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TAXONOMIC NOTES ON CISTANTHE DISCOLOR (SCHRAD.) SPACH AND OTHER CISTANTHE SECT. CISTANTHE SPECIES (MONTIACEAE)

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ABSTRACT

Up until now, the taxonomic identity of the Chilean plant species *Cistanthe discolor* (Schrad.) Spach (basionym *Calandrinia discolor* Schrad.; *C.* sect. *Cistanthe*; Montiaceae) has been unknown. Plants commonly identified as *C. discolor* have been shown to pertain to another species, *Cistanthe lindleyana* (Walp.) Hershk., whose basionym, *Calandrinia discolor* Lindl. (nom. illegit) is a later heterotypic homonym of *Calandrinia discolor* Schrad. Here, I conclude that *Cistanthe discolor* is an uncommon species from the coastal ranges of the Valparaiso Region, Chile, at ca. -33°. In addition, I revalidate names of some *Cistanthe* species whose Type specimens had not been accessioned by a herbarium at the time that those names were published, which appears to violate Article 8 of the current International Code of Nomenclature for Plants, Algae, and Fungi (ICN).

KEYWORDS: *Cistanthe*, Montiaceae, Chile.

INTRODUCTION

More than 125 years ago, Philippi [1] and later Reiche [2] manifested their frustration with revising the taxonomy of Chilean species now classified in *Cistanthe* Spach sect. *Cistanthe* sensu [3]. Philippi [1] operationally recognized ten species, but Reiche [4, 5] lumped these into a polymorphic *Calandrinia grandiflora* Lindl., now classified as *Cistanthe grandiflora* (Lindl.) Schltdl. A century later, Hershkovitz [6, 7] adopted Reiche's view, but, like some other contemporary workers [8–10], later rejected it [11]. Still, accepting multiple species in this section is a far cry from resolving the taxonomy of the entire section, and both the

scientific and popular taxonomic literature remains plagued with inconsistencies and conflicts.

In a series of papers published within the past ten years, Hershkovitz [1, 12–27] has substantially advanced knowledge of the taxonomy of *C.* sect. *Cistanthe*. These works include the recognition of several new species and resolution of the taxonomic identity of older names. One particularly difficult problem that was resolved only partially was the taxonomy of *C.* sect. *Cistanthe* plants associated with the name "*Calandrinia discolor*" [20, 27]. The difficulty emerged because the same name was used in publications describing three different plants, viz. as heterotypic homonyms. The name first was used by Schrader [28], who published only a very brief description of *C. discolor* Schrad. [≡ *Cistanthe discolor* (Schrad.) Spach] in the Göttingen Botanical Garden seed catalog. The same name later was used by Jacques [29] in a more elaborate and illustrated description of *C. discolor* Jacques (nom. illegit.). Finally, Lindley [30] published an elaborate and illustrated description of *C. discolor* Lindl. (nom. illegit.).

Hershkovitz [20] studied the above works and concluded that *C. discolor* Schrad. and *C. discolor* Jacques were not only homonyms, they were taxonomic synonyms. Both traced to the same horticultural provenance, viz. Paris, where Jacques worked. Hooker [31] later described in detail and illustrated plants of *C. discolor* Schrad. he received in 1824 from the Göttingen Botanical Garden. Schrader's plant was commercialized from this garden, but its provenance was reported as the Botanical Garden in Paris. Hooker's illustration is very similar to the plant (independently) illustrated by Jacques [29]. However, *C. discolor* Lindl. was a different species, and this already was recognized by Walpers [32], who renamed it *Calandrinia lindleyana* Walp., and Hershkovitz [20] thus recombined it as *Cistanthe lindleyana* (Walp.) Hershk. Hershkovitz also showed that this particular species is extremely common in the coastal ranges and Andean precordillera of north-central Chile. However, the name *C. discolor* Schrad. had become widely but erroneously applied to these plants.

