

# Taxonomic revision of *Cuscuta* (Convolvulaceae) in Chile

## Revisión de las especies de *Cuscuta* (Convolvulaceae) en Chile

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### ABSTRACT

Parasitic plant genus *Cuscuta* is important both economically and ecologically. This study is the result of more than fifteen years of herbarium and field studies in preparation for the floristic account of the genus in *Nueva Flora de Chile*. Eleven species that belong to three sections of subgenus *Grammica* were confirmed from Chile. Two historically reported species, *C. epithymum* and *C. grandiflora*, were not corroborated by the existing evidence. An identification key, typification, detailed descriptions and illustrations were provided to facilitate the identification of species, and their taxonomy was discussed, outlining remaining problems. Geographical distribution, ecology and host range of species were detailed. Results strongly suggested that several species are likely rare (e.g., *C. andina*, *C. rustica*, *C. pauciflora*) or even extinct (*C. werdermannii*), emphasizing the need for concerted efforts to locate these species in the wild and establish their conservation status.

**Keywords:** *Cuscuta*, New Flora of Chile, taxonomy.

### RESUMEN

El género de plantas parásitas *Cuscuta* es importante tanto desde el punto de vista económico como ecológico. Este estudio es el resultado de más de quince años de estudios de herbario y de campo en preparación del tratamiento del género en la Nueva Flora de Chile. Para Chile se confirmaron once especies pertenecientes a tres secciones del subgénero *Grammica*. Dos especies reportadas históricamente de la flora, *C. epithymum* y *C. grandiflora*, no fueron corroboradas por la evidencia existente. Se proporcionan, una clave de identificación, tipificaciones, descripciones detalladas e ilustraciones para facilitar la identificación de las especies, y se discutió la taxonomía, delineando los problemas restantes. Se detallaron la distribución geográfica, la ecología y la diversidad de huéspedes. Los resultados sugieren claramente que algunas especies son naturalmente escasas (raras) como, por ejemplo, *C. andina*, *C. rustica*, *C. pauciflora* o incluso ya están posiblemente extintas tal como *C. werdermannii*; esto subraya la necesidad de hacer esfuerzos concertados para localizar estas especies en la naturaleza y establecer su actual estado de conservación.

**Palabras clave:** *Cuscuta*, Nueva Flora de Chile, taxonomía.

## INTRODUCTION

*Cuscuta* (dodder) includes ca. 200 species of obligate stem parasites with nearly cosmopolitan distribution (Engelmann 1859; Yuncker 1921, 1932; Costea *et al.* 2015a). *Cuscuta* has evolved within Convolvulaceae (Stefanović & Olmstead 2004) and ca. 75% of species have diversified in North and South America (Stefanović *et al.* 2007; García *et al.* 2014) where they inhabit a wide range of ecosystems, from desert to riparian, littoral to high mountains, grasslands, forests, saline, and agricultural or disturbed habitats. *Cuscuta* species are important both economically and ecologically. Approximately 15–20 worldwide distributed *Cuscuta* species are agricultural and horticultural pests, and in most countries the non-native species are targeted by control and quarantine measures (Dawson *et al.* 1994; Lanini & Kogan 2005; Costea & Tardif 2006). However, native *Cuscuta* species act as keystone species in their ecosystems (Press & Phoenix 2005) and some may necessitate conservation measures (Costea & Stefanović 2009a).

South American species of *Cuscuta* were described in the monographs of Choisy (1841), Engelmann (1859), Yuncker (1921, 1932) and Hunziker (1949, 1950), as well as in the works of Humboldt *et al.* (1818); Philippi (1860, 1864–1865, 1895), Reiche (1907, 1910), and Yuncker (1922, 1923). Gay (1849) wrote the first floristic account of *Cuscuta* in Chile, which included five species. Reiche (1910) mentioned eight species from Chile, of which *C. aurea* Phil. is currently known to be a synonym of *C. chilensis*. Yuncker (1932) indicated nine species from Chile, but subsequently reconsidered *C. pusilla* Phil. ex Yunck. as synonymous with *C. pauciflora* Phil. (Yuncker 1943). Zuloaga *et al.* (2008) and Rodríguez *et al.* (2018) enumerated 12 species from Chile in recent taxonomic synopses of the genus.

During the last 15 years, our understanding of *Cuscuta* systematics has been considerably advanced by molecular, character evolution, and biogeography studies. Three broad-level molecular phylogenetic studies outlined the relationships among major infrageneric clades (García & Martín 2007; Stefanović *et al.* 2007; García *et al.* 2014). While these recent studies largely confirmed the subgenera proposed by Engelmann (1859) and Yuncker (1921, 1932), especially the largest infrageneric group, subgenus *Grammica* required a new infrageneric classification to reflect phylogenetic relationships (Costea *et al.* 2015a).

The objective of this study is to contribute to the Nueva Flora de Chile project by revising the taxonomic knowledge about *Cuscuta* in Chile in view of recent phylogenetic results, as well as to update the geographical distribution of species and ecological information. This study also draws attention

to several rare species of *Cuscuta*, which require targeted conservation assessments and management measures.

## MATERIALS AND METHODS

A full review of the literature pertinent to *Cuscuta* in Chile and South America was undertaken. *Cuscuta* collections, including the types from the following herbaria were studied and annotated: AAU, ARIZ, ASU, B, BAB, BC, BCN, BM, BORD, BR, BRIT, CANB, CAS, CEN, CHSC, CIMI, CONC, CORD, CTES, DAO, F, G, GH, HUFU, IAC, IEB, IND, JEPS, K, LYJB, LL, LP, LPB, LPS, MA, MEL, MERL, MEXU, MICH, MO, NMC, NY, OKLA, OSC, OXF, P, PACA, QCNE, RB, RSA, S, SD, SGO, SI, SPF, TEX, TRT, TRTE, UB, UCR, UPS, US, W, and WLU (herbaria acronyms from Thiers 2018-continuously updated).

Flowers, fruits and seeds removed from herbarium specimens were steeped in gradually warmed 50% ethanol, which was then allowed to boil for a few seconds to rehydrate tissues. Ethanol is used for rehydration because it hardens the tissues, which are very delicate in *Cuscuta* flowers. Flowers were dissected under a Nikon SMZ 1500 stereomicroscope and imaged with PaxCam Arc digital camera (MIS Inc. 2021, Villa Park, Illinois) equipped with a Pax-it 8.2 imaging software. Numerous photographs illustrating details of the floral and fruit morphology for all taxa, including their type collections, are made available on the Digital Atlas of *Cuscuta* website (Costea 2007-onwards).

### COLLECTING AND IDENTIFICATION RECOMMENDATIONS

Only mature plants with flowers, and, ideally fruits, should be collected. Collections with only stems are impossible to identify morphologically, and while identification using molecular markers is possible for some species, for some it is not. In descriptions, the stem categories proposed by Yuncker (1932) based on their diameter were used: “slender” with the diameter of 0.35–0.4 mm, “medium” with the diameter of 0.4–0.6 mm, and “coarse” when diameter is greater than 0.6 mm. Accurate identification of most *Cuscuta* sp. requires the rehydration of flowers, dissection and examination under a stereo microscope. Measurements of floral parts were done on rehydrated herbarium material. Length of flowers was measured from the base of calyx to the tip of straightened corolla lobes. The texture of flowers and calyx were noted on the dry material (fresh flowers are  $\pm$  fleshy in all species). Observation of papillae requires magnifications of at least 100  $\times$ . Visibility of laticifers was recorded with a Nikon SMZ1500 stereo microscope using transmitted light. Position of corolla lobes (e.g., spreading, reflexed) was noted in mature flowers (all species have initially erect corolla lobes).

## RESULTS

There are 11 species of *Cuscuta* native or naturalised in Chile, all of them members of subgenus *Grammica*, more specifically of three of the 15 monophyletic sections defined by Costea *et al.* (2015a): *Cleistogrammica* (1 species), *Racemosae* (6 species) and *Subulatae* (4 species). Two other species, *C. epithymum* (L.) L. and *C. grandiflora* Kunth, were historically reported from Chile, but their current presence is highly unlikely, and although they were included in the identification key, they were not described in the taxonomic treatment. *Cuscuta epithymum* is a species of subgenus *Cuscuta*, characterized by gynoecea with two equal styles and linear stigmas; its variety *angustissima* (Engelm.) Yunck., with calyx and corolla narrowly lanceolate, was indicated from Chile by Hunziker (1950) based on a single specimen collected from Santiago by Philippi in 1888 and supposedly kept at CORD. While we do not doubt the existence of this specimen in 1950s, we could not find it neither at CORD nor at other herbaria (e.g., SGO, SI); *Cuscuta epithymum* is native to Europe and northern Africa, and a worldwide wave of anthropogenic dispersal with contaminated legume seeds took place at the end of the 19<sup>th</sup> century. However, the species did not naturalize subsequently in the Americas (Costea & Nesom 2023) and it is facing conservation problems in some of its the native areas (e.g., Meulebrouck *et al.* 2007). The current study did not confirm the presence of this species in Chile.

*Cuscuta grandiflora* Kunth of sect. *Subulatae* (subg. *Grammica*), was mentioned from Chile by Engelmann (1859) also based on a single specimen, Edmonston s.n., with no further information. Yuncker (1922, 1932) repeated this record, also without providing additional details. We did not locate any Edmonston *Cuscuta* specimens at MO, K or other relevant herbaria. Thomas Edmonston took part in the voyage of H.M.S Herald until he was tragically killed in 1846 by an accidental rifle discharge when returning from a trip from Santa Rosa de Atacames in the province of Esmeraldas, Ecuador (Seeman 1857). There is no doubt that Engelmann

examined a specimen of *C. grandiflora*, but the missing specimen could have also been collected from mainland Peru or Ecuador, where *C. grandiflora* is relatively common. In the absence of the specimen itself or more information, it is not possible to confirm the accuracy of this record. The presence of *C. grandiflora* in Chile is not impossible because the species occurs in the Andes from Ecuador to Argentina; however, we have not been able to find any corroborating evidence to confirm its presence. Reiche (1910) also mentioned *C. grandiflora* as problematic for Chile. The species can be easily distinguished from all the Chilean species by its rotate corolla with no infrastaminal scales (Engelmann 1859; Yuncker 1932).

### DESCRIPTION OF GENUS IN CHILE

*Cuscuta* L., Sp. Pl.: 124. 1753.

Holoparasitic annual herbs. Stems filiform, yellow, orange, or purple, trailing or dextrorsely twining and attached to the host by numerous small haustoria. Leaves reduced to alternate scales. Inflorescences axillary scorpioid cymes, usually compound, rarely flowers solitary or in fascicles (e.g., *C. pauciflora*). One bract present at the base of cymes or pedicels. Flowers bisexual, radial, 5-merous, white, sometimes yellow or purple; laticifers with translucent latex are commonly present in all the flower organs, isolated or in rows/groups, ovoid or elongate (as an exception, *C. microstyla* has yellow latex in the laticifers); calyx and corolla gamopetalous; stamens alternating with the corolla lobes, anthers longitudinally dehiscent; infrastaminal scales, variously fimbriate and fimbriae contain translucent laticifers; ovary superior, 2-locular; styles 2, unequal; stigmas globose, globose-depressed or ellipsoidal. The fruit is a capsule dehiscent by a ± regular line near the base, irregularly dehiscent or indehiscent. Seeds 1–4 per capsule; seed coat cells papillate or dome-like when hydrated and alveolate when dry; embryo slender, 1–3-coiled, rarely globose-enlarged at the radicular end (*C. microstyla*), without cotyledons.

Common name: all *Cuscuta* species in Chile are generically known as “cabello de ángel.”

### KEY FOR SUBGENERA AND SECTIONS OF *CUSCUTA* IN CHILE

1. Styles 2, equal; stigmas elongate, cylindrical.....Subgenus *Cuscuta*
1. Styles 2, unequal; stigmas globose, depressed to ellipsoid.....Subgenus *Grammica* (2)
  2. Fimbriae of infrastaminal scales papillate or with yellow laticifers (absent in *C. grandiflora*); styles, thick, subulate; capsules circumscissile dehiscent (indehiscent in *C. microstyla*).....sect. *Subulatae*
  2. Fimbriae of infrastaminal scales without papillae and laticifers are translucent; styles thick, subulate; capsules indehiscent.....3
    3. Capsules globose-depressed surrounded by the withered corolla in the lower 1/3..... sect. *Cleistogrammica*
    3. Capsules globose to ovoid entirely surrounded and hidden by the withered corolla.....sect. *Racemosae*

IDENTIFICATION KEY FOR SPECIES FROM CHILE

1. Styles 2, equal; stigmas elongate, cylindrical.....*C. epithymum* (Subgenus *Cuscuta*)
1. Styles 2, unequal; stigmas globose, depressed to ellipsoid.....2 (Subgenus *Grammica*)
  2. Infrastaminal scales absent; corolla rotate.....*C. grandiflora*
  2. Infrastaminal scales present; corolla campanulate, cylindrical or cupulate.....3
    3. Flowers 4.5–7 mm long; fruits circumscissile dehiscent.....4
    3. Flowers 2–5 mm long; fruits indehiscent or irregularly dehiscent.....6
      4. Corolla tube cylindrical; lobes 1/4–1/3 as long as the tube.....*C. chilensis*
      4. Corolla tube globose; lobes equalling or exceeding corolla tube.....5
        5. Calyx of fresh plants usually purple; corolla lobes acute to subacute, stamen filaments 0.1–0.3 mm long.....*C. purpurata*
        5. Calyx of fresh plants white-creamy to orange; corolla lobes acute to subacute; stamen filaments 0.3–1.2 mm long.....*C. odorata*
  6. Fresh flowers with yellow corolla; infrastaminal scale fimbriae papillate and with yellow latex; styles thick, subulate; embryo globose enlarged at the radicular end.....*C. microstyla*
  6. Fresh flowers with white corolla; infrastaminal scale fimbriae not papillate, with translucent latex; styles, thin, filiform; embryo entirely filiform.....7
    7. Calyx lobes overlapping at base, golden-reticulate when dry; capsule globose-depressed surrounded by the withered corolla in the lower 1/3.....*C. campestris*
    7. Calyx lobes not overlapping at base or if they do, the calyx is not golden-reticulate when dry; Capsule globose to ovoid, entirely enveloped by the withered corolla.....8
      8. At least some of the corolla lobe apices are inflexed.....9
      8. Corolla lobe apices not inflexed; some may be cucullate.....11
        9. Pedicels papillate; calyx base with a ring of multicellular protuberances bearing stomata.....*C. werdermannii*
        9. Pedicels glabrous; calyx without multicellular protuberances.....10
          10. Flowers solitary or in fascicles, 2.5–3.2 mm long; calyx 3/4 to equaling corolla tube.....*C. pauciflora*
          10. Flowers in corymbiform (compound) cymes, 3–5 mm long; calyx ca. 1/2 of corolla tube.....*C. suaveolens*
    11. Pedicels, calyx, corolla and ovary papillate; infrastaminal scales fimbriae >40.....*C. andina*
    11. Pedicels, calyx, corolla and ovary glabrous (but papillae often present on the tips of corolla lobes); infrastaminal scales fimbriae < 40.....12
      12. Anthers 0.8–1.1 mm long; capsules irregularly dehiscent.....*C. rustica*
      12. Anthers 0.25–0.8 mm; capsules indehiscent.....*C. micrantha*

TAXONOMIC TREATMENT

1. *Cuscuta* sect. *Cleistogrammica* Engelm. ["Clistogrammica"] Trans. Acad. Sci. St Louis 1: 490. 1859. Sect. *Cleistogrammica* includes 16, mostly N American species with intricate evolutionary history that involved ancestral hybridization and long-distance dispersal (Costea *et al.* 2015b). Most species possess glomerulate inflorescences; flowers have obtuse calyx lobes, and the capsules are indehiscent, globose-depressed. The only species of this section introduced and naturalised in Chile is *C. campestris*.

