

Herniaria alpina (Caryophyllaceae) in the Iberian Peninsula

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Abstract. *Herniaria alpina* Chaix is a southern European orophyte distributed in the Alps, Apennines and the Pyrenees. In the Pyrenees it is considered a rare species because it is only known from few locations of the northern side (France) and there are no citations in the southern side (Spain). In summer 2018, a population was found in the Catalan Pyrenees (northeastern Iberian Peninsula). A complete description is presented and an identification key is included as an amendment for its taxonomic treatment in *Flora iberica*. Its current Pyrenean distribution, habitat and phenology are also reported. The conservation status is evaluated under the IUCN regional and national levels.

Keywords. *Flora iberica*, *Herniaria alpina*, Iberian Peninsula, Pyrenees, Taxonomy.

Resumen. *Herniaria alpina* Chaix es un orófito del sur de Europa distribuido en los Alpes, Apeninos y Pirineos. En los Pirineos se considera una especie rara, ya que solo se conoce de pocas localidades en la vertiente norte (Francia) y no hay citas de la vertiente sur (España). En el verano de 2018 se encontró una población en los Pirineos catalanes (noreste de la Península Ibérica). Se presenta una descripción completa y una clave de identificación como adición al tratamiento taxonómico de *Flora iberica*. Se aporta información sobre su distribución actual en el Pirineo, el hábitat y fenología. Se evalúa el estado de conservación según los criterios UICN a escala regional y estatal.

Palabras clave. *Flora iberica*, *Herniaria alpina*, Iberian Peninsula, Pirineos, taxonomía.

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INTRODUCTION

Herniaria alpina Chaix (Caryophyllaceae Juss.) is a southern European orophyte mainly distributed in the Alps, with populations in the Apennines and the Pyrenees (Brummitt & Heywood 1964). In the Pyrenees, it is known in the northern side (southern France), but it has never been clearly reported in the southern side (northeastern Spain) (Brummitt & Heywood 1964; Chaudhri 1988; Bolòs & Vigo 1990; Bolòs & al. 2005). In the French Pyrenees, the species is known since the 19th century (Doumet-Adanson 1872), and it is currently known from the departments Pyrénées Orientales and Ariège, but the presence and conservation status of this species is unclear because some sources indicated that its presence is not confirmed currently in some territories. According to *Tela Botanica* (<https://www.tela-botanica.org>), *H. alpina* is reported as ‘Présence à confirmer’ in Pyrénées-Orientales and Ariège. However, according to *SIFlore* (<http://siflore.fcbn.fr>, Just & al. 2015) the species is confirmed in these two departments (with observations after 2000), and there are citations from the communes of Fontpédrouse, Planès, Saint-Pierre-dels-Forcats, Eyne and Llo in the Pyrénées Orientales, and Artigues in the Ariège, and only in Llo there are no modern observations. The species is also considered as

‘espèces déterminantes’ in the ZNIEFF (Zone naturelle d’intérêt écologique, faunistique et floristique): Vallée d’Eyne, Chaine du Puigmal et Vallées Adjacentes, Haute vallée de Planès, Haute vallée d’Err and Cambre d’Ase (INPN 2019), and with observations after 2000, except in the Haute vallée d’Err, where the obsolescence date of the last observation of this species is 1982. With these data, *H. alpina* is assessed as ‘Near Threatened’ (VU D2 -1) in the Midi-Pyrénées (Corriol 2013) and ‘Taxon confirmé’ (‘obs. ≥ 1990’) in the Pyrénées-Orientales in Languedoc-Roussillon region (Molina 2015).

In the southern Pyrenees, Vigo (1983, 1996) explored intensely during decades the Ribes Valley (Catalonia, Spain) and concluded that this species did not reach the southern side of the Pyrenees, and that all Pyrenean references should be attributed to France. In *Flora iberica*, Chaudhri (1988) also excluded this species from the Iberian Peninsula, but included it in the group of species to be sought.

In summer 2018, during the field work of the project “Cartography of the CORINE’s and HIC’s habitats of the Capçaleres del Ter i del Freser Natural Park, 1:10:000 scale”, a unique population of *H. alpina* was found, and it

became the first full-checked record of this species in the Iberian Peninsula.

MATERIAL AND METHODS

The new population of *H. alpina* was discovered in the eastern Iberian Pyrenees, Catalonia (Spain), in the Capçaleres del Ter i del Freser Natural Park. Some specimens from this population were collected on August 3rd, 6th, 2018 to carry out a morphological study, and two vouchers were later deposited at BCN herbarium (BCN 149602 and BCN 149603).

Taxonomic identification was made using several floras of the European territories (Brummitt & Heywood 1964; Chaudhri 1988; Bolòs & Vigo 1990; Bolòs & al. 2005; Tison & de Foucault 2014; Tison & al. 2014). Morphological observations were carried out with a Zeiss Stemi DV4 stereomicroscope.

