THE BIONOMICS OF *STATOR PYGIDIALIS* (COLEOPTERA: BRUCHIDAE)

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ABSTRACT

The unique behavior of ovipositing only on seeds exposed on the ground is described for *Stator pygidialis*. This behavior is related to other aspects of its bionomics and compared to other species with similar ovipositional behavior, namely *S. chihuahua, S. sordidus, S. vachelliae, S. mexicanus* and *S. generalis*.

Bruchid beetles feed only in plant seeds, usually those of the Leguminosae, and most records of bruchid hosts are of seeds collected in fruits while on the plant. Bottimer (1973) reported that *Stator vachelliae* Bottimer and *S. mexicanus* Bottimer breed in *Acacia* spp. seeds that were exposed on the ground. Shortly before Bottimer's publication, I had discovered that *S. pygidialis* (Schaeffer) breeds in seeds of *Calliandra humilis* after they had fallen to the ground. Stimulated by these discoveries my subsequent studies have shown that this unique habit among bruchids is also shared by *S. chihuahua* Johnson and Kingsolver, *S. generalis* Johnson and Kingsolver, and *S. sordidus* (Horn). Hosts for all these species were reported by Johnson and Kingsolver (1976) and Johnson (1979).

Because the habit of oviposition on seeds only when they are on the ground is a rare phenomenon in bruchids, this behavior is reported upon here. Also, because more information is available on the life history of *S. pygidialis*, it will serve as a model for other species in this "guild."

S. pygidialis has been reared from *Calliandra humilis* growing in Flagstaff, AZ, and from *C. reticulata* growing in Naco, AZ. Bruchids from both localities oviposit only on seeds on the ground near plants. These bruchids breed readily in seeds of their hosts in the laboratory and continue to breed until the seeds are used up.

Pods of *C. humilis* usually start to ripen and dehisce during the last week in August in Flagstaff. In the subsequent 2 weeks many seeds mature and are scattered over the ground by the elastically dehiscent pods. Occasionally some seeds remain in the pods but none of these seeds has ever been found to be fed upon by a bruchid. I have observed adult *S. pygidialis* actively searching for seeds on the ground at about the time the pods start to dehisce. Oviposition usually occurs on seeds that are protected in a crevice, depression, (i.e. a natural catchment) where they are carried by gravity. (R. Conway observed that *S. pygidialis* carry seeds with their hind legs in laboratory culture jars. Subsequent experiments showed that there was a tendency for this species to carry seeds to areas sheltered from light.) Only rarely does oviposition occur other than in one of the "caches" that is not covered by a plant, a rock, etc. The great majority (95+%) of *C. humilis*

seeds which have eggs on them, have only one *S. pygidialis* egg per seed. The remainder have 2 eggs per seed. No seeds have been found with 3 or more eggs on them. Apparently *S. pygidialis* has only one generation per year in Flagstaff (elevation 2133m). I have collected seeds with eggs on them from the ground as late as 13 December, and there was no evidence of prior bruchid emergence from them. When these seeds were subsequently put in the laboratory at room temperature adults emerged about six weeks later. This corroborated experiments that I had conducted earlier. Seeds with eggs on them were collected in September. Some were (1) placed in the laboratory at room temperature (25°C); (2) placed in a refrigerator at 3.3°C; and (3) placed in an unheated shed for the winter. Those under laboratory conditions (1) emerged in about 6 weeks and continued to breed in seeds in culture. Those placed in the refrigerator emerged the following summer when they were placed at room temperature in the laboratory. Those kept in an unheated shed emerged in June of the following year. No bruchids emerged subsequently from this lot of seeds, so all of the bruchids emerged during the year following oviposition. Thus, *S. pygidialis* has the potential to continue to breed if the temperature is high enough but because of the cold winters in Flagstaff it has only one generation per year.

No other insect seed predators of *C. humilis* have been found in Flagstaff, nor have parasites been reared from *S. pygidialis*. *Calliandra eriophylla*, a host of *S. chihuahua*, grows in Arizona at lower elevations and warmer temperature regimes than *C. humilis*. Unlike *C. humilis*, *C. eriophylla* seeds that remain in the dehisced pods are preyed upon by *Stator pruininus* (Horn) and *S. limbatus* (Horn). Hence it appears that reproduction of *C. humilis* is enhanced because it grows under temperature extremes that cannot be tolerated by *S. limbatus* and *S. pruininus*.

Under favorable conditions, all of the *Stator* spp. mentioned in this paper continue to breed in seeds until their food supply is used up. *Stator pruininus* and *S. limbatus* oviposit only on seeds while they still are on the plant and are not host specific, having 30 to 40 hosts. The other species utilize seeds only after they have fallen to the substrate and are very host specific, having only 1 to 4 hosts per species. Thus it appears, in this group of bruchids, that those species feeding in seeds on plants are generalists while those that feed in seeds on the ground are specialists.

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