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A new species of *Campylanthus (Scrophulariaceae)* from Ras Fartak, Al-Mahra, and notes on other species of the genus in Yemen

Abstract

Kilian, N., Hein, P. & Bahah, S. O.: A new species of *Campylanthus (Scrophulariaceae)* from Ras Fartak, Al-Mahra, and notes on other species of the genus in Yemen. – Willdenowia 32: 271-279. 2002.

Campylanthus hubaishanii, a dwarf shrub from the coastal mountains of southeastern Yemen, is described as a species new to science and illustrated. It is the fifth species of the genus known from mainland Yemen. The new species is compared and a closer relationship suggested with *C. sedoides* from coastal Jiddat al Harasis, central Oman. Based on collections made by the authors during the last years, new data on the distribution and variation of *C. antonii, C. junceus* and *C. pungens* in Yemen are also provided.

Introduction

The genus *Campylanthus,* of uncertain affinities within the *Scrophulariaceae* (Hjertson 1997), has a centre of diversity in S Arabia and the Horn of Africa region. Separated by the Gulf of Aden some 10 million years ago (Thulin & Lavin 2001), S Arabia and the Horn of Africa together shelter 12 of the hitherto 15 known *Campylanthus* species, most of them described in the last 22 years (Miller 1980, 1982, 1988, Thulin 1995, Hjertson 1997, Hjertson & Miller 2000). One species is confined to S Pakistan, and two closely related species are distributed on the Canary and Cape Verde Islands, an area remarkably disjunct from the main distribution of the genus.

During our recent field work in the governorates of Hadhramout and Al-Mahra, Yemen, plants of a pretty *Campylanthus* were discovered in 2000 and again collected in 2001, which could not be identified with any of the known species. Further studies revealed that it is a species new to science, rising their total number to 16 and their number in mainland Yemen to five. On this occasion a few, mainly distributional, data on other *Campylanthus* species in Yemen are added.

Campylanthus hubaishanii N. Kilian & P. Hein, **sp. nova** – Fig. 1-3, 4a-b

Holotype: Yemen, gov. Al-Mahra, S Fartak Mts, mountain ridge along the E coast forming the vertical escarpment to the sea, passage to the coast and slopes below the vertical escarpment,

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Fig. 1. *Campylanthus hubaishanii* – a: flowering twig from the type population; b: flowering twig from the N Fartak Mts; c: habit of a plant from the type population. – Photographs by P. Hein (b+c) and N. Kilian (a).

15°38'28.9"N, 52°12'54.3"E, 400-450 m, 10.10.2001, *N. Kilian, P. Hein, H. Kürschner & M. Reisch YP [BIOTA Yemen Project] 1169* (B; isotypes: E, K, UPS, herbarium of AREA in Dhamar).

Campylantho sedoide similis sed praecipue foliis oblanceolatis 6-15 × 2-5 mm metientibus (nec suborbicularibus ad oblanceolatis et 3-6 × 1.5-4.5 mm), calyce valde minore, 2-2.5 nec 4-6 mm longo, lobis calycis acute ovatis nec lineari-ellipticis ad lineari-lanceolatis et seminibus exalatis, pallide brunneis nec distincte alatis et griseo-nigris differt.

