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REMOVAL OF *RHODODENDRON MACROPHYLLUM* PETALS BY *CAMPONOTUS MODOC*

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Most research on the relationship between ants and plants has focused on mutualistic interactions in which plants benefit from the presence of ants (Hölldobler and Wilson 1990). While there are examples of ants removing petals as a food source (Cerdá et al. 1992, Hölldobler and Wilson 1990), I know of no report of ants removing petals specifically to access floral nectaries. There are few reports in the literature of ants collecting floral nectar (Tobin 1994), but ants will readily accept floral nectar when it is accessible (Schubart and Anderson 1978, Guerrant and Fiedler 1981, Haber et al. 1981). Herein I report observations of *Camponotus modoc* removing petals from *Rhododendron macrophyllum* flowers, a behavior that may have impacts on *R. macrophyllum* pollination biology.

Camponotus modoc (Hymenoptera: Formicidae: Formicinae), a common carpenter ant of the Pacific Northwest, nests at the base of live trees, as well as in dead logs in old-growth forests. In clear-cuts they often nest in and under stumps. *Rhododendron macrophyllum* (Ericaceae) is a common shrub of moist to dry, coniferous or mixed forests ranging from British Columbia south to California. In the Western Cascade Range of Oregon, *R. macrophyllum* flowers in May and June. Flowers have large pink blossoms that are collected in racemes of 20 or more flowers. Individual flowers last a few days, and then the entire corolla (individual petals are fused to each other) wilts, turns brown, and falls off the flower. *Rhododendron macrophyllum* is bee pollinated (Halverson 1986), but many other insects and hummingbirds visit *Rhododendron* flowers for nectar (Pojar 1975).

I made all observations reported here in H.J. Andrews Experimental Forest, Willamette National Forest, in the Western Cascade Range of Oregon. My initial observation, in full sun at 1400 hours on 2 June 1997, was of *R. macrophyllum* in flower in a clear-cut experimental plot at ~650 m. Several *C. modoc* workers were clipping petals off apparently normal *R. macrophyllum* flowers. The workers, typically a single individual to a flower, were cutting around the base of the petals with their mandibles, clipping off the entire corolla intact, which then fell to the ground. The remaining flower had very little or no petal remaining (i.e., all pink-colored portions of the flower were removed.) The ants remained on the flower head after removing the corolla and appeared to collect nectar from the base of the flower. They placed their mouthparts on the base of the flower and their gasters appeared distended, indicating that they had taken up liquid from the plant. None of the flowers I observed being clipped had any serious damage to their petals (e.g., browning or wilting) before cutting by the ant.

I observed this behavior on 6 other *R. macrophyllum* in the immediate area. Two *R. macrophyllum* in the area had *C. modoc* on them, but I did not observe petal removal. I saw this behavior over several days at this single site, but not on *R. macrophyllum* at other localities within H.J. Andrews. I also observed at least 10 species of flying insects, including Hymenoptera, Lepidoptera, and Diptera, landing on intact flowers. The only flying insects observed landing on flowers lacking petals were asilid flies that used them as perches.

While speculative, I suggest that *C. modoc* workers removed the petals to access the floral nectar of *R. macrophyllum* and that removing

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petals allowed the ants to monopolize the nectar source. It is possible that the petals limited *C. modoc* access to the inside of the corolla. Two smaller species of ants (*Tapinoma sessile* and *Formica* sp.) were observed within intact flowers. Several small *C. modoc* were observed within corollas of unclipped flowers, but many more were observed on the outer surface of the flowers, which may indicate that petals limit *C. modoc* access to the floral nectaries.

Given that removal of the corolla was almost complete, pollinators, which use the showy pink petals as a cue to find floral nectar, would be less likely to visit flowers lacking these cues. As only *C. modoc* and asilid flies were seen visiting clipped flowers, the nectaries were, in effect, monopolized by the ants.

To differentiate between the hypotheses that flower clipping behavior was for access or monopolization (or both), one could manipulate petals of *R. macrophyllum* in the presence of ants and observe their behavior. For example, if a portion of the corolla large enough for the ants to pass through were removed, then the access hypothesis predicts that they would not continue clipping petals. The monopolization hypothesis predicts complete petal removal.

I observed more than 10 flowers being cut from a single plant in 2 hours. Estimating 150–200 flowers on the plant, one can easily extrapolate the potential impact of this behavior on the pollination biology of *R. macrophyllum.* Ants are not effective pollinators (Hölldobler and Wilson 1990), and removal of petals should reduce the number of potential pollination events by reducing blooming time for individual flowers. Petal removal also may affect the energy budget of *R. macrophyllum,* as non-pollinating nectar-feeders such as hummingbirds would not access flowers lacking petals. As the flowers clipped by ants look superficially similar to flowers that have naturally dehisced their corolla, this behavior has implications for field studies of *R. macrophyllum,* specifically in the examination of seed set and pollination success.

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