The descriptive terminology follows Chaudhri (1998). Because *H. alpina* resembles *H. latifolia* Lapeyr., an identification key is provided in order to distinguish between these two species. The key is built up following *Flora iberica* (Chaudhri 1988).

The conservation status was assessed applying the IUCN Red List criteria at regional and national level (IUCN 2012a, 2012b).

RESULTS Y DISCUSSION

Morphology, distribution, habitat and phenology

Herniaria alpina Chaix in Vill., Hist. Pl. Dauphiné 1: 379 (Villars 1786). Ind. loc.: “(...) in *Valle ludoviceae summis alpibus* (...)”. Fig. 1.

Caespitose perennial, strain or rhizome lignified, greyish to green (Fig. 1a). Stems 5–15 cm, much-branched but compact, cushion-like, with internodes not more than 5 mm. Younger stems densely leafy, shortly hairy or almost glabrous at maturity. Older and inner stems leafless, and retain much soil (Fig. 1b). Leafs not more than 4–5 × 2 mm, elliptic-obovate, surface glabrous or rarely with few hairs, strongly ciliate at margin with short cilia up to 0,4 mm long. Few-flowered, lax clusters with 1–3 flowers, mostly terminal or solitary (Fig. 1c). Flowers 5-merous, up to 2–5 mm in diameter, cylindrical or ellipsoidal. Sepals 1.2–1.5 mm long, oblong, densely hairy with rigid hairs, obtuse. Stamens 5. Stigma bifid.

Distribution.—Central and southern Europe, at a range between 2500 and 2600 m a.s.l.: Alps, Apennines and Eastern Pyrenees. The only known population of *H. alpina* in the Iberian Peninsula is located in the eastern Catalan Pyrenees (northeastern Spain), in the Capçaleres del Ter i del Freser Natural Park, close to the Coll de la Marrana, between the peaks of Bastiments and Gra de Fajol, Ripollès (Girona province, 31T DG3796 (ETRS89)), at a range between 2520 and 2550 m a.s.l. (Fig. 2), in a hillside oriented to the north-east. This population is located more than

1.1 km far from the French border and more than 7 km far from the other known citations in France.

Habitat.—Calcareous and calcschist screes of the alpine stage, with sparse bushes of *Dryas octopetala* L. and alpine grasslands. All summits in this region are dominated by granodiorite rocks (plutonic intrusive igneous rocks), but there are few little outcrops of schist, gneiss and marbles (metamorphic rocks) and limestone and dolomites (sedimentary rocks). *Herniaria alpina* occurs in a very restricted area, about 300 m², in calcareous and calcschist scree between the granodiorite batholith dominating in the Capçaleres del Ter. The population grows in a stony steep slope, very eroded (snow, wind, slope...), and with a very sparse mosaic of bushes of *Dryas octopetala*, calcareous coarse screes (*Doronico-Crepidetum pygmaeae* Br. Bl. 1948), *Festucion gautieri* Br.-Bl. 1948 grasslands and *Elyno myosuroidis-Oxytropidetum halleri* Br.-Bl. 1948 swards. Most individuals of *H. alpina* grew isolated on bare soil (Fig. 3a), but some individuals grew with or near individuals of *Dryas octopetala*, *Salix retusa* L., *Kobresia myosuroides* (Vill.) Fiori, *Koeleria vallesiana* (Honck.) Gaudin, *Helictotrichon sedenense* (DC.) Holub, *Androsace villosa* L., *Galium pyrenaicum* Gouan, *Saxifraga oppositifolia* L., *Astragalus alpinus* L., *Carex capillaris* L., *Helianthemum nummularium* (L.) Mill., *Anthyllis vulneraria* subsp. *vulnerarioides* (All.) Arcang., *Carex ornithopoda* Willd., *Campanula cochlearifolia* Lam. and *Sedum atratum* L. Interestingly, few individuals also grew inside of semi-withered bushes of *Dryas octopetala* (Fig. 3b).

Phenology.—The species blooms between July and August.

Identification key

In order to add *H. alpina* to the identification key of the genus in *Flora iberica* (Chaudhri 1988), and thereby facilitating further identification, we present here a partial modification of that key affecting the couplet #11, which should be modified as follows:

- 11. Sepals densely covered with rigid, almost setaceous hairs 11'
- Sepals covered with soft hairs 12
- 11'. Plant cushion-like, compact; internodes shorter than 5 mm; flower-clusters terminal or subterminal with 1–3 flowers; leaves up to 4.5 × 2 mm, hairs on leaf-margins short, < 0.4 mm 11bis ***H. alpina*** Chaix
- Plant prostrate, lax; internodes longer than 5 mm; flower-clusters distributed along most of the younger branches, with 3–12 axillary and terminal flowers; leaves up to 8 × 4.5 mm, hairs on leaf-margins long, 0.4–0.5 mm 11. ***H. latifolia*** Lapeyr.