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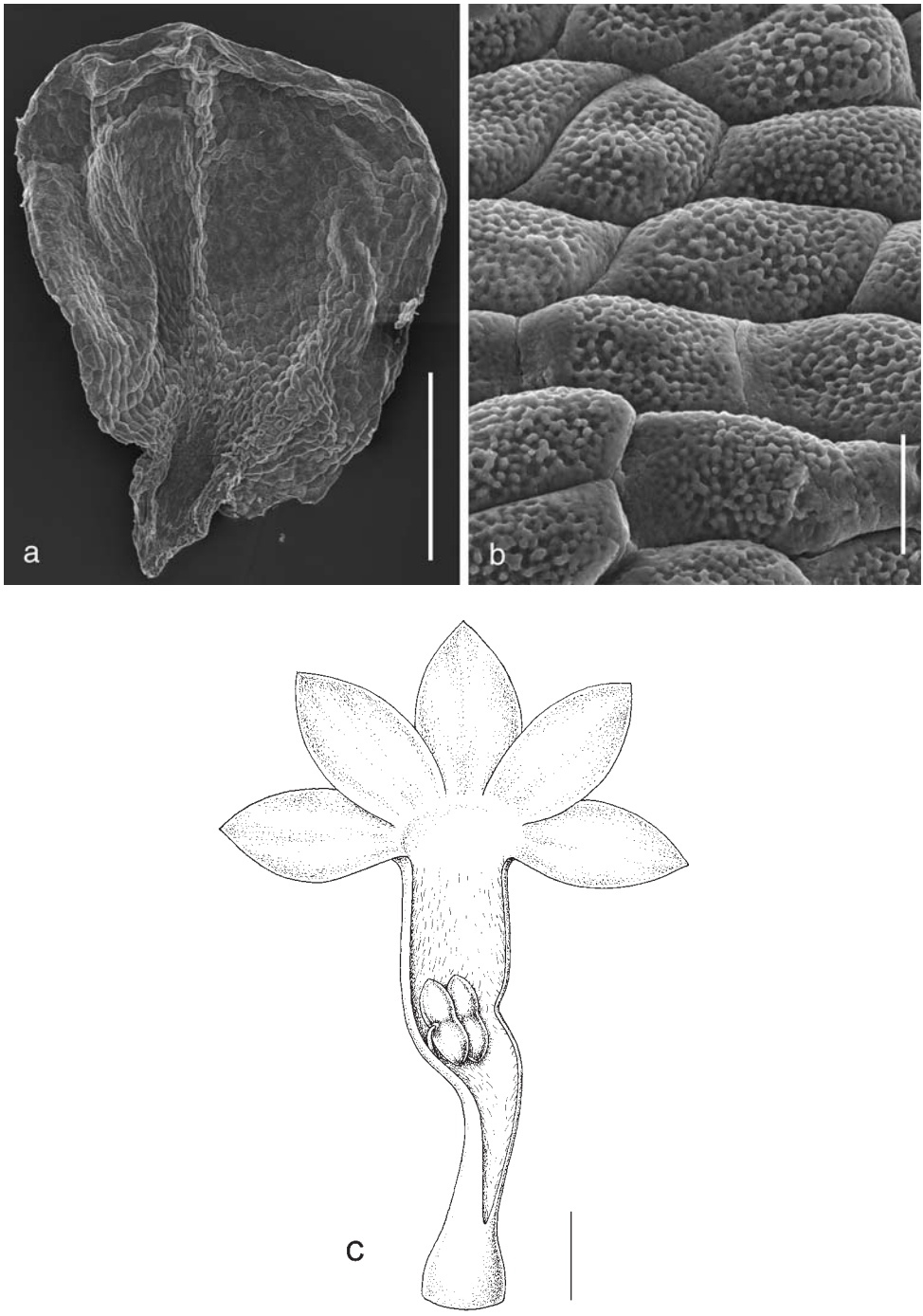


Fig. 2. *Campylanthus hubaishanii* – a-b: scanning electron micrographs of a seed of the type collection, overview (a), detail of the testa surface (b); c: corolla, opened, style removed. – Scale bars a = 400 µm, b = 20 µm, c = 2 mm.

