

## *Hypericum scruglii* sp. nov. (Guttiferae) from Sardinia

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A new species of *Hypericum* (Guttiferae) from Sardinia, *H. scruglii*, is described and illustrated. It occurs on damp soil, near springs or streams with freshwater, where it grows with numerous hygrophytes. This diploid species ( $2n = 16$ ) belongs to the sect. *Adenosepalum* and is closely related to *H. tomentosum*, a species widespread in the west Mediterranean region.

During field investigations in Sardinia, very peculiar populations of *Hypericum* L. were found occurring on damp soils and limited to calcareous substrates. These plants showed a close morphological and ecological relationship with *H. tomentosum* L., a species belonging to sect. *Adenosepalum* Spach. As emphasized by Robson (1996), the Sardinian populations of *H. tomentosum* tend towards *H. pubescens* Boiss. A detailed analysis of living material collected from many localities on the island allowed us to verify that these plants were remarkably different from typical specimens of *H. tomentosum* and, in addition, were totally unlike *H. pubescens*. The Sardinian populations differ from both related species with respect to the shape and size of leaves, floral structures and capsules. Based on this, we concluded that they constitute a new species.

### Material and methods

The investigation is based on numerous plants collected from 11 Sardinian localities, some of which (5) were cultivated in the Botanical Gardens of Cagliari and Catania, as well as on herbarium material at CAG, CAT, FI and TO. In addition, many herbarium specimens of *Hypericum tomentosum* and *H. pubescens* have been examined at CAT, FI and VAL. Karyological observations were made on mitotic plates from root tip cells of ca 50 germinated seeds, pre-treated for 3 h with 0.3% colchicine water solution at room temperature, fixed in Carnoy and stained according to the Feulgen technique. All metaphases were examined using the image analysis systems IKAROS 4.6 (Metasystem) and Zeiss Axiovision 5.1.

### *Hypericum scruglii* Bacch., Brullo & Salmeri sp. nov. (Fig. 1, 2)

*A Hyperico tomentoso foliis suborbicularibus vel orbiculari-ellipticis, corolla 18–20 mm in diametro, sepalis subaequalibus ovato-lanceolatis, acuminatis, 1.2–1.8 mm latis, petalis irregulariter oblongo-oblanceolatis, 10–11 mm longis, 3.5–4.5 mm latis, staminibus 8 mm longis, antheris 0.4 mm longis, 0.5 mm latis, stylis usque ad 4.7 mm longis, reflexis in fructu, capsula elipsoidea, sepalis longiora, 5.0–6.5 mm longa, 2.5–2.7 mm lata, loculis longe apiculatis differt.*

**Type:** Italy, CE Sardinia, Montarbu di Seui, Nuraghe Ardasai, 39°53'32.77"N, 9°20'27.90"E, 19 Jul 2004, Brullo and Bacchetta, s.n. (holotype: CAT, isotypes: CAG, CAT, FI).

Perennial herb 5–30 cm tall; branches herbaceous, tomentose, prostrate to decumbent, unbranched, rooting in their lower half, the lower internodes almost shorter than their leaves. Leaves sessile, lamina 9–17 × 7–13 mm, suborbicular to orbicular–elliptic, concolorous, green–glaucous, plane, apex rounded, margin plane, base subcordate; venation in 2–3 basal pairs, curved, ascending and ending freely, 1 upper pair incurved and united at apex; marginal glands black, irregularly distributed and not prominent. Cymes 3–25-flowered, from up to 1–3(6) nodes, corymbiform; pedicels 1–3 mm long; bracts not auriculate, bracteoles linear–subulate, with black marginal glands. Flowers 18–20 mm in diameter, buds ellipsoid, obtuse. Sepals 4.0–5.5 × 1.2–1.8 mm, subequal, ovate–lanceolate, acuminate, with 10–14 marginal black glands on cilia 0.5–4.0 mm long and 1 large black gland at the apex, black laminar glands absent; veins 5. Petals bright yellow, 10–11 × 3.5–4.5 mm, irregularly oblong–oblanceolate, obtuse, apiculus lateral, prominent and acute, dentate in the upper part; interdental black

