The Great Lakes Entomologist

Volume 24
Number 3 - Fall 1991 *Number 3 - Fall 1991*

Article 12

October 1991

Burrow Construction From the Ground Surface in *Lyroda Subita* (Hymenoptera: Sphecidae)

Frank E. Kurczewski
State University of New York College of Environmental Science and Forestry

BURROW CONSTRUCTION FROM THE GROUND SURFACE IN *LYRODA SUBITA* (HYMENOPTERA: SPHECIDAE)

Frank E. Kurczewski[1]

ABSTRACT

Plasticity in the nesting behavior of *Lyroda subita*, a species that renovates and then uses pre-existing burrows and other subterranean cavities for nesting sites, is illustrated by one female which apparently excavated her burrow from the ground surface. Details of burrow construction are described. Information on nest structure and dimensions and cell contents is presented.

Lyroda subita (Say) is a common species of larrine wasp that inhabits much of North America. Females are often seen transporting paralyzed crickets on the ground and in low flights in broad daylight on bare soil. This species is one of the more heavily cleptoparasitized sphecids with cleptoparasitic frequencies approaching 25-50% at many localities (Evans 1964, Kurczewski and Peckham 1982, Spofford and Kurczewski 1990). Despite such high mortality, the species is relatively abundant throughout much of its range. This abundance may be related to its adaptability in both prey and nest site selection. Although the species usually preys upon nymphal Gryllidae (Kurczewski and Peckham 1982), one female nesting in upstate New York provisioned with Tridactylidae (Kurczewski and Spofford 1985), a behavior reported for an undescribed Australian species of *Lyroda* by Evans and Hook (1984).

Provisioning females of *L. subita* are seen commonly during field studies on other solitary wasps, but their burrow construction and nest closure has never been described. One reason for the lack of such information is related to the almost exclusive use of pre-existing burrows and other subterranean cavities as nesting sites by this species (Evans 1964, Kurczewski and Peckham 1982). *Lyroda subita* has been reported to renovate the tunnels and nests of a variety of insects, including other species of Sphecidae and Cicindelidae, as well as to modify underground crevices and cavities for nesting purposes. I have observed several females nesting within the narrow confines of cracks between concrete patio slabs in both New York and Pennsylvania. In every instance, burrow construction took place below ground level and out-of-sight. The single record of digging from the ground surface reported below fills in gaps about the nesting activities of this species and represents plasticity in its behavior.

As might be expected in a species of digger wasp that renovates preexisting depressions rather than digging from the ground surface, the foretarsal rake of *L. subita* females is weak and possesses few spines. The mid-and hindlegs of *L. subita* females are likewise weakly spined, except for the hindtibial spurs. The two parallel rows of spines on the hindtibiae may assist in pushing the soil upward during soil removal.

---

[1]Environmental and Forest Biology, State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210.

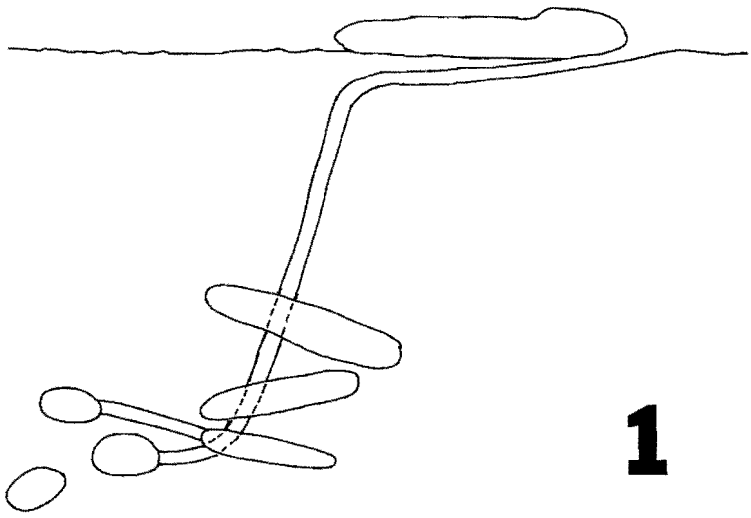

Figure 1. Nest of *Lyroda subita*, as seen in side view. All cells are fully provisioned and contain an egg on a paralyzed nymphal *Allonemobius carolinus*.

The pygidium of the female, which also assists in soil removal, is sparsely to densely covered with short, stiff setae and appressed hairs.

On 9 July 1972 at Presque Isle State Park, Erie County, Pennsylvania, I observed a female of *L. subita* pushing damp sand out of an entrance at intervals of 1–4 min. During soil removal, the hindlegs were used to push the damp sand up the burrow; the end of the abdomen, including the pygidium, was then used to bulldoze this sand onto the surface where it accumulated in a semi-circular mound below the entrance. Although initiation of the burrow from the ground surface was not observed, the situation of the entrance being located beneath one end of a flat stone, 5.5 cm long and 0.8 cm high, in soft moist sand and the design of the nest directly beneath the surface (see Kurczewski and Peckham 1982) suggests that the female did not use a preexisting depression. This nest was marked and excavated two days later.