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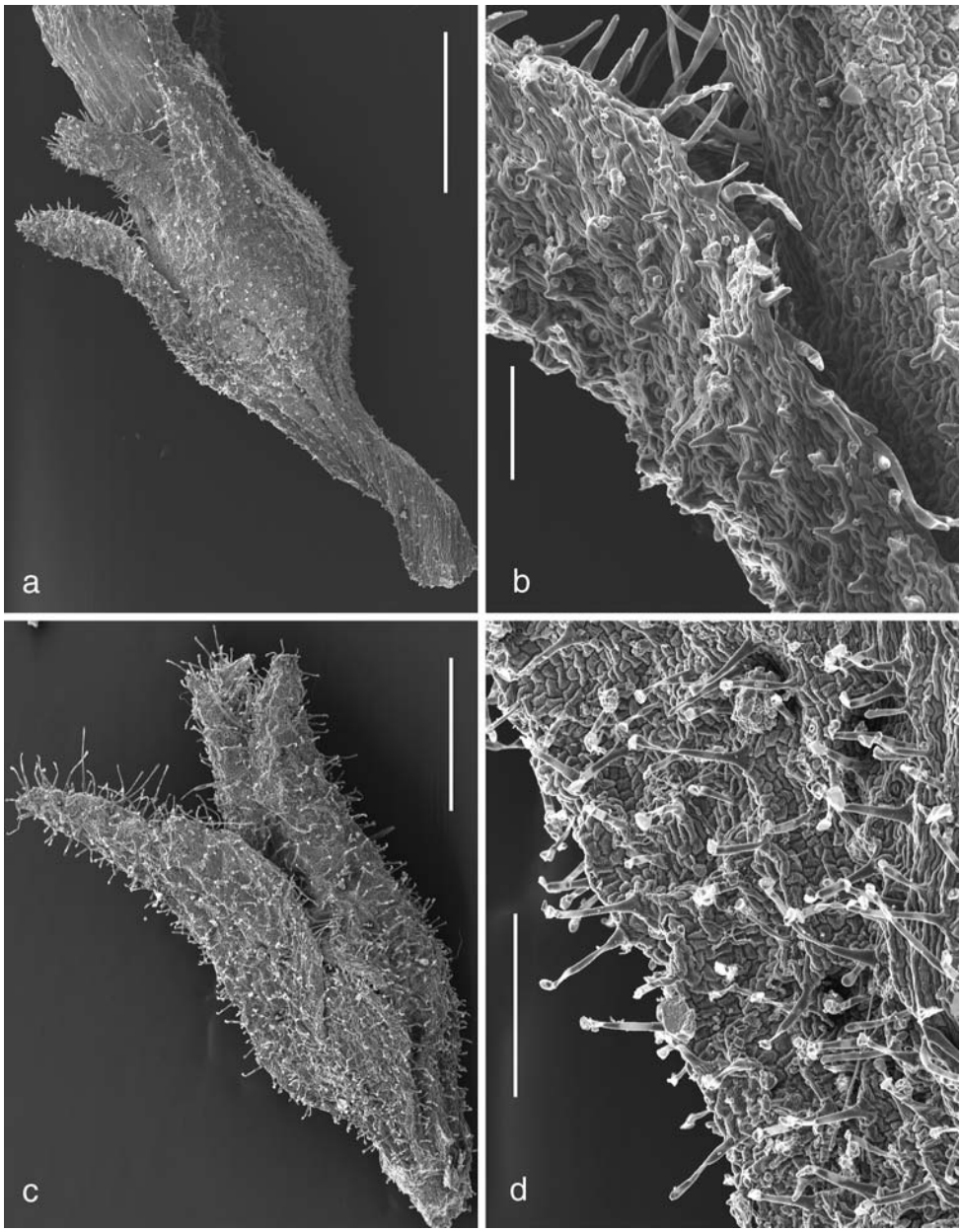


Fig. 3. *Campylanthus hubaishanii,* scanning electron micrographs of the indumentum – a-b: calyx indumentum, overview and close up of the common subglabrous plants in the type population; c-d: calyx indumentum, overview and close up of the occasional pubescent plants in the type population. – Scale bars a+c = 1 mm, b+d = 0.1 mm.

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It is a great pleasure for us to dedicate this fine species to our colleague, travel companion and friend Dr Mohamed Ali Hubaishan from El Hami, Hadhramout, Director of the Eastern Coastal Branch of the Agricultural Research and Extension Authority (AREA), to whose dedicated and untired commitment to our joint research on the palaeo-African refugia in the southern governorates of Yemen since 1998 much of its success is owed.

