A new species of Hypochaeris L. (Asteraceae, Cichorieae) from Sardinia

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Abstract

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Hypochaeris sardoa, belonging to *H.* sect. *Metabasis,* is described as a species new to science and illustrated. It occurs on siliceous rocks in southern Sardinia. Its karyology, ecology, chorology and relationship are examined. A key to the species of *H.* sect. *Metabasis* is provided.

Introduction

The genus *Hypochaeris* L. has two main geographical centres, temperate South America and the Mediterranean region (Stebbins 1971). The majority of species, c. 50, occur in South America, all being characterized by a basic chromosome number of x = 4 (Saez 1949, Stebbins & al. 1953, Cerbah & al. 1995, Weiss & al. 2003), and forms a monophyletic group derived from some Mediterranean ancestor (Samuel & al. 2003). About 10 taxa occur in the Mediterranean region (De Filipps 1976, Oberprieler & Vogt 2002, Fürther & Podlech 2002), having basic chromosome numbers ranging from x = 3 to x = 6 (Stebbins & al. 1953, Brullo & al. 1977, Mugnier & Šiljak-Yakovlev 1987, Galland 1988, Barghi & al. 1989, Galán de Mera & al. 1999). The sectional subdivision of *Hypochaeris* in the tradition of Hoffmann (1890-94) has been confirmed recently by molecular studies, with the restriction, however, that *H. robertia,* the sole representative of *H.* sect. *Robertia* (DC.) Hoffm., groups with *Leontodon* and should therefore be excluded from *Hypochaeris* (Samuel & al. 2003).

In this paper a critical taxon, growing on siliceous rocky outcrops in some localities of southern Sardinia, is examined. It can be assigned to *Hypochaeris* sect. *Metabasis* (DC.) Hoffm., characterized by glabrous or subglabrous stems, achenes with a beak that is shorter in the marginal achenes than in the inner and a pappus of a single row of rigid, plumose hairs (Hoffmann 1890-94, Fiori 1904, 1927). This section is represented by several species in the Mediterranean region, all characterized by a diploid chromosome number of 2n = 6. These include *H. cretensis* (L.) Bory & Schaub., *H. hispida* Willd., *H. angustifolia* (Litard. & Maire) Maire, *H. pinnatifida* Cyr. ex Ten. and *H. tenuiflora* (Boiss.) Boiss.

Herbarium investigation and literature data revealed that the Sardinian taxon is morphologically and ecologically well differentiated from the other taxa of *Hypochaeris* sect. *Metabasis.* Therefore it is described here as the new species *H. sardoa.*

The present study is based on herbarium material and specimens collected in various Sardinian localities and cultivated in the Botanical Gardens of Cagliari, Catania and Valencia. For the karyological investigation, root-tips of cultivated plants were pretreated with 0.3 % colchicine, fixed in Carnoy and stained according to the Feulgen technique.

Hypochaeris sardoa Bacchetta, Brullo & Terrasi, **sp. nova** – Fig. 1
Holotype: Italy, Sardinia, Conca d'Oru, Capoterra (CA), metaquarziti, 655 m, 10.6.1998, *Bacchetta & Brullo* (CAT; isotypes: B, CAG, CAT, FI).