Hershkovitz' [20] work resolved the taxonomic identity of *C. discolor* Lindl. and demonstrated that *Cistanthe lindleyana* was the correct name for the common and widespread species erroneously referred to *C. discolor* Schrad. But this did not resolve the taxonomic identity of *C. discolor* Schrad. [24, 27]. The present work establishes this identity, neotypifies *C. discolor* Schrad., and describes its distribution.

Another matter that has arisen in *Cistanthe* taxonomy pertains to Article 8 of the International Code of Nomenclature for Plants, Algae, and Fungi (ICN [34]). Among the ICN validation criteria is that specified in Article 8, which requires that the physical Type specimen of the

species is physically deposited in an appropriate institution (usually a herbarium) and that the name or code of this institution is stated in the effective publication. Within the past year, Hershkovitz [19, 21] described four species of *Cistanthe* Spach for which the Type specimen was deposited in the indicated herbarium *post*-publication. The species are: *Cistanthe behacheliana* Hershk., *C. gbifiana* Hershk., *C. ipniana* Hershk., and *C. reshetiana* Hershk. While the Code is not completely clear on this matter, it *appears* to suggest that the names must be revalidated by effective publication of post-publication specimen deposition. This revalidation is undertaken in the present work. Per Article 33 of the ICN [34], the publication date for these species is no longer the original effective publication date, but the date of the present publication.

A variety of factors led to the delay in deposition of the Type specimens, though none of these override Article 8 of the ICN. In part, the delay was consequent to inadequate study of the ICN, hence an incorrect sense that post-publication deposition was adequate. Access to this Type material was essential to my ongoing taxonomic research on *Cistanthe*. Because the herbarium in Santiago is ca. 110 km from my residence in El Quisco, Chile, and because travel costs are high relative to my income, these specimens would have been inaccessible for my research use. In the meantime, the specimens were retained in my personal herbarium with the intention of prompt deposition.

MATERIALS AND METHOD

For determination of the taxonomic identity of *Cistanthe discolor* (Schrad.) Spach, the literature was scrutinized again and the information was compared with online images of Chilean plants of *Cistanthe* sect. *Cistanthe*, primarily in the iNaturalist.org web site. The GBIF database (www.gbif.org) was searched for possible Type material. For the revalidation of species names, the ICN [34] was studied carefully in order to determine whether or not post-publication deposition of the Type specimens fails to fulfill validation criteria, and the appropriate corrections deemed necessary are made here.

RESULTS AND DISCUSSION

1. The taxonomic identity of *Cistanthe discolor*

Hershkovitz [27] discussed in detail evidence for the identity of *Cistanthe discolor* in the existing literature. The original diagnosis [28] was very brief, stating only that the species differed from *Cistanthe grandiflora* in its shorter stems and spathulate rather than rhombic leaf shape. The latter trait is variable in *C. grandiflora*, which also can have obovate leaves

that might also be described as spathulate. Based on plants grown from seed received from the Göttingen Botanical Garden, Hooker [31] added to this description that the stems were terete and that the flowers where ca. twice as large as those of *C. grandiflora*.

Spach [33] distinguished *C. discolor* from *C. grandiflora* specifically on the basis of the terete stems of the former versus angular stems of the latter. He also remarked, evidently on the basis of observation of living plants, that the petals were whitish at the base. Schrader [28] noted that his material originated from the botanical garden in Paris, which connects it to Jacques' *Calandrinia discolor*, which Jacques [29] had described as commonly cultivated in Paris. Spach also lived in Paris and thus the plants he observed ought to have been from the same genet as the plants described by Schrader and Jacques and Hooker. But a whitish spot at the base of the petals was not mentioned in the descriptions of Jacques or Hooker and is not evident in their respective illustrations. This suggests to me that the spot must be relatively small, unlike the conspicuous ca. 1 cm diameter white spot at the base of *C. lindleyana* petals [20].

