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On *Ranunculus aspromontanus (Ranunculaceae)* and its taxonomic relationship

Abstract

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Based on plants from the locus classicus, the type and other herbarium material, *Ranunculus aspromontanus,* usually related to the SW Mediterranean *R. spicatus* group, is shown by morphological and karyological investigations to be closely allied to the NW Mediterranean *R. monspeliacus*. Whereas the hitherto unknown chromosome number of $2n = 16$ is common in the *R. spicata* group and *R. monspeliacus,* the combination of deflexed sepals at anthesis and a beak equalling the nutlet in length is decisive for the relationship to the latter species. Closer morphological comparison revealed that *R. aspromontanus* is best treated as a subspecies of *R. monspeliacus.* The corresponding combination is validated.

Introduction

Ranunculus aspromontanus Huter (1903), described from Calabria, Italy, is usually considered to be a member of the *R. spicatus* group (Greuter & al. 1989, Romo 1992) belonging to *R.* subg. *Ranunculus* sect. *Ranunuculastrum* DC., which is characterized by tuberous and fibrous roots, the receptacle elongating in fruit and compressed, keeled nutlets (Tutin 1993). Prompted by doubts regarding the close affinity of the little known *R. aspromontanus* to *R. spicatus,* a re-assessment of its taxonomic position has been conducted. Initially, our studies included, apart from *R. aspromontanus,* the members of the *R. spicatus* group *R. rupestris* Guss., *R. spicatus* Desf., *R. blepharicarpos* Boiss., *R. maroccanus* Cosson (usually all treated as infraspecific taxa of *R. spicatus,* Greuter & al. 1989) but has been extended soon to other taxa of *R*. sect. *Ranunculastrum,* and then focussed on *R. monspeliacus* L., *R. saxatilis* Balb. and *R. gracilis* E. D. Clarke.

Material and methods

For a morphological characterisation of *Ranunculus aspromontanus,* which was never studied in vivo before, in addition to the type and other herbarium material consulted, living plants were studied at and collected from the locus classicus in the southern Calabrian Aspromonte.

For the karyological study of *R. aspromontanus,* material from the locus classicus and its surroundings were cultivated in the Botanic Garden of the University of Calabria (Aspromonte, 24.5.2001, *Peruzzi & Passalacqua,* BG Univ. Calabria acc. no. 175*;* S. Caterina allo Jonio, 5.2002, *Romeo,* BG Univ. Calabria acc. no. 206, 594). Root tips from the cultivated plants were pretreated with a 0.3 % solution of colchicine, fixed in Carnoy, then hydrolysed in 1N HCl, stained with fuchsine and squashed in a 45 % solution of acetic acid for counting and measuring the chromosomes. The karyotype formula is according to Levan & al. (1964) and based on measurements of three somatic metaphase plates.

The study of the other taxa was based exclusively on herbarium material, from BP, CAT, CLU, FI, G, P, RO, TO, WU, Z (herbarium abbreviations according to Holmgren & al. 1990) and the personal herbarium of R. Huter, currently preserved at the Ferdinandeum Museum, Innsbruck.

The *Ranunculus* treatments in following floras were consulted: Fiori (1926), Coutinho Pereira (1939), Davis (1965), Jordanov & Kožuharov (1970), Zangheri (1976), Pignatti (1982), Grau (1986), Romo (1992) and Tutin (1993).

Specimina visa selecta

***R. aspromontanus*.** – ITALY, CALABRIA: Boschi della Sila in Calabria, 23.4.1884, *Fiori* (FI); La Sila di Savelli Mezzocampo, 6.1917, *Guadagno* (FI); Aspromonte, lungo il sentiero che porta al Convento dei Polsi, margini della strada, 23.5.2001, *Peruzzi & Passalacqua* (CLU); Sila, Mezzocampo, 31.5.2002, *Peruzzi & Passalacqua* (CLU); c/da Vutulli (Santa Caterina allo Ionio), 450 m, 30.4.1983, *Puntillo & Sia* (CLU); Santa Caterina allo Jonio, contrada Vutulli, 5.2002, *Romeo* (CLU); Campicello, Valle del Torrente Menta, 18.07.1990, *Brullo & Spampinato* (CAT). — SICILY: Etna, 3.1842, *Parlatore* (FI); Madonie, 1841, *Parlatore* (FI).

