

THE BEHAVIOR OF SOME BEMBICINE WASPS
OF SOUTHERN ARIZONA (HYMENOPTERA:
SPHECIDAE, *MICROBEMBEX*,
GLENOSTICTIA, *XEROSTICTIA*)

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ABSTRACT. Aspects of the nesting behavior of a number of bembicine wasps are described for the first time. Of special interest is the discovery that *Xerostictia longilabris* provisions its nests with adult ant-lions. This is the only nyssonine wasp known to capture living Neuroptera regularly for use as prey.

This paper contains data on the behavior of several bembicine wasps about which little or nothing has been written previously. All species were observed at a site in the Gila River Indian Reservation located approximately 3 mi SE of Gila Crossing and just east of the Sierra Estrella mountains in Maricopa Co., Arizona. The wasps nested in a large stabilized sand dune which extended as a ridge 5-10 m above the surrounding plain, an *Atriplex* desert. A thicket of mesquite paralleled the ridge for several hundred yards; otherwise, the vegetation was sparse and scattered. Temperatures in July, when much of this work was done, regularly exceeded 110 F. by midday and were much higher still on the surface of the dunes.

Microbembex argyropleura R. Bohart:—By far the most abundant species, *M. argyropleura*, nested in dense aggregations in several blow-outs on the dune ridge. Females of populations active in July constructed exceptionally long (ave. length = 81 cm, range 70-95 cm, N = 5) and deep (ave. depth = 54 cm, range 45-67 cm, N = 5) burrows. These figures far exceed any reported for other members of the genus; *M. nigrifrons* builds burrows in August in eastern Washington that average about 50 cm in length and 30 cm in depth (Alcock and Ryan 1973). The unusual dimensions of these nests appear to be a concession to the extraordinary dryness of the dunes. As was true for *M. nigrifrons*, cells of *M. argyropleura* were located approximated 10-15 cm below the point (40-50 cm beneath the surface) where the sand

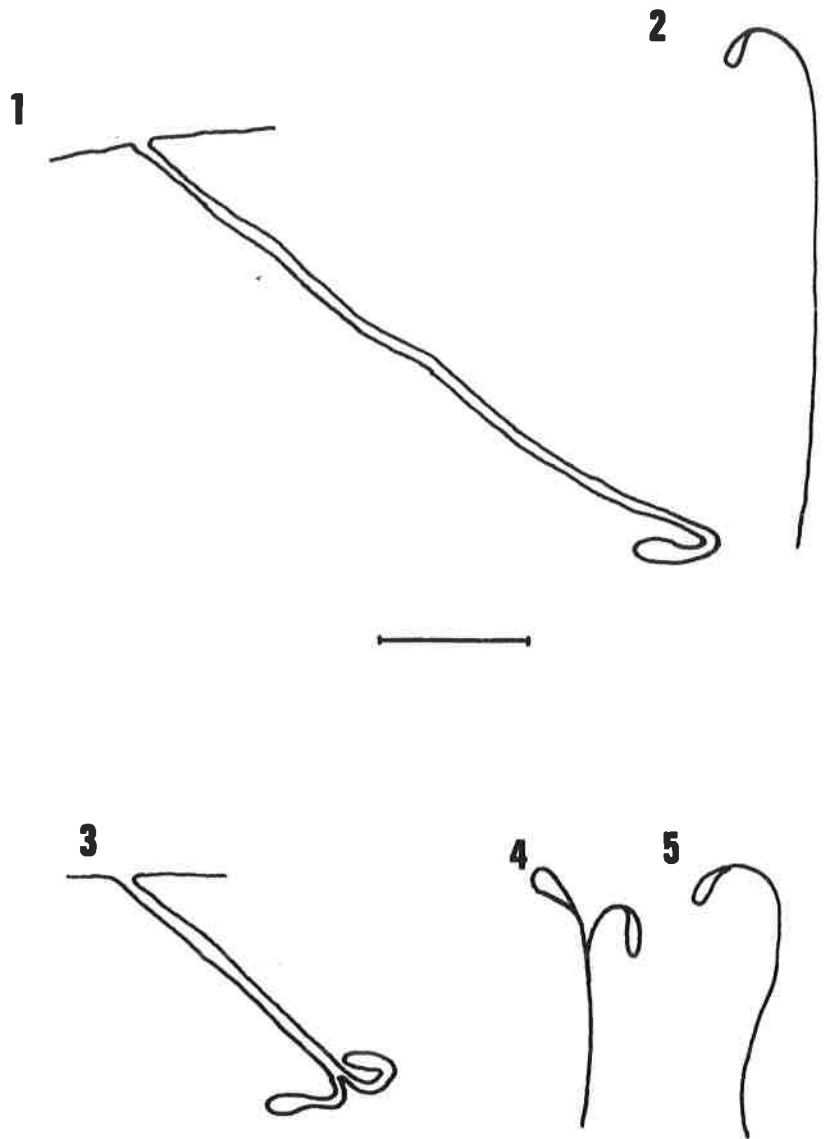


Fig. 1. Diagrams of the nests of *Microbembex argyropleura* (1—side view; 2—the view from above) and *Xerostictia longilabris* (3—a side view of a multicelled nest; 4,5—views from above of two nests. The horizontal line = 20 cm.

retained some moisture. The simple design of the nest of this species is shown in Fig. 1,

