

## ***RUTA LAMARMORAE (RUTACEAE), A NEW SPECIES FROM SARDINIA***

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A new species from Sardinia occurring on the Gennargentu massif, *Ruta lamarmorae* (*Rutaceae*), is described and illustrated. Its relationships with *R. corsica*, a species widespread in the Corsican mountains, are examined.

*Keywords.* Orophilous flora, *Ruta*, *Rutaceae*, Sardinia, taxonomy.

### INTRODUCTION

*Ruta corsica* DC. (*Rutaceae*) is considered a Sardo-Corsican endemic, occurring in the mountains, where it grows chiefly on siliceous incoherent substrata represented by stabilized screes. This species is widespread in all the main Corsican massifs, while in Sardinia it is confined to the Gennargentu massif (Townsend, 1968; Pignatti, 1982).

Field investigations aimed at verifying the variability of the populations living in the two islands have emphasized that the Corsican plants are morphologically well differentiated from the Sardinian ones (Honsell, 1957; Arrigoni, 1979; Pignatti, 1982). The main differences are in the size and shape of the leaves, flowers and fruits.

Based on literature data they differ also in chromosome number, since the Corsican populations are diploid with  $2n = 18$  (Contandriopoulos, 1957), and the Sardinian ones are tetraploid with  $2n = 36$  (Honsell, 1957).

It is thus quite clear that the populations of the two islands with their morphological and karyological differences, which have arisen as a consequence of their geographical isolation, cannot be ascribed to the same taxon. Therefore, the Sardinian populations should be treated as a species distinct from *R. corsica*.

### MATERIAL AND METHODS

For this survey literature data, herbarium material (CAG, CAT, FI, TO) and personal field investigations were used. In addition, in order to clarify the ecological requirements of the investigated populations, phytosociological surveys were carried out in Sardinia and Corsica.

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## RESULTS

The Corsican populations were originally described by Salzmänn (1821) as *Ruta divaricata*, but this is an illegitimate name since Tenore (1811–1815) had already used this specific epithet for a species now considered a synonym of *R. graveolens* L. Later, de Candolle (1824) proposed *R. corsica* as a new name for this plant.

The Sardinian populations, so far attributed to the previous species, have to be described as a species new to science, differing from *R. corsica* in morphological characters and ploidy levels.

***Ruta lamarmorae* Bacchetta, Brullo & Giusso del Galdo, sp. nov. Fig. 1.**

*Ruta corsicae* affinis sed lobis foliorum obovato-rotundatis, floribus majoribus, 12–13 mm diametro, sepalis per 0.3–0.6 mm ad basin connatis, 1.2–1.5 mm longis, 1.3–1.7 mm latis, petalis 5.5–6.5 mm longis, limbo 2.8–4 mm lato, carina 0.5 mm lata, staminibus exterioribus filamentis 3.5–4.5 mm longo, staminibus interioribus filamentis 3–3.5 mm longo, ovario 3–3.5 mm longo, carpellis in maturitate superne valde amotis, capsula 6–7 mm longa, segmentis late obtusis. – Type: Sardinia, Bruncu Spina, Gennargentu – Fonni (NU), versante NE, 18 vii 2004, Bacchetta & Brullo s.n. (holo CAT; iso CAG, CAT, FI).

Erect shrub 15–50 cm tall, glandular, malodorous; branches woody, divaricate, rigid, robust, intricate, subspinescent. *Leaves* bipinnate, 1.5–8 cm long, lower ones long petiolate, upper shortly petiolate or subsessile; lobes fleshy, green-glaucous, obovate-rounded, 3–10 mm long, 2–8 mm wide. *Flower* 12–13 mm in diameter with peduncle 1–3 mm long, the central one 5-merous and the other ones 4-merous. *Calyx* 3–4.5 mm in diameter with sepals glandular, connate for 0.3–0.6 mm at base, 1.2–1.5 mm long, 1.3–1.7 mm wide; petals white to pale yellow, 5.5–6.5 mm long, with claw 1.5 mm long and limb cucullate, undulate at margin, 2.8–4 mm wide with keel 0.5 mm wide. *Outer stamens* with filament 3.5–4.5 mm long and anther 1.8–2 mm long; inner ones with filament 3–3.5 mm long and anther 1.3–1.4 mm long. *Ovary* green, glandular, 3–3.5 mm long with carpels 2–2.5 mm long, strongly detached at maturity towards the apex. *Style* white, 2.5 mm long. *Capsule* 6–7 mm long with segments broadly obtuse at apex.