R. spicatus subsp. ***rupestris*.** – SICILY: Salina apud Malta, 3.1952, *Zodda* (FI); verso Pizzo Falcone Marittimo Egadi, 30.4.1935, *Francini Mezzeni* (FI); in umbrosis sylvaticis vetta del M. Erici 1000 m, 4.1881, *Lojacono* (FI); Palermo, M. Pizzuta, c. 900 m, 4.1895, *Ross* (FI); Palermo, Monte Pizzuta, 19.4.1890, *Longo* (RO); Palermo alla Pizzuta, *Todaro* (RO); ibid., 5.1838, *Parlatore* (FI); in herbosis rupestribus montanis Busambra, *Todaro* (FI); Busambra, 3.1842, *Parlatore* (FI); in rupibus montosis Gibilmanna, 5.1891, *Ross* (FI).

R. spicatus subsp. ***spicatus*.** – ALGERIA: Hamma (Alger), 8.3.1886, *Battandier & Trabut* (RO); Oran, à Santa-Cruz lieux rocailleux sur le versant N., 26.3.1914, *Faure* (FI); Constantine, versant nord du Sidi Mecid, 3.1879, *Rebaud* (FI); environs d'Alger, chemin de la Fontaine-Ble, près Mustapha, 19.2.1879, *Meyer* (FI).

R. spicatus subsp. ***fontqueri***. – MOROCCO: Melilla ou Fuvugu, 26.3.1932, *Sennen & Mauricio* (FI); Moyen Atlas, Ain Kahla, rochers calcaires 1900 m, 16.4.1924, *Jahandiez* (FI).

R. spicatus subsp. ***blepharicarpos*.** – SPAIN: Sierra DeRonda, sur les rochers calcaires, 7.6.1889, s. *coll.* (FI); Sierra de Segura, 18.4.1851, *Bourgeau* (FI). — PORTUGAL: Adarigo près Regoa, 3.1880, *Schmit* (FI); Coimbra, 7.5.1876, *Hackel* (FI).

***R. saxatilis*.** – FRANCE: Vallée du Rhône, à Plaisance (Aveyron), 300 m, 2.-30.5.1800, *Coste* (FI); Saint-Vallier (Rhône), 4.5.1878, *Chabert* (FI); Choponost (Rhône), 12.5.1878, *Perret* (FI); environs de Toulon champs derriere la montagne de Cordon, 7.5.1861, s. *coll. (FI).* — ITALY, PIEMONTE: Brissogne, pendici aride sotto la borgata Cesalet (Val d'Aosta), 25.5.1900 *Ferrari* (FI); ibid., 25.5.1899, *Ferrari* (FI);

***R. monspeliacus*.** – ITALY, CALABRIA: La Sila Cuturelli (S.S. 107 Km 108) lungo un ruscello, 1150 m, 11.5.1950, *Sarfatti & Corradi* (FI); La Sila Camigliatello (S.S. 107 km 82), 1290 m, 7.5.1950, *Sarfatti & Corradi* (FI); La Sila a N del Lago Arvo presso la Fonte della Soc. Idr. Forestale, 1300 m, 6.5.1950, *Sarfatti & Corradi* (FI); La Sila presso Strada Statale 107 K 107 (S. Giovanni in F.), 1150 m, 6.5.1950, *Sarfatti & Corradi* (FI); La Sila Camigliatello, 1290 m,

Table 1. Morphological features of the subspecies of *Ranunculus spicatus* in comparison with *R. aspromontanus,* bracketed values are uncommon; measurements in [mm].