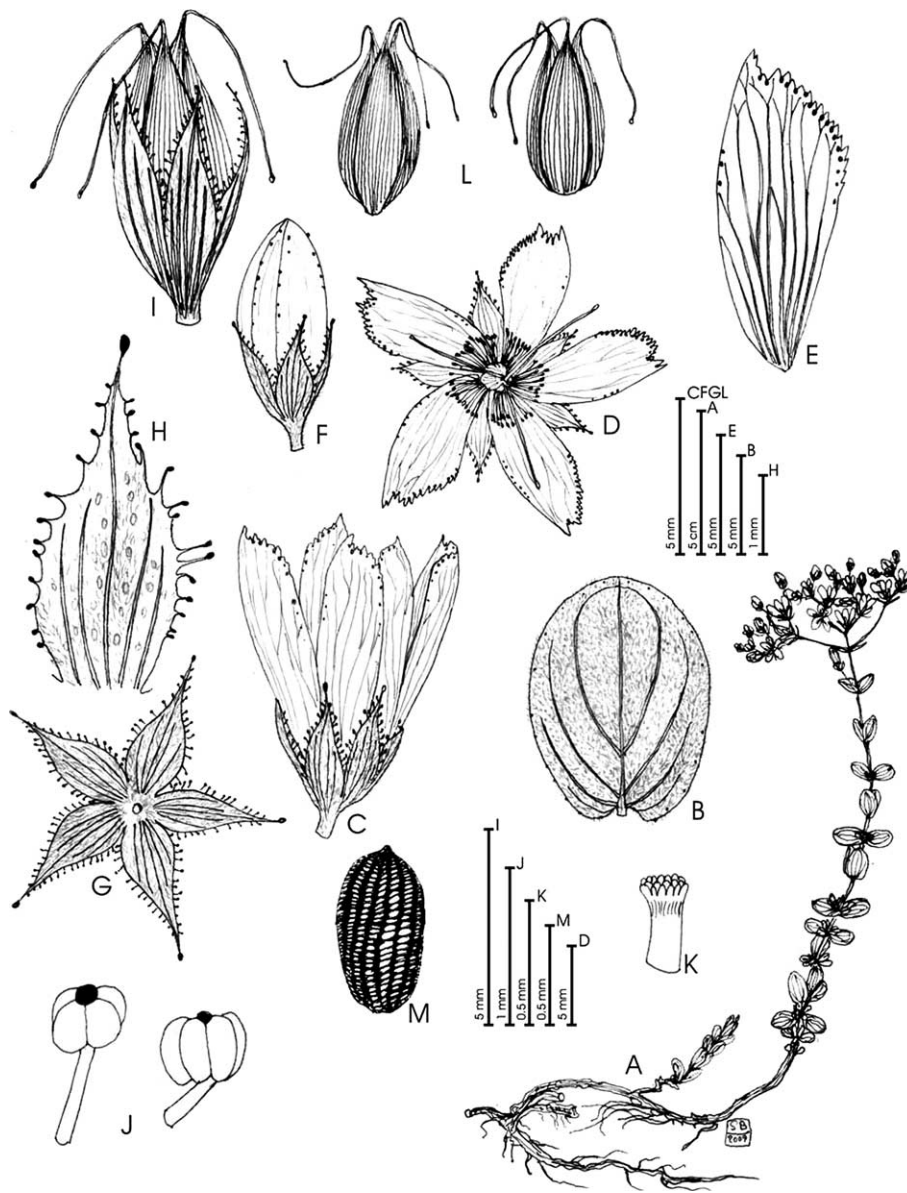


Figure 1. *Hypericum scruglii* sp. nov. (A) habit, (B) leaf, (C) flower, lateral view, (D) flower, upper view, (E) petal, (F) bud, (G) calyx, (H) sepal, (I) calyx and fruit, (J) anthers, (K) stigma, (L) fruits, (M) seed.

marginal glands few, not prominent. Stamens 33, conspicuously 3-fascicled, 3 innermost and 8 outermost, 8 mm long. Anthers 0.4–0.5 mm, with black gland. Ovary  $1.7 \times 1.3$  mm, narrowly ovoid–pyramidal. Styles up to 4.7 mm long, reflexed in fruit. Capsule 5.0–6.5  $\times$  2.5–2.7 mm, ellipsoid, longer than sepals, tridentate with loculi long apiculate. Seed brownish, 0.7–0.9 mm long, testa finely reticulate–scalariform. Flowering occurs in late Jun–Jul and fruiting in Aug–Sep.