Dwarf shrub, 5-15 cm high, strongly branching, with rather short, procumbent to ascending or ascending-erect twigs; older twigs lignified, fragile, greyish, with a rough, cracking bark and the persistent bases of the former leaves; fresh shoots green, densely leafy, with a ± sparse indumentum of minute conical hairs (c. 0.05 mm long) (Fig. 3a-b), or with spreading simple hairs 0.1-0.2 mm long (Fig. 3c-d), or with a dense indumentum of 0.2-1 mm long simple hairs (Fig. 4a-b), the latter two types of hairs appearing gland-tipped because of an apical knob. *Leaves* 6-15 × 2-5 mm, alternate, fleshy, entire, oblanceolate, obtuse to faintly acute and basally strongly attenuate, early deciduous. *Flowers* axillary, single, successively developing at the uppermost nodes of the twigs, only 1-2(-3) per twig flowering at the same time. *Pedicels* 2-4 mm long, like the upper portion of the twigs often tinged reddish. *Bracts* subtending the flowers leaf-like in shape and size; *bracteoles* two, leaf-like in shape but only 1.8-2 × 0.9-1 mm. *Calyx lobes* ovate, acute, 2-2.5 × (0.6-)1-1.2 mm, with margins pale to scarious and ciliate with stiff, white hairs up to 0.3 mm long, surface with an indumentum as on the leaves, either of scattered, stiff, minute 0.05 mm long hairs or denser of hairs up to 1.0 mm long. *Corolla* hypocrateriform (Fig. 2c), mauve except for a yellowish mouth, outside glabrous or, more rarely, sparsely pubescent on the upper part of the tube and dorsally on the lobes; *tube* 10-11 mm long with the double geniculation in the middle third of the tube, well exserted from the calyx, inside with an indumentum of 0.3-0.5 mm long unicellular hairs, being antrorse above and retrorse below the insertion of the stamina; *lobes* subequal, approximately elliptical, 4-4.5 × 1.9-2.8 mm, faintly acute. *Stamina* 2, inserted at the upper geniculation; *filaments* c. 1 mm long, *anthers* c. 2 × 0.7 mm. *Style* c. 4 mm long, *stigma* capitate, perpendicular to the style. *Capsule* ovoid, 3.6-4.1 × 2.5 mm, brown, glabrous and shiny, of two carpels, with numerous seeds, septicidally opening. *Seeds* (Fig. 2a-b) suborbicular, distinctly flattened, 0.9-1.1 mm in diameter, pale brown, very inconspicuously winged in the funicular region and otherwise at the margin here and there only with a minute rim.

Additional specimen seen. – Yemen, gov. Al Mahra, northeastern flank of Jabal Fartak S of Nishtun, 400-550 m, 15°46'N, 52°09'E, rocky slopes, 16.11.2000, *P. Hein, N. Kilian & C. Naumann PH 8254* (B).

Distribution. – *Campylanthus hubaishanii* is a rare species of the Fartak Mts in Al-Mahra, found only twice, in the lower half of the eastern flank, on rocky limestone slopes. At the type locality not far from the 'ras' (i.e. the cape), the plants grow on a gentle slope below the huge rock face, rising vertically almost to an elevation of 900 m, which makes Ras Fartak a prominent landmark when coming by sea from the east. The locality is rather dry, shaded only in the afternoon and the rocky slope only sparsely covered by dwarf and succulent shrubs, subshrubs and perennials, such as *Cienfuegosia welshii* (T. Anders) Garcke, *Cryptolepis yemenense* Venter & R. L. Verh., *Gypsophila montana* Balf. f., *Lavandula dhofarica* A. G. Mill. subsp. *dhofarica, Lindenbergia indica* (L.) Vatke, *Pavonia pirottae* (Terracc.) Chiov., *Polycarpaea haufensis* A. G. Mill., *Polygala* sp. and *Vernonia arabica* F. G. Davies. The second locality (see *PH 8254,* see above), some 20 km to the north, is situated a few km inland, above a deep ravine, similarly dry and sparsely vegetated by dwarf and succulent (sub)shrubs, such as *Cryptolepis yemenense*, *Cyclocheilon somalense* Oliver, *Gymnocarpos mahranus* Petruss. & Thulin, *Kleinia squarrosa* Cufod., *Lavandula dhofarica* subsp. *dhofarica* and *Limonium axillare* (Forssk.) Kuntze.

Variation. – The indumentum of the plants shows considerable variation. Leaves and axes of the young shoots of almost all plants of the type collection have a very similar sparse indumentum of