	subsp. ***blepharicarpos***	subsp. ***maroccanus***	subsp. ***fontqueri***	subsp. ***spicatus***	subsp. ***rupestris***	***Ranunculus aspromontanus***
Sepals	appressed to corolla at flowering	appressed to corolla at flowering	appressed to corolla at flowering	appressed to corolla at flowering	appressed to corolla at flowering	deflexed at flowering
Nutlet						
beak	curved, subruncinate	curved, runcinate	curved, runcinate	curved, apiculate / subruncinate	curved, subruncinate	curved, runcinate
size	5 × 4	5 × 3	4.5 × 6.5	2.5 × 3	3 × 3.5	2 × 2.5
indumentum	subglabrous	pubescent	subglabrous	subglabrous	pubescent	pubescent
length ratio corpus / beak	1.4	1.9	2	1.5	1.9	1.1
Spike size	15 × 10	15 × 10	10-12 × 12-15	15-20 × 6	10-20 × 9	10-15 × 8-9
Receptacle	pubescent	pubescent	pubescent	subglabrous	subglabrous	subglabrous
Plant size	200-450	200-450	400-500	150-300	150-300	(150)240-350(400)
Number of flowers	2-7	2-7	4-7	1-5	1-3	1-5
Length of honey-leaves	(15)20	20	20	15-20	15-20(25)	10-14(18)
Leaf size	10-60 × 15-70	20-60 × 20-70	40-70 × 40-60	20-50 × 20-60	50-80 × 30-50	(15)25-42(45) × (12)25-27(30)

15.5.1950, *Sarfatti & Corradi* (FI); S. Giovanni in Fiore, in cultis incultisque, 800-1200 m, 10.6.1910, *Lopez* (FI); Sila Lago di Arvo, 1278 m, 31.5.1955, *Chiarugi*, *Bavazzano* & *Contardo* (FI); Sila tra Carlopoli e Tempone Morello alla Mandria Grande, 17.6.1899, *Fiori* (FI); sopra Spezzano Grande, 22.5.1898, *Preda* (FI); Sila a Tempone Morello 1600 m, 15.6.1899, *Fiori* (FI); Sila, rive del Lago di Cecita, 5.2002, *Peruzzi* (CLU); Sila Piccola, Faugli (Cosenza), 31.5.2002, *Peruzzi & Passalacqua* (CLU); Sila Piccola, Lago Ampollino, 31.5.2002, *Peruzzi & Passalacqua* (CLU); poco prima del Lago Ampollino proveniendo da San Giovanni in Fiore (Cosenza), 31.5.2002, *Peruzzi & Passalacqua* (CLU); Monte Cocuzzo, versante SE, nei pressi di Caselle Catena Costiera, 33S WD 98.41, 20.5.1993, *Oliveti & Tucci* (CLU); Martirano, Macchia di Pietre sul T.te Mentaro, UTM 33S XD 5.27, 180 m, 25.4.1999, *Bartolotta* (CLU); C. da Molarotta (Camigliatello Silano, Sila Grande, Cosenza), 1164 m, 5.5.1994, *Maiorca* (CLU); Fontana S. Giovanni, UTM XD 04.38, 1000 m, 2.7.1989, *Bernardo* (CLU).

Results

Typification of Ranunculus aspromontanus. – The name *R. aspromontanus* is based on one gathering, i.e. *Huter, Porta & Rigo, "Iter Italicum III", no. 335*. In the protologue (Huter 1903) four duplicates are mentioned that were used for the description; these are from the herbaria of Kerner, Jordan, Boissier and Haynald. Further duplicates exist in other herbaria (e.g. FI, TO, see Fig. 1B) and also represent original material. Of the four specimens explicitly mentioned in the protologue, only the one in the Kerner herbarium appears to be extant and is therefore selected as lectotype (Fig. 1A). Two individuals are mounted on this sheet, of which only the right one represents *R. aspromontanus* (the left one is doubtless *R. paludosus* Poir. = *R. flabellatus* Desf.).

Morphology. – The comparison between morphological features of *R. aspromontanus* and the *R. spicatus* group is summarized in Table 1. The features considered are overlapping in all taxa, ex-

Table 2. Morphological comparison of *Ranunculus aspromontanus, R. saxatilis, R. monspeliacus* and *R. gracilis;* measurements in [mm].

