

by Connie Rutherford

Bees and the Lane Mountain Milk-vetch



Cindy Hopkins

A bee in the species *Anthidium marginatum* in the act of pollinating a Lane Mountain milk-vetch.

The cool, quiet air of a spring morning gives way to the wakening of jackrabbits, quail, ground squirrels, and horned lizards as the sun quickly warms the Coolgardie Mesa in the western Mojave Desert of California. Along with these animals, a host of insects set out to gather pollen and nectar from the shrubs and wildflowers in bloom. Cynthia Hopkins, a biologist with an eye for microfauna, has already staked out the plots where she will observe the insects at work over the course of the day. Of particular interest to Cynthia and the U.S. Fish and Wildlife Service are those insects that visit an endangered plant, the Lane Mountain milk-vetch (*Astragalus jaegerianus*).

An herb in the pea family (Fabaceae), Lane Mountain milk-vetch has some interesting life history traits. Due to foliage that dries up with the onset of the hot, dry summer weather, the above-ground part of the plant behaves more like an annual. However, by tagging plants and tracking them over a period of years, we have found that individuals may live for as long as 15 years. Their taproot enables them to persist underground during the non-growing season, and it can maintain them through several years of unfavorable weather. But as researchers from the University of California, Los Angeles (UCLA), have found, the conditions in a favorable year still may not be good enough for the plants to produce flowers, attract pollinators, and successfully set a new batch of seed. If the seed bank is exhausted through germination of plants that are

unable to set new seeds, populations may disappear over time.

So why are the pollinators important? Cross pollination is one of two ways that genetic material is exchanged within and between populations of plants (the second way being through the dispersal of seed by ants, birds, and small mammals). In other milk-vetch species, the amount of seed produced, and the viability of that seed, is greater when it results from insect-facilitated pollination compared to self-pollination. Maintaining pollinators is therefore important to ensure a seed bank large enough to carry the species through years of unfavorable conditions.

The pollination study, along with long-term monitoring and research on the plant's life history traits, genetic characteristics, and the effects of dust, are part of a suite of studies that are being undertaken or funded by Service partners, including the Department of Defense (DoD), Bureau of Land Management (BLM), U.S. Geological Survey's Biological Resources Division, UCLA, California State University at San Bernardino, and various biological consultants. Most Lane Mountain milk-vetch populations occur on lands managed by two federal agencies. About half are on the DoD's National Training Center at Fort Irwin; a portion of these populations will be affected by military training in the future, and others are on sites being designated as conservation areas. The other half of the populations are on BLM lands near the city of Barstow; the BLM has established Areas of Critical Environmental Concern there for the

milk-vetch and has initiated efforts to restore habitat affected by unauthorized off-road vehicle use and mining. Information gleaned from these studies will help the agencies manage the plant's habitat.

Back on Coolgardie Mesa, Cynthia shifts her focus to some insects that have approached Lane Mountain milk-vetch flowers. She and Denis Kearns, another researcher, have observed that the most common pollinators of Lane Mountain milk-vetch are bees from the same genera known to pollinate other milk-vetch species. These bees are well-suited to pollinate milk-vetches because they are the right size and weight to land on the specialized keel petal of these flowers, which then exposes the pollen-bearing anthers that are enclosed within the keel.

Two of the most common visitors are the "leaf-cutter" or "wool carder" bees from the genus *Anthidium*. These names result from their practice of lining their nest cavities in the soil or within shrub stems with shredded leaves. They are solitary bees, though their nests may be in close proximity to each other. The female bees, which have hairs on their abdomen perfectly suited to holding pollen, gather pollen from the milk-vetch flowers, while the male bees gather nectar, bask on the ground while waiting for a chance to mate with the females, and patrol the area to make their presence known to other insects.

Two other insects appear to be important pollinators of Lane Mountain milk-vetch. One, a leaf-cutter bee in the genus *Osmia*, is in the same family (Megachilidae) as the *Anthidium* bee and has similar traits. The other is a digger bee in the genus *Anthophora* (family Anthophoridae), so named for the nests they dig in the ground. *Anthophora* bees are also social bees, though their nests tend to be more dispersed over a larger area than those of the *Anthidium* bees.

Solitary bees may produce only 15 to 20 offspring per year, and the abundance of each pollinator species may vary from year to year. Maintaining a suite of pollinators will help ensure that the plants can set seed. Understanding the needs of pollinators emphasizes the importance of maintaining fully functioning ecosystem processes in the habitats that are being conserved for Lane Mountain milk-vetch. Through our partnerships with universities, federal agencies, and biologists like Cynthia Hopkins, we are learning how human uses can be managed in these areas to allow for the survival of unique natural resources.

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