The Occurrence of *Chalybion zimmermanni* Dahlbom (Sphecidae) in Indiana

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Abstract

Chalybion zimmermanni Dahlbom (Hymenoptera, Sphecidae) is added to the list of insects of Indiana. The northern extent of this insect's range was shown by Bohart in 1963 as Tennessee. It was found nesting in holes in wood in Wayne County, Indiana, in 1968, and in 1969 evidence of nesting was found in six other counties. Nests are provisioned with small spiders, generally Argiopidae or Theridiidae. An unusual two-layered plug is made of mud and uric acid. The white uric acid contrasts distinctly with the old wood around the nest hole. A small number of nests were located in deserted nests of the yellow-legged mud dauber, *Sceliphron caementarium*.

During a recent study of three mud-using wasps, *Sceliphron caementarium* (Drury), *Trypargilum politum* (Say), and *Chalybion californicum* (Saussure), another large mud-using wasp appeared in my study area near Centerville, Wayne County, Indiana. This was *Chalybion zimmermanni* Dahlbom. On 1 August 1968, an assistant, Jay Myers, called my attention to the metallic blue wasp which was plugging a hole in the wooden plate of an old tool shed. The original borer was probably a beetle.

We watched this wasp clean the debris out of a second hole, gather mud from old *Sceliphron caementarium* nests and form a barricade deep in the hole. She collected small spiders, laid an egg on the abdomen of one of the first spiders, and, on two occasions, built a wall about halfway down the hole. The remaining space was used for a second cell. When this was filled, the female formed a countersunk plug of dark mud. This sometimes required three or four loads of mud, apparently all of it gathered from old nests.

After the dark mud was dry, she made a level or slightly concave seal of white material. We collected some of this white plaster from one cell, and analysis by infra-red spectrophotometry showed that it was mainly uric acid. The wasp disappeared after completing six holes.

In May, 1969, six small cylindrical traps made of fiberglass screening were fastened over the white-plugged holes. Emergence of wasps from these cells was noticed first on 28 June. Nothing emerged from one cell. Two males were collected and are in the Joseph Moore Museum of Earlham College. Five wasps, including both males and females, were released. A summary of the adults which emerged is shown in Table 1.

Several of the wasps which emerged were chilled in a glass jar in a food freezer for about 4 minutes, and then were measured before their release. The clypeal teeth were examined to determine the sex. The male has a median tooth which is longer than either of the side teeth, and the female has three small flaps with the middle one not shorter than the others, as it is in *Chalybion californicum*.

TABLE 1. *Adults emerging from cells of* Chalybion zimmermanni *Dahlbom, Indiana, 1969.*

Cell	Number emerging	Body length (mm)	Sex
A	1	18	F (?)
B	2	19, 15.5	F, M
C	0	—	—
D	1	16	M
E	2	18, 16	F (?), M
F	1	large	F (?)

Two females started to make nests in old holes in the wooden plate on 16 July 1969. Eight holes were filled, four of which had been occupied in 1968.

An attempt was made in 1969 to determine the extent of *C. zimmermanni* penetration into Indiana. In 1963, Bohart and Menke (1) reported the northern extent of the range as Tennessee. Although no other specimens were collected, the distinctive two-layered, two-colored plugs were found in the following counties: Clark, Crawford, Dearborn, Ohio, Ripley, and Switzerland. An equal amount of collecting yielded negative results in Decatur, Jackson, Lawrence, Rush, and Washington counties.

Most of the cells were in the old timbers of barns and sheds, but in Clark County four of these plugs were found in a mass of deserted *Sceliphron caementarium* cells. Rau (5) reported that in Mexico *C. zimmermanni* uses the old cells of *Sceliphron assimilis* (Dahlbom).

A total of 40 spiders was examined from *C. zimmermanni* nests. The majority, 60%, were in the family Araneidae, and the remaining 40% were in the Theridiidae. These are shown in Table 2.

TABLE 2. *Prey of* Chalybion zimmermanni *Dahlbom in Indiana, 1969.*

	No.	%	Total %
Araneidae			
Araneus spp.	12	30.0	
Argiope aurantia Lucas	9	22.5	
Argiope trifasciata (Forskal)	2	5.0	
Cyclosa conica (Pallas)	1	2.5	
			60.0
Theridiidae			
Theridion frondeum Hentz	15	37.5	
Asagena americana Emerton	1	2.5	
			40.0
	—		—
	40		100.0

Whether or not the uric acid serves as a deterrent to parasites which might invade the completed cell through the plug has not been determined. The use of two colors of material in the final plug was reported by Williams (6) for *Chalybion violaceum* (Fabricius) in the Philippines. He said that this wasp ". . . stores her small spiders in some convenient hollow, as a rung socket, penholder base, old mud nest, etc., and simply plugs up the aperture, first with mud or moist earth, and finishes this off with a mixture of the excreta of geckos (lizards), giving the plug a whitish or plaster-like appearance."

Williams (6) also reported that d'Herculais in 1882, observing *Chalybion chalybeus* (Smith) at Port Natal, Africa, noticed "this curious habit" of using a light-color final plug. The material used at Port Natal was bird excrement.

Iwata (2) reported that he saw *Sceliphron* (*Chalybion*) *inflexum* Sickmann on Taiwan plaster the mud seal of her nest with white material, and also (3) reported this in Thailand. Yamamoto (7) said that he saw this wasp in Japan collecting bird droppings which were still damp, and using them for plastering.

In India, Jayaker and Spurway (4) observed *Chalybion bengalense* Dahlbom make a plug of brown mud and then cover it with a plug of white. One wasp collected the white material from the feces of a pet tortoise and another wasp used bird feces.

Summary and Conclusions

Chalybion zimmermanni, having the northern edge of its range reported in 1963 as Tennessee, appears to be moving northward in Indiana. The food stored for the young is small spiders from the families Araneidae and Theridiidae. It most often nests in borings in old timbers, but has been seen to use the deserted mud nests of *Sceliphron caementarium*.

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