Planta perennis, (10)15-30(35) cm alta, radice lignosa, palari, simplici vel ramosa in parte terminali. *Caudex* lignosus, ramosus vel simplex, ramis contractis. *Caulis* erectus, glabrus vel sparsim pilosus basin versus, basi ramosus, ramis rectis vel divaricatis. *Folia basalia* rosulata, glabra vel sparsim margine ciliata, costa pilosa praecipue inferne, incisa usque laciniata, saepe integerrima, (40)50-100(160) × (4)5-6(8) mm, dentibus lateralibus acutis vel obtusis, 1-6(8) mm longis, obtusa vel acutiuscula apice, generaliter in petiolum alatum attenuata. *Folia caulina* triangulari-lanceolata, integra vel dentata, 0.4-5(7) cm longa, ciliata inferne, longe acuminata apice. *Capitula* juvenilia reclinata, adulta erecta, involucro cylindrico-campanulato, 12-15 mm longo, bracteis pluriseriatis lineari-lanceolatis, brevi tomento albo-lanuginoso tectis, costa atroviridi-violacea glabra superne, exterioribus brevioribus, 2-5 mm longis, interioribus longioribus usque ad 15 mm longis. *Receptaculum* planum, squamis hyalinis, longe apiculatis, 10-16 mm longis. *Corolla* 13-15 mm longa, lutea, ligula 9-10 × 2-3.5 mm, 5 dentibus 0.3-0.8 mm longis. *Tubus antherae* 4-4.5 mm longus. *Achaenia* atrobrunneae, exteriores 10-12 mm longae, interiores 12-15 mm longae, omnes attenuatae in rostrum subtilem longum, corpore fusiformi, costato-spinuloso, pappo uniseriato, 5-6 mm longo, setis plumosis, basi laeviter dilatatis.

Perennial herb, (10)15-30(35) cm tall, with a taproot single or branched below. *Rootstock* with short branches or, sometimes, simple. *Flowering stems* erect, one to several, glabrous or sparsely pilose towards base, with straight or divaricate branches already from the base. *Basal leaves* rosulate, glabrous or sparsely ciliate at the margin, with the midrib, mainly on the lower surface, pilose, lamina incised to laciniate, or often entire, (40)50-100(160) × (4)5-6(8) mm, attenuate into a petiole, obtuse or somewhat acute, with lateral, acute to obtuse, 1-6(8) mm long teeth. *Cauline leaves* triangular-lanceolate, entire or dentate, 0.4-5(7) cm long, ciliate at the base, long-acuminate at the apex. *Capitula* first reclinate, later erect, with cylindrical-campanulate involucre, 12-15 mm long. *Involucral bracts* in several rows, linear-lanceolate, covered by a short white-woolly tomentum, midrib violet dark green above; outer bracts 2-5 mm long, inner ones up to 15 mm long and acute at apex. *Receptacle* flat, with hyaline, long-apiculate, 10-16 mm long scales. *Corolla* 13-15 mm long, yellow, with ligule 9-10 × 2-3.5 mm, the 5 teeth 0.3-0.8 mm long, upper part of the tube sparsely hairy. *Anther tube* 4-4.5 mm long. *Achenes* dark brown, the outer (11)12 mm, the inner 12-15 mm long, all with a long beak, which is shorter in the marginal achenes, corpus fusiform, ribbed-spinulose. *Pappus* 5-6 mm long, of a single row of plumose hairs, somewhat dilated at the base.

Additional specimens examined. – Sardinia: Punta Sebera, Teulada (CA), rupi metamorfiche paleozoiche, 10.6.1998, *Bacchetta & Brullo* (CAG, CAT); Punta sa Cresia, Pula (CA), rupi granitiche, 10.6.1998, *Bacchetta & Brullo* (CAG, CAT); Pranedda de Leunaxi, Sarroch (CA), pareti rocciose metaquarzitiche, 10.6.1998, *Bacchetta & Brullo* (CAG, CAT); Rio de Monti Nieddu, Villa San Pietro (CA), 13.6.1998, *Bacchetta & Brullo* (CAG, CAT); Monte Linas a Scracchinus, Gonnosfanadiga (CA), rupi granitiche, 12.6.1998, *Bacchetta & Brullo* (CAG, CAT); Malacalzetta, Fluminimaggiore (CA), rupi metamorfiche paleozoiche, 29.5.1999,

