

STUDIES IN THE FLORA OF ARABIA XIX:

Teucrium in the Arabian Peninsula and Socotra

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ABSTRACT. A revision of *Teucrium* L. (Labiatae) in the Arabian peninsula and Socotra including a key, illustrations and distribution maps is presented. Fourteen species are recognized of which two are described as new: *T. hijazicum* I. C. Hedge & R. A. King and *T. popovii* R. A. King. Two other taxa are identified as possibly new species (*T. sp. A* & *T. sp. B*) but, because of inadequate material, not formally described. Also included is a new subspecies of *T. stocksianum* Boiss., subsp. *stenophyllum* R. A. King.

INTRODUCTION

Teucrium consists of about 200 species widely distributed throughout the world. It is essentially a genus of temperate regions with relatively few members in the tropics and the greatest concentration of species in the Mediterranean area and central Europe.

There are 14 species of *Teucrium* in the Arabian peninsula and Socotra, of which nine are considered to be endemic to the area. The majority of the endemic taxa occur in southern Oman, the People's Democratic Republic of Yemen (PDRY) and Socotra; Kürschner (1986) and research associated with Flora writing at Edinburgh has shown a high rate of endemism in some other genera in this southern area.

Bentham produced the basic sectional arrangement of the genus in his *Labiatarum Genera et Species* (1835), with Boissier in 1879 making a few additions and adaptations in *Flora Orientalis*. Nothing more modern exists. I have not adopted a sectional treatment here as a number of the Arabian species have been placed in a section that seems inappropriate; in particular some of those put in Sect. *Polium*. In view of the small group of species included in this study and the variability of some of the sectional characters (see discussion), I have preferred to simply record the species and the sections to which they have been assigned.

Sect. *Polium* (Moench) Benth. in Lab. Gen. et Sp. 663 (1835).

T. balfourii Vierhapper (as *T. prostratum* Balf.f.); *T. leucocladum* Boiss.; *T. mascatense* Boiss.; *T. nummularifolium* Baker; *T. polium* L.; *T. rhodocalyx* Schwartz; *T. sokotranum* Vierhapper (as *T. petiolare* Balf.f.); *T. stocksianum* Boiss.; *T. yemense* Deflers.

Sect. *Teucrium*

T. oliverianum Ging. ex Benth.; *T. orientale* L.

T. paulayanum Schwartz was placed in Sect. *Chamaedrys* (Moench) Benth. but is now in synonymy under *T. nummularifolium* Baker. *T. eximium* Schwartz was not placed in a section by Schwartz when he described the species.

The sections of the genus are essentially based on the form of the inflorescence and calyx, both rather variable characters as pointed out by

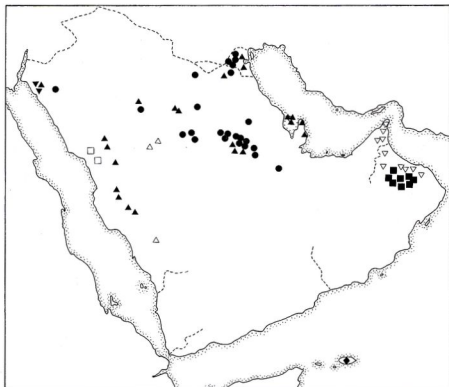


FIG. 1. Distribution within Arabia of *Teucrium polium* ▲; *T. leucocladium* ▼; *T. stocksianum* subsp. *stocksianum* ▽; *T. oliverianum* ●. Total distribution of *T. popovii* △; *T. hijazicum* □; *T. mascatense* ■; *T. balfourii* ◆.

Bentham. The shape of the inflorescence among those species examined here which basically have dense heads, shows a wide range of intraspecific variation from capitate to oblong or oblong to spike-like. The general shape of the calyx and the length of the calyx teeth are important diagnostic characters but again can show considerable variation within a species. The relative inequality of the calyx teeth, also used in the sections, appears to be a poor character in the sense that the variation makes a meaningful definition impossible in most cases.

The overall shape of the leaf and the prominence and distribution of lobing are good diagnostic characters although difficult to quantify. The size of the leaf can be extremely variable and depends largely on the aridity of the immediate environment. This factor also appears to fundamentally affect the indumentum of stem, leaf and calyx which can vary greatly in both density and hair type. The corolla has few diagnostic characters although the size and shape of the lateral lobes (the uppermost lobes) are important.

A varied combination of characters defines the species and suggests relationships between them. *T. polium*, *T. leucocladium* and *T. popovii* are related on the basis of their tubular calyces, short corolla lobes and

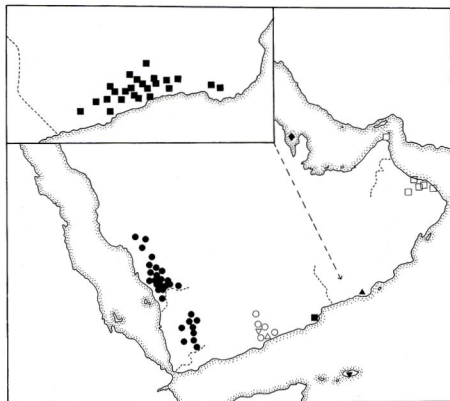


FIG. 2. Total distribution of *T. sp. A* ▲; *T. stocksianum* subsp. *stenophyllum* □; *T. sokotranum* ▼; *T. nummularifolium* ■; *T. rhodocalyx* ○; *T. eximium* △; *T. yemense* ●; *T. sp. B* ▽. Distribution within Arabia of *T. orientale* subsp. *taylora* ◆.

whitish flowers; their affinities lie with the species of the Mediterranean region. *T. hijazicum* also has links to the north but appears to be systematically isolated, as it is geographically, growing near the summit of high solitary mountains in western Saudi Arabia. *T. yemense* is another species of high altitude from the mountains of the Yemen Arab Republic and the southwest of Saudi Arabia. It is readily distinguished by its unusual calyx and, although known as an endemic, undoubtedly has close relatives, such as *T. spicastrum* Hedge & Miller, across the Red Sea and *T. sp. B* (see discussion under that taxon). *T. oliverianum* and *T. orientale* are species of the Irano-Turanian floristic region and quite distinct with their lax inflorescences, broad calyces and large violet flowers. The treatment by Hedge & Lamond (1968) of *T. stocksianum* gives it a range from the Punjab to SE Iran and this is now extended to the northeast of the Arabian peninsula.

The remainder of the species included here are endemics that appear to be relict and isolated: *T. mascatense*, restricted to the high mountains in northern Oman; the two species on Socotra, *T. balfourii* and *T. sokotranum*; *T. nummularifolium*, restricted to Dhofar and the east of PDRY and the poorly collected and known PDRY species, *T. rhodocalyx*

and *T. eximium*. *T. sp. A* is a poor specimen from a little-collected mountain summit in Dhofar, and has a tubular calyx and cream flowers but the long lateral lobes, simple hairs and the locality separate it from *T. polium*. The distributions of all species treated are shown in Figs 1 and 2.

All specimens cited, including types, have been seen unless otherwise indicated.