#### **Habitat, distribution and etymology**

*Hypericum scruglii* is generally linked to calcareous substrates like limestone, conglomerate, travertine, sandstone and marl, where it grows exclusively on damp soil, near springs or streams with freshwater. Occasionally it is possible to find it in pools. It is especially linked to subalkaline and alkaline soils, not much developed from

the pedogenetic point of view. It grows under a pluvisesonal Mediterranean bioclimate, within the lower meso-Mediterranean and lower supra-Mediterranean belts, with a lower subhumid and lower humid ombrotype. It is a member of hygrophilous plant communities characterized by many Sardinian and Cyrno-Sardinian endemics like *Borago morisiana* Bigazzi & Ricceri, *B. pygmaea* (DC.) Chater & Greuter, *Morisia monanthos* (Viv.) Barbey, *Polygala sardoa* Chodat and *Ranunculus cordiger* ssp. *diffusus* (Moris) Arrigoni. Other hygrophytes like *Carex flacca* Schreb. ssp. *serrulata* (Biv.) Malagarriga, *Mentha pulegium* L., *Oenanthe pimpinelloides* L., *Platanthera algeriensis* Batt. & Trab., *Schoenus nigricans* L. and *Solenopsis bivonae* (Tineo) M. B. Crespo, Serra & Juan also occur in the same habitat.

*Hypericum scruglii* is distributed in centraleast and southeast Sardinia, in particular in the Sarcidano, Barbagia of Seulo, Ogliastra and Quirra areas (Fig. 3). Only two old herbarium specimens are from the Nurra and Sassari

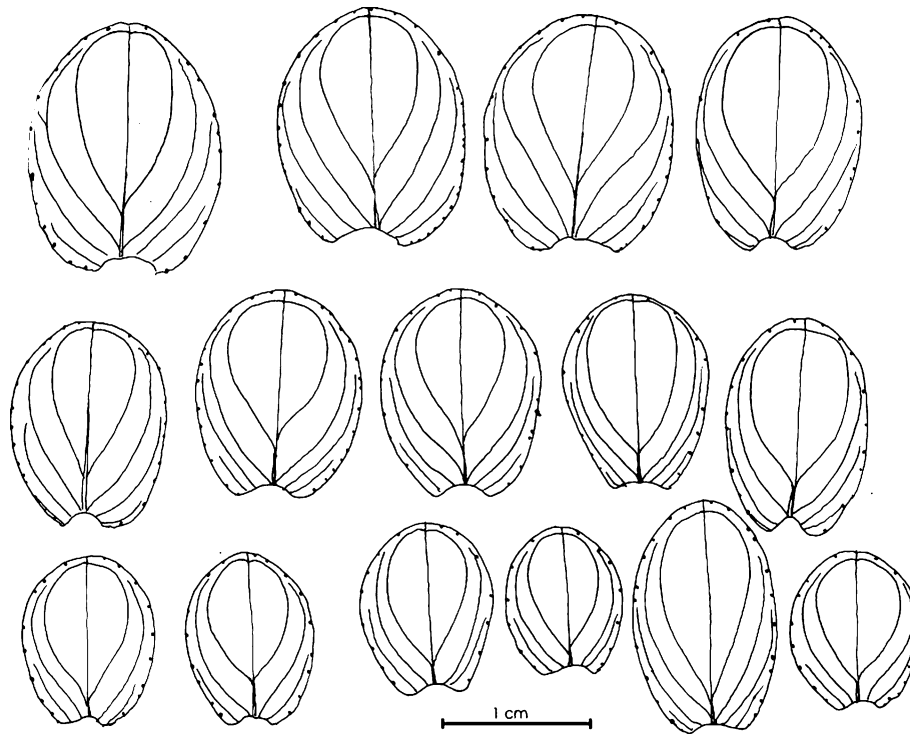


Figure 2. Variability of leaf shape in *Hypericum scruglii* sp. nov.

districts (northwest Sardinia). However, these records are not quoted by Bagella and Urbani (2006) and need to be confirmed. The species name is given in honour of the Sardinian botanist Antonio Scrugli.

#### Conservation status

Presently the populations of *H. scrugli*, although widely distributed, are threatened by overgrazing and human activities (groundwater extraction, roads and manufactures). For this reason it is suggested to be added to the regional red lists of the IUCN, as a 'Vulnerable' species (VU) based on the criteria B1ab (ii, iii, v) + 2ab (ii, iii, v) (according to IUCN 2001, 2006).

