

A Revision of the African Species of *Epilobium* (Onagraceae)

by

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ABSTRACT

There are in Africa 10 native species of *Epilobium*, one of *Circaea*, and between 8 and 12 of *Ludwigia* (including *Jussiaea*), depending upon how many species are considered native. These three genera include all native African species of Onagraceae. Four sections of *Ludwigia*, comprising a total of five species, and one fairly distinctive group of *Epilobium* are the most characteristic African groups. Despite the fact that H. Perrier de la Bâthie (in Humb., Fl. Madagasc., Oenotheracées : 1-26, 1950) considered all three of the species of *Epilobium* that he recognized and four of the 11 species of *Ludwigia* (including *Jussiaea*), to be endemic to Madagascar, there are in my opinion no Mascarene endemics in the family Onagraceae and nothing to suggest any great antiquity for the family on that island. This observation agrees with the general pattern for the family in Africa in suggesting that plants of this family are relatively recent arrivals on that continent. Indeed this generality could be extended to apply to the Old World as a whole, where there is no endemic genus of the family (as opposed to 16 endemic genera and 2 endemic tribes—Lopezieae and Onagreae—in the New World, principally in Mexico and the western United States) and relatively few endemic sections or subgenera.

The ten African species and one subspecies of *Epilobium* recognized are described, and a key provided.

INTRODUCTION

The genus *Epilobium* (Onagraceae) probably comprises more than 200 species, but is best represented at relatively high latitudes. Thus only a few members of the genus occur in Africa. Nevertheless, the ten species and one additional subspecies here recognized for the continent provide an interesting pattern phylogeographically, and it has been more than 80 years since the last attempt to treat them as a group. Representatives of the specimens examined are cited under each species.

In fact, the only comprehensive treatment that attempts to cover all African species of *Epilobium* is that of Carl Haussknecht who, in his Monographie der Gattung *Epilobium* (1884), included a section on the species found in Africa. Relatively little material was available from Africa at the time Haussknecht wrote, and he adopted a narrow species concept for the characteristically African group including *E. capense*, *E. salignum* and *E. stereophyllum*. Haussknecht considered material, that is here referred to one of these three species, as belonging to a total of 13 species, five of which are here referred to *E. capense* and four each to the other two. He recognized eight other species from Africa, among which *E. angustifolium* and *E. lamyi* (= *E. tetragonum* subsp. *lamyi*) are considered as doubtfully African in the present work, *E. madeirense* a synonym of *E. obscurum*, and *E. tournefortii* a subspecies of *E. tetragonum* (Haussknecht's *E. adnatum*).

Following Haussknecht's revision, new species, subspecies and varieties were described from tropical and southern Africa by various European authors, including Hector Léveillé, Th. Loesener, Adolph Engler, W. P. Hiern and E. G. Baker. Not a single one of these is considered worthy of taxonomic recognition in the present

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treatment. By the early part of this century, there were some 26 names that had been applied to various forms of the three species that ranged into tropical Africa: *E. capense*, *E. salignum* and *E. stereophyllum*. Various authors working on regional treatments or works of more limited scope, for example H. Lévillé, *l.c. Gen. Epil.* 68 (1910), and W. Robyns, *Fl. Sperm. Parc Nat. Albert 1: 684* (1948), clearly realized that not all of these entities were distinct. The first comprehensive attempt to compare them, however, was undertaken by J. P. M. Brenan of the Royal Botanic Gardens, Kew, in preparing his treatments of Onagraceae for the floras of East and West Tropical Africa. For the first time, Brenan brought together these segregates into the same three species that are recognized here, and the present treatment is largely based on an extension of his concepts beyond his geographical limits.

Several entities were likewise described from North Africa, of which *E. atlanticum* and *E. psilotum* are strikingly distinct endemics of the Haut Atlas, the former also occurring in the Sierra Nevada of Spain. Several other entities recently described from North Africa, namely *E. mirei* Quezel, *E. numidicum* (Batt.) Batt., *E. × caballeroi* Pau and *E. tetragonum* var. *ampelusia* Maire, are here reduced to synonymy.

RELATIONSHIPS OF THE AFRICAN SPECIES

To summarize the preceding discussion, Haussknecht recognized 22 species of *Epilobium* from Africa, of which two are tentatively excluded from the flora, 11 reduced to synonymy and one regarded as a subspecies. Two more recently described species are added, bringing the continental total to 10 species and one additional subspecies. Of these, five (*E. hirsutum*, *E. parviflorum*, *E. lanceolatum*, *E. tetragonum* subsp. *tetragonum* and *E. obscurum*) range widely in Europe; two others (*E. tetragonum* subsp. *tournefortii* and *E. atlanticum*) have Mediterranean distributions and are found in Europe; and one (*E. psilotum*, endemic to the Haut Atlas of Morocco) is clearly related to European and north temperate species. Thus these eight species and subspecies are identical with or closely related to European species, and may have reached Africa relatively recently. *Epilobium hirsutum* extends down the eastern half of the continent to South Africa, where it is common, and *E. tetragonum* subsp. *tetragonum* is likewise common in South Africa where it was probably introduced from Europe. The other six species and subspecies are restricted to the Atlantic islands and to a narrow band within 150 miles of the Mediterranean, extending from Morocco to Tunisia.

The remaining three species, *E. capense*, *E. salignum* and *E. stereophyllum*, are a characteristically African group without any clear affinities elsewhere in the genus. *Epilobium capense*, found from southern Tanzania to the Cape, is an extremely variable species with a deeply 4-lobed stigma. The other two species have more or less clavate, undivided stigmas, and occur in the mountains of east Africa. *Epilobium stereophyllum* ranges from equatorial east Africa north to the mountains of Ethiopia, where it is common and variable, whereas *E. salignum* which overlaps with *E. stereophyllum* in the northern end of its range, occurs from the equatorial mountains south to the eastern half of South Africa. Both *E. capense* and *E. salignum* are found on Madagascar, where they are the only two species of the genus present.

In the light of the data presented in this revision, it is interesting to consider the representation of the family Onagraceae as a whole in Africa. Three native genera occur in this continent: *Circaea*, *Epilobium* and *Ludwigia* (including *Jussiaea*). The only other genus of the family which has native species in the Old World is *Fuchsia*, with an endemic subgenus in New Zealand and Tahiti. *Circaea* is a characteristic North Temperate genus not represented at all in the Southern Hemisphere; a single widespread European species, *C. lutetiana* L. subsp. *lutetiana*, reaches North Africa, where it occurs only in the coastal mountains of Algeria and Tunisia. In its pattern of distribution it is obviously comparable to the primarily European taxa of *Epilobium*

discussed above and, like them, it may have reached Africa relatively recently. If the European species of *Epilobium* did not reach Africa over water, it is difficult to account for the absence in Africa of such characteristic European taxa as *E. angustifolium* L., *E. montanum* L., *E. collinum* Gmel., *E. tetragonum* subsp. *lamyi* (F. W. Schultz) H. Lév., *E. roseum* Schreb. and *E. palustre* L. The ability of the genus to disperse, by means of its plumed seeds, across considerable water barriers, is clearly illustrated by the presence of three species on Madeira, more than 400 miles from the mainland (in an area where no species of *Epilobium* grows); two on the Azores, more than 800 miles from the mainland; and four on the Canary Islands, far from the nearest stations for the species involved. There seems no compelling reason to think the eight primarily European taxa of *Epilobium* and *Circaea lutetiana* may not have reached Africa relatively recently, as the result of chance dispersal.

In *Ludwigia*, for which I recently revised the Old World species (in Reinwardtia 6: 327-427, 1963), the pattern is very different. The genus is primarily tropical in distribution, although it does include characteristically North Temperate groups. One species of clear North Temperate affinities, *L. palustris* (L.) Ell., occurs in coastal Morocco, Algeria and Tunisia (in the same area as the characteristically European species of *Epilobium* and *Circaea*), as well as on Socotra and in temperate southern Africa, in both of which areas it may well have been introduced. South America is clearly the centre of distribution and evolution of the tropical species of *Ludwigia*, and five of the 13 remaining African species* are shared with South America, from which two were certainly, and all may possibly have been, introduced. One other *L. perennis* L., is found nearly throughout the tropics of the Old World. The seven remaining species are essentially endemic to Africa, and represent six sections, four of them endemic to Africa. The four endemic sections have no evident relationship to one another, and it is therefore likely that several lines of the genus reached tropical Africa at a relatively early date, with others coming more recently, up to the present. The characteristic African group of *Epilobium* (comprising *E. capense*, *E. salignum* and *E. stereophyllum*) probably likewise reached Africa at a fairly early date and evolved their characteristic combinations of characteristics in isolation there.

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* I now regard *L. pulvinaris* Gilg as a synonym of *L. senegalensis* (DC.) Troch.

of Science, Lisboa; British Museum (Natural History), London; Institut de Botanique, Université de Montpellier; Botanische Staatssammlung, München; The East African Herbarium, Nairobi; Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris; National Herbarium, Botanical Research Institute, Pretoria; Federal Herbarium, Salisbury; Dudley Herbarium, Stanford University; Botanical Department, Naturhistoriska Riksmuseum, Stockholm; and U.S. National Museum, Washington.

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EPILOBIUM

KEY TO THE AFRICAN SPECIES

Stigma deeply 4-cleft:

Stems clothed with spreading pubescence; leaves sessile:

- Leaves distinctly clasping at base; petals 6–16 mm long..... 1. *E. hirsutum*
 Leaves not clasping at base; petals (4–)6–9 mm long..... 2. *E. parviflorum*

Stems clothed with appressed pubescence or subglabrous; leaves petiolate:

- Leaves narrowly cuneate at base, the petiole 3–10 mm long; petals white, fading rose; inflorescence drooping in bud..... 3. *E. lanceolatum*
 Leaves not narrowly cuneate at base, the petiole 1–2.5 mm long; inflorescence not drooping in bud..... 8. *E. capense*

Stigma entire, clavate or capitate:

Plants pubescent:

- Plants less than 3 dm tall, with conspicuous leafy stolons creeping through cushions of moss; Haut Atlas of Morocco..... 6. *E. atlanticum*

Plants usually taller and lacking leafy stolons:

- Pubescence entirely strigose except for a few glandular trichomes on the calyx; plants with leafy stolons at the base; Madeira and Canary Islands..... 5. *E. obscurum*

Pubescence entirely strigose or with a copious admixture of glandular trichomes; plants lacking leafy stolons:

Leaves narrow, sessile and strongly decurrent, evenly and strongly denticulate; flowers erect at anthesis:

- Petals 2.5–5(–7) mm long; stigma surrounded by the anthers at anthesis 4a. *E. tetragonum*
 subsp. *tetragonum*

- Petals 7–12 mm long; stigma held above the anthers at anthesis 4b. *E. tetragonum* subsp. *tournefortii*

Leaves often broader, distinctly petiolate (the petiole often short), not decurrent; flowers usually strongly nodding at anthesis:

- Cauline leaves normally broadly rounded to subcordate at base; petals rose-purple, 6–16 mm long, 4–11 mm wide..... 9. *E. stereophyllum*

- Cauline leaves cuneate to narrowly rounded at base; petals white or cream, then rose following pollination, 5–15 mm long, 2–7 mm wide..... 10. *E. salignum*

Plants entirely glabrous, to 2.5 dm tall..... 7. *E. psilotum*

1. *Epilobium hirsutum* L., Sp. Pl. 347 (1753); Harv. in Fl. Cap. 2 : 506 (1862); Oliv. in Fl. Trop. Afr. 2 : 487 (1871); Hausskn., Monogr. Epil. 53, t. 1, fig. 20 (1884); Batt. in Batt. & Trab., Fl. Alger. 316 (1889); H. Lévl., Ic. Gen. Epil. tt.230, 231 (1911); Muschler, Man. Fl. Egypt 679 (1912); Jehandiez & Maire, Cat. Pl. Maroc. 2 : 516 (1932); Adamson in Fl. Cape Penins. 605 (1950); Andrews, Fl. Pl. Anglo-Egypt. Sudan 1 : 143 (1950); Täckholm, Stud. Fl. Egypt 208 (1956); Ross-Craig, Drawings Brit. Pl. 9 : t.18 (1958); Quezel & Santa, Fl. Nouv. Alger 2 : 640 (1963). Type: from Europe.

E. tomentosum Vent., Descr. Pl. Nouv. Jard. Cels. t.90 (1802). Type: from Persia, cultivated in France. *E. hirsutum* var. *villosissimum* ("villosissima") Koch, Syn. Fl. Germ. Helv., ed. 1 : 240 (1835); Batt. in Batt. & Trab., Fl. Alger. 316 (1889); Brenan in Fl. Trop. E. Afr., Onagraceae: 2, fig. 1 (1953); Fernandes & Fernandes in Garcia de Orta 5 : 473 (1957); 7 : 493 (1959). Type: presumably from central Europe. —var. *tomentosum* (Vent.) Boiss., Fl. Or. 2 : 746 (1872). —var. *villosum* Hausskn., Monogr. Epil. 55 (1884). No type indicated. —var. *africanum* H. Lév. in Bull. Herb. Boiss., ser. 2, 7 : 589 (1907). *E. mirei* Quezel in Bull. Soc. Hist. Nat. Afr. Nord. 48 : 90 (1957).

