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A new species of *Cronisia* Berkeley (Corsiniaceae) from Mexico

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Abstract: A new species of *Cronisia* with sessile dorsal female involucres is described from Mexico. This plant, *C. mexicana*, is compared to *C. paradoxa* and to other species with similarly placed female involucres.

In the course of examining unidentified thalloid specimens collected in central Mexico more than 40 years ago by Dr. A.J. Sharp, an interesting specimen with large sessile dorsal female involucres was discovered. The plants have the aspect of *Oxymitra* (Oxymitraceae) but lack the stellate air pores and conspicuous lanceolate ventral scales characteristic of that genus. Two other genera, *Corsinia* and *Cronisia* (both Corsiniaceae), with sessile dorsal female involucres are known to occur in North America. Both *Oxymitra* and *Corsinia* are found in Mexico as well as Texas and adjacent states; *Cronisia* has been reported from Mexico and South America.

The Sharp collection from Mexico contained female thalli with sporophytes not yet fully mature. Spores were in the tetrad stage and the short elaters had few thickenings. The well developed foot of the sporophyte as well as the presence of such elaters establish a close alliance to *Cronisia*, with a single recognized species, *C. paradoxa* (Wils. & Hook.) Berkeley (see Vital, 1974). The vegetative characteristics however, differ from *C. paradoxa* and indicate a second species in the genus (Figure 1).

Cronisia mexicana sp. nov.

Thallus simplex vel bifurcatus, planoconvexus, 1-3 cm longus, 0.3-0.7 cm latus, 0.3 cm altus. Dorsalis cavernula cum simplicibus poris; filamenta chlorophyllosa e fundo cavernarum erecta, 3-6 cellulis composita. Squamae ventrales dupliciordine, lunatae cum appendicibus ramosis.

Dioica. Inflorescentia feminea in pagina superiore infixa. Involucrum conicum inflatum, 2-3 mm altum cum parietes 4-6 cellulis latae, cum cavernulis. Capsula sphaerica, pes bene formata. Calyptra 3-4 cellulis lata. Elateres male formati, cum annulis vel spiris imperfectis. Sporae adultae nondum scitae.

HOLOTYPE: Tlaxcala, Mexico: *A.J. Sharp 419* (1944) on soil, next to waterfall on Rio Zuahua-