	R. aspromontanus	***R. saxatilis***	***R. monspeliacus***	***R. gracilis***
Plant size	240-350	100-280	250-440	50-200
Indumentum	pubescent, hairs not appressed	pubescent, hairs not appressed	sericeous, hairs appressed	almost glabrous
Leaf shape	orbicular to trilobed	orbicular to trilobed	deeply divided, with the middle segment stipitate	generally deeply divided
Tubers				
shape	fusiform	fusiform	fusiform	ovoid
length	10-30	8-30	15-30	3-5
Length of honey leaves	10-14	10-15	12-20	6-10
Length of sepals	6-7	7-10	7-10	4-5
Number of flowers	1-5	1-3	1-4	1-3
Length of spike	10-15	10-19	10-13	6-8
Nutlet				
beak shape	curved and hooked	almost straight	almost straight	almost straight
beak length	2-2.5	1.5-2	1.5-2	0.5-1
indumentum	pubescent	pubescent	pubescent	glabrous
corpus length	2-3	2-3	1-2.5	1.5

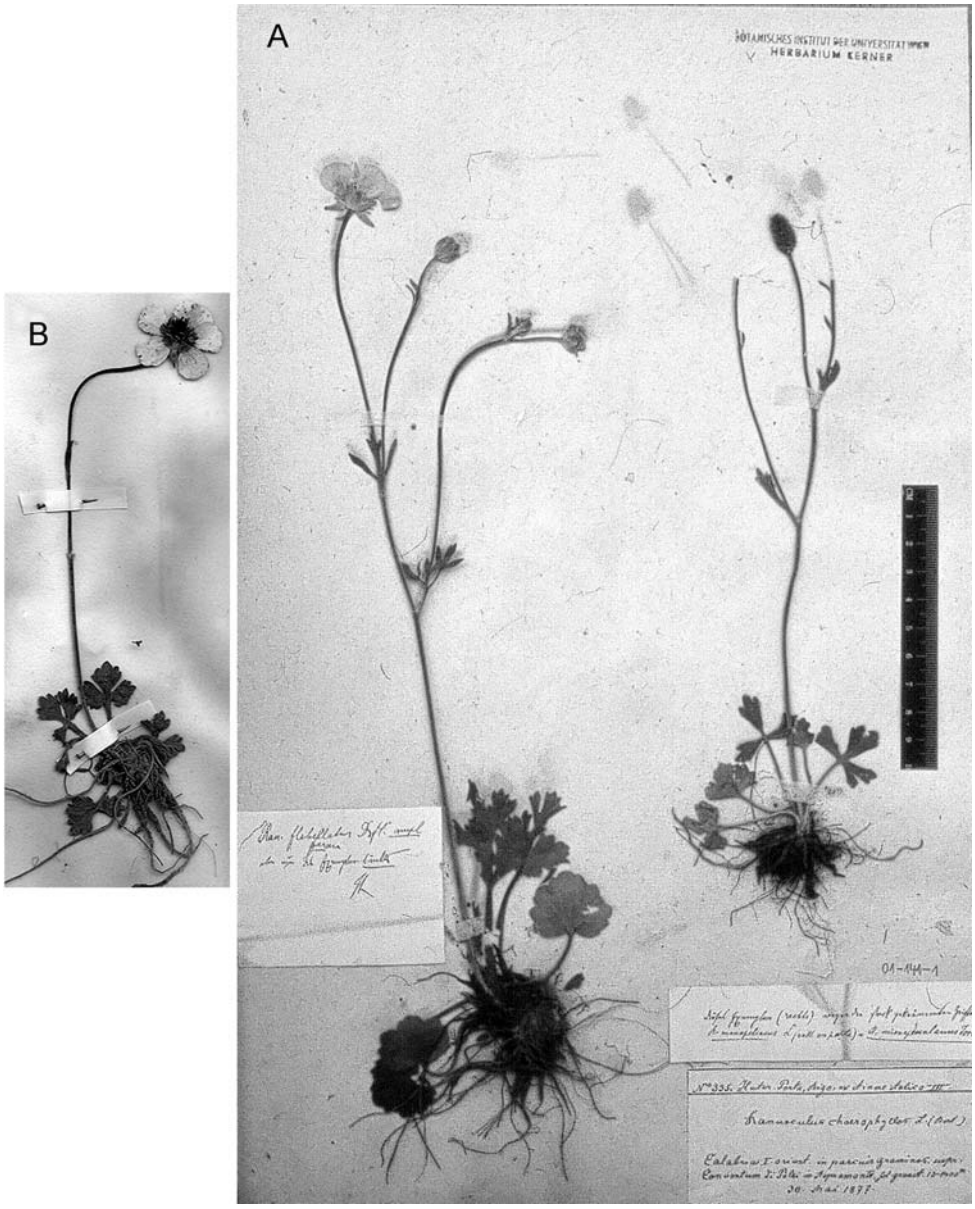

Fig. 1. A: lectotype of *Ranunculus aspromontanus* (only the plant on the right), preserved in herb. Kerner (WU); B: an isolectotype of *R. aspromontanus,* preserved in TO.

cept for *R. aspromontanus,* which is the only one showing deflexed sepals and a beak almost equalling in length the corpus of the nutlet.