Robust herb, 0·2–2·5 m tall, the subligneous stems sometimes persistent; rhizome stout, producing thick white underground runners with very scattered cataphylls; plants more or less white-pubescent, densely covered, especially in the inflorescence, with long spreading trichomes. *Leavers* mostly opposite, alternate above, oblong-lanceolate, densely hairy, acute, sessile, clasping at the base, coarsely toothed, 2–12 × 0·5–4 cm; rosette leaves longer and less hairy than later leaves; young leaves more glabrous, to 20 cm long, petiole to 5 cm. *Inflorescence* with an admixture of glandular trichomes, erect in bud; flowers erect in bud. *Hypanthium* 2·5–3 m across c. 1–1·5 m deep. *Sepals* 6–10 mm long, 2–2·5 mm wide, apiculate. *Petals* 6–16 mm long, 6–15 mm wide, deeply notched, bright purplish-rose. *Anthers* 1·5–2 mm long, the filaments of the longer 3·5–6 mm long, of the shorter 2–3 mm long. *Styles* 6–10 mm long; stigma deeply 4-lobed, held above the anthers at anthesis, the lobes 1·5–2·5 mm long. *Capsules* densely villous, 3–8 cm long, on a pedicel 2–12 mm long; seeds dark brown or even coppery, oblong-obovoid, acute at the base, coarsely papillate, 0·9–1·15 mm long, the coma 5–7 mm long, dull white. Gametic chromosome number, $n = 18$. Reportedly protandrous.

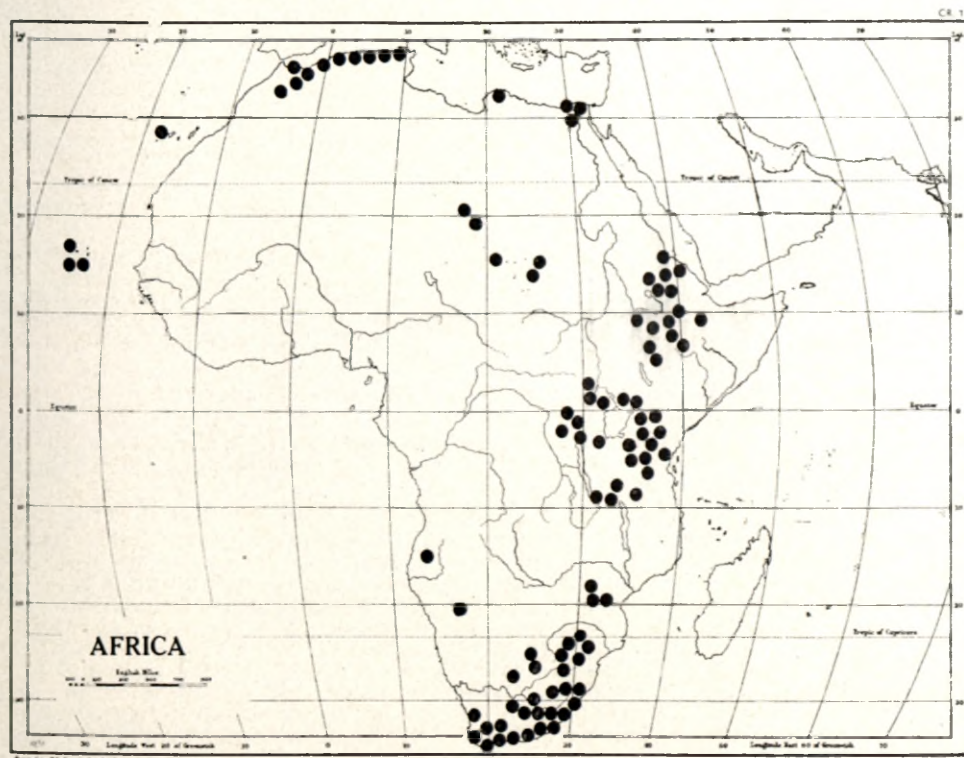


FIG. 1.—Range of *Epilobium hirsutum* in Africa.

Geographical range (Fig. 1): Wet places as in swamps and marshes and beside rivers and lakes, Canary Islands, Cape Verde Islands, and Morocco along the coast of North Africa to Egypt, whence south in the eastern part of the continent to the Cape; sea level to 2,600 m elevation, but mostly above 1,200 m elevation in equatorial regions. The species ranges throughout Europe except for the extreme north and across Asia to China and Japan, reaching south to about 27° N in Nepal. It has become naturalized in North America.

CANARY ISLANDS.—La Palma, Gran Caldera, in 1892, *Murray* s.n. (K).

CAPE VERDE ISLANDS.—Santo Antão, Cova, Bordeiros, *Chevalier* 45606 (P). San Tiago, Ponta da Cruz, *Chevalier* 44610 (COI, K, P). Fogo, at the Fonte up Monte Whuco, *Lowe* s.n. (BM).

MOROCCO.—Bou Gamez Taorirt near Ait Milch, c.2000 m, *Spence* S189 (E). Arrond, Haut Atlas, c.2000 m, *Polunin* 2172 (BM).

SPANISH MOROCCO.—near Xauen, 600 m, *Font Quer* 289 (BM, G).

ALGERIA.—Sidi-bel-Abbis, prov. d'Oran, in 1863, *Lefrane* s.n. (P). Environs d'Alger, in 1856, *Durando* s.n. (E). Kroubs, Dep. Constantine, in 1954, *Doppelbauer* s.n. (M).

TUNISIA.—Au Nord d'Aïn Draham, Kroumirie, in 1883, *Cosson* et al. s.n. (P).

LIBYA.—Cyrenaica, Derna, U. Derna, *Pampanini & Pichi-Sermolli* 5367 (FI).

EGYPT.—Marais entre le canal Makmoudieh et le Ch. du fer du Caire, sous Alexandrie, in 1871, *Du Parquet* s.n. (P). Entre le Jardin du Khédive et l'extrémité du petit lac du Bamleh, in 1872, *Du Parquet* s.n. (P).

CHAD.—Mare d'Arigui, *Miré* (herb. Quezel). Tigui, in 1956, *Quezel* s.n. (herb. Quezel; holotype of *E. mirei*). Tibesti, Nema-Nemasso, 1400 m, *Quezel* s.n. (herb. Quezel).

SUDAN.—Darfur Prov., Nyuringya, on west side of Marra Mountains, c. 2000 m, *Dandy* 169 (BM). Darfur Prov., Suni, 1700 m, *Robertson* 117 (BM).

ETHIOPIA.—Eritrea, Hamasen, road from Asmara to Keren, *Buscaloni* 400 (FI). Begemdir, Gondar and vicinity, *Massey* 8 (K). Shoa, near Wofasha, 39° 48' E, 9° 44' N, 2500 m, *Mooney* 7886 (BR, K). Harar, Galla Pass, 2250 m, 9° 28' N, 42° 19' E, *Gillett* 5168 (F, K, P).

REPUBLIC OF THE CONGO.—Orientale, entre Aru et Mahagi, Yibali-Ytieri, 1650 m, *Lebrun* 3731 (BR). Kivu, Terr. Lubero, S.A.L. Luhotu, route Lubero-Butembo, 2100 m, *Christiaensen* 2127 (BR).

RWANDA.—Lubona, Astrida, 1700 m, *Becquet* 701 (BR).

BURUNDI.—Muruketchu, Ngozi, 1700 m, *Becquet* 873 (BR).

UGANDA.—West of Lake Bunyoni, 35 miles east of Rutshuru, 220 m, *Chapin* 268 (BR, US). N. E. Elgon, 8,000 feet, *Tweedie* 711 (BR, K).

KENYA.—Endebiss, 7,500 feet, *Webster* (EA). South side of Lake Naivasha, 1870 m, *Mearns* 701 (BM, BR, US).

TANZANIA.—Muleha, Makuyuni Dist., *Koritschoner* 1360 (EA, K). Kilimanjaro, southeast side, 1800 m, *Schlieben* 4383 (BM, BR, G, LISC, M). Near Mondo, Kondo Dist., 1340 m, *Burt* 1022 (BM, EA, K). Uluguru, Uhehe, Usangu, *V. Prittowitz & Gaffron* 104 (BM). Mbeya Forest Reserve, Mbeya, Southern Highlands, 2,400 m, *Myembe* 53 (EA, K).

ANGOLA.—Huila, *Mendes* 1408 (LISC). Huila, ad rivulem de Lopolo, 1500 m, *Welwitsch* 4457 (BM, COI, K, G, LISU, P).

MOZAMBIQUE.—Manica e Sofala, Himalaya, roadside in indigenous forest down P.E.A. side, 1400 m, *Lady Drewe* 26 (BM, SRGH).

RHODESIA.—Mazoe, 1350 m, *Eyles* 524 (BM, BOL, K, PRE, SAM, SRGH). Mann's Farm, Salisbury Dist., *Drummond* 6781 (COI, EA, K, M, SRGH). Inyanga Dist., near Cheshire, c.1300 m, *Norlindh & Weimarck* 4795 (BM, BR, K, PRE).

SOUTH WEST AFRICA.—Gross Waterberg Mt., near Waterberg, *Rodin* 2586 (BOL, K, PRE, US).

SOUTH AFRICA.—CAPE.—Aliwal North: Eland's Hoek, 1350 m, *Bolus* 29 (BOL). Bedford: Upper Cowie, 750 m, *Bennie* 264 (PRE). Bredasdorp: Papiessvlei, near Elim, 100 m, *Schlechter* 10446 (BM, BOL, BR, E, GRA, K, P, PRE, US). Peninsula: Camps Bay, *Marloth* 6044 (PRE). Clanwilliam: Clanwilliam, *Leipoldt* 138 (PRE). Kuruman: Batlharo, *Silk* 269 (BOL, K). Matatiele: Mvenyani, P.O. Cedarville, *Bandirt* 166 (PRE). Riversdale: Plattebosch, near Still Bay, 30 m, *Muir* 103 (J). ORANGE FREE STATE.—Harrismith: Harrismith, in 1928, *Kulling* s.n. (PRE). Vredfort: Parys, Vaal River, *Obermeijer* s.n. (BOL). NATAL.—Estcourt: Winterton, *King* 357 (NH). Umzinto: 750 m, *Rudatis* 1649 (BM, E, G, K, P, PRE, US). TRANSVAAL.—Barberton: near Barberton, *Thorncroft* 1070 (K). Letaba: 1050 m, *Scheepers* 625 (K). Lichtenburg: Lichtenburg, *Jenkins* 11203 (BOL). Lydenburg: Lydenburg, 1600 m, *Schlechter* 3939 (BM, BOL, BR, COI, GRA, K, P, PRE). Pretoria: Pretoria, *Rehmann* 4752 (GRA). Soutpansberg: Louis Trichardt, in 1919, *Breyer* s.n. (PRE).

LESOTHO.—Leribe, *Dieterlen* 764 (K, NH, P, PRE, SAM). Roma 5500 ft., *Ruch* 1581 (PRE).

Epilobium hirsutum is, as pointed out by Brenan (in Turrill and Milne-Redhead, Fl. Trop. E. Afr., Onagraceae : 3, 1953), relatively uniform in appearance in Africa, in contrast to its great variability in the European and Asiatic portions of its range. Brenan (l.c.) suggested that this might indicate the possibility of a "relatively recent and rapid migration southwards of a single race capable of withstanding African conditions". On the other hand, it is interesting to note that Michaelis (in Zeitschr. Pflanzenzuchtung 30 : 250-275, 1951) found that cytoplasmically, South African strains of *E. hirsutum* were distinct from all European ones he tested. The present species is relatively rare between lat. 10° S and lat 20° S, but again abundant in South Africa; but there is apparently no strong reason to think that it reached South Africa in historical times.

Epilobium hirsutum grows with *E. capense*, *E. salignum* and *E. tetragonum* subsp. *tetragonum* in South Africa. I have seen one specimen of what is surely a hybrid between *E. capense* and *E. hirsutum*, from South Africa: Mt. Currie Dist., near Kokstad, 1500 m, Feb. 1883, Tyson 1423 (SAM). This sheet consists of two branches, both evidently from a single vigorous plant, and is perfectly intermediate between the parental species. The pubescence is somewhat appressed but longer than in *E. capense*, the leaves almost sessile, with teeth intermediate between the forward-directed ones of *E. capense* and the spreading ones of *E. hirsutum* and the plants have large, purplish-rose petals. The capsules are obviously failing to set, and only 20.6 per cent of the pollen was stainable in cotton blue in lactophenol, based on an examination of 1,500 grains. Generally only one grain of each tetrad was filled. Hybrids with *E. salignum* and *E. tetragonum* have not been observed, although the hybrid with the last-mentioned species is known to be rather frequent in Europe.

Epilobium caballeroi, supposed to be the hybrid between *E. hirsutum* and *E. tetragonum* subsp. *tournefortii*, is here considered a synonym of *E. parviflorum*. *Epilobium mirei* is clearly a form of *E. hirsutum* with relatively small flowers and small, rounded leaves. Such plants are often found among European material, particularly among those flowering late in the season or in relatively dry habitats. I have no records of *E. hirsutum* growing with any other species in North Africa or on the Atlantic islands, although it must occasionally do so. Hybrids with *E. lanceolatum*, *E. obscurum*, *E. parviflorum* and *E. tetragonum* subsp. *tetragonum* are known from Europe, and the hybrid with *E. tetragonum* subsp. *tournefortii* has been described from Syria (Hausskn., Monogr. Epil. 74, 1884).

