

bathed lomas which has a very strong affinity with the flora of central Chile in which the main range of *C. glomerata* falls. Reiche treated *E. strictum* as a variety of *C. microcarpa*, but the characters he enumerates for it do not hold in light of the new material recently collected. While the plant has a fairly characteristic coarse gross habit and a very detached range it does not seem to be decisively separated from *C. glomerata*.

28. **C. alfalfalis** (Ph.), comb. nov. Annual, 3–4 dm. tall; stems stiff, subsimple or loosely and ascendingly long-branched, somewhat cinerous, finely appressed or spreading villous-hispid; basal leaves linear, becoming 6 cm. long; stem-leaves linear or lanceolate, obtusish, firm, 2–3 cm. long, 2–3.5 mm. broad, finely pustulate; cleistogamic flowers very numerous, solitary or glomerate in the leaf-axils or in small-bracted spikes terminating the stems and branches, calyx and fruit similar to those of the chasmogamic flowers; chasmogamic flowers very few, mixed with the cleistogamic flowers in the terminal solitary or geminate spikes; corolla not conspicuous, ca. 2 mm. broad; fruiting calyx ovate or oblong-ovate, 2–3 mm. long, subsessile; mature calyx-lobes narrowly lanceolate, connivent above, hirsute especially on the thickened midrib; flowers biovulate; nutlets 1–2, axial one always present and most persistent, ovate-oblong, somewhat compressed, 2.5–3 mm. long, 1.3–1.5 mm. broad, densely verrucose, apex acute, base truncate, sides acute, back obtuse, groove closed or open and broadly forked below; gynobase  $\frac{2}{3}$ – $\frac{3}{5}$  height of nutlets; style shortly but definitely surpassing the nutlets.—*Eritrichium alfalfalis* Ph. Anal. Univ. Chile xc. 525 (1895); Reiche, Anal. Univ. Chile cxxi. 831 (1908) and Fl. Chile v. 236 (1910). *E. rigidum* Ph. l. c. 529. *C. rigida* Reiche, l. c. 819 and l. c. 224.

CHILE. SANTIAGO: Rio Colorado, Jan. 1888, *Philippi* (MS, TYPE of *E. alfalfalis*; G, photo.); Rio Colorado, Jan. 1888, *Philippi* (MS, TYPE of *E. rigidum*; G, photo.).

The specific name suggests that the type of this species came from El Alfalfal, a locality on the Rio Colorado in the mountains about 40 km. east of Santiago. The two collections cited probably came from the same locality and represent merely ecological phases of one species. It is quite possible that the plants concerned represent merely very coarse forms of *C. glomerata*. The description given above is incomplete from lack of well developed spikes of chasmogamic flowers, both the cited collections being almost wholly cleistogamic.

29. **C. haplostachya** (Ph.), comb. nov. Erect slender annual ca. 1.2 dm. tall, with several well developed ascending branches, ap-

pressed short-hispid; leaves narrowly lanceolate, 1–1.7 cm. long, 2–3 mm. broad, sessile by a broad rounded base, scabrous, minutely pustulate, apex acute or acuminate; cleistogamic flowers solitary or glomerulate in all the leaf-axils; chasmogamic flowers in a dense short solitary terminal spike 1–1.5 cm. long; corolla ca. 2 mm. broad; fruiting calyx ovate, ca. 1.5 mm. long, subsessile; mature calyx-lobes linear or oblong-linear, densely villous, midrib scarcely developed; flowers biovulate; nutlets 2, opposite one another, firmly affixed, ovate, thick, ca. 1.7 mm. long, 1.5 mm. broad, minutely granulate and coarsely tuberculate, pale, apex acute, base obtuse, back convex or obtuse, sides acute, groove very narrow and broadly forking below; gynobase poorly developed, ca.  $\frac{2}{3}$  length of nutlets; style just surpassing the nutlets, short.—*Eritrichium haplostachyum* Ph. Anal. Univ. Chile xc. 537 (1895).

CHILE. ATACAMA: Piedra colgada, Sept. 1885, no collector given (MS, TYPE; G, photo.).

More material of this very distinct species is a decided desideratum. It is known only from the type, which is a small, very slender plant in full fruit. Its nearest relation is found in *C. calycotricha* of the Coquimbo region.