*Etymology.* This species is named after Alberto Lamarmora (1789–1863), distinguished naturalist and topographer, who studied the Sardinian environment for many years. The top of Gennargentu massif is named after him (Punta Lamarmora, 1834 m a.s.l.).

*Phenology.* Flowering: June–August; fruiting: September–November.

*Habitat and ecology.* *Ruta lamarmorae* is an orophyte growing on siliceous substrata (metamorphites and granites) at 1500–1750 m altitude. It mainly prefers stabilized screes rich in rocky material. It is a member of the dwarf-shrub communities linked to the upper supratemperate belt, characterized by a temperate submediterranean bioclimate (Rivas-Martínez *et al.*, 2002).

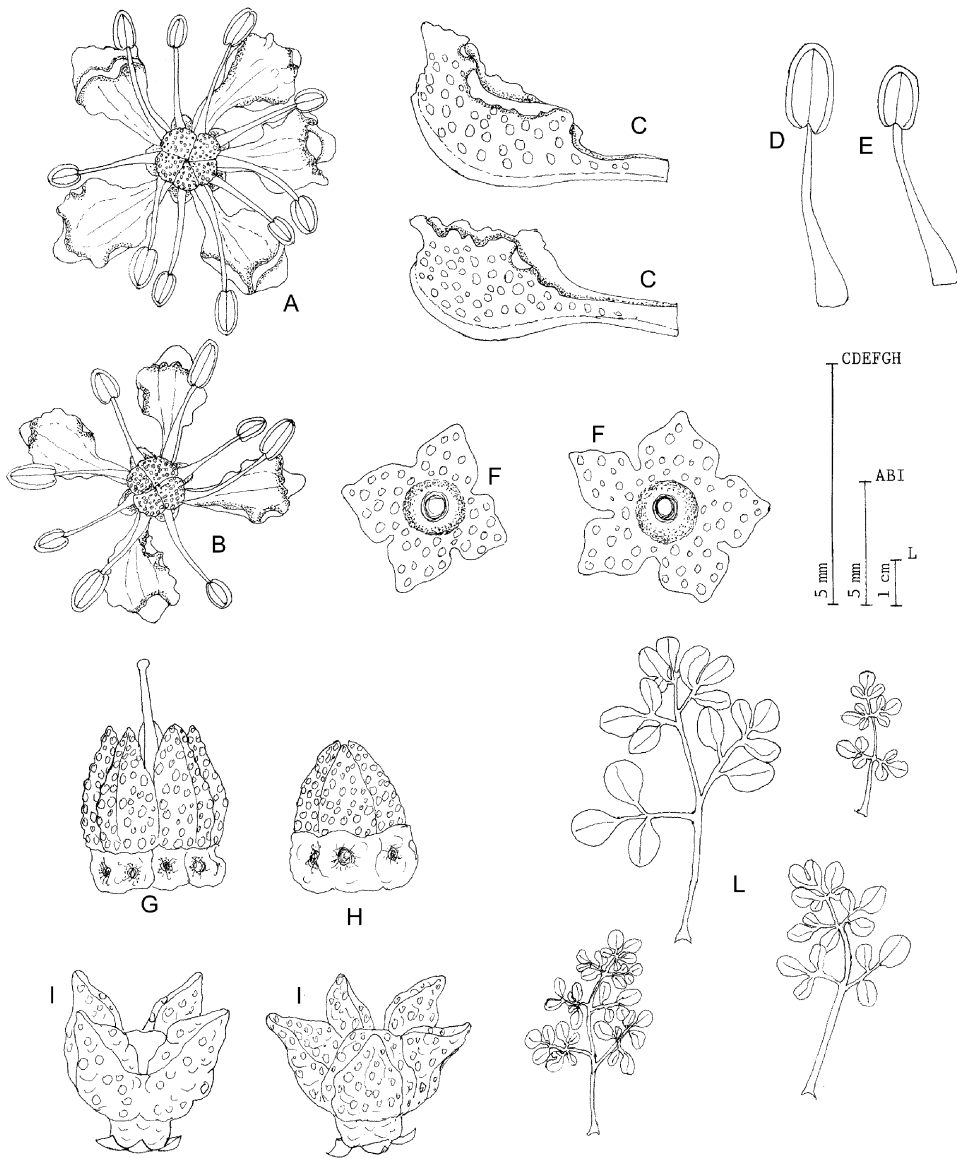


FIG. 1. Morphological characters of *Ruta lamarmorae* Bacchetta, Brullo & Giusso del Galdo: A, pentamerous flower; B, tetramerous flower; C, petals; D, inner stamen; E, outer stamen; F, calyces; G, mature ovary; H, immature ovary; I, capsules; L, leaves.

