

are usually more dispersed, particularly when monogynous, which would require high numbers of slave-maker workers and imply high costs of search for and exploitation of suitable slave species nests.

The original condition, thus may be identical for incipient slave-makers and temporary parasites, but in the latter case the evolutionary increase of colony size in the hosts may have rendered slave-making more and more difficult. So temporary parasitism and building up an own, functional workforce remained as the only option.

A further problem arises from the existence of the polygynous, facultative temporary parasites in the genus *Formica*. They may either reproduce by budding, or (rarely) found new colonies through single queens who invade colonies of the subgenus *Serviformica*. Most probably the temporary parasitic behavior here represents a relic condition, the typical, monogynous. *F. rufa* exhibiting the original, obligatorily temporary parasitic behavior, and the other species having switched over to polygyny again. In another temporary parasite, *Lasius fuliginosus*, also polygynous and polydomous colonies are known (STITZ 1939), whereas *L. umbratus*, host species of *L. fuliginosus*, and temporary parasite itself (host *L. niger*), is apparently monogynous.

Conclusion

The hypothesis presented here describes an evolutionary scenario which accounts for all known forms of social parasitism among ants, and which interpretes the complete life cycles of the taxa involved. It is quite evident that polygyny plays a crucial role in the evolution of parasitic colony foundation. A sympatric origin of more or less deleterious genotypes dependent upon their ancestral, and erstwhile conspecific, host forms appears conceivable and could well account for the frequent, convergent evolution of parasitic species in various ant subfamilies and genera.

Very little evidence, however, was found supporting the idea that inquilinism be the final step of several evolutionary pathways, via dulosis, temporary parasitism, or xenobiosis. The known facts instead speak in favor of inquilinism being one of four options open to a "preparasite", a subpopulation of reproductives living in dependence upon a polygynous ancestral form, and slightly developing sexual and eventually genetic isolation. During this process various features of the "preparasite" (production of few, or no workers) and of the "host" (colony sizes, nest distances, transition to monogyny, etc.) may shape the developing parasite to become a workerless inquiline, a "murder"-parasite, a slave-maker, or a temporary parasite. From these conditions, as was shown, only rarely an evolution to a derived type of parasitism has occurred. The main types of parasitism, thus should have evolved in a radiative manner out of a common primary stage, the intra-specific "preparasite".

Appendix

Systematic survey of the ant taxa mentioned in the text

Fam. Formicidae	Subfam. Pseudomyrmecinae	<i>Pseudomyrmex</i> Smith, 1858
Subfam. Myrmeciinae	Subfam. Myrmicinae	<i>Tetraponera</i> Smith, 1852
Subfam. Ponerinae	Tribus Myrmicini	<i>Manica</i> Jurine, 1807
Tribus Cerapachyini		<i>Myrmica</i> Latreille, 1802
<i>Cerapachys</i> Smith, 1857		<i>M. hirsuta</i> Elmes, 1978
<i>Sphinctomyrmex</i> Mayr, 1866		<i>M. microgyna</i> Pearson, 1981
Tribus Ectatommini		<i>M. ruginodis</i> Nylander, 1846
<i>Gnamptogenys</i> Roger, 1863		<i>Pogonomyrmex</i> Mayr, 1868