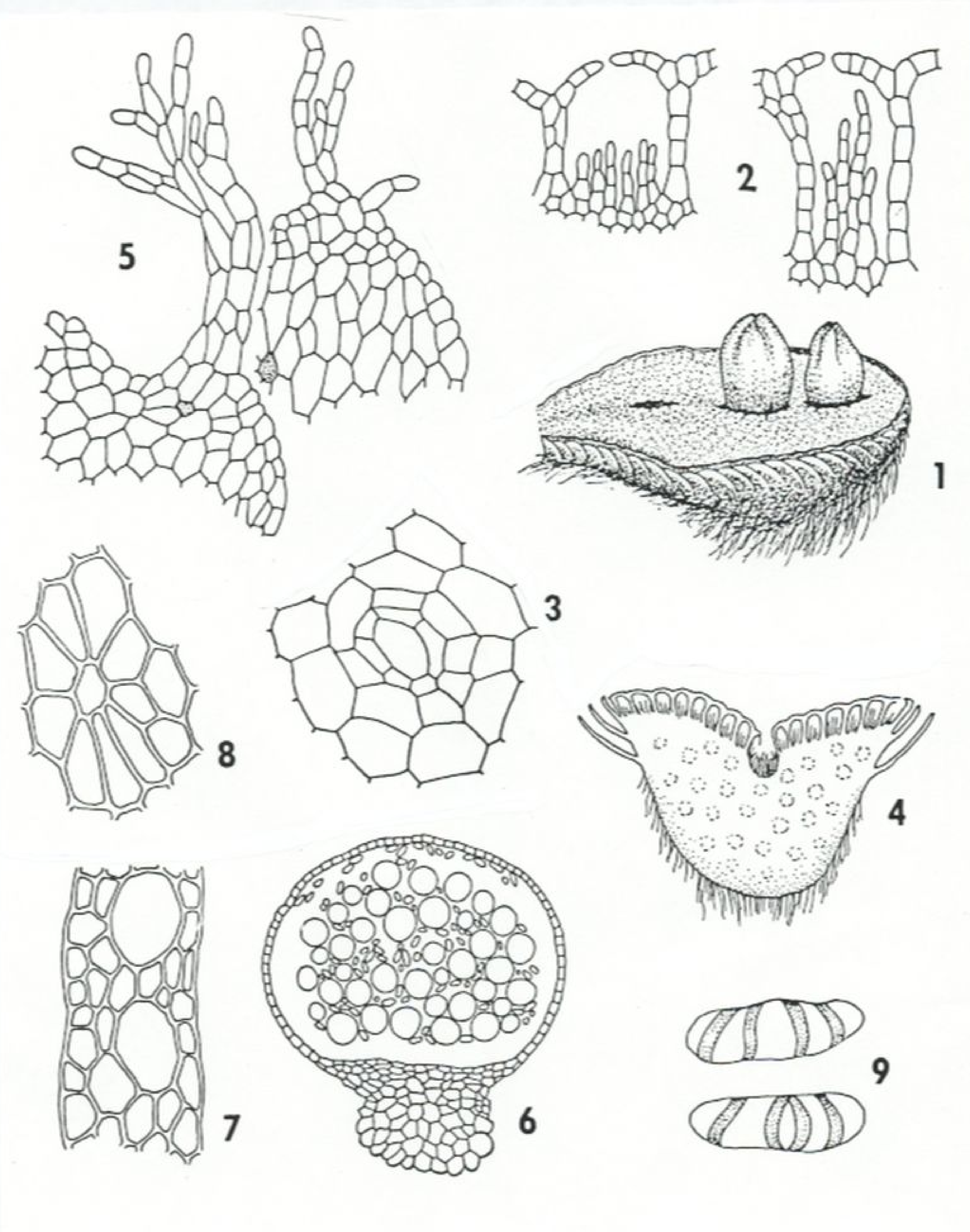

Figure 1. *Cronisia mexicana.* (1) thallus with involucres, X10; (2) dorsal air chambers, X100; (3) air pore, X250; (4) thallus, section through gynoecium, X15; (5) ventral scale appendages, X100; (6) developing sporophyte X-section, X100; (7) involucre wall, section, X150; (8) epidermis of involucre, oil cell, X200; (9) elaters, X400. (all from AJS #419 TYPE).

pan near Amaxac, alt. ca. 2300 m. (TENN); isotype (MEXU).

Plants thalloid, green above and slightly purplish-brown beneath, simple or with one or two dichotomies, forming gregarious mats on soil crusted with blue-green algae. Thallus thick, convex below, plane or slightly concave above with median dorsal depressions only where gynoecia are produced, 1-3 cm long 0.3-0.7 cm wide, 0.3 cm thick with crenulate, narrowly hyaline margins. Dorsal epidermis of thin-walled cells, persistent, faintly areolate; air pores simple, not stellate, surrounded by 1-2 concentric rows of tangentially elongate, smaller cells. Ventral scales in two rows, ventro-lateral, imbricate, lunate, brownish with hyaline margins, reaching the upper edges of the thallus but not extending beyond; each scale with 1-4 oil cells and one or two narrow, linear, branched, hyaline appendages 1-3 cells wide at the base. Appendages with 1-3 delicate branches which seldom persist on older scales. Margins of some scales sub-fimbriate from projecting cells. In cross-section, upper thallus with air chambers separated by thin 1-cell wide septa. Perpendicular chlorophyllous filaments 3-6 cells long arise from chamber floors. Lower thallus with broad keel in cross-section, abruptly narrowed to margins. Thallus interior dense and parenchymatous with spherical mucilage globules scattered throughout. Rhizoids dense, both with and without internal pegs, on median part of ventral thallus.

