Swarm Raiding in a Myrmicine Ant

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Doryline ants (commonly known as army ants) are among the best studied social animals [1]. This can be attributed in large part to their dramatic raiding behavior. While the majority of doryline species forage in narrow columns, a few raid in broad swarms [1]. Swarm raiding, though rare, has been studied intensively [1, 2], and has long been recognized as one of the most impressive examples of coordinated group activity shown by animals [1]. To date swarm raiding has been found only in doryline ants. I report the discovery of massive swarm raiding in the myrmicine species *Pheidologeton diversus* (Jerdon); the raids of this highly polymorphic Asian ant (Fig. 1) are remarkably convergent with those of army ants.

*P. diversus* colonies have one or two stable trunk trails (i.e., relatively long-lasting orientation trails [3]), which extend 5–100 m from the nest. Trunk trails often remain in use for weeks, during which time ants move along them continuously, day and night. A variety of other ants, including certain dorylines [4], also produce trunk-trail foraging routes.

The great majority of ants search for food solitarily [5]. This is also true for most species with trunk trails, since workers depart from the trails singly to search for food. However, in *P. diversus*, as in doryline ants, trunk trails serve as the departure points of raids: solitary foraging, insomuch as it can be said to occur, is restricted to the advancing fronts of these raids (other than at the raid front, solitary ants rarely travel even 5 cm from a trail).

Raids originate at any time of day and from any point along the trail; they advance for variable distances and then usually retreat. Raids are apparently influenced little by the courses of recently retreated raids, and will advance readily over previously unvisited ground [6].

A raid begins when ants abruptly move out from some point along a trunk trail or from the nest entrance and then advance at 10–20 cm/min in a narrow column. After the column extends between 0.5–3.0 m, the ants at its terminus spread out to form a narrow group, and progress begins to slow. A minority of these column raids further expand into larger, fan-shaped raids (Fig. 2) which sometimes advance at least 20 m. Within a narrow region along the advancing margin of these raids, ants move about in large numbers, forming a swarm. Behind this region, most ants move in a fan-shaped network of columns. The raid funnels back to a single, basal column, which lengthens as the raid progresses.

The raids of *P. diversus* can reach 6 m in width and contain tens of thousands of individuals. Such raids resemble those of swarm-raiding doryline ants, yet they advance slowly, usually 1.5–2.0 m/h, while doryline swarm raids often sweep ahead at 10–20 m/h [1]. A disparity in worker movement patterns probably accounts in large part for this difference. In contrast to doryline ants [1], workers at the raid front do not advance rapidly and directly on to uncharted territory and

![Fig. 1. *Pheidologeton diversus* foragers, including several minor workers riding on a large major (scale bar = 0.5 cm)](image-url)
Doryline ants foraging in swarm raids are characterized by their large colonies, relatively broad diets, and the efficiency with which they kill massive prey [8]. Tropical Asia lacks epigaec doryline species of this description, although such ants are conspicuous in Africa (i.e., some Dorylus spp.) and Central and South America (i.e., Eciton burchelli and Labidus praedator). In Asia, P. diversus and probably some other related Pheidologeton species have apparently preempted this army ant niche.

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4. For example, Neivamyrmex nigrescens (Schneirla, T.C.: Anim. Behav. 11, 583 (1963))