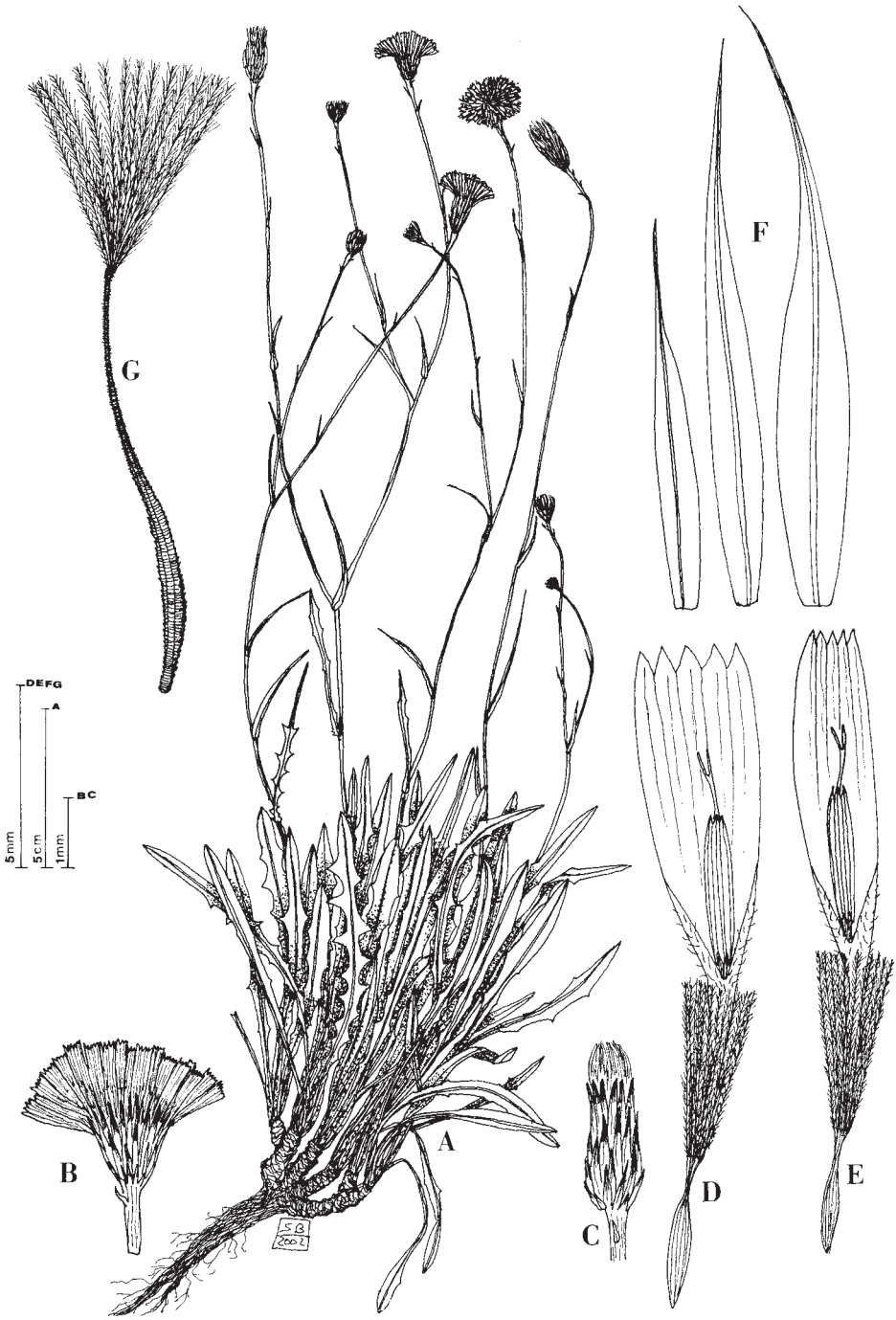

Fig. 1. *Hypochaeris sardoa* Bacchetta, Brullo & Terrasi – A: habit; B: flowering capitulum; C: fruiting capitulum; D: outer floret; E: inner floret; F: receptacular scales; G: achene. – Drawn from material from the locus typicus.

