

A REVISION OF CAMPYLANTHUS

A. G. MILLER

ABSTRACT. A synopsis, including keys and illustrations, is given of the genus *Campylanthus* Roth (Scrophulariaceae). Nine species are recognised including four new ones: *C. incanus* A. G. Miller (Somalia), *C. yemenensis* A. G. Miller (Y.A.R.), *C. sedoides* A. G. Miller (Oman), and *C. chascaniflorus* A. G. Miller (Oman). The genus stretches disjunctly from Macaronesia to Somalia and T.F.A.I., the south of the Arabian peninsula (the main area of diversity) and thence to W Pakistan. It appears to be very isolated in the family.

Campylanthus (Scrophulariaceae) is a small genus of nine species showing a remarkably disjunct distribution (fig. 1). One species is restricted to the Canary and Cape Verde Islands, three are in Somalia, one in Socotra, five in the south-west of Arabia and one in Pakistan. Although there is a huge gap between Macaronesia and E Africa, this pattern is not altogether unparalleled. *Aeonium*, *Canarina*, *Drusa* and *Euphorbia balsamifera* show similar trends in their distributions (Moggi, 1963; Hedge & Miller, 1977).

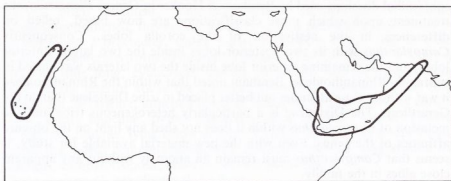


FIG. 1. Total distribution of *Campylanthus*.

The present paper resulted from a study of recently collected material from the Yemen Arab Republic, Somalia and Dhofar (Sultanate of Oman). Four new species came to light in this work and it seemed an appropriate time to present an up-dated account of the genus as a whole.

All the species have very similar floral and fruiting characters. The corolla (fig. 2) is hypercrateriform to sub-infundibuliform with five subequal lobes; the corolla tube is cylindrical and has two characteristic bends. The two stamens are anterior and unilocular with two fully confluent divaricate thecae (fig. 5Bb); they are held by short filaments in the upper bend of the corolla tube. The stigma is capitate, thickened, and held obliquely below the anthers. The capsule is more or less round to oblong-ovate, laterally compressed, many-seeded, bilocular and dehisces septicidally. The seeds are comma-shaped and flattened with a hyaline wing around the margin; the embryo is curved, peripheral, horse-shoe shaped. In contrast to their floral and fruit characters, the species vary greatly in facies and vegetative features, all showing adaptations to xerophytic conditions.

C. sedoides is a low subshrub with subglobose succulent leaves; *C. chascaniflorus* is a suffruticose, leafy, ascending, perennial herb; *C. ramosissimus* and *C. yemenensis* are low, intricately branched, almost aphyllous, greyish green shrubs; *C. incanus* and *C. spinosus* are also low and intricately branched but are clothed with many linear to linear-spathulate leaves and have a whitish, dense indumentum composed of parallel, medifixed, appressed hairs in the former and of simple sericeous hairs in the latter; *C. pungens* is a low shrub with erect, semi-succulent stems and minute, pungent leaves; *C. junceus* is a virgate shrub with sprawling stems up to 120 cm long; lastly *C. salsoloides* is a leafy shrub to 2 m high with linear to linear-oblong, succulent leaves.

Despite the great differences in facies between the species there is no doubt about the cohesiveness of the genus. When it comes to assessing its position in the family, however, problems arise. Webb (1845) placed it, by itself, in the sub-tribe Campylantheae within the Salpiglossideae because of its apparent affinities with the Solanaceae. However, most of the genera included in the Salpiglossideae have now been transferred to the Solanaceae and the apparent close relationships between the Solanaceae and Scrophulariaceae are thought to be superficial (Thieret, 1967). The subfamilial divisions used by Bentham & Hooker in *Genera Plantarum*, the treatment upon which most classifications are now based, relied on differences in the aestivation of the corolla lobes. Consequently *Campylanthus* with its two posterior lobes inside the two lateral anterior lobes, and the remaining anterior lobe inside the two laterals was placed in subfamily Rhinanthoideae. Bentham noted that within the Rhinanthoideae it was without close affinities but better placed in tribe Digitaleae than in the Gerardieae. The Digitaleae is a particularly heterogeneous tribe and the inclusion of *Campylanthus* within it does not shed any light on the obscure affinities of the genus. Even with the new material available for study, it seems that *Campylanthus* must remain an anomaly without any apparent close allies in the family.

All specimens which were seen are cited, except in *C. salsoloides* and *C. junceus* where the citations only represent a selection of those examined.