Phytosociologically the plant community characterized by *R. lamarmorae* can be referred to *Carici-Genisteteta lobelii* (Klein, 1972) which includes the dwarf-shrub orophilous vegetation occurring in the mountains of Sardinia and Corsica (Klein, 1972; Gamisans, 1977; Pignatti *et al.*, 1980; Arrigoni, 1986). From the floristic point of view, this vegetation is characterized by some Sardinian endemics (*Thymus*

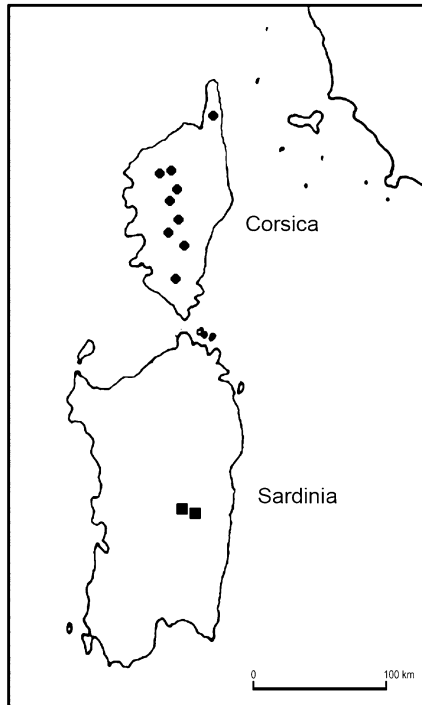


FIG. 2. Distribution map of *Ruta lamarmorae* (squares) and *R. corsica* (circles).

*catharinae* Camarda, *Festuca morisiana* Parl., *Viola corsica* Nyman subsp. *limbarae* Merxm. & Lippert) and several Sardo-Corsican endemics (*Astragalus genargenteus* Moris, *Bunium corydalinum* DC., *Carex caryophyllaea* Latourr. subsp. *insularis* (Barbey) Arrigoni, *Carlina macrocephala* Moris, *Crocus minimus* DC., *Galium corsicum* Spreng., *Genista corsica* (Loisel.) DC., *Herniaria latifolia* Lapeyr. subsp. *litardierei* Gamisans, *Odontites corsica* (Loisel.) G. Don, *Petrorhagia bicolor* Jord. & Fourr., *Plantago subulata* L. subsp. *insularis* (Gren. & Godr.) Nyman, *Poa balbisii* Parl., *Trisetum gracile* (Moris) Boiss., etc.).

*Distribution.* *Ruta lamarmorae*, endemic to the Gennargentu massif (Fig. 2), is very rare and found only in two small stands: Su Susciu (Desulo and Villagrande Strisaili) and Bruncu Spina (Fonni).

*Conservation status.* Due to strong pressure throughout its range (overgrazing, fires, ski facilities and activities, etc.), we suggest that *R. lamarmorae* be included in the IUCN regional red list as an endangered species (EN). In particular, according to the methodology adopted by IUCN (2001, 2003), the following specific category is proposed: EN B1ab(ii,iii,v) + 2ab(ii,iii,v); C2a(i).

## DISCUSSION

*Ruta lamarmorae* is closely related to *R. corsica*, sharing the same habit and similar leaves, flowers and fruits. However, it differs from *R. corsica* in several features (Table 1). In particular, *R. corsica* has leaves with lobes which are obovate to cuneate-oblong; the flowers are smaller, 8–10 mm in diameter; the sepals are connate for 0.1–0.3 mm at the base and are 0.8–1 mm long, 0.9–1.2 mm wide; the petals are 4.5–5 mm long with a limb 2.3–2.5 mm wide and a keel 1 mm wide; the outer stamens have filaments 2.8–3.2 mm long; the inner stamens have filaments 1.8–2 mm long; the ovary is 2.7–3 mm long with carpels 1.5–2 mm long, slightly detached at maturity towards the apex (?); the capsule is 7–8 mm long with segments apiculate at apex (Fig. 3).

*Ruta lamarmorae* is a tetraploid species which probably arose from the diploid populations of *R. corsica*. The polyploidization event, together with the geographical isolation, has led to a morphological differentiation of the Sardinian populations which, therefore, can be treated as an apocentric species (Favarger & Contandriopoulos, 1961). According to Contandriopoulos (1962), *R. corsica*, and consequently also *R. lamarmorae*, must be considered as relict species, taxonomically very isolated from the other known species belonging to the same genus. Both these species are morphologically well characterized and show some archaic features such as the pulvinate subspinescent habit, green-glaucous leaves, and white to pale yellow petals, which are lacking in the other known species.