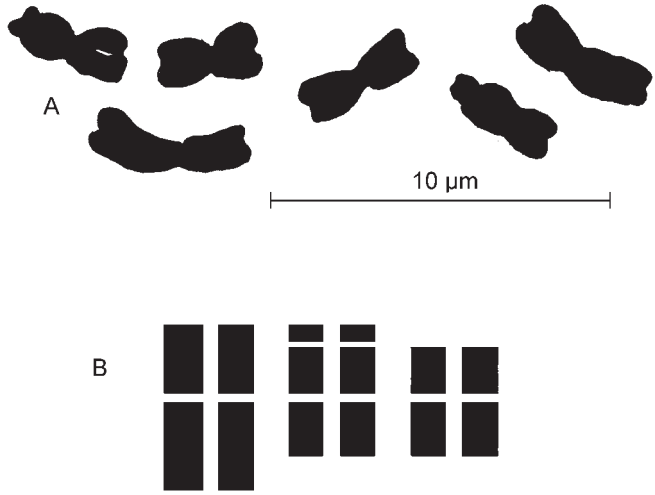

Fig. 2. Chromosome complement of *Hypochaeris sardoa* Bacchetta, Brullo & Terrasi – metaphase plate (A) and idiogram (B).

Bacchetta & Selvi (CAG, FI); Arenas, Fluminimaggiore (CA), rupi metamorfiche paleozoiche, 29.5.1999, *Bacchetta & Selvi* (CAG, FI); Monte Linas a Genna Eidadi, Gonnosfanadiga (CA), rupi granitiche 14.7.2000, *Bacchetta & Brullo* (CAG, CAT); Tinny, Domusnovas (CA), 10.6.2001, *Bacchetta, Brullo, Casti & Giusso* (CAT);

Karyology. – *Hypochaeris sardoa* is a diploid species with a somatic chromosome complement of 2n = 6 (Fig. 2). The karyotype is characterized by metacentric chromosomes, two of which are microsatellited, so that the formula is $2n = 2x = 2M+2m+2m^t$. The same chromosome number is known for the species of *H.* sect. *Metabasis,* as for instance *H. cretensis* (L.) Bory & Chaub. (Stebbins & al. 1953), *H. pinnatifida* Ten. (Stebbins & al. 1953), *H. hispida* Willd. (Brullo & al. 1977), *H. tenuiflora* (Boiss.) Boiss. (Montmollin 1986) and *H. angustifolia* (Litard. & Maire) Maire (Galán de Mera & al. 1999). According to Bramwell & al. (1972) and Lack (1978), this chromosome complement occurs also in *H. oligocephala* (Svent. & Bramw.) Lack, a species formerly segregated as a monospecific genus *Heywoodiella* Svent. & Bramw.

Flowering. – April to June, fruiting May to July.

Distribution and habitat. – *Hypochaeris sardoa* is a typical chasmophyte, occurring in Sardinia at an altitude of 80-1185 m, where it is localized in the Sulcis-Iglesiente and Sarcidano sectors (Fig. 3). It grows in crevices of Palaeozoic siliceous rocks, such as metamorphytes, metaquarzites, granites and granodiorites, and is a member of a rupicolous plant community belonging to the Asplenietea trichomanis (Br.-Bl. 1934) Oberd. 1977. In these localities, there are many Sardinian or Cyrno-Sardinian rare endemics linked to rocky habitats, such as *Helichrysum montelinasanum* E. Schmid, *Armeria sulcitana* Arrigoni, *Dianthus mossanus* Bacchetta & Brullo, *Linaria arcusangeli* Atzei & Camarda, *Galium glaucophyllum* E. Schmid, *Silene nodulosa* Viv., *Bituminaria morisiana* (Pignatti & Metlesics) Greuter. Other chasmophytes, with a wider distribution, are also present; these include *Hypochaeris robertia* Fiori, *Sedum dasyphyllum* L., *Umbilicus rupestris* (Salisb.) Dandy, *Asplenium billotii* F. W. Schultz, *Asplenium trichomanes* subsp. *quadrivalens* D. E. Mey., *Ceterach officinarum* Willd. and *Melica minuta* L.

Table 1. Differential characters of the species of *Hypochaeris* sect. *Metabasis*.