R. aspromontanus appears instead more closely related to taxa of *R.* sect. *Ranunculastrum* that also have deflexed sepals, such as *R. monspeliacus* L., *R. saxatilis* Balb. and *R. gracilis* E. D. Clarke (Table 2). The latter, NE Mediterranean species (see Fig. 2) is well distinct from *R.*

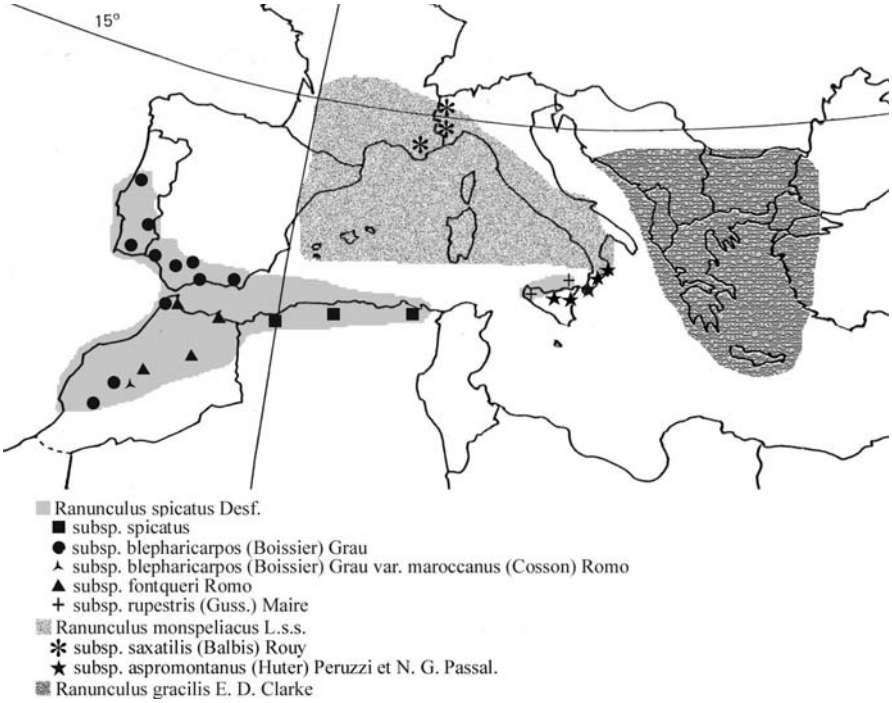

Fig. 2. Distribution of the *Ranunculus spicatus* group, *R. aspromontanus* Huter, *R. monspeliacus* L., *R. saxatilis* Balb. and *R. gracilis* E. D. Clarke. Symbols indicate localities substantiated by the herbarium specimens listed in this paper and Romo (1992), respectively; the different grey areas indicate the distribution areas of the taxa as given in the literature.

