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HEPATICAE OF SIERRA ANCHA, ARIZONA

ELBERT L. LITTLE, JR.¹

Sixteen species of Hepaticae of Sierra Ancha, in central Arizona, are represented in a collection made by the author as a spare-time study from 1935 to 1937. As five of these apparently have not been reported previously from the State, the State list is increased to twenty-seven species.

In a preliminary list of Arizona Hepaticae, Evans (4) recorded twenty-one species, based largely upon collections made by G. E. Nichols in 1913. Most of the specimens, including sixteen species, were from Santa Catalina Mountains of southern Arizona, about 100 miles south of Sierra Ancha. Howe (Grout, 5, p. 278) cited an additional species, *Porella platyphylloidea*, from Arizona.

Sierra Ancha is located within Tonto National Forest in Gila County, by air line about twenty-five miles north of Globe and fifteen miles northeast of Roosevelt Dam. From an elevation of about 2,100 feet above sea level at Roosevelt Reservoir it rises gradually to about 7,800 feet at the summit. It is composed mainly of quartzite with intrusions of diabase and small outcrops of sandstone and limestone.

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Three climatic or life zones with their distinctive vegetation are represented here: (1) semidesert, or Lower Sonoran life zone, up to an elevation of about 3,500 feet; (2) chaparral-woodland, or Upper Sonoran zone, from about 3,500 feet to 6,000 feet; and (3) pine-fir forest, or transition zone, above 6,000 feet. Nearly all the collecting was done in Sierra Ancha Experimental Forest, a branch of the Southwestern Forest and Range Experiment Station, headquarters of which is located at an elevation of about 5,000 feet on the southwest side of the mountain. All the specimens except those of *Riccia Frostii* were obtained within a five-mile radius of this point.

In relative numbers hepatics are rare on Sierra Ancha and insignificant in composing the vegetation, but certain species are common locally and seasonally. They are distributed from the exposed bed of Roosevelt Reservoir, where members of the species *Riccia Frostii* are found, to the highest point of Sierra Ancha, where the species *Frullania inflata* and *Radula complanata* are represented. Principal habitats are rock outcrops and moist soils, such as on rock ledges where there is seepage and near streams. Liverworts of only one species, *Frullania inflata*, were observed growing on tree trunks.

The best display of Hepaticae on Sierra Ancha occurs in early spring in the chaparral-woodland zone. Here liverworts grow on shallow soils upon exposed quartzite ledges kept moist by seepage from heavy winter rains. They start growth in January or earlier, mature and form spores usually by the end of March, and become dormant or die shortly afterwards as the soils become dry. *Mannia californica* and *Fossombronina longiseta* are the species most commonly represented on these sites, and individuals of *Riccia* spp. are found here in fewer numbers.

Evans (4) noted that the large proportion of thalloid species in Arizona indicates the strongly xerophilous character of the hepatic flora. Of the sixteen species of hepatics on Sierra Ancha, only four are leafy and the rest are thalloid. Campbell (2) observed that drought-resistant thalloid liverworts in California, including those of species represented also on Sierra Ancha, are perennial but remain dormant during the dry season. Cannon (3) demonstrated that thalli of *Plagiochasma* sp. at Tucson, Ariz., were capable of enduring great loss in water content amounting to seventy to eighty percent of weights of moist plants. The xerophytic thalloid hepatics on Sierra Ancha doubtless react to dry periods as do those studied by Campbell

and Cannon. During the rainy season of midsummer, most hepatics here stay dormant and do not resume growth until winter rains begin.

From a comparison of lists from bordering states, Evans (4) concluded that a close relationship exists between the species of Arizona and those of California and Mexico. In geographic distribution the Hepaticae of Sierra Ancha are principally species of the semiarid Southwest. All except three of the species of Sierra Ancha were recorded from California by Howe (6). Only about half the species, including all five species of the pine-fir forest zone, are represented also in eastern United States.

Detailed collections in the high mountains of northern New Mexico by the late Brother Arsène (1) increased the number of species of Hepaticae in that state to twenty-eight. Eleven of these are listed from Arizona also, and the two states together have forty-four species. While more species are expected to be found common to both states, the character of the lists reveals differences in habitats. New Mexico has eighteen species of leafy liverworts and only ten of thalloid liverworts, while Arizona has eight species of leafy hepatics and nineteen of thalloid. Leafy forms of the order Jungermanniales are better represented in the more humid, cooler zones of high mountains, which are more extensive in New Mexico than in Arizona. Thalloid hepatics, on the other hand, are more numerous in the drier, warmer zones, which are more widespread in Arizona.

