Teucrium Salaminium Hadjik. & Hand (Lamiaceae, Teucrium sect. Polium), a New Species from Cyprus

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Source: Candollea, 66(2) : 341-351

Published By: The Conservatory and Botanical Garden of the City of Geneva (CJBG)

URL: https://doi.org/10.15553/c2011v662a11

Teucrium salaminium Hadjik. & Hand (Lamiaceae, Teucrium sect. Polium), a new species from Cyprus

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Abstract

HADJIKYRIAKOU, G. & R. HAND (2011). Teucrium salaminium Hadjik. & Hand (Lamiaceae, Teucrium sect. Polium), a new species from Cyprus. *Candollea* 66: 341-351. In English, English and French abstracts.

A new gypsophilous species, *Teucrium salaminium* Hadjik. & Hand *(Lamiaceae, Teucrium* sect. *Polium),* recently identified in Cyprus, is described. Its relationship to the four species of *Teucrium* sect. *Polium* known to occur in Cyprus is discussed, and ecological data on its habitat are provided.

Key-words

LAMIACEAE – *Teucrium* sect. *Polium* – Cyprus – Taxonomy – Conservation

Résumé

HADJIKYRIAKOU, G. & R. HAND (2011). Teucrium salaminium Hadjik. & Hand (Lamiaceae, Teucrium sect. Polium), une nouvelle espèce de Chypre. *Candollea* 66: 341-351. En anglais, résumés anglais et français.

Une nouvelle espèce gypsophile, *Teucrium salaminium* Hadjik. & Hand *(Lamiaceae, Teucrium* sect. *Polium),* récemment identifiée à Chypre, est décrite. Ses relations avec les quatre espèces de *Teucrium* sect. *Polium* présentes à Chypre sont discutées, et les données écologiques de son habitat sont exposées.

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Submitted on April 23, 2010. Accepted on August 29, 2011. Edited by P. Perret

Online ISSN: 2235-3658 *Candollea* 66(2): 341-351 (2011)

Introduction

A recent article has sought to clarify taxonomic problems concerning *Teucrium* sect. *Polium* (Mill.) Schreb. *(Lamiaceae)* occurring in Cyprus (HADJIKYRIAKOU & HAND, 2008). The four known species, *T. cyprium* Boiss. s.str., *T. karpasiticum* Hadjik. & Hand, *T. kyreniae* (P. H. Davis) Hadjik. & Hand and *T. micropodioides* Rouy all belong to *Teucrium* subsect. *Rotundifolia* Valdés Berm. & Sánchez-Crespo and all are endemic to Cyprus. Distribution of the species has been mapped by CHRISTODOULOU (2009). Surprisingly, studies undertaken by the first author, in the southern foothills of the eastern part of the Pentadaktylos mountain range, revealed a population of a taxon new to science. Examinations have shown that it differs in several characteristics from the above mentioned four Cypriot species. Furthermore, comparisons with herbarium material kept at B as well as with descriptions in the literature (e.g. BOULOS, 2002; EKIM, 1982; FEINBRUN-DOTHAN, 1978; KING, 1988; RECHINGER, 1982; SIDDIQI, 1985; TUTIN & WOOD, 1981), reveal that it cannot be identified with any known species of *Teucrium* occurring in the Mediterranean and the Near East. The new plant differs considerably from the other taxa, both in and outside Cyprus, due to a unique combination of discriminatory characters and in our opinion this differentiation merits recognition of a new taxon at species rank.

Material and methods

This study is based on intensive research in the field. Measurements of both fresh and dried specimens were taken, and trichomes were examined using SEM. Samples were mounted on SEM stubs on double-sided sticky tape, coated with 20 nm Au-Pd using an Emitech K550 sputter-coater, examined under a Philips SEM 515 scanning electron microscope and documented with the Point Electronic WInDISS III digital imaging device (hard and software).

The taxonomy and nomenclature of taxa follow MEIKLE (1985) and the updated new checklist for Cyprus (HAND & al., 2011). For the trichomes identification we follow NAVARRO & EL OUALIDI (2000b).