1. *Cuscuta campestris* Yuncker [nom. nov.], Mem. Torrey Bot. Club 18: 138. 1932. Based on *Cuscuta pentagona* Engelm. var. *calycina* Engelm., Amer. J. Sci. 45: 76. 1843 [1845]. *Cuscuta arvensis* Beyr. ex Engelm. var. *calycina* (Engelm.) Engelm., Trans. Acad. Sci. St. Louis 1: 495. 1859. Lectotype

(Yuncker 1921): U.S.A. Texas: Wet prairies, [no date], Lindheimer 126 (MO!). Fig. 1, A–G.

Stems thin to medium, yellow to orange. Inflorescences glomerulate; pedicels 0.3–2.5(–3.5) mm long. Flowers 5-merous, 2.5–3.6 mm long, white-creamy when fresh, golden-yellow when dried; papillae absent; laticifers evident in the calyx and less obvious in the corolla and ovary/capsule; calyx yellow, reticulate, glossy, cupulate, about as long as corolla tube, divided 2/5–3/5 the length; lobes overlapping at base; ovate, margins entire, apex obtuse to rounded; corolla 2.4–3.5 mm, tube (1.1–)1.5–1.8 mm long, campanulate; lobes 1.2– 2 mm long, patent to reflexed, equaling the tube, triangular-lanceolate, margins entire, apex acute to acuminate, inflexed; stamens exerted, anthers 0.3–0.5 × 0.25–0.3 mm, elliptic, filaments 0.4–0.7 mm long; infrastaminal scales 1.3–2 mm long, slightly exceeding corolla tube, oblong-ovate to spatulate, rounded, uniformly dense fimbriate, fimbriae

0.3–0.6 mm long; styles 0.8–1.6 mm, ca. as long as the ovary, thin, cylindrical, stigmas globose. Capsules indehiscent, 1.3–2.8 × 1.9–3.8 mm, globose-depressed to depressed, not thickened or raised around the large interstylar aperture, sometimes translucent, persistent corolla enveloping 1/3

or less of the capsule base. Seeds 3–4 per capsule, 1.12–1.54 × 0.9–1.1 mm, subrotund to broadly elliptic, hilum 0.45–0.5 mm in diameter, vascular scar 0.085–0.01 mm long.  $2n = 56$  (Fogelberg 1938; García *et al.* 2019).

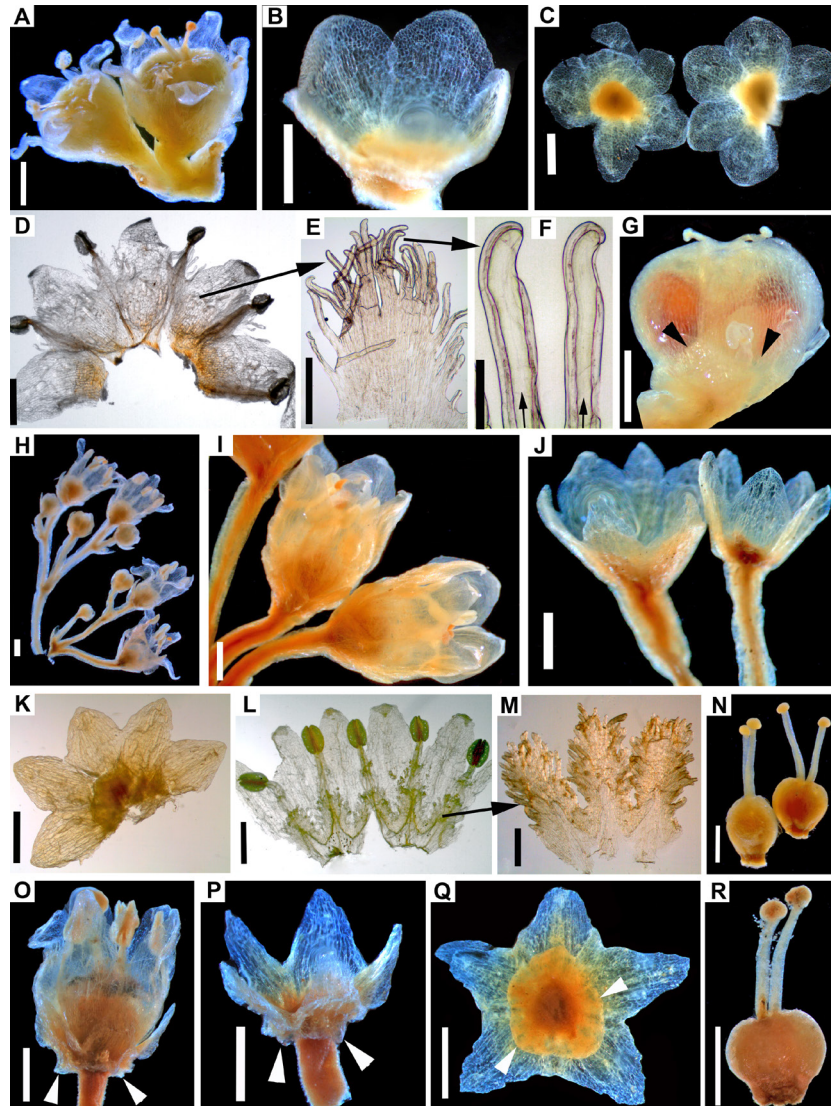


FIGURE 1. Morphology of *Cuscuta campestris*, *C. suaveolens* and *C. werdermannii* analyzed on rehydrated herbarium material. A-G: *Cuscuta campestris* (Lindheimer 126, the type, MO); A: flowers; B: Calyx; C: calyces, dissected and flattened; D: corolla dissected and opened to reveal infrastaminal scales; E: infrastaminal scale; F: one of the fimbriae of infrastaminal scale (arrows indicate laticifers); G: capsule (note corolla persistent at the capsule base indicated by arrowhead). H-N: *Cuscuta suaveolens* (Ortega s.n., SGO); H: inflorescence; I: Flowers; J: calyces; K: calyx, dissected and flattened; L: corolla, dissected; M: infrastaminal scales; N: gynoecia. O-R: *Cuscuta werdermannii* (Werdermann 880, the type, GH); O: flower; P: calyx; Q: calyx dissected and flattened; black arrows indicated protuberances with stomata at the base of calyx; R: gynoecium. Scale bars = 1 mm except for E = 250  $\mu\text{m}$  and F = 50  $\mu\text{m}$ . / Morfología de *Cuscuta campestris*, *C. suaveolens* y *C. werdermannii* analizada a partir de material de herbario rehidratado. A-G: *Cuscuta campestris* (Lindheimer 126, typus, MO); A: flores; B: Cáliz; C: disección de cálices abiertos; D: corola disecada para mostrar las escamas infraestaminales; E: escama infraestaminal; F: una de las fimbrias de la escama infraestaminal (la flecha muestra un vaso laticífero); G: cápsula (se observa la corola persistente en la base de la cápsula (flecha)); H-N: *Cuscuta suaveolens* (Ortega s.n., SGO); H: inflorescencia; I: flor; J: cálices; K: cáliz, disecado y abierto; L: corola, disectada; M: escama infraestaminal; N: gineceo. O-R: *Cuscuta werdermannii* (Werdermann 880, typus, GH); O: flores; P: cáliz; Q: cáliz disecado y abierto, las flechas blancas muestran las protuberancias con estomas ubicadas en la base del cáliz; R: gineceo. Las barras de la escala = 1 mm excepto E = 250  $\mu\text{m}$  y F = 50  $\mu\text{m}$ .

**GEOGRAPHICAL DISTRIBUTION:** Although it has not been collected from all the Chilean administrative regions, its presence is possible in all these areas except perhaps in the regions of Aisén and Magallanes. The oldest herbarium specimen was collected from Guatacondo, Region de Tarapacá in 1899. *Cuscuta campestris* is a hybrid species native to N America (Costea *et al.* 2015b) and has spread worldwide as a seed contaminant of legume crops (Olszewski *et al.* 2020), but it can also be dispersed over long distances by migratory birds through endozoochory (Costea *et al.* 2016) or hydrochory by the floating capsules (Ho & Costea 2018).

**ECOLOGY:** Flowering Aug-March. The species grows in places with a degree of anthropomorphic disturbance, on margins of roads, pathways, urban and rural wasteland, fallow fields, docks, etc., from 10 to 2500 m in elevation. Only a few herbarium specimens have been collected from agricultural crops, mainly from beats, lucerne (alfalfa) and red trefoil. However, *C. campestris* is a well-known pest of numerous agricultural and horticultural crops due to its ability to parasitize a broad range of herbaceous plants (Gaertner 1950; Costea & Tardif 2006). There are also two records on native species: *Muehlenbeckia hastulata* J. E. Sm. (Polygonaceae) and *Nertera granatensis* (Mutis ex L.f.) Druce (Rubiaceae).

**SPECIMENS EXAMINED:** CHILE. Región de Tarapacá, prov. Tamarugal, Guatacondo, 2460 m, IX-1899, F. Johow s.n. (CONC 60855). Región Coquimbo. Prov. Elqui, Rivadavia, camino a Paihuano, 29°59'S 70°33'W, 800 m, 12-III-1987, O. Matthei & R. Rodríguez 83 (CONC). Región de Valparaíso: prov. San Antonio, El Tabo, 29-VIII-1965, A. Kohler 65 (CONC). Región Metropolitana de Santiago: prov. Maipo, laguna de Aculeo, 365 m, I-1965, H. Gunckel 43029 (CONC). Prov. Melipilla, fundo Esmeralda, 33°41'S 71°12'W, 175 m, 29-XII-2003, H. Flores s.n. (CONC 159898). "Prov. Talagante" (sic), Paine, 33°48'S 70°44'W, 400 m, 26-I-2004, R. Pinilla s.n. (CONC 159897). Región O'Higgins, Prov. Cachapoal, Las Cabras, 34°17'S 71°19'W, 130 m, 5-II-2004, C. Miranda s.n. (CONC 159895). Prov. Colchagua, San Fernando, termas de El Flaco, 1700 m, 30-XII-1974, G. Montero 9624 (CONC); Chimbarongo, 34°42'S 71°02'W, 310 m, 13 Jan 2004, M. Palma s.n. (CONC 159899); Las Peñuelas, camino de San Fernando a Nancagua, 34°36'S, 71°02'W, 28-XI-1989, O. Matthei & M. Quezada 686 (CONC). Región Maule: prov. Curicó, Curicó, I-1922, 200 m, E. Barros s.n. (CONC 60853). Prov. Talca, predio Venecia, 1 km al sur de Talca, 100 m, 16-III-1988, R. Rodríguez & C.M. Baeza 2339 (CONC). Región Ñuble: prov. Diguillín, camino Recinto-Chillán, fundo Pilmaiquén, 950 m, 30-I-1959, O. Matthei s.n. (CONC 27004). Chillán: camino a las termas, 30-I-1959, O. Matthei s.n. (CONC 27000);

Pueblo Seco, 11-I-1960, O. Matthei s.n. (CONC 26999); 15-IV-1959, O. Matthei s.n. (CONC 26998). Prov. Punilla, San Carlos, Las Encinas de Pomuyete, 3-II-1959, O. Matthei s.n. (CONC 27002). Región de Biobío: prov. Concepción, dpto. Talcahuano, Lenga, 10 m, 5-I-1962, M. Ricardi, C. Marticorena & O. Matthei s.n. (CONC 47836). Región de los Lagos: prov. Osorno, Llifén, riberas del lago Ranco, 75 m, 22-II-1958, A. Marticorena & V. Finot 48 (CONC).

II. *Cuscuta* sect. *Racemosae* (Yunck.) Costea & Stefanović, Syst. Bot. 40(1): 283. 2015.

Section *Racemosae* is endemic to South America and includes 16 species with campanulate or cylindrical corolla tubes, and indehiscent or irregularly dehiscent capsules (Costea *et al.* 2015a). Six species are native to Chile; among them, *C. andina*, *C. micrantha* and *C. rustica* form a difficult species complex, within which evolutionary relationships and morphological limits that have not been fully clarified.

2. *Cuscuta andina* Phil., Anales Univ. Chile 90: 224. 1895. The lectotype selected by Yuncker (1932) is a specimen from B: "Chili: Prov. Talca on *Ephedra andina*, F. Philippi [no date]". This specimen does not exist anymore after the Herbarium Berolinense was destroyed in 1943. However, fragments of at least two Philippi specimens collected from the same locality and parasitizing the same host exist in other herbaria: Feb 1888 (CORD! and K!) and Feb 1879 (GH! and SGO!). These specimens can be all considered syntypes. As Hunziker cited the CORD specimen, this is considered here the (neo)lectotype, while the K specimen is a (neo)isolectotype. Fig. 2. A-H.

*C. decora* var. *integriuscula* Engelm., Trans. Acad. Sci. St. Louis 1: 502. 1859. *C. indecora* Choisy var. *integriuscula* Yunck., Amer. J. Bot. 10: 10. 1923. TYPE: Argentina: "Andes of Mendoza on *Ephedra*", Gillies s.n. (Holotype: MO! isotype: OXF!).

*Cuscuta racemosa* Mart. var. *andina* Reiche, Anales Univ. Chile 120: 819. 1907.

Stems medium, color unknown but likely yellow orange. Inflorescence corymbiform; pedicels 2–5 mm long. Flowers 5-merous, 3–4 mm long, membranous, creamy-white when fresh, creamy-brown when dried; papillae present on pedicels, calyx, corolla, and ovary, arranged in rows; laticifers visible in the calyx and corolla; calyx 1.5–1.8 mm long, yellow-brown, not reticulate or glossy, shallow campanulate to cupulate, 1/2–2/3 as long as the corolla tube, divided ca. 1/3 the length, tube 0.5–0.8 mm long, lobes 1.2–1.4 mm long, overlapping at base, triangular, margins entire, apex acute to subacute; corolla 2.8–3.8 mm long, tube 1.8–2.2 mm long, campanulate

but becoming urceolate in fruit, lobes 1.4–1.8 mm long, spreading, equalling or longer than the tube, triangular-ovate, overlapping at base, margins entire, apex sub-acute, straight or slightly cucullate; stamens not exerted, anthers 0.5–0.7 × 0.4–0.5 mm, broadly elliptic, filaments 0.4–0.7 mm long; infrastaminal scales 1.9–2.5 mm long, equalling or slightly longer than corolla tube, ovate to triangular, bridged at 0.6–0.9 mm, uniformly dense-fringed, fimbriae > 40, 0.15–0.3 mm

long; styles 0.8–1.3 mm long, shorter than the ovary, thin, cylindric, stigmas subglobose. Capsules indehiscent, 2.8–3 × 2.5–3 mm, ovoid-globose, slightly risen around the small interstyler aperture, translucent, surrounded by the withered corolla. Seeds 3–4 per capsule, 1.4–1.7 × 1.3–1.4 mm, broadly-elliptic to round; hilum area 0.2–0.3 mm in diameter, scar 0.08–0.15 mm long.