ACKNOWLEDGMENTS

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KEY TO THE SPECIES

- | | |
|---|--------------------------|
| 1. Plants with parallel, medifixed hairs | 2. <i>incanus</i> |
| + Plants glabrous or with simple hairs only | 2 |
| 2. Plants with thick, fleshy, $\pm$ obovoid leaves | 8. <i>sedoides</i> |
| + Plants with linear or flattened leaves, sometimes slightly fleshy | 3 |
| 3. Ascending, woody based perennial herb; corolla tube more than 15 mm long | 6. <i>chascaniflorus</i> |
| + Shrubs or subshrubs; corolla tube less than 15 mm long | 4 |

- | | | |
|----|--|------------------------|
| 4. | Leaves 2–4 cm long | 1. <i>salsoloides</i> |
| + | Leaves up to 1 cm long or absent | 5 |
| 5. | Virgate shrub; inflorescence more than 15-flowered | 7. <i>junceus</i> |
| + | Much branched, compact shrub; inflorescence up to 5-flowered | 6 |
| 6. | Plant shortly sericeous, silvery grey | 5. <i>spinosus</i> |
| + | Plant glabrous, shortly hirsute or papillose, never silvery grey | 7 |
| 7. | Corolla shortly hirsute outside; whole plant shortly hirsute | |
| | | 4. <i>yemenensis</i> |
| + | Corolla glabrous outside; whole plant glabrous or at most sparsely papillose | 8 |
| 8. | Stems semi-succulent, branches erect; leaves scale-like, to 2 mm, ± pungent | 3. <i>pungens</i> |
| + | Stems not semi-succulent, intricately branched; leaves fleshy, to 8 mm, obtuse | 9. <i>ramosissimus</i> |

Campylanthus Roth, Nov. Pl. Sp. 4 (1821).

Woody-based herbs or shrubs. Leaves simple, linear to subglobose, entire, often succulent, sometimes absent. Inflorescence a raceme, sometimes branched, flowers subsessile or shortly pedicellate, subtended by a bract and 2 bracteoles. Calyx 5-partite, lobes ± equal, free to base. Corolla hypercrateriform to infundibuliform; lobes 5, subequal, obovate to elliptic; tube long, cylindrical, doubly geniculate with upward-pointing hairs in the interior above the stamens. Stamens 2, anterior, thecae fully confluent, divaricate, attached by short filaments to upper bend of corolla tube. Ovary bilocular, ovules numerous. Style filiform. Stigma capitate, thickened, oblique, lying below anthers. Capsule many-seeded, septicidally dehiscent. Seeds comma-shaped, with a narrow scarious wing around the margin, campylotropous; embryo curved, peripheral.

Type species: *C. salsoloides* (L.f.) Roth

1. *C. salsoloides* (L.f.) Roth in Nov. Pl. Sp. 4 (1821).

Syn.: *Eranthemum salsoloides* L.f. Suppl. Pl. 82 (1781).

Campylanthus glaber Benth. in DC., Prodr. 10:508 (1846).

C. benthamii [Webb ex] Hook. in Niger. Fl. 163 (1849).

C. spathulatus A. Cheval. in Rev. Bot. Appliq. 15:897–8 (1935).

lc.: Webb & Berth., Hist. Nat. Iles Canar. 3. Phytogr. III: t. 176 (1836–50). Bramwell, D. & Z. I. Wild Flowers of the Canary Islands, t. 265 (1974). Hook., Ic. Pl. 8. t. 776 (1848)—as *C. benthamii*. Fig. 2h.

Shrub. Stems to 2 m, leafy, older parts with persistent leaf bases. Leaves linear to narrowly oblong, succulent, (10–)20–50 × 1–5 mm, persistent. Inflorescence a terminal, simple, or little branched raceme, villous. Pedicel 3–10 mm, filiform. Calyx lobes linear-triangular, 4–5(–6) × 0.75–1.5 mm, glabrous inside, villous outside. Corolla bluish pink, pink or white, hypercrateriform to infundibuliform; tube c. 7 mm, c. 2 × long as calyx, villous outside; lobes elliptic to broadly obovate, 5–6 × 2.5–4 mm, acute or obtuse, glabrous inside, villous outside. Anthers c. 2 mm. Style c. 15 mm. Fruit dark brown or black, shiny, oblong ovate, laterally compressed,

4.5–6 × 3.5–4 mm. Seeds 0.8 × 1 mm, reddish brown with narrow hyaline wing around margin.

Type: [Canary Islands, Tenerife] 'Habit in Barrancas circa oppidum St Crux'. *Franc. Masson* (BM).

CANARY ISLANDS. Gran Canaria: Caldera de Bandara, 26 v 1894, *Murray*, (K); N Coast nr Punta Camillo, rocky ridge, 50 m, 4 xi 1977, *Lavranos* 16028 (E); Santa Lucia de Tiurajana, dry cliffs, 600 m, 27 iii 1969, *Bramwell* 1036 (E); La cuesta de Silva, 100–200 m, iv 1924, *Burchard* 236 (E); Carretera Telde, Atalaya, 280 m, 12 i 1969, *Kunkel* 12296 (BM); Barranco San Felipe, 60 m, 11 iv 1973, *Stearn* 1102 (BM); Barranco de la Virgen, nr Cambalud, 300 m, 23 iv 1973, *Aldridge* 1577 (BM). Gomera: below Hermigua, v 1899, *Murray* (BM, K); road from Vallehermosa to Hermigua nr Tamargada, 450 m, 9 iii 1973, *Aldridge* 1138 (BM). Tenerife: Bufadero, 16 iv 1855, *Bourgeau* 1449 (E); Barrancas de las Hiedras, nr Sabinita, 660 m, 12 i 1973, *Aldridge* 517 (BM); Adeje, Barranco de infierno, 7 iv 1975, *Cannon* 4637 (BM); Montañas de Teno, 50 m, 8 iv 1977, *Jarvis & Murphy* 197 (BM); *ibid.*, 220 m, 18 ii 1969, *Bramwell* 754 (E); Monte Santa Cruz, 100–150 m, ii 1909, *Dummer* 5T (E); Guimal, iii 1933, *Trethewy* 102 (K); nr S. Andres, 18 v 1895, *Murray* (K).