#### Karyology

*Hypericum scruglii* is a diploid species with the somatic chromosome number  $2n = 16$  (Fig. 4). The chromosomes are relatively small, therefore, a detailed, statistically supported karyotypic analysis was not possible. However, the total chromosome length ranges from approximately 2.85 to 0.5  $\mu\text{m}$  and some plates clearly show the presence of larger metacentric chromosomes together with punctiform ones. It must be noticed that the same number ( $2n = 16$ ) has been reported for the allied species *H. tomentosum* L. (from Portugal, Queiros 1991, Robson 1996).

### Discussion and conclusions

In the classification proposed by Robson (1968, 1996) and Ramos Nuñez (1983, 1993), *H. scruglii* belongs in sect. *Adenosepalum* Spach owing to its pubescent branches and leaves, black glands on leaves, sepals, petals and anthers,

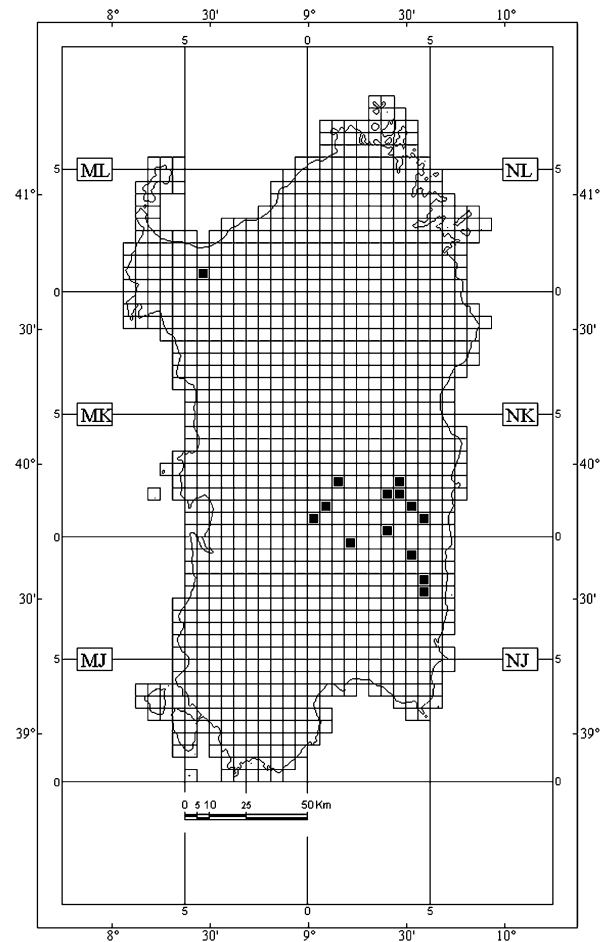


Figure 3. Geographical distribution of *Hypericum scruglii* sp. nov. in Sardinia.

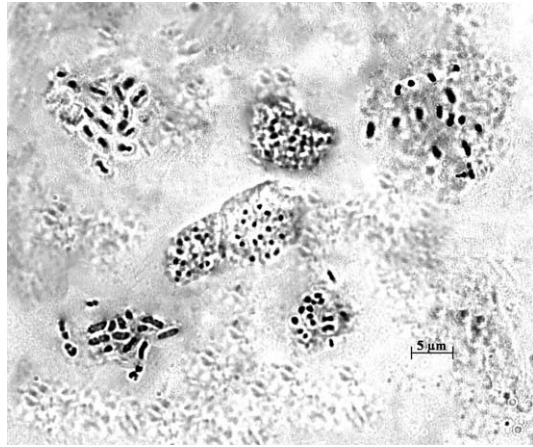


Figure 4. Mitotic metaphase plates ( $2n = 16$ ) of *Hypericum scruglii* sp. nov.

as well as 3 stamen fascicles, 3 styles and reticulate and scalariform seeds. Robson (1977, 1993) recognized four subsections within this section and *H. scruglii* may be included in subsect. *Pubescentes* N. Robson. Within this subsection, *H. scruglii* shows a close relationship to *H. tomentosum*. Both these species are characterized by

sepals up to 5.5 mm long with black, ciliate marginal glands and petals up to 11 mm long. However, as outlined in Table 1, there are significant morphological differences between *H. tomentosum* (Fig. 5) and *H. scruglii*.

