

A Mating Aggregation of *Dasymutilla foxi* in Southern Arizona

(Hymenoptera: Mutillidae)

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In general, velvet ants are most abundant in deserts or similar arid regions (Hurd, 1951). In the United States, numerous species belonging to the genus *Dasymutilla* Ashmead occur in the southwestern states.

Velvet ants are not frequently encountered in large numbers. Fattig (1936) described seeing unusual mating behavior involving *Mutilla briaxus* Blake, in which "at least" 40 males were involved. Linsley *et al.* (1955) told of an "unusually large concentration" of *Dasymutilla formicalia* (Rohwer) in which 31 males and 37 females were collected in a period of about one hour. Other records have been made of specimens in higher densities than usual (Mickel, 1928; 1938), but these apparently have not involved any true aggregation.

The present study involves a very large aggregation, including both males and females, of *D. foxi* (Cockerell). The site was located in Pinal Co., Arizona, about 40 km (25 miles) north of Tucson (Star Flat Tank, Black Mt., 7½ min. topographic series, about 32°45'00"N/110°52'30"W). It was discovered on September 11, 1976, and has now been under observation for more than 12 months. The site consists of two reservoirs used for watering cattle, separated by an earthen dam. Each reservoir is approximately one half hectare in area. The dam is nearly devoid of vegetation, though some trees of the species *Prosopis juliflora* (Swartz) border the water in the reservoirs. The dominant plant species in the area is *Larrea divaricata* Cavanilles. Vegetation is relatively sparse. Two species of bees, *Diadasia rinconis* Cockerell and *D. opuntiae* Cockerell (identified by E. Ordway), were nesting at the site.

Materials and Methods

Visits every two to three weeks for the 12 months were made to the study area for purposes of collection and observation, and for deter-

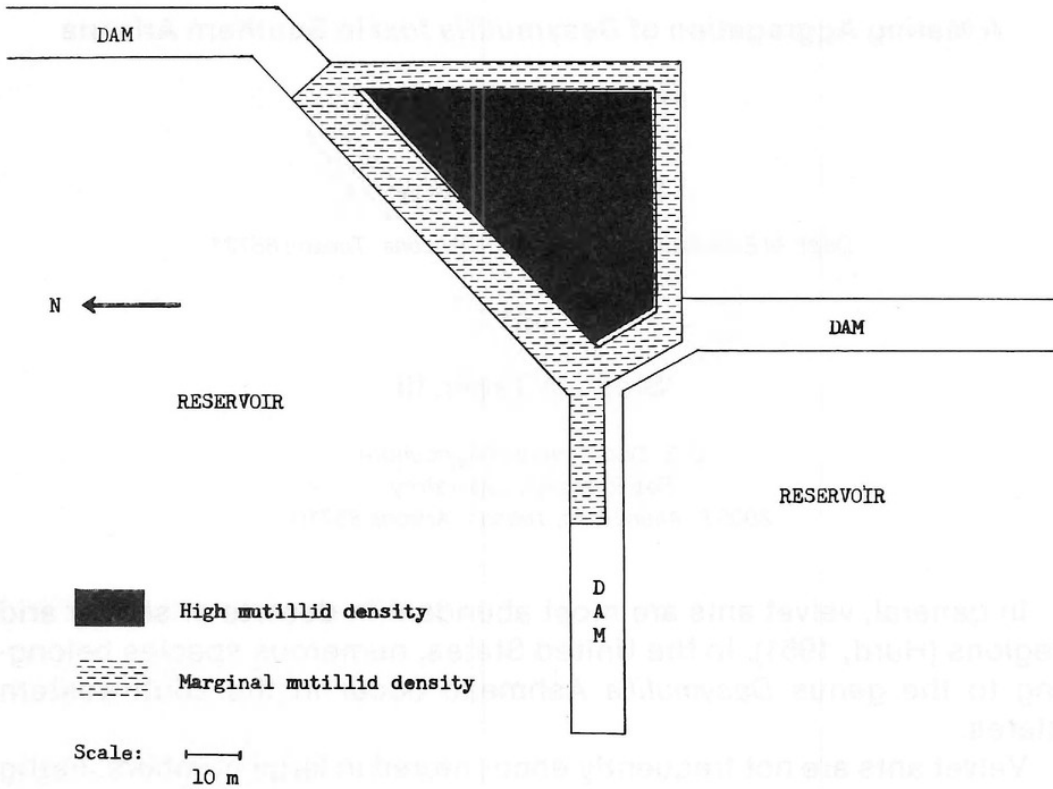


Fig. 1. A map of the aggregation site at which mutillid activity was observed. There was an area of high density surrounded by an area of marginal density on and near the earthen dams.

mining the population size. During a visit on September 29, a map (Fig. 1) was made in which the aggregation was located. A marginal area was also noted. Within the location, five one square meter plots were marked off. The distance between the sample areas was about 6 meters. The number of male and female mutillids in each square meter was first counted at 1710 MST, and then at 10 minute intervals for 80 minutes.