Dioecious. Antheridia not seen. Gynoecia in open, pit-like discontinuous depressions in linear series along dorsal midline, each with several archegonia and paraphyses. Sporophytes typically one (rarely two) per involucre. Involucres up to three per thallus branch, tubular, fleshy, arising as an outgrowth of upper chlorophyllous tissue, inflated-conical, 2-3 mm high with walls 4-6 cells thick, containing air chambers; mouth contracted and somewhat lobed. Sporophyte surrounded by a 2-4 cell thick, smooth calyptra often with two or three undeveloped archegonia on its outer surface. Calyptra free from involucre. Sporophytes globose, sessile and partly within the dorsal depression. Capsule wall 1-cell thick; foot well developed, bulbous, of fifty or more cells. Spores only in tetrad stage, thus lacking characteristic ornamentation. Elaters immature, with band-like thickenings visible with staining.

Asexual propagules absent but old inflated involucres detach easily and float on water; these may have the ability to colonize new sites near streams.

Genera producing dorsal, sessile sporophytes with a protective covering can be confusing to identify because of similarities in their gametophytic structures. Table I compares *Oxymitra paleacea* Bischoff, *Corsinia coriandrina* (Spreng.) Lindb., *Cronisia paradoxa* (Wils. & Hook.) Berkeley and *Cronisia mexicana* Hicks, all reported from North America. Because gametophytic similarities may be the result of similar environmental pressures on casually related plants, characteristics of sporophytes are considered more reliable in determining relationships (Hässel de Menendez, 1976). Unfortunately, many hepatics seldom produce capsules, or when they do, these structures are ephemeral. In plants with sessile sporophytes such as *Oxymitra*, *Corsinia* and *Cronisia*, the distinguishing differences among them often require careful dissection. Both *Oxymitra paleacea* (Oxymitraceae) and *Cronisia mexicana* (Corsiniaceae) have tubular, thick involucres surrounding sporophytes while in *Cronisia paradoxa* the involucre is thin and dotted with pigmented cells. There are, however, basic differences between the sporophytes of *Oxymitra* and *Cronisia*. In *Oxymitra*, the sporophyte has no foot or seta; the calyptra is one cell thick and adheres closely to the capsule wall which is “used up” by spore maturation, leaving the spore mass enclosed by a single layer of cells. Elaters are absent. Also, in *Oxymitra* sex organs are produced within a dorsal sulcus, similar to that of *Riccia* and are not aggregated into discrete gamoecia. In *Cronisia*, the gynoecia are in discontinuous dorsal depressions; each develops one or two involucres. Each involucre usually develops one sporophyte. Sporophytes have a well-developed foot; the calyptra is 2-4 cells thick and is free from the capsule wall which is one cell thick. The spore mass is thus enclosed by a calyptra as well as a capsule wall. The involucre surrounding

	Oxymitra paleacea	Corsinia coriandrina	Cronisia paradoxa	Cronisia mexicana
Foot (Present or Absent)	A	P	P	P
Capsule wall thickness (number of cells)	0	1	1	1
Capsule wall thickenings (Present or Absent)	N/A	A	P	?
Calyptra thickness (number of cells)	1	4+	2	2-4
Involucre thickness (number of cells)	4+	1	1	4+
Spore distal face	areolate	grooved**	grooved**	?
Elaters	absent	vestigial	annular	annular
air pores	stellate	simple	simple	simple
scales (no. rows)	2	several	2	2
chromosome number*	n=9, 18	n=8, 16	n=9	?

*Jovet-Ast (1969, 1973, 1974)
**raised blister-like ridges appear as grooves under light microscope.

TABLE I. Comparison of species of *Oxymitra, Corsinia* and *Cronisia* from North America

nisia paradoxa is one cell thick, hoodlike and open along one side (Jovet-Ast 1963, 1964). The calyptra within is two cells thick. In *C. mexicana,* the involucre is more than four cells thick and contains air chambers; the calyptra is also thikker than that of *C. paradoxa*. The sporophytes however, are similar.