The Sardinian material preserved in the Moris herbarium (TO!), as well as the description and illustration of *H. tomentosum* from Sardinia given by Moris (1837), correspond very well to the populations that we attribute to *H. scruglii*. On the basis of our herbarium investigations, we conclude that the Sardinian records of *H. tomentosum* quoted by Fiori (1924), Robson (1968) and Pignatti (1982) must be referred to *H. scruglii*.

Robson (1996) examined a specimen collected by Müller at Laconi (H, K), and formulated the hypothesis that the Sardinian populations of *H. tomentosum* belong to a hybrid taxon verging towards *H. pubescens*. We do not believe in this hypothesis, mainly because neither of the proposed parental species do occur in Sardinia. In addition, *H. scruglii* differ markedly from *H. pubescens* as outlined in Table 1. Many of these morphological characters can be observed on the Iberian material in the detailed iconography published by Boissier (1840, Table 36). Further, *Hypericum tomentosum* and *H. pubescens* have different chromosome numbers,  $2n = 16$  and  $2n = 18$  or  $36$ , respectively (Reynoud 1986, Ramos Nuñez 1987, Queiros

Table 1. Diagnostic morphological characters of *Hypericum scruglii*, *H. tomentosum* and *H. pubescens*.

Characters	<i>H. scruglii</i>	<i>H. tomentosum</i>	<i>H. pubescens</i>
Habit	perennial herb, 5–30 cm tall	perennial herb, 9–53(90) cm tall	perennial herb, 10–70 cm tall
Branches	herbaceous, prostrate to decumbent, unbranched, rooting in the lower half, the lower internodes almost shorter than the leaves	partially woody, erect or decumbent to prostrate, branching and sometimes rooting at base, internodes longer than the leaves	herbaceous, erect or decumbent and rarely prostrate, unbranched, internodes almost longer than the leaves
Leaves	sessile, lamina 9–17 × 7–13, suborbicular to orbicular-elliptic, concolorous, green-glaucous, apex rounded, base subcordate	sessile, lamina 5–26 × 2–11 mm, elliptic-oblong to triangular-ovate, concolorous, green, apex rounded to obtuse, base cuneate to truncate or subcordate	sessile, lamina 6–40 × 2–16 mm, narrow oblong to oblong-oblancheolate, concolorous, green, apex subobtusate to rounded, base rounded to cordate-amplexicaul
Cymes	3–25-flowered, from up to 1–3(6) nodes, corymbiform	3–70-flowered, from up to 3 nodes, curved-corymbiform to cylindrical	3–5-flowered, from up to 3 nodes, curved-corymbiform
Bracteoles	linear-subulate	linear	linear
Flowers	18–20 mm in diameter, buds ellipsoid, obtuse	10–15(20) mm in diameter, buds ellipsoid, obtuse to rounded-obtuse	15–30 mm in diameter, buds cylindrical-ellipsoid, obtuse
Sepals	4.0–5.5 × 1.2–1.8 mm, subequal, ovate-lanceolate, acuminate, with 10–14 marginal black glands on each side, on cilia 0.5–4.0 mm long, laminar black glands absent but with big black apical gland, veins 5	3–5 × 2.5–3.5 mm, subequal to unequal, lanceolate to ovate or broadly elliptic, acute to usually shortly aristate, with 8–16 marginal black glands on each side, on cilia 0–1 mm long, with black laminar glands and big black apical gland, veins (3)5–7	5–10 × 1.5–2.5 mm, subequal, linear-lanceolate to lanceolate, long aristate, with 3–5 sessile marginal black glands on each side, laminar and apical black glands absent, veins 3(5)
Petals	10–11 × 3.5–4.5 mm, irregularly oblong-oblancheolate, obtuse, apiculus lateral, prominent and acute, dentate in the upper part; interdigital marginal glands black and few, not prominent	6–9 × 2.5–3.5 mm, oblancheolate, rounded, apiculus lateral, shortly acute to absent, entire or slightly dentate in the upper part; marginal to inframarginal glands black, few, subterminal and not prominent	9–15 × 3.0–6.5 mm, oblancheolate, rounded, apiculus lateral, apiculate or absent, entire or slightly dentate in the upper part; marginal to inframarginal glands black, few, not or scarcely prominent
Stamens	33, clearly 3-fascicled, 3 inner and 8 outer, 8 mm long	25–35, clearly 3-fascicled, longest 5–7 mm	30–50, clearly 3-fascicled, longest 6–11 mm
Anthers	0.4 mm long and 0.5 mm wide	0.5 mm long and 0.8 mm wide	0.6 mm long and 0.4 mm wide
Ovary	1.7 × 1.3 mm, narrowly ovoid-pyramidal	1.5–2.0 × 1.0–1.3 mm, narrowly ovoid-pyramidal	2–3 × 1–2 mm, ovoid-elypsoid to elypsoid
Style	up to 4.7 mm long; reflexed in fruit	5.0–6.3 mm long; patent in fruit	5–7 mm long; spreading-incurved in fruit
Capsule	5.0–6.5 × 2.5–2.7 mm, ellipsoid, longer than sepals, tridentate with loculi broadly apiculate	4–5 × 3–4 mm, ovoid-subglobose, shorter than sepals, truncate with loculi rounded at apex	6–7 × 3.5–5.0 mm, ovoid, shorter than sepals, tridentate with loculi short apiculate at apex
Seed	brownish, 0.7–0.9 mm long, testa finely reticulate-scalariform	greyish-brown, 0.9–1.0 mm long, testa finely reticulate-scalariform	purplish, 0.6–1.0 mm long, testa finely scalariform