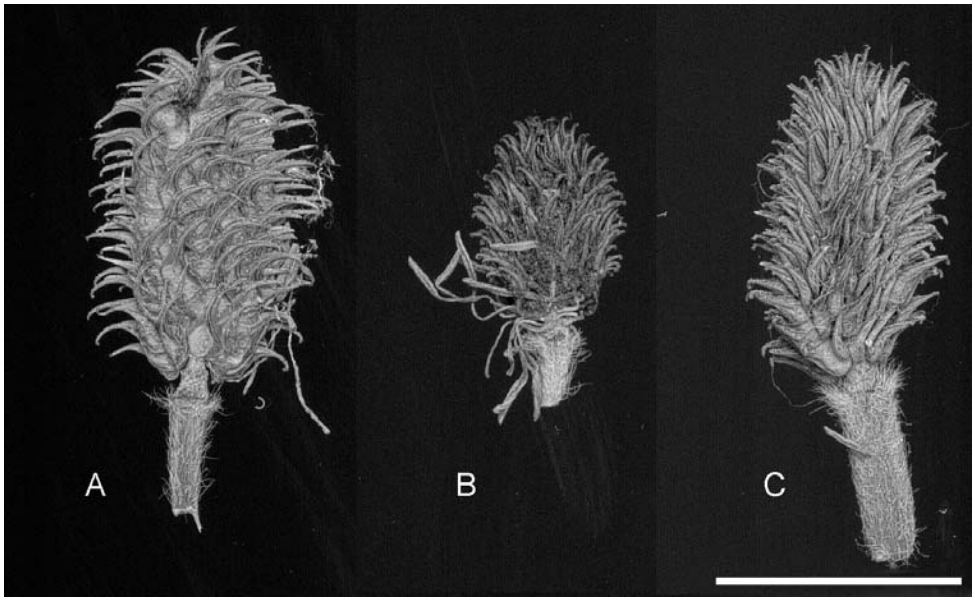

Fig. 3. Spikes of *Ranunculus aspromontanus* (A); *R. saxatilis* (B); *R. monspeliacus* (C). – Scale bar: 1 cm.

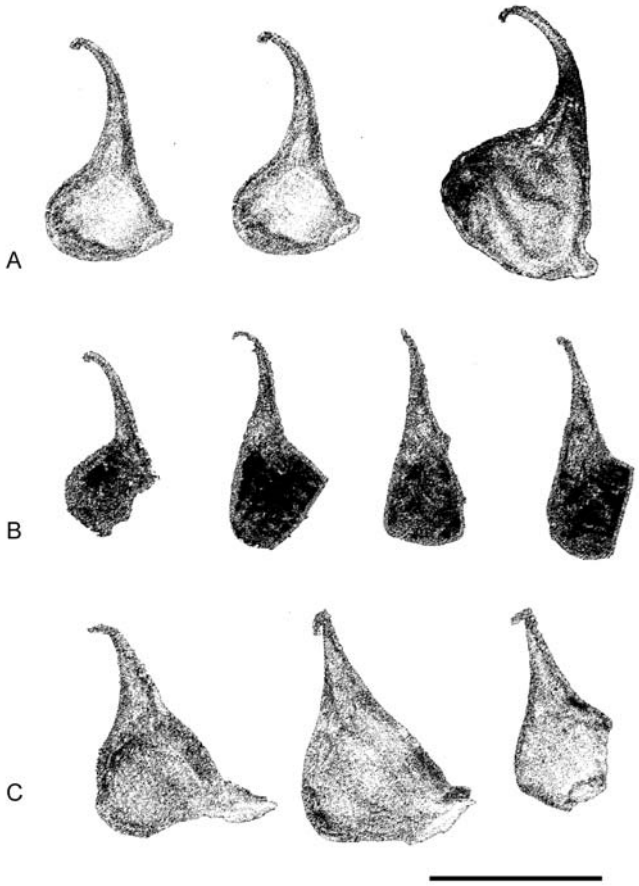

Fig. 4. Nutlets of *Ranunculus aspromontanus* (A); *R. saxatilis* (B); *R. monspeliacus* (C). – Scale bar: 2 mm.

