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A World Perspective

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Overview

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The world is full of ants. They crisscross virtually every square meter of land from the tropics to the subarctic. As a myrmecologist, I have difficulty stopping anywhere without shortly making their acquaintance.

Generally, ants are peaceable residents of natural communities. However, a few species have earned a reputation for "afflicting and tormenting man." Most of these species are exotics which have become especially abundant in heavily disturbed areas associated with human habitation. Practically everyone, it seems, has their own "war stories" about the depredations of one ant or another. On the positive side, research on pest species has provided much of what we know about the basic biology of ants. The following 13 chapters are replete with myrmecological data which should benefit both the naturalist and the pest control expert.

The first two chapters discuss the relationship between the fire ant, *Solenopsis invicta*, and native ant communities in North and South America. Camilo and Phillips evaluate the impact of imported fire ants at 12 sites in Central Texas. They report that "within the range of *S. invicta*, the diversity of the ant assemblages were adversely affected by increasing densities" of fire ants. These results are in contrast to those of Fowler, Bernardi and Romagnano in Brazil, where *S. invicta* is apparently a minor component of the native ant community. Fowler et al. conclude that, "*S. invicta* populations [in Brazil] are not limited by competitive interactions at food resources," and that *S. invicta*, "may be held in check by natural South American enemies."

The next seven chapters focus on various aspects of leaf-cutting ant biology. Weiss briefly describes the growth of a laboratory reared *Atta cephalotes* colony, from the founding queen to the colony's eventual death after 10 years. This colony produced more than 160 L of cumulative refuse and contained a maximum of 54 L of fungus. Cedeño and Leon document the growth and demography of *Atta laevigata* colonies in the field, from initial founding to colonies more than two years of age. They also suggest that young colonies may aggregate brood in their second fungus chamber because this, "liberates immatures from the action of secondary plant compounds," which are apparently detoxified in the upper or initial chamber. Claver evaluates several transect methods of estimating *Acromyrmex lobicornis* colony density and recommends that (when possible) transect widths should be, "based on distance estimates of widths derived from indefinite width transects."

The quantity of vegetation consumed by leaf-cutting ant colonies determines, to a large extent, the magnitude of their ecological and economic impacts. Fowler, Forti and Romagnano review and evaluate techniques used to estimate vegetation consumption of attine colonies in 32 published studies. The information they provide will facilitate more prudent use of those techniques in future research. Perera, González and Martínez describe activity patterns of *Atta insularis* in Cuba as a function of season and weather. They found that food retrieval only accounted for about 20% of surface activity and that the overall activity pattern did not change consistently with season. Jolivet assesses the effectiveness of ant-tended *Cecropia* trees in fending off *Atta* defoliation. He also hypothesizes that *Cecropia* species which are not tended by ants are defended by secondary chemicals which make them unacceptable for leaf-cutting ants. Waller and Moser discuss numerous symbionts associated with *Atta texana* colonies in Texas and Louisiana. Comparative studies of symbiotic communities in other attines would be very interesting from the standpoint of community ecology and coevolution. Such studies could also lay a foundation, as the authors suggest, for future "biological control programs using natural enemies."

The final four chapters of this section summarize our knowledge of the natural history and ecology of several lesser-studied groups of pest ants. These reviews will be a valuable resource for these groups. Hansen and Akre provide an excellent review of carpenter ant (*Camponotus*) biology including mating flights, colony founding and the structure of mature colonies. They also discuss foraging and nesting sites. Ulloa-Chacon and Cherix summarize previous studies of the little fire ant, *Wasmannia auropunctata* with special emphasis on nest structure, queen fecundity and sexual production. Zenner-Polanía details the biology and history of *Paratrechina fulva* in Colombia, where huge densities of this species can disrupt agriculture and greatly reduce biodiversity. Finally, Harada outlines the history, biology and economic importance of nine dolichoderine ant pests in the tribe Tapinomini, most notable of which is the Argentine ant, *Iridomyrmex humilis*. Harada also provides a key, distributional maps and several fine illustrations of the ants themselves.

This book covers a considerable amount of territory concerning pest ants, but I would like to mention several opportunities for future work. For example, information concerning the natural history and ecology of *Pheidole megacephala, Paratrechina longicornis* and *Anoplolepis* species is either limited or difficult to obtain. A considerable amount of research has been done with the Argentine ant, *I. humilis*; nevertheless, much of this information is scattered across six continents or buried in old bulletins. Similar complaints can be made about the Pharoah's ant, *Monomorium pharaonis*, and the tropical fire ant, *Solenopsis geminata*. Thorough literature reviews for each of these species would be very useful. Also, there is probably room for a carefully illustrated book on leaf-cutting ants written for the general scientific audience, a sequel to Weber's 1972 book.

In conclusion, I would like to highlight one important area for future research. I think we need to look more seriously at the possibility of biological control of pest ants. We know very little about the ecology of exotic species in their native habitats, specifically the biotic and abiotic factors which regulate populations of these pests. For instance, why do *P. fulva* populations in Colombia appear to decline after a decade or so (Zenner-

Polania, this section) and why do *Solenopsis* densities in Brazil appear to be much lower than they are in the United States (Fowler et al., this section). Certainly, in the case of *S. invicta*, pathogen and parasite levels are much higher in South America than in North America. Perhaps some pest ants attain high densities as a consequence of their release from natural control agents left behind in their homeland. The prospect of biological control of pest ants is still speculative; nevertheless, it offers the potential for long-term control that would be both cost-effective and environmentally sound.