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Feeding preferences and performance of an aquatic lepidopteran on macrophytes: plant hosts as food and habitat

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Abstract Although host preferences in phytophagous insects may be generated by several factors, few studies have simultaneously examined several potential host choice determinants. In this study we tested the impact of the following potential host choice determinants on host preference of the semi-aquatic lepidopteran *Munroessa gyralis* (Pyrilidae): growth on different host plants; protein content, polyphenolic content, toughness, and chemical extracts of different host plants; prior feeding experience; and predation pressure on the caterpillar by fishes. Two water lilies, *Brasenia schreberi* and *Nymphaea odorata*, were preferred in cafeteria-style feeding experiments over 14 other species of vascular plants. The most preferred water lily (*Brasenia*) also afforded the fastest growth relative to three other species on which growth was measured. Feeding preferences across species were unrelated to protein content, polyphenolic content, or toughness. Domiciles constructed by caterpillars from leaf fragments were protective from field assemblages of fishes, but domiciles made from preferred or unpreferred host species conferred no significant protection from fish in the laboratory. Caterpillars responded positively to chemical cues of water lilies, and prior feeding experience increased preference for an otherwise unpreferred water lily (*Nuphar advena*) within the life-span of individual caterpillars. *M. gyralis* is a generalist herbivore exhibiting modest preference induction and preferences for and among members of the family Nymphaeaceae. Our results suggest that relative growth

rates, chemical cues, and previous feeding experience are important factors determining feeding preference. Protein content, polyphenolic content, and toughness appear less important, and the importance of fish predators remains in question. As pupation seems to occur exclusively on Nymphaea, we suggest that host use may be restricted due to life-stage-specific developmental constraints that are not apparent from the results of growth or preference assays. It is currently unknown how often specific life-stages may restrict host use, but our work suggests this as a potentially important area of inquiry.

Keywords Aquatic macrophyte · Aquatic lepidopteran · Herbivory · Preference induction · Water lily

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