

GOING WITH YOUR GUT: INSIGHTS INTO NUTRITION AND DIGESTION IN *SIREX NOCTILIO* WOODWASPS AT EMERGENCE

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ABSTRACT

The threat to U.S. and North American forests posed by *Sirex noctilio* and its symbiotic fungal partner, *Amylostereum areolatum*, is expected to be significant in the coming decade. Feeding habits of insect pests present a reasonable target for managing them. Complete knowledge of *S. noctilio* larval nutrition and digestion is critical but perhaps underused information in controlling them. The following nutritional resources have been observed and described for Siricid woodwasps: mycelia of their fungal symbiont; wood cell contents; yolk remains from their eggs (first instar) ; wood cell walls digested by fungi; and frass recolonized by fungus (reverse feeding).

The larval gut is much simpler in *S. gigas* and *S. cyaneus* than in insects capable of digesting cellulose, a fact cited as indirect evidence for mycophagy. An early examination of the *S. noctilio* larval gut concluded that the gut is too simple morphologically to digest cellulose. The termite midgut by contrast is threefold longer than the midgut of phytophagous solid feeders

that do not digest cellulose. Further, the termite midgut offers evidence of microorganismal symbiosis internal to the digestive system (cuticular spines). To date, no comparable morphological feature of the larval digestive tract suggestive of symbiosis appears in the literature. Our laboratory is examining the alimentary organs of newly emergent *S. noctilio* females for previously overlooked features suggestive of gut microflora.

Wood is an especially nitrogen-poor food source. If woodwasps derive significant nitrogen from prokaryotic nitrogen fixation in the gut, it is important to identify these organisms. The presence of previously unidentified participants in the pathosystem would offer additional targets for insect management, perhaps through nutritional means. The gut tissues of *S. noctilio* are fertile ground for immunocytochemical investigation of this question, and immunocytochemistry offers a viable means of identifying any such organisms.