TABLE 1. Comparison of the features distinguishing *Ruta lamarmorae* and *R. corsica*

Character	<i>R. lamarmorae</i>	<i>R. corsica</i>
Leaf lobes	obovate-rounded	obovate to cuneate-oblong
Flower diameter (mm)	12–13	8–10
Connate portion of sepals (mm)	0.3–0.6	0.1–0.3
Sepal length (mm)	1.2–1.5	0.8–1
Sepal width (mm)	1.3–1.7	0.9–1.2
Petal length (mm)	5.5–6.5	4.5–5
Petal width (mm)	2.8–4	2.3–2.5
Petal keel width (mm)	0.5	1
Outer stamen filament	3.5–4.5	2.8–3.2
Outer stamen anther length (mm)	1.8–2	1.5–1.7
Inner stamen filament	3–3.5	1.8–2
Inner stamen anther length (mm)	1.3–1.4	1.4–1.5
Ovary length (mm)	3–3.5	2.7–3
Carpels length (mm)	2–2.5	1.5–2
Capsule length (mm)	6–7	7–8
Apex segment of capsule	obtuse	apiculate
Chromosome number (2n)	36	18

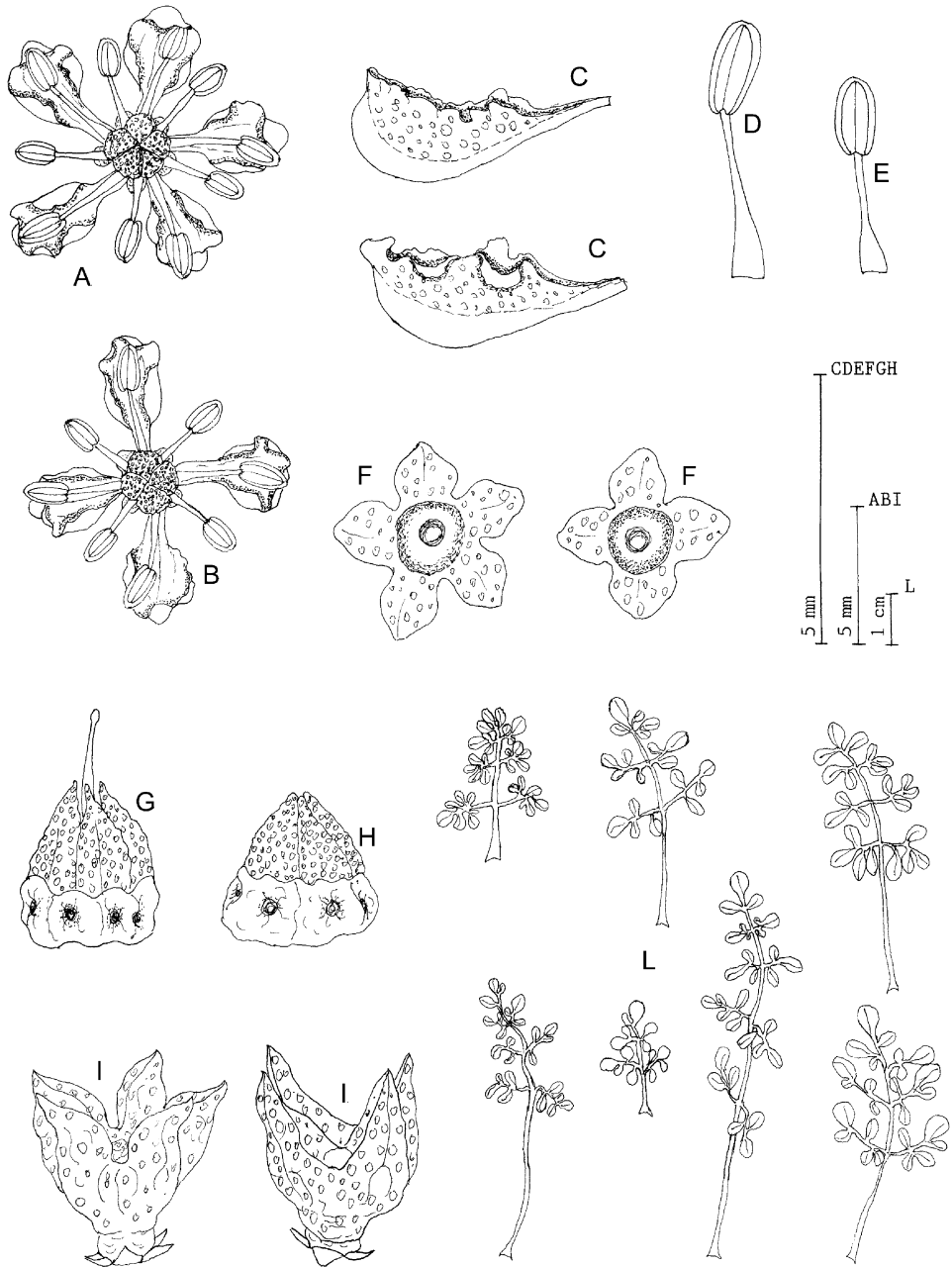


FIG. 3. Morphological characters of *Ruta corsica* DC.: A, pentamerous flower; B, tetramerous flower; C, petals; D, inner stamen; E, outer stamen; F, calyces; G, mature ovary; H, immature ovary; I, capsules; L, leaves.

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## APPENDIX

*Specimens examined****Ruta lamarmorae***

SARDINIA. Tonneri d'Irgini et Genargentu, au rupes tribus, vii–viii, *Moris* 273 (TO); In rupestribus montosis Genargentu (Tonneri d'Irgini), s.d., s.l. (FI); Genargentu, vii 1859, *Gennari* (CAG, FI); Genargentu, vii 1860, *Gennari* (FI); Genargentu, viii, *Gennari* (FI); Monte

Genargentu, Su Sciu-sciu, rupi in vetta, 1700 m, 29 v 1894, *Martelli* (FI); Monte Genargentu, rupi del Su Susciu, 29 vii 1894, *Martelli* (FI); M. Gennargentu, Sardegna, s.d., *Bonomi* (FI); Su Xuxu, Genargentu, vii 1900, *Bonomi* (FI); Su Sciusciu, Desulo, 17 vii 1992, *Marras* (CAG); Genna Pedru Surdu, Bruncu Spina, Fonni (NU), 7 vii 2000, *Bacchetta, Brullo & Casti* (CAG); Bruncu Spina, Fonni (NU), metamorfiti, 1635 m – NNE 30°, 40°01'397"N – 9°17'861"E, 25 vi 2003, *Bacchetta, Carriò, Casti & Herrerros* 400/03 (CAG); Bruncu Orisa, Villagrande Strisaili (NU), granodioriti, 1750 m – E 85°, supratemp. sup.