30. **C. calycotricha**, sp. nov. Annua ca. 1.5 dm alta basaliter laxaque pauciramosa; ramis ascendentibus delicate adpresseque brevi-hispidis; foliis adpresse hispidis minute pustulatis obtusis, inferioribus linearibus vel anguste oblanceolatis 3–3.5 cm. longis 3–5 mm. latis, mediis oblongis vel ovato-oblongis late affixis 1–2 cm. longis 5–10 mm. latis, superioribus paullo reductis; floribus cleistogamis in axillis foliorum glomeratis et in parte inferiori spicae productis; floribus chasmogamis albis 2.5–3 mm. latis in spicis geminatis 1–2.5 cm. longis congestis ebracteatis dispositis; calycibus fructiferis ovatis 4–5 mm. longis subsessilibus; lobis calycis linearibus vel oblongo-linearibus vel late lanceolatis obtusis dense molliter villosis fulvescentibus ascendentibus cum costa paullo prominenti; fructu biovulato; nuculis 2 anguste ovatis crassis 1.8–2.1 mm. longis brunneis dense tuberculato-granulatis sparse crasseque tuberculatis vel papillatis apice plus minusve acutis basi obtusis margine angulatis dorso obtusis saepe crasse carinatis, sulcis apicem versus clausis infra mediam in areolam triangularem profundam grandem abrupte ampliatis; gynobasi quam nuculae  $\frac{2}{3}$  longiori basim versus crassa medium et apicem versus abrupte contracta; stylo quam nuculae conspicue longiori.

CHILE. COQUIMBO: Frai Jorge, Dept. Ovalle, Sept. 21, 1893, *F. Philippi* (MS, TYPE; G, photo. and frag.).

A very distinct species apparently most related to *C. haplostachya* of the Caldera-Copiapó region but widely differing from it in habit. In the Philippi collections it was found determined as *E. capituliflorum*. Reiche reported that species from Frai Jorge apparently upon the basis of this misdetermination. The plant described and named above is most certainly not closely related to the high Andean *C. capituliflora*.

III. Section *GEOCARYA*.—This section is characterized by being amphicarpous, producing ordinary spikes of chasmogamic flowers and at the very base of the stem in the lowermost leaf-axils highly specialized cleistogamic flowers. The latter are commonly developed just below the surface of the ground. They are always biovulate, strongly compressed and at maturity become acutely ovate in outline and closely invested by the tough, much accrescent highly modified calyx. The calyx, commonly, is indehiscent, and has the throat conspicuously smaller than the broadly expanded proper tube which tightly invests the fruit. Frequently the mature calyx is strengthened by prominent ribs, these either simple and vertical, or irregularly anastomosing and loosely reticulate. These peculiar cleistogamic flowers at maturity become 3–9 mm. long, 2–5 mm. broad and 1–3 mm. thick. In order to distinguish them from the much simpler cleistogamic flowers developed in the section *Eucryptantha* I have restricted to them, in the present treatment, the term "Cleistogene." Little is known concerning the early growth of these highly specialized structures. In this paper I have described only their mature fruiting condition.

The section is a very natural one and apparently contains some of the most highly evolved members of the genus. With the exception of one high Andean species which occurs just over the Argentine border, the section is entirely Chilean with its center of distribution in the north-central part of the country. It seems to lend itself readily to classification, in fact the principal difficulties in its classification are those concerned with the proper delimitation of *C. linearis*.

#### KEY TO SPECIES.

- Plant a strong-rooted coarse perennial. *Alyssoides*.....31. *C. alyssoides*.  
 Plant definitely annual.  
 Root fleshy and spindleform. *Dimorphae*.  
 Spikes bracted; calyx-lobes linear.  
 Corolla 5–8 mm. broad; chasmogamic flowers 4-ovulate. 32. *C. involucrata*.  
 Corolla 2–5 mm. broad; chasmogamic flowers 2-ovulate. 33. *C. Volckmanni*.  
 Spikes bractless; calyx-lobes oblong.  
 Corolla 2–3 mm. broad; hairs on calyx straw-colored;  
 pubescence on stems loose.....34. *C. dimorpha*.