KEY TO SPECIES

1. Pedicels 6mm or more; calyx broadly campanulate with lobes 2.7mm or more long 2
- + Pedicels less than 3mm long; calyx campanulate to tubular or obovate with lobes 2.5mm or less long 3
2. Leaves 3-5-lobed rarely more; upper bracts often entire or with 3 short lobes; nutlets densely villous 15. *T. oliverianum*
- + Leaves bipinnatifid with numerous lobes; upper bracts never entire, 3-lobed, lobes at least half total length; nutlets with short sparse hairs at apex only 16. *T. orientale*
3. Lateral lobes of corolla \pm as long as broad; corolla white to pale yellow 4
- + Lateral lobes of corolla at least 1.5 \times as long as broad; corolla white, cream, pink, mauve, purple or violet 6
4. Indumentum of at least some branched hairs; leaves oblong to narrowly obovate with 5-7 pairs of lobes 1. *T. polium*
- + Indumentum of simple hairs only; leaves cuneate to broadly obovate with 2-4 pairs of lobes. 5
5. Flowers 6mm or less long 2. *T. leucocladum*
- + Flowers 10mm or more long 3. *T. popovii*
6. Leaves linear, 0.9-2(-3)mm broad with revolute margins, erect or ascending; [restricted to high mountains in northern Oman or to Socotra] 7
- + Leaves oblong, elliptic, obovate or cuneate, usually more than 2.5mm broad, only appearing linear when margins strongly revolute, erect, spreading or recurved 8
7. Leaves sessile; [northern Oman] 7. *T. mascatense*
- + Leaves very shortly but distinctly petiolate; [Socotra] 8. *T. balfourii*
8. Calyx inflated at base and contracted at mouth (especially after anthesis) 9
- + Calyx not inflated at base nor contracted at mouth 10
9. Leaves ovate to elliptic, 9mm or less long with 6-8 pairs of prominent lobes; calyx teeth 1mm or less long 14. *T. sp. B*
- + Leaves obovate to narrowly oblong, usually 7-16mm long with 3-4 pairs of lobes; calyx teeth 1.5mm or more long 13. *T. yemense*
10. Leaves coriaceous with sparse very short crisped hairs above, densely white tomentose below, all petiolate; petiole up to 8mm; [Socotra] 9. *T. sokotranum*

- + Leaves soft-textured with tomentose or villous indumentum above and below, rarely lanate below, sessile or petiolate; petiole up to 5mm; [Oman, PDRY (excl. Socotra), Saudi Arabia] 11
- 11. Calyx lanate or tomentose 12
- + Calyx villous 14
- 12. Corolla 11mm long or more; calyx more than 6mm long
6. *T. stocksianum*
- + Corolla 9mm or less; calyx less than 5mm long 13
- 13. Corolla less than 7.5mm long; calyx tubular, shortly lanate
4. *T. sp. A*
- + Corolla 8–9mm; calyx tubular-campanulate with long lanate hairs
12. *T. eximium*
- 14. Leaves elliptic, 2–5.5mm broad; calyx with hairs tufted at margins of teeth; [Hadramaut, PDRY] 11. *T. rhodocalyx*
- + Leaves linear-oblong, ovate, obovate, cuneate or suborbicular, 1.7–21mm broad; hairs not tufted at margins of calyx teeth. 15
- 15. Leaves linear to linear-oblong, usually \pm erect, not more than 3mm broad; corolla 11–14mm 6. *T. stocksianum*
- + Leaves ovate, obovate, cuneate or suborbicular, erect, spreading or recurved, 2.5–21mm broad; corolla 8.5–12mm 16
- 16. Corolla pink to purple, lateral lobes 3mm or more long; [southern Oman, PDRY] 10. *T. nummularifolium*
- + Corolla cream with pink venation and yellow throat, lateral lobes 2.5mm or less long; [western Saudi Arabia] 5. *T. hijazicum*

1. *T. polium* L., Sp. Pl. 566 (1753). Figs 1, 3A.

Ic.: Collettete: 283 (1985).

Woody-based perennial with an indumentum of at least some branched hairs. *Stems* 10–38cm long, ascending to erect with white or rarely yellow shortly lanate indumentum with sessile glands. *Leaves* sessile, oblong to narrowly obovate, 9–20(–30) \times 3–7mm; margins usually strongly revolute, lobed in upper $\frac{1}{2}$ or to base, rarely with less than 5–7 pairs of lobes; indumentum similar to stem, rarely tomentose. *Inflorescence* capitate, rarely oblong, 1–2.8(–3.4) \times 0.8–2cm, 3 or 5 often clustered at apex of stem. *Upper bracts* sessile, narrowly obovate, 4–10mm long, \pm equalling calyces. *Pedicels* 0–0.3mm long. *Calyx* \pm tubular, 4–6(–7)mm long, densely lanate; teeth \pm equal, triangular to broadly triangular, 0.8–1.5mm long, usually with subsidiary teeth or lobes. *Corolla* white to cream with yellow marking in throat, 6.4–9mm long, tube 3–4.5mm long, lateral lobes c. 1.3 \times 1.3mm, external indumentum of branched and simple hairs. *Staminal filaments* pilose especially at point of attachment to corolla. *Nutlets* oblong, c. 2.2 \times 1.5mm, reticulately rugose, dark brown.

Type: not selected; described from Italy, Spain, Portugal & S France.

Saudi Arabia, Qatar, Bahrain, Kuwait, Afghanistan, Turcomania, Iran, Iraq, N Africa, Mediterranean region. Dry sandy, stony and rocky areas, open *Juniperus* or *Acacia* woodland, 12–2200m. Fl.i–v, viii–x.

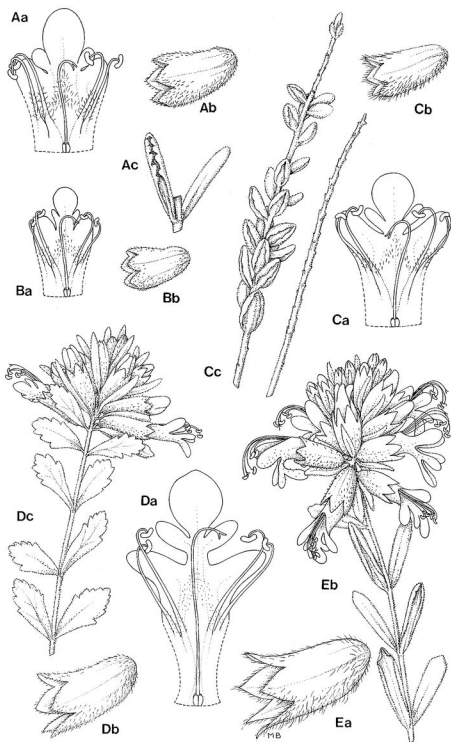


FIG. 3. *Teucrium polium*: Aa, corolla $\times 5$; Ab, calyx $\times 5$; Ac, leaves $\times 2$. *T. leucocladum*: Ba, corolla $\times 5$; Bb, calyx $\times 5$. *T. sp. A*: Ca, corolla $\times 5$; Cb, calyx $\times 5$; Cc, old inflorescence stems and leaves $\times 2$. *T. stocksianum* subsp. *stocksianum*: Da, corolla $\times 5$; Db, calyx $\times 5$; Dc, inflorescence and leaves $\times 2$. *T. stocksianum* subsp. *stenophyllum*: Ea, calyx $\times 5$; Eb, inflorescence with leaves $\times 2$.

Selected specimens:

SAUDI ARABIA: 60km SW of Medina, 700m, 10 iii 1982, *Baierle & König* 82-77 (E); Zabirah, 200km N of Buraydah, 549m, 22 ix 1981, *Collenette* 2838 (E, K); Harrat Khaybar Camp, 25°41'N 39°57'E, 1676m, 31 viii 1982, *Collenette* 3835 (E, K); Wadi Al A'aqla, 30km N of Riyadh, 14 iii 1981, *Hillcoat* 213 (BM); N of Taif, 1700m, 4 v 1978, *Humbles* 10159 (E); 1km E of Zalma turnoff, 700m, 17 iv 1982, *Podzorski* 955 (E); J. Shammar, near Hail, 9 v 1946, *Vesey-Fitzgerald* 15882/2 (BM).

QATAR: Nasraniyah, 15 iv 1979, *Batanouny* 1521 (K); 40km NNW Doha, 16 x 1974, *Mandaville* 4092 (BM); J. Fuwairat, 23m, 7 ii 1971, *Wilcox* 72 (K).

BAHRAIN: Wadi SE of Awali, 60m, 18 viii 1985, *Cornes* 338 (E); J. Dukhan, 17 ii 1936, *Fernandez* 303 (K); Khor Al-mufattah, 16 iv 1969, *R & M Halwagy* 529 (K).

KUWAIT: Arafjan, iii 1933, *Dickson* 131 (K); Salmi, on the way to Wadi Al Batin, 200m, 27 iv 1981, *Rawi, Jalili & Armer* 10701 (E, KUH).

A widespread and very variable species distributed from the Mediterranean region to Afghanistan. The polymorphism within the species makes it difficult to recognize in some areas but in the Arabian peninsula it is readily identified by the presence of branched hairs and most material shows the typical clustered, white woolly, \pm capitate inflorescences. Branched hairs are still present even when the plant has a much thinner indumentum and the inflorescences appear quite green. The record of *T. sinaicum* Boiss. from the Zor Hills, Kuwait by Gilbert-Carter (1917) is most likely a confusion with this species.