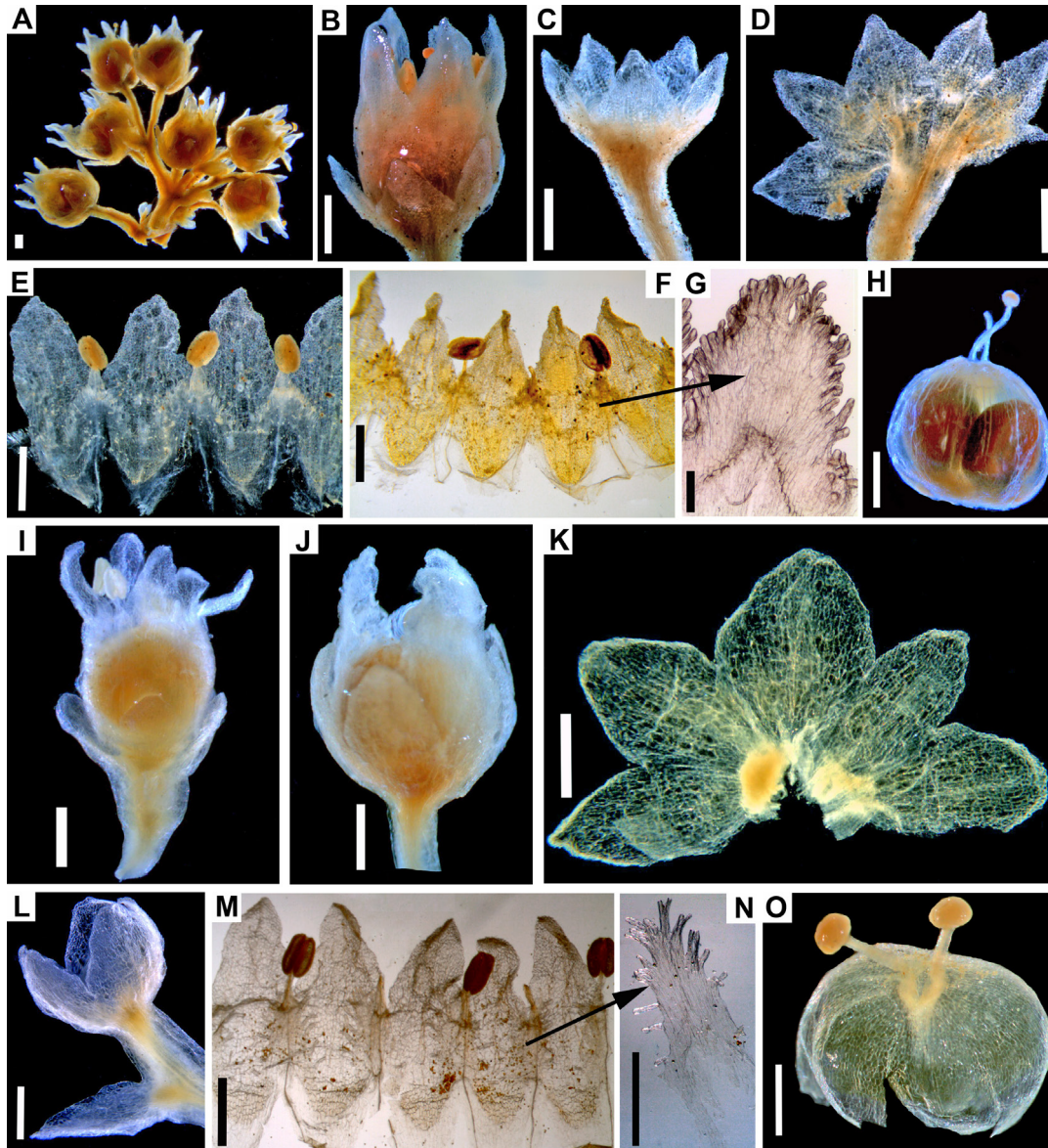


FIGURE 2. Morphology of *Cuscuta andina* and *C. rustica* analyzed on rehydrated herbarium material. A-H: *Cuscuta andina* (Gillies s.n., OXF); A: inflorescence; B: flower; C: calyx; D: calyx, dissected; E-F: corolla dissected; G: infrastaminal scale; H: capsule. I-O: *Cuscuta rustica* (Squeo 88126, CONC): I-J: flower variation on the same individual; K: calyx dissected; L: calyx and bract; M: corolla dissected; N: infrastaminal scale; O: capsule, note the irregular dehiscence line at the base. Scale bars = 1 mm, except G = 100  $\mu$ m. / Morfología de *Cuscuta andina* y *C. rustica* analizada a partir de material de herbario rehidratado. A-H: *Cuscuta andina* (Gillies s.n., OXF); A: inflorescencia; B: flor; C: cáliz; D: disección del cáliz; E-F: disección de la corola; G: escama infraestaminal; H: cápsula. I-O: *Cuscuta rustica* (Squeo 88126, CONC): I-J: variación de las flores en una misma planta; K: disección del cáliz; L: cáliz y bráctea; M: disección de la corola; N: escama infraestaminal; O: cápsula, observar en su base la línea irregular de la dehiscencia. Barras de la escala = 1 mm, excepto G = 100  $\mu$ m.

NOTE: *Cuscuta andina* differs from the alpine forms of *C. micrantha* in the flowers with pedicels, calyces and ovaries papillate. Infrastaminal scales are triangular, with more numerous and shorter fimbriae compared to *C. micrantha* and *C. rustica*. The presence of papillae on the pedicels and calyces is usually a variety trait in species of other subg. *Grammica* sections [e.g., *C. californica* var. *papillosa* Yunck. (Costea & Stefanović 2009b), *C. pacifica* var. *papillata* (Yunck.) Costea & M.A.R. Wright (Costea et al. 2009)].

GEOGRAPHICAL DISTRIBUTION: Known in Chile only from the syntypes collected in Talca and one newly found specimen from Lagunillas in the Cordillera Province (Región Metropolitana, see below). Similarly, in Argentina, the species is known only from the type of *C. indecora* Choisy var. *integriuscula* collected in Mendoza.

ECOLOGY: Flowers in Jan–Feb. The host of all the type specimens is *Ephedra andina* Poepp. ex C.A. Mey., which is currently considered a synonym of *Ephedra chilensis* C. Presl (Rodríguez et al. 2018), but the host of specimen collected from Lagunillas is *Adesmia* sp. Elevation over 2000 m.

SPECIMENS EXAMINED: CHILE. Región Metropolitana de Santiago, prov. Cordillera, Lagunillas, 7–8 Jan 1971, K. Beckett, M. Cheese & J. Watson 4788 (SGO).

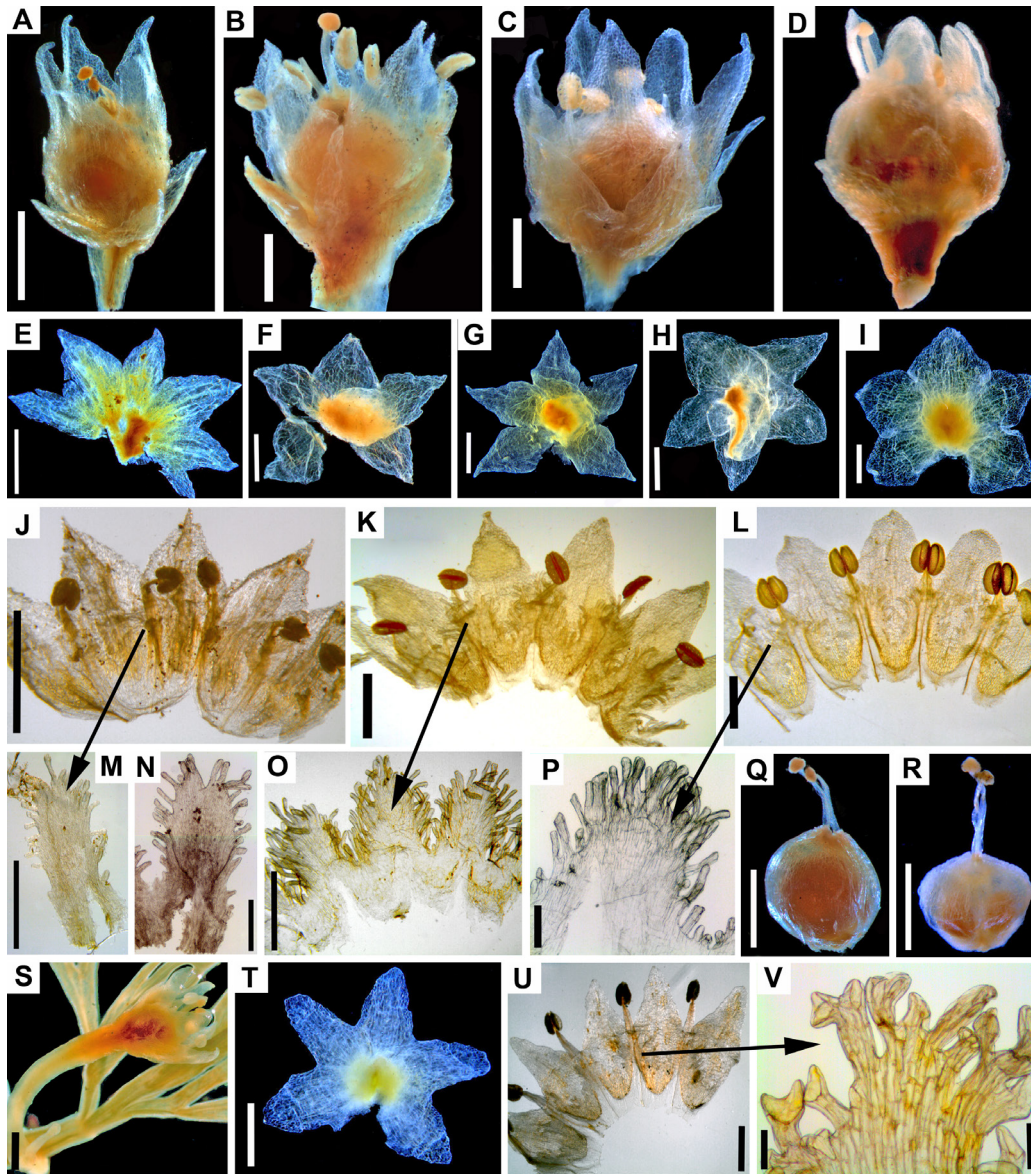
3. *Cuscuta micrantha* Choisy, Mém. Soc. Phys. Genève 9: 271, pl. 1. f. 3. 1841. Type. Chile: Constamment sur la *Frankenia* du bord de la mer. Fleurit en Décembre ni rare ni commune, Gay 538 (Lectotype: P!; isolectotype MO!). The isolectotype at MO is a fragment sent to Engelmann from Paris, and the label is in English. Fig. 3, A–R. *Cuscuta micrantha* var. *holwayi* Yunck., Mem. Torrey Bot. Club 18: 170. 1932. Type: Chile, Linares, Panamavida, 17 Dec 1919, E.W.D. & Mary M. Holway s.n. (holotype: NY! 621760). “Panamavida” likely refers to Panimávida, a small town in Prov. Linares with one of the oldest hot springs centers in the country. *Cuscuta micrantha* var. *latiflora* Engelm., Trans. Acad. Sci. St. Louis 1: 501 (1859). Type: (lectotype Yuncker 1932): Chile: Concon, *Poeppig 89* (MO!). A *Poeppig 89* specimen without indicating the locality is also preserved at HAL. *Cuscuta sparsiflora* Philippi ex Reiche, Fl. Chile 5: 171. 1910. Type: Chile, Cordillera de Santiago, sobre *Laretia acaulis*, Mar 1899, *Philippi s.n.* (holotype SGO). Note. The specimen cited by Yuncker (1932) from Herbarium Berlinense does not exist anymore. Another specimen at SGO (000003931) together with its duplicate at GH

(00054359) can be considered syntypes: Chile, Valle Largo, sobre *Laretia acaulis*, Feb 1893, *Philippi s.n.*

Stems slender, yellow-orange. Inflorescence loose-glomerulate to corymbiform; pedicels 0.5–4 mm long. Flowers 5-merous, 2–4 mm long, membranous, white when fresh, creamy-brown when dried; papillae present on corolla lobe apices; laticifers visible in the calyx and corolla lobes; calyx 1.5–2.2 mm long, brownish, not reticulate or glossy, campanulate to cupulate, equalling or slightly exceeding the corolla tube, divided 1/2–1/3 the length, tube 0.4–1 mm long, lobes 0.6–1.2 mm long, not overlapping or slightly overlapping at the base, broadly-ovate to lanceolate, margins entire or irregular-crenulate, apex acute to acuminate or sub-acute to obtuse; corolla 1.8–3.8 mm long, tube 0.8–2.2 mm long, initially campanulate but becoming ovoid to globose at fruiting, lobes 0.7–2 mm long, spreading or patent, equalling or longer than the tube, triangular, triangular-lanceolate, overlapping or not, margin entire or crenulate, apex acute, acuminate or obtuse, inflexed, cucullate or with margins of inrolled; stamens not exerted, anthers 0.25–0.8 × 0.2–0.5 mm, round to broadly-ovate; filaments 0.25–0.6 mm long; infrastaminal scales 0.8–2.5 mm long, equalling or longer than corolla tube, oblong to ovate, bridged at 0.4–0.9 mm, fimbriae 9–35, 0.2–0.6 mm long, from a few short, distal to more numerous, regularly distributed; styles 0.3–2 mm long, shorter, equalling or longer than the ovary, thin, cylindrical, stigmas globose to subglobose. Capsules indehiscent, 1.2–2.3 × 1.3–2.4 mm, ovoid to globose, slightly thickened or risen around the small or medium-sized interstyler aperture, translucent, completely surrounded by the withered corolla. Seeds 1–4 per capsule, 0.8–1.2 × 0.9–1.1 mm, subround to broadly-elliptical, hilum area 0.2–0.3 mm in diameter, scar ca. 0.1 mm long.

NOTE: *Cuscuta micrantha* is a very variable species but the recognition of the varieties proposed by Engelmann (1859) and Yuncker (1932) has proven ultimately unfeasible. The description of “typical” *micrantha*, var. *latiflora* and var. *holwayi* was historically based just on a few specimens, which themselves often consisted only of a few flowers. Both Engelmann (1859) and Yuncker (1932) indicated Gay 538 (MO) as a lectotype of *C. micrantha*. This specimen parasitizing *Frankenia* on the ocean shore at Coquimbo has small flowers, 2–2.4 mm long, narrow infrastaminal scales with a few short, terminal fimbriae, and 1-seeded capsules. While this phenotype is easily recognizable, it is just one of the extremes of a much broader range of morphological variation.





