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NOTES ON THE NESTING BEHAVIOR OF *STENIOLIA ELEGANS* (HYMENOPTERA: SPHECIDAE)

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ABSTRACT.— The nesting behavior of a small aggregation of the digger wasp *Steniolia elegans* near Fort Collins, Colorado, is described. The prey was found to consist primarily of bee flies (Bombyliidae), the egg being laid erect on the first fly placed in the cell. Nests were shallow, unicellular, and were closed at all times when the female was away.

Several years ago Evans and Gillaspay (1964) reviewed what is known of the nesting behavior of digger wasps of the genus *Steniolia* (tribe Bembicini). One of the more common and widely distributed species, *elegans* Parker, was largely omitted from this review, since little was known concerning it. The present report is based on a two-day study of a nesting aggregation of this species just west of the city of Fort Collins, Colorado.

This aggregation was discovered on 4 July 1971 on the slag pile of an abandoned mine on a south-facing slope. There were an estimated 50 individuals of each sex. Males were most active during the morning (8:30 a.m.-12:30 p.m.), flying close to the ground in irregular patterns and landing here and there with their legs outstretched and their antennae extended rigidly forward. Now and then they hovered, with their middle legs extended, over females occupied at their nests, and on several occasions attempted copulations were observed.

The nests of the females were located in sloping, moderately friable but very stony soil. During the morning (9:30-11:30 a.m.) each female reopened her nest, first hovering over the entrance briefly and then digging through the closure, remaining inside for 20-60 seconds, then emerging and making a fresh closure. Then she hovered over the nest, flew off, and returned one or more times to hover again over the nest. These were evidently "inspection trips" serving to inform the wasp of the needs of the larva and perhaps to reinforce her memory of the nest site.

Within a few minutes to an hour or two following the inspection, each female returned with her first prey, carried with the middle legs in the usual manner of Bembicini. Prey-laden females produced a loud whine and often hovered briefly over the nest before digging through the closure. They remained in the nest very briefly (usually less than a minute) before coming out and restoring the closure. The prey consisted mostly of bee flies, as is common in the genus. The following species, in the numbers indicated, were taken from nests or from provisioning females (determinations by L. V. Knutson):

Bombyliidae

Anthrax irroratus Say
Poecilanthrax signatipennis (Cole)

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<i>Systoechus vulgaris</i> Loew	4
<i>Villa sinuosa</i> Wiedemann	2
<i>Villa</i> spp.	8
Asilidae	
<i>Holopogon atripennis</i> Back	1
Syrphidae	
<i>Eupeodes volucris</i> Osten Sacken	1
<i>Microdon coarctatus</i> Loew	1
<i>Volucella</i> sp.	1

Provisioning was found to be fully progressive, the number of flies brought in per day being determined by the size of the larva. Nests dug out in the morning, before provisioning began, contained only the remains of flies.

Several females were seen starting new nests in the afternoon, after having made the final closure of their previous nests. Much use was made of the mandibles in breaking through the soil and in dragging pebbles from the burrow and depositing them on the mound. From time to time, the female backed out of the entrance scraping soil, then remained on the mound for a few seconds, turning to one side or the other while still scraping soil. As the burrow deepened, the wasp appeared less frequently (at 5- to 10-minute intervals), each time she appeared taking either a brief flight in a small loop or a much larger loop with a diameter of 3-6 meters. I observed no leveling movements following completion of the nest, and the mound of earth at the entrance was left intact, measuring about 3 cm wide by 4 cm long and 0.5-1.0 cm deep. Several hours were required for completion of a nest.

When the nest was finished, each female made a thick closure from the outside by digging into that portion of the mound close to the entrance. Thus, newly completed nests could be recognized by the fresh mound which had been dug away on one side, facing the covered entrance. The egg was found to be laid erect on the side of the initial fly placed in the cell, in the common manner of *Bembicini*.

Six nests were excavated, and all were found to be unicellular—a simple, oblique burrow leading to a terminal cell 4.5-9 cm deep (mean 6.6 cm). Some burrows were straight, while others were curved in various ways to avoid stones. Burrow length varied from 7 to 17 cm (mean 11 cm). None of the nests excavated appeared to be parasitized.

It was evident that wasps did not spend nights or rainy periods inside their nests, and it is known that this species forms clusters on vegetation in the manner of other *Steniolia* species (Evans and Gillaspay, 1964). However, an extensive search of surrounding terrain during the evening failed to reveal any such clusters.

LITERATURE CITED

- EVANS, H. E., AND J. E. GILLASPY. 1964. Observations on the ethology of digger wasps of the genus *Steniolia* (Hymenoptera: Sphecidae: Bembicini). Amer. Midl. Nat. 72: 257-280.