2. *T. leucocladum* Boiss. in Diagn. sér, 1:544 (1844). Figs 1, 3B.

Bushy, woody-based perennial with white stems. *Stems* to 20cm long, \pm erect, much-branched at base and above, white tomentose. *Leaves* sessile, obovate to cuneate, 4.7-9 \times 3.2-5mm; margins not usually revolute, with 2-3 pairs of pronounced lobes in upper $\frac{1}{3}$ to $\frac{1}{2}$; tomentose indumentum thinner than that of stem, with glandular hairs. *Inflorescence* capitate, c.0.8cm long. *Upper bracts* with short stalk, linear or narrowly obovate, c.3.5mm long, \pm equalling calyces, not overtopping inflorescence. *Pedicels* 0-0.3mm long. *Calyx* tubular, (3-4)mm, tomentose, with sessile glands and capitate glandular hairs, pilose within; teeth subequal, ovate-triangular to triangular, 0.5-0.7mm long, sometimes with small subsidiary teeth. *Corolla* creamy white to pale yellow, 5.3-6mm long, tube 2-2.5mm long, lateral lobes c.0.8 \times 0.8mm, sparsely pilose externally. *Staminal filaments* densely pilose at point of attachment to corolla. *Nutlets* \pm oblong, c.1.7 \times 1.2mm, reticulately rugose, dark brown. Type: In Arabia Petraea ad rupes Wadi Hebran, 4 vi 1835, *Schimper* 145 (iso. E, K).

Saudi Arabia, Egypt (incl. Sinai). Stony and rocky places (granite ravine), 549-1676m. Fl. iii-vi.

SAUDI ARABIA. Wadi Sawawin, 610m, 2 v 1978, *Collenette* 690 (K); J. Dibbagh, 1676m, 4 v 1978, *Collenette* 719 (K); N Hijaz, J. Hamtha, 549m, 5 v 1978, *Collenette* 730 (K); J. Dabbagh, 100km SW of Tabuk, 762m, 13 iv 1985, *Collenette* 5289 (E).

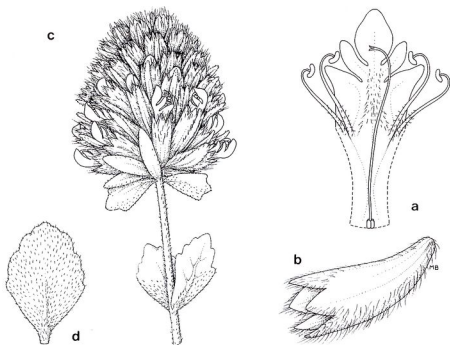


FIG. 4. *Teucrium popovii*: a, corolla $\times 5$; b, calyx $\times 5$; c, inflorescence $\times 2$; d, leaf $\times 2$.

A low bushy perennial with white stems, flat grey-green leaves and many small inflorescences.

T. leucocladum has been recorded from the Yemen Arab Republic by Blatter (1919) with a reference to Botta but without any further information. I have been unable to locate any Botta collection but the record probably refers to *T. popovii* described below.

3. *T. popovii* R. A. King, sp. nov. Figs 1, 4.

Et *T. stocksiano* Boiss. subsp. *stocksiano* et *T. leucoclado* Boiss. indumento caulis albo-tomentoso et forma foliorum cuneata usque obovata similis. A *T. stocksiano* lobus lateralibus corollae brevibus et corolla calyce tantum quarta parte longiore (non sesquialongiore) differt; a *T. leucoclado* habitu minus ramoso, floribus circa duplo majoribus, et indumento calycis villosa, non tomentoso recedit.

Woody-based perennial. *Stems* \pm erect, up to 36cm long, branching mainly near the base, white tomentose. *Leaves* sessile, broadly obovate to obovate, 10–19 \times 5.4–12mm, margins flat with 3–4 pairs of lobes in upper $\frac{1}{2}$, antrorsely crisped-hairy with some sessile glands, indumentum slightly denser on lower surface. *Inflorescence* capitate to ovoid, 1.3–2.8cm long. *Upper bracts* stalked, linear, 6–9mm long, equalling calyces. *Pedicels* 0–0.3mm. *Calyx* tubular, 6–9mm long, antrorsely villous with some sessile glands and small capitate glandular hairs, internally glabrous; teeth

subequal, triangular, 1–1.2mm long. *Corolla* colour not recorded, probably white or cream, 10–11.5mm long, tube 4.4–5.5mm long, lateral lobes 1.7–2.1 × 1.3–1.8mm, externally pilose on ventral surface of tube. *Staminal filaments* densely pilose in lower $\frac{1}{2}$. *Nutlets*: no mature nutlets seen.

Type: Saudi Arabia, Bishah to Nimas, 1 vi 1969, G. Popov 69/229 (holo. BM).

Endemic to Saudi Arabia. No habitat details recorded but probably in sand areas, 853–?1500m. Fl. iv–vi.

SAUDI ARABIA. South Nuqra, between Medina and Buraydah, 914m, 11 iii 1977, *Collenette* 105 (K); Uqlat Assuqur, 853m, 18 iv 1981, *Collenette* 2436B (E).

This new species occurs to the east of the escarpment mountains in south-west and central Saudi Arabia. It is related to *T. leucocladum* but differs in the habit, flower and inflorescence size, and calyx indumentum. A record of *T. leucocladum* from the Yemen Arab Republic by Blatter (1919) could extend the distribution to the south (see discussion under *T. leucocladum*).

The epithet is in honour of George B. Popov, a locust ecologist who has collected plants, including the type of this species, throughout the Arabian peninsula and Socotra since 1949 (Wickens, 1982).

4. *T. sp. A.* Figs 2, 3C.

Greyish white woody-based perennial. *Stems* up to 25cm long, ascending with white shortly lanate indumentum of simple hairs. *Leaves* sessile, ovate to elliptic, 3.5–6 × 2.7–3mm, margins revolute giving linear-oblong appearance to leaf, obscurely lobed in upper $\frac{2}{3}$ with 2–3 pairs of lobes, indumentum similar to stem. *Inflorescence* probably capitate to oblong up to c.3cm long. *Upper bracts* \pm sessile, narrowly obovate, 3–3.8mm long, shortly lanate. *Pedicels* c.0.3mm long. *Calyx* tubular, 3.6–4.8mm long, lanate-tomentose; teeth \pm equal, narrowly triangular to triangular, 0.7–1mm long, apparently without subsidiary teeth. *Corolla* cream, 5–7.4mm long, tube c.3.5mm long, lateral lobes 1.8–2 × 0.5–0.7mm, external indumentum of simple pilose hairs, very short hairs and small capitate glandular hairs. *Staminal filaments* pilose, not exceeding length of lower lip. *Nutlets* \pm oblong, c.1.8 × 1.1mm, reticulately rugose, dark brown.

Endemic to Oman (Dhofar). Open limestone slopes with *Boswellia* and *Dracaena*, 1460m. Fl. viii–ix?

OMAN. Dhofar, J. Semhan, N of Juffa, 'Dragon's Blood Valley', 1460m, 23 ix 1984, *Miller* 6323 (E).

This specimen has a *facies* similar to *T. polium* but differs in the simple hairs and longer lateral lobes of the corolla; it also occurs well south of the apparent southern limit of that species in Arabia (Fig. 1). It has no intact inflorescences and is showing some renewed growth; the possibility that the aridity of its habitat (Miller, pers. comm.) has produced a growth form that is obscuring its affinity cannot be ruled out but at present it appears to be a distinct taxon. More material in a better condition is required for formal recognition.

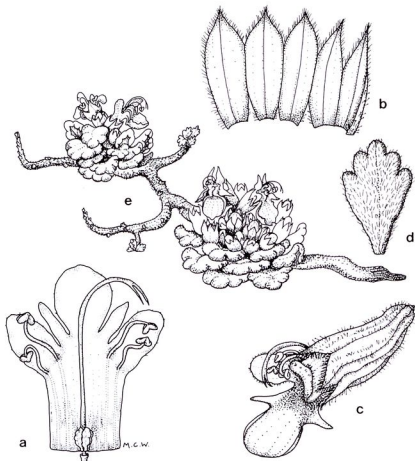


FIG. 5. *Teucrium hijazicum*: a, corolla $\times 5$; b, calyx $\times 6$; c, flower $\times 6$; d, leaf $\times 6$; e, flowering branch $\times 2$.

