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HIGHLIGHTED ARTICLE

Colony size evolution in ants

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How animals transitioned from simply living together to forming eusocial societies is a fascinating question for social insect researchers. As a result, much of the current science on eusocial animals focuses on the cusp between presocial and eusocial life. A lot of interesting evolution happens, though, after eusociality is firmly established in a group like the ants. In this issue Burchill and Moreau (2016) assemble the available data on colony size for ants and overlay this information on the current consensus evolutionary tree for ants. Doing this allowed them to develop an understanding of dynamics of how colony size evolved and to propose hypotheses that will lead to very interesting subsequent studies.

Casual observers of ants probably have the impression that most or all ants live in large colonies, like those of pavement ants, leafcutters, and army ants. Researchers of ants will appreciate that the majority of ant species have colonies of a few dozen to a few hundred workers. Burchill and Moreau's study is an excellent invitation to consider that very large colony size has many independent origins in ants. What are the evolutionary steps between the basal state of small colony size to colonies of tens or hundreds of thousands of workers? Is colony size evolutionarily fluid, with movement from large to small as possible as small to large?

Burchill and Moreau provide at least suggestive answers to these questions. Evolutionary trends show gradual transitions to larger colony sizes. This may support a view that there were few unique innovations that allowed sudden jumps in colony size. They found no strong evidence for reversal of colony size evolution when considering large to medium shifts, at least if the evolution of obligate social parasites is set aside.

An impact of Burchill and Moreau's discussion is a renewed call for publication of more extensive sociometric data (Tschinkel 1991). Characterizations of colony properties, such as the number of workers, have extreme importance in facilitating deeper studies of evolutionary processes. Unfortunately, there are few published high quality sociometric studies of eusocial insects. Such studies would have sample sizes that are large enough to establish the certainty of estimates for measures like colony size. They would also allow assessment of within- and between-population variances. Important surveys like Burchill and Moreau's would be greatly facilitated by sociometric data banks.

As Burchill and Moreau point out, it is likely that ant species with small colonies are under-represented in the sociometric literature. This means that in their analysis the transition from medium to large colonies is better represented than small to medium transitions. Nevertheless their results strongly support the hypothesis that colony size evolution in ants is gradual rather than saltatory, with trends for increasing colony size in some groups. Among the many interesting questions suggested by this study are whether modifications of colony reproductive structure, such as movement from monogyny to polygyny (Hölldobler and Wilson 1977), facilitate colony size evolution. Similarly, are modifications of social mechanisms like division of labor important in these evolutionary shifts? Much remains to be answered about the fascinating trends highlighted by Burchill and Moreau.

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