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Observations on hunting behavior of juvenile *Chanbria* (Solifugae: Eremobatidae)

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Abstract. Juvenile solifuges have rarely been observed hunting in natural conditions. We recorded the hunting behavior of juvenile third or fourth instar solifuges of the genus *Chanbria* (Eremobatidae) near lanterns set up in the Imperial Sand Dunes, Imperial County, California. At least 10 juveniles were observed between 22:50 and 01:40 h on 18–19 June 2010. The behavior consisted of nearly constant movement, abrupt stops or retreats, and quick excavation of the sand. The juveniles probed the sand using their pedipalps. One juvenile was observed to dig up an immature Hemiptera from just beneath the surface amidst the sand grains. Direct contact with other solifuges or arthropods occasionally triggered an immediate flight response.

Keywords: Solifugids, camel spiders, predation

The order Solifugae remains poorly studied (Punzo 1998a; Harvey 2003). This is largely due to difficulties in observing individuals in the wild, lack of success raising solifuges in captivity, and a generally low yield of specimens from field collection efforts (Punzo 1998a). Little is known about the behavior of early instars since few researchers have been successful raising solifuges to maturity in captivity, and even fewer studies document the behavior of juveniles in the wild (Punzo 1998a, 1998b). Herein we report observations on the hunting behavior of juveniles in the genus *Chanbria* (Solifugae: Eremobatidae). *Chanbria* currently includes *C. rectus* Muma 1962, *C. regalis* Muma 1951, *C. serpentinus* Muma 1951, and *C. tehachapianus* Muma 1962; all of which are psammophilic species found in southwestern United States and northwestern Mexico. This is the first record of hunting behavior for juvenile *Chanbria* and one of the very few records of hunting behavior in juvenile Solifugae. Muma (1966a), Wharton (1987) and Hrušková-Martišová et al (2007 (2008)) have previously reported observations on juvenile solifuges in natural conditions.

The observations occurred on 18–19 June 2010 in the Imperial Sand Dunes Recreation Area, Imperial County, California (32.94586°N, 115.14703°W). Since solifuges are known to be attracted to light (Cloudsley-Thompson 1977; Punzo 1998a), we set up three Coleman lanterns in a triangle on top of a sandy ridge. Each lantern was suspended on a wooden tripod to elevate it slightly above the ground. The lights were set up just at dusk (20:10 h). The sand ridge was situated between an open, unvegetated dune habitat and a sparsely vegetated desert habitat with small clumps of shrubs. Penultimate and juvenile solifuges approached the lights exclusively from the direction of the vegetated habitat and were first observed at 22:55 h. From that time until 01:40 h when observations ended, we observed at least 10 juveniles hunting under the pool of light.

Three of the juveniles were captured, preserved in 100% ETOH, and deposited in the arachnology collection of the Denver Museum of Nature & Science (#ZA.23696). These early instar juveniles were 4 mm from the anterior edge of the propeltidium to the posterior of the abdomen. The juveniles collected had three sets of malleoli. Since the first four nymphal stages of Eremobatidae exhibit three pairs of malleoli and do not develop the full complement of five pairs until the fifth instar (Muma 1966b), the juveniles observed in the field were no older than 4th instar nymphs. The loss of aggregative behavior only after the second instar molt (Cloudsley-Thompson 1977) suggests that the juveniles we observed in the field were third or fourth instars.

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The early instar juveniles moved in an apparently erratic search pattern. Their search was often interrupted by a quick, short retreat along their previous path, immediately followed by a vigorous excavation of the sand with their 2nd and perhaps also 1st pair of legs and chelicerae, creating a shallow bowl under the crust of the sand. The period of digging was variable. Some individuals dug for only a few seconds, while others paused, probed the hole with their pedipalps, and then immediately began digging again for a variable number of times until they began their search for another patch of sand to excavate. No visible sign on the surface of the sand gave us hints as to why the solifuges would pick a spot to dig. However, one specimen was seen to excavate a hemipteran nymph from just under the surface of the sand, and another was seen eating an aphid, though its excavation was not observed.