The burrow, 4.5 mm in diameter, entered the sand at a 10° angle to the surface and proceeded at this angle for 6 cm before plunging nearly vertically for an additional 8 cm where it was lost among a series of subterranean flat stones. Three fully provisioned cells were unearthed 2.5 – 4.0 cm beyond this point at depths of 8.5, 8.0 and 7.0 cm beneath the sand surface (Fig. 1). The cells were 6–7 x 12–14 mm in height and length, respectively. The deepest cell contained three paralyzed nymphal field crickets and the two shallower cells, two such crickets each. All prey were identified as *Allonemobius carolinus* Scudder (Gryllidae) (det. A.B. Gurney, Systematic Entomology Laboratory, USDA). The individual crickets had been placed in the cells in a head inward and ventral side up position and weighed (wet) 23–35 ($x = 28.6$, $N = 7$) mg. (The wasp weighed 21 mg.) The wasp's eggs, ca. 2.0 x 0.6 mm, were each attached by a cephalic end to either a right (1) or left (2) forecoxal corium of the prey, the caudal end extending to the other side between the fore-and midlegs. One of the eggs hatched during transport to the lab and the feeding larva was photographed 1.5 days later (Fig. 2).

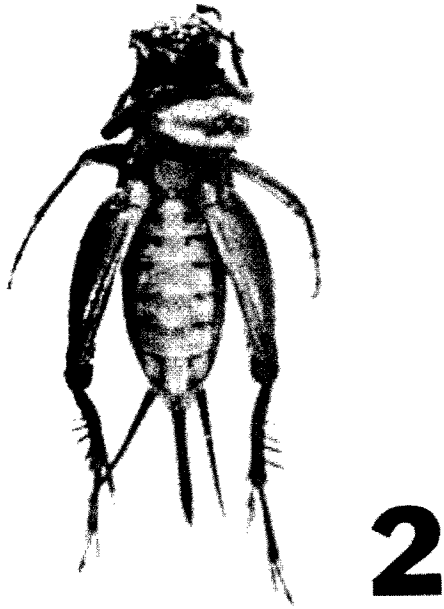

Figure 2. Larva of *Lyroda subita*, 1.5 days old, feeding at right forecoxal corium of paralyzed nymphal *Allonemobius carolinus*.

DISCUSSION

Until rather recently, plasticity in nesting behavior of solitary wasps had been little studied and not well documented (Evans 1966, Bohart and Menke 1976, Krombein 1979). More intensive studies are needed to fully disclose the spectrum of variation that remains undiscovered for the vast majority of species. This plasticity may be expressed in the use of unusual prey (Evans 1948, Kurczewski 1966, Kurczewski and Spofford 1985), variation in individual behavioral components (Steiner 1971) or modification in species-specific nesting patterns (Brockmann 1980, Evans 1987, Field 1989). Although a switch from usual to unusual prey is the most frequently observed change in a species-specific behavior pattern, intensive behavioral studies often reveal "hidden" variability in the form of omissions, additions or modifications in behavioral components. The excavation of a burrow from the ground surface in *Lyroda subita*, a species previously known to use only pre-existing holes for nests (Evans 1964, Kurczewski and Peckham 1982), is a significant deviation from its known nesting pattern. However, the mechanics employed by the female for this excavation, i.e., use of hindlegs and abdomen, are probably the same as those used during the renovation of an underground pre-existing burrow or cavity.

LITERATURE CITED

Bohart, R. M. and A. S. Menke. 1976. Sphecid Wasps of the World. A Generic Revision. Berkeley, Univ. Calif. Press, 695 pp.

Brockmann, H. J. 1980. Diversity in the nesting behavior of mud-daubers (*Trypoxylon politum* Say: Sphecidae). Fla. Entomol. 63:53–64.

Evans, H. E. 1948. Biological notes on two species of *Anoplius* (Hymenoptera: Pompilidae). Entomol. News 59:180–184.

_____. 1964. The classification and evolution of digger wasps as suggested by larval characters. Entomol. News 75:225–237.

_____. 1966. The behavior patterns of solitary wasps. Ann. Rev. Entomol. 11:123–154.

_____. 1987. Observations on the prey and nests of *Podalonia occidentalis* Murray (Hymenoptera: Sphecidae). Pan-Pacif. Entomol. 63:130–134.

Evans, H. E. and A. W. Hook. 1984. Nesting behaviour of a *Lyroda* predator (Hymenoptera: Sphecidae) of *Tridactylus* (Orthoptera: Tridactylidae). Australian Entomol. Mag. 11:16–18.

Field, J. 1989. Alternative nesting tactics in a solitary wasp. Behaviour 110:219–243.

Krombein, K. V. 1979. Superfamily Sphecoidea, pp. 1573–1740, *In*: Krombein, K. V., P. D. Hurd, Jr., D. R. Smith, and B. D. Burks. Catalog of Hymenoptera in America North of Mexico. Vol. 2. Apocrita (Aculeata). Smithsonian Inst. Press, Washington, D.C.

Kurczewski, F. E. 1966. *Tachysphex terminatus* preying on Tettigoniidae—an unusual record (Hymenoptera: Sphecidae, Larrinae). J. Kansas Entomol. Soc. 39:317–322.

Kurczewski, F. E. and D. J. Peckham. 1982. Nesting behavior of *Lyroda subita* (Say) (Hymenoptera: Sphecidae). Proc. Entomol. Soc. Wash. 84:149156.

Kurczewski, F. E. and M. G. Spofford. 1985. A new host family for *Lyroda subita* (Hymenoptera: Sphecidae). Great Lakes Entomol. 18:113–114.

Spofford, M. G. and F. E. Kurczewski. 1990. Comparative larvipositional behaviours and cleptoparasitic frequencies of Nearctic species of Miltogrammini (Diptera: Sarcophagidae). J. Natur. Hist. 24:731–755.

Steiner, A. L. 1971. Behavior of the hunting wasp *Liris nigra* V.d.L. (Hymenoptera, Larrinae) in particular or in unusual situations. Canad. J. Zool. 49:1401–1415.