

Hertia cheirifolia and *H. maroccana* (Asteraceae), two species endemic to North Africa: nomenclatural notes, morphology, distribution, and IUCN Red List assessments

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Abstract

HERTIA CHEIRIFOLIA AND *H. MAROCCANA* (ASTERACEAE), TWO SPECIES ENDEMIC TO NORTH AFRICA: NOMENCLATORIAL NOTES, MORPHOLOGY, DISTRIBUTION, AND IUCN RED LIST ASSESSMENTS.— *Hertia cheirifolia* and *H. maroccana* (Asteraceae) are endemic North African species occurring, respectively, in Algeria and Tunisia, and Morocco. Morphological descriptions, distributions, and IUCN Red List assessments are provided in the present paper. In addition, a nomenclatural study of Battandier *Hertia maroccana* and Linnaean *Othonna cheirifolia* are carried out and these two names are typified on specimens preserved, respectively, at MPU and LINN.

Key words: Africa; Algeria; *Othonna*; Tunisia; typification.

Resumen

HERTIA CHEIRIFOLIA Y *H. MAROCCANA* (ASTERACEAE), DOS ESPECIES ENDÉMICAS PARA ÁFRICA DEL NORTE: NOTAS NOMENCLATORIALES, MORFOLOGÍA, DISTRIBUCIÓN Y EVALUACIÓN DE LA LISTA ROJA SEGÚN LA UICN.— *Hertia cheirifolia* y *H. maroccana* (Asteraceae) son dos endemismos norteafricanos que crecen, respectivamente, en Argelia y Túnez, y en Marruecos. Presentamos en este trabajo descripciones morfológicas, distribución y categorización en la lista roja de la UICN. Además, se lleva a cabo un estudio nomenclatural de *Hertia maroccana* de Battandier and *Othonna cheirifolia* de Linneo y se tipifican ambos nombres sobre especímenes conservados, respectivamente, en MPU y LINN.

Palabras clave: África; Argelia; *Othonna*; tipificación; Túnez.

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INTRODUCTION

Hertia Less. (*Asteraceae* Bercht. & J. Presl, *Senecioneae* Cass., *Othonninae* Less. according to Pellerin *et al.*, 2007) is a small genus of nine species with a disjunct distribution, i.e. north-western Africa (two species in Morocco, Algeria, and Tunisia), Middle Asia (two species in Afghanistan, Iran, and Pakistan), and Southern Africa (five species in Botswana, Namibia, and Republic of South Africa) (POWO, 2021a).

As part of the ongoing studies on the tribe *Senecioneae* (Iamónico, 2013, 2015, 2017; Iamónico & Hjertson, 2015; Iamónico & Managlia, 2015; El Mokni & Iamónico, 2018; Pellegrini *et al.*, 2018), we are hereby presenting a contribution regarding North African endemic species *Hertia cheirifolia* (L.) Kuntze and *H. maroccana* Batt., providing nomenclatural notes and the first IUCN assessment on their conservation status (IUCN, 2021).

MATERIALS AND METHODS

The work is based on field surveys, analysis of relevant literature and examination of specimens preserved at HFLA, LINN, MPU, and P (codes according to Thiers, 2021) and in the personal collection of one of the authors (R. El Mokni) deposited in the herbaria of the Faculty of Pharmacy of Monastir and the Faculty of Sciences of Bizerta (not listed in *Index Herbariorum*). The morphological descriptions of the two species are amended based on both herbarium specimens and field surveys. The articles cited through the text follow the International Code of Nomenclature for algae, fungi, and plants (Turland *et al.*, 2018, hereafter *ICN*).