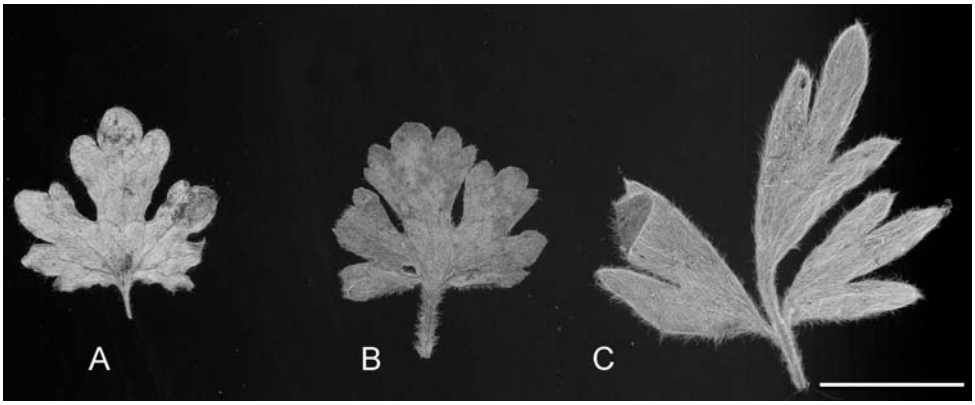

Fig. 5. Basal inner leaves of A: *Ranunculus aspromontanus;* B: *R. saxatilis;* C: *R. monspeliacus*. – Scale bar = 2 cm.

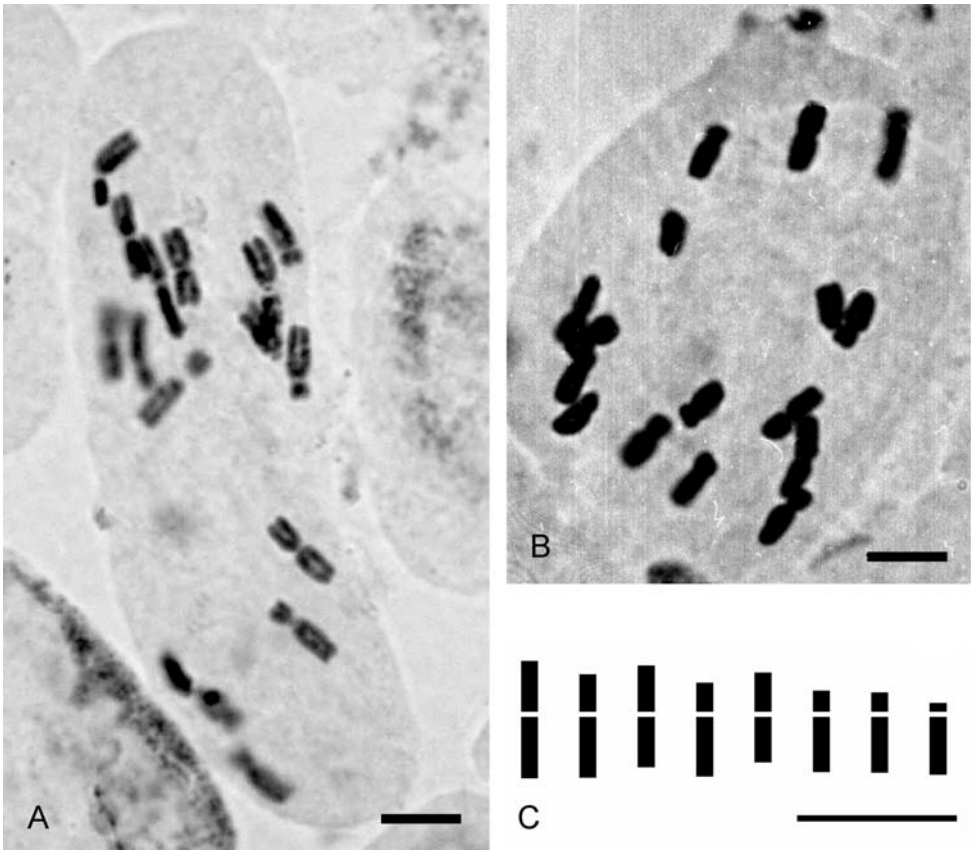

Fig. 6. Metaphase plates from root tips of *Ranunculus aspromontanus*, 2n = 16, A: from S. Caterina allo Jonio (Reggio Calabria); B: Convento dei Polsi, Aspromonte; C: haploid idiogram. – Scale bars: 5µm.

aspromontanus by its broadly ovoid tubers, almost glabrous leaves, glabrous nutlets with a short, almost straight beak, whereas *R. saxatilis* and *R. monspeliacus* show stronger affinities. *R. monspeliacus,* mainly distributed in the NW Mediterranean (Fig. 2), and *R. saxatilis,* which occurs in SE France and Aosta Valley (Italy), share some features of the spikes (Fig. 3B-3C) and nutlets (Fig. 4B-4C), but are distinct in the shape and indumentum of the leaves (Fig. 5B-5C). *R. aspromontanus* shares characters of the habit, the leaves and spikes with *R. saxatilis* (Fig. 3A-3B; 5A-5B), but shows some difference in the shape of the nutlets (Fig. 4A-4B), which distinguishes it from *R. monspeliacus* (Fig. 4A-4C) together with leaf features (Fig. 5A-5C). Moreover, *R. aspromontanus* has smaller sepals than *R. saxatilis* (Table 2).