The list of sixteen species of Hepaticae of Sierra Ancha, Arizona, with brief notes follows. *Riccia* is represented by five species and the other eleven genera by a single species each. The five state records are indicated by asterisks (*). Specimens from the Hepatic Herbarium of the Sullivant Moss Society, which were lent by Dr. Margaret Fulford, were used in making determinations. Dr. Alexander W. Evans has kindly determined the specimen of *Cephaloziella papillosa* and has verified the author's determinations of a few other specimens. Duplicate sets of the Hepaticae of Sierra Ancha, Arizona, have been deposited in herbaria of the U. S. Forest Service at Washington, D. C., and Sierra Ancha Experimental Forest, and in the herbaria of the Sullivant Moss Society, Yale University, and University of Arizona.

RICCIACEAE

**RICCIA CRYSTALLINA* L. Rare on moist soils, chaparral-woodland zone; spring.

**RICCIA FROSTII* Aust. Abundant on moist soils recently exposed

along Salt River by lowering of level of Roosevelt Reservoir, semi-desert zone, Aug. 24, 1936.

Apparently a characteristic habitat of this species is denuded, moist soils along streams. The author has found plants common in similar areas along Rio Grande in New Mexico and Arkansas River in Oklahoma.

**RICCIA NIGRELLA* DC. Uncommon on moist, shallow soils on quartzite ledges, chaparral-woodland zone; spring.

RICCIA SOROCARPA Bisch. Rare on moist, shallow soils on quartzite outcrops, chaparral-woodland zone; spring.

**RICCIA TRICHOCARPA* M. A. Howe. Rare in crevices of quartzite, chaparral-woodland zone; spring.

TARGIONIACEAE

TARGIONIA HYPOPHYLLA L. Rare on quartzite and diabase outcrops, semidesert and chaparral-woodland zones, spring.

REBOULIACEAE

ASTERELLA CALIFORNICA (Hampe) Underw. Uncommon on moist soils and diabase ledges, semidesert zone, spring.

Collection of carpocephala confirms Evans' (4) doubtful Arizona record based upon sterile specimens.

MANNIA CALIFORNICA (Gottsche) Wheeler. (*Grimaldia californica* Gottsche.) Common on moist quartzite ledges and occasionally found on moist soils, chaparral-woodland zone, spring.

This is the species of Hepaticae most commonly represented on Sierra Ancha. The perennial thalli grow only in winter and spring and mature archegonial receptacles from February to April. The rest of the year the thalli are tightly inrolled with the purplish-black ventral scales exposed. This record confirms Evans' (4) report based upon provisional determination of sterile Arizona specimens.

REBOULIA HEMISPHAERICA (L.) Raddi. Uncommon on sandstone and quartzite ledges, chaparral-woodland and pine-fir forest zones.

MARCHANTIACEAE

MARCHANTIA POLYMORPHA L. Uncommon on moist, shaded soils along a small stream, pine-fir forest zone.

Thalli perennial and evergreen. Archegonial receptacles mature in summer.

PELLIACEAE

FOSSOMBRONIA LONGISETA Aust. Common locally on moist soils

on quartzite and diabase ledges, chaparral-woodland and semidesert zones; spring.

The light green, ruffled, leaf-like thalli often form large mats.

CEPHALOZIELLACEAE

CEPHALOZIELLA PAPILLOSA (Douin) Schiffn. Rare in shaded crevices of quartzite cliffs, chaparral-woodland zone.

RADULACEAE

RADULA COMPLANATA (L.) Dumort. Common locally on shaded sandstone boulders and cliffs, pine-fir forest zone. Sporophytes produced in spring.

PORELLACEAE

PORELLA PLATYPHYLLOIDEA (Schwein.) Lindb. Uncommon on shaded sandstone bluffs, pine-fir forest zone.

LEJEUNEACEAE

FRULLANIA INFLATA Lehm. & Lindenb. Common locally on shaded sandstone boulders and cliffs and trunks of trees (*Quercus utahensis*, *Q. chrysolepis* var. *Palmeri*, and *Acer grandidentatum*), pine-fir forest zone. Sporophytes produced in spring.

ANTHOCEROTACEAE

**ANTHOCEROS FUSIFORMIS* Aust. Rare on moist, shaded soils near springs, chaparral-woodland zone. Sporophytes mature in early summer.

SUMMARY

Sixteen species of Hepaticae including five state records are represented in a collection made by the author on Sierra Ancha in central Arizona from 1935 to 1937. Only four of these species are leafy and the rest are thalloid, mostly xerophytic forms.

TUCSON, ARIZONA

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