Teucrium salaminium Hadjik. & Hand, **spec. nova** (Fig. 1-6)

Holotype: CYPRUS. Division 7 (sensu MEIKLE, 1977): Ypsarovounos forest, c. 2.5 km southwest of Mandres, steep to even gypsum slopes dissected by streams, phrygana vegetation, with scattered *Pinus brutia* and *Cupressus sempervirens,* alt. c. 265 m, 27.VI.2007, *Hadjikyriakou 7071* (holo-: B; iso-: B, CYP, G, STU, herb. Hadjikyriakou).

Differt a Teucrio micropodioide caulibus (sub)erectis (non procurrentibus), foliis olivaceis vel viridis (non glaucoviridis), inflorescentiis obpyramidalibus vel obconicis (non globosis plus minusve), nuculis 1.1-1.3 mm (non 1.8 mm) longis.

Shrub, 15-40 cm high, with erect or suberect stems. *Indumentum* consists out of the following types of trichomes: (1) short and long clavate glandular trichomes, mostly with 2-3 stalk cells, (2) subsessile one-celled glandular trichomes, (3) non-glandular, unbranched, thick-walled trichomes, with 2 to several stalk cells. *Old wood* greyish-brown, fissured; *current year's shoots* straight, terete, erect to suberect, simple or variously branched, lengthening up to 20(-30) cm; *lowermost part of the shoots* remaining alive throughout the year becomes leafless; the upper part bearing the flower heads dries out; *indumentum* consists of dense, white, crisped or adpressed eglandular, unbranched hairs, intermixed with spreading, long or short glandular ones. *Leaves* subsessile or shortly petiolate, narrowly to broadly oblanceolate or elliptical, 12-22 × 3-6 mm when fully open, olive-green to green on both sides, becoming yellowish-green with age; margins slightly revolute, the lower ½-¾ entire or somewhat sinuate-undulate, the upper ¼-½ with an apical tooth and (0-)2-4(-7) crenations on either side; *leaves appearing from late spring* onwards become progressively smaller, narrowly oblong to linear, tufted on top of the sterile shoots, 4-11(-19) × 1.5-2(-2.5) mm when fully opened, subsessile or sessile, olive-green to green on both sides; margins strongly revolute, entire except for an apical tooth, or the upper ¼-½ with 2-4 crenations on each side and an apical tooth; *both surfaces* of the leaves with sessile glands, at first with lax to dense, white, unbranched, spreading or subappressed, short or long glandular and eglandular hairs, becoming appressed and crisped with age. *Flower heads* obpyramidal or obconical, flat-topped or slightly rounded, by the end of the flowering period many slightly elongated and ovoid, (6-)8-16 × (6-)8-16 mm, arising on top of long shoots or on lateral, long or short branches, altogether giving the appearance of a lax panicle; sometimes the heads on top of the long shoots are subtended by 2-4 smaller, subsessile ones. *Bracts* foliaceous, greenish, for most of the flowering period, equal or exceeding the flowers, all more or less reaching to the same height, 4.5-7.5(-2.4) × 0.5-1.3 mm, linear, narrowly oblong or oblanceolate, with revolute margins, entire, except for an apical tooth. *Bracteoles* absent. *Flowers* 4-15(-20) per head, sessile or shortly petiolate, sometimes 1-2 of the central buds never open. *Calyx* tubular, 4-6.1 mm; tube curved, 3.2-4.3 × 1.8-2 mm, 5-nerved, reticulately veined, externally with sessile glands and lax or dense white, spreading or adpressed, crisped, short or long glandular and eglandular hairs and internally with spreading or shortly subadpressed, eglandular and glandular hairs; *teeth* somewhat unequal; the abaxial deltoid, somewhat acuminate, 1-1.8 × 0.5-0.7 mm, the adaxial about 0.8-1.3 × 0.8-1 mm. *Corolla* tube 2.5-5 × 0.8-1.3 mm, slightly curved, glabrous to subglabrous towards the base externally, glabrous towards the base internally, pubescent at the region of the throat; *limb* white flashed with pink-violet on the lower part or pinkish-violet all over, 4-6 mm long; *basal lobes* oblong, 1.2-2 × 0.5-0.8 mm, *lateral*

Fig. 1. – *Teucrium salaminium* Hadjik. & Hand. Habit of a plant at the type locality.
[Photo: G. Hadjikyriakou]

