

The Great Lakes Entomologist

Volume 20

Number 2 - Summer 1987 *Number 2 - Summer 1987*

Article 4

June 1987

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O'Brien, Mark F. (1987) "Biology and Distribution of *Tachysphex Aethiops* in Michigan (Hymenoptera: Sphecidae: Larrinae)," *The Great Lakes Entomologist*: Vol. 20 : No. 2 , Article 4.
Available at: <http://scholar.valpo.edu/tgle/vol20/iss2/4>

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BIOLOGY AND DISTRIBUTION OF *TACHYSPHEX AETHIOPS* IN MICHIGAN (HYMENOPTERA: SPHECIDAE: LARRINAE)Mark F. O'Brien¹

ABSTRACT

Tachysphex aethiops is a primarily western species that also occurs in the Upper Peninsula of Michigan. Females nest in mossy, sand slopes and utilize pre-existing burrows of other insects. One shallow, five-celled nest contained a single, third-instar nymph of *Spharagemon* sp., probably *bolli*, in each cell. Three prey were parasitized by miltoigrammine flies.

Tachysphex aethiops Cresson is a robust, shiny, all-black species found across the western half of North America (Krombein 1979). It reaches its easternmost limit in the Upper Peninsula (UP) of Michigan. Evans (1970, 1973) briefly reported on some aspects of *T. aethiops* nesting behavior in Wyoming. Females there preyed upon *Trimerotropis* sp. nymphs and made a two-celled nest. Evans saw many females digging burrows, but never observed them dragging prey or exhibiting other provisioning activities. The shallow, oblique burrow he unearthed was 10 cm long and 4 cm deep, with the two cells in close proximity. Alcock (1973) found a three-celled nest of this species in Seattle, Washington, which apparently had been modified from a *Bembix* sleeping burrow. Each cell contained a single, large grasshopper nymph. The burrows were 10–12 cm long and 4 cm deep.

These are the first records of *T. aethiops* from Michigan. The quantity of males and females of this species collected in Malaise traps in the UP indicates it can be abundant in the proper habitat. I have seen specimens of this species from the following localities in Michigan: Alger Co., Pictured Rocks National Lakeshore, 30 June–2 July 1982, M. S. Arduser, coll.; Dickinson Co., Channing, 17 July 1983, R. L. Fischer, coll.; and Marquette Co., Huron Mountain Club, (various dates as stated below) D. C. L. Gosling, coll. An attempt was made in 1986 to locate a nesting aggregation of this species at the Huron Mountain Club, a large, private preserve in northwestern Marquette County, about 7 km W of Big Bay, as part of a continuing study of the aculeate Hymenoptera of the region (O'Brien 1987).

T. aethiops was studied at the Huron Mountain Club during 21–27 June 1986. Collection records from Malaise traps from previous years (1983–85) indicated that the wasps were active from 21 June to 30 July, with most records from late June to mid-July. During the study period, females were active both on sunny and cloudy days from 0900 to 1900 h (EDT) at ambient temperatures of 20–33°C. Observations were made primarily along a portion of a sandy lane running through an old, abandoned homestead and into a pine plantation. The area where the wasps were most frequently encountered consisted of a sandy slope covered with patches of mosses, grasses, various Compositae, and bracken fern (*Pteris* sp.).

Several female *T. aethiops* were seen digging at the bases of clumps of moss-covered sand, (reminiscent of the moss-covered slopes in central New York, where populations of