5. *T. hijazicum* I. C. Hedge & R. A. King, *sp. nov.* Figs 1, 5.
lc.: Collenette: 283, as 'sp. nov.' (1985).

Suffrutex caespitosus basi erebo ramosus. *Caules* 7–23cm longi, procumbentes vel \pm erecti, pilis eglandulosis villosis patulis atque pilis glandulosis capitatis parvis obsiti. *Folia* 5–10.5 \times 2.5–7mm, sessilia vel breviter petiolata, obovata vel cuneata, margine plerumque plana, in dimidio superiore prominenter utrinque 2–4 lobata, basi attenuata vel cuneata, supra pilis eglandulosis villosis pilis glandulosis et glandulis sessilibus provisa, subtus similiter sed glandulis sessilibus numerosissimis. *Inflorescentia* capitata, 0.7–1.4 \times 1–1.6cm. *Bracteae* calycem subaequantes, 5–8 \times 0.8–3mm, lineari-oblongae basi cuneatae vix pedunculatae. *Pedicelli* c. 1mm longi. *Calyx* tubuloso-campanulatus, florifer 5–6mm longus, pilis glandulosis capitatis parvis numerosis et pilis eglandulosis longis praecipue basin versus et margine dense provisus; dentes 5(–6) subequales, 1.4–1.8mm longi, labio superiore tridentato dentibus ovato-triangularibus, interdum lobis subsidiariis, labio inferiore dentibus angustotriangularibus. *Corolla* alba vel crenea, labio inferiore roseo-reticulato et

fauce lutea, 8.5–10.5mm longa, extus pilosa et villosa; tubus 3.7–4.3mm longus, lobis lateralibus 2.3–2.5 × 1–1.2mm. *Filamenta* sparsim pilosa; thecae rubro-castaneae. *Nuculae* ovoidea, reticulato-rugosae, atro-brunneae.

Type: Saudi Arabia, Jabal Warjan, 100km SW of Medina, on summit of col, 2072m, 27 iv 1984, *I. S. Collett* 4970 (holo. E, iso. K).

Endemic to Saudi Arabia. Rocky areas and crevices, 1402–2134m. Fl. iv, viii.

SAUDI ARABIA. J. Radhwa, N of Yenbo, 1981m, 10 x 1981, *Collett* 2883 (E); mountain 80km SSW of Madinah, 23°45'N 39°22'E, 1402m, 15 viii 1982, *Collett* 3788 (E); ravine on N side of large mountain, 23°58'N 39°15'E, 60km SW of Madinah, 1676m, 15 viii 1982, *Collett* 3795 (E, K); J. Radwa, 100km N of Yanbu, 1890m, 15 viii 1982, *Collett* 3797 (E, K); J. Warjan, 100km SW of Madinah, 2134m, 7 iv 1985, *Collett* 5221A (E).

T. hijazicum is similar in leaf shape and indumentum to *T. cyprium* Boiss., a species endemic to Cyprus and included in Sect. *Polium*, but differs in the calyx shape and corolla characters.

The specific epithet refers to the Hijaz region in the northwest of Saudi Arabia.

6. *T. stocksianum* Boiss., Diagn. sér. 2, 4:58 (1859). Figs 1, 2, 3D & E.

Perennial, often woody-based. *Stems* erect or ascending, up to 32cm long, much-branched, white tomentose. *Leaves* sessile to shortly petiolate, linear-oblong to broadly obovate, 4.5–15 × 2–7(–11)mm, base cuneate or narrowly tapered; margins flat or revolute, ± entire to distinctly lobed; indumentum similar to that of stem but sparser and with sessile glands especially on lower surface. *Inflorescence* usually capitate, occasionally elongated, 1.5–6.5 × 1.3–2.4cm. *Pedicels* up to 2(–3)mm long. *Upper bracts* stalked, linear-elliptic, 6–8(–10.5)mm long, ± equalling calyces, appearing tufted at apex of young inflorescences only. *Calyx* ± tubular to tubular-obconical, 6–7(–9)mm long, with base slightly upcurved, white tomentose, thinly lanate or villous with small capitate glandular hairs and sessile glands; teeth subequal to unequal, ovate-triangular to narrowly triangular, 0.8–2.5mm long. *Corolla* white with pink venation, light pink or mauve to violet, 11–14mm long, tube 5–6mm long, lateral lobes 3.4–4.5 × 1.6–2mm, externally pilose with small capitate glandular hairs. *Staminal filaments* pilose, especially towards the base. *Nutlets* oblong-elliptic, 2 × 1.2mm, reticulately rugose, dark brown.

Type: In ditone Beloutschistan superiori ad cacumen colli Hurbab in montibus Hala, 5000ft, 1850, *Stocks* (G-BOISS, K).

Saudia Arabia, Oman, United Arab Emirates, Iran, Pakistan, Afghanistan, Punjab.

This species varies considerably throughout its range and Rechinger (1982) recognizes four subspecies from the *Flora Iranica* area. The Arabian material falls into two identifiable groups; one compares reasonably well with the type subspecies but I consider recognition of the other as a new subspecies is justified on the basis of the leaf shape and calyx characters.

1. Calyx tomentose or thinly lanate, teeth 1.5–2mm long; leaves obovate to broadly obovate, (3–)4–7(–11)mm broad, prominently lobed in at least upper half, margins usually flat subsp. *stocksianum*
 + Calyx villous, teeth 2–2.5mm; leaves linear-oblong, 2–3.5mm broad, entire or lobed in upper third only, margins usually revolute subsp. *stenophyllum*

subsp. ***stocksianum***

Leaves obovate to broadly obovate, rarely more than twice as long as broad, prominently lobed in upper $\frac{1}{2}$ – $\frac{2}{3}$, 2–3 pairs of lobes (rarely 4), usually flat, green to grey-green with indumentum of short crisped hairs, *Calyx* 6.5–9mm long, tomentose, teeth 1.5–2mm long.

Oman, United Arab Emirates, Iran, Pakistan. Rocky hillsides, sea-level–1065m. Fl i, iii–v.

Selected specimens:

OMAN. Wadi Bani Kharus, near Subaykhah, 300m, 2 iii 1980, *Edmondson* 3222 (E); Hibra, 10km N of Nakhl, 23°26'N 57°52'E, 18 i 1985, *McLeish* 483 (E); Wadi Sahtan, 30km from Al Rustaq, 9 iv 1982, *Maconochie* 3374 (BM, E, MUSCAT); Wadi Dahir, 15km NE Mahdah, 400m, 26 iii 1980, *Oman Mining Ltd.* E.3498 (E); near Dhank, 366m, 18 v 1957, *Popov* 57/106 (BM).

UNITED ARAB EMIRATES. Fujairah, between Khatt and Dibba, 25°55'N 56°14'E, 455–1065m, 21 v 1982, *Western* 188 (E); Wadi Safarfir, near Hatta, up to 800m, 17 viii 1984, *Western* 676 (E).

Although the Arabian material of this subspecies compares somewhat poorly in leaf form with the type material seen from Balouchistan, Boissier in the type description of *T. stocksianum* makes a comparison with the leaf form of *T. leucocladum* Boiss., and the Arabian material conforms closely in this respect.

subsp. ***stenophyllum*** R. A. King, subsp. nov.

Ab aliis subspeciebus *T. stocksiani* foliis lineari-oblongis, plerumque marginibus valde revolutis, et combinatione indumenti caulis tomentosi, indumenti calycisque quasi villosi differt.

Leaves linear-oblong, generally at least 4 × as long as broad, tomentose or rarely short crisped-hairy, entire or 1–3 pairs of lobes near apex, margins usually strongly revolute, greyish white to grey-green. *Calyx* 6–7.5mm long, ± villous with straight or curved hairs, teeth 2–2.5mm long. Type: Oman, near Dibab, 25km SE of Qurayat, 23°02'N 59°05'E, 60m, 18 iv 1985, *M. D. Gallagher* 7499/8 (holo. E, iso. MUSCAT).

Oman, including Musandam. Rocky slopes, 30–1981m. Fl. ii–iv.