RESULTS AND DISCUSSION

Hertia cheirifolia (L.) Kuntze

Hertia cheirifolia was validly proposed by Kuntze (1891: 334) as a new combination of the Linnaean name *Othonna cheirifolia*. This taxon was validly published by Linnaeus (1753: 926) with a short diagnosis (“*OTHONNA* foliis lanceolatis integerrimis”) taken directly from Linnaeus (1738: 418) and Van Royen (1740: 179), followed by a

synonym cited from Commelin (1701: 147) and Ray (1704: 174) “*Jacobaea africana frutescens, crassi & succulentis foliis*”, and the provenance “*Habitat in Aetiopia*”. An unnamed variety “*β. Aster fruticosus africanus luteus, folii tymeleae*” from Ray (1704: 161, not “167”) was also reported. Commelin (1701) published an illustration (Fig. 1 “*Fig. 75*”, image available at <https://www.biodiversitylibrary.org/item/15230#page/224/mode/1up>) which is part of the original material for the Linnaean name. We traced a specimen at LINN (no. 1038.14) bearing two parts of a same plant (each one including leaves and one capitulum) and the Linnaeus’ annotations: “13 *cheirifolia*” and (on verso) “*Calthoides fol. oblongis casus calyx Shaw Afr. 103 | ex semina D. Shaw enata Milleri*”. The number “13” corresponds to the *Species Plantarum* number as reported by Linnaeus (1753: 926). Consequently, the specimen 1038.14 (LINN) is part of the original material and eligible as lectotype. No further material useful for the lectotypification purpose was found in Linnaean and Linnaean-linked herbaria (Jarvis, 2007).

In conclusion, between the elements traced (Commelin’s illustration and LINN specimen), both matching the Linnaean diagnosis, since herbarium specimens are better suited for typifications than illustrations due to their ability to provide useful additional characters that cannot be matched by images (Jarvis, 2007: 21–22), we designate the specimen 1038.14 at LINN as the lectotype of the name *Othonna cheirifolia*. The lectotype corresponds to the current concept of the taxon which is nowadays recognized under the genus *Hertia* as *H. cheirifolia* (see e.g. Chatelain *et al.*, 2018).

***Hertia cheirifolia* (L.) Kuntze**, Revis. Gen. Pl. 1: 344. 1891

≡ *Othonna cheirifolia* L., Sp. Pl. 2: 926. 1753 ≡ *Othonnopsis cheirifolia* (L.) Benth. & Hook. f., Gen. Pl. 2(1): 451. 1873.

Lectotype (**designated here**): Herb. LINN no. 1038.14 (LINN [digital image]!), image of the lectotype available at <http://linnean-online.org/10846>.

– *Othonnopsis cheirifolia* (L.) Batt. & Trabut., Fl. Algérie: 447. 1888, *nom. inval.*, isonym (Art. 6 Note 2 of *ICN*).

Description: Perennial herb (hemicryptophyte), 20–100 cm in height; with a fleshy stump, growing in large clumps; stem glabrous, branched (branches



Figure 1. Illustration of “*Jacobaea africana frutescens, crassi & succulentis foliis*” by Commelin (1701: Fig. 75).

prostrate-ascending), highly leafy; leaves alternate, more or less fleshy, oblong-mucronate $24\text{--}58 \times 06\text{--}16$ mm, the lower ones cuneated at the base, the others sessile, margins scabrous entire; capitula heterogamous, solitary, $3.8\text{--}4.4$ cm in diameter, on naked peduncles widened at the top; involucre campanulate, uniseriate, with bracts oblong, $13\text{--}18 \times 4.4\text{--}7.2$ mm, acute, scarios on both edges; receptacle flat to convex; flowers lemon-yellow, ray florets female, fertile, ligulate $24\text{--}28 \times 4\text{--}6$ mm arranged in a single series, disc florets tubular $14\text{--}17 \times 2.1\text{--}2.3$ mm, hermaphroditic or/and sterile; cypselae oblong $5\text{--}7 \times 2$ mm, pubescent, not or slightly ribbed, with a pappus of fine dense bristles up to 2 cm long, arranged in several rows; seeds grayish-brown in colour; central and peripheral seeds do not seem to have significant differences in length, whereas peripheral seeds

exhibited greater large in the upper part (widely oblong vs. narrowly oblong in central seeds) $3.3\text{--}4.2 \times 0.9\text{--}1.3$ mm (Fig. 2).

Phenology: Flowering time December–May; fruiting time February–June.

Distribution and habitat: *Hertia cheirifolia* occurs in the following Tunisian governorates (one observed population per locality): Gafsa (Guettar), Kasserine (Sbeitla), Monastir (Kheniss), Sidi Bouzid (Djebel Mghilla), Siliana (Sidi-Hmada and Makthar), Sousse Governorate (Sousse-South), and Zaghuan (Djebel Zaghuan). Preferential habitats are steppes, pastures, uncultivated lands, stony slopes and roadsides, where the species grows on silty-clay substrates at $5\text{--}845$ m a.s.l.

