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L. H. Pammel
Iowa State College

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THE SPECIES OF RHAMNUS IN SOUTHWESTERN UNITED STATES AND THE PACIFIC COAST AND PUCCINIA CORONATA

L. H. PAMMEL

Brewer and Watson¹ in the Botany of California list four species and one variety of the genus *Rhamnus* in California as follows: *Rhamnus alnifolia*, *R. crocea*, *R. californica* and var. *tomentella* and *R. Purshiana*. Jepson² in his Flora of Western Middle California lists three species and two varieties, the only addition to that of the flora of California being the variety *ilicifolia*. Trelease³ in his revision of North American *Rhamnus* records the following species and three varieties of *Rhamnus* of Western United States: *Rhamnus crocea* Nutt and var. *pilosa*, *R. alnifolia*, *R. Purshiana*, *R. California* var. *tomentella* and var. *rubra*. Coulter⁴ lists two of the Pacific Coast species in Western Texas, the *R. Purshiana* and *R. californica*. It is not probable that either of these species occurs in the mountains of Western Texas as reported. The recorded western species are referable to other species occurring in New Mexico and adjacent regions west and north. Wooten⁵ however recognizes none of the Pacific coast species. The four species enumerated by him are *R. fasciculata*, *R. Smithii*, *R. ursina* and *R. betulaefolia*. These species were segregated by Greene from the Pacific coast species previously recorded for the region.

It is interesting to note that there are only two native species of *Rhamnus* in Iowa, namely *R. lanceolata* and *R. alnifolia*, besides the occasionally naturalized *R. cathartica*. The Pacific coast species of buckthorn are extremely variable and it is doubtful whether the number of species recognized by some North American botanists is entirely justified.

Rhamnus California Esch. is one of the most common and variable species of the genus in California. This is a tall shrub, with somewhat tomentose twigs, lower surface of leaves glossy or pubescent, upper surface dull green. The California buckthorn produces fruit abundantly. It occurs on margins of streams or forms a low undergrowth in coniferous woods. The altitudi-

¹ 1: 100-101.

² 251-252.

³ Trans. Acad. Sci. St. Louis 5; 365-367; 1892.

⁴ Botany of Western Texas: Contr. U. S. Nat. Herb. 2; 60; 1891-1894.

⁵ Flora of New Mexico: Contr. U. S. Natl. Herb. 19; 414-415; 1915.

nal range varies greatly, from nearly sea level to 6,500 feet and over. We find this species represented in I. S. C. herbarium from the following localities in California.

- Yosemite, Mariposa Grove, California (L. H. Pammel)
- Yosemite Valley, Glacier Point, California (L. H. Pammel)
- San Francisco, California (C. C. Parry)
- North American Pacific Coast (2 specimens)
- Monterey
- Yosemite, Merced Canyon between El Portal and Power Plant (L. H. Pammel)
- Belden, California (L. H. Pammel)
- Patterson, somewhat pubescent leaves (L. H. Pammel)
- Fairfax, California (Katherine Jones)
- Los Angeles County, California (H. E. H.)
- Also in the canyons of the mountains near Pasadena, the Sierra Madre (L. H. Pammel)

The so-called *Rhamnus rubra* (Green) is evidently nothing more than a form with reddish glabrous twigs and narrowly obovate or oblong lanceolate leaves. We have this from Butte County, Forest Range, altitude 2400 feet, No. 11404 (A. A. Heller), between upper Soda Springs and Shasta Retreat.

Rhamnus tomentellus Benth. This is the *R. Californica* var. *tomentella* Brewer and Watson. It is a rather low spreading shrub with leaves and twigs densely tomentose below. It is a very striking shrub, growing in rather dry soils and on banks of streams. From a distance it has the aspect of an olive tree. We have it in the I. S. C. herbarium as follows:

- Live oak, California, banks of Feather River (L. H. Pammel)
- Merced Falls, banks of Merced River (L. H. Pammel)
- California 1889 (C. C. Parry)
- California Mountains
- Blairsden (L. H. Pammel)
- Gridley (L. H. Pammel)
- Marysville Butte (No. 11358) (A. A. Heller)
- Mud Flat, Newville, Covelo road Glenn County, (No. 11534) (A. A. Heller)

Rhamnus Purshiana DC. The sagrada is found only in the mountains of northern California and in the coast range, generally north of the Bay region to Oregon and Washington. It is a small tree with slightly pubescent twigs, leaves thinner than the California buckthorn, mostly thin and dull green, petioles pubescent. We have it in the herbarium from:

- Mill Valley, California with *Sequoia sempervirens* (L. H. Pammel)

Washington, No. 3885 (A. A. & Gertrude Heller)
Defiance Park, Tacoma, Washington (L. H. Pammel)

Rhamnus Smithii Greene. This species was described by Greene⁶ from specimens collected at Pagosa Springs, southwestern Colorado, and its range is given as southern Colorado and northern New Mexico. E. O. Wooten and P. C. Standley⁷ record it from Chana between Tierra Amarilla and Park View in New Mexico. The only specimens I have seen are those of Miss Florence Willey, from Pagosa Springs, Colorado, and another from the same place by Willey, Clokey and Bethel. This seems to me to be closely allied to *R. Californica* in some respects. Perhaps it should be regarded as distinct.