Character	*H. sardoa*	*H. cretensis*	*H. hispida*	*H. pinnatifida*	*H. angustifolia*	*H. tenuiflora*
Woody rootstock	yes	no	no	no	no	no
Root	taproot	taproot	taproot	taproot	fibrous, creeping	taproot
Stems [cm]	erect, 1-few, (10)15-30(35)	erect, 1-few, 10-40(85)	erect, 1-few, 10-40	erect, 1-few, 15-30	erect, 1-few, 15-35	erect, 1-few, 2-10
Basal leaves	green, entire to laciniate, glabrous to sparsely pilose	green, pinnatifid to runcinate, setose-hispid	green, lyrate-pinnatifid to runcinate, setose-hispid	green, pinnatifid to runcinate, setose-hispid	glaucous, spathulate to oblanceolate, subentire to dentate; subglabrous	green, linear to oblanceolate, glabrous to sparsely pilose
Cauline leaves	triangular-lanceolate to linear-lanceolate	1-few, grading into short scales above	1-few, grading into short scales above	1-few, grading into short scales above	grading into short scales	grading into linear scales
Involucral bracts	glabrous	setose-hispid	setose-hispid	glabrous (rarely hispid)	setose-hispid	glabrous to sparsely hispid
Corolla [mm]	13-15	10-12	10-12	9-10	9-10	6-8
Marginal achenes [mm]	13-14 long-beaked	5-6 short-beaked	5-7 short-beaked	7-8.5 long-beaked	9-10 long-beaked	4.5-6.5 short-beaked
Inner achenes [mm]	13-14 long-beaked	6-9 long-beaked	8-12 long-beaked	9-10 long-beaked	9-10 long-beaked	4.5-6.5 short-beaked
Pappus of marginal achenes [mm]	plumose, 5-6	corona of fimbriate scales, 0.15-0.4	plumose, 5-6	plumose, 5-6	plumose, 7-8	plumose, 4-4.5
Pappus of inner achenes [mm]	plumose, 5-6	plumose, 5-6	plumose, 5-6	plumose, 5-6	plumose, 7-8	plumose, 4-4.5

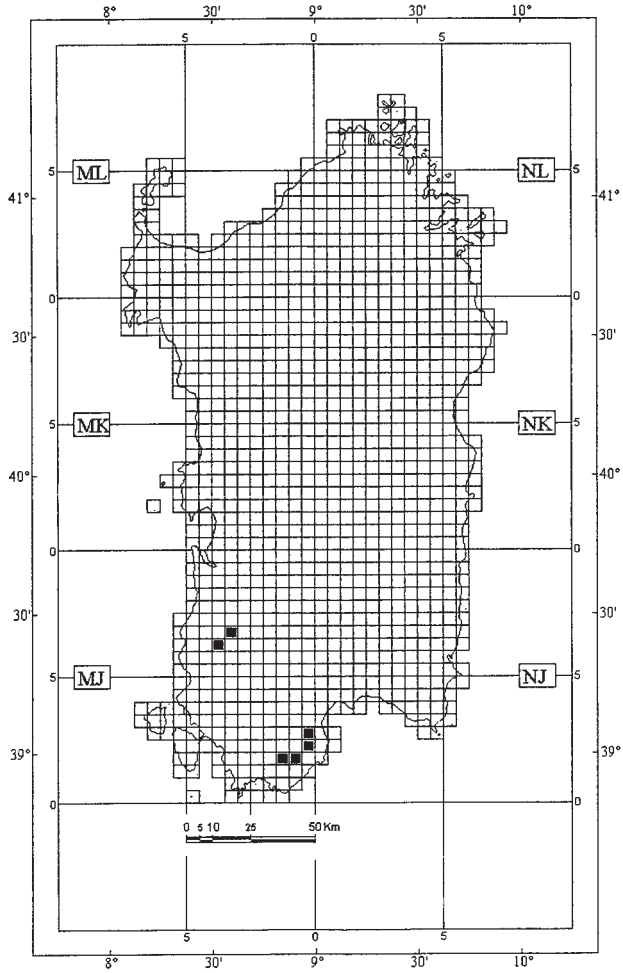

Fig. 3. Distribution of *Hypochaeris sardoa* Bacchetta, Brullo & Terrasi.

H. sardoa is found between the upper thermo-Mediterranean and the lower supra-Mediterranean belt, with a lower subhumid and humid ombrotype.