OMAN. Muscat, between Bawshar and Madinat Qaboos, 50–350m, 20 ii 1983, *Frey & Kürschner* 83-366 (E); Khasab-Sayh, Musandam, 23 viii 1982, *Maconochie* 3695 (E, MUSCAT); Al Masdud trail above Izki, 914–945m, 16 iii 1972, *Mandaville* 3456, 3465 (BM); J. Al-Aswad, 23°10'N 58°37'E, 1829m, 23 iv 1975, *Mandaville* 6738 (BM); Ruwi, 30m, 26 ii 1976, *Radcliffe-Smith* 3661 (K); Ruwi, 30m, 12 iii 1976, *Radcliffe-Smith* 3905 (K); 10km W of Muscat, 18 iii 1975, *Rubens* 83 (E).

This subspecies is readily distinguished from the others in *T. stocksianum* by the narrow leaves which are generally strongly revolute at the margins. The calyx indumentum is somewhat variable: on some plants

it is obviously spreading and on others the hairs are slightly shorter and curved but it never resembles the indumentum of the type subspecies.

7. *T. mascatense* Boiss. in Diagn. sér. 1, 5:44 (1844). Figs 1, 6A.

Low tufted woody-based perennial. *Stems* mostly erect, some ascending, 7.5–20cm long, much branched from the base, quite slender, white tomentose to \pm lanate or velvety with small capitate glandular hairs. *Leaves* usually \pm erect and adpressed to stem, sessile, (4–)4.5–9 \times 0.9–2(–3)mm, linear-oblong tapering to the base, appearing linear because of revolute margins, margins with 1–2 pairs of small lobes near apex; indumentum similar to stem, slightly less dense and sometimes yellowish on young growth. *Inflorescence* \pm capitate, 1–2cm long. *Upper bracts* usually sessile, linear to linear-oblong, 4–6mm long, slightly exceeding calyces. *Pedicels* 0.5–1mm long. *Calyx* obconical to tubular-campanulate, 5.2–8.5mm long, densely glandular hairy with some eglandular villous hairs on margins of teeth; teeth unequal, ovate-triangular to triangular, 1.2–2.5mm long. *Corolla* white with pale violet veins to pink or purple, 9.5–13mm long, tube 4–4.5mm long, lateral lobes 3–3.5 \times 1.1–1.2mm, external indumentum of \pm dense retrorse hairs ringing throat area with some short glandular and eglandular hairs elsewhere. *Staminal filaments* pilose towards base. *Nutlets* elliptic, c.2 \times 1.2mm, reticulately rugose, dark brown.

Type: [Oman] In monte Chebek regni Mascate, *Aucher* 5172 (BM, G, K).

Endemic to northern Oman. Amongst rocks and boulders on open rocky ground, 1034–3000m. Fl. iii–v, vii, ix–x.

OMAN. J. Al Akhdar, 23°04'N 57°40'E, 1034m, 8 ix 1984, *Ash* 84 (E); J. Akhdar massif, 1829–2591m, i 1959, *Deacock* 18 (BM); J. Akhdar, near Saiq, v 1959, *De C. Smiley* 9 (BM); J. Al Akhdar, Wadi Mistral, 1600–1800m, 18 ii 1983, *Frey & Kürschner* 83-281 (E, MUSCAT); Saiq area, J. Akhdar, 18 v 1982, *Maconochie* 3480 (E, MUSCAT); Ra's ar Rumad, 23°06'5"N 57°39'E, 2408m, 18 iii 1972, *Mandaville* 3604 (BM); J. Al Akhdar, 23°13'N 57°16'E, 2957m, 14 iv 1975, *Mandaville* 6511 (BM); Birkat Sahfan, 23°10'N 57°19'E, 1394m, 18 iv 1975, *Mandaville* 6597 (BM); Rasal Shayf, 23°01'N 51°41'E, 1950m, 17 x 1984, *Miller* 6613, 6614b (E); J. Shams, J. Akhdar, 3000m, 30 vii 1978, *Whitcombe* 247 (E); Masjid Ma'illah, 1700–2900m, 4 x 1978, *Whitcombe* 385 (E); Masjid Ma'illah, 1500–2850m, 4 x 1978, *Whitcombe* 397 (E).

A distinctive species with numerous rather slender stems and erect narrow leaves, *T. mascatense* is confined to the mountains of northern Oman above 1000m. De C. Smiley notes on his collection that the plant has been used as medicine for people suffering from fits and epilepsy.

8. *T. balfourii* Vierh. in Denkschr. Akad. Wien math.-nat. 71:436 (1907). Figs 1, 6B.

Syn.: *T. prostratum* Balf.f. in Proc. Roy. Soc. Edinb. 12:92 (1884) non Schur.

Woody-based perennial. *Stems* procumbent to ascending, 9–23cm long, becoming woody below, white pubescent-tomentose. *Leaves* shortly petiolate, petiole 0.5–1mm long, linear-oblong, 4–6.5 \times 1.5–2mm; margins revolute making leaves appear linear, entire or with 1–2 pairs of obscure

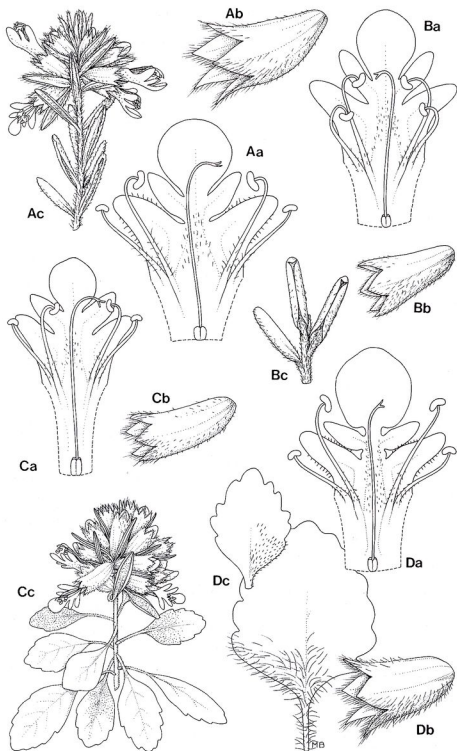


FIG. 6. *Teucrium mascaiense*: Aa, corolla $\times 5$; Ab, calyx $\times 5$; Ac, inflorescence and leaves $\times 2$. *T. balfourii*: Ba, corolla $\times 5$; Bb, calyx $\times 5$; Bc, leaves $\times 5$. *T. sokotranum*: Ca, corolla $\times 5$; Cb, calyx $\times 5$; Cc, inflorescence and leaves $\times 2$. *T. nummularifolium*: Da, corolla $\times 5$; Db, calyx $\times 5$; Dc, leaves: large from wet habitat, small from dry habitat, both $\times 5$.

lobes at apex; antrorsely crisped-hairy with some capitate glandular hairs on both surfaces. *Inflorescences* probably capitate, about 1cm long. *Pedicels* to 0.5mm long. *Upper bracts* stalked, \pm linear, 4.5–5mm long, \pm equalling calyces. *Calyx* obconical to obovate, 4.5–6mm long, \pm tomentose with some capitate glandular hairs; teeth triangular, 1.2–1.7mm long, slightly cucullate. *Corolla* white, 9–11mm long, tube 4.5–5mm long, lateral lobes 2.4–2.8 \times 1.2mm, external indumentum of sparse pilose and capitate glandular hairs. *Staminal filaments* sparsely pilose. *Nutlets* not known.

Type: [PDRY] Socotra, ad basim montium calcareorum prope Galonsir et Tamarida. B.C.S. 342, 547 (syntypes, K).

Endemic to Socotra. Stony slopes, up to 632m. Fl. i–iii.

PDRY (SOCOTRA). Hunter s.n. (E); J. Ma'ali. above Qaysuh, 366m, 27 iii 1967, *Radcliffe-Smith & Lavranos* 151 (K); J. Rahmen, Wadi Meige, 632m, 10 i 1899, *Simony* (n.v.); Fedhan Ahelif, 12 i 1899, *Simony* (n.v.).

This species differs from *T. mascatense*, which it resembles in general appearance, in its short but distinct petioles and the stem and calyx indumentum. The two *Simony* collections cited above are records from Vierhapper (1907).

9. *T. sokotranum* Vierh. in Denkschr. Akad. Wein math.-nat. 71:436 (1907). Figs 2, 6C.

