

## From the laboratory to the field: the advantage of pleometrotic colony founding

In their recent *TREE* review, Bernasconi and Strassmann<sup>1</sup> discuss several benefits of pleometrotic founding in ants, but suggest that the main benefit of such cooperation is 'higher success at brood raiding'. This appears to be true for the invasive fire ant, *Solenopsis invicta*, where brood raiding between incipient nests plays a major role in initial colony success in natural populations<sup>2</sup>. However, in spite of a series of elegant laboratory experiments<sup>3-6</sup>, there remains no direct evidence that brood raiding is important or that it even occurs between incipient field colonies of pleometrotic species other than *S. invicta*. In the only published study of incipient colonies in *Messor pergandei*<sup>7</sup>, in spite of intense behavioural observation, Pfennig found no evidence that brood raiding occurred in the field.

Why is brood raiding between incipient colonies important in *S. invicta*, but not even reported from natural populations of other pleometrotic species? *Solenopsis invicta* is an invasive species in North America, where it rapidly expands into disturbed and unpopulated land. Dense aggregations of incipient colonies, in the absence of mature colonies, enable brood raiding to play an important part in initial colony success<sup>2,8</sup>. In contrast, it seems likely that brood raiding is rare and potentially less important in South American populations of this ant<sup>9</sup>.

In other, non-invasive pleometrotic species, mortality before emergence<sup>10</sup> and territorial attacks by mature colonies after emergence<sup>7</sup> might reduce the density of incipient nests to the point that brood raiding rarely occurs and is unimportant in the recruitment of incipient colonies to the extant population.

In the potential absence of brood raiding, what is the benefit of pleometrotic founding? Pleometrotic colonies produce a larger initial worker force more quickly than do haplometrotic colonies<sup>3,4,5,9</sup>. A larger worker force should result in increased foraging success, which, in turn, will enhance colony survival and growth. Evidence from *S. invicta* shows that production of a larger initial worker force leads to positive feedback, with

initially pleometrotic colonies growing faster and producing sexuals earlier<sup>11</sup>. Thus, one explanation for pleometrosis is that such colonies can forage earlier and more effectively, increasing the probability that they will survive and enhancing their future reproduction.

An initial test for the relative importance of brood raiding and foraging as selective forces driving pleometrosis, would be to relate levels of pleometrosis across sites with both incipient nest density and resource availability. A decrease in resource availability, coupled with increasingly common pleometrosis, would suggest that selection for enhanced resource acquisition maintains pleometrosis as a colony-founding strategy.

Successful recruitment of new ant colonies has been shown to depend upon the density and the age of neighbouring colonies<sup>12</sup>. To determine the real benefits of pleometrosis in non-invasive ant species, further studies of the ecology and the behaviour of incipient colonies within the matrix of extant populations are essential.

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