**FIGURE 3.** Morphology of *Cuscuta micrantha* and *C. pauciflora* analyzed on rehydrated herbarium material. A-R: Flower variation in *C. micrantha*. A: flower of “var. micrantha” (Gay 538 s.n., P, type); B: flower of “var. latiflora” (Poeppig 89, Lectotype, MO); C: flower of “var. holwayi” (Holway & Holway s.n. holotype, NY); D: large-flowered form from Atacama (Rechinger & Rechinger 63632, NY). E-I: calyx variation. E: Gay 538 s.n., the type; F: Gay 203, P; G: Holway & Holway s.n., NY; H: Hastings 154 (cited by Yuncker 1932 as “var. holwayi”), NY; I: Rechinger & Rechinger 63632, NY; J-L: corolla variation. J: Gay 538 s.n.; K: Holway & Holway s.n., NY; L: Rechinger & Rechinger 63632, NY; M-P: infrastaminal scale variation. M: Gay 203, P; N: Poeppig 89, MO; O: Holway & Holway s.n., NY; P: Rechinger & Rechinger 63632, NY; Q: gynoecium, Gay 203, P; gynoecium, Holway & Holway s.n., NY. S-V: *Cuscuta pauciflora* (Teillier et al. 6659); S: solitary flower; T: dissected calyx; U: dissected corolla; V: infrastaminal scales (not the wider than long laticifers). Scale bars = 1 mm except in P = 250  $\mu\text{m}$  and V = 100  $\mu\text{m}$ . / Morfología de *Cuscuta micrantha* y *C. pauciflora* analizada a partir de material de herbario rehidratado. A-R: Variación de la morfología de las flores de *C. micrantha*. A: flor de la “var. micrantha”(Gay 538 s.n., P, typus); B: flor de la “var. latiflora” (Poeppig 89, Lectotype, MO); C: flor de la “var. holwayi” (Holway & Holway s.n. holotypus, NY); D: var. con flores grandes de Atacama (Rechinger & Rechinger 63632, NY). E-I: variación de la morfología del cáliz. E: Gay 538 s.n., typus; F: Gay 203, P; G: Holway & Holway s.n., NY; H: Hastings 154 (citado por Yuncker 1932 como “var. holwayi”), NY; I: Rechinger & Rechinger 63632, NY; J-L: variación de la morfología de la corola. J: Gay 538 s.n.; K: Holway & Holway s.n., NY; L: Rechinger & Rechinger 63632, NY; M-P: variación de la escama infraestaminal. M: Gay 203, P; N: Poeppig 89, MO; O: Holway & Holway s.n., NY; P: Rechinger & Rechinger 63632, NY; Q: gineceo, Gay 203, P; gineceo, Holway & Holway s.n., NY. S-V: *Cuscuta pauciflora* (Teillier et al. 6659); S: flor solitaria; T: cáliz disecado; U: corolla disecada; V: escama infraestaminal (se observan los vasos laticíferos más largos que anchos). Barras de la escala = 1 mm excepto P = 250  $\mu\text{m}$  y V = 100  $\mu\text{m}$ .

Engelmann (1859) indicated that all the specimens he had cited for *C. micrantha* aside from Gay 538, "Concon, Poeppig 89; St. Jago, Philippi, Besser" belong to a new variety, var. *latiflora*, with slightly larger flowers, infrastaminal scales and longer styles. Among these specimens, Yuncker (1923, 1932) selected Poeppig 89 as a lectotype of *C. micrantha* var. *latiflora*. To be noted that Poeppig 89 (also indicated in the label as "Diar. 159") is the other syntype of *C. micrantha* mentioned by Choisy (1841). In fact, in the De Candolle herbarium (G-DC), the latter specimen is mounted together with the Gay s.n. collected in 1839 from Coquimbo (G00135197, the former at the bottom right, the latter at the top and left of the sheet). Even if they observed only these few specimens, both Engelmann (1859) and Yuncker (1923, 1932) noted the presence of intermediate forms connecting var. *latiflora* with the typical variety. The flower length of Poeppig 89 and Philippi s.n. specimens range from 2.4 to 3.2 mm; also, the different flower parts are approaching or overlapping in size and shape with those of Gay 538. Another specimen collected by Gay, apparently not examined by either Engelmann or Yuncker, "Prov. de Coquimbo, Chili, 1839" (G00135197 top and left plants), also parasitizing on *Frankenia*, has larger flowers up to 3 mm long, more developed scales, longer styles and 2 seeds per capsule. Two more Gay specimens of *C. micrantha* parasitic on *Frankenia*, also not seen by Engelmann and Yuncker ("Oct 1836, La Serena, SGO" and one with unspecified locality and date preserved at K) also broaden the range of morphological variation of this species. After also examining the much more numerous specimens collected since 1900s, we conclude that as defined by Engelmann (1859), var. *latiflora* is inseparable from the type form, as initially envisioned by Choisy (1841). Similarly, based on the three specimens cited by Yuncker (1932) for var. *holwayi* (including its type), this variety can not be distinguished morphologically from var. *latiflora* and, thus, from the type variety.

The only *C. micrantha* assemblage of forms that is apparently distinct morphologically, belongs to specimens from Atacama (see "Specimens examined"), which not only possess larger flowers, up to 4 mm long, but also the apices of their calyx and corolla lobes are subobtuse to obtuse. Two specimens that belong to this form, Morong 1163 and Werdermann 464, were cited by Yuncker (1932) under var. *latiflora*. However, as explained above, in its current delimitation, var. *latiflora* cannot be separated from the "typical" form. If the plants for Atacama will be deemed sufficiently distinct, they should be described as a new variety. However, we defer making a decision in this respect until a molecular and morphometric study can encompass and analyze all the variation as well as retrace the diversification of *C. micrantha*. The extensive range of morphological variation

observed in *C. micrantha* is most likely a consequence of ecological amplitude of this species, which grows in numerous habitats, on an elevation gradient that ranges from the Pacific shore to alpine meadows (see below).

GEOGRAPHICAL DISTRIBUTION: Chile, administrative regions from Region de Antofagasta to Region Metropolitana.

ECOLOGY: Flowering Sep-Nov; elevation from sea level to 2200 m; grows in a great diversity of habitats from coastal dunes to alpine meadows. Hosts: *Cistanthe* and *Montiopsis* (Montiaceae), *Corrigiola* (Caryophyllaceae), *Cristaria* (Malvaceae), *Fagonia chilensis* Hook. & Arn. (Zygophyllaceae), *Gutierrezia resinosa* (Hook. & Arn.) S.F. Blake and *Hypochaeris glabra* L. (Asteraceae), *Nolana* (Solanaceae), *Plantago hispidula* Ruiz & Pav. (Plantaginaceae), *Tetragonia* (Aizoaceae).

SPECIMENS EXAMINED: CHILE. [Unspecified locality], Desert of Atacama, IX-X-1890, T. Morong 1163 (MO). Región de Antofagasta, prov. Antofagasta, caleta El Cobre, 24°15'LS-70°33' LW, 1-X-1987, S. Teillier 498 (CONC, SSUC, SGO). Cruce de entrada a Taltal, 27-X-1987, M. Muñoz & I. Meza 2272 (CONC). Prov. El Loa, Negrillar, 2900 m, 18-X-2015, R. Lund SGA-18-098 (CONC). Región de Atacama, prov. Copiapó, quebrada El Morado, 23-X-1971, C. Marticorena, R. Rodríguez & E. Weldt 1788 (CONC). Ca. 40 Km S of Copiapó along highway 5, 27°30'S, 70°30'W, 6-X-1991, C. M. Taylor, C. Von Bohlen & A. Marticorena 10777 (CONC, MO). Hacienda Castilla, 27°53'S, 70°41'W, 28-X-1965, F. Behn s.n. (CONC 47834). Cerro Bandurrias, X-1888, H. Gunckel 8763 (CONC, SGO). Zwischen Caldera und Copiapó, 27°15'S, 70°50'W, 12-XI-1987, K. H. Rechinger & W. Rechinger 63632 (B). Monte Amargo, 200 m, XI-1924, E. Werdermann 464 (G, K, MO, S, SI). Travesía, al N de Vallenar, 5-X-1966, A. Kohler 533 (CONC). Llano de Chacritas, entre Vallenar y Copiapó, 28°23'S, 70°42'W, 638 m, 5-XI-1969, C. Jiles 5265a (CONC). Prov. Huasco, Km 29 al N de Vallenar, 19-IX-1983, M. Muñoz 1841 (SGO). Llano de La Jaula, frente a sierra Los Nichos, 2-XI-1991, M. Muñoz, S. Teillier & I. Meza 2914 (SGO). 15 km M Vallenar, 28°35'S, 70°16'W, 4-XI-1987, K.H. Rechinger & W. Rechinger 63326 (B). Vallenar: embalse Santa Juana, 28°34'S, 70°45'W, 585 m, 10-XII-1991, F. Saavedra 476 (SGO). Isla Guacolda, 5-15 m, 26-X-1938, C.R. Worth & J. L. Morrison 16235 (K, MO, S, WTU). Entre Vallenar y Copiapó, 16-X-1961, A. Garaventa 4259 (CONC). Vallenar, 825 m, 27-VIII-2015, P. Medina PM362 (CONC). Región de Coquimbo. Prov. Elqui, Coquimbo, 1839, Gay s.n. (G, MO). Prov. Limarí, Morrillos, 30-X-1966, A. Kohler 588 (CONC). 1 Km W on the road to P.N Fray Jorge, 30°37'S, 71°33'W, 200 m, 4-XI-2006, E.J. Tepe, A. Marticorena & P.B. Pelsler 1732 (CONC,

MO). Región de Valparaíso. Prov. Valparaíso, Valparaíso, 10-XI-1895, A. Brenning 91 (B, NY). Valparaíso, Laguna Verde, 500 m, 14-XI-1937, Andreas 77 (B, NY). Valparaíso-Limache, al este del Huinca, 17-X-1916, F. Behn s.n. (CONC 22317). Concón, en dunas, 19-X-1966, A Kohler 578 (CONC, SGO). Prov. Petorca, carretera Panamericana, 8 km N del puente Guaquén, 15-XII-1971, C. Marticorena, R. Rodríguez & E. Weldt 1319 (CONC). Prov. San Antonio, Santo Domingo, El Yali, 20 m, 12-XII-2000, M. K. Arroyo 203-102 (CONC). Región Metropolitana de Santiago. "Sant Jago in collibus", no date, Philippi s.n. (F, MO). Cerro San Cristóbal, 1917, C. Skottsberg & I. Skottsberg 995 (F, S). Cerro Blanco, 16-XI-1900, G. T. Hastings 154 (US). Prov. Melipilla, Curacaví, quebrada Maquehua, 280-380 m, 11-XII-2020, S. Teillier, J. Delaunoy & R. Trincado 8618 (CONC). Prov. Maipo, Reserva Altos de Cantillana, 430 m, 7-XII-2018, S. Teillier, J. Macaya, J. Delaunoy & F. Romero 8720 (CONC).

4. *Cuscuta rustica* Hunz., Darwiniana 7: 328, Fig. 2 (1947). (Holo)type: Chile, de Juntas del Toro a Las Hediondas, depto. Elqui, prov. Coquimbo, 24 Mar 1938, K. À. Pérez-Moreau s.n. (BA 23333). Hunziker (1947) indicated in the protologue that the host of the type specimen was *Sphaeralcea* sp., at an elevation of 4000 m. A closer inspection of the type specimen revealed that the host was *Cristaria andicola* Gay, which is not growing above 3000 m elevation. Fig. 2, I-O.

Stems medium, yellow. Inflorescence corymbiform-paniculiform; pedicels 1.5–6.2 mm long. Flowers 5-merous, 3.8–5 mm long, membranous, white when fresh, creamy when dried; papillae present on the apices of corolla lobes; laticifers visible especially in the calyx; calyx 2–3 mm long, yellow-brown, not reticulate or glossy, cupulate, 1/2–3/4 as long as the corolla tube, divided ca. 1/2–2/5 the length, tube 0.8–1.4 mm long, lobes 1.2–2 mm long, not or only barely overlapping at base, ovate, margins entire, apex obtuse or sub-acute in the same flowers; corolla 3.4–4.8 mm long, tube 2.2–2.7 mm long, campanulate but becoming globose in fruit, lobes 1.2–2 mm long, reflexed, shorter to equalling the tube, triangular-ovate to oblong, overlapping at base, margins entire, apex sub-acute or sub-obtuse, ± cucullate; stamens exerted, anthers 0.6–1 × 0.4–0.7 mm, broadly elliptic to oblong, filaments 0.3–0.4 mm long; infrastaminal scales 2–3 mm long, equalling or slightly exceeding corolla tube, ovate to oblong, bridged at 0.5–0.8 mm, moderately fringed, fimbriae 0.15–0.3 mm long; styles 0.6–1.5 mm long, shorter than the ovary, thin, cylindrical; stigma globose, lobed or not. Capsules very thin and irregularly dehiscent at the base, 2–2.4 × 3–5 mm, globose to globose-depressed, slightly

risen around the moderate interstylar aperture, translucent, completely surrounded by the withered corolla. Seeds 2–3 (–4) per capsule, 1–1.6 × 1.2–1.4 mm, angled, broadly-elliptic to round; hilum area 0.25–0.4 mm in diameter, scar 0.07–0.14 mm long.

NOTE: Hunziker (1947) did not mention *C. micrantha* among the similar species he compared *C. rustica* with but acknowledged a morphological likeness with *C. suaveolens*. There is no doubt that *C. rustica* is part of the difficult *C. micrantha* species complex. In particular, it morphologically resembles the large-flowered forms of *C. micrantha* from the Atacama Region with subacute or obtuse corolla and calyx lobes, from which it differs in the stamens with larger anthers and the irregularly dehiscent capsules.

GEOGRAPHICAL DISTRIBUTION: Chile, Coquimbo, prov. Elqui.

ECOLOGY: Flowering in Feb-Mar. Occurs at high elevation, 3000–3300 m, and it parasitizes *Adesmia* and *Cristaria*. The label of the *Squeo* 88126 (see below) indicated that *C. rustica* was uncommon at the collection site. Combined with the very limited distribution area the taxon likely requires conservation.

SPECIMENS EXAMINED: CHILE. Región de Coquimbo, prov. Elqui. Canchas de sky, 29°51'S, 70°03' W, 3200–3300 m, 22-II-1988, F. Squeo 88-126 (CONC).

5. *Cuscuta pauciflora* Phil., Linnaea 33: 185. 1864. Type: Chile: Ancud, on *Myrtus nummularia*, 1858, *Philippi* s.n. (Holotype: SGO; isotype: GH). Fig. 3, S–V. *C. pusilla* Phil.exYunck., Mem. Torrey Bot. Club 18: 151. 1932. TYPE. Chile, Valdivia, Los Lagos, *Philippi* s.n. (isotype: MO; the holotype cited by Yuncker (1932) from B was apparently destroyed).

