Abstract

The moth *Schinia miniana* (Grote) of Lepidoptera family Noctuidae is reported on Desert Marigold (*Baileya multiradiata*) of plant family Compositae. Characteristics of the plant and the life history of the insect are discussed. Principal features of this plant-insect interaction are described and illustrated.

One of the wildflowers that is invariably featured in popular guides to Southwestern flora is the Desert Marigold, *Baileya multiradiata* Harv. et Gray ex Torr. This prominent Arizona native is a favorite for several reasons. It is a vigorous, xeric-adapted, biennial or perennial, low-growing herb with wooly sculptured gray-green leaves [Kearney and Peebles, 1960]. Above the attractive leafy clump are a prodigious number of solitary composite inflorescences (commonly called flower heads) each on a foot-long peduncle. The large, showy, richly-yellow flower heads bob and sway gracefully in the breeze. Of the early spring flowers, it is one of the most dependable. In the Tucson area the peak of flower production is from March through April but some plants continue to produce some flowers right through summer to as late as November [McGinnies, 1980].

*Baileya multiradiata*, known also as Desert Baileya, is distributed throughout Arizona except for the upper elevations of the northeast. Its range extends into the canyon lands of Utah, southern Nevada, the deserts of southeastern California, eastward across New Mexico and into western Texas, and southward into Chihuahua and Sonora, Mexico [Welsh et al., 1987]. Its reputation as a roadside weed is well deserved for it grows especially well on open, disturbed, gravelly soil and thus thrives on road shoulders while often being absent from adjacent undisturbed soil.

In recent years, the desert marigold’s use as a landscape accent plant has increased. Its color and texture contrast with other garden plants and its long flowering season and drought tolerance make it a perfect addition in these times of reduced water consumption. So numerous are its desirable qualities that New Mexico State University researchers have recently developed two extension brochures – one advocating its uses in landscaping and another describing a system of nursery plant production [Cotter et al., 1980, 1982].

Research into the chemistry of the plant has revealed an ironic contrast of positive and negative value to man. One of its chemical constituents, hymenoxon, is toxic to some livestock and there are reports of 25% losses where sheep have fed on this plant on overgrazed rangelands in Texas [Hill et al., 1979] In Arizona, *B. multiradiata* is listed as a potentially hazardous rangeland plant [Schmutz et al., 1968]. Poisoning of cattle and horses seems never to have been reported, however. On the positive side, researchers at Arizona State University Cancer Research Institute have extracted and identified at least half a dozen compounds (e.g. fastigilin and radiatin) with antibiotic and antitumor activity [Pettit et al., 1978].

Our initial interest in the plant was based on a general curiosity concerning plants of the family Compositae as sources of insect growth regulators (IGRs). Insect anti-hormones, chemicals which cause precocious metamorphosis, have been isolated from the closely allied genera *Ageratum* and *Chrysanthemum* [Bowers, 1976, 1987]. Desert plants producing IGRs or other allelochemical substances to deter herbivory are often relatively abundant and have fewer insect consumers, as appears to be the case with *B. multiradiata*. However, during the course of collecting plant material we noticed that an occasional flower head was sealed up as a ball. Some of the sealed flower heads contained a yellow caterpillar. Adults reared from these larvae were determined to be a species of noctuid “flower moth”, *Schinia miniana* (Grote).
Larval cocoons formed by *Schinia miniana* larvae in flower heads of *Baileya multiradiata*.

Webbed-up flower head opened to reveal larva feeding on central achenes.

Adult male of *Schinia miniana* on inflorescence of *Baileya multiradiata*.

Typical occurrence of *Baileya multiradiata* on a gravel roadside.

The species was initially described in 1881 in the genus *Rhododipsa*. The one paragraph description based on the coloration of the adult was followed a year later in the same journal by dorsal and lateral color illustrations, a rare treatment in those days, afforded to this species no doubt because of its uncommonly bright colors for a noctuid moth (ocher colored forewings with two transverse white bands and wine red hindwings). The species was again illustrated in *The Moth Book* (Holland, 1937). David F. Hardwick’s 1958 monograph synonymized *Rhododipsa* with *Schinia* and provided a wealth of biological information on the genus but nothing specifically about *S. miniana*.