CAPE VERDE ISLANDS. Brava: S. João Baptista, 900 m, 28 iii 1864, *Lowe* (BM); Fajaa d'Agua, 29 iii 1864, *Lowe* (BM). Santo Antão: Pta do Sol to Ribeira Grande, 2 iii 1864, *Lowe* (BM, K); Tiago on road to S. Lawrence, 23 iii 1864, *Lowe*. São Nicolau: Cammilo da Caldeira, 22 ii 1864, *Lowe* (BM), *Forbes* (K). São Vincente: 330 m, *Moseley* (K, BM); Fogo, 19 vii 1934, *Chevalier* 44841 (K).

Chevalier (1935) recognised two species of *Campylanthus* from the Cape Verde Islands, *C. salsoloides* (L.f.) Roth and *C. spathulatus* Cheval. He included *C. benthamii* [Webb ex] Hook. in the synonymy of *C. salsoloides* and mentioned that there seemed to be many intermediates (mainly in indumentum) between the two varieties of *C. salsoloides*, var. *glaber* Webb and var. *hirsutus* Webb. He recognised *C. spathulatus* as a distinct species mainly on the grounds of the flat oblong leaves and differences in indumentum. *C. benthamii* var. *hirsutus* Webb also has flat, oblong leaves and by his own admission Chevalier says that the differences in indumentum are unimportant. It therefore seems to me that *C. spathulatus* is not distinct from Webb's concept of *C. benthamii* and that *C. benthamii* should be included in *C. salsoloides*. With the limited material I have examined from the Cape Verde Islands I have treated *C. salsoloides* as the only species present.*

2. *C. incanus* A. G. Miller, sp. nov. Fig. 2i, 3.

Ab omnibus speciebus generis propter pilos medifixos adpressos parallelos diversus; a *C. spinoso* caulibus sine spinis differt.

Frutex humilis dense ramosus; rami juniores pilis argenteo-griseis medifixis parallelis dense obsiti. *Folia* linearia, 3–17 × 0.5–0.75 mm,

* Since this paper went to press I have been in communication with Per Sunding (Oslo) who on fresh material and field experience provisionally recognises 3 species in Macaronesia: *C. salsoloides* in the Canary Islands; another species corresponding to *C. glaber* Benth. in DC. in the Cape Verde Islands and finally *C. spathulatus* on S. Antão in the Cape Verde Islands.

leviter involuta. Flores 2–3 ad apices ramorum. Pedicelli 1.5–2 mm, glabri vel pilis sparsis medifixis obsiti. Calycis lobi anguste-elliptici 3.5–4.5 × 0.8–1.5 mm, apices acuti, pilis sparsis medifixis obsiti, ad apices densiore. Corolla hypercrateriformis vel ± infundibuliformis, subroseo-brunnea (in sicco), pilis sparsis medifixis obsita; tubus 7–9 × 0.8 mm, calyce 3–4-plo longior; lobi late obovati, 5–6 × 4–5.5 mm, apices rotundati. Antherae 1.5 mm longae; filamenta brevia, c. 0.4 mm. Ovarium ovoideum, parum applanatum. Stylus 1–2 mm, calyce brevior. Stigma capitatum, incrassatum, obliquum. Fructus ignotus.

Low densely branched shrub. Young branches with a dense indumentum of silvery grey, parallel, medifixed hairs; older stems becoming glabrous. Leaves linear, 3–17 × 0.5–0.75 mm, slightly inrolled, densely clothed with medifixed hairs. Flowers 2–3 at ends of branches; bracts and bracteoles shorter than the pedicels. Pedicels 1.5–2 mm, glabrous or with scattered medifixed hairs. Calyx lobes narrowly elliptic, 3.5–4.5 × 0.8–1.5 mm, apices acute, sparsely covered with medifixed hairs, denser at apices. Corolla hypercrateriform to somewhat infundibuliform, pinkish brown (when dry), sparsely covered with medifixed hairs; tube 7–9 × 0.8 mm, 3–4 × as long as calyx, with geniculations within calyx; lobes broadly obovate, 5–6 × 4–5.5 mm, apices rounded. Anthers 1.5 mm long, filaments short, c. 0.4 mm. Ovary ovoid, somewhat laterally compressed. Style 1–2 mm, shorter than calyx. Stigma capitate, thickened, oblique. Fruit unknown.

SOMALIA. Above Galgallo, 1150 m, 28 xi 1972, Lavranos & Horwood 9038 (holotype E); Bogha Aled, 49°55' E, 11°12' N, cracks of limestone slabs, bare windswept place, 300 m, 7 ix 1957, Newbould 1078 (K); Mijertein, 11°35' N, 50°20' E, 450 m, 22 v 1957, Everard 7 (BM).