Syn.: *T. petiolare* Balf.f. in Proc. Roy. Soc. Edinb. 12:92 (1883) non Raf.; *T. petiolare* var. *pubescens* Balf.f. loc.cit.

Woody-based perennial. *Stems* ascending, 10–15cm long, white pubescent-tomentose with some sessile glands. *Leaves* coriaceous, petiolate with petiole to 8mm long, oblong to elliptic, 8–18.5 \times 6–9.5mm, usually cuneate at the base; margins obscurely to clearly lobed in upper $\frac{2}{3}$ to $\frac{1}{2}$ with 3–5 pairs of lobes; apparently thick textured, sparsely crisped hairy with sessile glands above, white tomentose below. *Inflorescence* \pm capitate, 1.3cm long. *Pedicels* 0.5–1mm long. *Upper bracts* stalked, narrowly linear, 5.5–7.5mm long, margins revolute, \pm equalling calyces. *Calyx* tubular-obconical, 5.4–7mm long, sparsely crisped hairy with dense small capitate glandular hairs to \pm tomentose, usually with villous hairs in upper part; teeth equal, triangular-ovate, 1.2–2mm long, sparsely ciliate on margins. *Corolla* white or lavender, 9–11mm long, tube 4.6–5mm long, lateral lobes c.2 \times 0.9mm, external indumentum of sparse pilose and capitate glandular hairs. *Staminal filaments* pilose towards base. *Nutlets* \pm obovate, c.2 \times 1.2mm, reticulately rugose, blackish brown.

Type: [PDRY] Socotra, in montibus prope Galonsir, ii–iii 1880, B.C.S. 431 (lecto. selected here, BM; isolecto., K).

Endemic to Socotra. Stony places, rock crevices, 305–900m. Fl. ii–v.

PDRY (SOCOTRA). Konhil, 610m, 25 ii 1953, *Popov* 50/117a (BM); Hijama, 457m, 15 iii 1953, *Popov* 50/252 (BM); Reiged, 610m, 4 iv 1953, *Popov* 50/346 (BM); Hammaderoh, 457m, 6 iv 1967, *Radcliffe-Smith & Lavranos* 260 (K); J. Rughid, 305m, 13 iv 1967, *Radcliffe-Smith & Lavranos* 378 (K); Wadi Cigal, 26 iv 1881, *G. Schweinfurth* 566 (K); Adho, 1898–99, *Ogilvie et al.* 211 (E); Wadi Kischen, 900m, ?11 v 1881, *G. Schweinfurth* 578 (K, type of var. *pubescens*).

T. sokotranum is readily distinguished from the other Arabian species by its thick-textured petiolate leaves. Its closest relative appears to be *T. buxifolium* Schreb. in SE Spain which has similar but much smaller leaves and a somewhat similar calyx.

10. *T. nummularifolium* Baker in Kew Bull. 1895: 185 (1895). Figs 2, 6D.

Syn.: *T. paulayanum* Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10:219 (1939).

Softly villous, decumbent, woody-based perennial. *Stems* 9–30cm long, indumentum from fairly dense to very densely white villous, sometimes white pubescent or tomentose. *Leaves* sessile or with a petiole up to 5mm, very variable in size, 6–22(–27) × 5–21mm, obovate to suborbicular, sometimes ± elliptic, usually cuneate at the base, margins usually flat with c.5 pairs of obscure to pronounced lobes in upper $\frac{2}{3}$; indumentum ranging from sparsely to densely villous or ± tomentose with numerous sessile glands, more dense on lower surface than on upper. *Inflorescence* oblong to spike-like, rarely capitate (1–)1.5–11 × 1–2cm, softly villous. *Upper bracts* stalked, linear-oblong to oblong, 5–12mm long, often 3-lobed at apex, slightly exceeding calyces and therefore just overtopping inflorescence. *Pedicels* 0–1.2mm long. *Calyx* campanulate or obconical to ± tubular, sometimes quite broad, 6–7(–7.7)mm long, densely patently or antrorsely villous with numerous sessile glands and small capitate glandular hairs; teeth ± equal or lower 2 slightly longer, ± triangular, 1.5–2mm long. *Corolla* pink to purple, 8.5–12mm long, tube 4–5mm long, lateral lobes 3.1–4 × 0.9–1.6mm, external indumentum of scattered small capitate glandular hairs with pilose hairs on lower lip. *Staminal filaments* densely antrorsely hairy at point of attachment to corolla. *Nutlets* ovate-oblong, 1.5–1.8 × 1.2–1.4mm, reticulately rugose and minutely punctate, very dark brown.

Type: [Oman] S.E. Arabia, Wady Gerzid, Dhofar mountains, 1895, *Bent* 169 (holo. K).

Endemic to Oman (Dhofar) and PDRY. In various habitats from wet wooded escarpment slopes and grasslands to drier rocky slopes with *Acacia* and *Commiphora*, also on gravel plain and cliff tops on coast, 50–1100m. Fl. ii–iv, ix–xi.

Selected specimens:

OMAN (DHOFA). 2km NW of Sher, 17°12'N 54°10'E, 500m, 5 x 1984, *Ash* 150 (E); J. Qara, 13 iii 1978, *Lawton* 2020 (BM, K); road to Surfayt, N of J. Qamar, 16°48'N 53°19'E, 28 viii 1982, *Lawton* 2391 (BM); near Zik, 17°16'N 54°08'E, 25 ix 1976, *Mandaville* 6910 (BM); 40km W of Salalah, 16°45'N 53°40'E, 9 xi 1984, *McLeish* 317 (E); 10km W of Hajeif, 17°12'N 54°02'E, 24 xi 1981, *Maconochie* 2972 (K, MUSCAT); J. Qara, Jibjat, 1000m, 29 ix 1979, *Miller* 2346 (E, K); wadi 5km N of 'Ravens Roost' on Salalah-Thamrait road, 800m, 4 x 1979, *Miller* 2510 (E); J. Qamar, 9km N of Dalqut, 1100m, 10 x 1979, *Miller* 2650 (E, K); Leje water hole at base of J. Semhan, 17°11'N 54°56'E, 500m, 20 ix 1984, *Miller* 6200 (E); Aqarhanawt, near Tawi Atair, 900m, 23 ix 1984, *Miller* 6328 (E); Wadi Adownib, behind Firqah camp, 100m, 2 iv 1985, *Miller* 7067 (E); ravine below Ras Hamar, 15km W of Salalah, 80m, 8 ix 1985, *Miller* 7522 (E); Ayun road, 5km E of turnoff to pools, 870m, 17 ix 1985, *Miller* 7655 (E); 5km E of Mugsayl, 50m, 18 ix 1985, *Miller* 7675 (E);

43km N of Salalah on Thumrait road, 600m, 21 ix 1977, *Radcliffe-Smith* 5129 (K); Arazat, 29 ix 1943, *Vesey-Fitzgerald* 12338/1 (E).

PDRY (HADRAMAUT). Wadi Dhaurutan near Ras Fartak, 7/8 iii 1899, *Paulay* (HBG, type of *T. paulayanum*).

A very variable species in leaf size, calyx shape and density of indumentum. The size of leaf and density and type of the stem and leaf indumentum (i.e. whether villous or tomentose) appear to be closely related to the aridity of the habitat; specimens from the edges of the monsoon area have small, compact, \pm elliptic leaves and a tomentose stem and leaf indumentum (e.g. *Lawton* 2391, *Miller* 6200, *Miller* 7655, *Miller* 7675), the indumentum of the inflorescence, however, remains consistently villous.

11. *T. rhodocalyx* Schwartz in Mitt. Inst. Bot. Hamburg 10:218 (1939). Figs 2, 7A.