Fig. 2. – *Teucrium salaminium* Hadjik. & Hand. Parts of an inflorescence, also showing typically shaped leaves.
[Photo : G. Hadjikyriakou]

Fig. 3. – *Teucrium salaminium* Hadjik. & Hand. Single flower and subtending bract.
[Photo : C. Makris]

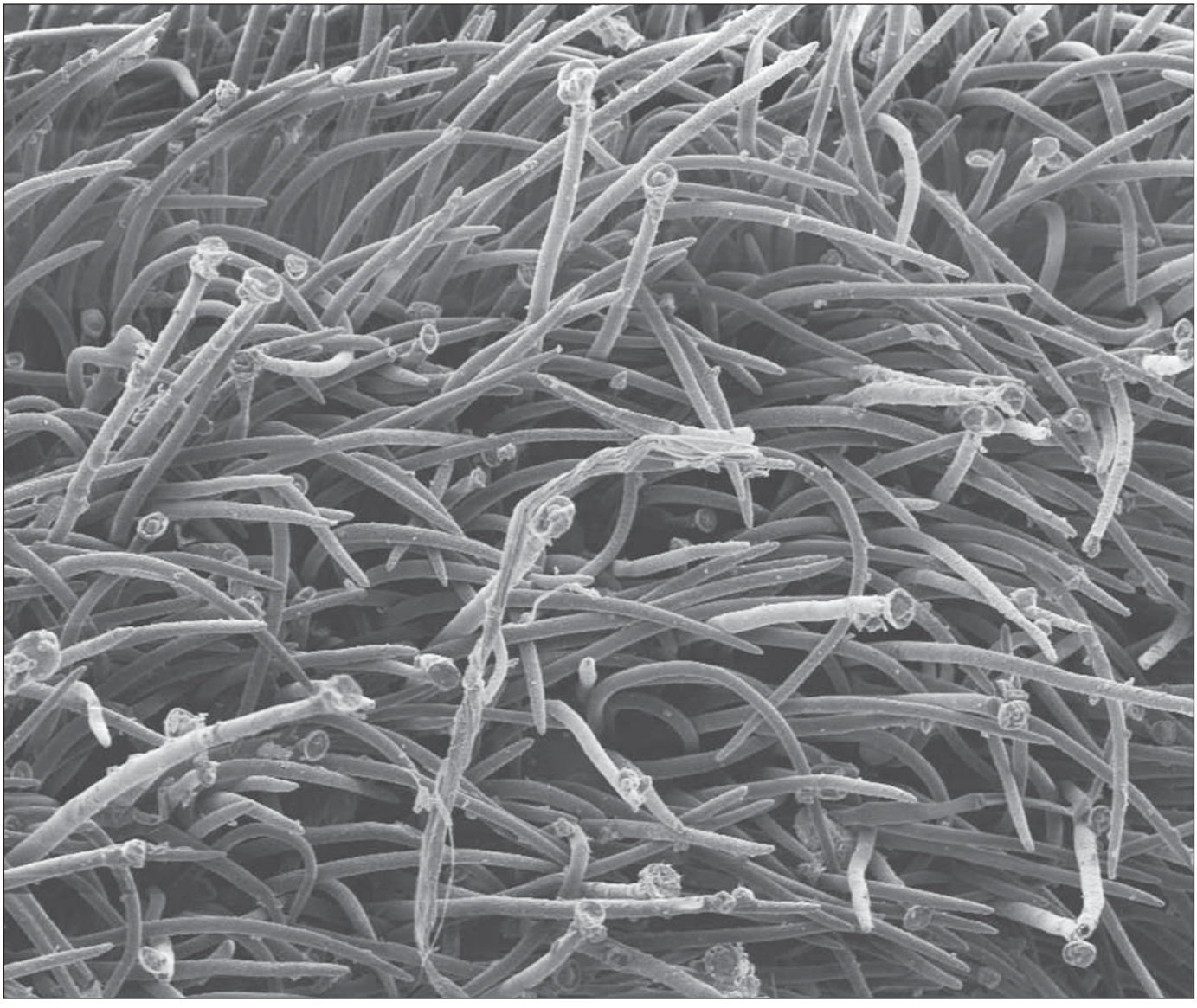

Fig. 4. – *Teucrium salaminium* Hadjik. & Hand. Stem indumentum.
[SEM photo: M. Lüchow]