C. incanus is restricted to N Somalia. It differs from other species in the genus in having an indumentum of parallel, medifixed hairs. This hair type is unique in the genus and unusual in the Scrophulariaceae.

3. *C. pungens* O. Schwartz in Mitt. Inst. Bot. Hamburg 10:245 (1939). Fig. 2e, 3.

Semi-succulent, subaphyllous, low shrub. Stems much branched, erect, to 40 cm, young branches purplish tinged, old ones more or less spiny, grey-green, all glabrous or rarely scabridulous at base. Leaves minute, linear-subulate, 2–4 mm, ± pungent, caducous. Flowers 2–4 at ends of branches, sometimes congested, subsessile or shortly pedicelled; bracts and bracteoles subulate, villous on margins. Calyx purplish green; lobes linear-triangular, 3.5–4 × 0.75 mm, apex acute, villous on margins. Corolla hypercrateriform, pinkish purple, throat yellow inside; tube 8–8.5 (–10) mm, 2–2.5 × as long as calyx; lobes subequal, ovate 2.75–3 (–3.5) × 1.4–2 mm. Fruit 3.5 × 3.25 mm, round, laterally compressed. Seeds 1.4 × 1.6 mm, straw-coloured.

Type: [P.D.R.Y., S. Yemen] In Arabia in Hadramaut (ohne Standortsangabe, 1931), Wissmann 661 (HBG).

SULTANATE OF OMAN. Dhofar, 12 km E of Ayun Pools, 17°16' N, 53°59' E, on crumbling rocky hills, 660 m, 12 iv 1977, Radcliffe-Smith 5463 (K). P.D.R.Y. S Yemen: Hadhramaut, Jol, between Saium and Makalla, 1220 m,

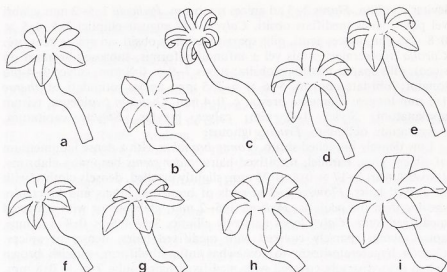


FIG. 2. Corollas. a, *Campylanthus sedoides*; b, *C. junceus*; c, *C. chascaniflorus*; d, *C. yemenensis*; e, *C. pungens*; f, *C. ramosissimus*; g, *C. spinosus*; h, *C. salsoloides*; i, *C. incanus*. All $\times 3$, except c $\times 2$.

iv 1952, Popov 557 (K); nr Moola Mutar, 24 vi 1950, Guichard KG/HAD/313 (BM).

YEMEN ARAB REPUBLIC. J. Shamsan, 15 km NNE of Sana'a, recent volcanic cone, 2450 m, 14 ix 1977, Lavranos 15846 (E); 79 km S of Sana'a on Dhamar rd, in rocky crevices, 2500 m, 25 vii 1977, Radcliffe-Smith & Henchie 4761 (K); c. 60 km S of Sana'a, rocky and pebbly slope without soil, 2 xi 1975, Hepper 6206 (K).

SAUDI ARABIA. U.S.G.S. Camp nr airport, Khamis Mushayt, 2000 m, 27 iii 1977, Collenette 222 (K); Abha, 2200 m, ii 1976, Brooks (BM); base of Jebal Shithath, $17^{\circ}41' N$, $43^{\circ}30' E$, 2100 m, 21 x 1969, Mandaville 2544 (BM); Wadi Erin, 18 iii 1952, Tothill 75 (BM).

C. pungens is a low, much branched shrub characterised by its semi-succulent, erect branches. It is found on dry rocky hills from 600–2500 m.

4. *C. yemenensis* A. G. Miller, sp. nov. Fig. 2d, 3.

A *C. pungenti* O. Schwartz indumento tomentoso et caulibus nunquam semi-succulentis bene differt.

Frutex, humilis, subaphyllus. Caules intricato-ramosi, subspinosi; rami juniores griseo-virides, hirsuti, c. 15 cm. Folia minutissima, linearia, 1–2 mm, caduca, hirsuti. Flores 2–3 ad apices ramorum. Bractea una et bracteolae duae adsunt. Pedicelli 1–2 mm. Calycis lobi angustetriangulares, $3.25\text{--}3.75 \times 0.75\text{--}1$ mm, acuti, intus glabri, extus hirsuti margine anguste hyalini, villosi. Corolla hypercrateriformis, malvina; tubus $7\text{--}8 \times 1\text{--}1.25$ mm, calyce 2–2.5-plo longior, extus pilosus; lobi subaequales, oblongo-ovati, $4 \times 1.5\text{--}1.75$ mm obtusi, extus pilosi, intus glabri. Antherae c. 2 mm longae. Stylus 2.5 mm longus. Stigma capitatum, incrassatum, obliquum. Fructus late ellipticus vel circularis, parum appianatus, $3.5\text{--}4 \times 3.5$ mm longus, apice retusus, glaber. Semina

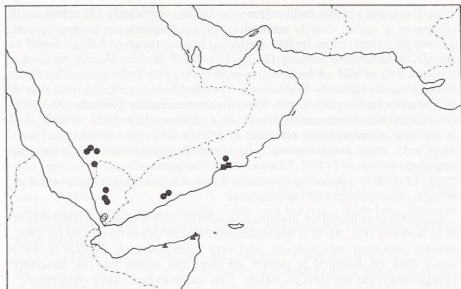


FIG. 3. Distribution of *C. incanus* ▲, *C. pungens* ●, *C. yemenensis* ○, *C. chascaniflorus* ■.

circularia, campylotropia, 1.75×1.5 mm, pallide badia, ad regionem funiculi alata.

