

SIMULTANEOUS MASS RECRUITMENT IN EXOTIC
PONERINE ANTS

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During a recent sojourn in Bhutan, I had the opportunity of making several observations on the peculiar foraging behaviour of the Ponerine ant Leptogenys kitteli (Mayr). Although individual foraging is still present in this species, most of the workers observed in the field have been seen foraging in well-ordered squadrons of four parallel columns. The total number of ants participating in an expedition varies between two and seven dozen, but, in general, most of the expeditions comprise some 40 - 60 ants. The distribution of the ants during such expeditions is striking but there is a further, even greater peculiarity of this species.

Every squadron is preceded by a "guide ant" walking about ten centimetres in front of the column and tracing the way that the other ants must follow. Sometimes, the followers catch up with the "guide ant" and, in this case, some confusion may arise; but, in general, the leader keeps its position at least for most, if not for the complete distance. This pattern, as we will see, is one of the most important in the whole behaviour. During the return to the nest, the "guide ant" frequently changes, but all the workers taking part in the return, and not only those carrying a prey, show a completely different behaviour: they are far more excited and less organized, and even limited field experience allows one to distinguish an expedition leaving the nest from another coming back, by individual behaviour only.

During the march from the nest to the feeding place, I cannot be completely sure that the "guide ant" is always the same (although this is my impression), because of the broken nature of the ground in the jungle. However, I have observed the same ant at the head of the column for at least 15 metres or more.

The main peculiarity of the "guide ant" is that it seems to represent the main if not the only stimulus for the activity of the whole column. In fact, when I suppressed the "guide ant" all the remaining workers appeared disoriented and, after a few minutes of hesitation, they came back to the nest in disorder. I repeated this simple experiment several times under different conditions and in different localities in the districts of Samchi and Phuntsholing with the same result; this is only true for the expeditions leaving the nest and not for those coming back.

In order to understand the nature of the stimulus released by the "guide ant", I wiped the ground immediately behind its tracks. The excitement and partial disorientation of the follower ants was evident, although, because of the speed of movement and the short interval between the guide and the column, it could be argued that a visual or olfactory stimulus from the observer caused the disturbance. The influence of my own odour was excluded in a subsequent experiment by

wiping the ground using a piece of wood with a long handle. Trail pheromones, although apparently scarce or absent in most of the species of the subfamily Ponerinae, have already been postulated for the genus Leptogenys by Wilson (1971:258). Nomadic behaviour, although present in other related species, has never been observed in L. kitteli, and no evidence of prey preference has been recorded. Although several group-predatory Ponerinae are specialized termite-eaters, most of the prey of L. kitteli are large arthropods such as grasshoppers, beetles, etc. Both these characters are probably primitive in the evolution of true legionary behaviour.

Group-predatory behaviour is widespread in Ponerine ants (see, for instance, the review by Wheeler, 1936) and foraging in four columns in L. kitteli has been previously recorded by Bingham (1903:54), although the latter author did not mention the presence of the "guide ant". Recently, Wilson (1958) studied the group-predatory behaviour of some Leptogenys species related to kitteli in New Guinea. According to Wilson's observations, the "guide ant" seems to be always present in these species, although he concluded that "leadership of the group changed constantly from one worker to another". Of course, these observations, which refer to different species, have a purely comparative value and do not imply any contradiction with the behaviour observed for L. kitteli. Furthermore, other Leptogenys species observed by me in the Indian subregion apparently do not show such a behaviour.

On the other hand, an indirect confirmation of my observations is afforded by two nearly forgotten papers by Collart (1925, 1927) who, in studying the African species Megaponera foetans (F.), reaches conclusions almost identical with mine on the presence and special role played by the "guide ant". Very little attention has been paid to these observations in the subsequent literature, and only recently, Lévioux (1966) stated that, since the leader ant is not always at the head of the column, we do not have a true "director". Although I have never observed Megaponera in the field, I find Collart's observations (unknown to me when I studied L. kitteli) agree with mine so well that it is much easier for me to accept them as a whole than to refute them. I agree with Lévioux when I have to admit that, even for L. kitteli, I cannot be sure that the same ant functions as a guide for the whole way. The guide does not change for long periods of the expedition (10 minutes or more) and its suppression completely disorients the remainder of the ants. This is true for the expeditions leaving the nest, but not for those coming back and this, perhaps, is the source of the confusion existing in the literature.

However, the question of whether the "guide ant" may change occasionally is of secondary importance. The most important point is that a single individual can release such an efficient and well coordinated reaction in fifty or more companions. The components of this behaviour are the dominant role played by an individual and the imitation by others. In fact, we find similar ideas in the ant literature as

far back as the "Privatinitiative" of Goetsch (1934), according to whom there are some "Organisatoren-Elemente" in Cremastogaster. Also Combes (1935, 1937) deals with "élites" which are constituted by the only true worker individuals in Formica. A similar behaviour has been cited by Barnes (1940), who observed "restless" individuals in an unspecified species. But the first observations recalling the behaviour of Leptogenys and Megaponera are contained in the well known work by Chen (1937) who, clearly speaks of "leader" and "follower" ants in Camponotus. His work may be regarded as the necessary basis of modern research on recruitment (for a review see Wilson, 1971), although in L. kitteli and probably M. foetans, the phenomenon seems to be of a superior order of magnitude to that in any other species.

Unfortunately, the term "leader" has been employed with a different meaning by some authors (see Wilson, loc. cit.) and "recruiter" is usually applied to individuals showing a much less strikingly efficient behaviour. Therefore, until a more detailed analysis of this behaviour of L. kitteli can be obtained, I prefer to continue using the term "guide ant", firstly proposed by Collart for Magaponera.

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