In *Corsinia coriandrina*, sporophytes are individually protected by a thickened calyptra that forms a closed fleshy covering around the sporophyte; these spherical "calyptrae" are several cells thick and are subtended by short membraneous flaps (involucres). Enclosure of the sporophyte is by the calyptra; the involucres are small and probably function earlier in protection of gynoecia, which are in dorsal depressions. In *Corsinia* a small foot is present, elaters are vestigial and lack thickenings.

It is also interesting to note that the chromosome number of *Corsinia* is n=8, the same number reported for Riccia (Jovet-Ast, 1974). The chromosome number of *Oxymitra* and *Cronisia* is n=9.

Because larger structures such as involucres are most useful in identification, a convenient key is necessarily artificial and does not reflect phylogenetic arrangements.

KEY TO MEXICAN SPECIES WITH DORSAL, SESSILE INVOLUCRATE SPOROPHYTES

1. Sporophyte surrounded by a fleshy closed involucre (calyptra) with finger-like projections on its surface and membraneous flap at base; plants lacking purplish pigmentation..*Corsinia coriandrina*

1. Sporophytes surrounded by smooth, open involucres, either contracted tubes or thin hoods; plants able to produce purplish or brownish pigmentation...2

2. Involucres thin with pigmented cells forming scattered small, dark dots over surface, one cell thick, open along one side, hoodlike; elaters present, with ring-like thickenings or incomplete spirals; sporophyte with foot..*Cronisia paradoxa*

2. Involucres 4 or more cells thick, without scattered pigmented dots, forming a complete tube, large and well exserted above the thallus; elaters present or absent; sporophyte with or without foot 3

3. Ventral scales lunate, with hyaline, branched appendages; air pores not stellate; calyptra 2-4 cells thick, free from capsule wall and involucre; capsule wall one cell thick; foot present; elaters with incomplete spirals or ring-like thickenings .... *Cronisia mexicana*

3. Ventral scales lanceolate-acuminate, white, extending beyond the thallus margins; air pores stellate with thickened radial walls; calyptra one cell thick and capsule wall absent at maturity; foot absent; elaters absent.. *Oxymitra paleacea*

Currently the families Oxymitraceae and Ricciaceae (which have similar sporophytes) are placed the suborder Ricciniiae (Schuster, 1979) while the Corsiniaceae, which includes *Corsinia* and *Cronisia*, is in the Marchantiineae where it is considered an unspecialized family. The Oxymitraceae and Corsiniaceae have few species (2 genera, 3 species in Corsiniaceae; 1 genus, 2 species in Oxymitraceae).

The Marchantiineae and Ricciineae have been historically segregated as suborders or separate orders (Lamy, 1976) of a Marchantialean ancestral line. In such an arrangement, Ricciineae includes *Riccia* which has a reduced sporophyte and is without female receptacles. This genus has been represented as a product of reduction with an unspecialized gametophyte and an “advanced-reduced” sporophyte; genera with stalked female receptacles were included in the Marchantiineae. The intercalation into such a scheme of *Oxymitra*, *Corsinia* and *Cronisia* with sessile female receptacles would appear to form a “gametophytic bridge” between the groups. The sporophytes of both *Cronisia mexicana* and *C. paradoxa* are most similar to other Marchantiineae and the thallus, with its filament-bearing air chambers, exhibits similarities to that of *Exormotheca* {see *E. ceylonica*, (Meijer, 1956) which has simple stalked receptacles}. The sessile involucres are superficially similar to those of *Oxymitra.* Schuster (1984) has pointed out that evolution among Marchantiales is bush-like, not linear. However with so few representatives to demonstrate variety of form in plants with sessile female receptacles, the establishment of relationships between Corsiniaceae and plants such as *Exormotheca* with simple stalked receptacles and those without receptacles such as *Riccia* can best be elucidated by comparison of their sporophytes.

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