2. ***Epilobium parviflorum* Schreb.**, Spicil. Fl. Lips. 146, 155 (1771); Lowe, Man. Fl. Madeira 1 : 271 (1868); Hausskn., Monogr. Epil. 66, t.I fig. 21 (1884); Webb & Berthol., Hist. Nat. Îles Canar. 3, 2 : 7 (1888); Batt. in Batt. & Trab., Fl. Alger. 316 (1889); Pitard & Proust, Fl. Arch. Îles Canar. 183 (1909); H. Lév., Ic. Gen. Epil. t. 232 (1911); Maire, Cat. Pl. Maroc 2 : 516 (1932); Ross-Craig, Drawings Brit. Pl. 11 : t.19 (1958); Quezel & Santa, Fl. Nouv. Alger 3 : 640 (1963). Type: from Europe.

E. parviflorum var. *numidicum* Batt. in Bull. Soc. Bot. Fr. 40 : 478 (1896). *E. numidicum* (Batt.) Batt. in Batt. & Trab., Synop. Alger. 127 (1902); Quezel & Santa, Fl. Nouv. Alger 2 : 640 (1963). *Epilobium* × *caballeroi* Pau ("*E. hirsutum* × *tournefortii*") in Bol. Soc. Esp. Hist. Nat. 22 : 59 (1922); Jehandiez & Maire, Cat. Pl. Maroc. 2 : 516 (1932). *E. parviflorum* "var. *mollissimum* (Welw.) H. Lév."; Jehandiez & Maire, Cat. Pl. Maroc 2 : 516 (1932).

Perennial herb, 0.2-1.4 m tall; in autumn producing short-stalked leafy rosettes near the base of the plant; plants covered with short soft spreading hairs throughout, the stems with raised lines decurrent from the margins of the petioles, glandular-pubescent in the inflorescence or rarely subglabrous. *Leaves* narrowly lanceolate to narrowly ovate, 3-12 cm long, 1-3.5 cm wide, acute, sessile, denticulate, softly

hairy, opposite below, alternate in the upper half. *Inflorescence* erect in bud. *Hypanthium* 1·1–9 mm deep, 1·3–2 mm across at the summit. *Sepals* (2–) 3–6 mm long, (1–) 1·4–2 mm wide at the base, lanceolate, acute. *Petals* (4–) 6–9 mm long, 3·5–4·8 mm wide, deeply notched, rose-purple. *Anthers* 1–1·2 mm long, the filaments of the longer 1·8–3·5 mm long, of the shorter 1–2 mm long. *Style* 2·2–4·7 mm long; stigma 4-lobed, the lobes 1–1·8 mm long, surrounded by the shedding anthers at anthesis. *Capsule* 3·5–7 cm long, glabrous to densely pubescent with erect hairs, on a pedicel 0·8–1·7 cm long; seeds brown, obovoid, rounded at the base, coarsely papillose, 0·9–1 mm long, the coma c. 5–6 mm long, dull white. Gametic chromosome number, $n = 18$.

Geographical range (Fig. 2): In moist places from sea level to 1700 m elevation, Madeira, Canary Islands, and from Morocco to Tunisia. Also known from the Azores (e.g. July, 1868, *Drouet*, BM). The general range of this species is from Europe, where it occurs throughout except for the extreme north, to western China. In the Himalaya it ranges east to Nepal at about 27° N lat.

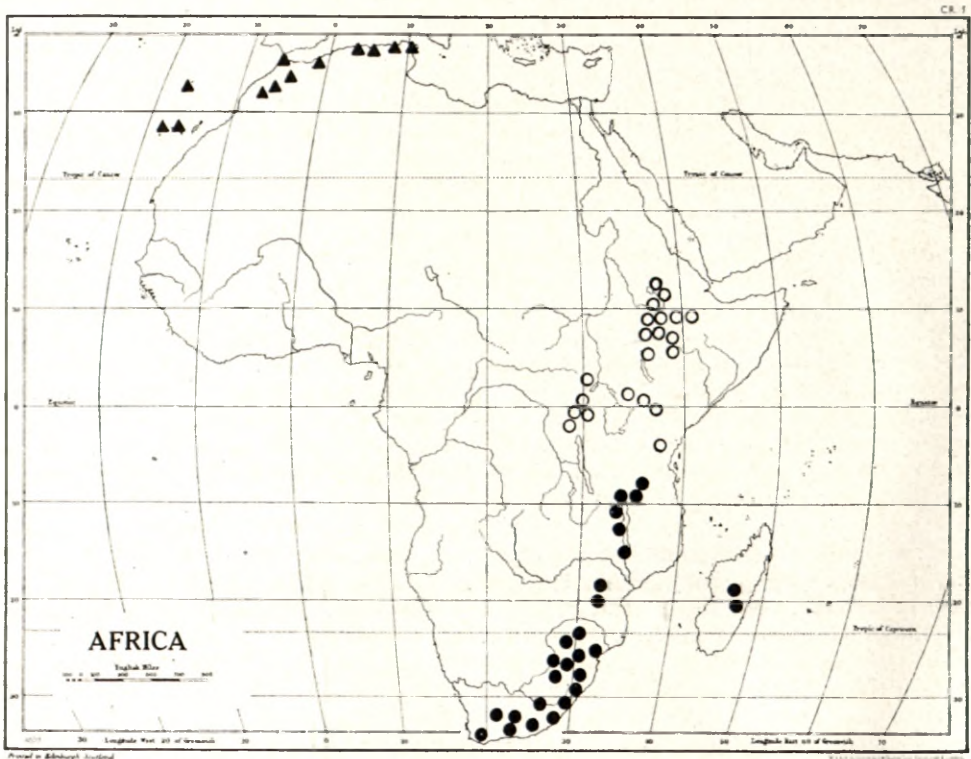


FIG. 2.—Range of *Epibolium parviflorum* in Africa (triangles), and total range of *E. stereophyllum* (circles) and of *E. capense* (dots).

MADEIRA.—Along the Levada in the Ribeira d'Ametade, in 1849, *Lowe* s.n. (BM). Queimadas, bank of Levada in woodland (*Erica scoparia*), 1000 m, *Coleridge* 8 (BM).

CANARY ISLANDS.—La Palma, Barranco del Río, *Sprague & Hutchinson* 211 (K). Gomera, San Sebastián, in 1905, *Pitard* s.n. (P). Tenerife, San Andreas, *Knoche* 116 (DS).

TANGIER.—Fide Haussknecht, *Monogr. Epil.* 67 (1884).

SPANISH MOROCCO.—Xauen, in 1921, *Vidal* s.n. (MA, holotype of *E. caballeroi*, not seen; photograph, DS).

MOROCCO.—Great Atlas, in valley of the Aïd Messane, c. 1300 m, *Lindberg* 3664 (K). Middle Atlas, Ras-el-Ma, *Wooddell* 157 (BM). Moyen Atlas, Daïet Achlef, bords de la Daya, 1700 m, *Jehandiez* 583 (P).

ALGERIA.—Murs de Tlemcen, *Jourdan* 111 (P). Kerrata, Kabylie, 800 m, in 1897, *Reverchon* s.n. (E). La Calle, *Battandier* (MPU, lectotype of *E. numidicum*). Djebel Megris, *Battandier* (MPU).

TUNISIA.—Burgous, Tunis, *Letourneux* (P).

Epilobium caballeroi was described as a hybrid between *E. hirsutum* and *E. tetragonum* subsp. *tournefortii* but, in a photograph of the type (DS), it seems clearly to be a luxuriant form of *E. parviflorum*. The petals were described as being 10 mm long, but no flowers this large are visible on the photograph I have examined, the largest being about 8 mm long. *Epilobium numidicum* is likewise, although relatively slender in habit, indistinguishable from many European plants of *E. parviflorum*.

Hausknecht (Monogr. Epil. 67, 1884) also recorded *E. parviflorum* from Santa Antão in the Cape Verde Islands. I have seen no material, and A. & R. Fernandes do not mention it in their treatment of the Onagraceae of these islands (in Garcia de Orta 5 : 473–474, 1957). Its presence there requires confirmation.

I have no records of *E. parviflorum* growing with other species in North Africa or on the Atlantic islands, but hybrids with *E. hirsutum*, *E. lanceolatum*, *E. tetragonum* subsp. *tetragonum* and *E. obscurum* are known from Europe.

3. *Epilobium lanceolatum* *Seb. & Mauri*, Fl. Rom. Prod. 138 (1818); Hauskn., Monogr. Epil. 90, t. II fig. 22 (1884); Batt. in Batt. & Trab., Fl. Alger. 316 (1889); Ross-Craig, Drawings Brit. Pl. 11: t. 21 (1958); Quezel & Santa, Fl. Nouv. Alger 2 : 639 (1963). Type: from Europe.

Perennial herb, 0·1–0·6 m tall, producing leafy rosettes at ground level in autumn; stems strigulose usually with a strong admixture of glandular hairs above and in the inflorescence, or more rarely subglabrous below, with obscurely marked raised lines running down a short distance from the margins of the petioles. Leaves elliptical to elliptical-lanceolate, 3–12 cm long, 1·3–5 cm wide, acute, narrowly cuneate at the base, on a petiole 3–10 mm long, sharply serrulate, opposite near the base, alternate above. Inflorescence drooping in bud, the pubescence strigulose with many glandular hairs intermixed; flowers erect in bud. Hypanthium 1·1–2 mm deep, 1–1·3 mm across at the summit. Sepals 3–4·5 mm long, 0·8–1·3 mm wide at base, lanceolate, acute. Petals 4·5–8 mm long, 2·6–4 mm wide, shallowly notched, white or very pale purplish-rose at first, becoming darker after pollination. Anthers 0·8–1·1 mm long, the filaments of the longer 3–5 mm long, of the shorter 2·5–3·2 mm long. Styles 4·5–5·5 mm long; stigma 4-lobed, the lobes c. 1 mm long, erect or spreading, surrounded by the shedding anthers at anthesis. Capsules strigulose, usually with an admixture of glandular hairs, 3–7 cm long, on a pedicel 1–2·5 cm long; seeds reddish-brown, oblong-obovoid, acute at the base, finely papillose, c. 1 mm long, the coma c. 5 mm long, dull white. Gametic chromosome number, $n = 18$.

Geographical range (Fig. 3): Petite Kabylie and Djuradjura Mountains of northern Algeria (cf. Hauskn., Monogr. Epil. 92, 1884). The general range of this distinctive species is in Europe, where it is common in the central and southern parts and rarer northwards, eastward to western and central Anatolia and the Caucasus.

ALGERIA.—Djebel Tabor, Petite Kabylie, prov. de Constantine, 22 July, 1861, *Cosson* (P); 25 June, 1880, *Cosson* (P).

Epilobium lanceolatum is not known to grow with other species in Africa, although it may do so. Hybrids with *E. hirsutum*, *E. obscurum*, *E. parviflorum*, and *E. tetragonum* subsp. *tetragonum* have been described from European material.

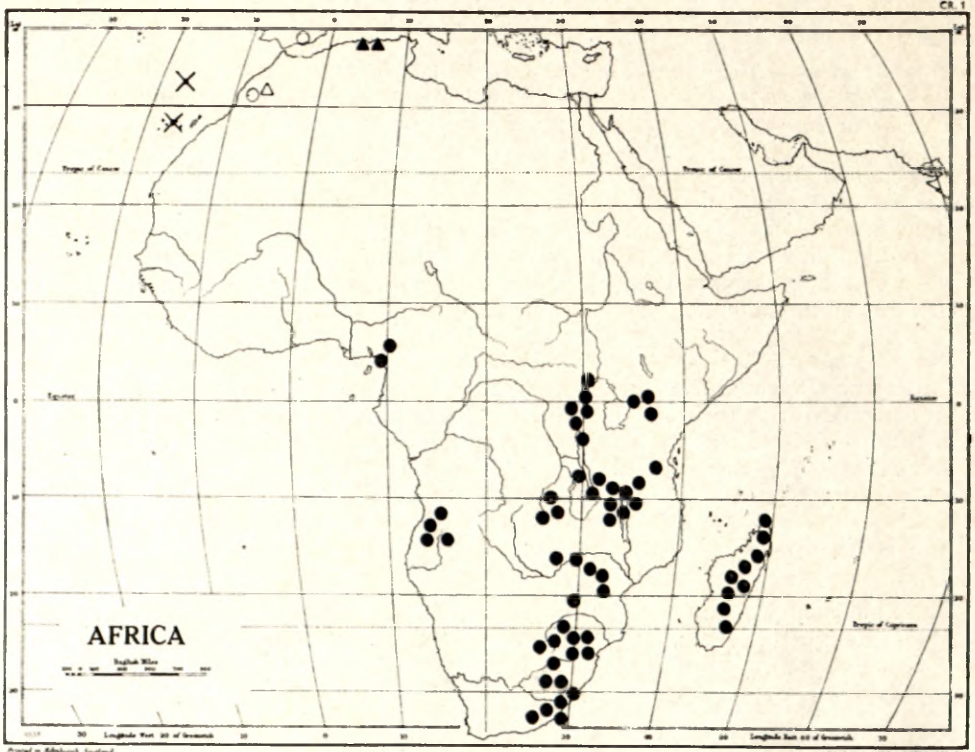


FIG. 3.—Ranges of *Epilobium obscurum* (crosses) and *E. lanceolatum* (solid triangles) in Africa, and total ranges of *E. atlanticum* (circles), *E. psilotum* (hollow triangle), and *E. salignum* (dots).

