

Ozaena ground beetles likely parasitize ants throughout their life cycle

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Ozaena. Credit: Wendy Moore (2019)

Ozaena ground beetles likely have anatomical adaptations enabling them to parasitize ant nests throughout their life cycle, according to a study published January 16, 2019 in the open-access journal *PLOS ONE* by Wendy Moore from the University of Arizona, USA, and colleagues.

Some ground beetles in the genus *Paussus* ("ant nest beetles") are known to live in [ant nests](#) and parasitize ant societies for their entire life cycle, for example secreting chemicals as larvae to attract ant prey. However, ground beetles in the genus *Ozaena* were previously thought to be free-living, with larvae digging burrows to ambush their prey.

The authors of the present study examined ground beetles of the species *Ozaena lemoulti*, using adults collected from the Parajito Mountains of Arizona, eggs from previously-preserved [adult females](#), and hand-reared larvae. They examined the beetles' anatomy in all three life stages and molecularly-sequenced adult beetle gut contents to confirm [food sources](#), hoping to find clues to the species' lifestyle and behaviors. They also compared *O. lemoulti* to the closely-related *Goniotropis* beetle, which is known to be a free-living, burrow-digging predator.

The authors found anatomical features which might indicate that *O. lemoulti* parasitizes ant nests throughout its lifecycle, unlike other *Ozaena* beetles. Compared with *Goniotropis* larvae, *O. lemoulti* larvae have morphological modifications to their mouthparts, head and abdomen which indicate that they are free-living mobile hunters in ant nests instead of immobile burrow-dwellers. The eggs lack the spongy air layer which in *Goniotropis* eggs protects against extreme weather conditions, indicating that they may be laid directly in the protected conditions of the ant nest. The gut sampling of *O. lemoulti* adults revealed that these beetles appear to exclusively feed on ant fluids, unlike *Goniotropis* adults.

While previous studies have indicated a possible link between adult

Ozaena and ant societies, the authors state that this is the first research to indicate that an *Ozaena* species might exploit [ants](#) throughout its [life cycle](#). Further research might use larger sample sizes and observe more directly the behavior of the beetles. Nonetheless, the authors believe that their research strongly indicates that *O. lemoulti* beetles, independently of the *Paussus* ant nest beetles, have adopted a lifestyle exploiting the rich food supply and safety found in ant nests.

The authors add: "DNA sequencing of gut contents and comparative anatomy of three life history stages reveals that Flanged Bombardier Beetles in the genus *Ozaena* have adopted a new, obligate [nest](#) parasite strategy for living with and exploiting ants as their sole source of food. Unique morphological modifications of the head and abdomen indicate that *Ozaena* larvae do not live in burrows but rather are free-living, mobile hunters. We hypothesize that the main motivation to leave the burrow is the opportunity that affords the larva to feed on non-mobile food, specifically ant brood, the most treasured, soft, protein rich, and fat rich resource in the nests."

More information: Moore W, Di Giulio A (2019) Out of the burrow and into the nest: Functional anatomy of three life history stages of *Ozaena lemoulti* (Coleoptera: Carabidae) reveals an obligate life with ants. *PLoS ONE* 14(1): e0209790.

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