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On the identity of *Helianthemum mathezii* and *H. pomeridianum* (Cistaceae)

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Abstract. The original description of *Helianthemum mathezii* regarded the species to be a therophyte. However, the detailed observation of the holotype of *H. mathezii*, as well as newly collected specimens from the type locality, does not support its condition of annual plant. Further study has led to the conclusion that all these plants can readily be identified as *H. pomeridianum*; the descriptions of *H. mathezii* and *H. pomeridianum* are equivalent except for the habit, being the former annual and the latter suffruticose. We show in this study that *H. mathezii* is to be considered a synonym of *H. pomeridianum*, and report a new locality of *H. pomeridianum* in Morocco. Also, we provide the first chromosome count for this species ($2n = 22$) which emphasizes the close relationship of *H. pomeridianum* to *H.* subgen. *Plectolobum*.

Keywords. Chromosome count, Cistaceae, *Helianthemum mathezii*, *Helianthemum pomeridianum*, taxonomy.

Resumen. En la descripción original de *Helianthemum mathezii* se considera esta especie como un terofito. Sin embargo, la observación minuciosa de su holotipo, así como de otros especímenes recientemente recolectados en la misma localidad del tipo, sugiere que no se trata de una planta anual. Concluimos que estas plantas pueden ser bien identificadas como *H. pomeridianum*; las descripciones de *H. mathezii* y *H. pomeridianum* son similares excepto en lo referido a su hábito, la primera supuestamente es una planta anual y la segunda sufruticosa. Así pues, aquí recomendamos considerar *H. mathezii* como sinónimo de *H. pomeridianum*, y citamos una localidad nueva de esta especie en Marruecos. Además, damos cuenta del primer recuento de cromosomas efectuado para la misma ($2n = 22$), que demuestra la estrecha afinidad de *H. pomeridianum* y *H.* subgen. *Plectolobum*.

Palabras clave. Cistaceae, *Helianthemum mathezii*, *Helianthemum pomeridianum*, recuento de cromosomas, taxonomía.

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INTRODUCTION

Dobignard (2009) described *H. mathezii* Dobignard—Cistaceae Juss.— from a single locality from the Moroccan High Atlas—Taroudant province—as a 20–35 cm tall, much-branched, and glandular-hairy annual plant. This author stated that, despite its apparent morphological resemblance to *H. salicifolium* (L.) Mill. (*H.* subg. *Helianthemum*), *H. mathezii* should be ascribed to *H.* sect. *Atlanthemum* (Raynaud) G. López & al. (*H.* subg. *Plectolobum* Willk.) due to its glandular and prominently 5–7-veined inner sepals that resembled those of *H. sanguineum* (Lag.) Lag. ex Dunal. Dobignard (2009) also reported that this species inhabited wet travertine deposits accompanied by *Feeria angustifolia* Buser and *Euphorbia rimarum* Coss. & Balansa, among other species. Thus described, *H. mathezii* constituted a very interesting species inasmuch as it was the only *Helianthemum* species inhabiting a wet habitat (cf. Arrington & Kubitzki 2003), and the only annual species in the genus with such a restricted distribution (cf. Proctor & Heywood 1968; Greuter & al. 1984), further included in the checklist of

North African endemic plant species (El Oualidi & al. 2012). Consequently, as part of a comprehensive phylogenetic study of the genus *Helianthemum* (Aparicio & al. 2017), we considered of interest to perform a new collection and a detailed study of *H. mathezii*.

MATERIAL AND METHODS

To do so, we visited the type locality of *H. mathezii*, at “piste d’accès au plateau du J. Tichka alt. c. 1100 m, 30°47'18 N, –8°40'73 W” (Dobignard 2009), to survey the species. For the chromosome number determination we collected matured seeds that were disposed for germination in Petri dishes. Then, root tips were immersed in chilling water at 0 °C for 24 h, then fixed in 1:3 glacial acetic acid and absolute ethanol for 3 h. They were finally stained in alcoholic hydrochloric acid-carmin for 48 h and squashed in 45% acetic acid.

