

posture illustrated in Figure 8. If an object was thrust at the workers they sometimes rushed at it and occasionally even attempted to seize it before breaking away and retreating; often the workers simply ran away without offering any resistance. Continued harassment of this kind resulted in a decrease in the number of workers in the arena, as some of the foragers returned to the nest tree. When we tapped sharply on the arena floor, most or all of the workers ran directly homeward.

When workers of a small ant species, *Pheidole dentata*, were introduced to the arena, the *Oecophylla* invariably charged them and attempted to seize the intruders with their mandibles. In about a third of the cases the *Oecophylla* were successful at the first attempt; otherwise they chased the more agile *Pheidole* for one or two centimeters before giving up. In time all of the *Pheidole* were caught and killed, usually by one or two *Oecophylla*. Workers of the fire ant *Solenopsis invicta*, equally small in size relative to the *Oecophylla*, were also charged directly by the weaver ants. But the *Oecophylla* quickly broke away and retreated, often cleaning themselves vigorously. They were evidently repulsed by the venom that the fire ants attempted to smear on them.

c) *Short-Range Recruitment*. When larger ants, including alien *Oecophylla* and workers of the Florida harvester ant *Pogonomyrmex badius* and African tree ant *Polyrhachis militaris*, were introduced, the *Oecophylla* major workers displayed a wholly new set of behavior patterns. They charged the intruders and attempted to seize them. In many instances they failed, as before. However, in most such cases *the workers failing to hold on to the intruders chased them for distances of 15 cm or more while dragging the last abdominal sternite over the ground* (Fig. 7, lower). The behavior was entirely different from ordinary trail-laying employed during recruitment to new terrain and to food discoveries. The ants touched the ground with a portion of the sternite located anterior to the abdominal tip, rather than the tip itself (the tip bears the acidopore and anus). Their movements were excited and jerky, of the kind associated with the attack on enemies, in contrast to the relatively leisurely, more even movements employed during trail-laying from new terrain and food. Nestmates in the vicinity (for distances up to 10 cm) were attracted by nestmates behaving in this fashion. They tended to move toward the displayers and then, together with the recruiting ant, to slow down and settle in clumps where the display had occurred. Even when the displayers moved to a new location, the area where the display occurred remained attractive to her nestmates. The interaction resulted in the accumulation of small groups of workers in the places where intruders had been encountered. For this reason we refer to it as 'short-range recruitment to enemies'. An example of the alteration in spatial pattern due to the recruitment is given in Table 6.

The important result of short-term recruitment, confirmed in repeated laboratory trials, was that clumps of workers were able to retain and subdue invaders in much shorter periods of time than were single individuals.

d) *Source of the Short-Range Recruitment Pheromone*. Because short-range recruitment involves touching the substratum with a portion of the abdomen