Stems slender, orange. Flowers solitary or in fascicles of 2–3; pedicels 3–5 (–7) mm long. Flowers 5-merous, 2.5–3.2 mm long, membranous, white when fresh, creamy-brown when dried; papillae absent; calyx 1.2–1.5 mm long, brownish, not reticulate or glossy, ± membranous, campanulate, 3/4 to equalling the corolla tube, divided ca. 1/2–2/3 the length, tube 0.4–0.6 mm long, lobes 0.6–1.1 mm long, not overlapping at the base, triangular to ovate, margins entire or irregular, apex rounded to subacute; corolla 2.2–3 mm long, tube 1.3–1.8 mm long, initially campanulate but becoming globose at fruiting, lobes 1.1–1.3 mm long, slightly spreading or patent, equalling or slightly shorter than the tube, triangular, not overlapping, margin entire, apex acute (rarely subacute),

± inflexed; stamens not exerted, anthers 0.4–0.6 × 0.3–0.5 mm, subround to broadly ovate, sometimes apiculate, filaments 0.5–0.9 mm long; infrastaminal scales 1–1.8 mm long, slightly shorter to equalling corolla tube, ovate to oblong, bridged at 0.5–0.7 mm, fimbriae 0.1–0.3 mm long; styles 0.4–1 mm long, shorter than the ovary, thin, cylindrical. Capsules indehiscent, 2–3 × 2.2–3.2 mm, globose-obovoid, slightly depressed, not thickened or risen around the medium-sized interstylar aperture, translucent, surrounded by the withered corolla. Seeds (1–)2–4 per capsule, 1.1–1.4 × 1.1–1.2 mm, angled, broadly-elliptic to subround, hilum area 0.4–0.55 mm in diameter, scar 0.11–0.15 mm long.

NOTE: Yuncker (1923, 1932) initially placed *C. pauciflora* in synonymy with *C. micrantha* (var. *micrantha*) but subsequently reconsidered (Yuncker 1943) and indicated the former is “the same” as *C. pusilla*, a binomial over which it has priority. As Yuncker (1943) indicated, *C. pauciflora* is separated “with some difficulty” from *C. micrantha*. The main differences consist in flowers that are solitary or in cymose fascicles with only 2–3 flowers, pedicels are longer and corolla lobes have inflexed apices.

GEOGRAPHICAL DISTRIBUTION: Chile, in the Regions of Araucanía and los Ríos. The species was also collected in Argentina at Río Negro and Santa Cruz (known from only 2 specimens).

ECOLOGY: Flowering Dec–Feb; hosts: *Arenaria serpens* Kunth (Caryophyllaceae) and *Azorella trifoliolata* Clos (Apiaceae).

SPECIMENS EXAMINED: CHILE. Región de la Araucanía, prov. Cautín, Villarrica, II-1854, W Lechler 1395 (K). Región de los Ríos, prov. Valdivia. “Valdivia”, II-1888, Philippi s.n. (K, SGO). Panguipulli, 140 m, XII-1927, E. Werdermann 1884 (B, US). Panguipulli, 9-I-1928, H. Gunckel 2125 (SI); Las Mulatas, Valdivia, Jan 1929, A. Hollermayer 515 (CONC). Neltume: Reserva Huilo Huilo, sector pampa Pilmaiquén, laguna de Los Patos, 39°54′38″S 71°53′37″W, 750 m, 18-II-2011, S. Teillier, J. Delaunoy & C. Bonnemaïson 6659 (CONC, WLU). Neltume: Reserva Huilo Huilo, sector pampa Pilmaiquén, laguna de Los Patos, 39°54′38″S 71°53′37″W, 750 m, 12-II-2012, S. Teillier, J. Delaunoy & C. Bonnemaïson 7430 (CONC).

6. *Cuscuta suaveolens* Ser., Ann. Sc. Phys. Nat. Agric. et Indust. 3: 519–520. 1840. Type: “*Cuscuta suaveolens*” (LYJB 010230). Seringe described *C. suaveolens* from an alfalfa (“luzerne”) crop cultivated in Bresse, Lyon grown from Chilean seeds. No illustration was provided and no specimen mentioned. A search at Jardin Botanique de Lyon where some of the Seringe’s collections are currently

preserved, revealed three specimens of *C. suaveolens* parasitizing alfalfa (*Medicago sativa*). These specimens possess only a hand-written identification label, and no collection information. Frédéric Danet, Collections Manager at LYJB indicated that these collections are original Seringe specimens, and the labels bear his handwriting. Thus, one of them has been selected here as a type. According to Seringe, the flowers possess a pleasant fragrance, hence the specific epithet. Fig. 1, H–N.

Stems medium, yellow or orange. Inflorescences corymbiform; pedicels 1.5–6 mm long. Flowers 5-merous, 3–5 mm long, membranous, white when fresh, light-brown-creamy when dried; papillae absent; laticifers visible in the calyx and corolla; calyx 1.4–2 mm long, light-brown-creamy, not reticulate or glossy, membranous, broadly-campanulate to cupulate, ca. 1/2 as long as the corolla tube, divided ca. 2/3 the length, tube 0.4–0.6 mm long, lobes 0.8–1.4 mm long, not overlapping at the base and forming V-shaped sinuses, ovate-triangular, margins entire, apex acute to subacute; corolla 2.8–4.6 mm long, tube 2–2.6 mm long, campanulate but becoming globose in fruit, lobes 1.2–1.6 mm long, spreading, shorter than the tube, ovate-triangular, slightly overlapping at the base, margin entire, apex acute, ± inflexed; stamens exerted, anthers 0.6–0.9 × 0.4–5 mm, broadly-elliptical, filaments 0.6–0.8 mm long; infrastaminal scales 1.5–2.2 mm long, shorter to equalling corolla tube, oblong, bridged at 0.7–1 mm, fimbriae numerous, 0.25–0.45 mm long; styles 1.2–2.3 mm long, shorter to equalling the ovary, thin, cylindrical. Capsules indehiscent, 2.4–2.8 × 2.5–3 mm, ± globose, not thickened or risen around the medium to large interstylar aperture, translucent, entirely enveloped by the withered corolla. Seeds 1–4 per capsule, 1.3–1.5 × 1.2–1.4 mm, angled, broadly-elliptic to subround, hilum area 0.4–0.5 mm in diameter, scar 0.1–0.2 mm long.

GEOGRAPHICAL DISTRIBUTION: Chile, from Región de Arica y Parinacota to Región de los Lagos. The species was also dispersed worldwide with contaminated legume seeds in the 19<sup>th</sup> century (and it was described from France). However, after this historical wave of introductions outside Chile, it has currently naturalized only in Australia.

ECOLOGY: Flowering Oct–Apr; elevation 20–2250 m. Hosts: *Baccharis*, *Daucus carota* L., *Hypochoeris*, *Medicago sativa*, *Persicaria*, *Phyla nodiflora* (L.) Greene, *Solanum* sp. *Trifolium pratense* L.; Flowers are fragrant (“olor de miel”).

SPECIMENS EXAMINED: CHILE. [No region specified] “Chili”, 1845, Bertero 940 & 201 (MO); IV-1828, Bertero 205 (MO). Región

de Arica y Parinacota., prov. Arica, valle de Codpa, 2000 m, 10-IV-1974, J. F. Castillo 98-74 (SGO). Valle de Codpa, 2000 m, 15-III-1949, F. Sudzuki 615 (SGO). Lluta, 35 Km NE Arica, 30 m, 23-II-1939, W. J. H. Eyerdam 24649 (G, MO). Valle de Azapa, 18°30'S, 69°45'W, 840 m, 22-III-1987, O. Matthei & R. Rodríguez 350, 376 (CONC). Región de Tarapacá, prov. Tarapacá, quebrada de Tarapacá, 10-III-1948, 1410 m, F. Sudzuki 584 (SGO). Región de Atacama (erroneously indicated in the label as Región Antofagasta), prov. Atacama, Potrerillos, quebrada Agua Dulce, 10-I-1966, 2500 m, O. Zöllner 988 (CONC). prov. Copiapó, Puerto Viejo, en la desembocadura del río Copiapó, 26-XI-1941, 60 m, E. Pisano & R. Bravo 849 (SGO). Copiapó, 24-I-1959, R. Acevedo s.n. (SGO 134017). Piedra Colgada, 29-X-1956, M. Ricardi & C. Marticorena 3681 (CONC). Camino al salar de Maricunga, Km 71, 2450 m, 31-I-1963, M. Ricardi, C. Marticorena & O. Matthei 559 (CONC). Km 8, río Chollay, 2050 m, 17-I-1994, G. Arancio, F. Squeo & P. León 94-112 (CONC). 25.8 Km E of mina de Baritina entrance, 2260 m, 7-II-1988, C. Marticorena, T. Stuessy & M. Baeza 9833 (CONC). Región de Coquimbo, prov. Elqui, La Higuera, 1886, Frank s.n. (SGO 042077). Región de Valparaíso, prov. Quillota, Quillota, II-1884, E. Moore s.n. (SGO 042086). Near Valparaíso, VI-1885, H.H. Rusby 2000 (NY). Prov. Petorca, Zapallar, quebrada grande en la playa, 9-IV-1918, K. Behn 22319 (CONC). Región Metropolitana, prov. Santiago, "St Jago", II-1839, C. Gay 449 (MO). Santiago, 1-XII-1954, E.M.L. Kausel s.n. (F 1519491). Región del Maule, prov. Linares, San Javier de Loncomilla, P. Ortega s.n. 1886 (SGO 054170). Región Ñuble, prov. Punilla, San Carlos, camino Recinto-Chillán, fundo Pomuyeto, 9-II-1959, O. Matthei 26995 (CONC). Prov. Diguillín, camino a las termas, fundo Rosario, 16-I-1959, O. Matthei 26996, 27007 (CONC). Región del Biobío, prov. Arauco, Contulmo, Feb 1913, F. Johow s.n. (CONC 60804). Prov. Concepción, laguna Grande de San Pedro, 36°50'S, 73°06'W, 10 m, 16-III-1988, R. Castillo 86798 (CONC). Camino de Concepción a Florida, 2 km de Puchacay, 36°48'S, 72°59'W, 20 m, 20-III-1979, E. Ugarte 63 (CONC). Camino de Concepción a Santa Juana, cerro Mitrinhue, 36°59'S, 72°58'W, 21-II-1962, C. Marticorena 62 (CONC). Región de los Ríos, prov. Valdivia, "Prope urbem Valdivia", [no date], R. F. Hohenacker 479 (B, NY, UPS). Quinchilca, III-1942, A. Hollermayer 515 (CONC). Región de los Lagos, prov. Osorno, Trumao, vega del río Bueno, III-1936, A. Hollermayer 515 (CONC).

7. *Cuscuta werdermannii* Hunz., Darwiniana 7: 326, Fig. 1 f-i. 1947. Type: Chile, Prov. Coquimbo, La Serena, 30 m, Nov 1925, *Werdermann* 880 (holotype: SI!; isotypes: BM, CONC!, G!, GH!, K!, LIL!, MO!, SGO!). Hunziker (1947) described as a new species *C. suaveolens* var. *papillata*

using the same herbarium specimen as a type (see below). Fig. 1, O-R.

*Cuscuta suaveolens* var. *papillata* Yunck., Mem. Torrey Bot. Club 18: 150. 1932. Type: Chile: Prov. Coquimbo, La Serena, 30 m, Nov 1925, *Werdermann* 880 (holotype: SI! isotypes: BM!, CONC!, G!, GH!, K!, LIL, MO!, SGO!).

Stems medium, orange. Inflorescences lax, corymbiform and usually confluent; pedicels 2–6 mm long. Flowers (4–)5-merous, 2.4–3 mm long, fleshy, white when fresh, reddish-brown when dried; papillae present on pedicels; laticifers visible in the calyx and corolla; calyx 1.3–1.6 mm long, reddish-brown, not reticulate or glossy, fleshy at base with a ring of multicellular protuberances bearing stomata, cupulate, 3/4 to equaling corolla tube, divided ca. 2/3 the length, tube 0.3–0.5 mm long, lobes 0.8–1.1 mm long, not overlapping at the base, triangular, margins entire, apex acute to subacute; corolla 2–2.8 mm long, tube 1.2–2 mm long, campanulate, lobes 1–1.6 mm long, initially erect, later spreading, equalling or longer than the tube, triangular, not overlapping, margin entire, apex acute, usually ± inflexed; stamens exerted, anthers 0.5–0.7 × 0.4–5 mm, broadly-elliptical, filaments 0.4–0.5 mm long; infrastaminal scales 1.2–2 mm long, equalling corolla tube, oblong, bridged at 0.4–0.6 mm, fimbriae numerous, 0.15–0.3 mm long; styles 0.8–1.5 mm long, equalling or longer than the ovary, thin, cylindrical. Capsules indehiscent, 2–2.5 × 2.2–2.5 mm, globose or slightly depressed, not thickened or risen around the medium to large interstyler aperture, not translucent, surrounded by the withered corolla. Seeds 3–4 per capsule, 1.1–1.3 × 1–1.1 mm, angled, subround, hilum area 0.4–0.6 mm in diameter, scar 0.1–0.2 mm long.

NOTE: *Cuscuta werdermannii* is known only from the type collection, which is fortunately of good quality and has numerous duplicates, which allowed both molecular phylogeny studies (Stefanović *et al.* 2007; García *et al.* 2014) and a detailed morphological examination. It resembles *C. suaveolens*, but it has a fleshy ring with stomatiferous protuberances (SPs) at the base of the calyx. SPs at the base of the calyx are known in S. America only from *C. yunckeriana* Hunz., an enigmatic species described from Argentina, which is also known only from its type (Hunziker 1947). SPs on the flowers are diverse morphologically and have systematic significance in several sections of the subgenera *Grammica* and *Cuscuta* (Clayson *et al.* 2014). SPs evolved in species that grow areas with a marked dry season, for example, in Mexico and southern U.S.A. (Costea *et al.* 2011a, 2011b, 2013) and Brazil (Costea *et al.* 2021). The water loss through the SPs stimulates the hosts to absorb more water by increasing the

negative pressure/tension in the xylem of the host, via the haustorial connection (Clayson *et al.* 2014).

**GEOGRAPHICAL DISTRIBUTION:** Known only from Punta Teatinos, on the Coquimbo littoral, some 13 km north of La Serena. The locality is frequently visited by botanists, but the species has not collected again, which suggests *C. werdermannii* may be extinct.

**ECOLOGY:** Flowering in Nov; growing at low elevation; hosts unknown.

**SPECIMENS EXAMINATED:** CHILE: Región de Coquimbo, prov. Elqui, La Serena, Punta Teatinos, 30 m, XI-1925, E. Werdermann 880 (CONC).

III. *Cuscuta* sect. *Subulatae* (Engelm.) Costea & Stefanović, Syst. Bot. 40(1): 279. 2015.

Section *Subulatae* includes 30 species, and it is the largest clade of subgenus *Grammica* (Costea *et al.* 2015a). This infrageneric lineage has diversified in South America, but two cases of long-distance dispersal to Africa are also known (García *et al.* 2014). The species present in Chile have large flowers with papillate infrastaminal scales; a prominent nectary ring at the base of the ovary, styles are thick, subulate, and capsules are circumscissile dehiscent. As an exception, *C. microstyla* has relatively small flowers (2.5–4 mm long) and indehiscent fruits.

8. *Cuscuta chilensis* Ker Gawl., Bot. Reg. 7: 603. 1821 (publ. 1922). Holotype: loc. cit., pl. 603, M. Hart del., pub. by J. Ridgway, 170 Piccadilly, Feb 1, 1822. The species was minutiously described based on a plant “introduced from South America” grown from seeds in the greenhouse of the British Horticultural Society using as a host *Basella alba* L. (*Basella rubra* L.) In addition to the good quality color illustration, pl. 603, published in 1922 which is considered here the type, Ker Gawler also indicated an “unnamed” specimen from the Banks Herbarium collected by Menzies from Valparaiso, which we have not been able to locate at BM, K or other herbaria. If this specimen were to be found, it would obviously be a better choice of type. Fig. 4, A–H.