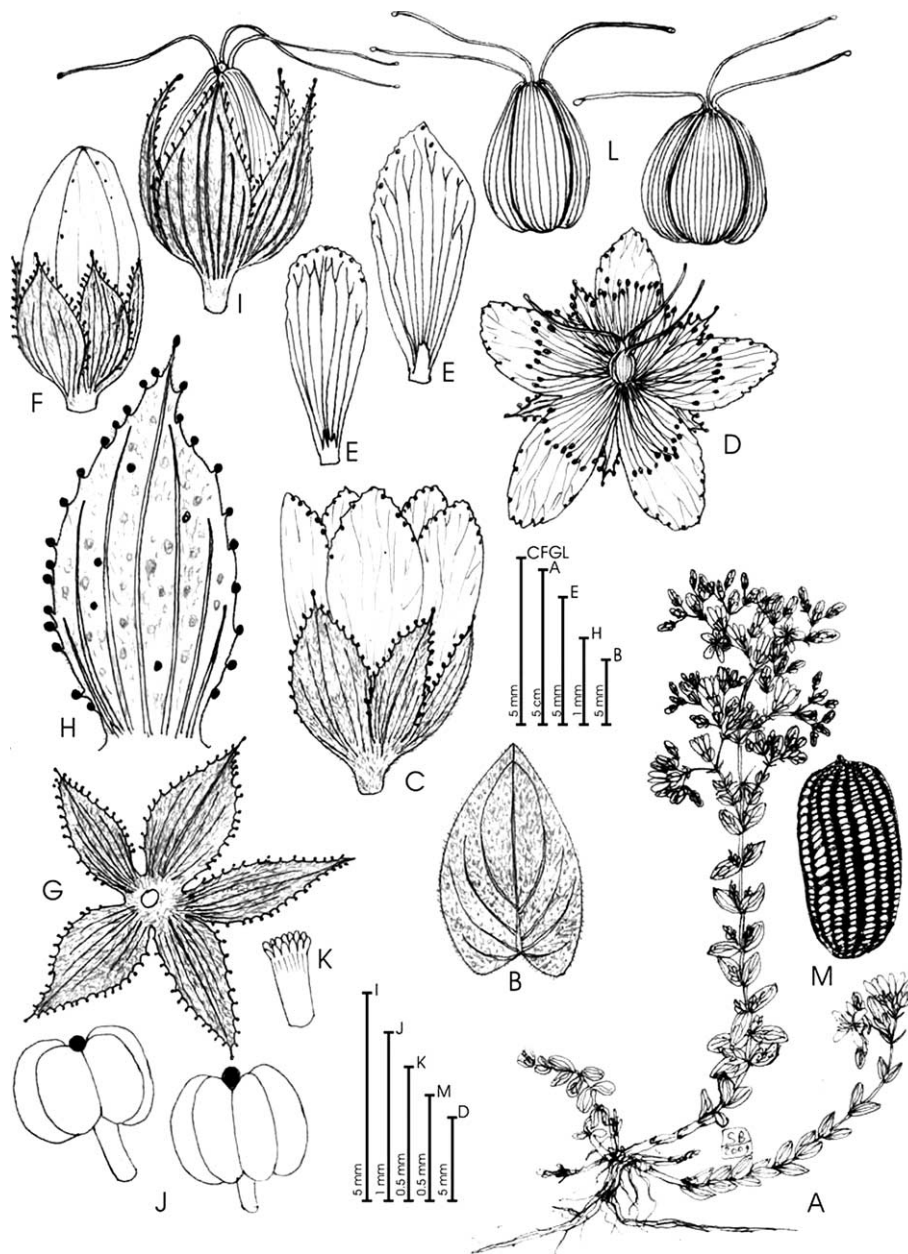


Figure 5. *Hypericum tomentosum*. (A) habit, (B) leaf, (C) flower, lateral view, (D) flower, upper view, (E) petals, (F) bud, (G) calyx, (H) sepal, (I) calyx and fruit, (J) anthers, (K) stigma, (L) fruits, (M) seed.

1991, Robson 1996). Therefore, *H. scruglii*, being a diploid species with  $2n = 16$ , is very unlikely to have evolved from a hybridization process between these two taxa.

In conclusion, based on our morphological and karyological observations, we hypothesize that *H. scruglii* arose from populations of *H. tomentosum* as a consequence of geographical isolation.

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#### **Additional specimens examined**

*Hypericum scruglii* Bacch., Brullo & Salmeri (paratypes): Sardinia. In apricis collinis, Sardinia, Jun–Jul, Moris (FI); In pratis prasertum maritimis, May, Moris 237 (TO); Ad vias inter Esterzili

et Nurra, Jul 1826, Moris (TO); In Sardinia orientalis Perdas de Fogu, May, Moris (TO); In umentibus presso Sassari, 1840, Lisa (TO); Contorni d’Isili, Jul 1860, Gennari (FI); Ad rivulos Horti Marchionas de Laconi, 25 Jun 1863, Ascherson (FI); Laconi, Pauli, 8 Jun 1864, sine leg. (TO); Ibid., 20 Aug 1864, sine leg. (TO); Laconi, boschetto, 25 Jun 