The pool of light attracted many different desert arthropods. When a young *Chanbria* directly contacted another arthropod of similar size, it typically showed avoidance behavior. Individuals appeared to run backwards, as has been reported for pseudoscorpions (Weygoldt 1969; de Andrade & Gnaspini 2003), although whether solifuges are capable of backward movement remains to be tested. This movement away from disturbance was sometimes followed by a very brief pause and a resumption of foraging. One of us (PEC) observed one juvenile standing still, vibrating its raised pedipalps. We do not know whether this behavior was a response to disturbance or a method for detecting airborne chemical cues.

Our observations suggest that juvenile *Chanbria* may use a combination of tactile and chemical cues to locate prey that are buried just beneath the surface of the sand. We suspect they may use chemosensory signals since we saw them reverse directions on several occasions and begin digging in areas they had just passed. Brownell & Farley (1974) showed that the malleoli function as chemoreceptors; thus, the juveniles were returning to areas that they had, presumably, just contacted with the malleoli. However, it is likely they also use tactile cues for prey localization; our observations of juvenile *Chanbria* support the use of pedipalps for tactile detection of prey. Substrate tactile cues have been shown to be involved in prey localization in other species of Solifugae (Muma 1966a; Wharton 1987).

Hrušková-Martišová et al. (2007 (2008)) reported on *Galeodes caspius subfuscus* (Birula 1890) and had unique observations of juvenile hunting behavior. Juveniles were observed to hunt exclusively on bushes, hanging on branches with their pedipalps extended forward. They were observed to catch flying prey, including Trichoptera. One of our observations in the field was a juvenile sitting still with pedipalps extended, vibrating, which may reflect a prey localization behavior similar to that seen in *G. caspius subfuscus*.

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LITERATURE CITED

Brownell, P.H. & R.C. Farley. 1974. The organization of the malleolar sensory system in the solpugid, *Chanbria* sp. Tissue and Cell 6:471–485.

Cloudsley-Thompson, J.L. 1977. Adaptational biology of the Solifugae (Solpugida). Bulletin of the British Arachnological Society 4:61–71.

De Andrade, R. & P. Gnaspini. 2003. Mating behavior and spermatophore morphology of the cave pseudoscorpion *Maxchernes iporangae* (Arachnida: Pseudoscorpiones: Chernetidae). Journal of Insect Behavior 16:37–48.

Harvey, M.S. 2003. Catalogue of the Smaller Arachnid Orders of the World: Amblypygi, Uropygi, Schizomida, Palpigradi, Ricinulei and Solifugae. CSIRO Publishing, Collingwood, Victoria, Australia.

Hrušková-Martišová, M., S. Pekár & A. Gromov. (2007 (2008)). Biology of *Galeodes caspius subfuscus* (Solifugae, Galeodidae). Journal of Arachnology 35:546–550.

Muma, M.H. 1966a. Feeding behavior of North American Solpugida (Arachnida). Florida Entomologist 49:199–219.

Muma, M.H. 1966b. The life cycle of *Eremobates durangonus* (Arachnida: Solpugida). Florida Entomologist 49:233–242.

Punzo, F. 1998a. The Biology of Camel-Spiders (*Arachnida, Solifugae*). Kluwer Academic Publishers, Boston/Dordrecht/London.

Punzo, F. 1998b. Natural history and life cycle of the solifuge *Eremobates marathoni* Muma & Brookhart (Solifugae, Eremobatidae). Bulletin of the British Arachnological Society 11:111–118.

Weygoldt, P. 1969. The Biology of Pseudoscorpions. Harvard Books in Biology, Number 6. Harvard University Press, Cambridge, Massachusetts.

Wharton, R.A. 1987. Biology of the diurnal *Metasolpuga picta* (Kraepelin) (Solifugae, Solpugidae) compared with that of nocturnal species. Journal of Arachnology 14:363–383.

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