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THE EVOLUTION OF THE DACETINE ANTS

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ABSTRACT

A preliminary synthesis of evolutionary studies of certain morphological and ethological characters in the ant tribe *Dacetini* is given. A primary trend inferred from the study of living species is the shift from epigarie-subarboreal to cryptic-terrestrial foraging. Possibly associated in the early stages of dacetine evolution with this shift was a trend toward oligophagous predation, resulting in extreme cases among modern forms in specialized feeding on collembolans. Secondary changes have occurred in hunting behavior and in a diversity of morphological features; these are described briefly. Reversed or, more accurately, "countercurrent" evolution has occurred in various phyletic lines in most of the characters of this morphological-ethological coadaptive system. Such changes are relatively short-range and usually involve only a few characters at a time. In at least some instances they have produced a local reversal in the overall dacetine trend to specialization, as with secondarily increased polyphagy in some species of *Strumigenys*. Convergence to the higher dacetine morphological type has occurred independently in several other ant tribes; in at least one case (*Rhopalothrix*) ethological convergence is also evident.

INTRODUCTION

In recent years, we have witnessed a spectacular rise in interest in comparative studies of animal behavior. Many of these studies have attempted to relate behavior of given species or higher taxa to their particular environments, to the morphology and physiology of the animals, to their systematics, and to their evolutionary history. Certainly, the integration of all these approaches should be a principal goal of the modern investigation of any group.

One important group of animals that is especially favorable for such an integrated study is that of the ants. These insects form a distinct family, the Formicidae, in the Order Hymenoptera, or wasp-like insects. The ants are still incompletely known and are rather unsatisfactorily classified, but we believe that, with more than 10,000 species and several hundred genera already described, they are roughly comparable in diversity to a taxon such as the class Aves.

As is implied by their placement among the Hymenoptera, the ants arose (apparently during the Cretaceous) from some group of wasps, probably solitary wasps allied to the living *Euphidae*. The existing ant species are all social, that is, parent adults and their offspring of all

developmental stages live together in groups, called colonies. In most species the colonies inhabit more or less definitely structured nests in the soil, in plant cavities, etc. During most of the year they are composed entirely of females, which are normally divided into two basic castes, the queens and the workers, which tend to be specialized for different functions. Males appear in the colonies at certain seasons, and are important only in sexual reproduction.

The fact that nearly all human cultures have a common word meaning "ant" is a tribute to the abundance and ubiquity of these insects over the temperate and tropical parts of the earth. Their great numbers and relatively high activity rates place them among the really important transformers of energy in terrestrial environments. It is again their exceptional abundance, as well as the ease with which they may be found and cultured in the laboratory, that renders ants ideal subjects for biological study.

The most primitive ants, like their wasp ancestors, feed their larvae on many kinds of insects that they capture on plants or on the ground surface, while the adult workers themselves gain a large part of their nourishment from nectar or other sugary substances for which they forage on plants. In higher groups of ants, feeding is often more specialized. Some kinds