N O T E

Cooperative Exit Hole Chewing in *Dibrachys pelos* (Hymenoptera: Pteromalidae) and its Possible Implications[1]

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Dibrachys pelos Grissell (Hymenoptera: Pteromalidae) is an ectoparasitoid of solitary wasps (Grissell 1974, Florida Entomol. 57: 313-320). Grissell (1974) reported that this species attacks mud daubers *Sceliphron caementarium* (Drury) (Hymenoptera: Sphecidae), which build thick-walled nests to protect and store provisioned spiders for their offspring. In the laboratory *D. pelos* also attacks larval bee flies, *Anthrax* sp., predators of mud daubers (Diptera: Bombyliidae) (Deyrup, unpub.). Species of *Melittobia* (Hymenoptera: Eulophidae), also parasitoids of mud daubers, have evolved cooperative chewing to escape the thick walls of the nest (Donovan 1976, N. Z. Entomol. 6: 192-193). *Dibrachys pelos* also is thought to chew escape holes in the mud walls of the host nest (Deyrup, unpub.).

While rearing *D. pelos* in the laboratory, I noticed that they formed small aggregations, each centered around a female that was chewing on the wall of the container (Fig. 1). This behavior appeared similar to that exhibited by *Melittobia* species reported by Deyrup et al. (2005, J. Insect Behav. 18: 293-304). The *D. pelos* aggregations typically consisted of a single female chewing whereas several others stood motionlessly, oriented toward the chewing. In addition, when one female ceased chewing, another female would take over the task. I checked for sting marks in the chewing spots, which are characteristic of *M. digitata* (Deyrup et al. 2005) and, although 13 out of the 63 spots I examined did have associated sting marks, few were central in the chewed pits. Males were not seen participating in these chewing aggregations, but they were seen attempting to interact with females waiting around the chewing individual.

Cooperative chewing by females to escape mud dauber nests has been recorded in *Melittobia* (Donovan 1976), but *Melittobia* is in a different family of parasitoid wasps. It is unlikely that an ancestor is responsible for passing on cooperative chewing to both groups; it is more likely that this behavior is a product of convergent evolution. Females of both genera face the task of escaping through a thick barrier after emerg-

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Fig. 1. A group of *D. pelos* females oriented toward a chewed spot in a plastic rearing container. Arrow shows the female that is currently chewing.

ing as adults. It could be very taxing for a female to chew through the entire barrier, and because emerging females are likely to be inbred sisters, selection favoring cooperation is not improbable.

This example of cooperative chewing in a second unrelated species that occurs in the same situation as *Melittobia* species offers an opportunity for comparative investigations of pathways leading to such cooperation. This situation has obvious similarities with the theory of byproduct mutualism where groups of individuals of variable relatedness cooperate to overcome a large obstacle or subdue a large prey item that could not be accomplished individually (Dugatkin 2002, Naturwissenschaften. 89: 533-541).

Research into the cues eliciting chewing behaviors might reveal additional subtle similarities and differences in the nature of this convergence. The female *D. pelos* did not appear to be guided by physical and chemical cues associated with a sting mark as in *M. digitata* (Deyrup et al. 2005). Alternative sources of chemical cues might be salivary or mandibular glands.

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