Over the past two years we have on four occasions collected several hundred webbed-up flower heads. These “larval cocoons” built in flower heads were not found in early spring (March–April) despite several searches, but were common in May and again in August and September. Undoubtedly there are at least two generations per year in the Tucson area. Approximately one third of the webbed flower heads are found with a single larva present and feeding on the central achenes. We have never found more than one larva per flower head. The other two thirds of the webbed flower heads have been vacated but show the signs of previous occupation: central achenes eaten out, fecal pellets, and often a single exuvium or cast skin. These observations indicate that probably at least three different inflorescences are used over the course of the five larval instars. Only the soft developing central achenes are eaten and not the outer sterile ray flowers. Flower heads are usually abandoned before all the achenes are consumed. We speculate that *S. miniana* is a major selection agent causing the desert marigold to generate the multiple flower heads alluded to by its scientific name, *multiradiata*.

Large larvae were observed to web up flower heads in as little as 20 minutes. The webbed-up inflorescence presumably serves several functions for the larvae: protection from
Central achenes slightly parted to reveal egg of Schinia miniana.

Triungulin larvae attached to prothoracic segment of caterpillar.

In the adult a distinctive color dimorphism occurs in the hind wings. The male is a more brilliant wine-red or magenta while the female is more of a brown-red or russet. Species of Schinia are referred to as flower moths and are often rather colorful day-fliers in contrast to the great majority of drab nocturnal noctuids. Often the adult colors are such as to camouflage the adult when resting on a flower head of the host plant (Hardwick, 1958, 1983). Indeed, the length, color and banding of the forewings of S. miniana would seem to be well suited for camouflage on the dried flower heads which are faded to a clay-yellow. The brilliant magenta hind wings of the male are quite exceptional for a noctuid moth, even for the genus Schinia. The pattern of brilliantly colored hind wings concealed by the forewings however is fairly common among other insects and is generally considered an adaptation to startle predators. The sexual color dimorphism in this case, however, suggests a possible alternative or additional function in sexual communication.

Aside from the initial description by Grote in 1881, no biological information has been recorded for S. miniana in the past hundred and eight years. However, the life history and immature stages of a closely related species, S. palli-cincta Smith (possibly a geographic race or junior synonym of S. miniana; Hardwick, personal communication) were examined (Hardwick, 1972). The California populations which he studied live mainly on sand dunes and feed primarily on Bailey pauciradiata Harv. and Gray. Our report contributes toward understanding the complex interactions between B. multiradiata and S. miniana. This is but one example of the numerous interesting plant-insect associations of the Southwest that remain unregistered in the scientific literature.

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References

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somewhat from its credibility. However, I witnessed an Italian midwife perform a similar procedure on a breech presentation with success. The attending doctor was preparing for a Caesarean section at the time. There seem to be threads of consistency among methods in provincial medicine that transcend cultural boundaries. Unfortunately, the value of such procedures and their possible applications to modern medicine have been little studied by professionals. Knowledge of methods used by curanderas and midwives rarely reaches the modern physician and when it does it is in the form of an anecdote, which detracts from its credibility. In many cultures these procedures are often associated with ritualistic incantation or preparation, an aspect of provincial medicine that makes it difficult, if not undesirable, to study by a professional. Nonetheless, the modern physician is confronted by many of the same problems facing curanderas and midwives. The curadera and midwife have the benefit of the experience of numerous generations. Experience, when finally studied, may prove to have been of more value than previously comprehended. Attention should be given to the medicinal plants used by cultures that inhabit tropical and subtropical regions of the world. Such regions have the most diverse of all floras and have had countless generations of provincial experience. Nevertheless, the plants and their medicines have been little studied scientifically. It is not mere coincidence that plant families singled out as having medicinal properties by diverse cultures of the tropics are often the same, and used for similar ailments. The medical effects are real and have been repeatedly discovered and rediscovered by unrelated peoples.

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