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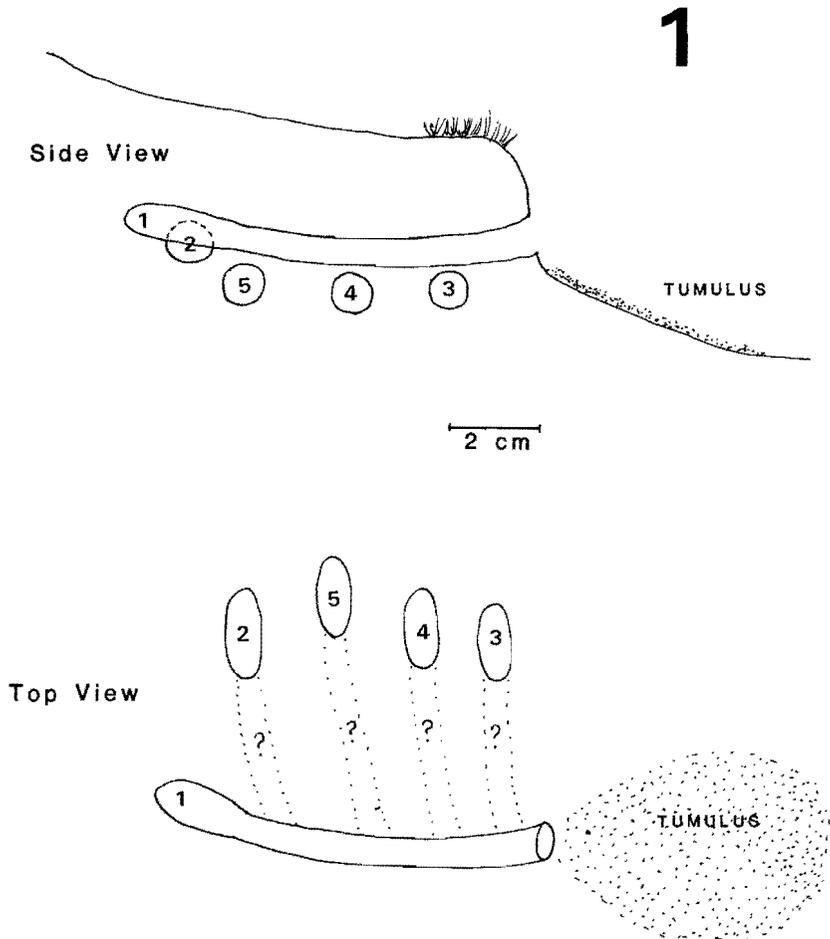


FIG. 1. Side and top views of *Tachysphex aethiops* nest. Numbered cells denote order in which they were excavated, not sequence of provisioning by wasp. Question marks and dotted lines denote hypothetical burrows.

Liris argentata (Beauvois) and *Podalonia luctuosa* (Smith) were observed [O'Brien and Kurczewski 1982a,b]). *T. aethiops* females were commonly seen digging or inspecting burrow entrances throughout various times of the day. Females inspected the bases of grass clumps and exhibited searching behavior, but prey capture or transport was never observed.

On 24 June, one female was observed throwing sand into a burrow at the base of a sandy slope at 1300 h. This burrow was marked and excavated the following day. The nest (Fig. 1) was in moist, friable sand. A broad, fan-shaped, low tumulus ca. 6 × 5 cm

extended out from the open entrance, which entered the sand at an oblique angle. The burrow entrance measured 6 mm in diameter.

A total of five cells was unearthed, all in close proximity to each other, each containing a single third instar nymph of *Spharagemon* sp., probably *bolli* Scudder (Orthoptera: Acrididae) which faced head inward with venter up. The most recent cell was at the end of the main burrow (6.4 cm), at a depth of 2.3 cm. The cell measured 1.5×0.9 cm, and the grasshopper contained five miltogrammine maggots, which emerged from beneath the pronotum after it was immersed in alcohol. A second cell was found at a right angle to the first, 2.8 cm deep, 2.0 cm away. This cell measured 2.0×0.8 cm, and the grasshopper nymph had a mutilated egg with a miltogrammine larva on the sternum. Cell three was almost below the entrance, in line with cell two at a depth of 2.8 cm, and measured 1.7×0.8 cm. The prey had three miltogrammine maggots. Cell four, also in line with cell two, was 3.0 cm deep, measuring 1.8×0.8 cm. The nymph was apparently not parasitized; no egg or larva was on it when removed. It is possible that the egg may have been dislodged during excavation or a miltogrammine maggot may have burrowed inside after devouring the egg. Cell five was 2.2 cm from cell four, about halfway between cells two and four, at a depth of 3.1 cm. The cell measured 1.7×0.8 cm, and contained a grasshopper nymph with a 4-mm-long wasp larva across the prosternum, attached to the base of the right forecoxa. The prey measured 16, 18, 17, 18, and 17 mm, in body length respectively.