Regarding Algeria, *Hertia cheirifolia* occurs in highlands and Saharian Atlas (central-eastern region



Figure 2. *Hertia cheirifolia*: (A), plant (Frina-Monastir, CE-Tunisia, 25 december 2020); (B), leaves (Frina-Monastir, CE-Tunisia, 25 december 2020); (C), capitulum (Frina-Monastir, CE-Tunisia, 25 december 2020), (D), pappus (Makthar-Siliana, NW-Tunisia, 30 april 2019) (photographs: Ridha El Mokni).

of the country) in the provinces of Djelfa (Djelfa), Ghardaïa (Mansoura/Hassi Fehal), Laghouat (Bordj Senoussi-Sidi Makhlouf), Sétif (Rmada), Tebessa, and Batna (Oued Taga and Timgad). The species grows on silty-clay substrates in pastures, uncultivated lands, stony slopes and roadsides, at 843–1398 m a.s.l.

Conservation status: 18 populations are currently known, some of the Tunisian ones occurring in the National Park of Jebel Serj (NW Tunisia), some of the Algerians in Belezma National Park (Aurès Mountains, NE Algeria). Based on the Threats Classification Scheme by IUCN (2021), we can highlight the following ones:

1. Residential and commercial development (1.1. Housing and urban areas) and 4. Transportation and service corridors (4.1. Roads): extensive urbanization and increasing of transportation infrastructures (roads and highways construction) cause disruption and splitting of natural habitats and populations;
7. Natural system modifications (7.1. Fire): the increase of frequency of fires in Algeria and Tunisia during the last decade facilitates the fragmentation of habitats and disrupts important processes such as gene flow;
8. Invasive species (8.1. Invasive non-native species): the success of the high naturalization of *Solanum elaeagnifolium* Cav. in Tunisia causes a reduction of the population of *H. cheirifolia*;
9. Pollution (9.3. Agricultural effluents, 9.3.3. Pesticides): intensification of agricultural activities and various types of pesticides affect the species diversity and the structure of plant communities, and reduce soils quality;
12. Other options: the lack of efficient strategies for conservation of habitats by governments, rehabilitating burnt areas and increase the resilience of species populations against fire damages.

The AOO (Area of Occupancy) is 76 km², the EOO (Extent of Occurrence) is 184.81 km². Since no data are currently available to apply the conditions of the criterion B2 of IUCN (2021), we are forced to apply only the criterion B1 and assessed *Hertia cheirifolia* as an Endangered species (EN).

Chromosome number: $2n = 2x = 20$ (from Algerian populations; Abdelkader *et al.*, 2020: 39–40, Ounoughi *et al.*, 2020).

Specimina visa: Tunisia, Monastir: Monastir south-Frina, 35° 43' 44" N, 10° 48' 38" E, within the margins of olive groves, about 7 m a.s.l., 16.II.2016, *El Mokni s.n.* (Herb. El Mokni); *ibid.*, 25.XII.2020, *El Mokni s.n.* (Herb. El Mokni); Sousse: Sousse south, 35° 47' 16" N, 10° 39' 21" E, within the margins of olive groves, about 14 m a.s.l., 23.III.2016, *El Mokni s.n.* (Herb. El Mokni); *ibid.*, 25.XII.2020, *El Mokni s.n.* (Herb. El Mokni); in pascuis aridis, IV.1907, *Pitard* (MPU301782); Siliana: Sidi Hmada, 35° 57' 38" N, 009° 33' 04" E, low scrublands, about 698 m a.s.l., 8.III.2013, *El Mokni s.n.* (Herb. El Mokni); Makthar, 35° 51' 45" N, 009° 12' 28" E, low scrublands, about 857 m a.s.l., 30.IV.2019, *El Mokni s.n.* (Herb. El Mokni); Kasserine, Djebel Chambi, 12.IV.1912, *Humbert s.n.* (MPU034124). Algeria, Constantine: Mansourah, pentes scutagineuses, V–VI.1855, *Choulette fils s.n.* (MPU034072); terres argileuses au Mesloug près de Sétif, 30.III.1930, *Dubuis s.n.* (MPU293518); Sétif: plateaux de Sétif, 27 Mar 1912, *s.c.* (MPU034071); Ouergla: (without locality), 11.I.1923, *Maire s.n.* (MPU034132); Batna: sommet du Djebel Lazreg, massif de l'Aurès, 8.V.1949, *Dubuis s.n.* (MPU293504); 20 km avant Arvis, 5.V.1954, *s.c.* (MPU029362), Steppe près de Mac Mahon au sud de Batna, 6.V.1963, *Dubuis et Faurel s.n.* (MPU293502); Djelfa: champs des céréales près de l'oued Sissoud, 25 km au N.W. de Djelfa, 5.V.1936, *Dubuis s.n.* (MPU293519); à 3 km Sud de Djelfa, 5.VI.1976, *Cadel* (MPU1184054).