Low subaphyllous subshrub, with intricately branched, more or less spiny stems; younger branches greyish green, shortly hirsute, c. 15 cm. *Leaves* minute, linear, 1–2 mm, caducous, hirsute. *Flowers* 2–3 at end of branches; bracts and bracteoles leaf-like, shorter than the pedicels. *Pedicel* 1–2 mm. *Calyx lobes* narrowly triangular, $3.25\text{--}3.75 \times 0.75\text{--}1$ mm, acute, glabrous inside, hirsute outside, margin more or less scarious. *Corolla* hypercrateriform, mauve; tube $7\text{--}8 \times 1\text{--}1.25$ mm, $2\text{--}2.5 \times$ as long as calyx, pilose outside, lower geniculation within the calyx and upper at its mouth; lobes subequal, oblong-ovate, $4 \times 1.5\text{--}1.75$ mm, obtuse, pilose outside, glabrous inside. *Anthers* c. 2 mm. *Style* 2.5 mm. *Stigma* capitate, thickened, oblique. *Fruit* broadly elliptic or circular, laterally compressed, $3.5\text{--}4 \times 3.5$ mm, apex retuse, glabrous. *Seeds* circular, campylotropous, 1.75×1.5 mm, pale reddish brown, wing restricted to funicular region. YEMEN ARAB REPUBLIC. Slopes of Jebal an Nar [Taiz to Mocha road, 25 km E of Mocha] c. 100 m, 21 iv 1977, *Lavranos & Newton* 15914 (holotype E); nr Al Mafrag, between Mocha and Taiz, rocky bank, c. 300 m, 26 v 1975, *J. Wood* 75/225 (E).

Known only from two gatherings in the south-west of the Y.A.R., it can be distinguished from the other low shrubby species by its shortly hirsute indumentum, especially on the outside of the corolla. The only other species of *Campylanthus* in the Y.A.R., *C. pungens*, grows at much higher altitudes on the mountains of the inner plateau and is distinguished from *C. yemenensis* by its semi-succulent, more erect branches.

5. *C. spinosus* Balf. f. in Proc. Roy. Soc. Edinb. 12:84 (1884).

lc.: Balf. f. in Bot. Socotra (Trans. Roy. Soc. Edinb. 31: t. 61) (1888);

Engler & Drude, Veget. Erde, 9,1,1:205 (1910). Fig. 2g.

Low compact spiny shrub. *Stems* to 60 cm, intricately branched, each ending in a spine; shortly sericeous, spines glabrescent, straw-coloured. *Leaves* persistent, more or less appressed above, recurved below, linear or elliptic-oblancheolate, obtuse, (2-)3-5 × 0.75-1 mm, shortly sericeous. *Flowers* 2-3 at end of branch, beneath spine, subsessile or sessile. *Calyx lobes* linear to narrowly ovate, 3-4(-5) × 0.75-1 mm, apex acute, shortly sericeous outside, glabrous at base, thinly tomentose towards tip inside. *Corolla* mauve, hypercrateriform; tube c. 8 mm, glabrescent outside, 2-3 × as long as calyx; lobes obovate, c. 4.25 × 2.7 mm. *Anthers* c. 1 mm. *Style* c. 1 mm. *Fruit* ovate-oblong, laterally compressed, glabrous, tip rounded, 4.5-5 × 2.5-2.75 mm. *Seeds* not seen.

Type: [P.D.R.Y.] Socotra, in campis prope mare abundans, *Balfour et al.* 101 (E), *Schweinfurth* 261 (Syntypes).

C. spinosus is found on Socotra and Abd al Kuri with an outlying station in N Somalia (Fig. 4). It is distinguished from all other species by its short, densely sericeous indumentum, and very spiny habit. A. Radcliffe-Smith notes that on Socotra it occurs all over the island on the limestone formations from sea level to 500 m. Two varieties have been recognised.

- | | | |
|----|-------------------------------|-----------------------|
| 1. | Leaves linear | var. <i>spinosus</i> |
| + | Leaves elliptic-oblancheolate | var. <i>kuriensis</i> |

var. *spinosus*

P.D.R.Y. Socotra: between Qallansiya and Qaysuh, 12°40' N, 53°29' E, s.l., 26 iii 1967, A. R. Smith & Lavranos 128(K); Hammaderoh, 12°35' N, 54°17' E, 350 m, 6 iv 1967, A. R. Smith & Lavranos 366(K); Jalonsir, 10 iv 1881, *Schweinfurth* 261(K); 1897, *Bent* (K); Reiged, on stony slopes, 450 m, 4 iv 1953, *Popov* GP/50/353 (EA, BM); Ras Katanahan, rocky hillside, 15 m, 18 ii 1953, *Popov* GP/50/135 (EA, BM).