Hershkovitz [27] believed that plants he had studied personally (two decades ago) and in images (more recently) from the coastal ranges of the Valparaiso Region at ca. -33° correspond to *C. discolor*. In this area, which includes Chile's La Campana National Park and the mountains to its south, Hershkovitz reported [20, 27] that *C. lindleyana* occurs, although the leaf veins of plants here may be less conspicuously embossed on the adaxial leaf surface and also may be less purple on the abaxial surface. But there also are plants with essentially smooth adaxial leaf surfaces, and the petals may have a small irregular white spot at the base.

Coincidentally, immediately following publication of [27], images of such plants from this locality were uploaded to the iNaturalist.org website (https://www.inaturalist.org/observations/344102409). The leaves of the plants in these images appear to be at best only slightly purplish on the abaxial surface, but I have seen images of similar plants from this area in which the surface is more purplish. However, I do not consider this trait to be very diagnostic, as it seems to vary in populations and even developmentally within individuals of other *C.* sect. *Cistanthe* species [24, 25]. More convincing is the adaxial leaf surface, which appears as completely smooth except for a depression along the1° vein, with the 2° vein pattern not visible adaxially, both exactly as illustrated by Jacques [29] and Hooker [31] and very different from the veins of *C. lindleyana*, in which the 1° and 2° veins are elevated (embossed) conspicuously above the

adaxial leaf surface [20]. Also, the leaves appear as lanceolate-spathulate to spathulate, as described in the literature, and the very few stem leaves are highly reduced (viz. cataphylls) and unlike the large foliose heteroblastic stem leaves of *C. grandiflora*. In addition, I judge the stems to be terete, with no evidence of angularity as in *C. grandiflora*.

Hershkovitz [27] also mentioned circumstantial evidence for believing that these plants from this locality pertain to *C. discolor*. In particular, this area is traversed by the road that connects the towns of Limache and La Calera. From the colonial period up until ca. 1970, this was the principal road connecting the Chilean capital of Santiago and principal port city of Valparaiso. Before automobiles, it was traveled on foot or riding animals or animal-driven wagons (i.e., traveling slowly). Meanwhile, *C.* sect. *Cistanthe* plants tend to be among the most conspicuous of those on slopes and roadsides, rendering ever more likely that they would have caught the attention of early 19th Century botanists traveling between Valparaiso and Santiago.

I thus consider the question of the taxonomy of *Calandrinia discolor* Schrad. to be resolved, and I thus add this species to the total number of species I accept for *C.* section *Cistanthe*, now 16, of which 14 occur in Chile, 13 endemically (cf. [25]). While I cannot provide a complete description of this species without further field research, I provide below its diagnostics and also its typification. For the latter, I designate Hooker´s [31] illustration as the neotype. I select this material because Hooker's plant represents the closest organic connection to Schrader's plant. However, at present, I find no evidence that the plant specimen studied by Hooker [31] still exists. If it exists, it would be in one of three herbaria: Glasgow, Edinburgh, or Kew. Databases of all three herbaria are available via GBIF, but the Kew data is probably incomplete. Thus, a manual search of the herbarium is necessary. The advantage of neotypification using Hooker's illustration is that the neotype can be replaced with the physical specimen if ever it is located.

Calandrinia discolor Schrad., Index Sem. Horti Academici Gottingensis [1831]: 2. 1831. Neotype (designated here): Illustration, Hooker, W.J., Curtis's Botanical Magazine new series vol. 8: Plate 3357. 1834, illustration based on plants he received in Glasgow in 1824 from Friedrich Fischer's collection in Göttingen Botanical Garden. No associated plant specimen can be located. ≡ *Cistanthe discolor* (Schrad.) Spach, Hist. Nat. Vég. (Spach) 5: 231. 1836.

Diagnosis: Plants similar to *Cistanthe lindleyana* (Walp.) Hershk., but differing in having smooth rather than embossed adaxial leaf surfaces, with the 1° vein recessed and the 2° veins not superficially visible, and petals with a much smaller basal white spot; similar to *Cistanthe grandiflora* (Lindl.) Schltdl., but differing in having terete rather than angular stems bearing only cataphylls rather than large foliage leaves; similar to *Cistanthe reshetiana* Hershk., but differing in having stems twice as long (or high), larger and broader leaves, and petals with a small basal white spot.