-umido inf., 11 ix 2003, *Bacchetta & Carta* 666/03 (CAG); Bruncu Spina, Fonni (NU), metamorfiti, 1620–1635 m – NE 55°, 40°01'409"N – 9°17'851"E, supratemp. sup.-umido inf., 26 viii 2004, *Bacchetta, Fenu, Mandis, Mascia & Mattana* 542/04 (CAG).

### *Ruta corsica*

CORSICA. Ghisoni, s.d., *Jordan* (FI); Bastelica, vii 1847, *Requien* (FI); Vallée de Rivisecco au pied du Monte Rotondo, 31 vii 1866, *Madille* (FI); Bastelica, vii 1867, *Requien* (FI); De Bastelica a Mont Renose, 6 vii 1878, *Reverchon* 2413 (FI); Bastelica, Monte Renoso, a la Vitalac, 1800 m, sur le granitiques, 12 vii/17 viii 1878, *Reverchon* (FI); Bastelica (Monte Renoso), 12 vii/17 viii 1878, *Reverchon* (FI); Corsica, in valle Restonica, supra Corte au grotta del Dragoni, 11 vii 1880, *Levier* (FI); In montosis editioribus vallis Restonica supra Corte (pr. Grotta del Dragone), 11 vii 1880, *Levier* (FI); Asco sur les bords du torrent, 9 vii 1881, *Chobert* (FI); Rochers des regions subalpine et alpine infer. Mt. Rotondo, 16 ix 1888, *Chobert* (FI); Monte Cinto, vii 1907, *Martelli* (FI); Bastelica, 23 vii 1912, *Burdon* (FI); Haute Vallée d'Asco, sentier d'Asco la Neige, au Col de Mufrella, alt. 1700, roccaille granitiques grossieres, bord d'un petit torrent dans l'etage de la lande a genevrier nane, 18 ix 1980, *Lambinon, Bellotte & Monfort* 10414 (FI); Corsica, Plateau de Stagnari, Monte Cinto, Asco (Bastia), 11 vi 1999, *Brullo, Giusso, Guarino & Pott* (CAT); Monte Cinto, Asco (Bastia), 18 vii 2004, *Giusso* (CAT); Haut Ascò, Asco (Bastia), porfiroidi, 1825 m – NE 50°, 42°22'092"N – 8°54'196"E, supratemp. sup.-subumido sup., 22 vii 2004, *Adamo, Bacchetta, Carai, Iiriti & Pontecorvo* (CAG).