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The Defensive Role of the Pupal Secretion of a Ladybird Beetle (*Epilachna borealis*)

Pupae of the ladybird beetle *Epilachna borealis* are attached conspicuously to vegetation and thus appear rather vulnerable to predators. The pupal cuticle bears glandular hairs that produce droplets containing polyazamacrolide alkaloids, the largest cyclic secondary metabolites known to date. After contacting the beetle pupa, predatory ants (*Crematogaster cerasi*) showed an adverse reaction, vigorously cleaning and often vomiting. To determine whether the droplets, and not some other property of the pupa, led to this response, I conducted the following experiments. Individual *C. cerasi* were presented a pupa either with or without (due to a methanol rinse) droplets. Ants presented with pupae lacking droplets spent significantly less time cleaning and more time contacting the pupae than ants receiving pupae with droplets. Additionally, colonies of *C. cerasi* were provided with normally palatable insect eggs. Eggs were presented in pairs: one coated with the secretion of a single *E. borealis* pupa and the other serving as a solvent control. Foraging ants removed eggs receiving secretion much less frequently than control eggs. Collectively these results demonstrate that the alkaloid-laden droplets are responsible for the observed pupal defense. Further experiments will test the secretion's components to see which, either alone or in combination, account for the deterrence. Studies such as this may identify compounds that will prove useful as natural insect deterrents.