Conservation status

The current major threat for this species is the high anthropogenic frequentation in this region due to recreational activities: hiking, mountain races and mountain skiing, especially those activities that imply crowds in the Coll de la Marrana and nearby. The newly discovered population grows near the GR11 trail (that crosses the Pyrenees), close the Coll de la Marrana (2529 m a.s.l.), and between two highly visited peaks: Bastiments (2883 m a.s.l.) and Gra de Fajol (2712 m a.s.l.). In the mountainside where the population occurs, some shortcuts exist probably caused by wild herds and domestic

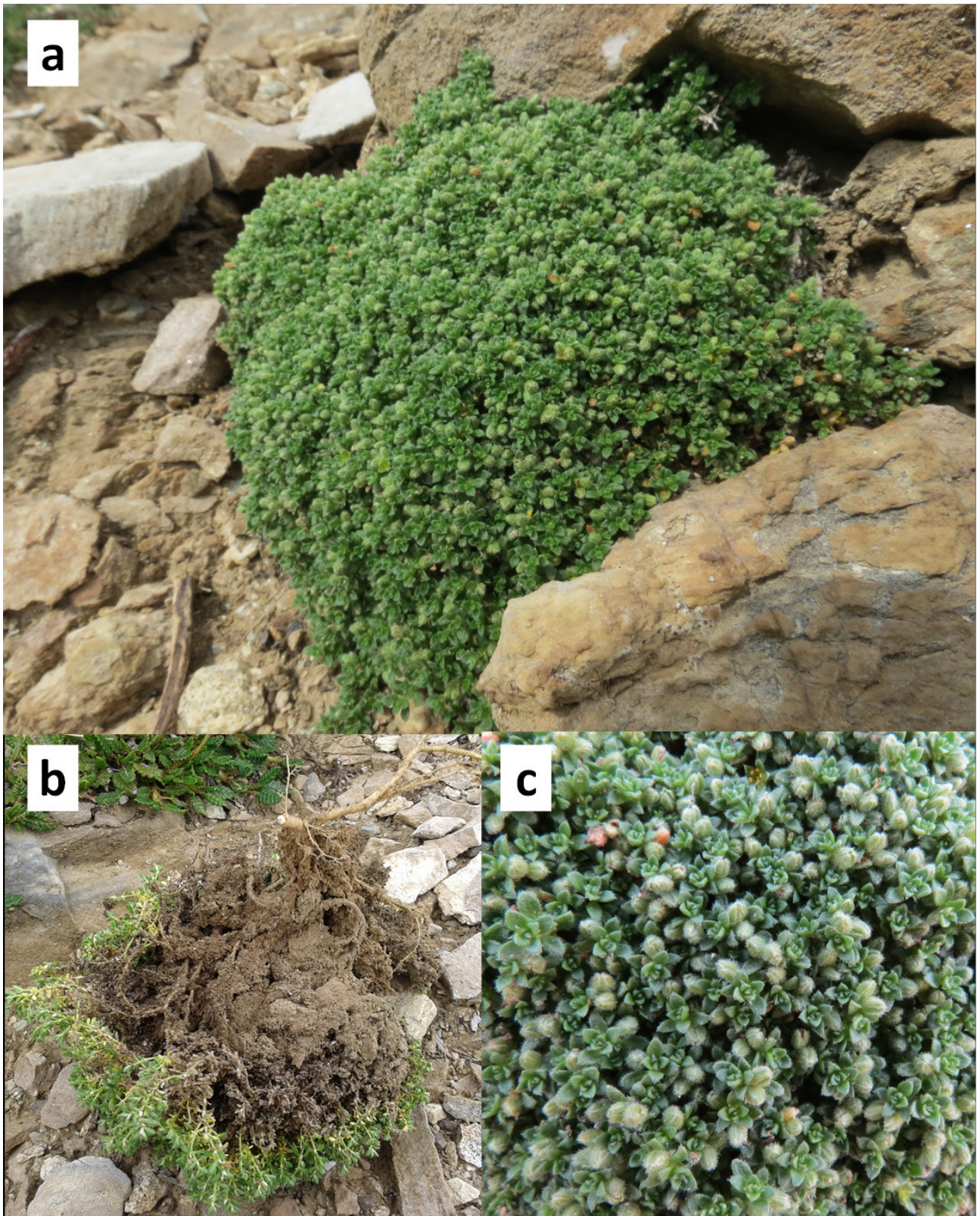


Fig. 1. *Herniaria alpina* Chaix: **a**, general habit; **b**, dig up plant showing cushion-like lifeform and soil retained inside; **c**, detail of leaves and flowers. [Photographs by M. Guardiola Bufi.]

cattle, but apparently it seems that no hikers walk through the population. However, at present there are no signs of damaged individuals, population decline or fluctuations, neither indications of reduction in geographic range (extent of occurrence or area of occupancy) were detected.