Greyish white, often \pm erect, woody-based perennial. *Stems* up to 17cm long, branched at the base and above, densely white tomentose to shortly lanate. *Leaves* always sessile, elliptic often appearing very narrowly elliptic when margins revolute, 7–9(–14) \times 2–5.5mm, cuneate at the base, margin flat or revolute with 5–6 pairs of small lobes in upper $\frac{2}{3}$; indumentum as on stem, slightly less dense on upper surface giving greyish appearance. *Inflorescence* capitate to oblong, 1–3.2 \times 1.2–1.5cm, softly hairy. *Upper bracts* stalked, linear-oblong, (3.7–)5.8–8mm long, slightly exceeding calyces. *Pedicels* c.1mm long. *Calyx* tubular to tubular-campanulate, 5–7mm long, often suffused dark red with small capitate glandular hairs, sometimes with crisped hairs, usually villous in upper part, fairly densely villous on tooth margins giving tufted white appearance; teeth subequal to unequal, triangular to narrowly triangular, 1–1.5mm long. *Corolla* pink to deep carmine ('probably white' in type description), (7–)8.5–11mm long, tube 4.5–5mm long, lateral lobes 2.4–2.8 \times 0.7–0.8mm, externally sparsely pilose also with small capitate glandular hairs. *Staminal filaments* sparsely pilose above and shortly retrorsely hairy around point of attachment to corolla. *Nutlets* not known.

Type: PDRY, Hadramaut, Kor Seban, 2100m, 12 v 1931, *Wissmann* 1286 (lecto. selected here, HBG); Djol vor Do'an, v 1931, *Wissmann* 1287 (syntypes, BM, HBG).

Endemic to PDRY. Rocky limestone plains, 1219–2100m. Fl. v, viii.

PDRY. Hadramaut, 190km S of Sayun on road to Mukalla, 1570m, 16 vi 1986, *Boulos*, *Rowaished*, *Gifri et al* 17066 (E, KUH); Jol, 1524m, iv 1961, *Kerfoot* 3032 (K); Jol, west road, 40 miles S of Jahi, 16 viii 1949, *Guichard* 13 (BM); Jol, west road between Sai'un and Mukalla, 1219m, 1 v 1952, *Popov* 569 (BM, K); Djol vor, Aqabet Huwere, 14 v 1939, *Wissmann* 2496, 2958 (BM); Hadramaut, Kor Seban, 15 v 1939, *Wissmann* 3045 (BM).

This is apparently a distinct species distinguished by the small elliptic leaves, the calyx indumentum and the branching in the upper part. Most specimens have many rather fine white stems arising from the base but this may be a response to grazing; some of the specimens cited above have very poor inflorescences.

12. *T. eximium* Schwartz in Mitt. Inst. Allg. Bot. Hamburg 10:219 (1939). Figs 2, 7B.

Described as 'probably annual' but more likely perennial. *Stems* ± erect, 12–24cm, white tomentose with some small capitate glandular hairs. *Leaves* sessile, oblong to narrowly ovate, 6–12 × 3–6mm, cuneate to somewhat obtuse at the base; margins flat, lobed from apex to base with 5–7 pairs of lobes, indumentum on upper and lower surface similar to that of stem with numerous sessile glands. *Inflorescence* oblong to spike-like, 3.5–9cm long, lanate. *Upper bracts* sessile, linear-oblong, 5–6mm long, often lobed at apex, ± equalling calyces. *Pedicels* up to 1mm long. *Calyx* tubular-campanulate, 4–6mm long, densely lanate; teeth subequal, triangular, 1–1.5mm long, obscured by indumentum. *Corolla* colour not known, 8–9mm long, tube 4.5–4.8mm long, lateral lobes c. 2.6 × 0.7mm, pilose externally especially on ventral surface with small capitate glandular hairs and sessile glands. *Staminal filaments* sparsely pilose. *Nutlets* obovate, c. 1.7 × 1.1mm, reticulately rugose, dark brown.

Type: [PDRY] Im Küstengebiet von Hadramaut: am Gebirgsabfall hinter Makalla (Wadi Himem), *Wissmann* 1281 (holo. HBG).

Endemic to PDRY. No habitat details available; the coastal collection area indicates a low altitude. Fl. v.

Known only from the type. The densely woolly inflorescences make this species very distinct.

13. *T. yemense* Deflers, Voyage au Yemen 190 (1889). Figs 2, 7C.
Ic.: Colletette: 283 (1985).

Greyish woody-based perennial. *Stems* procumbent to ascending, 4–14(–23)cm long, dense white ± antrorse tomentose indumentum with small capitate-glandular hairs and some sessile glands. *Leaves* sessile to subsessile, obovate to narrowly oblong, (4–)7–16 × 2–7mm; margins flat or revolute with 3–4 pairs of lobes in upper $\frac{2}{3}$ to $\frac{1}{2}$; indumentum as on stem but with more sessile glands. *Inflorescence* capitate to oblong, rarely spike-like, 1.2–6(–7.5)cm long. *Upper bracts* stalked, linear-spathulate, 4–6mm long, exceeding calyces and appearing tufted at apex of inflorescence. *Pedicels* up to 0.5mm long, glandular. *Calyx* ovate, slightly contracted at the mouth, 5–7mm long, somewhat inflated on ventral side near base, indumentum as on stem; teeth subequal, narrowly triangular to ovate-triangular 1.5–2.5mm long, apiculate with white hairs densely ciliate on margins. *Corolla* pink or mauve to purple with yellow marking in throat, 7.5–9.5mm long, tube 4–5mm long, lateral lobes 1.8–2.4 × 0.8–1mm, external indumentum of small capitate glandular hairs. *Staminal filaments* pilose towards base. *Nutlets* obovate c. 1.6 × 1mm, reticulately rugose, dark brown.

Type: Yemen Arab Republic, in Wadi Schidja, prope Menakha, 2200m, 16 v 1887, *Deflers* 443 (lecto. selected here, P).

Saudi Arabia, Yemen Arab Republic. Rocky slopes and screes, often in basalt and granite areas, 914–3300m. Fl. ii–vii, ix–xii.

Selected specimens:

SAUDI ARABIA. Wadi Bida, 15km S of Al Baha, 17 v 1980, *Boulos & Ads* 13904 (K); 5km S of Biljurshi, 2134m, 1 v 1981, *Colletette* 2574 (E); Wadi

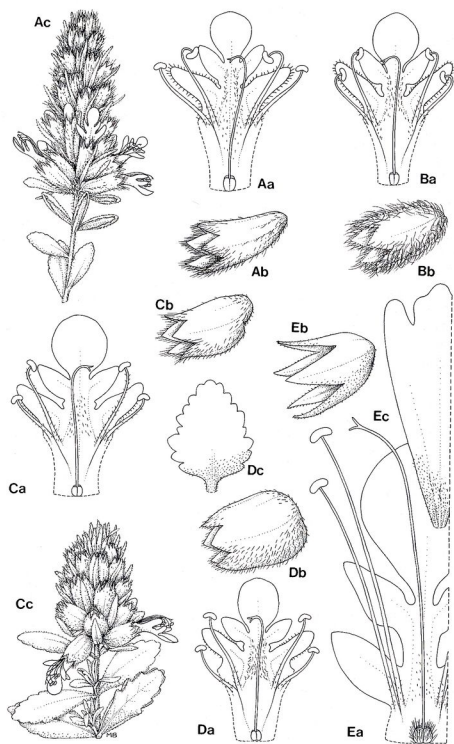


FIG. 7. *Teucrium rhodocalyx*: Aa, corolla $\times 5$; Ab, calyx $\times 5$; Ac, inflorescence and leaves $\times 2$. *T. eximium*: Ba, corolla $\times 5$; Bb, calyx $\times 5$. *T. yemense*: Ca, corolla $\times 5$; Cb, calyx $\times 5$; Cc, inflorescence and leaves $\times 2$. *T. sp. B*: Da, corolla $\times 5$; Db, calyx $\times 5$; Dc, leaf $\times 5$. *T. oliverianum*: Ea, corolla $\times 5$; Eb, calyx $\times 5$; Ec, lower bract $\times 5$.

al Uss, NW of Abha, 2591m, 22 ii 1982, *Collenette* 3318 (E); J. Feifa, 914m, 10 iv 1982, *Grainger* 533 (E); 35km SW Al Aqiq, 20°03'N 41°30'E, 2150m, 7 viii 1982, *Hassan, König & Kürschner* 82-2109 (E); Abha, 15km SE of Khamis Mushayt, 16 iii 1980, *Lavranos & Collenette* 18376 (E); 50km SE of Abha, 2 iii 1978, *Nasher* H18 (E); N Asir mts, Wadi Namra, 1600m, 23 iv 1982, *Podzorski* 1066 (E); Abha, at foot of Dhillah pass, 1524m, 31 v 1946, *Thesiger* s.n. (BM, E).