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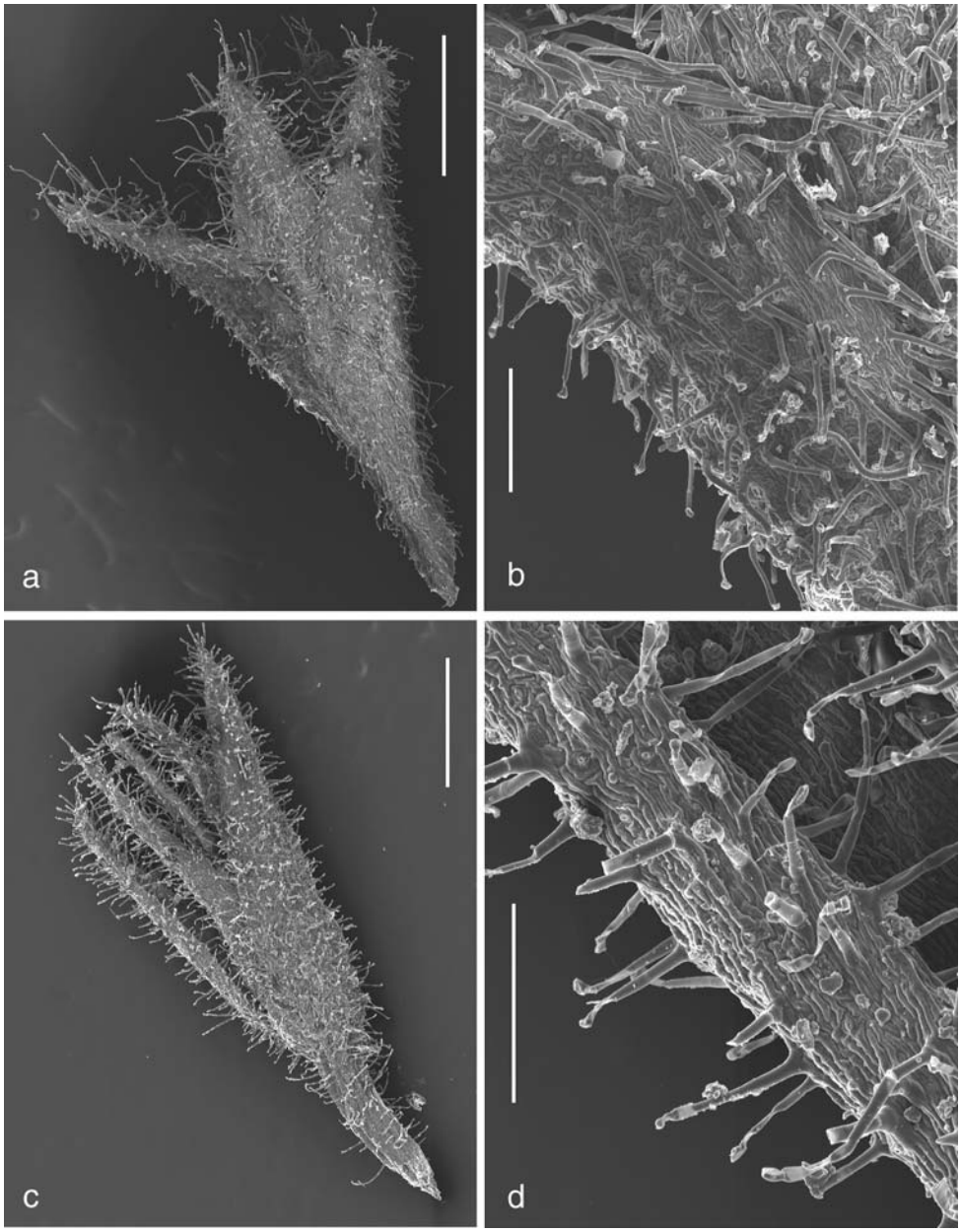


Fig. 4. Scanning electron micrographs of the indumentum of *Campylanthus* – a-b: *C. hubaishanii* (calyx, overview and close up of *PH8254* from the N Fartak Mts); c-d: *C. antonii* (calyx, overview and close up of *NK6954,* see below). – Scale bars a+c = 1 mm, b+d = 0.1 mm.

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minute, conical hairs only 0.05 mm long, and longer hairs exclusively on the calyx margin (Fig. 3a-b). Exceptional individuals, however, have a distinctly denser indumentum of up 0.1-0.2 mm long hairs (Fig. 3c-d). The single individual collected in the northern Fartak Mts strikingly deviates by a dense indumentum on leaves, pedicels and calyx of 0.2-1 mm long hairs (Fig. 4a-b), which is visible already with the naked eye (Fig. 1b). Also the outer surface of the corolla lobes and the upper part of the corolla tube is sparsely hairy, whereas glabrous in the southern population. Comparing these hair types, it becomes evident, that it is in both populations essentially the same type. Variation only concerns the length of the hairs, whereas the apical knob is present in both populations. Due to this apical knob the hairs look gland-tipped, but in no case could any sign of excretion be observed. A similar case of variation in the indumentum between different populations seems to exist in *Campylanthus antonii* Thulin (see below).