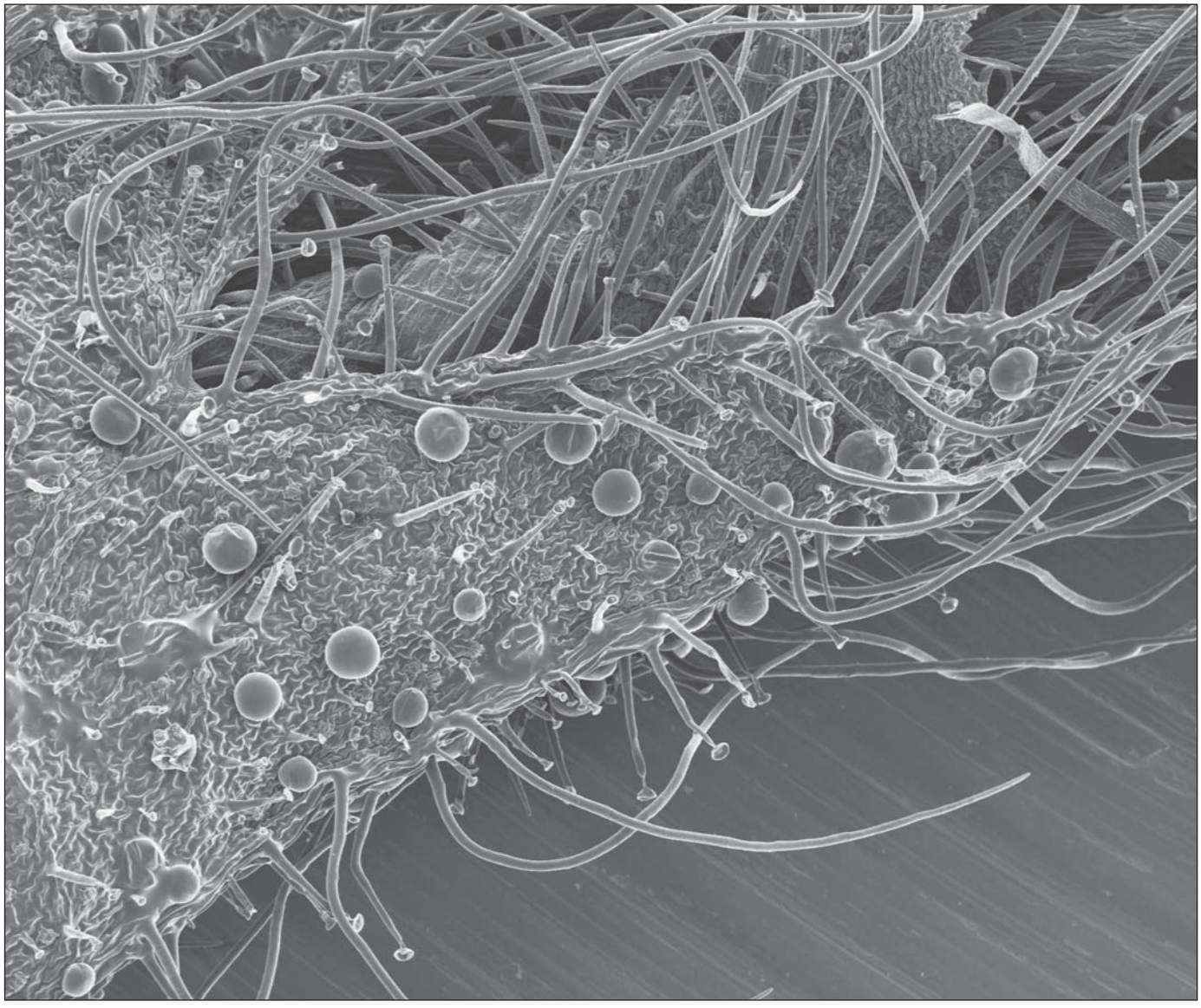

Fig. 5. – *Teucrium salaminium* Hadjik. & Hand. Apical part of calyx, indumentum.
[SEM photo: M. Lüchow]