The related *E. montanum* L., a Eurasian species not otherwise known from Africa, was collected once as an introduced plant on Madeira: "A weed in the Rectory Garden, Lea", August, 1863, Lowe (G). It can easily be distinguished from *E. lanceolatum* by its leaves, which are rounded at the base, and the colour of its petals, which are bright purplish pink from the time they first open.

4. *Epilobium tetragonum* L., Sp. Pl. 1 : 348 (1753); Harv. in Fl. Cap. 2 : 597 (7862); Lowe, Man. Fl. Madeira 1 : 273 (1868); Batt. in Batt. & Trab., Fl. Alger. 315 (1889); Pitard & Proust, Fl. Arch. Îles Canar. 183 (1909); Jehandiez & Maire, Cat. Pl. Maroc 2 : 515 (1932); Adamson in Fl. Cape Penins. 606 (1950); Quezel & Santa, Fl. Nouv. Alger. 2 : 639 (1963). Type: from near Montpellier, France.

Perennial herb, often flowering the first year, 0.1–1.8 m tall; in autumn producing leafy rosettes from short stolons near the base; plants strigulose, especially above, and with raised lines running down from the bases of the petioles, these pubescent above. Leaves narrowly lanceolate to nearly elliptical, 1.5–7.5 cm long, 0.3–1.5 (–2.1) cm wide, bluish-green, mostly opposite, alternate above, acute, subsessile and usually decurrent into the raised lines on the stem, evenly and strongly denticulate. Inflorescence erect in bud; pubescence of inflorescence entirely strigulose; flowers erect in bud. Hypanthium 0.8–2.5 mm deep, 1–3.5 mm across at summit. Sepals 2–8–7.5 mm long, 0.8–2.2 mm wide at base, lanceolate, apiculate. Petals 2.5–12 mm long, 1.8–7 mm wide, shallowly notched, pale lilac to rich rose-purple. Anthers 0.3–3 mm long, the filaments of the longer 1.3–4 mm long, of the shorter 0.3–3 mm long, the filaments of the longer 1.3–4 mm long, of the shorter 0.3–2.2 mm long.

Styles 1.5–9 mm long; stigma clavate, 1.8–3.6 mm long, surrounded by or held well above the shedding anthers at anthesis. *Capsules* densely strigulose, (3.5–) 5–11 cm long, on a pedicel 1.2–3 cm long; seeds brown, oblong-obovoid, acute at the base, coarsely papillose, 1–1.3 mm long, the coma c. 8–10 mm long, dull white. Gametic chromosome number, $n = 18$.

(a) subsp. **tetragonum**

E. adnatum Griseb. in Bot. Zeit. 10 : 851 (1852); Hausskn., Monogr. Epil. 97, t. II fig. 31 (1884); Ross-Craig, Drawings Brit. Pl. 11 : t. 24 (1958). Type: from Europe. *E. tetragonum* subsp. *adnatum* (Griseb.) Maire in Jehandiez & Maire, Cat. Pl. Maroc 2 : 515 (1932); Quezel & Santa, Fl. Nouv. Alger 2 : 639 (1963). —var. *ampelusii* Maire, Mém. Soc. Sci. Nat. Maroc 15 : 33 (1927); Jehandiez & Maire, Cat. Pl. Maroc 2 : 515 (1932). —var. *rodriguezii* "(Hausskn.)" Maire in Mem. Soc. Sci. Nat. Maroc 15 : 33 (1926); Jehandiez & Maire, Cat. Pl. Maroc 2 : 515 (1932). *E. virgatum* sensu Batt. in Batt. & Trab., Fl. Alger. 315 (1889); non Lam., Dict. Encycl. 2 : 375 (1786). *E. palustre* sensu Webb & Berthelot, Hist. Nat. Îles Canar. 3, 2 : 8 (1888); Pitard & Proust, Fl. Arch. Îles Canar. 184 (1909), probably; non L., Sp. Pl. 348 (1753). *E. capense* sensu H. Lév., Ic. Epil. t. 40 (1910); non Buch. ex Hochst. in Krauss in Flora 27 : 425 (1844).

Plants mostly 0.1–1 m tall, autogamous. *Hypanthium* c. 1 mm across and deep. *Sepals* 2.8–4.2 mm long, 0.8–1.8 mm wide at base. *Petals* 2.5–5(–7) mm long, 2.3–5(–4.5) mm wide, pale lilac. *Anthers* 0.3–1.3 mm long, the filaments of the longer 1.3–2.1 mm long, of the shorter 0.3–1.2 mm long. *Styles* 1.5–3.2 mm long; stigma surrounded by the shedding anthers at anthesis. *Capsules* (3.5–)5–11 cm long. Gametic chromosome number, $n = 18$.

Geographical range (Fig. 4): Generally in moist places, Madeira, Canary Islands, and from Tangier to Tunisia in the coastal hills and mountains at low elevations. The general range is throughout Europe, except for the extreme north, east to Iran and the Caucasus.

MADEIRA.—Cliffs to the east of Funchal, in 1862, *Lowe* s.n. (BM).

CANARY ISLANDS.—Gomera, in humidis convalle Sancti Sebastiani, in 1845, *Bourgeau* s.n. (BM, K, P). Tenerife, above Cruz de Carmen, *Cook* 1076 (US). In humidis alterioribus insulae Teneriffae, "Epilobium palustre", *Barker-Webb* (P).

TANGIER.—Djebel Kebir, in 1921, *Pitard* s.n. (P); Point Ampelusius near Tangier, *Maire* (type of var. *ampelusii*, AL, RAB, not seen).

ALGIERS.—Pres Bône, in 1841, *Durieu* s.n. (P). Philippeville, in 1840, *Durieu* s.n. (P). Mila, prov. de Constantine, in 1840, *Durieu* s.n. (P).

TUNISIA.—Sidi Athman El-Ahdedd, Kroumirie orientale, in 1888, *Cosson et al.* s.n. (P).

SOUTH AFRICA.—CAPE.—Albany: Coldspring, *Glass* 224 (GRA). Aliwal North: Eland's Hoek, near Aliwal North, c. 4700 ft., *Bolus* 215 (BOL, PRE). Barkley West: Danielskuil, *Esterhuysen* 2028 (BOL, NBG). Graaff-Reinet: Graaff-Reinet, 2500 ft., *Bolus* 415 (BOL, PRE). King William's Town: Kei Road, 2000 ft., *Schlechter* 6129 (BOL, GRA). Middelburg: Van Wyk's River, 4500 ft., *Archibald* 3037 (GRA). Murraysburg: Mt. Randveld near Murraysburg, *Tyson* 419 (GRA). Oudtshoorn: Huis River Pass, *Compton* 20330 (NBG). Peninsula: *Wolley Dod* 672 (BM). Queenstown: Berry Reservoir, east of Queenstown, *Hilner* 303 (GRA). Riversdale: Oakdale, *Muir* 3028 (PRE). Somerset West: Somerset West, *Parker* 3638 (BOL, K, NBG). Tarka: Great Winterberg south of Tarkastad, Fairfield Farm, c. 5000 ft., *Comins* 198 (K, PRE). Uitenhage: Zwartkopsrivier, *Zeyher* (SAM). Victoria East: Woburn, 1800 ft., *Acocks* 11099 (K, PRE). ORANGE FREE STATE.—Bethlehem: Golden Gate, *Compton* 22476 (BOL, NBG). Harrismith: Harrismith, *Sankey* 71 (K). NATAL.—Estcourt: Mooi River, *Johnston* 369 (E). Utrecht: Kafir Drift, Tweeloof, *Thode* A320 (K, NH, PRE). TRANSVAAL.—Johannesburg: Van Wyksrust, West Witwatersrand, *Moss* 18312 (BM, J). Middelburg: Klein Olifants River near Middelburg, *Young* A109 (PRE). Pretoria: Rietvallei 221, north portion, c. 5000 ft., *Acocks* 11334 (PRE).

LESOTHO.—Leribe, 5000–6000 ft., *Dieterlen* 936 (K, P, PRE, SAM). Mokhotlong Dist., 9300 ft., *Guillarmod* 1101 (PRE).

There have been several reports of *Epilobium tetragonum* subsp. *lamyi* (F. W. Schultz) H. Lév. in Africa, for example: Madeira.—*Mandon* (Hausskn., Monogr. Epil. 107, 1884); Algeria.—*Mitidja, Pomel* (Batt. in Batt. & Trab., Fl. Alger. 315, 1889); Tenerife.—*Cabrera* (Pitard & Proust, Fl. Arch. Îles Canar. 184, 1909); Algeria.—*Djebel Kebir, Lindberg* (Jehandiez & Maire, Cat. Pl. Maroc 515, 1932); *Quezel & Santa, Fl. Nouv. Alger 2 : 639, 1963*. I have not seen any of the specimens concerned and consider it probable that they are either subsp. *tetragonum* or perhaps *E. obscurum*.

The two populations of *E. tetragonum* subsp. *tetragonum* in Africa are separated by more than 4,000 miles and the entire width of the tropics; furthermore, they are very distinct from one another. The North African population is extremely variable, intergrading with the very large-flowered subsp. *tournefortii*, whereas the South African population is extraordinarily constant morphologically. These South African plants are exactly similar to the common small-flowered race of central and northern Europe morphologically, and it is likely that they have been derived from a single early introduction from Europe into South Africa. The earliest South African collection I have seen is in the Burman collection (G), and is labelled "Caput bonae Spei". As pointed out to me by Dr. B. de Winter, however, weeds were introduced into South Africa very soon after the settling of the Cape in 1652, and it would not be surprising to find one well established some 80 years later. This species is commonly represented in 19th Century collections but almost always in settled regions. As the South African plants have very little in common with most North African plants it is very unlikely that they were introduced from North Africa. In South African material, the pale petals are 2.5–3.5 mm long, with other flower parts correspondingly small. This race, like the common European one, is very highly autogamous.

Although it may do so, *E. tetragonum* subsp. *tetragonum* is not known to grow with other species of the genus in Africa. In Europe, hybrids with *E. hirsutum*, *E. lanceolatum*, *E. obscurum* and *E. parviflorum* are known.

(b) subsp. *tournefortii* (Michal.) H. Lév., *Monde des Pl.* 6 : 22 (1896); *Jehandiez & Maire, Cat. Pl. Maroc 2 : 515 (1932); Quezel & Santa, Fl. Nouv. Alger 3 : 639 (1963)*.

E. tournefortii Michal., *Bull. Soc. Bot. Fr.* 2 : 731 (1855); Hausskn., *Monogr. Epil.* 112, t. I fig. 11, t. II fig. 29a, b (1884); *Batt. in Batt. & Trab., Fl. Alger. 315 (1889)*. (Based on plants from Corsica, Sardinia, Portugal and Tangier, herb. Gay.). *E. tetragonum* var. ? *tingitanum* Ball, *J. Linn. Soc. Bot.* 16 : 459 (1878).

Plants mostly 1–1.8 m tall, allogamous. *Hypanthium* 1.2–2.5 mm deep, 2–3.5 mm across. *Sepals* 5–7.5 mm long, 1.2–2.2 mm wide at base. *Petals* 7–12 mm long, 4.5–7 mm wide, rich rose-purple. *Anthers* 1–3 mm long, the filaments of the longer 3–4 mm long, of the shorter 1.5–2.2 mm long. *Styles* 4–9 mm long; stigma usually held well above the shedding anthers at anthesis. *Capsules* mostly 5–6 cm long.

Geographical range (Fig. 4): Moist places near the Mediterranean, from Tangier to Tunisia: from sea level to 1,000 m elevation. Outside of Africa, this subspecies is known from southern Portugal, Spain and France; Sicily, Corsica, Sardinia and Malta; Turkey, where it ranges to eastern Anatolia, Syria and Lebanon.

TANGIER.—Tangier, "*E. tingitanum* Salzman", in 1835, *Salzman* s.n. (P, type of var. ? *tingitanum*, G). Near Tangier, *Lindberg* 1331 (K).

SPANISH MOROCCO.—In argillosis humidis montis Djebel Zem-Zem, 200 m, *Font Quer* 459 (G, P).

ALGERIA.—Maison Carrée, near Algiers, *Gandoger* 586 (P). Kabylie, 1000 m *Reverchon* 237 (BM, DS, E, G).

TUNISIA.—Tabarque, Kroumirie orientale, in 1888, *Cosson et al.* s.n. (P). Between Bizerte and Sidi Hassoun, in 1887, *Letourneux* s.n. (P).