Rhamnus Nevadensis Aven Nelson. Dr. Aven Nelson⁸ has described this species from Nevada and states that it differs from *R. Californica* Esch in its non-coriaceous leaves and its short calyx lobes. The *R. Californica* in the Rocky Mountain herbarium, collected at Verdi, Nevada, by B. P. Kennedy, No. 953, and the one collected by Marcus E. Jones at Reno seem to me to be pretty closely related to *R. Californica*. There are some slight differences in the leaves of the Nevada specimens, which are somewhat more narrow than *R. Californica*. I do not find much difference in the calyx lobes. The California buckthorn is an extremely variable plant.

Rhamnus alnifolia L. Her. This is a low shrub with pubescent branches, leaves short petioled, ovate or broadly elliptical, glandular serrate. It is of course a common species in the northern states, not common in California. We have the following specimens in our collection from the west and northwest.

Sierra County, California (J. G. Lemmon)
Northern Pacific Coast (C. C. Parry)
Obsidian Creek, Yellowstone National Park (Aven and Elias Nelson)
Bitter Root Valley Warm Springs Creek (L. H. Pammel and H. S. Fawcett)

Rhamnus crocea Nutt. This is an evergreen low spreading shrub with reddish bark, leaves glossy, roundish or broadly ovate or elliptical, glandular dentate. This species has the most restricted distribution. It evidently belongs to the Mexican flora and is most common in Southern California. Specimen were collected by Parry near San Diego (Mexican Boundary Survey),

⁶ Pittonia 3: 17.

⁷ Flora of New Mexico, 415.

⁸ Proc. Biol. Soc. of Wash., 18: 174.

soil rather dry. We have it in the collection from the following points.

- No label (probably California) (C. C. Parry)
- Yosemite Valley, Yosemite Falls (L. H. Pammel)
- North Pacific Coast Flora (C. C. Parry)
- San Diego, California, Mexican Boundary Survey (C. C. Parry)
- Ione, California (C. C. Parry)
- var. *ilicifolia* Kellogg of *R. insulis* Kellogg
- Southern California No. 41 (Parry and Lemmon, 1876)
- Fall Brook (C. C. Parry)

CROWNED RUST AND RHAMNUS

I was requested by Dr. I. E. Melhus to look for species of *Rhamnus* and the uredo spores of *Puccinia coronata*, especially on *Lolium perenne*, *Holcus lanatus* and other grasses on which it occurs. The perennial rye grass was rather common in the Rio Grande Valley, Fort Bayard, New Mexico, and at San Diego, Los Angeles, Patterson, Yosemite, Wawona, Berkeley and Sacramento, California. The *Holcus lanatus* is a common grass in clearings and meadows in the Sierra Mountains of California. Thus it occurs in the Yosemite Valley at Blairsden and Wawona. Velvet grass is one of the common meadow grasses of the mountain region. The time of my visit was in August, naturally dry and in places where irrigation was practiced, I expected to find some form of *Puccinia coronata*. It was, however, rare. I examined thousands of leaves of this grass, but in no case except at Wawona did I find any *Puccinia coronata*. Wawona is on a branch of the Merced River and the plot of grass where I found uredo spores was irrigated. Here the rust was fairly common on the leaves of *Holcus lanatus*. There were some *Rhamnus Californica* near it. I should judge therefore, that *Holcus* is not a favorable host of the infection of the rust from *Rhamnus Californica* in California. How common the aecial stage may be on the *Rhamnus Californica* I do not know. One would expect to find the *Puccinia coronata* on the introduced species of the *A. fatua* and its variety as well as on *A. barbata* the two wild species of oats of California, but I did not find any of the teleutospores though these grasses are common in many parts of California, like Berkeley, Los Angeles, Patterson, Merced Falls and San Diego. I also observed numerous young green leaves of *Avena fatua* along irrigation ditches but no rust infection.

DEPARTMENT OF BOTANY,

IOWA STATE COLLEGE