

they retrieve worker pupae, thus replenishing the stock of slaves in the slavemaker colony.

The third group of social parasites, the "inquilines", are species that usually have lost their own worker caste. Mated young queens, by one or the other technique, join the host colonies in which they typically coexist with the host species queen(s). A few inquiline species are dubbed "host queen intolerant" because they are never found in queenright host nests.

A surprising wealth of morphological and behavioral particularities has been found in such social parasites, and nearly each species, or at least each genus of parasitic ants exhibits its own blend of techniques to ensure its survival and to exploit the social characteristics of its respective host species. Some species, instead of mating during a nuptial flight, mate inside the mother nests and thus are adelphogamous. Hibernation of dealate, mated, young queens is observed in some of these species making the colonies seemingly polygynous during parts of the annual cycle. Wingless, workerlike females may occur, and the sex ratio may be considerably female-biased due to reduced male production. Both host and inquiline species may be monogynous or facultatively polygynous, etc.; for details, particularly referring to the various hypotheses on the evolution of social parasitism, see BOURKE & FRANKS (1991), BUSCHINGER (1986a, 1990, 2002) and HÖLLDOBLER & WILSON (1990).

In this paper, we will investigate a poorly known inquiline species of which we recently were able to gather a number of colonies from the field, *Temnothorax* (= *Leptothorax*, subgenus *Myrafant*) *minutissimus* (SMITH, 1942). Our experiments and observations suggest that this species exhibits a novel blend of life history traits.

Temnothorax minutissimus has been described by SMITH (1942) after four females from the collections of the United States National Museum of Natural History, Washington DC, USA (USNM). Because the females were in the same series with several workers of *T. curvispinosus* (MAYR, 1866), the author suggested that the new species is an inquiline of the latter.

Until recently, practically nothing new has been published on the species' life history. HEINZE (1989) mentions preliminary enzyme-electrophoretic results suggesting a close relationship of *T. minutissimus*, *T. duloticus* (WESSON, 1937) and *Protomognathus americanus* (EMERY, 1895) to their hosts. *Temnothorax duloticus* and *P. americanus* are slavemaker species that both enslave *T. curvispinosus* and in addition a few other species of *Temnothorax*. A couple of websites refer to new records and provide a few more biological observations of *T. minutissimus*.

Besides the original collection from Washington D.C. (SMITH 1942), *T. curvispinosus* colonies with



Fig. 1: Part of a *Temnothorax curvispinosus* colony with workers and a large queen, and a few alate gynes of the inquiline, *Temnothorax minutissimus*.

T. minutissimus have also been collected in Michigan (ALLOWAY undated), West Virginia (S. Foitzik, pers. comm.), New York (COVER 1996) and Ohio (HERBERS 2004). Apparently, multiple gynes of *T. minutissimus* can be found in a host species colony, but only the "socially dominant" female lays eggs, and this individual spends most of its time riding on the back of the host queen (ALLOWAY undated). Males of *T. minutissimus* apparently are produced in low numbers (HERBERS 2004). In this paper, we report collection data and further observations from 45 colonies of *T. curvispinosus* with *T. minutissimus*, and we provide an as yet lacking description of the male of *T. minutissimus*.

Material and methods

A total of 45 *T. curvispinosus* colonies with *T. minutissimus* were collected from June 2002 to August 2004 (Tab. 1) from the Griffy Nature Preserve and the adjacent Indiana University Griffy Woods Research and Teaching Preserve, near Bloomington, Indiana, USA. For laboratory rearing, proven techniques were applied as described by BUSCHINGER (1995). Dissections of females were made according to BUSCHINGER (1968) and ALLOWAY & al. (1982). Laboratory colonies were checked once a week, except for the time of hibernation. Since we lacked *T. minutissimus* colonies of similar size and composition in large numbers, the laboratory studies were designed in a way that a maximum of information could be gained from each single colony. Therefore the fate of a number of colonies is described in detail (Appendix).

Results

Temnothorax minutissimus is a rare workerless parasite of *T. curvispinosus*. For example, among 556 and 610 colonies of *T. curvispinosus* collected for different studies in 2003 and 2004, only 18 (3.3 %) and 14 (2.3 %), respectively, were parasitized by *T.*