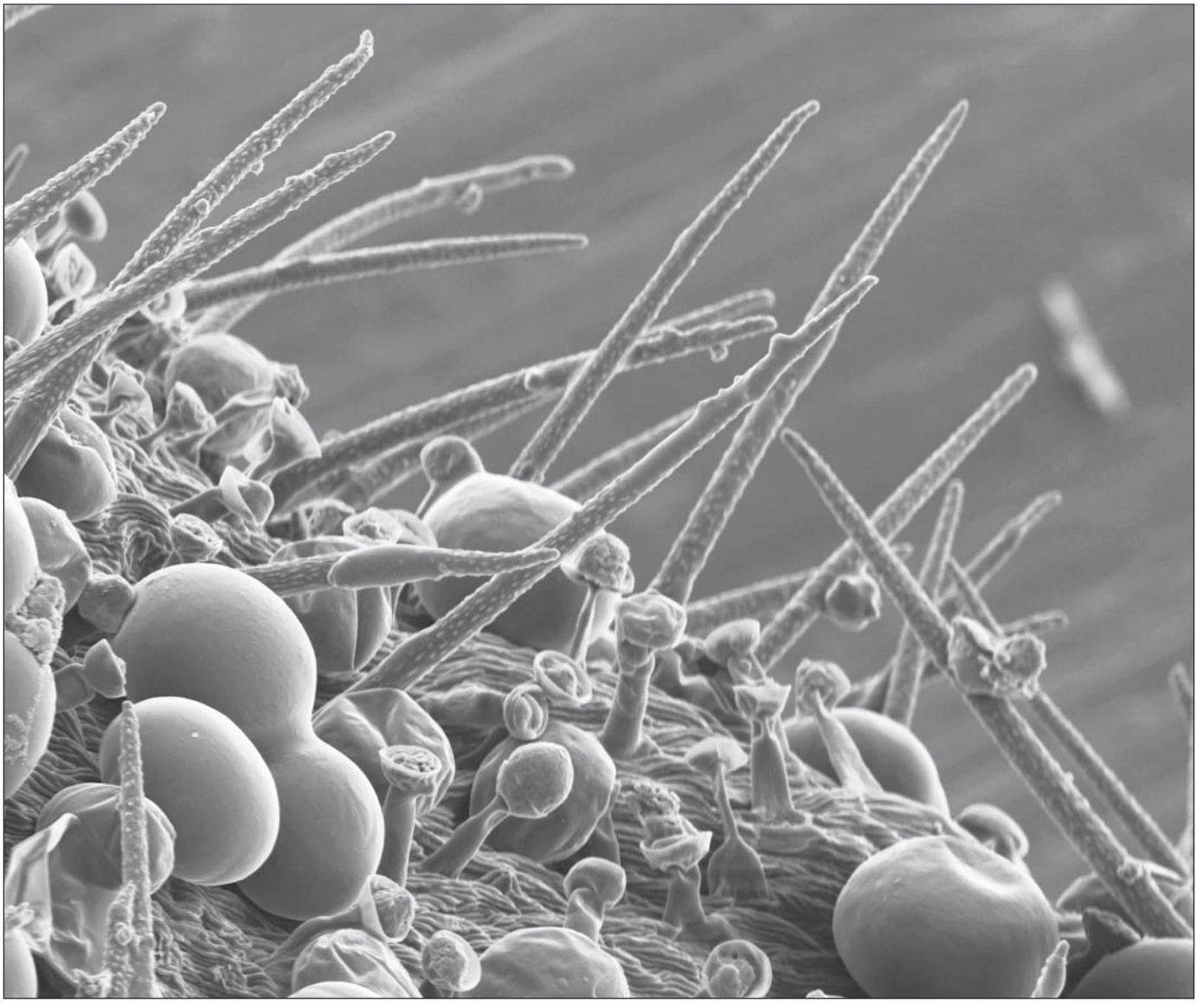

Fig. 6. – *Teucrium salaminium* Hadjik. & Hand. Corolla tube, indumentum.
[SEM photo: M. Lüchow]