No type specimen of *H. pomeridianum* Dunal has been observed. Nevertheless, *H. pomeridianum* has been many times collected by different authors in its Algerian locus

classicus —circa Oran, Djebel Santo—, and vouchers are available on-line at the Muséum Nationale D'Historie Naturelle —MNHN—. We list the studied ones in appendix 1, all identified as *H. pomeridianum*.

RESULTS AND DISCUSSION

During our field trip to the type locality, we found a population integrated by about 30 individual plants readily identifiable as *H. mathezii*, other than for the fact that these specimens, albeit having slender branches, were perennial suffruticose plants (fig. 1). Moreover, they were located in a sunny dry area on the top of a calcareous travertine deposit accompanied by *Micromeria hochreutineri* Maire and *Lavandula multifida* L. rather than in the wet vertical run-off area of the same travertine outcrop, where *Feeria angustifolia* and species of *Euphorbia* L., *Campanula* L., and *Erodium* L'Hér. were common.

The detailed observation of the holotype of *H. mathezii* (fig. 2), as well as the figure no. 7 of the original description of the species (Dobignard 2009), does not provide conclusive evidence that *H. mathezii* is a therophyte since the root system cannot be observed, a fact clearly evident in the specimens of *H. sanguineum* and *H. salicifolium* therein included for illustration —not shown here—. Moreover, the analysis of the Dobignard's material and

our newly collected plants, following Quézel & Santa (1962) and Fennane & al. (1999), has resulted in that all these plants can be identified as *H. pomeridianum*. Further study has also shown that the description of *H. mathezii* is equivalent to that of *H. pomeridianum* except for its habit —the former annual, the latter suffruticose— since both descriptions depict glandular plants which have: 1) slender branches bearing very shortly petiolate, exstipulate, flat, ovate-lanceolate leaves markedly veined beneath —falsely stipulate because of the presence of small axillary crowded leaves—; 2) very loosely arranged flowers in glandular terminal cymes composed by a few pedicellate and bracteate solitary flowers; 3) inner sepals 4–6 × 2 mm, striate with prominent veins; 4) stamens numerous; 5) pubescent ovary bearing a short capitate style; 6) capsule shorter than the inner sepals, glabrous, with ciliate margins at the apex (Dunal 1847; Willkomm 1856; Dobignard 2009). Overall, these arguments show that *H. mathezii* is a synonym of *H. pomeridianum*, and that both Dobignard's specimen —G 00441364— and our own collection —SEV 286762 (Morocco: Taroudant, between Sidi Abdellah Oussaid and Alegiane, 1100 m a.s.l., 30°47'10.38" N, 8°40'43.74" W, 13 Nov. 2016, A. Aparicio & F.J. Aparicio s.n.— are to be regarded as a new locality of *H. pomeridianum* in Morocco.

Helianthemum pomeridianum is a rather poorly known North African endemic species (El Oualidi & al. 2012), which was originally described, and many times collected by different authors, from around Oran —Djebel Santo, Santa Cruz— in Algeria. To date, *H. pomeridianum* has also been recorded in Melilla (Caballero 1917), the Trara Mountains, also in the northern Algeria (Medjahdi & al. 2009), and in a few far away locations in the Moroccan High Atlas area, between Taroudant and Marrakech —RAB 078906, MA 472377 (P 04729082 photo!), MGC 80897 (MA 321784–1!)— (Förther & Podlech 2002; GBIF 2016; SEV 225757! from the southern Algeria is a misidentification of *H. lippii* (L.) Dum.-Cours.). Taxonomically, *H. pomeridianum* was ascribed by Dunal to *H. sect. Halimium* Dunal, but Pomel (1860: 11) formulated the species sub *Rhodax pomeridianus* Pomel. Willkomm (1856) and Grosser (1903) re-ascribed the species to *H. sect. Eriocarpum* Dunal (*H. subg. Helianthemum*), but Quézel & Santa (1962) included it in *H. sect. Chamaecistus* Willk. of *H. subg. Plectolobum*. Phylogenetic data (Aparicio & al. 2017) has revealed an unexpected close relationship between *H. pomeridianum* and *H. lunulatum* DC., a dwarf shrub found only in the Maritime and Ligurian Alps (Barbero 1966) that is the only member of *H. sect. Macularia* Dunal in *H. subg. Plectolobum*. This finding triggers further biogeographical interest since it may reveal a major intercontinental disjunction during the early diversification of *H. subg. Plectolobum* in the Upper Pliocene and that geographical vicariance might represent



Fig. 1. Specimen of *Helianthemum pomeridianum* Dunal (SEV 286762).