Attempts were made to excavate two other *T. aethiops* burrows near the above nest. The burrows entered the ground at the bases of moss-covered clumps of soil. A female had been observed intermittently removing sand from one burrow from 1500 to 1520 h. She raked the sand onto the tumulus after carrying out several loads. The irregular, slightly fan-shaped tumulus measured 5.3×5.0 cm. The burrow was traced to a length of 5 cm, where it was 3.8 cm below the surface. The other burrow was excavated 30 m away from two nests dug previously, after a female of this species was observed closing the entrance at 1812 h. The entrance was 8 mm in diameter, and the burrow was traced for 4 cm before being lost.

DISCUSSION

It is surprising that *T. aethiops*, a large and conspicuous species, has not been observed transporting prey in this or previous studies (Alcock 1973; Evans 1970, 1973). Although more than 15 h were spent at the site during various times of the day (0900–1900 h), no females were seen with prey. The wasps may have been capturing prey during early morning and early evening hours, or while I was absent from the site at other times of the day. On the other hand, I observed *T. pompiliformis* (Panzer) and *T. tarsatus* (Say) provisioning nests at the same site during this time.

T. aethiops may hunt for prey in or bordering the woodlands, because *Spharagemon bolli* is an inhabitant of open, dry woodlands, woods margins, and sandy roadsides (Otte 1984). *Spharagemon* is closely related to *Trimerotropis* (Otte 1984), which was reported as prey by Evans (1973).

Although I observed several wasps removing sand from open burrows, I did not actually see any of them initiate a burrow, and I suspect they were using abandoned colletid or andrenid bee burrows. It was not uncommon to see as many as four females at a time running about, inspecting open holes, antennating entrances, and then continuing on to the next burrow. There were several dozen inactive openings in the sand that resembled the burrows *T. aethiops* used for nests. Alcock (1973) observed a *T. aethiops* female modify a *Bembix* sleeping burrow into a complete nest in about 70 min, but after 5 h the nest still had not been provisioned. This cryptic provisioning behavior certainly deserves further study.

The multicelled, shallow nests with a long main burrow are characteristic of *T. aethiops* and *T. punctifrons* Fox. *T. punctifrons* also makes a multicellular (six or more cells) nest with a long main burrow and several side burrows, each leading to a single cell

(Kurczewski, in press). Other *Tachysphex* species in the *pompiliformis* group that have thus far been studied, make only unicellular nests, either with a single large prey or a few smaller grasshoppers (Kurczewski 1964, Krombein 1979).

Miltogrammine flies may be a significant cause of mortality among *T. aethiops*, evident from the three of five cells parasitized in this study and Evans' (1970) observation that a *Trimerotropis* nymph was heavily parasitized. *T. aethiops* does not construct a temporary closure at the burrow entrance, which may account for susceptibility to cleptoparasitism by miltogrammine flies.

ACKNOWLEDGMENTS

I thank Adrienne O'Brien for her assistance in the field; David C. L. Gosling for the numerous Malaise trap samples from 1983–85; the Huron Mountain Wildlife Foundation for its generous support; Frank E. Kurczewski, SUNY College of Environmental Science & Forestry, for his helpful comments on the manuscript; Theodore H. Hubbell, University of Michigan Museum of Zoology, for identifying the prey; Wojciech J. Pulawski, California Academy of Sciences, for identifying *Tachysphex aethiops* specimens; and Roland Fischer, Michigan State University, for allowing me to examine the MSU specimens of *T. aethiops*. Voucher specimens and associated field notes have been deposited in the University of Michigan Museum of Zoology.

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