Hertia maroccana Maire

Maire (1931: 298) reported “*Hertia maroccana* (Batt.) Maire, comb. nov. [combination nova] — *Othonnopsis maroccana* Batt. Bull. Soc. Hist. Nat. Afr. Nord., 12, 1921, p. 8” so proposing a nomenclatural change of a Battandier’s name. Battandier (1921: 8) described a new species from “L’Oued” (currently Ouled Said l’Oued, a locality of Morocco included in the administrative province of Béni Mellal, region Béni Mellal-Khénifra) providing both a diagnosis and a description. He provided two names for this taxon, i.e. *Hertia maroccana* and *Othonnopsis maroccana* (both the epithets were reported as “*marocana*”). According to the Art. 36.3 of ICN, these two Battandier’s binomials should be considered as “alternative names”. The same Article states: “When, on or after 1 January 1953, two

or more different names based on the same type are accepted simultaneously for the same taxon by the same author and accepted as alternatives by that author in the same publication ..., none of them, if new, is validly published". Consequently, since Battandier published the names *Hertia maroccana* and *Othonnopsis maroccana* in 1921, they were validly published (see also Ex. 11 of the Art. 36.3 of *ICN*). Maire's name is to be considered as invalid from the nomenclatural point of view (isonym, Art. 6.3 Note 2 of *ICN*). Note that only a few online databases of plant names (i.e. IPNI, 2021 and POWO, 2021b) correctly reported the name as "*Hertia maroccana* Batt." whereas many others [e.g. Tela Botanica, 2021; SANBI, 2012; CWG, 2021; GBIF, 2021; Tropicos, 2021] wrongly accepted the Maire's combination as valid.

According to HUH Index of botanists (2013), Battandier's collection is mainly preserved at MPU and AL. A specimen was found at MPU (barcode MPU008063) that bears a plant and the original annotation "*110 | Ansegmir | Dans le roches granitiques | 10-4-1920*". Both the locality (Ansegmir) and the habitat ("*roches granitiques*" = granitic rocks) match the information reported in Battandier's (1921) protologue. Also, the date of collection (year 1920) precedes the year of Battandier's publication (1921). Furthermore, we traced a specimen at P (barcode P00084023) which bears a plant that is part of the "HERBIER BATTANDIER" as reported in the printed label. All things considered the specimens MPU008063 and P00084023 can be considered as part of the original material. These two specimens match the description and diagnosis by Battandier (1921) and are both eligible as lectotypes. The specimen MPU008063 is designated as the lectotype of the names *Hertia maroccana*, and therefore P00084023 is an isolectotype. Both specimens correspond to the current concept of the name (see e.g. Fennane *et al.*, 2014).

Hertia maroccana Batt., Bull. Soc. Hist. Nat. Afrique N. 12: 8. 1921 ("*marocana*")

≡ *Othonnopsis maroccana* Batt., Bull. Soc. Hist. Nat. Afrique N. 12: 8. 1921 ("*marocana*") (alternative name, valid according to the Art. 36.3 of *ICN*)
 ≡ *Othonna maroccana* (Batt.) C. Jeffrey, Kew Bull. 47(1): 99. 1992.