SOMALIA. Erigavo, very stony ground, 1500 m, 7 ix 1956, *Simmons* B50 (EA, K).

var. *kuriensis* A. R. Smith in Kew Bull. 25:189 (1971).

P.D.R.Y. Socotra: Abd al Kuri, c. 6 km NE of J. Hassala, stony slope above coastal salting, 3 m, 8 v 1967, A. R. Smith & Lavranos 706 (holo. K; iso. EAH, FI, PRE, W, WAG— all iso. n.v.).

6. *C. chascaniflorus* A. G. Miller, sp. nov. Fig. 2c, 3, 5Ba-d.

Ab omnibus speciebus generis caulibus herbaceis corollis longis ad 19 mm differt.

Herba perennis, basi suffrutescens. *Caules* prostrati vel ascendentes, 10-20 cm, e basi vel superne ramosi, villosi. *Folia* obovata vel elliptica, 2-18 × 0.5-7 mm, apice acuta, villosa, in bracteis gradatim transientia. *Inflorescentia* terminalis, ± secunda, (2-)4-8-flora. *Pedicelli* 2-4(-6) mm longi. *Calycis lobi* anguste elliptici vel anguste-triungulares, 3.5-5 × 0.25-1.25 mm, basin versus anguste hyalini, extus villosi intus breviter puberuli. *Corolla* hypercrateriformis, subroseo-brunnea, extus glabra; tubus calyce 5-6-plo longiores, 15-19 × c. 1 mm; lobi subaequales, recurvi, anguste-oblongi vel anguste-elliptici, apice acuti, 5-6(-7) × c. 1-2.5 mm. *Antherae* 2.5 mm longae. *Filamenta* brevia, 0.3-0.5 mm. *Ovarium* ovoideum, leviter parum applanatum, in stylum gradatim

decrescens. *Stylus* longus, filiformis, calyce 2–3-plo longior, c. 9 mm. *Stigma* capitatum, obliquum. *Fructus* ignotus.

Perennial herb, base somewhat woody. *Stems* prostrate or ascending, 10–20 cm, branched from below or slightly branched above, villous. *Leaves* obovate or elliptic, 2–18 × 0.5–7 mm, apex acute, villous, grading into bracts above. *Inflorescence* terminal, ± secund, (2–)4–8-flowered. *Pedicels* 2–4(–6) mm long. *Calyx lobes* narrowly elliptic or narrowly triangular, 3.5–5 × 0.25–1.25 mm, with a narrow scarious margin at least at the base, outside villous, inside shortly puberulous. *Corolla* hypercrateriform, pinkish brown, outside glabrous, tube 5–6 × as long as calyx, 15–19 × 1 mm, geniculations above calyx; lobes subequal, recurved, narrowly oblong or narrowly elliptic, 5–6(–7) × c. 1–2.5 mm, apex acute. *Anthers* 2.5 mm long. *Filament* short, 0.3–0.5 mm. *Ovary* ovoid, laterally slightly compressed, narrowing gradually above into the style. *Style* long, filiform, c. 9 mm long, 2–3 × as long as calyx. *Stigma* capitate, thickened, oblique. *Fruit* unknown.

SULTANATE OF OMAN. Dhofar, Ras Hamar, 6 km W of Raysut, on sea cliffs, 50 m, 28 ix 1979, A. G. Miller 2312 (holotype E); Dhofar, Mugsayl, rocky slopes next to Khor, 10 m, 19 x 1979, A. G. Miller 2772 (E); Dhofar, Kharfawt, lower Wadi Sayq, 16°44' N, 53°19' E, 9 km E of Dhalqut, 2 km W of Rakhyut, in coastal sand with pebbles, 26 ix 1977, Radcliffe-Smith 5263 (K, E).

C. chascaniflorus can be distinguished from all other members of the genus by its long corolla tube and more or less herbaceous habit. Known from only the three gatherings cited, it grows on coastal cliffs and sand in areas affected by summer rain from the SW monsoon. It will quite possibly also be found on the coast of the P.D.R.Y.

7. *C. junceus* Edgew. in J. As. Soc. Bengal 16:1217 (1847). Fig. 2b, 4.

Virgate shrub. *Stems* subaphyllous, sprawling, 60–120 cm, slightly branched, glabrous or with a few short white hairs at axils. *Leaves* semi-succulent, linear to linear-elliptic, acute, 6–12 × 1–2 mm, glabrous or rarely with a few hairs. *Inflorescence* a terminal ± secund raceme, to 25 cm, 15–35-flowered. *Bracts* shortly hirsute. *Pedicels* 2–3.5 mm. *Calyx lobes* narrowly ovate to ovate, 2–2.5 × 0.5–0.8 mm, apex acute, villous on margin. *Corolla* hypercrateriform, white or mauvish white, tube c. 7–8 × 1 mm, 3–4 × as long as calyx, glabrous outside, villous inside above stamens; lobes broadly obovate, 3–4 × 2.5–3 mm, apex obtuse to acute, glabrous. *Anthers* c. 1.6 mm. *Style* c. 2.5 mm. *Fruit* round, laterally compressed, apex emarginate, 4.5–5.5 × 4.5–5.5 mm, glabrous. *Seeds* c. 1 × 1.5 mm, reddish brown.