YEMEN ARAB REPUBLIC. Wadi Ahjar, 35km W of Sana'a, 4 iii 1977, *Chaudhary* s.n. (E); 20km SE of Dhamar, 2600m, x 1977, *Hendy* 31 (K); 25km SW of Sana'a on road to Menacha, 2700m, 26 xi 1982, *King* 298 (E); Qarn Al Wa'al on Sana'a-Hodeida road, 2800m, 29 ix 1976, *Lavranos & Newton* 13044 (E); Shaharah, 1200m, 22 ix 1978, *Miller* 171 (E); 20km SE of Dhamar, 2500m, 10 x 1978, *Miller* 468 (E); Wadi Sharaz on the road to Kochlan, 1200m, 12 x 1982, *Müller-Hohenstein & Deil* 823 (E, UNIV. BAYREUTH); Sana'a, 29 ix 1937, *Rathjens* 37/194 (BM); Yarim, 3048m, 26 ix 1972, *J. R. I. Wood* 72/28 (BM); Near Haifan, N face of J. Hitara, 1700m, 2 xii 1974, *J. R. I. Wood* 74/326 (E); 4km from Shemlaan to Shibam, 2500m, 13 vi 1975, *J. R. I. Wood* 75/318 (BM).

A distinctive species that is common on the high mountains in the southwest of the Arabian peninsula although, according to the collection details of J. R. I. Wood, it is absent from the areas of high rainfall. The most characteristic feature is the calyx which is broad, slightly inflated at the base and contracted at the mouth, especially after anthesis.

14. *T. sp. B.* Figs 2, 7D.

Small, greyish white woody-based perennial. *Stems* erect, branched from the base and above, to 9cm long, white tomentose. *Leaves* sessile or very shortly petiolate, ovate to \pm elliptic, 6-9 \times 3-5.8mm, margins flat or slightly revolute with 6-8 pairs of prominent lobes reaching almost to base, indumentum similar and as dense as that of stem with sessile glands. *Inflorescence* capitate to oblong, 1-1.6cm long, greyish white. *Upper bracts* shortly stalked, linear, c.5mm long, with 1-2 pairs of tiny lobes at apex, slightly exceeding calyces. *Pedicels* none. *Calyx* broadly ovate, slightly contracted at the mouth, 5-6mm long, somewhat inflated on the ventral side near the base, tomentose; teeth \pm equal, triangular, 0.5-1mm long, some straight hairs on margins. *Corolla* colour unknown (dried corollas show some pink coloration), c.8.5mm long, tube c.4mm long, lateral lobes c.2.5 \times 0.8mm, external indumentum of small capitate glandular hairs with retrorse pilose hairs on tube. *Staminal filaments* with sparse short pilose hairs. *Nutlets* not seen.

Endemic to PDRY. No habitat details available, 1219m. Fl. iii. PDRY. Hadramaut, Jol, E road between Mukalla and Sai'un, 1219m, 30 iii 1952, *Popov* 527 (BM, K).

Possibly a new species related, on the basis of the inflated calyx, to *T. yemensis*. It differs from that species in the much broader calyx with smaller teeth and in the shape and lobing of the leaf. It is mainly on the basis of these leaf characters, normally fairly consistent, that I have decided to keep this collection separate from *T. yemensis*; however the appearance of the specimens suggests that they grew in extremely arid

conditions and until more material is available from PDRY I think formal description is unjustified.

15. *T. oliverianum* Gingins ex Benth., Lab. Gen. Sp. 668 (1835). Figs 1, 7E.

Ic.: Fl Iranica 150, tab. 33 (1982); Collenette: 282 (1985).

Woody-based, pubescent perennial. *Stems* usually stiffly erect, 13–50cm, mainly branched at the base, clearly 4-angled, spreading or retrorsely pubescent with sessile glands. *Leaves* sessile, cuneate, 12–32 × 6–13mm, lower leaves often attenuate at the base, prominently 3–5(–9)-lobed in upper $\frac{1}{3}$ to $\frac{1}{2}$, usually 3 veins prominent on lower surface, margin slightly revolute, spreading to antrorsely pubescent. *Inflorescence* lax, \pm spike-like, flowers solitary in axils of bracts. *Upper bracts* sessile, leaf-like, cuneate, oblong or elliptic, 5–18mm, 3-lobed to entire. *Pedicels* 6–18mm, spreading-erect, usually straight and rather stout. *Calyx* broadly campanulate, 4.5–6(–8)mm long, enlarging slightly in fruit; teeth equal, narrowly triangular-ovate, 2.7–5.4mm long. *Corolla* violet to lilac-blue, rarely white, 10–16mm long, tube 2–3mm long, lateral lobes 3.5–4.2 × 2.7–4mm, externally pilose mainly on veins. *Staminal filaments* 17–20mm long, densely pilose at the base. *Nutlets* elliptic, c.2.5 × 1.4mm, densely villous.

Type: [Iraq] Inter Aleppo et Baghdad, *Olivier* (G, n.v.)

Saudi Arabia, Kuwait, Iraq, Iran. Sandy areas and stony gullies, often on sandstone and limestone, 45–945m. Fl. ii–iv, vi, xi–xii.

Selected specimens:

SAUDI ARABIA. 100km SW of Buraydah, 701m, 14 ii 1980, *Collenette* 1838 (E); 10km N of Shiqri, Tabuk Road, 945m, 12 ix 1983, *Collenette* 4545 (E, K); Wabra, Wadi Atshan, 45m, 21 iii 1969, *Dickson* 1103 (K); Wadi al A'aqla, 30km N of Riyadh, 16 iii 1981, *Hillcoat* 240 (BM); 10km NE of Khabari Wadha, 5 iv 1966, *Mandaville* 568 (BM); Al Bid', 28°17'N 43°14'E, 7 xi 1973, *Mandaville* 3946 (BM); 5km W of Al Majma'ah, 700m, 16 iv 1982, *Podzorski* 902 (E); Balum, 27°15'N 44°00'E, 7 iv 1946, *Vesey-Fitzgerald* 15746 (BM).

KUWAIT. Salmi on road to Wadi Al batin, 200m, 27 iv 1981, *Al Rawi et al.* 10708 (E, KUH); Al Salmi road, 94km towards Salmi, 123m, 13 iv 1981, *Armer* 159 (E); Dibdibba, 180m, 17 iv 1938, *Dickson* 453 (K).

This and the following species are readily distinguished from the other Arabian species by their height, lax inflorescences and large, usually violet-blue, flowers with long-exserted stamens. The upper bracts of *T. oliverianum* are shortly lobed to entire unlike the species below.

16. *T. orientale* L., Sp. Pl. 562 (1753).

subsp. *taylori* (Boiss.) Rech.f., Fl. Iranica 150:41 (1982). Fig. 2.

Ic.: Fl. Iranica 150, tab. 35 (1982).

Similar to the above species but differing in the bipinnatifid leaves; 3-lobed upper bracts divided almost to the base with the lobes spreading and the nutlets which are only very shortly and rather sparsely hairy at the apex with sessile glands elsewhere.

Type (subspecies): [Iran] Prope Schiras, 13 iii 1842, *Kotschy* 370 (G, W, n.v.)

Bahrain, S Iran. Dry areas, often near cultivation. Fl. iii.
BAHRAIN. Bahrain, iii 1931, *Ludlow-Hewitt* 1132 (K).

ADDENDUM

Since the completion of this paper a specimen has become available that bears a striking resemblance to material of *T. buxifolium* Schreb. from SE Spain. The collection was made in Dhofar, Oman and the details are as follows: Jabal Qinqari near Sath, 17°02'N 55°01'E, 4 ix 1983, *R. M. Lawton* 2523 (E, MUSCAT). The *Lawton* specimen only consists of a few flowering stems but it is virtually identical to *T. buxifolium* in stem, leaf and calyx characters and mainly differs in the shorter corolla tube (c.5mm compared with c.8mm in *T. buxifolium*).

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Note: The Herbarium at The Natural History Museum, P.O. Box 668, Muscat, Sultanate of Oman, cited as MUSCAT above, has been designated the herbarium code ON for the forthcoming, 8th edition, of *Index Herbariorum*.