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## RESPONSE TO J. DOBRZAŃSKA AND J. DOBRZAŃSKI ON THE RAIDS OF *POLYERGUS*

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The evidence cited by Dobrzańska and Dobrzański has certainly shown that the organization of the *Polyergus* raids is more complicated than mere trail following. They have not eliminated the role of odor trails in the process, however. There is first of all a clear distinction between orientation in *Pheidole dentata* and other ants to broadcast alarm substances and trail recruitment that accompany alarm. Furthermore, these two functions have been traced in experiments to pheromones from separate glandular systems. Also, the experiments by Regnier and myself on *Formica rubicunda* and *F. subnuda* leave no doubt that the workers of these slave-makers were following trails in the manner of recruitment, whatever the glandular source. No one to my knowledge has ever seen *Formica* come out along trails in this fashion just to attack enemies, although such alarm-recruitment occurs in formicine weaver ants of the genus *Oecophylla*. Also, there is no doubt that the *F. rubicunda* and *F. subnuda* workers led to colony fragments of slave species

by our artificial trails proceeded to conduct raids. The results were similar to those by Talbot on *Polyergus lucidus*. It is difficult to dismiss such complex and decisive behavior as an artifact.

Dobrzańska and Dobrzański have shown that such recruitment is not necessary for all raids of *Polyergus*, but they have not disproven its employment by these ants on some raids. What they have done is open the possibility of alternative chemical and visual modes of orientation during raids, as occurs during foraging for example in *Pogonomyrmex* and *Cataglyphis* (see review of this subject as well as of slave-raiding by Hölldobler and Wilson). They have made clear the necessity of more experiments, including those directed at the glandular source of trail-following, in order to clarify the organization of the *Polyergus* slave raids. It is true that in 1963 I said that they had solved the problem; then I thought in 1971 that Talbot had the correct answer instead. Now I have to say, with considerably more evidence in hand, that the problem remains largely unsolved.

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