lobes spreading, oblong, 1.1-1.3(-1.4) × 0.3-0.6 mm, *median lobe* nearly circular, 1.6-2.5 × 1.2-2.1 mm, cucullate; *external surface* thinly pubescent and with sessile glands; *internal surface* gland-dotted, hirsute at the region of the basal and lateral lobes, glabrous at the lateral lobes. *Stamens* inserted at or slightly below the mouth of corolla tube, exserted; *filaments* pinkish-violet above, thinly pilose, the adaxial 1.3-3.7 mm long, the abaxial 2.5-5.3 mm long; *anthers* pinkish-violet, 0.5-1 mm long. *Ovary* glabrous, about 0.5-0.8 mm long; *style* thinly pubescent, 4.5-6 mm long; stigmatic lobes subulate, unequal, 0.5-0.9 mm long. *Nutlets* somewhat cochleariform to obovate, 1.1-1.3 × 0.7-0.9 mm, rounded at apex, wedge-shaped at the base, attachment area flat, suborbicular, 0.6-0.7 mm in diameter, adjacent area convex; dark brown to blackish, granulose, slightly reticulately veined and foveolate.

Eponymy. – The specific epithet is the Latinized form of *salamínios,* which refers to somebody or something that comes from Salamis, an ancient city of Cyprus, situated about 17 km SE of the locality of collection. Salamis was founded by the Trojan hero Teucer, after whom the genus *Teucrium* is most likely named.

Flowering period. – *Teucrium salaminium* and *T. micropodioides* grow side by side in this area, but the former flowers from late June to end of September and the latter from May to late June; observations show that there is a period of 5-10 days overlapping. There were no indications of interbreeding or intermediacy.

Distribution and habitat. – *Teucrium salaminium* is confined chiefly within Ypsarovounos forest (ýpsaros = gypsum, vounón = mountain) and is found in the vicinity of the villages Mandres, Agios Iakovos and Platani (main occurrence at 35°19'N 33°47'E). Smaller groups have been located on gypsum hills which are situated at the northeast boundaries of the forest. It is generally found at an altitude between 200-380 m. The area is dissected by small streams, and it is characterized by steep to even slopes, cliffs and scattered, small flattish areas. The new species is restricted to Kalavasos geological formation (Upper Miocene) which is composed of gypsum alternating with chalky marls and marly chalks, in an area of about 5 km². This formation is mainly surrounded by Terrace Deposits (Pleistocene), but in a few places it adjoins outcrops of Alluvium-Colluvium, Pachna and Kythrea Formation (Middle Miocene) characterized by, e.g., several types of sands, silts, gravels, marls and conglomerates.

The precipitation rate in three nearby stations (Akanthou, Lefkoniko, Trikomo; 1951-1980; Meteorological Service, 1985) ranges from 316-513 mm per year. Because of the topographical situation, a rate of about 400 mm seems probable in the Ypsarovounos area.

Teucrium salaminium grows chiefly in habitat type 1520 Gypsum steppes – priority habitat type (sensu Directive 92/43 EEC), which covers extensive areas, or it is found in forest openings. It also occurs in other habitat types such as 5220 Matoral with *Ziziphus* (priority habitat type), 6220 Pseudo-steppe with grasses and annuals (priority habitat type), 9290 forests of *Cupressus sempervirens*, and 9540 Mediterranean pine forests with endemic Mesogean pines, *Pinus brutia*. Characteristic taxa of these habitats are mostly gypsovags, e.g., *Asparagus horridus* L., *Asphodelus ramosus* L., *Calycotome villosa* (Poir.) Link, *Cistus creticus* L., *Cistus salviifolius* L., *Cupressus sempervirens* L., *Cynara cornigera* Lindl., *Drimia aphylla* (Forssk.) J. C. Manning & Goldblatt, *Ferula communis* L., *Fumana arabica* (L.) Spach, *Fumana thymifolia* (L.) Verl., *Helichrysum stoechas* subsp. *barrelieri* (Ten.) Nyman, *Hyparrhenia hirta* (L.) Stapf, *Juniperus phoenicea* L., *Pistacia lentiscus* L., *Pistacia terebinthus* L., *Rhamnus lycioides* subsp. *graeca* (Boiss. & Reut.) Tutin, *Sarcopoterium spinosum* (L.) Spach, *Teucrium micropodioides, Thimbra capitata* (L.) Cav., and *Ziziphus lotus* (L.) Lam. The complete set of Cypriot gypsophiles is also found there: *Campanula fastigiata* Schult., *Gypsophila linearifolia* (Fisch. & C. A. Mey.) Boiss., and *Herniaria hemistemon* J. Gay.