From the limited material available it appears that the corolla lobes in the type population has widths of 2.3-2.8 mm whereas only 1.9-2 mm in the northern individual, a difference that is visible when Fig. 1a and b are compared.

In case further investigations would confirm the differences between plants in the southern and northern Fartak Mts, we would have to conclude that the populations have been genetically isolated for some time from each other and have independently evolved since. A formal recognition at infraspecific rank may in this case be appropriate.

Relationship. – Hjertson (1997) provided a cladistic analysis of *Campylanthus,* based on morphological characters. Only one clade, comprising four Somali(-Socotran) species, is well supported. The relationships among the main bulk of species has, however, remained unresolved and our knowledge about synapomorphies and homoplasies poor. An example is the corolla tube length, which has a wide range in the genus. The three species with a particularly long corolla tube, viz. *C. chascaniflorus* A. G. Mill. (15-19 mm) from W Dhofar, Oman, *C. antonii* Thulin (14-15 mm) from SE Yemen and *C. somalensis* A. G. Mill. (13-14 mm) from N Somalia, thus may or may not be closely related.

The corolla tube of our species, with a length of 10-11 mm, belongs to the medium sized ones in the genus. The tube is of similar length or only little shorter in *C. sedoides* A. G. Mill. (8.5-10 mm) from central Oman, in the widespread S Arabian *C. pungens* Schwartz (8-10 mm) and in *C. glaber* subsp. *spathulatus* (A. Chev.) Brochmann & al. (1972) from the Cape Verde Islands. All other species have a corolla tube with a length of only 6-8 mm.

An indumentum of gland-tipped hairs or of hairs with an apical knob respectively, is otherwise only known from *C. somaliensis* and, according to our findings, also from *C. antonii,* which are both otherwise not particularly similar to our species.

Habitually and from general appearance, *C. hubaishanii* is closest to *C. sedoides* A. G. Mill. (according to the herbarium material (from E) studied), which is restricted to coastal Jiddat Al Harasis, central Oman. *C. sedoides* is not only similar in corolla tube length (see above) but also as a procumbent dwarf shrub with fleshy leaves. The leaves of *C. sedoides* are variable in shape, ranging from suborbicular to oblanceolate, and with the latter shape they resemble those of our species but are smaller in size (3-6 × 1.5-4.5 versus 6-15 × 2-5 mm). Marked differences also shows the calyx: it is of double size in *C. sedoides* (4-6 versus 2-2.5 mm) and its lobes are somewhat fleshy, linear-elliptical to linear-lanceolate and without scarious margin, whereas not fleshy, ovate-acute and with scarious margin in *C. hubaishanii.* Also the indumentum is different: *C. sedoides* has a uniformly dense indumentum of rigid, ± straight, conical, acute hairs, which gives the plant a greyish tinge, whereas the rather variable indumentum of *C. hubaishanii* consists of weaker, much less straight hairs usually with an apical knob, and is generally much sparser. Other differences concern the corolla: the lobes are shorter in *C. sedoides* (2.5-4 versus 4-4.5 mm) and corolla colour ranges, according to the collectors' notes on the specimen labels of *C. sedoides* from creamy-red or flesh-coloured to red-brown or pinkish brown, but is mauve (with yellow mouth) in *C. hubaishanii*. The seeds are dark bluish grey and distinctly winged in *C. sedoides* but pale brown and ± unwinged in *C. hubaishanii*.

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Otherwise our species may be compared with *C. ramosissimus* Wight (1848-50, Miller 1980, Hjertson 1997, no herbarium material seen), which has also fleshy leaves of a similar size and shape and a similar type of inflorescence. *C. ramosissimum* is a little known member of the genus restricted to limestone hills of the Sind region in S Pakistan and the only one on the Asian mainland. Our species is, however, clearly distinguished from the latter by, in particular, its non-spinescent and procumbent to ascending (versus erect and postflorally spinescent) twigs, the corolla with a distinctly longer tube (10-11 versus 7-8 mm), a further distally positioned double geniculation and larger lobes (4-4.5 × 1.9-2.8 versus c. 3 × 1.5 mm).

