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Mites Affecting the Poison Oak

H. E. Ewing
Iowa State College

MITES AFFECTING THE POISON OAK.

H. E. EWING.

According to the plan of nature animals are compelled either directly or indirectly to lay under tribute the plant world in order to obtain food; and so completely have they done so that it is doubtful if any, among the many thousands of species of the latter, are exempt from attack. Being thus exposed to the wholesale appetites of higher creation plants have been forced into the evolution of devices for warding off animal attacks. We are all familiar, and probably to our sorrow, with the way in which many plants protect themselves from the larger animals by means of thorns or spines, thus lancing or even lacerating the hungry herbivor that comes too near or reaches with open mouth to devour them. Other plants obtain much protection, especially from their arthropod enemies, by the very tough tissues that make up the bulk of their substance, or by a well developed layer of hard cells that cover most of the exposed parts. But of all the devices that nature has contrived through the guiding hand of natural selection, to protect plants from animal attacks, it is doubtful if any is more successful than the development of poisonous properties. That these poisons do protect plants possessing them observations clearly show. Thus our poison ivy (*Rhus toxicodendron*) is known to be almost exempt from insect attacks. Only four species are known to feed upon it. Other species of poisonous plants also are known to be almost exempt from attack.

We have on the Pacific slope, a species of *Rhus* (*Rhus diversiloba*), known as the poison oak, which is much more abundant there than the poison ivy is with us, and also its toxin is, I believe, far more injurious to man. I have a photograph showing a large portion of a sheep pasture, located near Corvallis, Oregon, that is so completely overrun by poison oak that little of it is left available for grazing. In connection with the toxic effects of the poison oak, I remember seeing a woman who had both eyes swollen shut and her lips puffed out over an inch on account of a slight contact with poison oak. But contact is not necessary in order to be affected with the poison.

Many people have been badly poisoned by standing around camp fires on which poison oak branches had been carelessly placed. Again after being once affected with the poison of this plant, instead of becoming immune from further attack, one becomes more susceptible than before. At least this is the testimony that I have heard so often from friends who have been poisoned.

During the summer of 1915, I undertook a survey of the arthropods attacking the poison oak, and after continued search over large areas in western Oregon found only a single species that was generally distributed and found to be commonly feeding on this poisonous plant. This species was a gall mite. Besides the gall mite two other arthropod species were listed; the common spider mite *Tetranychus telarius* Linn., and a leaf-roller. In this paper I shall report only on the mites, as the leaf-roller certainly was not a normal feeder on the poison oak, as neither full-fed nor live caterpillars were found.

The gall mite found on the poison oak was widely distributed, and produced very conspicuous, reddish pouch galls on top of the leaves (see figure 52). These galls were at times so numerous that they ran together giving a "cock's comb" effect. Upon dissection the galls were found to be thickly erinosed on the inside, and each had an opening on the under surface of the leaf. Among the hairs of the erineum were found many gall mites of various sizes; some were females with eggs; and free eggs also were found inside of the galls. A technical description of the mite is here given:

Phyllocoptes toxicophagus n. sp.

Capitulum prominent, extending to the end of segment III of leg I. Shield covering cephalothorax. Dorsal setae about equal in length to dorsal shield. Abdomen curved downward considerably toward the tip, with from 36 to 45 dorsal half rings. Lateral setae prominent, equal in length to second pair of legs. Ventral setae I reaching over half the distance from the point of their origin to the tip of the abdomen, and extending to the bases of ventral setae II. Second ventral setae almost half as long as the first setae. Legs subequal. Third segments of first pair of legs each bearing a long seta which reaches to the tip of tarsus. Plumose tarsal setae, each with four pairs of bars. Length of male, 140 μ; width, 50 μ. Length of female, 160 μ; width, 60 μ.