Three of the Cypriot taxa of sect. *Polium* in Cyprus *(T. micropodioides*, *T. cyprium* and *T. karpasiticum)* grow in a variety of geological substrates and *T. kyreniae* grows in crevices of limestone cliffs, whereas repeated investigations show that *T. salaminium* is restricted exclusively to gypsum substrate. No plants have been found on the surrounding formations. Further investigations were carried out on extensive gypsum outcrops in the vicinity of Gastria village 15 km east of the type locality, in an area of 3 km², and on a smaller gypsum outcrop in the vicinity of Gypsou village, 6 km south of the type locality – in both areas without success.

Conservation. – *Teucrium salaminium* seems to be a rare endemic of Cyprus and according to the IUCN Red List Categories and Criteria (Version 3.1) is categorized as VU (Vulnerable): D2. This means that the area of occupancy is less than 20 km² and it occurs in only one location. Potential threats are forest fires, grazing, quarriyng of gypsum, road construction, agriculture and forestry operations. The largest part of its population is found within Ypsarovounos Main State Forest. Additionally, this forest is included in a proposed Natura 2000 site, and the habitat type 1520 (Gypsum steppes) is a priority habitat.

Systematic relationships. – Obviously, the new taxon is an endemic of the island. Probably the closest relatives of *T. salaminium* in Cyprus are *T. micropodioides* and *T. kyreniae*. The former grows together with *T. salaminium*, whereas the latter is a chasmophyte growing on limestone cliffs 5-7 km northeast of the type locality.

Teucrium salaminium and the mentioned taxa are distinguishable by the characters summarized in (Table 1) (see also MEIKLE, 1985 and HADJIKYRIAKOU & HAND, 2008 for further details). From a morphological point of view, *T. micropodioides* shares many characters with *T. salaminium*. Nonetheless, the two taxa are easily separable by, e.g., different growth form, colouration of leaves and flowers and structure of inflorescences.

The quality of indumentum is very similar in all five Cypriot taxa of sect. *Polium*. They all belong to subsect. *Rotundifolia*, which is characterized by, e.g., the lack of branched trichomes, whereas subsect. *Polium* has branched hairs (see also HADJIKYRIAKOU & HAND, 2008). The former taxon is widespread in the Mediterranean and the Near East; its members occur primarily in microclimatically hot habitats, on cliffs, rocks, especially on serpentine, as well as in maritime environments, avoided by other taxa of the genus (see NAVARRO, 1995; NAVARRO & EL OUALIDI, 2000a). *Teucrium salaminium* seems to be the only endemic gypsophile of Cyprus.

A detailed phylogenetic and ecological study of the Cypriot members of sect. *Polium* is planned for the near future.

Specimens seen (division sensu MEIKLE, 1977; herb. GH = herb. Hadjikyriakou). – **CYPRUS. Division 7:** Ypsarovounos forest, 2.5 km southwest of Mandres village, Ammochostos district, opening in pine forest on gypsum, alt. c. 250 m, 19.XII. 2008, *Hadjikyriakou 7041* (B, herb. GH); ibid., 25.III.2009, *Hadjikyriakou 7044* (B, herb. GH); ibid., 5.VII.2009, *Hadjikyriakou 7073 & 7074* (B, herb. GH); ibid, 25.VII.2009, *Hadjikyriakou 7075 & 7076* (B, herb. GH); ibid., 29.VIII.2009, *Hadjikyriakou 7100* (B, herb. GH); ibid., 11.IX.2009, *Hadjikyriakou 7124* (B, herb. GH); Kakotris hill Mandres Ammochostou, phrygana on gypsum, alt. c. 200 m, 1.VIII.2009, *Hadjikyriakou 7077* (B, herb. GH); 2 km E of Platani Village in Ypsarovounos forest, phrygana on gypsum, alt. c. 200 m, 16.VIII.2009, *Hadjikyriakou 7079 & 7080* (B, herb. GH); Agios Iakovos, c. 1.5 km W of village, lower slopes of gypsum hill, on N side close to the ascending track, open gypsum phrygana, alt. c. 350 m, 11.V.2009, *Hand 5475, Christodoulou & Hadjikyriakou* (B).