Visits were made to the site during all daylight hours to determine when the mutillids were most active.

It was suspected that the aggregation may have been for purposes of courtship and mating, as many pairs were observed in copulation. To determine whether successful mating was being accomplished, several pairs of specimens were collected *in copula* on September 22 and taken to the USDA Bee Research Lab in Tucson for dissection.

Results

The area of high concentration covered approximately 1300 square meters (Fig. 1). Using the data collected from the one meter squares

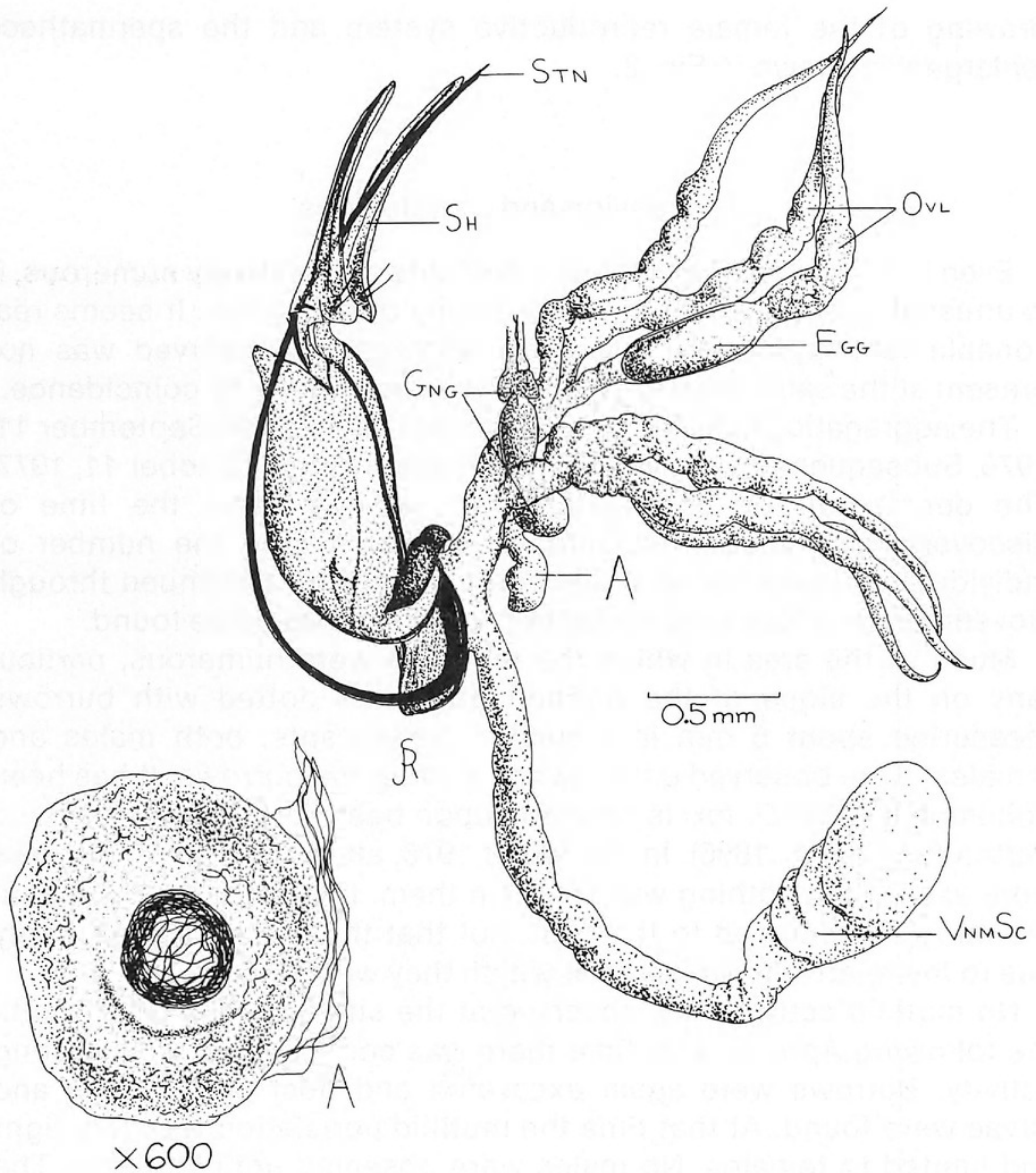


Fig. 2. A drawing of the reproductive tract of a female *Dasymutilla foxi*, with an enlarged drawing of the spermatheca (A) showing the sperm therein. GNG, ganglion; OVL, ovariole; SH, sheath; STN, sting; VNMSC, venom sac. (Drawing by R. Schmalzel).