Fig. 2. Holotype of *Helianthemum mathezii* Dobignard (G 00441364).



Fig. 3. Mitotic metaphase of *Helianthemum pomeridianum* Dunal (SEV 286762).

an important speciation force in this lineage; indeed, the first chromosome count for *H. pomeridianum* obtained from plants from this new Moroccan locality ($2n = 22$; fig. 3) provides additional support and emphasizes the relationship of this species to *H.* subg. *Plectolobum* (cf. Rice & al. 2015).

Finally, we were unable to extract DNA from a leaf sample of the type specimen of *H. mathezii* provided by herbarium G despite we followed two standard—and slightly modified—DNA extraction protocols: Invisorb Spin Plant Mini Kit—Stratec—and Isolate II Plant DNA-kit—Bioline—. Consequently, this accession could not be included in the phylogenetic analysis of *Helianthemum*, but in the phylogenetic analyses our samples collected in type locality—SEV 286762—clustered with other Moroccan accessions of *H. pomeridianum* Dunal and maintained the supported sister-taxa relationship between *H. pomeridianum* and *H. lunulatum* (Aparicio & al. 2017).

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APPENDIX 1. Studied material of *H. pomeridianum*.

- ALGERIA. Oran: *Balansa* (P 06686325 photo!); *ibid.*, 1842, *Cosson* (P 06686319 photo!); *ibid.*, *Durando* (P 06686313 photo!); *ibid.*, 1842, *Durieu* (P 06686306 photo!); *ibid.*, 1849, *Reuter* (P 06686308 photo!); *ibid.*, 1850, *Gouget* (P 06686309 photo!); *ibid.*, 1842, *Pomel* (P 06686326 photo!); *ibid.*, 1861, *Pomel* (P 06686310 photo!); *P06686303* photo!, P 04747844 photo!, P 06686327 photo!); *ibid.*, 1842, *Spach* (P 06686311 photo!); *ibid.*, Santa Cruz, 1905, s. coll. (P 04750429 photo!); *ibid.*, 1947, *Chevassut* (P 04637966 photo!); *ibid.*, 1918, *D'Alleizette* (P 04637967 photo!); *ibid.*, 1912, *D'Alleizette* (P 06686322 photo!); *ibid.*, 1887, *Luizer* (P 06686316 photo!); *ibid.*, 1930, *Faure* (P 06686328 photo!); *ibid.*, 1930, *Senay* (P 04729081 photo!); *ibid.*, Djebel Murdjadio, 1894, *Doumergue* (P 04637877 photo!); *ibid.*, 1905, *Faure* (P 06686304 photo!); *ibid.*, P 06686331 photo!, P 06686332 photo!, P 06686336 photo!); *ibid.*, 1906, *Faure* (P 06686337 photo!); *ibid.*, 1952, *Santa, Daumas & Retz* (P 04637876 photo!, P 04729083 photo!, P 04637968 photo!); *ibid.*, Djebel Santo, 1852, *Balansa* (P 06686317 photo!, P 06686318 photo!, P 06686334 photo!, P 06686324 photo!); *ibid.*, 1882, *Debeaux* (P 06686296 photo!, P 06686333 photo!); *ibid.*, 1887, *Garrigues* (P 06686320 photo!, P 06686321 photo!); *ibid.*, 1850, *Munby* (P 06686312 photo!, P 06686315 photo!); *ibid.*, *Munby* (P 06686323 photo!); *ibid.*, 1849, *Reuter* (P 06686329 photo!); *ibid.*, 1914, *Rotereau* (P 06686314 photo!).