Distribution: Endemic to an area centered in the coastal ranges of the Valparaiso Region, Chile, at ca. -33°, ca. 45 km E of Viña del Mar.

2. Revalidation of *Cistanthe* species names

No specific examples were located in the ICN [34] that pertained to validity or invalidity of names owing to post-publication Type specimen deposition. Technically, the names were validly published, because the original publication indicated that the specimens were properly preserved and provided no indication otherwise. Had I not called attention to the post-publication deposition, it might have gone unnoticed. Nonetheless, it is presumed here that the Article 8 provision requiring Type specimen deposition is fulfilled refers only when the specimens are deposited at the time of publication and not afterwards. Thus, the specimen depositions indicated [19, 21] were inaccurate at the time of publication, and that the post-publication deposition would not correct this error *sui generis* retroactively. While this interpretation may be incorrect, to account for any eventuality, the species names cited above are revalidated accurately here, reflecting the current status of the Type specimens. The revalidation texts are identical to the originally published texts, except that the Type specimen deposition has been consummated. Per ICN Article 33, only the citations are reproduced here, with direct reference to the earlier publication of the diagnoses and descriptions. If it is determined later that the original publications of these species names are, after all, valid, then the following revalidations will become isonyms.

1. *Cistanthe behacheliana* originally was described in Int. J. Adv. Res. Publ. Rev. 2(10): 32. 2025 [21]. The revalidation is:

Cistanthe behacheliana Hershk., sp. nov. Holotype: CHILE: Atacama Region, Huasco Province, Freirina Comuna, highway C-500 ca. 22 km west of the junction with the Panamerican Highway, loose sandy substrate in washes below sand dune “outcrops” on slopes otherwise covered with shrubby coastal scrub vegetation. -28.967° -71.106°, 500 m

elev., 19 September 2025, *Hershkovitz s.n.* (SGO).

2. *Cistanthe gbifiana* originally was described in Int. J. Adv. Res. Publ. Rev. 2(10): 34. 2025 [21]. The revalidation is:

Cistanthe gbifiana Hershk., sp. nov. Holotype: CHILE: Atacama Region, Huasco Province, Freirina Comuna, grounds around the main facility of Parque Eólico Sarco, ca. 16 km W of the junction of highways C-496 and C-500 and 4 km E of the coast, open shrubby vegetation dominated by *Eulychnia brevifolia* Phil. and *Frankenia chilensis* C.Presl. ex Schult. & Schult.fil. in dense, rocky, coarse whitish sand surrounding the facility, -28.86° -71.42°, 150 m elev., 22 Sept 2025, *Hershkovitz s. n.* (SGO).

3. *Cistanthe ipniana* originally was described in Int. J. Adv. Res. Publ. Rev. 2(10): 28. 2025 [21]. The revalidation is:

Cistanthe ipniana Hershk., sp. nov. Holotype: CHILE: Atacama Region, Huasco Province, Freirina Comuna, highway C-496 ca. 10 km west of the junction with highway C-500, in comparatively moist herbaceous patches in washes on south side of road, -28.903° -71.383°, 280 m elev., 22 September 2025, *Hershkovitz s.n.* (SGO).

4. *Cistanthe reshetiana* originally was described in Int. J. Adv. Res. Publ. Rev. 2(7): 328. 2025. [19]. The revalidation is:

Cistanthe reshetiana Hershk., sp. nov. Holotype: CHILE: Coquimbo Region, Choapa Province, Canela Comuna, Puerto Oscuro, semidesert scrub at the peak of a hill along a trail from a diner along the Panamerican Highway to the ocean, -31.41° -71.59°, 230 m elev, 13 September 2024, *Hershkovitz s.n.* (SGO).

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