Acknowledgments

The authors would like to thank Prof. Dr. Costas Kadis, Nature Conservation Unit of Frederick University (Lefkosia, Cyprus), for the measurements provided regarding the nutlets of *Teucrium kyreniae,* Charalambos S. Christodoulou (Lefkosia, Cyprus) for his contribution in the preparation of this paper, Christodoulos Makris (Lemessos, Cyprus) for the scanning of the flowers, and Monika Lüchow, Botanic Garden and Botanical Garden Berlin-Dahlem (Germany), for producing SEM images, Kathleen Stephanides (Lefkosia, Cyprus) for checking the text, and Annick Diguet (Frankfurt am Main/ Germany) for writing the résumé.

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Table 1. – Comparison between *Teucrium salaminium* Hadjik. & Hand, *T. micropodioides* Rouy and *T. kyreniae* (P. H. Davis) Hadjik. & Hand – selected characters (based on MEIKLE, 1985, and material cited by HADJIKYRIAKOU & HAND, 2008).

Character	*Teucrium salaminium*	*Teucrium micropodioides*	*Teucrium kyreniae*
Stems	erect to suberect	spreading	spreading or suberect
Stem indumentum	adpressed eglandular, unbranched trichomes, intermixedwith spreading, long or short glandular ones	adpressed unbranched trichomes, only few glandular ones	short glandular and long, white, spreading, eglandular hairs
Leaf shape, length and width (mm)	new leaves narrowly to broadly oblanceolate or elliptical, 12-22 × 3-6, those of late spring onwards become progressively smaller, narrowly oblong to linear, the uppermost usually resembling cedar needles, strongly revolute, 4-11(-19) × 1.5-2(-2.5)	all leaves oblong, margins strongly recurved or involute, 5-10(-12) × 1-3.5	all leaves oblong or obcuneate the whole year round, nearly flattened, 8-15 × 5-8
Colour of leaves	olive-green to green	greyish to bluish-green	light green, often tinged yellowish
Leaf indumentum	spreading or subappresed, eglandular trichomes (unbranched only) and short or long glandular trichomes, becoming appressed and crisped with age.	tomentose on both surfaces (unbranched trichomes only), only few glandular trichomes	more or less densely villose on both surfaces (unbranched trichomes only), usually besprinkled with subsessile and shining trichomes
Flower heads	obpyramidal or obconical, flat-topped or slightly rounded, but by the end of the flowering period many become slightly elongated and ovoid, (6-)8-16 × (6-)8-16 mm	spherical or hemispherical, 10-13 mm diameter	capitate, 13-25 mm diameter, or flowers occasionally geminate in the uppermost pairs of leaves
Bracts	equal or exceeding the flowers, all more or less reaching to the same height.	about equalling the flowers but not reaching the same height	shorter or equalling the flowers but not reaching the same height
Calyx indumentum externally	with lax or dense white, spreading or appressed, crisped, short or long glandular and eglandular trichomes	densely appressed lanuginose, few glandular trichomes	more or less villose with spreading eglandular trichomes, gland dotted
Colour of corolla limb	white flashed with pink-violet on the lower lobes or pinkish-violet all over	maroon, purple or brownish pink	milky white tinged or streaked yellowish-green
Lateral lobes of corolla	spreading	adpressed to median lobe	usually adpressed to median lobe
Stigmatic lobes length (mm)	0.5-0.9	c. 0.3	c. 0.4
Nutlets length (mm)	1.1-1.3	c. 1.8	(1.3-)1.5-1.8(-2)*

*The description in MEIKLE (1985) gives larger measurements. However from the examination of recent seed collections from Larnakas Lapithou (3 lots) and Mersinnikki area – Lefkonoiko Pass (1 lot) it has been found that measurements are mostly smaller (C. Kadis, pers. comm. 2009).