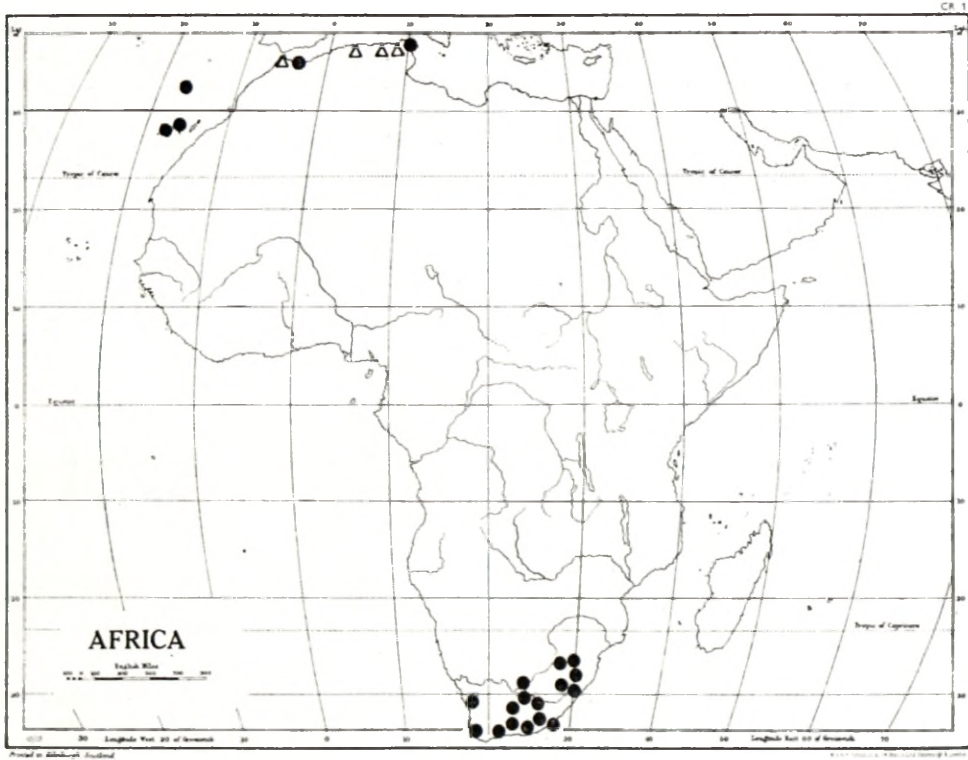


FIG. 4.—Range of *Epilobium tetragonum* in Africa. Dots indicate stations for subsp. *tetragonum* and triangles localities where subsp. *tournefortii* occurs with it. Subsp. *tournefortii* is not known to occur without subsp. *tetragonum* except locally.

The modally outcrossing plants of this handsome and distinct subspecies differ from those of subsp. *tetragonum* principally in their larger, darker-coloured flowers, doubtless associated with an increased frequency of visits by insects. They likewise appear to have broader and more evenly and coarsely denticulate, somewhat bluish green leaves. The peculiar, disjunct pattern of distribution of *E. tetragonum* subsp. *tournefortii* around the Mediterranean, coupled with the fact that it is one of the very few outcrossing entities in the genus, suggests strongly that it may be a relic similar to the populations from which the autogamous subsp. *tetragonum* and subsp. *lamyi* were derived. It is always found in the same areas as subsp. *tetragonum*, and here intermediates between the two are frequent and apparently completely interfertile. In my opinion, the prevalent autogamy of subsp. *tetragonum* contributes to the maintenance of its distinctness where it occurs with subsp. *tournefortii*, and microgeographical and perhaps ecological isolation doubtless also plays a rôle in their separation.

Epilobium tetragonum subsp. *tournefortii* is not known to grow with other species in Africa, although it probably does so. Hybrids with *E. parviflorum* have been described from Syria (Hausskn., Monogr. Epil. 74, 1884).

5. *Epilobium obscurum* Schreb., Spic. Fl. Lips. 147, 155 (1771); Loew, Man. Fl. Madeira 1 : 274 (1868); Hausskn., Monogr. Epil. 114, t. II fig. 33a, b (1884); Pitard & Proust, Fl. Arch. Îles Canar. 184 (1909). Type: from Europe.

Epilobium madeirense Hausskn. in Oester. Bot. Zeit. 29 : 90 (1879); Hausskn., Monogr. Epil. 232, t. XI fig. 59a, b, c (1889). *E. lanceolatum* sensu Lowe, Man. Fl. Madeira 1 : 274 (1868); non Seb. & Mauri, Fl. Rom. Prod. 138 (1818). *E. miguelense*

H. Lév. in *Monde des Pl.* 3 : 91, t.3 (1894). Type: Azores, Ilh. de S. Miguel, Candelaria, Aug. 1891, *Carreiro*. *E. tetragonum* L. subsp. *gilloti* H. Lév. in *Monde des Pl.* 6 : 21 (1896). Based on *E. obscurum* and *E. virgatum* Lam., *Dict. Encycl.* 2 : 375 (1786).

Perennial herb, 0.2–0.8 m tall; in late summer producing elongated leafy stolons above or on the surface of the ground, these not terminating in distinct rosettes; plants rather sparsely strigulose above, glabrous below, with raised lines running down from the margins of the petioles. *Leaves* lanceolate to narrowly ovate, 1.5–7 cm long, 0.5–1.8 cm wide, acute to obtuse, subsessile and often somewhat decurrent, sparsely denticulate, mostly opposite, alternate above. *Inflorescence* erect in bud, the pubescence strigulose but with a few glandular hairs on the hypanthium; flowers erect in bud. *Hypanthium* c. 1 mm deep, c. 1.5 mm across at summit. *Sepals* 2.5–4 mm long, 1–1.3 mm wide at base, lanceolate, apiculate. *Petals* 3.5–6 mm long, 1.8–3 mm wide, shallowly notched, rose-purple. *Anthers* 0.5–1 mm long, the filaments of the longer 2–2.2 mm long, of the shorter 1–1.3 mm long. *Styles* 2.5–3.3 mm long; stigma clavate, 1.5–2 mm long, surrounded by the shedding anthers at anthesis. *Capsules* strigulose, 4–6 cm long, on a pedicel 0.4–1.6 cm long; seeds brown, oblong-obovoid, acute at the base, coarsely papillose, c. 1 mm long, the coma 4–5 mm long, dull white. Gametic chromosome number, $n = 18$.

Geographical range (Fig. 3); In moist places from sea level to 1,300 m elevation, Madeira and Canary Islands. Also in the Azores (e.g. *Trelease* 341, BM). The general range is throughout Europe, except for the extreme north. *E. obscurum* reaches Asia only in the Amanus Mountains of southern Turkey.

MADERIA.—Mason (W, holotype of *E. madeirense*; isotype, BM). Madeira, in 1856, *Mason* 304 (CAM, JE). Pico Grande, Caminho Central, 1300 m, *Bornmüller* 611 (BM, JE). Fajão da Corte (Curral das Freiras), in 1851, *Lowe* s.n. (BM, K). Ribeira d'Ametade, in 1849, *Lowe* s.n. (BM).

CANARY ISLANDS.—Rabacal, *Moniz* 743 (BM). La Caldera, in 1858, *Lowe* s.n. (BM).

It is problematical whether *Epilobium obscurum* occurs on the African mainland or not. I have seen no material, but Haussknecht (*Monogr. Epil.* 117, 1884) cites a specimen from near Bufarick, Algeria, *Gandoger*, and several other authors have given references which might indicate the presence of this common European species in Algeria (for example: Batt. in Batt. & Trab., *Fl. Alger.* 315, 1889; Letourneux, *Étude Bot. Kabylie du JurJura* 42, 1871; Quezel & Santa, *Fl. Nouv. Alger* 2 : 639, 1963).

Epilobium madeirense ("maderense" of Hausskn., *Monogr. Epil.* 232, 1884) seems clearly to be a maritime form of this species with larger leaves and a somewhat lusher growth habit. It is curious that Haussknecht (op. cit.) referred it to his group *Capenses*, which otherwise comprises species here referred to the very different *E. capense*. There appears to be no reason to continue to recognize this form taxonomically.

Epilobium obscurum is not known to grow with other species in Africa, although it may do so. Hybrids with *E. hirsutum*, *E. lanceolatum*, *E. parviflorum* and *E. tetragonum* subsp. *tetragonum* have been described from European material.

6. *Epilobium atlanticum* Litard. & Maire, *Contrib. Étude Fl. Grand Atlas* (Arch. Sci. Maroc) 2 : 3 (1930); Litard. & Maire, *Mém. Soc. Sci. Nat. Maroc* 26 : 15 (1930); Jehandiez & Maire, *Cat. Pl. Maroc* 2 : 515 (1932).

Epilobium samuelssonii Raven, *Svensk Bot. Tidskr.* 56 : 61, fig. 1 (1962). Type: Spain, Prov. de Granada, Sierra Nevada, Río Monachil, 2,700 m.s.m., 24 July 1950, *Roivainen* (S).

Slender subglabrous herb, 3.5–28 cm tall; rhizomes slender, the lower part of the stems abundantly provided with elongate (to 10 cm) leafy stolons, typically creeping through cushions of moss, from which new plants arise; stems lightly strigulose above, especially along the lines decurrent from the margins of the petioles. *Leaves* opposite, alternate near the inflorescence, oblong-lanceolate, to narrowly ovate, 0.8–2.4 × 0.3–1 cm, subentire or slightly denticulate, at times ciliate with microscopic pubescence, subsessile or on a petiole up to 1.5 mm long, the apex broadly cuneate, the base obtuse. *Inflorescence* densely white-hairy, few-flowered, nodding before anthesis but erect in fruit; flowers erect in bud. *Hypanthium* broadly funnel-form, strigulose without, c. 1 mm deep, c. 2 mm wide. *Sepals* 3.8–4.5 mm long, 1.2–1.3 mm wide, very narrowly deltoid, narrowly acute, more or less densely strigulose, especially near the base. *Petals* 4.4–8 mm long, c. 4.5 mm wide, bright rose-purple, deeply notched. *Anthers* c. 1–1.2 mm long, the filaments of the longer c. 15 mm long, of the shorter c. 0.5 mm long. *Style* 4.7–6 mm long; stigma capitate, c. 1.8 mm thick, held above the anthers at anthesis; ovaries densely white-strigulose, the pedicels shorter than the subtending leaves. *Capsules* densely strigulose, 4.4–5 cm long, on a pedicel 3–4 cm long; seeds brown, narrowly obovoid, attenuate, very minutely papillose, c. 1.5 mm long, with a conspicuous pellucid beak; coma white, c. 5 mm long.

Geographical range (Fig. 3): Along streamlets and in moist cushions of moss, 2,700–2,900 m elevation, in the Haut Atlas of Morocco and the Sierra Nevada of Spain.

MOROCCO.—Haut Atlas, in Valle Reraya, in scaturiginosis alpinis, in clivo septentrionali montis Toubkal, secus rivulus convallis Immouzer, solo porphyrico, 2800–2900 m, in 1924, *Emberger, Litardière, & Maire* (MPU, holotype).

Epilobium atlanticum is an attractive and very distinctive species. In Africa, it is known only from the type collection, but it is also found in similar habitats in the Sierra Nevada of Spain. In 1962, unaware that *E. atlanticum* was the same, I described the European populations as a new species, *E. samuelsonii*. As presently understood, *E. atlanticum* adds yet another floristic link between the two mountain ranges where it occurs (e.g. Quezel in *Mém. Soc. Brot.* 9 : 1–77, t.1–6, 1953). The stigmas of *E. atlanticum* were said to be clavate by Litardière and Maire (*Mém. Soc. Nat. Maroc* 26 : 16, 1930), but have been capitate in the material I have seen, which however includes only a very small portion of the type collection. They are certainly capitate in the collections from the Sierra Nevada, which are identical in all other respects.

Epilobium atlanticum is not known to grow together with any other species of the genus.

7. *Epilobium psilotum* Maire & G. Samuels., *Ark. Bot. Stockh.* 29A, no. 11, 26, t.3 (1939); *Emberger & Maire, Cat. Pl. Maroc* 4 : 1081 (1941).

Entirely glabrous, slender, delicate, clumped perennial herb 6.5–25 cm tall, arising from a slender creeping rhizome from the underground portions of which arise leafy shoots, which are at first short and fleshy; stems with prominently raised lines decurrent from the margins of the petioles. *Leaves* almost entirely opposite, alternate only in the inflorescence, lanceolate to narrowly ovate, 0.9–2.6 × 0.30–6 mm, obscurely and sparsely serrulate, paler below, on a short but distinct petiole 1–2 mm long, the apex acute, the base obtuse. *Inflorescence* short, nodding before anthesis but erect in fruit; flowers erect in bud. *Hypanthium* 1.2–1.8 mm deep, 1.2–1.8 mm across. *Sepals* 3.1–3.8 mm long, 1–1.1 mm wide, very narrowly deltoid. *Petals* 5–8 mm long, 2.5–3.6 mm wide, light rose-purple, the notch prominent, 1.6–3 mm deep. *Anthers* 0.6–0.9 mm long, the filaments of the longer 3–5 mm long, those of the shorter 1.3–3.2

mm long. *Style* 3.5–4.3 mm long; stigma clavate, 2.2–1 mm long, 0.6–0.8 mm thick, surrounded by both sets of anthers at anthesis. *Capsules* 1.8–4.5 cm long, on a pedicel 1–2 cm long; seeds light brown, very finely papillose, 1.2–1.4 mm long, c. 0.4 mm thick, acute at both ends, not beaked; coma dull white, 4.5–5 mm long.

Geographical range (Fig. 3): Endemic to the Haut Atlas of Morocco, where it occurs in wet places from 2,100–3,100 m elevation.

MOROCCO.—Tashdirt, 2100 m, *Balls* B3117 (S, holotype; isotypes, BM, E, K). North face of Djebel Augour, c. 3100 m, *Polunin* 2200 (BM). G. Tistouti, 2850 m, *Newbould* 211 (BM).

As was pointed out in the protologue of the species, *Epilobium psilotum* is clearly related to the North Temperate group of the species which Haussknecht assigned to his group *Alpina*, but entirely distinct within this group. It is not known to grow together with any other species of the genus.