Lectotype (**designated here**): Morocco, Béni Mellal-Khénifra, Béni Mellal, Ouled Saïd L'Oued (*Ansegmir* in the original label), *Dans*

les roches granitiques, 10 April 1920, *Nain s.n.* (MPU008063[digital image]!, image of the lectotype available at <https://herbier.umontpellier.fr/zoomify/zoomify.php?fichier=MPU008063>); isolectotype at P (P00084023[digital image]!, image available at http://mediaphoto.mnhn.fr/media/1442334940557ze8CMgduUOzfGimZ?f-bclid=IwAR2-6Pzcl6Ak--p6M80iKQEk6JA3mp-P3Dn0H1YolferqW_9ArKgoXG-3cY).

– *Hertia maroccana* (Batt.) Maire, Bull. Soc. Hist. Nat. Afrique N. 22: 298. 1931, *nom. inval.*, isonym (Art. 6 Note 2 of *ICN*).

Description: Perennial herb (phanerophyte), up to 100 cm in height; very branched from the base; stems and twigs glabrous, dense, dark and highly leafy; leaves alternate sessile, fleshy, linear 20–40(–60) × 2–5 mm, with denticulate margins; capitula heterogamous, numerous, axillary and terminal, on not protruding peduncles, slightly widened at the top; involucre campanulate, uniseriate, with bracts oblong acute, scarious on both edges; receptacle flat to convex; flowers lemon-yellow, ray florets female, fertile, ligulate 23–26 × 3.6–4.0 mm arranged in a single series, disc florets tubular 12–14 × 1.8–2.0 mm, with sterile ovary; cypselae oblong 5–6 × 2.0 mm, very hairy, with a pappus of scabrous bristles (Fig. 3).

Phenology: Flowering time December–April; fruiting time February–May.

Distribution and habitat: *Hertia maroccana* occurs in two Moroccan regions, i.e. Béni Mellal-Khénifra (Errachidia Province) with six populations, and Drâa-Tafilalet region [Midlet (seven populations), Béni Mellal (one population), and Azilal provinces (three populations)]. Preferential habitats are: steppes, rocky places, stony slopes, and xerophilous pastures in mountains of north-eastern of the country. The species grows on silty or sandy-loam substrates within calcareous soils that are generally not very evolved and often stony, at 1005–1806 m a.s.l.

Conservation status: Fennane (2017: 25) assessed *Hertia maroccana* as Least Concern (LC). Eighteen populations are currently known. Some of these populations occur in the Haut Atlas Oriental National Park (eastern High Atlas Mountains, CE-Morocco). According to the Classification Scheme proposed by IUCN (2021), threats are represented by: (A) increase of urban areas and roads



Figure 3. *Hertia maroccana*: (A), population (Boudnib, Morocco); (B), leaves (Tazougart, Morocco); (C), capitulum (Tazougart, Morocco); (D), pappus (Kadoussa, Morocco) (photographs: Claude Lemmel, 10 June 2018).

[coded in IUCN (2021) as 1. Residential and commercial development (1.1. Housing and urban areas) and 4. Transportation and service corridors (4.1. Roads)], which cause disruption and splitting of natural habitats and populations; (B) intensification of agricultural activities and use of pesticides [coded as 9. Pollution (9.3 Agricultural effluents; 9.3.3. Pesticides)] which affects the species diversity and the structure of plant communities and reduce soils quality.

The AOO is 92 km², the EOO is 29.97 km². Since no data are currently available to apply the conditions of the criterion B2 of IUCN (2021), we are forced to apply only the criterion B1 and assessed *Hertia maroccana* as a Critically Endangered species (CR).

Chromosome number: $2n = 2x = 20$ (Vogt & Oberprieler, 2012: 202).

Representative specimens examined: Morocco, Drâa-Tafilalet, Midelt, Haut Atlas Oriental: entre Midlet et Riels Env aux Aït Labbès, 1550 m, 17.II.1951, *Guinet et Sauvage s.n.* (MPU331475); à 31 kms SE de Midlet (1 km S du Tizi-n-Talhhempt), 3.IV.1977, *Cadel s.n.* (MPU1184058); à 4 kms E de Midelt, 31.I.1984, *Cadel* (MPU1184053); Tinghir, Boumalne du Dadès, 5.IV:1963, *Cadel s.n.* (MPU1184056); à 18 kms amont de Boumalne du Dadès, 1.IV.1970, *Cadel s.n.* (MPU1184059).

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