*C. aurea* Phil., Anales Univ. Chile 90: 224. 1895. Later homonym (non Liebmann 1847). Type: Chile: San Javier de Loncomilla, 1886, *P. Ortega s.n.* (SGO 000003922!; GH 00054351!).

Stems medium to coarse, cream, yellow, orange, or purple-tinged. Inflorescences glomerulate to subglomerulate;

pedicels 0.5–1.4 mm long. Flowers 5-merous, 4.5–7 mm long, fleshy, white or with light purple shades when fresh, light-brown when dried; papillae present on fimbriae of infrastaminal scales; laticifers visible especially in the corolla; calyx 2.2–2.8 mm long, golden-brown, reticulate or glossy, membranous, campanulate to cupulate, 1/2–1/3 as long as the corolla tube, tube 1.1–1.3 mm long, lobes 1.3–1.5 mm long, overlapping at the base, broadly-ovate to oblate, margins entire, apex obtuse to acute; corolla 4.4–6.8 mm long, tube 3–4.6 mm long, cylindrical but becoming urceolate in fruit, lobes 1.2–2.2 mm long, initially erect, later spreading, 1/4–1/3 the tube, broadly ovate to lanceolate, overlapping at the base, margin entire, apex obtuse to acute, not inflexed or cucullate; stamens partially exerted when corolla lobes become reflexed; anthers 0.9–1.4 × 0.4–0.5 mm, oblong; filaments 0–0.1 mm; infrastaminal scales 2.2–3.2 mm long, 1/2 to nearly equalling corolla tube, oblong-ovate, bridged at 1–1.5 mm, fimbriae papillate very numerous on 2–3 rows, 0.28–0.5 mm long; styles 1.2–2.2 mm long, equalling the ovary, stout and subulate; stigmas large, globose, ± lobed. Capsules dehiscent, 2–3 × 3–4 mm, ± globose-depressed, not thickened or risen around the small interstyler aperture, translucent, entirely enveloped by the withered corolla. Seeds 1–3 per capsule, 1.4–1.7 × 1.4–1.8 mm, angled, subround to round, hilum area 0.3–0.5 mm in diameter, scar 0.1–0.2 mm long.

**NOTE:** *Cuscuta chilensis* is much more variable than described by Yuncker (1921, 1932). Among the variations encountered are the apices of calyx and corolla lobes, which can vary from obtuse to acute; the calyx reaching 1/3–1/2 of the length of corolla tube. Infrastaminal scales are most commonly 1/2–3/4 as long as the corolla tube, but sometimes they reach the anthers. Flowers with shorter corolla tube can be mistaken with *C. odorata* from which it differs in the sessile or nearly sessile anthers.

**GEOGRAPHICAL DISTRIBUTION:** *Cuscuta chilensis* the most common and abundant species in Chile. It has also been reported from Argentina (Hunziker 1950), but its presence in this country is based on a single herbarium specimen, *Smith s.n.*, collected in 1890–1891 from prov. Mendoza (S).

**ECOLOGY:** Flowering Oct–Apr; elevation 10–2500 m. Present in numerous habitats from near sea level to alpine. The nectary ring surrounding the ovary is prominent and produces copious nectar. Flowers are fragrant, with honey scent, and are most likely pollinated by insects. The most common hosts are *Cestrum parqui* L’Hér, *Colliguaja odorifera* Molina, *Muehlenbeckia hastulata*, and different species of *Schinus*

(e.g., *S. polygama* (Cav.) Cabrera, *S. latifolius* Engl., *S. molle* L.), but also it grows on numerous other plants, both woody and herbaceous: *Adesmia*, *Azara*, *Bacharis*, *Bahia ambrosioides* Lag., *Colletia*, *Euphorbia collina* Phil., *Fabiana viscosa* Hook. & Arn., *Foeniculum vulgare* Mill., *Haplopappus*, *Lobelia excelsa* Bonpl., *Mutisia*, *Myrcianthes coquimbensis* (Barnéoud) Landrum &

Grifo, *Quillaja saponaria* Molina, *Retanilla trinervia* Hook. & Arn., *Solanum pinnatum* Cav., *Trevoa*, *Junellia illapellina* (Phil.) Moldenke. When it parasitizes woody plants, it can regenerate from haustorial tissue left inside the host during the previous vegetation cycle, and plants are thus perennial.

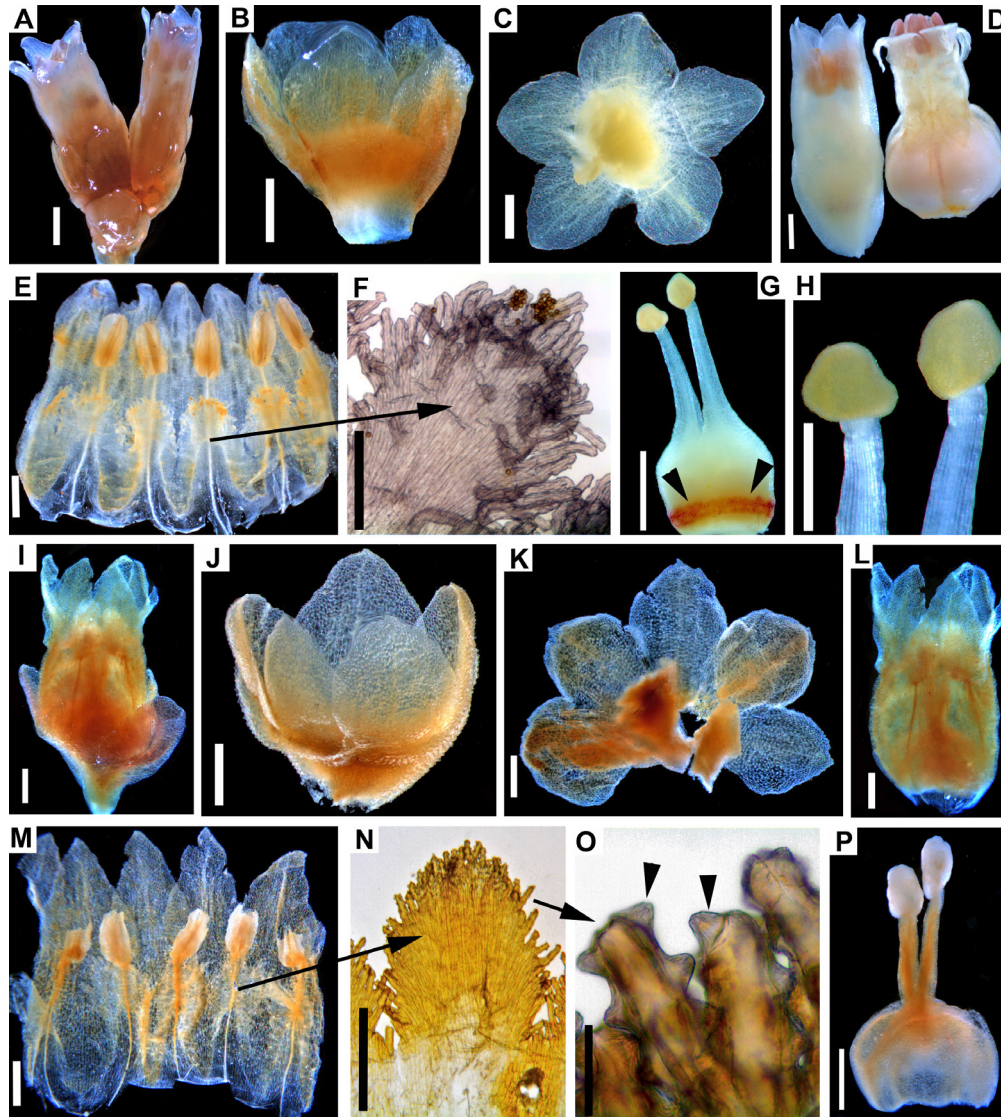


FIGURE 4. Morphology of *Cuscuta chilensis* and *C. purpurata* analyzed on rehydrated herbarium material. A-H: *Cuscuta chilensis* (Muñoz 4853, SGO). A: flower; B: calyx; C: calyx, dissected; D: variation of corolla, beginning of anthesis (left) and after fertilization (right); E: corolla, dissected; F: infra-staminal scale with papillate fimbriae; G: gynoecium; note ovary base with nectary ring (arrow); H: stigmas. I-P: *Cuscuta purpurata* (Muñoz et al. 1010, SGO): I: flower; J: calyx; K: dissected calyx; L: corolla; M: corolla, dissected; N: infra-staminal scale fimbriae with papillae; O: Detail of fimbriae (black arrows show papillae); P: gynoecium (note the elongated stigmas). Scale bars = 1 mm except in F = 500  $\mu$ m and O = 100  $\mu$ m. / Morfología *Cuscuta chilensis* and *C. purpurata* analizada a partir de material de herbario rehidratado. A-H: *Cuscuta chilensis* (Muñoz 4853, SGO). A: flor; B: cáliz; C: cáliz disecado; D: variación de la morfología de la corola, desde el comienzo de la anthesis (izquierda), hasta después de la fecundación (derecha); E: disección de la corola; F: escama infraestaminal con fimbrias papiladas; G: gineceo; se observa el ovario con el anillo nectarífero en la base del ovario (flecha); H: estigmas. I-P: *Cuscuta purpurata* (Muñoz et al. 1010, SGO): I: flor; J: cáliz; K: cáliz disecado; L: corola; M: disección de la corola; N: escama infraestaminal con fimbrias papilosas; O: Detalle de las fimbrias (las flechas negras señalan las papilas); P: gineceo (se observan los largos estigmas). Barras de la escala: = 1 mm excepto en F = 500  $\mu$ m y O = 100  $\mu$ m.

SPECIMENS EXAMINED: Región de Coquimbo, prov. Elqui, Punta de Teatinos, Coquimbo Bay, 20 m, 21-XI-1935, J. West 3924 (MO). Paihuano, 900 m, 27-IX-1948, F. Behn 22322 (CONC). Quebrada Amolanas, 31°12'S, 71°26'W, 260 m, 3-X-1948, C. Jiles 954 (CONC). Cuesta La Pelicana, 29°56'S, 71°00'W, 450 m, 7-II-1963, M. Ricardi, C. Marticorena, O. Matthei 739-B (B, CONC); 15-X-1963, C. Marticorena & O. Matthei 258 (CONC). Camino de la carretera Panamericana a Choros Bajo, Km 13, 21-X-1971, C. Marticorena, R. Rodríguez & E. Weldt 1685 (CONC). 1 Km N of the entrance to the El Tofo mine, 29°30'S, 71°15'W, 30-X-1991, C.M. Taylor, C. von Bohlen & A. Marticorena 10676 (CONC, MO). Prov. Limarí, cerro Tulahuén, 30°59'S, 70°42'W, 10-X-1948, C. Jiles 1079 (CONC). Serón, 8-III-1953, C. Jiles 356, 2370 (CONC). Barraza Bajo, 29-IV-1972, M. Ricardi, E. Weldt, & M. Quezada 4. (CONC). P.N. Fray Jorge, II-1979, N. Morales & A. Córdoba s.n. (SGO 138608; 18-VIII-1917, C. Skottsberg & I. Skottsberg 881 (NY, S). Prov. Choapa, caleta Oscuro, 31°25'S, 71°35'W, 5-50 m, 2-XI-1974, C. Marticorena, O. Matthei & R. Rodríguez 297, 301 (CONC). Along rd. to Illapel to Salamanca, 7 Km SE of Illapel, 575 m, 16-I-1989, T. G. Lammers, R. Rodríguez & C. M. Baeza 6365 (CONC). Illapel, cuesta del Espino, 1100 m, 17-I-1993, U. Eggli & B. E. Leuenberger 2242 (B, SGO). Batuco, 1500 m, 10-I-1998, D. Benyamini 470 (SGO). Región de Valparaíso, prov. Los Andes, Uspallata, 1903-2300 m, II-1903, O. Buchtien s.n. (NY, S, UPS). Cerro Pocuro [Calle Larga], 750 m, 17-X-1951, J. Salazar s.n. (CONC, 11604). Saladillo, 2200 m, 21-IV-1973, A. Castillo 4 (SGO). Prov. Marga Marga, cerca de Limache, [no date], G. Looser 2023 (NY). Limache, 20-II-1939, A.T. Hunziker 9393 (SI). Cerro La Campana, 7-I-1940, A. Garaventa 650 (CONC). Limache, 33°02'S, 71°17'W, 30-XI-1948, H.A. Senn 4517 (NY). El Granizo, near Olmué, 30-III-1956, K. Rahn & J. P. Hjertling 531 (MO). Prov. Petorca, Zapallar, 30-I-1920, E.W.D. Holway & M. Holway s.n. (NY). Zapallar, quebrada del Cajón, 100 m, 3-IV-1918, K. Behn (CONC 22318). Zapallar, quebrada del Tigre, 22-II-1952, O. Boelcke 6579 (F, MO); Papudo, above coastal cliffs, 33°30'21"S, 71°28'08"W, 10-XI-2006, E. J. Tepe, A. Marticorena & P. B. Pelsler 1926 (CONC). Prov. Quillota, Quillota, 1829, Bertero 940; Prov. San Antonio, dunas de Las Cruces, 19-X-1950, A. Pfister & M. Ricardi s.n. (CONC, 9725). Algarrobo, La Puntilla, 1-XI-1958, Kausel 4491 (SGO). Ca. 1-2 Km N of Algarrobo beach, 33°22'S, 71°40'W, near sea level, 25-III-1978, L. R. Landrum 3392 (ASU, F). Prov. de San Felipe, San Felipe, Feb 1937, [collector illegible] (SGO). Prov. Valparaíso, near Valparaíso, VI-1885, H.H. Rusby 2001 (NY); Valparaíso, 1895, Buchtien 4502 (NY). Quintero, Loncura, 20 m, II-1955, H. Gunckel 27414 (CONC). Valparaíso, slopes behind Jardín Botánico Nacional, 21-XI-1965, F. G. Meyer 9326 (MO). Región Metropolitana, prov. Cordillera, P.N. El