Conservation status. – It is characteristic of *Campylanthus* that a good number of its species have a very localised distribution or are known even from one or a few populations only, bearing witness of a lack of competitiveness, at least under the current climatic conditions. We infer from our five field trips in southeastern Yemen that also *C. hubaishanii* has a very localised distribution, being confined to the Fartak Mts. Estimating the total population size optimistically, we may expect the existence of several more populations but have to conclude from the ecology of both the habitats and the species, that they would all be rather small, comprising at best a few dozens of individuals each. The total population size of *C. hubaishanii* numbers certainly much fewer than 1000 mature individuals. Meeting so at least one (D) out of five criteria, we recommend placing *C. hubaishanii* under the IUCN category "Vulnerable" (IUCN 2001).

Notes on other *Campylanthus* species in Yemen

All collections cited are represented at B and the herbarium of the Agricultural Research and Extension Authority (AREA) in Dhamar, further sets are to be distributed.

Campylanthus antonii Thulin – This inconspicuous and rather rare species with a brownish corolla has been known so far only from the type population in western Al-Mahra (Thulin 1995). The species is here recorded also from Hadhramout, indicating a wider distribution in the coastal mountains of southern Yemen.

The individuals of the population in Hadhramout deviate from the type population, which is described in the protologue (Thulin 1995) as subglabrous to minutely pubescent of simple hairs, by a throughout dense indumentum of rather long hairs with an apical knob (Fig. 3c-d). This variation in the indumentum is surprisingly similar to that described above in *C. hubaishanii*.
YEMEN: HADHRAMOUT: Uppermost Wadi Azid al Jabal, near the villages Taht Tarik and Dabbak (above the projected track to Tarim), 680-750 m, 15°13'N, 50°11'E, steep rocky SW facing slope below the cliffs, 20.11.2000, *N. Kilian, S. O. Bahah, P. Hein & M. A. Hubaishan NK6954*.

Campylanthus junceus Edgew. – The most widespread of the species in the S Arabia and Horn of Africa region, and the only one present on both sides of the Gulf of Aden (Miller 1980: 382, fig. 4), is distributed in Yemen mainly along the mountainous south coast, apart from a few populations known further inland in the eastern escarpment in the governorate of Al-Bayda (see Wood 1997: 264; our collections *NK4913* and *PH3986* from the area of Rada). The easternmost records are from the area of Mukalla and Ghayl Ba Wazir in Hadhramout (Miller 1980: 381). We add a record from somewhat farther east.
YEMEN: HADHRAMOUT: 2 km NE of El Hami, 14°49'51.6"N, 49°50'20.1"E, 20-50 m, small wadis with scattered vegetation in the gypsum hillside, 25.9.2001, *N. Kilian & P. Hein YP384*.

Campylanthus pungens Schwartz – It is the most widespread species on the Arabian Peninsula, with scattered known localities from the Asir Mts in SW Saudi Arabia to the Dhofar Mts in Oman (Miller 1980: 379, fig. 3 & 1988: 76). For the southern governorates of Yemen, however, only a few records from Hadhramout have been published so far. We add several records from Al-Mahra, which provide evidence that the species has a rather continuous distribution along the southern coast from Hadhramout to Dhofar.
YEMEN: AL MAHRA: Jabal Sharwayn 10 km W of Qeshn, SW exposed steep rocky slopes and plateau, 550 m, 15°23'N, 51°36'E, 18.11.1999, *P. Hein, S. O. Bahah, S. M. Bashmela & N. Kilian*

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PH6499; Ras Fartak Mts, track between Haswayn and Ghaydah, pass, 620 m, 15°49'N, 51°57°E, rocky slopes, 24.9.1998, *N. Kilian, P. Hein & S. Ghazanfar NK5138;* id., 19.11.1999, *P. Hein & N. Kilian PH6551;* Jabal Fartak, SW facing slopes, 550-950 m, 15°50'N, 52°00'E, 26.11.1999, *P. Hein & N. Kilian PH6865;* Jabal Shubeid [Shubut, Shabit], 16°50'N, 51°50'E, c. 1000 m, only c. 50 m overtopping the plateau, upper edge of the escarpment, 25.9.1998, *P. Hein, N. Kilian & S. Ghazanfar NK5152, PH4956;* 15 km W of Al Fatk, southern flank of Jabal Faydami, 350-450 m, 16°30'N, 52°35'E, *P. Hein & N. Kilian PH7996*.

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