8. *Epilobium capense* Buch. ex Hochst. in Krauss in Flora 27 : 425 (1844); Hausskn., Mon. Epil. 229 (1884).

Epilobium flavescens E. Mey. ex Harv. in Fl. Cap. 2 : 506 (1862); Hausskn., Monogr. Epil. 230 (1884); H. Lév., Ic. Gen. Epil. tt. 42, 43 (1910). *E. bojeri* Hausskn., Oester. Bot. Zeit. 29 : 90 (1879); Hausskn., Mon. Epil. 231, t. XII fig. 60a, b (1884); H. Lév. Ic. Gen. Epil. t. 44 (1910); H. Perr. in Fl. Madagasc., Oenotheracées : 3, fig. 1 (1950). *H. bifforme* Hausskn., Monogr. Epil. 230 (1884); H. Lév., Ic. Epil. t. 41 (1910). *E. jonathum* Hausskn., Monogr. Epil. 231, t. X fig. 56a (1884); H. Lév., Ic. Gen. Epil. t. 45 (1910). *E. species* No. 2, Brenan in Fl. Trop. E. Afr., Onagraceae : 4, fig. 1 (1953).

Perennial herb, 0.1–1.2 m tall; underground stems vertical or nearly so, densely invested with thick white, fleshy, rounded scales c.4 mm long and 2–10 mm wide after first year of growth, the new shoots scaly and arising from this region; plants strigulose with some glandular trichomes in the more densely pubescent inflorescence; stems with weakly marked elevated lines decurrent from the margins of the petioles. *Leaves* opposite near the base, alternate above, the margins and veins and sometimes the entire surface finely strigulose, narrowly ovate to narrowly lanceolate, mucronate to long acuminate at the apex, rounded to obtuse or more rarely subcordate at the base, weakly or more often coarsely serrate with prominent forward-directed teeth, especially in the upper half, 2–5 cm long, 0.4–2.5 cm wide; petioles short but distinct, 1–2.5 mm long. *Inflorescence* densely strigulose with an admixture of glandular trichomes, erect in bud; flowers erect or somewhat drooping in bud. *Hypanthium* 2–2.5 mm across, 1.1–1.5 mm deep, usually long-ciliate at the mouth with trichomes mostly 0.6–0.8 mm long. *Sepals* 4.2–10 × 1.2–2.5 mm, narrowly oblong, acuminate or apiculate. *Petals* obovate, 6–16 mm long, 3–10.5 mm wide, bright rose-purple, paler purplish, creamy, or white, especially in smaller-flowered forms, the notch about 1/5 the length of the petal. *Anthers* white, 1.3–2.5 mm long, c. 0.8–1 mm thick; filaments pale rose to white, those of the longer stamens 2.5–8 mm long, of the shorter ones 1.5–5 mm long; pollen yellow. *Styles* pale rose to white, glabrous, 5–15 mm long; stigma white, 4-lobed, usually deeply so, the lobes 0.7–2 mm long, papillate and receptive within, held far above the anthers in larger-flowered plants but reached by them in smaller-flowered ones. *Capsules* densely strigulose with admixture of glandular trichomes, erect, 3–9 cm long, on a pedicel 1–6 cm long; seeds brown, oblong-obovoid, densely papillose, 1.3–1.6 mm long, the coma c. 5–7 mm long, dingy white. Gametic chromosome number, $n = 18$.

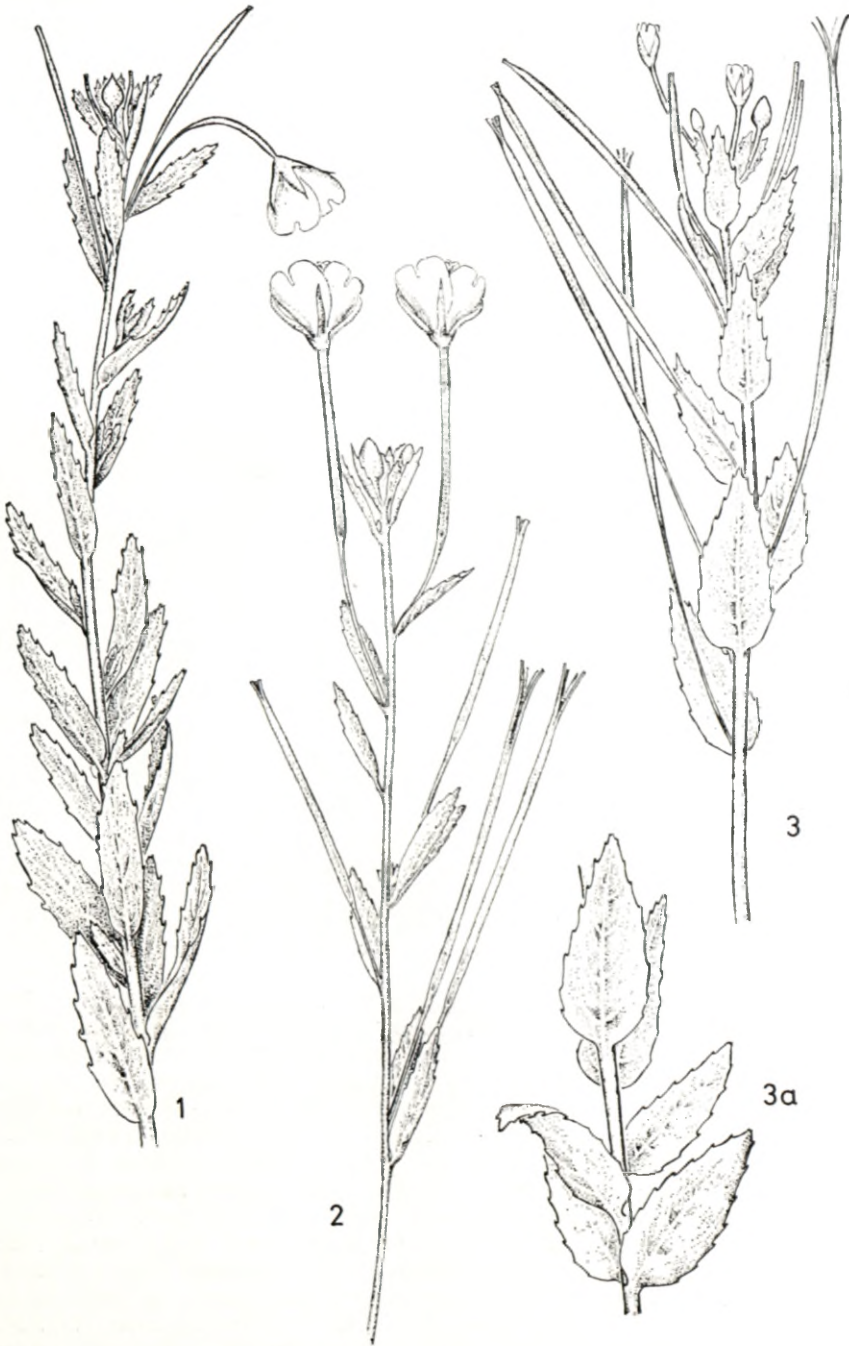


FIG. 5.—*Epilobium capense*. 1, from Madagascar, corresponding to *E. bojeri* (Humbert 11821, in P). 2, cultivated from seed from Swaziland, corresponding to *E. jonanthum*, *E. capense* sensu stricto (Compton 30558, in DS). 3 and 3a, from the Cape Province, corresponding to *E. flavescens* (Tyson 1813, in SAM).

Geographical range (Fig. 2): In moist places and mountain meadows, from southern Tanzania south and west to the vicinity of Cape Town; mountains of central Madagascar. 900–2,000 m elevation.

TANZANIA.—Southern Highlands District, Mbeya to Tukuyu Road, where it descends steeply to Mwakaleli, *Napper* 1182 (K). Elton Plateau, Ngjombe Dist., 2700 m, *Procter* 1604 (EA; K). Kigoro Forest Reserve, Mufindi, Iringa Dist., *Michelmores* 935 (K).

ZAMBIA.—Between Mts. Kongula and Kangampanda and the Malawi border near Mt. M'Wanda, high moorland on granitic soil, in 1932, *Temperley* s.n. (BM). Nyika Plateau, 2100 m, *Lees* 102 (K).

MALAWI.—Damp ground near streams, Nyika Plateau, 1350 m, *Benson* 1382 (BM). Dedza Mountain slopes, *Banda* 285 (BM). Ncheu Dist., Lower Kirk Range, Chipusiri, 1460 m, *Excell*, *Mendonça & Wild* 965 (BM; LISC, SRGH).

RHODESIA.—About 3 km west of Mt. Inyangani, Inyanga Dist., c. 2000 m, *Fries*, *Norlindh & Weimarck* 3479 (BR). Umtali Dist., South Patrol, Stapleford Forest Reserve, 1500 m, *Chase* 5883 (BM, K, SRGH). Chimanimani-Stonhenge, Melsetter Dist., 1700 m, *Phipps* 376a (BR).

SOUTH AFRICA.—CAPE.—Ceres: Koude Bokkeveld, in monte Tafelberg, 1500 m, *Schlechter* 10096 (BOL, GRA), Engcobo: near Engcobo, in 1896, *Bolus* s.n. (BOL). George: Knysna River, George, in 1840, *Krauss* s.n. (LZ, holotype of *E. capense*, destroyed; G). Herschel: Majuba Nek, near Sterkspruit, *Hepburn* 242 (GRA). Mount Currie: near Kokstad, 1500 m, *Tyson* 1813 (E, SAM). Murraysburg: Murraysburg, *Tyson* 114 (BOL). Somerset: Boschberg near Somerset East, 1050 m, *MacOwan* 729 (type collection of *E. biforme*; BM, BOL, G, GRA, K, NH, P, SAM). Stellenbosch: Biesie Vlei, Sonkanghoek, *Hamson* 3124 (BM). Stockenström: Hogsback, *Barker* 914 (NBG). Tulbagh: Sneeuwgat Valley, Great Winterhoek, *Phillips* 1740 (SAM). Umzimkulu: near Clydesdale, 2500 ft., *Tyson* 2012 (BOL). ORANGE FREE STATE.—Ficksburg: Strathcona, *Isaac* 118 (NBG). Harrismith: Bester's Vlei, Harrismith, 5400–6200 ft, *Bolus* 8161 (BOL). Orange Free State, *Cooper* (K, holotype of *E. jonanthum*; isotype, BOL). NATAL.—Alfred: Rooi Vaal, Harding, *Jacques* 5233 (NBG). Bergville: Oliviershoek Pass, *Gillett* 1163 (NH). Camperdown: Umlaas, *Krauss* 154 (lectotype of *E. flavescens*, BM, G, K). Inanda: *Medley Wood* 868 (BM, BOL, GRA, K, NH). Newcastle: near Newcastle, 900–1200 m, *Medley Wood* 6752 (E). Swaziland.—Forbes Reef Road, Mbabane Dist., 1200 m, *Compton* 25662 (NBG, PRE). Mankaiana, Mankaiana Dist., 1200 m, *Compton* 27493 (NBG). TRANSVAAL.—Johannesburg: Craighall, *Moss* 4027 (J). Lydenburg: near Lydenburg, *Atherstone* 174 (K). Potgietersrus: Palala River, in 1918, *Breyer* s.n. (PRE). Soutpansberg: Louis Trichardt, *Breyer* in 1919 (PRE). Ventersdorp: Klerkskraal, 1400 m, *Sutton* 730 (PRE). Wakkerstroom: Oshoek, 2000 m, *Devenish* 375 (BM).

MALAGASY REPUBLIC.—Ankaratra Mts., *Hildebrandt* 3869 in part (BM, JE, K). Mt. Iarambao, north of Inanatona, basin of the Andratsay, *Perrier* 6623 (P). Manambolo, vicinity of Isomono, Mt. Morahariva, *Humbert* 13213 (P). Mt. Itrafanaomby (Ankazondrano), haut Mandrare, *Humbert* 13477 (P). Near Ambositra, *Perrier* 14622 (P). Near Bezong zong, Feb.–Mar., *Bojer* (JE, lectotype of *E. bojeri*).

The 4-lobed stigma of *E. capense*, taken together with its distinctively serrate leaves and dense-set fleshy scales on its underground stems make it unmistakable. Haussknecht (Monogr. Epil. 229–232, 1884) considered the material he saw to belong to five species, differing primarily in leaf-width and flower colour. Together with *E. madeirense*, which is here considered a synonym of *E. obscurum*, these five species comprised his section *Capenses*. With the more abundant material available at the present day, it is impossible to find any subdivisions within his species recognizable on the basis of leaf-shape. Larger-flowered and presumably more highly outcrossed populations of this species normally have more or less erect bright rose-purple flowers and often, particularly in South Africa, relatively narrow leaves (Fig. 5: 2). Smaller-flowered, presumably more highly autogamous populations, normally have cream or white flowers, which are often nodding and relatively broad leaves (Fig. 5: 3 and 3a). But these correlations do not hold consistently, and specimens representing all possible combinations of these characteristics have been seen. *Epilobium bojeri* (Fig. 5: 1), considered by H. Perrier de la Bâthie (Fl. Madagascar., Oenotheracées: 4, 1950) to be endemic to Madagascar, is matched perfectly by numerous collections from the mainland of Africa; such plants are relatively short, with crowded leaves.