The application of IUCN (2012a) methodology to evaluate the vulnerability of *H. alpina*, produced the following results. Considering the Iberian Pyrenees, the species is restricted to one location included in one 1×1 km, with a population effort of less than 200 mature individuals (no immature individuals were seen). Therefore *H. alpina* should be assessed as 'Endangered' EN D (IUCN 2012a). However, according to the IUCN criteria for regional and national levels (IUCN 2012b), since recolonisation from the neighbouring French populations is possible, the category is downlisted to VU° D1+2.

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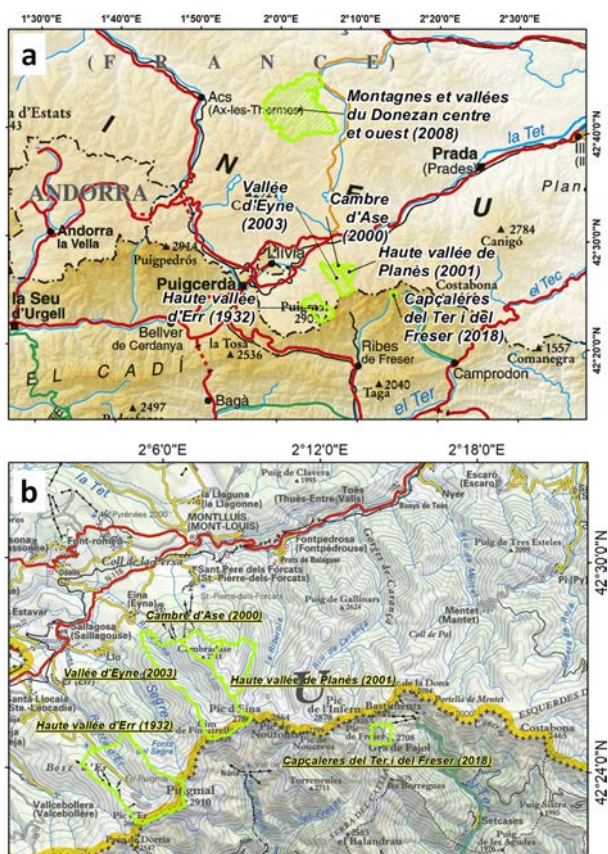


Fig. 2. Distribution map of *H. alpina* Chaix in the Pyrenees: **a**, Pyrenean populations; **b**, populations in Pyrénées-Orientales and Catalonia. [In France, green polygons represents the limits of the ZNIEFF; in Spain, green polygon represents the 1×1 km cUTM].

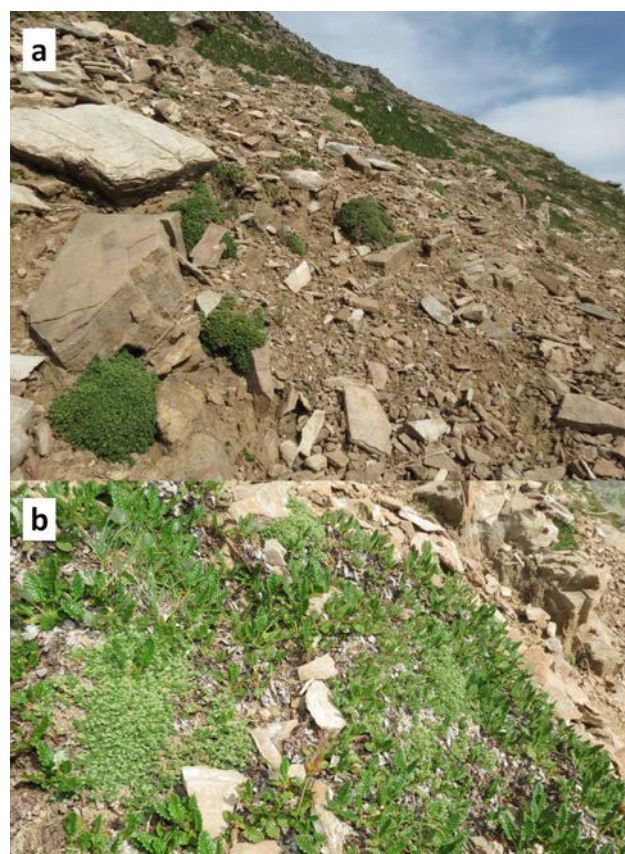


Fig. 3. Habitat of *H. alpina* Chaix: **a**, most individuals growing isolated; **b**, few individuals growing inside of semi-withered *Dryas octopetala* L. bushes. [Photographs by M. Guardiola Bufi.]

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