slopes, 2200 m, *Brass 30825* (L; US, mixture with *E. hooglandii*). Morobe District: Matap, 5—6000 ft, *Clemens 40953* (A); Mt. Sarawaket, *Clemens 5775* (A), 9000 ft, *Gillison 136* (L, LAE); Butung River, 3000 ft, *Clemens 5276* (A); Sattelberg, Sambanga, 5—6000 ft, *Clemens 7068a* (A).

CULTIVATED: Seed from R. Good, near Daulo, Chimbu Divide, W. of Goroka, Territory of New Guinea, 23 Dec. 1956, grown in Botany Department Garden, Cottingham, E. Yorkshire, 1957 (K).

Vernacular names: *kinbil* (Enga language, Poio; *Hoogland & Schodde 6934*); *tirimpia* (Chimbu, Masul; *Hoogland & Pullen 5390*).

Epilobium prostratum is closely similar to *E. hooglandii*, but readily distinguished for the most part by its smaller flowers and seeds. As discussed under that species, occasional intermediates are found where the two occur together. The present species occurs at lower elevations than other species of the genus found in New Guinea, and correspondingly has a much wider range. It is likewise the only species of the genus known from the Moluccas and from Celebes.

The gametic chromosome number of this species was reported by Borgmann (Zeitschr. Bot. 52: 124. 1964) in material of his no. *230*, cited above.

INDEX

Numerals refer to the number of the species; synonyms are in *italics*, new names in **bold type.** 'Sub' refers to a name mentioned under the remarks of the relevant species.