Karyology. – *Ranunculus aspromontanus* shows a chromosome complement of $2n = 16$ (Fig. 6A, 6B). The karyotype formula can be expressed as follows: $z = 2n = 2x = 16 = 2m + 2sm + 2m + 2sm + 2m + 4sm+ 2t$. The haploid idiogram is shown in Fig. 6C.

The number $2n = 16$ is present in both the *R. spicatus* group (Ferrarella & al. 1981, Diosdado & Pastor 1991, Vogt & Oberpieler 1994, Diosdado & Pastor 1996), in *R. gracilis* E. D. Clarke (Popova 1972, in Loon 1987) and in *R. monspeliacus* L. (Marchi 1971, Diosdado & Pastor 1991, 1996, Verlaque & al. 1997). The latter often has a tetraploid cytotype in Italy (Marchi & Visonà 1982).

Conclusions

Ranunculus aspromontanus differs from the *R. spicatus* group, which is concentrated in SW Mediterranean basin, by the deflexed sepals at flowering and a beak that almost equals the nutlet in length. It closely approaches *R. monspeliacus* and in particular *R. saxatilis,* and is allied with this NW Mediterranean group.

R. aspromontanus is endemic to Calabria and, if its presence can be confirmed, to Sicily (Etna and Madonie). In Calabria it is known from Aspromonte (locus classicus and surroundings) and Sila (Mezzocampo). Pignatti's (1982) report of *R. rupestris* Guss. for the Sila mountain (Central Calabria) was extracted from Sarfatti (1959), where the author cites an incomplete herbarium specimen of Guadagno (see "Specimina visa selecta" under *R. aspromontanus*) that we identified (also in the field) without doubts as *R. aspromontanus.*

Considering the strong affinities between *R. aspromontanus, R. monspeliacus* and *R. saxatilis* as well as their geographic distribution, a treatment of these three taxa as subspecies appears the most appropriate solution.

Ranunculus monspeliacus L., Sp. Pl. 1: 553. 1753

subsp. ***monspeliacus***

Described from France, Montpellier.

Ic.: Fig. 3C, 4C, 5C; De Candolle (1808: t. 50)

subsp. ***saxatilis*** (Balb.) Nyman, Consp. Fl. Eur.: 8. 1878

≡ *Ranunculus saxatilis* Balb., Misc. Bot.: 27. 1804. – Lectotypus (designated by Dal Vesco & al. 1987-88 [erroneously as"holotype"]): In aridis inter Pollein & Brissogne, 1801, *Tillier* (TO)

Ic.: Fig. 3B, 4B, 5B; Dal Vesco & al. (1987-88: fig. 1, p. 8)

subsp. ***aspromontanus*** (Huter) Peruzzi & N. G. Passal., **comb. nova**

≡ *Ranunculus aspromontanus* Huter in Österr. Bot. Z. 53: 489. 1903 ≡ *Ranunculus spicatus* subsp. *aspromontanus* (Huter) Greuter & Burdet in Willdenowia 19: 46. 1989. – Lectotypus (here designated): "Calabria I orient. In pascuis graminos. supra Conventum di Polsi in Aspromonte, sol. granit. 13-1400 m", 30.5.1877, *Huter, Porta & Rigo ex itinere italico III, no. 335* (WU [herb. Kerner, sub *R. chaerophyllos* L. (Bert), the individual on the right]; isolectotypi: TO [herb. Gibellianum], FI [herb. Levier], FI [ex Huter, 5.1878]).

– *Ranunculus monspeliacus* subsp. *saxatilis* sensu Pignatti (1982) p.p. (Calabrian records)

– *Ranunculus gracilis* sensu Pignatti (1982) and Tutin (1993) p.p. (Calabrian and Sicilian records)

Ic.: Fig. 1, 3A, 4A, 5A, 6

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