1864, sine leg. (TO); Laconi, Pauli gora, 27 Aug 1869, sine leg. (TO); Ulassai, alla Corci, luoghi umidi, 1 Aug 1894, Martelli (FI); Isili, in collibus, 15 May 1894, Martelli (FI); Isili, Sep 1901, Cavara & Grande (FI); Circondario di Aritzo, 1935, Porcu (FI); Genn’i Acca (Montarbu – Seui), 8 Jun 2001, Bacchetta, Brullo, Casti & Giusso (CAT); M. te Tonneri, rivoli presso il Nuraghe di Ardasai, 8 Jun 2001, Bacchetta, Brullo, Casti & Giusso (CAT); Sa Scala e sa Marra, Seui (NU), 9 Jun 2001, Bacchetta, Brullo, Casti, Català & Giusso 163/01 (CAG, CAT); Mura Gessa, Seui (NU), 9 Apr 2002, Bacchetta, Casti, Iriti, Pontecorvo & Serra 85/02 (CAG); Santa Sofia, Laconi (NU), 23 Apr 2002, Bacchetta, Casti & Pontecorvo 156/02

(CAG); Baccu Locci, San Vito (CA), 26 May 2002, Bacchetta, Brullo, Casti & Giusso 255/02 (CAG); Salto di Quirra, 26 May 2002, Bacchetta, Brullo, Casti & Giusso s.n. (CAT); Funtana is Breccas, Osini (NU), 5 Jun 2002, Bacchetta & Casti 372/02 (CAG); Funtamela, Laconi (NU), 6 Jun 2003, Bacchetta, Pirodda, Podda & Pontecorvo 383b/03 (CAG); S'Atza e Ziu Chiccu, Laconi (NU), 25 Jun 2003, Bacchetta, Carrió, Casti & Herreros 396/03 (CAG); Nuraghe Ardasai, Seui (NU), 19 Jul 2004, Angius, Bacchetta, Brullo & Mattana 427/04 (CAG).

*Hypericum tomentosum* L.

