Conclusions

The problem of describing morphological characters as primitive or derivative, specialized or generalized, can be exceedingly difficult. Even if we carefully relate the terms primitive and derivative to organismal phylogeny and specialized and generalized to ecological adaptation, we cannot always be sure of placing a given morphological character correctly. An organism is the sum of its characters, some of which may be primitive, some derived, some specialized, and some generalized — all at the same time. The Ponerinae are indeed a primitive group of ants on the basis of numerous conditions; but, when examining the palpi we find that the number of segments is often reduced from the primitive number of 6 (maxillary) and 4 (labial). This condition is thus believed to be derivative; but it can also be considered specialized if the reduction is a response to ecological conditions. The dolichoderines and formicines, on the other hand, while displaying complex social patterns, have maintained a primitive palpal segmentation and possess other mouthpart structures (stipes, galea, lacinia) that are simple in design. These latter structures appear generalized, but are they primitive or derivative? Have they evolved from more complex structures or have they remained basically unchanged in their evolution?

It is easy to find confident statements in the literature proclaiming phylogenies based on comparative studies of single structures or small groups of structures. But we must wait for the accumulation of these studies before we can venture upon phylogenetic schemes with any degree of confidence. Perhaps one of the most underestimated biological phenomena today is convergence, despite frequent examples claimed in the literature. I have tried to point out the possibility of morphological convergence in ants adapted to an army-ant lifeway. Selective pressures for increased efficiency in army-ant-like behavior must be similar for all stocks, and the ants can respond in only so many ways to maximize their efficiency. Is it too surprising, then, that *Simopelta oculata* is one of 2 ponerines thus far studied that has lost the furcula from its sting apparatus (a ubiquitous character among the Dorylinae) and at the same time is like the army ant in its behavior? On the basis of the furcula's absence we might regard *Simopelta oculata* and the dorylines as closely related. Upon examining other characters we can be relatively sure that they are not.

With these arguments in mind, I shall discuss the mouthparts of ants in these terms. The ants most specialized in mouthpart development are the Ponerinae, Cerapachyinae, Dorylinae, and possibly the Leptanillinae. Somewhere intermediate between specialized and generalized are the Myrmicinae and Pseudomyrmecinae, and those most generalized are the Myrmeciinae, Dolichoderinae, and Formicinae. To describe what might be primitive and derivative it is necessary to speculate on what the morphology of the mouthparts of the hypothetical ant archetype might have been like. Drawing heavily from what is known of *Sphecomyrma freyi* and