within the area of high mutillid concentration, it was calculated that there were nearly 5 velvet ants per square meter in the area. Using this, and the total area of the aggregation, it is estimated that the population consisted of approximately 6000 individuals, with a sex ratio approaching 1:1.

Activity was observed during all daylight hours, and even shortly after sunset. Greatest activity, however, was observed from about 1500 to 1900 MST.

It was determined that successful mating was occurring within the population, as live spermatozoa were observed in spermathecae. A

drawing of the female reproductive system and the spermatheca (enlarged) is shown in Fig. 2.

Discussion and Conclusions

Even in the Southwest, where velvet ants are relatively numerous, it is unusual to see many individuals in any one location. It seems reasonable to assume that the large aggregation observed was not present at the same location at the same time purely by coincidence.

The aggregation of velvet ants was first observed on September 11, 1976. Subsequent observations were made through October 11, 1977. The density of the aggregation was greatest from the time of discovery until about mid-October, at which time the number of individuals present began to decline. The decline continued through November, by which time no further specimens could be found.

Much of the area in which the mutillids were numerous, particularly on the slope of the earthen dam, was dotted with burrows measuring about 5 mm in diameter. Velvet ants, both males and females, were observed entering and exiting the burrows. It has been documented that *D. foxi* is parasitic upon bees of the genus *Diadasia* Patton (Cockerell, 1896). In the fall of 1976, although several burrows were excavated, nothing was found in them. It seemed probable that the burrows belonged to the host, but that the burrows were empty due to the relatively late dates at which they were examined.

No mutillid activity was observed at the site from November until the following April. At that time there was considerable host nesting activity. Burrows were again excavated and host pollen balls and larvae were found. At that time the mutillid population was very light and limited to females. No males were observed until mid-May. The mutillid population remained small and steady throughout the summer and early fall. At no time during 1977 did the population reach even $\frac{1}{4}$ the size of the fall 1976 population.

The activity over the course of the year seems to clearly indicate that the site is being used as a courtship and mating site for the mutillids, as well as a host nesting site.

Literature Cited

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BOOK REVIEW

A Revision of the Subfamily *Coelidiinae* (Homoptera: *Cicadellidae*) II. Tribe *Thagriini*. Nielson, M. W. 1977. Pacific Insects Monograph 34. Published by Entomology Department, Bishop Museum, Honolulu, Hawaii. 218 pages, generic and specific check lists and keys, 808 text figures. Price: \$12.50 soft cover; \$14.00 hard cover.

The leafhopper Subfamily *Coelidiinae* contains over 600 species, nearly 100 genera and 6 tribes. Leafhopper species within this subfamily are primarily inhabitants of tropical areas. Most of the genera are found in the Neotropical Region while over half of the species are known from the Oriental Region and another 50 species are represented in the Ethiopian Realm. Only two or three of more than 600 species are known from the United States and their origins are thought to be elsewhere.

This kind of worldwide revision of a large subfamily is a monumental task, in this case necessitating the publication of the revision in four parts. The first has been published in the Bulletin of the British Museum (Natural History) Entomology, Supplement 24, 1975 and is entitled "A Revision of the Subfamily *Coelidiinae* (Homoptera: *Cicadellidae*) Tribes *Tinobregmini*, *Sandersellini* and *Tharrini*." The remaining two parts will be published elsewhere.

Part II, which concerns us here, covers the large genus *Thagria* with 137 species from the Oriental and Australian Regions and the smaller genus *Tahara* from New Guinea. Part II, as with Part I, is a perfect example of what a revisionary work should be and for this the author is to be highly commended. Introductory sections are short, concise and well written. Ample descriptions of all tribes, genera and species are given and the keys provided appear quite adequate. Text figures illustrating the genitalic and cephalic characters necessary for specific identifications are excellent.

Pacific Insects Monograph #34, along with the other three parts of the revision of the *Coelidiinae* will make an excellent and important addition to the Homopterist's library. **R. J. Gill**, California Department of Food and Agriculture, Sacramento, 95814.



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