FIG. 6.—*Epilobium capense*. 1, detail of underground parts, showing imbricated fleshy scales, from Njombe District, Tanzania (Proctor 1809, in EA). 2, inflorescence, from Mbeya Range, Tanzania (Proctor 1618, in EA). These specimens correspond to Brenan's (1953) Sp. No. 2, and are from the north end of the range of the species.

Some plants of this species from the northern end of its range, especially those from Tanzania, have nodding flowers with purple rose-purple petals; relatively broad, rounded, more weakly serrulate leaves; and sometimes less deeply divided stigmas (Fig. 5 : 1). These plants were treated by Brenan (Fl. Trop. E. Afr., Onagraceae: 4, 1953) as an unnamed species, No. 2. It appears possible that some of the characteristics of these populations may have resulted from historical introgression between *E. stereophyllum* and *E. capense*. At present, however, the ranges of the two species are separated by a gap of more than 300 miles. Taken as a whole, the northern populations of *E. capense* appear to have no distinctive combination of characteristics that would allow their segregation as a geographical entity.

In summary, there appear to be no units within *E. capense* the formal recognition of which would shed greater light upon the complexities of the group. Indeed, treating the complex as a single, variable species seems much more informative.

The gametic chromosome number, $n = 18$, was determined from a single population grown at Stanford, collected June, 1964, the seeds from Compton 30558 (DS), Mbabane Dist., Swaziland. These plants had relatively erect, large, purple flowers (Fig. 5 : 2).

Epilobium capense has been collected growing together with *E. hirsutum*, *E. salignum* and *E. tetragonum* subsp. *tetragonum* in South Africa; a hybrid between it and the first-mentioned species is discussed under *E. hirsutum*. Hybrids with the other two species are not known.

9. ***Epilobium stereophyllum*** Fres. in Mus. Senckenberg 2 : 151 (1837); Oliv. in Fl. Trop. Afr. 1 : 487 (1871); Hausskn., Monogr. Epil. 233 (1884); H. Lév. Ic. Gen. Epil. t.47 (1910); Brenan in Fl. Trop. E. Afr. Onagraceae: 4, fig. 1 (1953); Hedberg in Symb. Bot. Upsal. 15, 1 : 133 (1957).

Epilobium fissipetalum Steud. ex A. Rich., Tent Fl. Abyss. 1 : 273 (1848); Hausskn., Monogr. Epil. 234 (1884); H. Lév., Ic. Gen. Epil. t.50 (1910). *E. cordifolium* A. Rich., Tent. Fl. Abyss. 1 : 274, t.50 (1848); Oliv. in Fl. Trop. Afr. 2 : 487 (1871); Hausskn., Monogr. Epil. 233 (1884); H. Lév., Ic. Gen. Epil. t.48 (1910). *E. schimperianum* Hochst. ex A. Rich., Tent. Fl. Abyss. 1 : 272 (1848); Oliv. in Fl. Trop. Afr. 2 : 487 (1871); Hausskn., Monogr. Epil. 232 (1884); H. Lév., Ic. Gen. Epil. t.46 (1910). *E. kilimandscharensis* H. Lév. in Bull. Herb. Boiss., ser. 2, 7 : 589 (1907); H. Lév., Ic. Gen. Epil. t.49 (1910). *E. kiwuense* Loes. in Mildbr., Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 1907-8, 2 : 588 (1913); Robyns, Fl. Sperm. Parc. Nat. Albert 1 : 682, t.lxxii (1948). *E. neriophyllum* subsp. *ellenbeckii* Engl. in Veg. Erde ix. Pflanzenw. Afrikas 3, 2 : 773 (1921). *E. stereophyllum* var. *kiwuense* (Loes.) Brenan in Kew Bull. 8 : 163 (1953); Brenan in Fl. Trop. E. Afr., Onagraceae: 5, fig. 1 (1953).

Perennial herb, 0.25-1.5 m tall, from a long rhizomatous base from which leafy shoots arise; plants puberulous or short-pubescent with spreading hairs, with elevated pubescent lines running down from the sides of the petioles, the stems often thick and hollow. *Leaves* mostly opposite, alternate in and near the inflorescence, the margins and veins and sometimes the entire surface finely strigulose, narrowly ovate, acute, cordate or more rarely to obtuse at the base, sparsely serrulate, 1.5-6.5 cm long, 0.3-2.7 cm wide; petiole short but distinct, up to 2.5 mm long. *Inflorescence* densely strigulose or spreading pubescent, sometimes with a strong admixture of glandular trichomes, erect in bud; flowers somewhat nodding in bud and when they first open, later erect. *Hypanthium* 1.8-3.5 mm across, 1-2.5 mm deep, its mouth glabrous or with a few hairs. *Sepals* 5.5-10 mm long, 1.8-2.8 mm wide, apiculate. *Petals* obovate, 6-16 mm long, 4-11 mm wide, rose-purple, the notch deep, about 1/6 of the length. *Anthers* 1.2-2.3 mm long; filaments of the longer stamens 3.5-7 mm long, those of the shorter 2-4 mm long. *Styles* 5-9.2 mm long; stigma obovoid-clavate, 1.5-4 mm long, 1-2-3

mm thick, the longer anthers surrounding it at the base. *Capsules* densely strigulose or spreading-pubescent, erect, 3.5–8.5 cm long, on a pedicel 1–9 cm long; seeds 1–1.2 mm long, 0.4–0.6 mm thick, oblong-obovoid, obtuse at the base, finely papillose, brown to black, the coma 4–8 mm long, white. FIG. 7 : 1.



FIG. 7.—1, *Epilobium stereophyllum*, from an isotype of *E. cordifolium* (P), from Ethiopia. 2, *E. salignum*, from Letaba District, Transvaal (Scheepers 625, in EA).

Geographical range (Fig. 2): Common in the mountains of Ethiopia, from the vicinity of Lake Tana southward, and south in the principal mountain masses of equatorial Africa: eastern Republic of the Congo and Rwanda; Ruwenzori, Virunga Volcanoes, Elgon, Cherangani Hills, Aberdares and Kinagop Plateau, Mt. Kenya, Mt. Kilimanjaro and the Pare Mountains; 1750–3660 m elevation. Usually in moist places in open mountain grassland.

ETHIOPIA.—Daugila, Lake Tana region, 2000 m, in 1926, *Cheesman* s.n. (BM). Mt. Buahit, *Schimper* 1348 (P, holotype of *E. fissipetalum*; isotypes, BM, G, K, M). Northeast side of Mt. Buahit, 4300 m, *Pichi-Sermolli* 2703 (BR, FI, K). Gara mulata Mt., 3000 m, 9° 15' N, 41° 45' E, *Gillett* 5374 (K). Mt. Silke, *Schimper* 972 (type of *E. schimperianum*, BM, K, P). Choke Mts., Gojjam, vicinity of the upper Ghiedeb Valley, 10° 40' N, 37° 50' E, at Arat Makere near Mt. Talo, c. 3600 m, *Evans* 500 (BM, K). Eastern slopes of Mt. Delo, Amaro Mountains, 5° 48' N, 37° 54' E, 2500–3000 m, *Gillett* 14909 (BR, EA, FI, K). Between Temben and Semen, *Rüppell* (FR, holotype of *E. stereophyllum*). Ethiopia, *Quartin Dillon & Petit* (P, holotype of *E. cordifolium*).

REPUBLIC OF THE CONGO.—Orientale, Nioka (Route Mawa), 1800 m, *Taton* 1100 (BR). Kivu, Kishi, Terr. Lubero, 2000 m, *Christiansen* 1079 (BR). Kivu, Numbi, Terr. Kalehe, 2200 m, *Leonard* 4570 (BR).

RWANDA.—*Mildbraed* 722, 1555, 1646 (B, destroyed; syntypes of *E. kiwuense*). Terr. Shangugu, Route Bukavu-Astrida, environ d'Uwinka, 2400 m, *Troupin* 9782 (BR, EA). Dorwa, *Biumba Becquet* 190 (BR).

UGANDA.—Ruwenzori, 2850 m, *Purseglove* P238 (K). Toro Dist., Ruwenzori, Namwanba Valley, 3150 m, *Taylor* 2911 (BM). Virunga Volcanoes, Kigezi Dist., saddle between Muhavura and Mgahinga, c. 3000 m, *Stauffer* 653 (K, PRE). Elgon, edge of stream just above Bulambuli, 2700 m, *Liebenberg* 1634 (K).

KENYA.—Elgon, eastern slope above Japata estate, along the Saum River, 3500 m, *Hedberg* 1000 (K). Cherangani Hills, 2400 m, *McLoughlin* (PRE). East Aberdares, Kimakia Forest Reserve, 2500 m, *Kerfoot* 617 (EA). Kinagop Plateau, Loreko, 3000 m, *Napier* 1248 (K). Mt. Kenya, northwest slopes, 3150 m, *Syngé* S1762 (BM).

TANZANIA.—Kilimanjaro, southeast side, 3200 m, *Schlieben* 4879 (BM, BR, LISC, M, P). Kilimanjaro, 2700 m, *Volkens* 1847 (G, holotype of *E. kilimansharensis*; isotypes, BR; E; K, photograph). South Pare Mts., between Tona and Muhasi swamp, *Peter* K.661 (O.III.142) (K).

Epilobium stereophyllum is extraordinarily variable in pubescence, leaf shape and size, and flower size, particularly in Ethiopia. In the mountains of equatorial Africa, plants with longer, spreading pubescence ("var. *kiwuense*") are generally found below 2,500 m elevation, those with shorter, appressed pubescence above this level. As this is only one of the several obvious parameters of variation, and is not useful in classifying populations found in Ethiopia, I prefer not to accord formal taxonomic recognition to these two entities. Some of the specimens referred here are difficult to distinguish from *E. salignum*, although the two species are normally totally distinct. It is likely that hybridization between them contributes to the local blurring of the distinctions between them. Between the southernmost stations for *E. stereophyllum* in the South Pare Mountains of Tanzania and the northernmost for *E. capense* in the Porotos is a lowland gap of more than 300 miles; yet the northern populations of the latter are more similar to *E. stereophyllum* than are the southern populations of the same species. Possibly past introgression has occurred between the two species, which are obviously relatively closely related.

Epilobium neriophyllum subsp. *ellenbeckii* is referred doubtfully here. It was based on material from "Arussi-Galla-Land bei Jidah um 2,600 m". This collection, which was doubtless in the herbarium at Berlin, was presumably destroyed in World War II, and no duplicates have come to my attention. The sub-species was contrasted with *E. neriophyllum* (= *E. salignum*) by its longer, cylindrical style; short petioles; and slightly toothed leaves 2–4 cm long and 4–5 mm wide. It is doubtful that it is *E. salignum*, as Brenan (in Turrill & Milne-Readhead, Fl. Trop E. Afr., Onagraceae: 6, 1953) considered it, for that species is not known closer to Jidda than the vicinity of Mt. Elgon, more than 600 miles to the south.

10. *Epilobium salignum* Hausskn. in Oester. Bot. Zeitschr. 29 : 90 (1879); Hausskn., Monogr. Epil. 236, t. XII fig. 62a, b, c (1884); H. Lév., Ic. Gen. Epil. t.54 (1910); Perr. in Not. Syst. 13 : 138 (1947); H. Perr. in Fl. Madagasc., Oenotheracées: 4 (1950); Brennan in Fl. Trop. E. Afr., Onagraceae: 5, fig. 1 (1953); Brennan in Hutch. & Dalz., Fl. W. Trop. Afr., ed 2, 1, 1 : 166 (1954); Fernandes & Fernandes in Garcia de Orta 5 : 111 (1957); 7 : 493 (1959).

Epilobium neriophyllum Hausskn. in Abh. Naturw. Verein Bremen 7 : 19 (1880); Hausskn., Monogr. Epil. 236, t. XII, fig. 61a (1884); H. Lév., Ic. Gen. Epil. t.55 (1910); Robyns, Fl. Sperm. Parc Nat. Albert 1 : 682 (1948). —subsp. *benguellense* (Welw. ex Hiern) Engl. in Veg. Erde IX. Pflanzenw. Afrikas 3, 2 : 773 (1921). —subsp. *benguellense* var. *welwitschii* Engl. in Veg. Erde IX. Pflanzenw. Afrikas 3, 2 : 773 (1921). —subsp. *cylindrostigma* Engl. in Veg. Erde IX. Pflanzenw. Afrikas 3, 2 : 773 (1921). *E. mundtii* Hausskn., Monogr. Epil. 235, t. XI fig. 58a (1884); H. Lév., Ic. Gen. Epil. t.52 (1910). *E. natalense* Hausskn., Monogr. Epil. 235, t. X fig. 57a (1884); H. Lév., Ic. Gen. Epil. t.51 (1910), probably. *E. oliganthum* Bak. in J. Linn. Soc. Bot. 21 : 345 (1886); non Michaux, Fl. Bor. Amer. 1 : 223 (1803). *E. benguellense* Welw. ex Hiern, Cat. Pl. Welwitsch, Dicot. 1 : 378 (1898). *E. madagascariense* H. Lév. in Fedde, Rep. Nov. Sp. 4 : 225 (1907); H. Lév., Ic. Gen. Epil. t.56 (1910). *E. schinzii* H. Lév. in Fedde, Rep. Nov. Sp. 4 : 225 (1907); H. Lév., Ic. Gen. Epil. t.53 (1910). *E. perrieri* H. Lév. in Rev. Géogr. Bot. 27 : 3 (1917); H. Perr. in Not. Syst. 13 : 139 (1947); H. Perr. in Fl. Madagasc., Oenotheracées: 4, fig. 1 (1950). *E. palustre* sensu Ridley, The Dispersal of Plants throughout the World 152 (1930); non L., Sp. Pl.: 348 (1753).