**Italy.** Liguria occid. S. Remo, preso gli Ospedaletti, May, Panizzi (FI); Sopra Monti Sterili in sassosis verso Porto fino Rapallo-Ruta, 7 Jul 1823, Figaro (FI); Bordighera, luoghi umidi, Jul, Ricca (FI); Lieux humides près la mer Ospedaletti, Liguria, 22 Jun 1878, Buknell (FI).

**France.** Lieux humides Aix, B. du Rhône, 9 Jun 1867, Courciore (FI); Fossés humidis sur les bordes de l'Etange de Marignane (B. du Rh.), Jun 1869, Martigue (FI); Nice, region littorale, St André, 16 Jul 1883, Barla (FI); Valacloche, lieux humides et herbeux sur le calcaire, 800 m a.s.l., Jul 1893, Reverchon 626 (FI); Hérault, Perola à l'Estelle, 8 Aug 1895, Sennen (FI).

**Spain.** Environs de Cadiz, s.d., Fée (FI); Bordes de la rivière a Riopar, 20 Jul 1850, Bourgeau 603 (FI); Bordes du lac de l'Albufera près de Valencia, 4 Jul 1852, Bourgeau 1582 (FI); Costal de Fels (Barcelone), 30 May 1871, Compañó (FI); Costal de Fels, province de Barcelone, Espagne, dans les bordes des zone estaguales bord de la mer, Jun 1873, Tremols (FI); Barcelone, in pratis humidis litoralis, Jun 1874, Castellantely (FI); Balearen insula Majore, in agris sterilibus paludosis prope Pagum Artá, 30 Jun 1885, Porta & Rigo (FI); Valence, Segorbe, lieux humides et torbeux sur les alluvions du Rio, 350 m a.s.l., Aug 1891, Reverchon 626 (FI); Catalogne, Llers ruisseau, 14 Jul 1907, Sennen 273 (FI); Catalogne, Llers, fossées et pelouses humides, 1 Aug 1907, Sennen 422 (FI, VAL); Sierra de Corteza, Jun 1945, Borja 787 (VAL); Madrid, Guadalix de la Sierra, en suelo cretácico, 25 Jul 1948, Rivas Goday (VAL); Alicante, Barranco de Chirles, en el Molinío-Holoschoenium, 12 Aug 1958, Rigual s.n. (VAL); Mallorca, sitios frescos y humedos, Lluc, 4 Aug 1959, Palau Ferrer 215 (VAL); Alicante, Vall de Ebo, 11 Jul 1962, Rigual 22078 (VAL); Soria, Berlanga de Duero, 900 m a.s.l., Jul 1975, Mateo 75/207 (VAL); Valencia, Barig, 300 m a.s.l., Sep 1976, Mateo, Mansanet & Puche (VAL); Valencia, Dos Aguas, en el Cirsio-Holoschoenium, 15 May 1984, Peris & Stübing (FI); Alava, Espejo, 540 m a.s.l., zona encharcada arcillosa, 31 Jul 1985, Morante & Morante VIT 547.85 (VAL); Valencia, Rozalesmes (Requena), XY67, 700 m a.s.l., 15 Jul 1986, García (VAL); Valencia El Brull, neixement del Vinalopó, Bocarent, 740 m a.s.l., 27 Sep 1987, Nebot (VAL); Teruel, Beceite, salida hacia el Parrizal, 575 m a.s.l., 12 Sep 1991, Fabregat (VAL); Alicante, Teulada, bco. de la font de l'Horta, 100 m a.s.l., 30 Jun 1995, Soler & Signes 1826 (VAL).

*Hypericum pubescens* Boiss.

**Italy.** Favignana, 14 Apr 1973, Brullo (CAT); Gorghetti Tondi, Mazzara del Vallo, 27 Sep 1973, Brullo (CAT); Levanzo, 4 Jul 1982, Brullo (CAT); Favignana, 15 Jun 1983, Brullo (CAT).

**Malta.** Wied Babu, 27 Jun 1973, Brullo & Ronsisvalle (CAT); Misvan Ghonoa, 28 Jun 1973, Brullo & Ronsisvalle (CAT); Xilendi Valley, 29 Jun 1973, Brullo & Ronsisvalle (CAT); Mosta, 4 Apr 1984, Brullo & Ronsisvalle (CAT); Qrejtjen Point, 9 Apr 1984, Brullo & Ronsisvalle (CAT).

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