In other respects, the behavior of this wasp appears to parallel that reported for all other observed *Microbembex* (Evans 1966; Goodman 1970; Alcock and Ryan 1973). Females laid an egg in an empty cell and subsequently provisioned the nest with dead arthropods of all sorts (Diptera, Hymenoptera, Coleoptera, Heteroptera, and one spider). In addition, fragments of mealworms, grasshoppers, and even pieces of cicada abdomen placed on the sand near nesting areas were quickly discovered and taken by hunting females. Large "prey" were sometimes picked up and carried upwards considerable distances (up to 6 m) as the female manipulated her find. One individual, harassed by other members of the aggregation, dropped a grasshopper femur by her burrow several times. Each time she then retrieved the prey and repeated the vertical manipulatory flight before reapproaching the nest entrance. In addition, females sometimes perched on a bush adjusting their find for several seconds before going to their burrow. On one occasion a prey-laden female was pursued by a satellite fly, *Senotainia* sp. nr. *rufiventris* (Coquillett) (determined by R. J. Gagne).

On four days, a male was seen grasping a female beneath him while the pair bobbed in flight 0.3–1.5 above the dune. Whether copulation was initiated and completed in flight could not be determined.

Glenostictia: Three members of this genus nested in the area during July. I found one burrow only of the small *G. argentata* (W. Fox) which was 24 cm long and 15 cm deep, a sloping tunnel leading to a single cell which contained a small larva, some prey remnants, and eight freshly captured flies (primarily Bombyliidae). The species evidently provisions its nests progressively. The burrow receives a closure each time the female leaves it.

I discovered one nest of *G. gilva* Gillaspay which measured 30 cm in length and 21 cm in depth, dimensions three times greater than the one previous report (Evans 1966). The cell contained a small bee fly with an egg attached vertically to the side of the thorax by the base of a wing which had been bent out perpendicular to the fly's body. Another nest of this species was located in a sand mound by the Agua Fria River, just south of Lake Pleasant, Maricopa Co., Arizona at the eastern border of the Hieroglyphic Mountains. The burrow (10 cm long \times 5 cm deep) contained a small larva, prey remains, and seven bee flies ranging in length from 6–8 mm.

I found no nest of *G. pictifrons* (F. Smith) but observed it hunting in the line of mesquite trees near the ridge. The wasp produces a distinctive whining buzz in flight which changes pitch as the insect alternates between hovering and darting forward. When searching for

prey (small Diptera visiting the flowers of the shrub *Condalia lycioides*) it almost always holds its body at a moderate angle with the head higher than the abdomen. It hovers in one area for many seconds changing position slightly while it scans the location. Failure to detect a fly causes the wasp to dart to a new hovering station. Upon spotting a prey, the female attempts to maneuver to a point where it has a clear *upward* route to the fly. It then moves *backward* 5–15 cm while continuing to orient its body on line with the intended victim; the wasp then charges rapidly straight forward and tries to pluck the fly from its perch or from the air, if the prey endeavors to escape. Two prey captures were observed along with numerous failures. After grasping a fly, the wasp quickly manipulates it (probably stinging it in the process) and then departs the hunting site.

Xerostictia longilabris Gillasp:—This genus was rather recently erected by Gillasp (1963) and nothing has been reported on its behavior to date. I found two nests of *X. longilabris* in mid-August, each 42 cm in length, one with two cells located 28 and 30 cm beneath the surface, the other with a single cell 30 cm deep. In the multicelled nest, one chamber was empty (or held an egg which was destroyed by a clumsy excavation) and the other contained a nearly mature larva and the remains of five adult ant-lions, *Brachynemurus longipalpis* Hag. (determined by O. S. Glint), stacked head-first into the cell as well as four flatid bugs, *Ormenis saucia* Van Duzee (determined by J. P. Kramer), a blue-green species that inhabits blue-green *Atriplex* bushes. The second nest, which was being provisioned at the time of its excavation, contained a cell with a medium-sized larva and the remains of two adult ant-lions and two flatids of the same species as above. The female wasp was taken as she brought a third flatid to the nest.

Both individuals were highly sensitive to human disturbance and each stopped removing the outer closure of the burrow when I approached them. They flew off with great rapidity and did not return for more than a minute. Moreover, they fled a number of other times before I was near enough to observe them closely. The prey-laden female dropped down to the nest entrance, from a height of about 40 cm, in a series of steps. The pitch of her loudly buzzing, whining wings changed with each downward drop. She grasped the prey with her middle legs. On one approach I saw that the flatid was held by its head, venter up and head forward. On another approach, the prey had been shifted so that it was carried on its side with the wasp's claws clutching the dorsum and venter of the anterior part of the bug.

In some respects the behavior of *X. longilabris* is similar to that of its closest relatives (*Glenostictia*, *Stictiella*, and *Steniola*—Evans 1966) with its scattered nests of simple design (Fig. 1), its noisy whining flight, the use of an outer closure, and progressive provisioning (Evans 1966). However, the capture of living Neuroptera as prey is nearly unique among the Nyssoninae (Evans 1966) although Evans (pers. comm.) has a single record of an Australian *Bembix* with an adult ant-lion. Moreover, the combination of Neuroptera and Homoptera as prey is unusual. Interestingly, one species of *Glenostictia* (*G. scitula*) takes both Homoptera and Diptera suggesting a propensity for diverse prey selection in this phylogenetic group. In any event, *Xerostictia* adds an extra dimension to the adaptive radiation in the choice of prey that has taken place within the sand wasps. Prof. R. M. Bohart has pointed out to me that the use of Neuroptera and Homoptera by *X. longilabris* strengthens its separation from the very similar *Stictiella pulchella*, a hunter of Lepidoptera.

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