Morado, 33°49'S, 70°05'W, 14-I-1991, S. Teillier, L. Pauchard & P. García 2489, 2490 (SGO). Prov. Santiago, Santiago, cerro San Cristóbal, 15-XII-1900, G. T. Hastings 291 (NY). Salto de Conchalí, 26-X-1924, Looser 7470 (NY). Cerro San Cristóbal, 16-II-1931, Looser 1465 (NY). Farellones, 2000 m, 5-I-1947, B. Sparre 1772 (S). Salto de Conchalí, 17-X-1950, A. Pfister & M. Ricardi (CONC 10639). Curacaví, 550 m, 7-XII-1951, J. Frödin 92 (UPS); 7-XI-1951, J. Frödin 91 (UPS). Farellones, 2200 m, 27-I-1952, J. Frödin 506 (UPS). Cerro San Cristóbal, 12-XII-1954, C. Skottsberg s.n. (S). Rinconada de Lo Cerda, quebrada La Plata, 33°29'S, 70°54'W, 740 m, 2-XII-1960, F. Schlegel 3283 (CONC). Lo Barnechea, hills near Nido de Aguilas school, 33°30'S, 70°30'W, 550 m, 21-I-1978, L. R. Landrum 3073 (MO). Quebrada de La Plata, 18-VII-1979, Muñoz 1419 (SGO). Vitacura por avenida Manquehue, XII-1988, M. Muñoz 2389 (SGO). Callejón, 14-VI-1995, J. Arriagada s.n. (SGO 135193). Prov. Chacabuco, Caleu, III-1971, A. Troncoso s.n. (SGO 128154); Caleu, sendero Las Palmas, 21-I-2007, M. Muñoz 4853 (SGO). Región O'Higgins. Prov. Colchagua, La Rufina, Río Claro, 34°44'S, 70°46'W, 770 m, 3-I-1951, M. Ricardi s.n. (CONC 10047). Región del Maule, prov. Curicó, Radal Siete Tazas, 35°30'S, 71°W, II-1987, Valdés s.n. (SGO, 106102). Prov. Linares, S of Linares, along the road to Melado and Medina, 35°50-52'S, 71°10-20'W, 750-900 m, 21-I-1993 (MO). Linares, Reserva Nacional Bellotos del Melado, ladera, 35°51'25.8"S, 71°05'31.4"W, 1370 m, 4-I-2000, M.T.K. Arroyo, A. Humaña & M. Mihoc, 20-081 (SGO). Región de Ñuble, prov. Diguillín, 8 km antes de llegar a San Miguel [San Ignacio], 23-I-1959, O. Matthei 27003 (CONC). Chillancito, cerca de la laguna Avendaño, 36°46'S, 72°26'W, 70 m, 20-XII-1977, E. Oehrens s/n (CONC 47663). Región del Biobío, prov. Arauco, quebrada cerca de la desembocadura de los ríos Raquí y Tubul, 5 m, 23-XII-1949, M. Ricardi s.n. (CONC 9158). Prov. Biobío, cerros de San Lorenzo, 6-7-III-1949, P. Montaldo & H. Seeger 694 (SGO). Santa Julia, XII-1895, F.W. Neger 13288 (CONC). Prov. Concepción, Concepción, [no date], Mertens s.n. (B 10 0239732). Coelemu, río Itata, 25-I-1950, P. Montaldo 957 (SGO). Concepción, Rafael, 11-II-1959, 100 m, F. Torres s.n. (CONC 25803). Concepción, camino entre Hualqui y Rere, 5-I-1959, C. Marticorena, A. Mancinelli & F. Torres 41 (CONC). San Pedro, cerros detrás de la laguna Grande, 7-II-1965, M. Ricardi 5229 (CONC). Región de Araucanía, prov. Malleco, Angol, 1908, O. Kuntze s.n. (NY). Cordillera de Nahuelbuta, ca. 5 Km NW of Los Alpes, 35°42'S, 72° 58'W, 650-800 m, 17-III-1979, Rahn & Ødum 4733 (MO).

9. *Cuscuta odorata* Ruiz & Pav., Fl. Peruv. [Ruiz & Pavón] 1: 69, t. 105. 1798.

Type (lectotype selected by Yuncker 1932): "Peru,



Huanaro [Huánuco], ex Herb. Beroli (MO 2756981). This is the specimen that was also apparently studied and cited by Engelmann (1859). Four more Ruiz s.n. specimens were located, two of them originally from Herbarium Berlinense. The first one is currently found at B (10 0239790): [Peru] Peruvia-Huamica [Huánuco], Ruiz s.n. This is a fragment that Yuncker had removed from the original specimen destroyed in 1943 and subsequently returned by NY to B. The second is currently at HAL (115085). Finally, a Ruiz s.n. specimen is found at MA (814643): ex herbario Fl. Peruviana, anno 1828, Herb Ruiz & Pavón, which has a duplicate at F (843410). All these specimens, including Yuncker's lectotype are good quality with mature flowers, capsules and seeds. Fig. 5, A–F.

*Cuscuta intermedia* Choisy, Mém. Soc. Phys. Hist. Nat. Genève 9: 275. pl. 2. f. 3. 1841.

*Cuscuta fragrans* Rusby, Mem. Torrey Bot. Club 6: 85. 1896. Type. Bolivia, vic. Sorata, May 1892, Bang 1303 (holotype: NY! Isotypes: GH!, MICH!, M, MO!, NDG, NY!, PH, US!)

Stems medium to coarse, cream, yellow, orange or purple. Inflorescences glomerulate; pedicels 0.5–1.2 mm long. Flowers 5-merous, 5–6.5 mm long, fleshy, white to purple when fresh (the calyx can be dark-purple in some plants; corolla is white), light-brown when dried; papillae present on fimbriae of infrastaminal scales; laticifers visible especially in the corolla; calyx 2–3 mm long, golden-brown, reticulate or glossy, membranous, cupulate, 3/4 to equaling corolla tube, tube 1–1.5 mm long, lobes 1.3–1.6 mm long, broadly overlapping, wider than long, oblate, margins entire, apex obtuse; corolla 4.7–6.3 mm long, tube 2.5–3 mm long, globose, lobes 2.5–3 mm long, initially erect, later spreading, equaling or somewhat longer than the tube, broadly ovate, overlapping at the base, margin entire, apex obtuse, not inflexed or cucullate; stamens exerted, anthers 0.7–1.2 × 0.4–0.9 mm, broadly-elliptical; filaments 0.3–1.6 mm, thick subulate; infrastaminal scales 1.9–2.8 mm long, 3/4 to equaling the corolla tube, ovate, bridged at 0.9–1.2 mm, fimbriae very numerous on 2–3 rows, 0.2–0.5 mm long, papillate; styles 1.2–1.8 mm long, equaling or exceeding the ovary, stout and subulate; stigmas large, globose, trapezoidal, ± lobed. Capsules dehiscent, 2–3.3 × 3–4 mm, globose to globose-depressed, not thickened or risen around the small interstyler aperture, translucent, entirely enveloped by the withered corolla. Seeds 1–3 per capsule, 1.5–2 × 1.7–2 mm, angled, subround to round, hilum area 0.4–0.6 mm in diameter, scar 0.1–0.2 mm long.

NOTE: *Cuscuta odorata* is also a variable species; one variety,

*botryoides* was described by Engelmann (1859) and two by Yuncker (var. *holwayana* and var. *squarrolosa* in 1922 and 1932, respectively). Among these, var. *botryoides* does not grow in Chile and has recently been shown to be related to another group of species in section *Subulatae* (Costea et al. 2021). Despite the several varieties described, very few herbarium specimens are available from Chile. *Morong 1143* (US) collected from Atacama and cited by Yuncker for var. *odorata* (1932), is in fact *C. purpurata*. That leaves only the historical specimen Gay 815 (G) from Coquimbo as a voucher for var. *odorata*. Yuncker (1932) also cited Gay 37 from Coquimbo as a voucher for var. *holwayana*, but we could not locate this specimen (similarly, we could not find Gay 38 also cited by Yuncker 1932 for var. *odorata*). Among the few more recent specimens from Chile examined (see below), none fits typical *C. odorata* from Peru and Ecuador because the latter has longer staminal filaments. Until more material can be collected and examined comparatively with *C. odorata* from Ecuador, Peru and Bolivia, we refer here to a broadly defined *C. odorata*. The species can be mistaken with *C. purpurata* from which it differs in the rounded corolla lobes and globose stigmas. It can be also confused with forms of *C. chilensis* that possess a short corolla tube, from which it differs in the anthers with longer filaments.

GEOGRAPHICAL DISTRIBUTION: administrative regions of Antofagasta and Atacama; specimens of Coquimbo are only historical records. Present also in Ecuador, Peru and Bolivia.

ECOLOGY: Flowering Aug–Oct. In Chile it grows apparently at low elevations. Hosts are poorly documented; the records available showed *Encelia canescens* Lam. (Asteraceae), *Skytanthus acutus* Meyen (Apocynaceae) and *Nolana* (Solanaceae). As indicated by the specific epithet, flowers are odoriferous, but at least one herbarium label specified an unpleasant odour.

SPECIMENS EXAMINED: CHILE: Región de Antofagasta, prov. Antofagasta, quebrada Yumbes, al nivel del mar, 25-26-VIII-1992, J.C. Torres s.n. (SGO 128793). Quebrada Cascabeles, al N de Taltal, 16-IX-1947, 10 m, C. Muñoz & G.T. Johnson 2837 (SGO). 10.5 Km N of Paposo, La Rinconada, ca. 24°54'S, 70° 30'W, 200 m, 15-IX-1991, L.R. Landrum, G. Gutierrez & S.S. Landrum 7475 (ASU). Entre Paposo y El Cobre, ca. 20 km al norte de Paposo, 30 m, 25-XI-2002, J. V. Schneider & M. L. Huertas 2883 (CONC). Región de Atacama, Prov. Copiapó, a 50 km S., 600 m, 25-IX-1952, M. Ricardi 2227 (CONC). Prov. Huasco, Huasco, X-1866, [Philippi s.n.?] (SGO). Región de Coquimbo, 1839, Gay 815 (G 00135232).

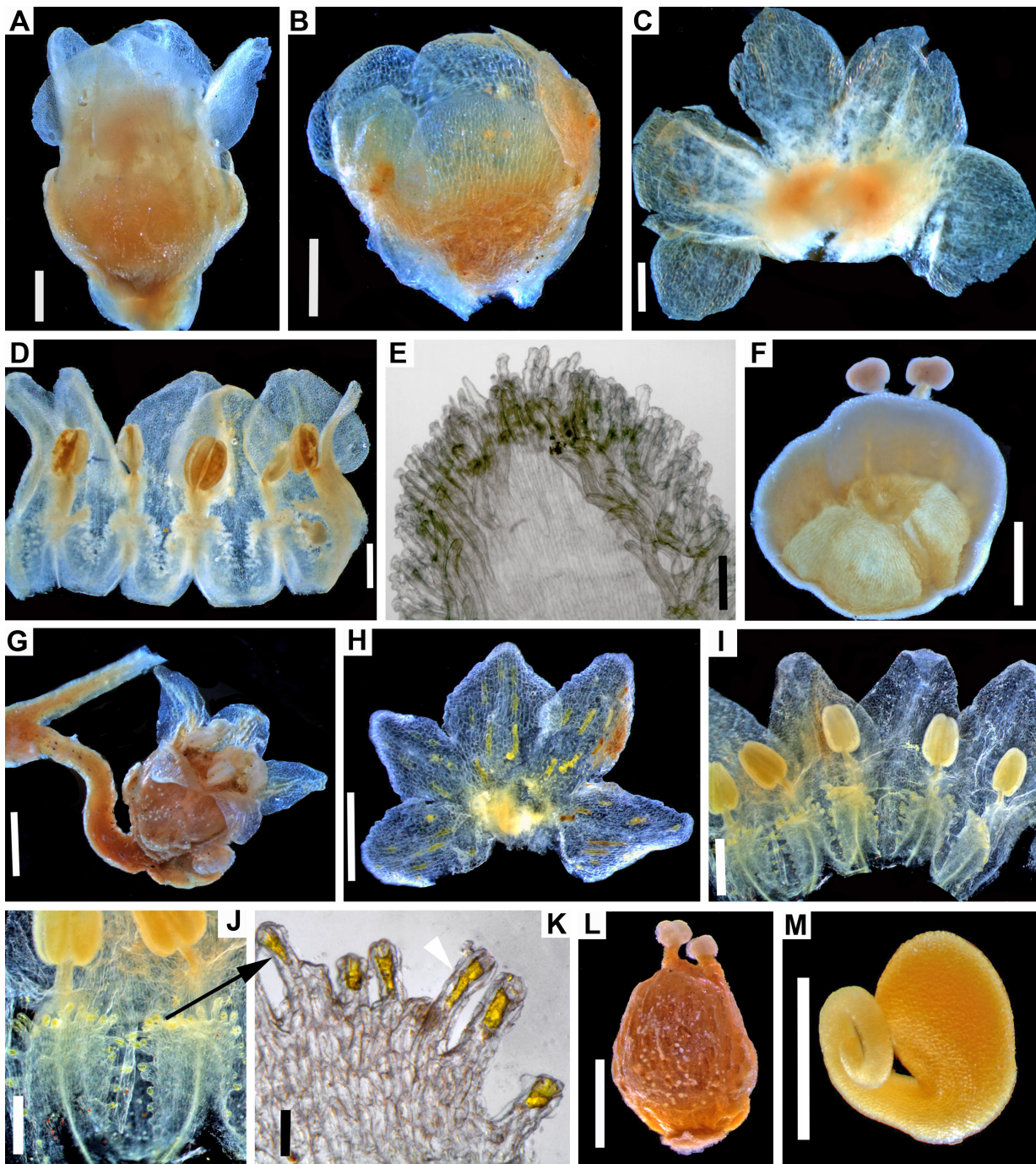


FIGURE 5. Morphology of *Cuscuta odorata* and *C. microstyla* analyzed on rehydrated herbarium material. A-F: *Cuscuta odorata* (Torres s.n., SGO). A: flower; B: calyx; C: calyx dissected; D: corolla dissected; E: infrastaminal scales with papillae on fimbriae; F: gynoecium. G-M: *Cuscuta microstyla* (G = Reynolds 95, the type, H-M = Muñoz *et al.* 3575, SGO); G: Flower; H: calyx, dissected; I: corolla dissected; J: infrastaminal scales; K: fimbriae of infrastaminal scales with yellow latex; L: gynoecium; M: embryo with radicle end globose-enlarged. All scale bars = 1 mm except J = 0.5 mm. / Morfología de *Cuscuta odorata* y *C. microstyla* analizada a partir de material de herbario rehidratado. A-F: *Cuscuta odorata* (Torres s.n., SGO). A: flor; B: cáliz; C: disección del cáliz; D: disección de la corola; E: escama infraestaminal con fimbrias papilosas; F: gineceo. G-M: *Cuscuta microstyla* (G: Reynolds 95, typus, H-M: Muñoz *et al.* 3575, SGO); G: flor; H: disección del cáliz; I: disección de la corola; J: escamas infraestaminales; K: fimbrias de las escamas infraestaminales con látex amarillo; L: gineceo; M: embrión con la radícula ensanchada y globosa en su parte terminal. Barras de las escalas = 1 mm excepto J = 0,5 mm.

10. *Cuscuta purpurata* Phil., Anales Univ. Chile 90: 225. 1895.

Yuncker (1932) tentatively indicated as a type a *Philippi* (s.n.) specimen at B from which he had removed a small fragment for study. The specimen at B was subsequently destroyed, but the fragment was returned to B in 1994 in an envelope on which Yuncker had written: "Type?: Col.: Philippi". The protologue, however, clearly indicated a different specimen: "*Loco Yerba Buena vallis Carrizal in Phredo Bridgesii legit orn, domina Rosario Godoi de Collao*". Thus, the type is: Chile. Prov. Atacama, valle Carrizal, Yerba Buena, 1885, *Rosario Godoi de Collao s.n.* (holotype SGO!, isotype: GH!). Fig. 4, I-P.

= *C. purpurata* f. *pallida* Yunck., Type: Chile, prov. Antofagasta, dep. Taltal, Alt. ca. 500 m, Oct 1925, *Werdermann 852* (holotype: B!; isotypes: MO!, SI, SI, US!).