Type. S Yemen [P.D.R.Y.].

P.D.R.Y. S Yemen. Hadhramaut, Jebal Aswad, 1220 m, 14 iii 1938, Wakefield Expedition 4A(K); Hadhramaut, nr Mukalla, 25 vi 1950, Guichard KG/HAD/317(BM) & KG/HAD/109(BM); Hadhramaut, above Maadi, 1830 m, iv 1961, Kerfoot 3038(K). Upper Gold Hohur valley, 30 m, 29 iii 1953, Grierson 119(E); 10 km W of Shuqra, rocks at edge of lava flow, s.l., 8 iv 1954, Grierson 137(E); Conquest Bay, s.l., 30 xi 1952, Grierson 21(E); J. Shamsan, 460 m, iv & v 1958, Waring 58(K); Little Aden, 17 iii 1967, A. R. Smith & Lavranos 64; Aden, cirque de Sehamsan, 8 xii 1889,

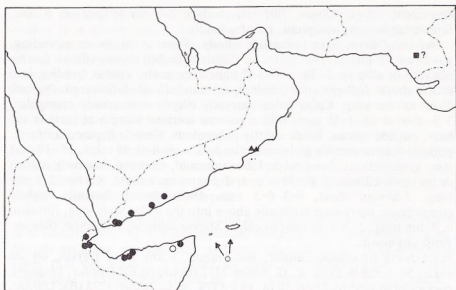


FIG. 4. Distribution of *C. spinosus* ○, *C. junceus* ●, *C. sedoides* ▲, *C. ramosissimus* ■.

Deflers 63(K); J. Risekla, coastal plain W of Aden, 1936, *Maxwell-Darling* 170(K); Aden, 150–450 m, 21 iii 1933, *Gillett* 5496(K); Wadi Mahfad, 600 m, 13 iii 1952, *Popov et al.* 4274(K); Aden, Maala Plain, 60 m, 4 iv 1894, *Lunt* 352(BM).

SOMALIA. Berbera, Karin nr Berbera, 100 m, 3 v 1945, *Glover & Gilliland* 1185(BM, K); 2 miles below Bihendula, 250 m, 31 v 1949, *Bally* B7276(K); Dubriat mt, 10°22' N, 45°10' E, 150 m, 3 i 1933, *Gillett* 4775(K); Camp 4, 10° N, 44°16' E, [NE Hargeissa], 1100 m, 18 x 1932, *Gillett* 4356(K); El Gurha in Abdu tug Elayu, 3 iv 1945, *Glover & Gilliland* 397(K); Kandala, 11°28' N, 49°52' E, 15 m, 2 ix 1957, *Newbould* 1033(K)—see p. 385.

Easily recognisable because of its weakly erect or scrambling habit, many flowered inflorescence and the pronounced curves of the corolla tube.

8. *C. sedoides* A. G. Miller, sp. nov. Fig. 2a, 4, 5Aa–e.

Species insignis. Differt ab omnibus speciebus generis habitu pumili et foliis succulentis obovoidis ± teretis.

Fruticulus, pumilus, succulentus. *Caules* 5–10 cm procumbentes; rami vetustiores albidi, decorticantes; rami juniores hirsuti, rubro-suffusi. *Folia* succulenta, incrassata, late obovoidea vel late ellipsoidea, parum complanata, 4–5 × 2.5–4.5 mm, apice rotundata; petiolus brevis, hirsutus. *Bractea* una et bracteolae duae, foliiforme adsunt. *Flores* 2–3 ad apices ramorum, subsessiles. *Calycis lobi* anguste elliptici vel anguste oblongi, 4–5.5 × 1–1.5 mm acuti, subsucculenti, hirsuti. *Corolla* hypercrateriformis, subroseo-brunnea; tubus 8.75–10 × 1–1.5 mm, calyce c. 2–2.5-plo longior, intus antheras supra puberulus extus superne hirsutus; lobi late obovati, 2.5–3 × 2.5–3.25 mm, superne canaliculati, acuti, hirsuti. *Antherae* 2.2 × 0.8 mm longi. *Ovarium* ovoideum parum applanatum, in stylum gradatim decrescens. *Stylus* c. 3 mm filiformis. *Stigma* capitatum, obliquum, incrassatum. *Fructus* late obovoideus, parum