Conservation status. – Proposed conservation status (IUCN 2001): Vulnerable (according to criteria B1a and B2a).

Taxonomic remarks. – Hypochaeris comprises taxa quite heterogeneous in the morphology of leaves, capitula and achenes, as well as in their karyology. In particular, the leaves are very variable (entire, dentate, pinnatifid, runcinate or lyrate), achenes are unbeaked to beaked, isomorphic or dimorphic and the pappus consists of 1-2 rows of scabrid or plumose hairs, sometimes dilated at the base, or of fimbriate scales.

H. sardoa shows close relationship with the *H. cretensis* group in *H.* sect. *Metabasis*. It differs from its three members, *H. cretensis* s. str., *H. hispida* and *H. pinnatifida,* in several significant morphological characters (Table 1) and ecological requirements. Whereas all these species are

hemicryptophytes and have densely pubescent, runcinate, pinnatifid (rarely dentate) leaves, marginal achenes with a beak evidently shorter than in the inner ones and grow always in meadows and garigues, *H. sardoa,* in contrast, is a typical chasmophyte with a somewhat suffruticose habit, the leaves are glabrous or subglabrous, entire to laciniate, and the marginal achenes only somewhat shorter than the inner ones. The closest affinities are between *H. sardoa* and *H. pinnatifida,* which occurs in Sardinia too, but clear differences exist between these two species. In particular, *H. pinnatifida* is a hemicryptophyte with leaves generally runcinate to pinnatifid and densely setose-hispid, stems ascending to prostrate-ascending, a capitulum with acuminate inner bracts, a 10 mm long corolla densely hairy in the upper part of the tube and with 1-1.2 mm long teeth, and markedly dimorphic achenes, the marginal 7-8.5 mm, the inner 9-10 mm long.

H. sardoa shows also affinities with *H. tenuiflora* from Crete, mainly in the subentire to pinnatifid, glabrous or sparsely pubescent leaves and in the ecology, also being rupicolous. However, *H. tenuiflora* differs in the smaller size (2-9 cm), the only up to 10 mm long involucral bracts, which are sometimes sparsely long-setose on the back, the 4.5-6.5 mm long, shortly beaked achenes and the 4-4.5 mm long pappus.

Due to its chamaephytic habit and very restricted distribution, *H. sardoa* may be considered as a paleoendemic species of phytogeographical interest.

Key to the species of *Hypochaeris* sect. *Metabasis*

In order to highlight the main morphological differences between the species the following analytical key is given:

1. Stems 2-10 cm; achenes 4.5-6.5 mm; pappus 4-4.5 mm . . . . . *H. tenuiflora*
– Stems 10-80 cm; achenes 6-14 mm and at least the inner ones with a long beak; pappus 5-8 mm 2
2. Chasmophyte with woody and usually branched (rarely simple) rootstock; corolla 13-15 mm; achenes 13-14 mm . . . . . *H. sardoa*
– Hemicryptophyte without rootstock; corolla 9-12 mm; achenes 6-10 mm 3
3. Marginal achenes shortly beaked and with a pappus of fimbriate scales, 0.15-0.4 mm . . . . . *H. cretensis*
– All achenes with a pappus of plumose setae, 5-6 mm 4
4. Fibrous, creeping roots; basal leaves glaucous or glaucescent, oblanceolate to spathulate, subentire or dentate; cauline leaves grading into short scales; pappus 7-8 mm . . . . . *H. angustifolia*
– Taproot; basal leaves green, pinnatifid to runcinate (rarely dentate); cauline leaves 1 to several, grading into linear scales; pappus 5-6 mm 5
5. Stems erect, solitary or few; involucral bracts densely setose-hispid on the keel (rarely subglabrous); marginal achenes shortly beaked, 5-7 mm, inner ones long-beaked, 7-12 mm . . . . . *H. hispida*
– Stems several, ascending to prostrate-ascending; involucral bracts glabrous (rarely sparsely hispid); all achenes ± long-beaked, 7-10 mm. . . . . *H. pinnatifida*

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