Perennial herb, 0.2–1.6 m tall, the stems sometimes persistent and subligneous; strongly rhizomatous, the rhizomes lacking scales, long-spreading and giving rise to new leafy shoots; plants evenly strigulose, sometimes sparsely so with faintly marked lines running down from the margins of the pedicels. *Leaves* mostly opposite or subopposite, alternate in the inflorescence, the margins and veins and sometimes the entire surface finely strigulose, very narrowly to narrowly elliptic, rarely almost lanceolate, acute, rarely acuminate, narrowly cuneate to attenuate at the base, very rarely rounded, weakly serrulate or rarely serrate to near the base, 2–8 × 0.3–2 cm; petiole 1–8 mm long, distinct. *Inflorescence* densely strigulose, erect in bud, to 3 dm long, the leaves usually not much reduced; flowers nodding in bud and when they first open, later erect. *Hypanthium* 0.8–2 mm across, 1.5–2.3 mm deep, its mouth glabrous or long-ciliate. *Sepals* 3.5–8.5 mm long, 1.2–2.2 mm wide, apiculate. *Petals* narrowly obovate, 5–15 mm long, 2–7 mm wide, at first white or cream, then rose following pollination, the notch 0.5–2 mm deep. *Anthers* brownish, fading rose, 0.8–2 mm long; filaments white, those of the longer stamens 2.5–8 mm long, those of the shorter 1.5–5 mm long. *Styles* white, 4.2–10 mm long; stigma white, usually clavate, rarely subcapitate, 1.8–4 mm long, 1.2–1.8 mm thick, the longer anthers usually just reaching the base of the stigma. *Capsules* densely strigose, erect, 3–7 cm long, on a pedicel 0.8–4.5 cm long; seeds light brown or tan, oblong-obovoid, obtuse at the base, very minutely pitted, 1–1.35 mm long, 0.35–0.6 mm thick, the coma c.5–9 mm long, copious, white. Gametic chromosome number, $n = 18$. FIG. 7 : 2.

Geographical range (Fig. 3): Moist places, 500–3,000 m elevation, from the eastern Republic to the Congo and the vicinity of Mt. Elgon in Uganda south in the mountains of east Africa to the eastern Cape Province; also in Cameroons and Benguela, Huambo, Huila and Bié in Angola; throughout Madagascar.

NIGERIA.—Cameroons, in marsh on the bank of River Bui, Bansa, Bameda, *Tamajong* FHI 23474 (K).

CAMEROUN.—Dschang Mélétan, 2500 m, *Saxer* 164 (K). Bamboutos, 1900 m, *Lepesme*, *Paulian* & *Villiers* 36 (P).

REPUBLIC OF THE CONGO.—Orientale, Nioka, marais affluent Korda, *Taton* 1074 (BR, K, P). Kivu, Kahuzi saddle on the road from Bukavu to Walikale, c. 2300 m, *Stauffer* 1110 (K). Kivu, Bwit, Kikuyu, Katwe, 1600 m, *Deru* 239 (BR). Katanga, envir. Elisabethville, in 1923, *DeGiorgi* s.n. (BR). Katanga, Parc National de l'Upemba, *De Witte* 3540 (BR). Katanga, Kipiri, Marungu Mts., 2200 m, *Dubois* L.1367 (BR).

RWANDA.—Kamiranjovu, Terr. Shangugu, 2000 m, *Christiaensen* 1412 (BR).

BURUNDI.—Dans le marais des bords du lac Kanzigiri, *Elskens* 169 (BR).

UGANDA.—Near Bwamba Pass, E. Ruwenzori, Toro Dist., 2250 m, *Eggeling* 4031 (K). Kigezi Dist., 1 mile north of Mpalo, 1800 m, *Norman* 79 (EA). Bugishu Prov., Mt. Elgon, Butandiga, 2100 m, *Synge* S817 (BM).

KENYA.—N.E. Elgon, swamp on Kisano River, 2400 m, *Tweedie* 1194 (K). Cherangani Mts., 1° 5' N, 32° 26' E, 3000 m, *Maas Geesteranus* 6334 (BR, COI, G, K, PRE, more or less intermediate to *E. stereophyllum*). Aberdare Range, Ol Bolossat, *Meinertzhagen* AH9343 (EA). Limoru, Nairobi, 2100 m, *Dümmer* 1643 (BM, K, PRE).

TANZANIA.—Ujamba, Kigoma Dist., *Mahinda* HSM1184 (EA, K). Foothills at Mt. Mmemya, Ufipa Dist., *Bullock* 3701 (BR, K). Kikondo Camp, Poroto Mts., 1960 m, *Richards* 13993 (K). Kigogo Forest Reserve, Mufindi, Iringa Dist., *Eggeling* 6814 (BM, BR, EA, FI, K, LISC, P, PRE, SRGH); cultivated material from this collection, grown at Kew, collected 29 June, 1955, (K). West side of Uluguru Mts., Lukwangule Highland, vicinity of Morogoro, 2400 m, *Schlieben* 3515 (BM, BR, G, LISC, M, P).

ANGOLA.—Benguela, between Ganda and Caconda, 1700 m, *Hundt* 840 (BM, DS, P). Huambo, Dist. de Nova Lisboa, Perimetro Florestal de Sacaala, junto as rio Curimaala, *Murta* 107 (COI). Huila, Huila cataract, 1700 m, *Exell & Mendonça* 2852 (BM, COI, LISJC). Huila, margins of the river Monino, *Welwitsch* 4458 (LISU, lectotype of *E. benguellense*, A. & R. Fernandes in Garcia de Orta 7 : 12, 1959; isolectotypes, BM, COI, G, K). Huila, margins of the rio Caculovar, Quilengues, *Welwitsch* 4459 (type of *E. neriophyllum* subsp. *benguellense* var. *welwitschii*; BM, COI, G, LISU, P). Bié, Menongue, margins of the rio Cutato-Cubango, near Sá Macaca, *Gossweiler* 3818 (BM, COI, LIJSC).

ZAMBIA.—Abercorn Dist., Saisi River Marsh, 1500 m, *Richards* 8381 (K). Lundazi Dist., Nyika Plateau, 2100 m, *Richards* 10416 (K). Solwezi, 1350 m, *Robinson* 3461 (BR, K, M, SRGH); cultivated at Kew, Aug.-Sept., 1961, K.5208 (K). Mochipapa, 5 miles east of Choma, 1300 m, *Robinson* 1279 (BR, K, SRGH).

MALAWI.—Kondowe to Konongu, 600–1800 m, in 1896, *Whyte* s.n. (K). Ncheu Dist., Lower Kirk Range, Chipusiri, 1460 m, *Exell, Mendonça & Wild* 967 (BM, LISC, SRGH). Zomba Plateau, Zomba Dist., 1500 m, *Brass* 16314 (BM, BR, K, SRGH, US).

MOZAMBIQUE.—Niassa, Vila Cabral, Metónia, *Torre* 97, 98a (COI, LISC).

RHODESIA.—Prince Edward Dam, Salisbury, 1400 m, *Eyles* 8943 (SRGH). Iona Farm, Melsetter Dist., *Chase* 4819 (BM, PRE, SRGH). Matopos, *Rogers* 5257 (SRGH). "Southern Rhodesia, *Epiobium palustre*, L. (Introduced from Europe)", *Hislop* 147 (K).

SOUTH AFRICA.—CAPE.—Bizana: 3 miles northwest of Fort Donald, between Emagushine and Bizana, *Lewis* 4475 (SAM). Komga: Komga, 500 m, *Flanagan* 665 (E, K, PRE). Queenstown; Katberg, Galpin 2075 (GRA). Somerset East: Boschberg, 900 m, *MacOwan* 1487 (K, chosen lectotype of *E. neriophyllum* by Brenan in Fl. Trop. E. Afr., Onagraceae: 6, 1953; GRA, NH). Stutterheim: 3 miles from Amabele, *De Vries* 112 (PRE). Umtata: Umtata, 1040 m, *Schlechter* 6537 (BOL). Umzimkulu: Clydesdale, 750 m, *Tyson* 2012 (BOL, K, PRE). Xalanga: Cala Kebelo Kloof, *Pegler* 1694 (PRE). Without definite locality, ad promont. bonae spei, in 1820, *Mundt & Maire* s.n. (JE, lectotype of *E. mundtii*). ORANGE FREE STATE.—Bethlehem: Golden Gate, *Compton* 22488 (NGB). NATAL.—Kliprivier: Van Reenen, 900 m, *Medley Wood* 13101 (PRE). New Hanover: Noodsberg, Noodsberg, 600–900 m, *Medley Wood* 5282 (Z, holotype of *E. schinzii*, not seen; isotypes, BM, NH, SAM). Umzinto: Dumisa, 850 m, *Rudatis* 1346 (BM, E, K). Underberg: Underberg, *McCLean* 662 (NH, PRE). Natal Bay, *Gueinzus* (LZ, holotype of *E. natalense*, destroyed; isotype, JE). TRANSVAAL.—Barberton: Reimers Creek near Barberton, *Thornicroft* 1069 (J, K). Heidelberg: *Vandeleur* in 1901 (BM). Letaba: 1050 m, *Scheepers* 625 (K, M, PRE, SRGH). Rustenburg: 3 miles south of Breedts Nek, 1200 m, *Story* 957 (PRE).

SWAZILAND.—Mbabane: Fyfes Swamp, 1050 m, *Compton* 24826 (NBG). Mankaiana: Mankaiana Swamp, 1200 m, *Compton* 27491 (NBG).

MALAGASY REPUBLIC.—Mantagne d'Ambre, *Perrier* (P). Bassin supérieur du Sambirano, forêt de Besantribe, c. 1200 m, *Humbert* 18707 (K, P). Ankaratra, 200 m, *Perrier* 6630 (P, lectotype of *E. perieri*). Ankaratra Mts., *Hildebrandt* 3869 in part (BM, JE, K, M, P, US). Sambiana, north of Antsirabe, *Waterlot* 754 (P). Bassin de l' Itomampy, col d'Andriteny, *Humbert* 6857 (P). Antananarivo and Be'zongzong, *Bojer* (P, lectotype of *E. salignum*, Brenan in Fl. Trop. E. Afr., Onagraceae: 5, 1953; K, photograph). Tanarivou, prov. Emirina, in 1830, *Bojer* s.n. (JE). Central Madagascar, *Barron* 2269 (K, type of *E. oligodontum*). Ranobé, near Sirabe, in 1895, *Forsyth-Major* s.n. (G, holotype of *E. madagascariense*).

Epilobium salignum is somewhat variable, and a number of its variants have been given names. Some specimens from Madagascar, for example, are relatively low in habit and have somewhat narrower leaves than usual; these have been called *E. perrieri*. In his treatment of Onagraceae for the Flore de Madagascar, H. Perrier de la Bâthie (op. cit.: 2, 1950) stated that such plants had "Stolons très greles et très longs", whereas plants of *E. salignum* are said to have "Stolons nuls, mais base des tiges radicante". I have been unable to substantiate this distinction with the available material; all plants that I have seen have long, somewhat woody, rhizomatous bases, from which arise leafy shoots after the flowering and fruiting cycle is completed.

Some of the plants of this species from South Africa (e.g., *Flanagan* 665 BOL, GRA, PRE; *McClellan* 913, PRE; *Mogg* 6830, PRE; *Tyson* 2012 E, PRE) have rather distinctly serrulate and often somewhat hairy leaves; they appear to constitute a rather distinctive local variant. The type collections of *E. mundtii*, *E. natalense* and *E. schinzii* represent plants of this sort.

As herein constituted, therefore, *Epilobium salignum* comprises Haussknecht's entire group Anomalifoliae. A few collections made where the range of this species overlaps with that of *E. stereophyllum* are assignable with difficulty to one species or the other, and it is likely that hybridization between them may contribute to this local blurring of the boundaries between what are otherwise very distinct species. In South Africa, *E. salignum* grows sympatrically with *E. capense*, *E. hirsutum* and *E. tetragonum* subsp. *tetragonum*, but hybrids have not been observed.

The gametic chromosome number of this species was determined in two collections grown at Stanford: *Raven* 19737 (DS), June, 1963, the seeds from *Procter* 2078 (K), Little Ruaha River, Sao Hill, Iringa, Tanzania, Jan., 1962; *Raven* 20339 (DS), June, 1964, the seeds from *Compton* 30554 (DS), Forbes Reef, Mbabane Dist., Swaziland, 3 March, 1961.

DOUBTFUL AND EXCLUDED SPECIES

***Epilobium angustifolium* L.**, Sp. Pl. 347 (1753). This widespread circumboreal species was reported by Haussknecht (Monogr. Epil. 39, 1884) from Africa "in ins. Madera leg. Forster, et in ins. Canar. ad Pic de Teneriffa alt. 11 000' s. m. repertum". I have not seen any material from these islands and have been unable to discover any further record of the presence of this species on them in the literature. Unless additional or authentic collections be discovered, the occurrence of this species in Africa must be regarded as extremely doubtful.