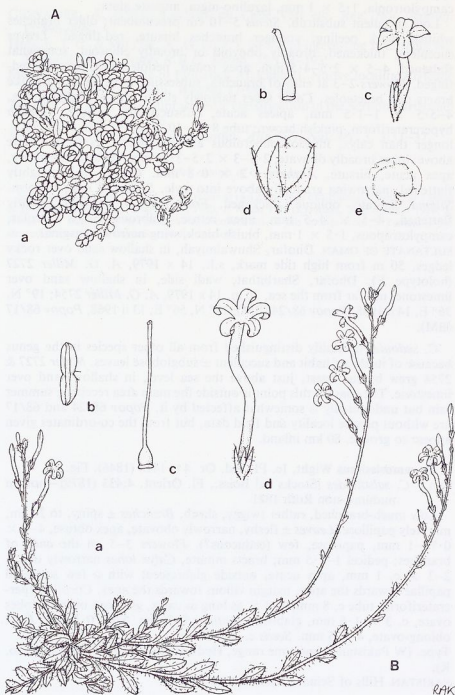


FIG. 5. A, *Campylanthus sedoides*: a, habit $\times 1$; b, gynoecium $\times 4$; c, flower $\times 2$; d, fruit $\times 4$; e, seed $\times 10$. B, *C. chascaniflorus*: a, habit $\times \frac{1}{2}$; b, anther $\times 9$; c, gynoecium $\times 4$; d, flower $\times 2$.

applanatus, 4–5 × 4–5 mm, apice retusus, glaber. *Semina* circularia, campylotropia, 1·5 × 1 mm, lazulino-nigra, anguste alata.

Low succulent subshrub. *Stems* 5–10 cm procumbent; older branches whitish, bark peeling; younger branches hirsute, red-tinged. *Leaves* succulent, thickened, broadly obovoid or broadly ellipsoid, somewhat flattened, 4–5 × 2·5–4·5 mm, apex round, petiole short, hirsute, red-tinged. *Flowers* 2–3 at ends of branches, subsessile, subtended by leaflike bracts and bracteoles. *Calyx lobes* narrowly elliptic or narrowly oblong, 4–5·5 × 1–1·5 mm, apices acute, subsucculent, hirsute. *Corolla* hypercrateriform, pinkish brown; tube 8·75–10 × 1–1·5 mm, c. 2–2·5 × longer than calyx, interior puberulous above stamens, exterior hirsute above; lobes broadly obovate, 2·5–3 × 2·5–3·25 mm, canaliculate above, apex acute, hirsute. *Anthers* 2·2 × 0·8 mm. *Ovary* ovoid, slightly flattened, narrowing gradually above into style. *Style* c. 3 mm, filiform. *Stigma* capitate, oblique, thickened. *Fruit* broadly obovoid, slightly flattened, 4–5 × 4–5 mm, apex retuse, glabrous. *Seeds* circular, campylotropous, 1·5 × 1 mm, bluish black, wing narrow, marginal.

SULTANATE OF OMAN. Dhofar, Shuwaimiyah, in shallow sand over rocky ledges, 50 m from high tide mark, s.l., 14 x 1979, A. G. Miller 2727 (holotype E). Dhofar, Sharbithat, wadi side, in shallow sand over limestone, not far from the sea, 20 m, 14 x 1979, A. G. Miller 2754; 19° N, 56° E, 14 ii 1968, Popov 68/24 (BM); 19° N, 56° E, 13 ii 1968, Popov 68/17 (BM).

C. sedoides is readily distinguished from all other species in the genus because of its dwarf habit and succulent ± subglobose leaves. Miller 2727 & 2754 grew by the coast, just above the sea level, in shallow sand over limestone. The coast at this point is outside the main area receiving summer rain but undoubtedly is somewhat affected by it. Popov 68/24 and 68/17 are without precise locality and field data, but from the co-ordinates given appear to grow c. 80 km inland.

9. *C. ramosissimus* Wight, Ic. Pl. Ind. Or. 4 t. 1416 (1846). Fig. 4

Syn.: *C. salsoloides* [Stocks ex] Boiss., Fl. Orient. 4:433 (1879)—nomen nudum—non Roth 1821.

Low much-branched, rather twiggy, shrub. *Branches* ± spiny, to 20 cm, minutely papillose. *Leaves* ± fleshy, narrowly obovate, apex obtuse, 4–8 × 0·75–1 mm, papillose, few (caducous?). *Flowers* 3–5 on the ends of branches; pedicel 1–1·5 mm; bracts minute. *Calyx lobes* narrowly ovate, 2–3 × c. 1 mm, apex acute, outside glabrescent with a few scattered papillae towards the apex, margin villous towards the apex. *Corolla* hypercrateriform; tube c. 8 mm, 3–4 × as long as calyx, glabrous outside, lobes ovate, c. 3 × 1·6 mm, glabrous. *Anthers* 0·8 mm. *Style* 0·5 mm. *Fruit* oblong-ovate, 4 × 5 mm. *Seeds* c. 2 × 2 mm.

Type. [W Pakistan] Limestone range, Hyderabad, 10 ii 1847, Stocks (holo. K).

PAKISTAN. Hills of Scinde, 1849, Stocks 522 (K).

Apparently known only from the two cited gatherings. It is distinguished from the other low shrubby species by its small, more or less persistent, semi-succulent leaves and minutely papillose indumentum.

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Further records of C. junceus

Since this paper went to press I have received two gatherings of *C. junceus* from the Yemen Arab Republic:— Harib, 1400 m, 5 iii 1980, *J. Wood* 3158 (K); Rada, 2100 m, 28 iv 1979, *J. Wood* 2767 (K). These represent the first collections of this species from N Yemen, a not altogether unexpected extension of distribution.