This mite is so abundant in certain places that every leaf on practically every plant is galled. Further, some of the leaves are so badly galled that they show general distortion and curling. On the other hand a considerable area may be free from

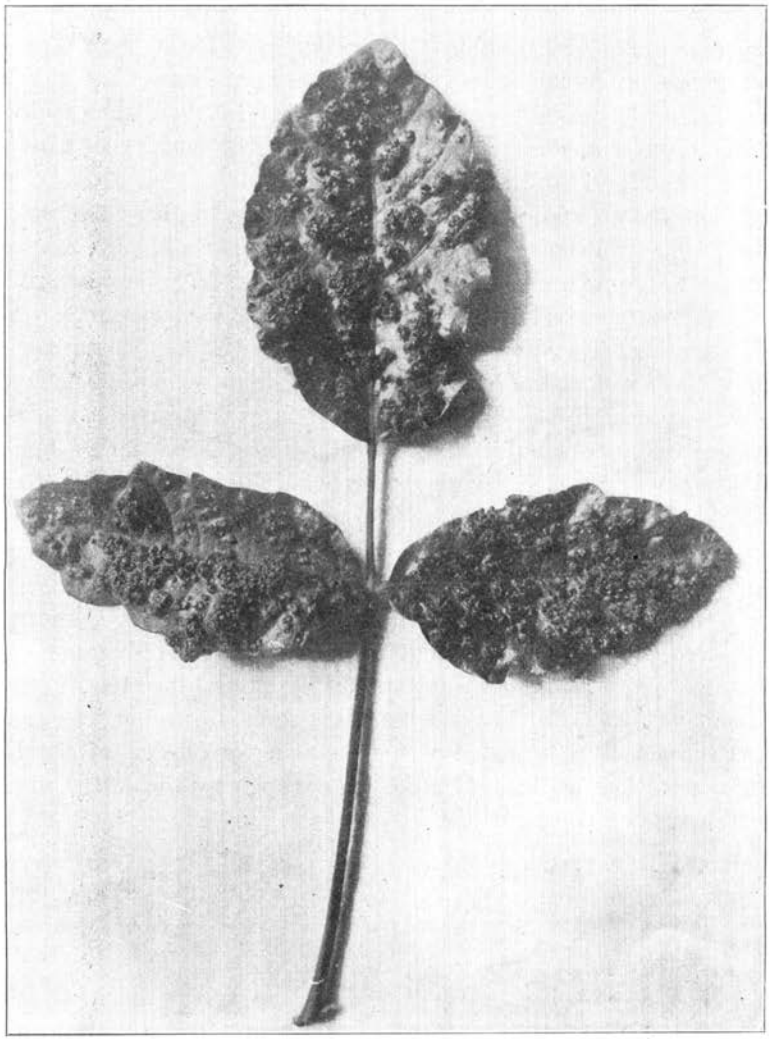

FIG. 52. Leaf of poison oak (*Rhus diversiloba*) showing galls produced by *Phyllocoptes toxicophagus* n. sp.

this mite. I have usually found it present in any large field where poison oak was growing, but not always. Plants badly infested are stunted and lack their normal vigor.

The other mite found feeding on the poison oak is no other apparently than our common *Tetranychus telarius* Linn., or spider mite. It differs from most of the forms of this variable species in being smaller, and in never being orange in color. This species was found in only one place, in a pasture inside of the city limits of Corvallis, Oregon, but was found here somewhat in abundance. The infested leaves were somewhat paled and cupped, but not seriously injured. On their undersides were found many mites, including males and females in about equal abundance and some eggs.

What do we know of the host distribution of these two species? The gall mite, *Phyllocoptes toxicophagus* n. sp., is, as far as we know restricted to the poison oak. The spider mite is found on many kinds of plants throughout the most of North America and Europe. Recently I compiled a list of seventy-eight species of plants belonging to many families, on which this mite had been recorded as feeding. It is in fact almost omnivorous. We have in this case, therefore, a species that is especially noted for its hardiness, its wide distribution, and its varying food habits feeding on a poisonous plant. But how about the gall mite? Here it is possible that the mite species itself became so adapted that it could withstand the toxin, so deadly to most species. But could it not be that this gall mite has been evolved along with its host species? Could it not be that the parasitic habit was established on an ancestor of the poison oak that did not possess the poisonous properties, and that the mite has persisted ever since as a parasite on succeeding generations of hosts? I see no reason why the latter suggestion is not a logical one.

ZOOLOGY DEPARTMENT,
IOWA STATE COLLEGE.