



Are they different species or vicariant elevational races of the same species? The case of an Iberian endemic plant, *Ranunculus bupleuroides* (Ranunculaceae)

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Abstract

The infrageneric taxonomy and evolution of *Ranunculus* are still not well understood. In this regard, we investigated the origin and genetic diversity of the Iberian endemic plant *Ranunculus bupleuroides* s.l. by analysis of nuclear internal transcribed spacers (ITS) and plastid (*rpl32-trnL*, *rps16-trnQ*, *trnK-matK*, *ycf6-psbM*) sequence data. Phylogenetic analysis reveals two geographically well supported subclades: one formed by high mountain plants and another by more typical samples of *Ranunculus bupleuroides* from the lowlands of the western Iberian Peninsula. The subclade of montane plants includes both plants originating in Gredos and Béjar (*Ranunculus cherubicus* subsp. *cherubicus*) and those from Sierra Nevada (*R. cherubicus* subsp. *girelai*). In the light of the new molecular results obtained, combined with an assessment of morphological, geographical and ecological characters, a new systematic treatment is proposed.

Key words: endemism, integrative taxonomy, Mediterranean, molecular markers, mountain flora, phylogeny, section *Ranuncella*, species complex

Introduction

Ranunculus Linnaeus (1753: 548) is the most diverse genus of Ranunculaceae (placed in tribe Ranunculeae) and comprises about 600 herbaceous species with a cosmopolitan distribution (Tamura 1995, Hörandl *et al.* 2005, Emadzade *et al.* 2010, Hörandl & Emadzade 2012). Modern systematics of the genus has substantially varied from those established in the nineteenth century (De Candolle 1824, Spach 1839, Freyn 1880, Prantl 1887). Current *Ranunculus* systematics is derived from Tamura (1991, 1992, 1995), who recognized seven subgenera and a large number of sections. The incorporation of molecular criteria alongside the traditionally used techniques (morphological, cytogenetic, phytogeography, etc.) has generated new taxonomic proposals, covering the definition of the genus (Emadzade *et al.* 2010) to its infrageneric taxonomy (Hörandl & Emadzade 2012), with 17 recognized sections divided into two subgenera.

Ranunculus section *Ranuncella* (Spach 1839: 204) Freyn (1880: 915) is one of these more generally accepted sections (Tutin & Cook 1964, 1993, Küpfer 1974, Cook *et al.* 1986, Hörandl *et al.* 2005, Hörandl & Emadzade 2012), albeit with some changes in its circumscription, such as the inclusion of sections *Acetosellifolii* Tutin (1964: 55) and *Chloeranunculus* Janchen ex Tamura (1991: 185, see Hörandl & Emadzade 2012), along with the exclusion of *R. kuepferi* Greuter & Burdet in Greuter & Raus (187: 452, see Huber 1988, Hörandl *et al.* 2005, Cosendai & Hörandl 2010, Cosendai *et al.* 2011). *Ranunculus* section *Ranuncella* is, according to Hörandl & Emadzade (2012), a monophyletic taxon, with a diversity mainly concentrated in the Iberian Peninsula and the Pyrenees (Jalas & Suominen 1989). The seven endemic species included in this section are: *Ranunculus abnormis* Cutanda & Willk. in Willkomm (1859-60: 83), *R. acetosellifolius* Boissier (1834: 5), *R. amplexicaulis* Linnaeus (1753: 549), *R. angustifolius* De Candolle (1808:10), *R. bupleuroides* Brotero (1805: 365) (Fig. 1), *R. cabrerensis* Rothmaler (1934: 148) and *R. pyrenaicus*