Stems thin to medium, cream, yellow, orange or purple. Inflorescences glomerulate; pedicels 0.3–1.2 mm long. Flowers 5-merous, 5–7 mm long, fleshy, with white corolla and purple calyx when fresh, brown when dried; papillae present or absent on the calyx and corolla lobes, as well as on the infrastaminal scales; laticifers visible especially in the corolla; calyx 2.6–4 mm long, golden-brown, reticulate and glossy, membranous, cupulate, 3/4 to equaling corolla tube, tube 0.8–1.6 mm long, lobes 2–3 mm long, broadly ovate, wider than long, at least 2 or 3 lobes auriculate, margins entire, apex rounded; corolla 4.7–6.5 mm long, tube 2.2–4 mm long, campanulate to globose, lobes 2.2–2.6 mm long, initially erect, later reflexed, shorter to equaling or somewhat longer than the tube, broadly ovate to ovate-lanceolate, overlapping at the base, margin entire, apex acute to subacute, not inflexed or cucullate; stamens barely exerted, anthers 0.8–1.2 × 0.5–0.6 mm, broadly-elliptical to oblong; filaments 0.1–0.3 mm, thick subulate; infrastaminal scales 2–3.8 mm long, equalling the corolla tube, ovate, bridged at 0.5–1.5 mm, fimbriae on 1 rows (rarely on 2), 0.4–0.6 mm long, papillate; styles 1.2–2.2 mm long, equalling or exceeding the ovary, stout and subulate; stigmas large, ovoid or ellipsoid, convolute. Capsules dehiscent, 1.8–3 × 3–4 mm, ± globose-depressed, not thickened or risen around the small or medium interstyler aperture, translucent, entirely enveloped by the withered corolla. Seeds 1–3 per capsule, 1.6–2.8 × 1.7–2.5 mm, angled, broadly-elliptic to round, hilum area 0.5–0.7 mm in diameter, scar 0.1–0.2 mm long.

GEOGRAPHICAL DISTRIBUTION: Endemic to Chile, where it grows from the Region of Tarapaca to the Region of Coquimbo.

ECOLOGY: Flowering Sep-Dec; elevation 10–750 m, hosts: *Eremocharis fruticosa* Phil. (Apiaceae), *Skytanthus acutus*

Meyen (Apocynaceae), *Encelia canescens* Lam., *Ophyrosporus triangularis* Meyen, *Oxyphyllum ulicinum* Phil. (Asteraceae), *Heliotropium* (Boraginaceae), *Atriplex* (Chenopodiaceae), *Balbisia pedunculata* (Francoaceae), *Frankenia chilensis* (Frankeniaceae), *Lycium stenophyllum* J. Rémy, *Nolana* (Solanaceae).

SPECIMENS EXAMINED: CHILE. "Desert of Atacama", Sep-Oct 1890, T. Morong 1143 (US). Región de Tarapacá, prov. Iquique, camino de Huara a Cancosa, entre Pachica y Poroma, 3000 m, 2-IV-1961, M. Ricardi, C. Marticorena & O. Matthei 381 (CONC). Región Antofagasta, prov. Antofagasta, near Paso Malo [Mal Paso] N of Taltal, 28-XI-1925, I. M. Johnston 5170 (S). Taltal, 500 m, X-1925, E. Werdermann 852 (B, G, K, S). 10 Km E of Taltal, quebrada de Taltal, 75 m, 12-X-1938, C. R. Worth & J. L. Morrison 15799 (G, MO). Caldera, 10 m, 19-II-1939, A.A. Beetle 26113 (G, K, MO, S). Quebrada de La Cachina, 250 m, 3-XI-1941, E. Pisano & R. Bravo 623 (CONC, SGO). 7-15 Km N Taltal, 25°24'S 70°29'W, 7-11-1987, K.H. Reichinger & W. Reichinger 63509 (B). Quebrada El Rincón, 5 Km N Papos, 24°57'S 70° 28'12.7"W, 150 m, 2-X-2005, M. Muñoz 4676 (SGO). Papos, sector "El Gaucho", 25°26'S 70° 35'W, 50 m, 18-IX-1992, S. Teillier, P. Rundel & P. García 2915 (SGO). Región de Atacama, prov. Chañaral, Sierra Esmeralda, 1884, [¿Philippi?] (SGO 054160). P.N. Pan de Azúcar, quebrada Coquimbo, 26°09'S 70° 39'W, 160–200 m, 5-XII-1987, M.O. Dillon & S. Teillier 5104 (MO, SGO). P.N. Pan de Azúcar, 26°07'S 70° 25'W, 15-IX-1992, S. Teillier, P. Rundel & P. García 2741 (SGO). P.N. Pan de Azúcar, Las Lomitas, 26°01'S 70° 36'W, 720–780 m, 11 Nov 1997, M.O. Dillon & C. Trujillo 8004 (CONC, F, SGO). Prov. Copiapó, Morro de Copiapó, SW of Caldera, 10 m, 21-X-1938, C.R. Worth & J.L. Morrison 16189 (G, MO). Quebrada La Gertrudis, entre Totoral y Puerto Viejo, 290 m, 28-XI-1941, E. Pisano & R. Bravo 810 (CONC, SGO). Carretera Panamericana entre Caldera y Chañaral, km 18, 14-X-1965, M. Ricardi, C. Marticorena & O. Matthei 1299 (CONC). Panamericana norte, entre Caldera y Obispito, 4-X-1991, C. von Bohlen 1217 (SGO). Rte 1 N of Caldera, ca. 10 Km, 26°50'S 70° 45'W, 4-X-1991, C.M. Taylor, C. von Bohlen & A. Marticorena 10697 (CONC, MO). Prov. Huasco, cerro Bandurrias, X-1888, W. Geisse 8762 (CONC). Vallenar, embalse Santa Juana, 28°34'S 70° 45'W, 585 m, 10-X-1991, F. Saavedra 477 & 478 (SGO). Quebradita mano izquierda a 1 h desde Copiapó a Vallenar, 21-IX-1997, M. Muñoz, I. Meza & E. Barrera 1010 (SGO). Quebrada Honda, N de Carrizal Bajo, 12-X-2010, M. Muñoz 5132 (WLU); Quebrada desde Carrizal Bajo a Totoral, 12-X-2010, M. Muñoz 5135, 5136 (WLU); Quebrada al S de Bahía Salado, 13-X-2010, M. Muñoz 5144 (WLU). Vallenar, 853 m, 27-VIII-2015, P. Medina 3300 (CONC). Región de Coquimbo, prov. La Serena, mineral Los

Plomos, 16 Km al S de Tres Cruces, 900–1200 m, 3-XI-1949, W. Biese 2998 (SGO). Cuesta Porotos, ca. 30 Km N of La Serena, along coast, ca.50 m, 3-XII-1987, S.S. Landrum & L.R. Landrum 5671 (RSA). Isla Damas, 29°14'S 71° 31'W, 30 m, 31-VIII-2002, G. Arancio 14877 (CONC).

11. *Cuscuta microstyla* Engelm., Trans. Acad. Sci. St. Louis 1: 506. 1859. Holotype: Chile: on the Volcano of Antuco, Reynolds 95 (holotype: K!; Isotype: MO!). Fig. 5, G–M. *Cuscuta bicolor* Hunz., Revista Argent. Agron. 11: 71. 1944. Type: Argentina. Mendoza, Valle del Sosneado, Arroyo Bayo, a 2100 m, sobre *Chuquiraga oppositifolia*, 18 Feb 1942, A. Burkart, N.S. Troncoso and E. G. Nicora s.n. (Holotype: SI; Isotypes: CORD, LIL). *Cuscuta microstyla* var. *bicolor* (Hunz.) Hunz., Revista Argent. Agron. 14: 135. 1947.

Stems thin, yellow or orange. Inflorescences glomerulate but cymes have only 1–4 flowers; pedicels 0.4–0.9 mm long. Flowers 5-merous, 2.5–4 mm long, fleshy, yellow when fresh, light- to dark-brown when dried; papillae present on infrastaminal scales; laticifers visible in the calyx, corolla (yellow), and ovary (dark-colored); calyx 1.3–1.8 mm long, brown, not reticulate or glossy, fleshy, cupulate, 1/2–3/4 of the corolla tube, tube 0.5–0.8 mm long, lobes 0.9–1.2 mm long, triangular ovate, not overlapping at base or one lobe broader and slightly overlapping with neighboring ones; apex acute to sub-acute; corolla 2.2–3.8 mm long, tube 1.2–1.8 mm long, campanulate, lobes 1.3–2.2 mm long, initially erect, later spreading, equaling or somewhat longer than the tube, broadly ovate to lanceolate, slightly overlapping at the base, margin entire, apex acute, slightly cucullate; stamens exerted (at full anthesis), anthers 0.45–0.75 × 0.4–0.6 mm, broadly-elliptical; filaments 0.2–0.25 mm, thin; infrastaminal scales 1.4–1.7 mm long, equalling the corolla tube, oblong, bridged at 0.4–0.5 mm, fimbriae on a single row, 0.1–0.25 mm long with yellow latex; styles 0.1–0.3 mm long, much shorter than the ovary, stout and subulate; stigmas large, globose, convolute. Capsules indehiscent, 1.8–2.2 × 1.4–1.5 mm, ovoid, thickened and risen around the small interstyler aperture, not translucent, enveloped by the withered corolla. Seeds 1 per capsule, 1.2–1.4 × 1.1–1.3 mm, spherical, hilum area 0.3–0.4 mm in diameter, scar 0.11–0.14 mm long. Embryo globose-enlarged at the radicular end.

NOTE: *Cuscuta microstyla* is sister to the remaining species of sect. *Subulatae* (Stefanović *et al.* 2007; García *et al.* 2014) and possess some unusual morphological features. Flowers are delicate, fleshy, and disintegrate easily upon dissection.

Laticifers in the calyx and the infrastaminal scales have yellow latex; those on the ovary are dark-colored (latex is translucent in other species). The radicular end of the embryo is globose-enlarged and likely functions as a storage organ, a feature encountered only in the four species of sect. *Denticulatae* that grow in deserts from SW N America (Olszewski *et al.* 2020). Variety *bicolor*, a taxon not accepted here, was initially described by Hunziker (1947) as a species, *C. bicolor*. The diagnostic traits mentioned by Hunziker (1947) –the size of the flowers and anthers– vary continuously, as do the shape of calyx and corolla lobes overlapping with those of the type specimen.

GEOGRAPHICAL DISTRIBUTION: Andes from, Region de Coquimbo, Prov. Choapa to Region de O'Higgins, Prov. Cachapoal.

ECOLOGY: Hosts, *Berberis montana* Gay (Berberidaceae), *Adesmia gracilis* Meyen ex Vogel, *A. pinifolia* Gillies ex Hook. & Arn. (Fabaceae), *Ribes cucullatum* Hook. & Arn. (Grossulariaceae), *Acaena* (Rosaceae), *Galium* (Rubiaceae), *Guindilla trinervis* Gillies ex Hook. & Arn. (Sapindaceae), *Fabiana imbricata* Ruiz & Pav. (Solanaceae), *Tropaeolum polyphyllum* Cav. (Tropaeolaceae).

SPECIMENS EXAMINED: CHILE. Región Coquimbo: prov. Choapa, Céspedes, 1800 m, 31 X-1999, D. Benyamini 745 (SGO). Región Metropolitana de Santiago. prov. Cordillera, valle de Yeso, 2700 m, 18-I-1970, A. Vargas & F. Farah 80 (SGO). Lo Valdés, 2000 m, 10-II-1963, M. Ricardi, C. Marticorena & O. Matthei 815 (CONC). Valle del río Colorado (cajón del Maipo), 1600 m, I-1964, M. Riquelme s.n. (CONC 60803). Monumento Natural El Morado, 33°49'S, 70°05'W, 15 Jan 1991, S. Teillier, L. Pauchard & P. García 2488 (CONC, SGO). Cajón del Maipo, trayecto refugio Cruz de Piedra hasta Los Chorreados, 2400–2700 m, 18-II-1995, C. Villagrán, R. Villa & F. Hinojosa 8503 (SGO). Cajón del Yeso, base de la piedra "Pan de Pascua", 19-I-1995, M. Muñoz, A. Moreira, I. Meza & J. Arriagada 3575 (SGO). Cajón del río Maipo, cerca de la vega Los Chorreados, 34°06'S, 70°03'W, 3100 m, 20-I-2000, S. Teillier 4550 (CONC). Cajón del Colorado, El Alfalfal, 2100 m, 15-I-2000, S. Teillier 7956 (CONC). Prov. Maipo, cerro Cantillana, 33°50'S, 70°56'W, 435 m, 16-I-2003, A. Marticorena 651 (CONC). Prov. Santiago, Santuario de la Naturaleza Yerba Loca, 33°21'S, 70°19'W, 2200 m, XII-2000, M.T.K. Arroyo & A.M. Humaña 202340 (CONC). Región de O'Higgins: prov. Cachapoal, Machalí, cajón de Las Leñas, 1910 m, 20-I-1998, M.T.K. Arroyo 99-323 (CONC). Machalí, Reserva Nacional Río Los Cipreses, 2000 m, 13-I-2000, M.T.K. Arroyo 20-448 (CONC). Machalí, Reserva Nacional Río Los Cipreses, 2200 m, 30-I-2001, M. K. Arroyo 21-545 (CONC).

## CONSERVATION OF *CUSCUTA* IN CHILE

Similar to other countries (e.g., Costea & Tardif 2006; Costea & Stefanović 2009a), in Chile, all the *Cuscuta* species are placed in block on regulated weed lists (SAG 2013). This strategy assumes that all the *Cuscuta* sp. are potentially agricultural pests. However, although some species like *C. campestris* (indicated as "*C. pentagona*" in the documents of Servicio Agrícola y Ganadero, SAG 2013), are indeed noxious weeds that can cause significant yield losses in numerous crops (e.g., Costea & Tardif 2006), others are endangered or even extinct. Treating all the species as pests prevents the evaluation of their conservation status and the elaboration of conservation management strategies for the rare ones. Based on the very few herbarium specimens available, several *Cuscuta* species in Chile are in need of conservation. *Cuscuta werdermannii* is known only from the type specimens and considering that this material was collected nearly a century ago (1925) from area commonly frequented by botanists, it is possible that the species is extinct. *Cuscuta andina* and *C. rustica* are known from two herbarium specimens each, the most recent ones being decades old; *C. pauciflora* is known from under ten collections, most of them collected in Prov. Valdivia. If one would use GeoCAT (Bachman *et al.* 2011) or other similar tool to determine the conservation status of any of these species, for sure the result would be "Critically Endangered". In conclusion, we hope that this study will stimulate the search of these species in the wild and to determine their conservation status.

## ACKNOWLEDGEMENTS

We are indebted to all the curators and directors of the many herbaria that sent us loans or allowed visits to their institutions, especially Alicia Marticorena (CONC) and Jimena Arriagada (SGO). Mihai Costea is grateful to Mélica Muñoz and Sergio Moreira who kindly welcomed him in their home in January 2011 and organized different field trips throughout Chile in search of *Cuscuta*. This research was supported by NSERC of Canada Discovery grant to M. Costea (327013). To ANID project: PIA-FB210006-2021 for funding the second author.

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Received: 27.07.2022  
Accepted: 11.10.2022