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An Ant Colony which Moved over Two Hundred Feet

R. M. SALLEE AND R. L. KING

Colonies of *Formica rufa melanotica* Emery construct the most conspicuous ant nests in the region of the Iowa Lakeside Laboratory; 85 nests of this species have been found in 40 acres of prairie. These nests are often two feet in diameter: a thatched mound composed of short lengths of grass, twigs and other plant debris; well developed mounds are often 18 inches high with an outer rampart of earth upon which the plant material forms a thatch. More numerous than these nests of *melanotica* are the smaller earthen mounds of the prairie ant, *Formica cinerea neocinerea* Wheeler: 72 nests of the latter species have been found in an area of about 2½ acres.

New colonies of ants belonging to the *Formica rufa group*, to which *melanotica* belongs, are founded by temporary social parasitism. A newly fertilized female invades the nest of the host species (here, *Formica cinerea neocinera*) and is adopted by the workers after acquiring the brood and nest odor. The host queen is probably killed by her own workers, which rear successive broods of the temporary parasite. Eventually the host species dies out and a pure colony of the parasite survives. New colonies may also be formed by swarming, in which a portion of the worker population leaves the old nest with one or more fertile females; however, the whole colony may move to a new location leaving the old nest site deserted. The new location may be only a few feet distant, rarely is it so distant as in the instance to be described below.

One of the best generalized description of the moving of a colony has been given by Wheeler in his book "Ants," in the anthropomorphic language so often used by students of social insects: "The migration of ants from one nest to another is determined upon and initiated by a few workers which are either more sensitive to adverse conditions or of a more alert and venturesome disposition than the majority of their fellows. These workers, after selecting a site, begin to deport their brood, queens, males, fellow workers and even their myrmecophiles. The departed workers are at first too strongly attached to their old quarters to remain in the new ones and therefore keep returning and carrying back their brood. The enterprising workers, however, obstinately persist in their endeavors to move the colony till their intentions are grasped and become contagious. The indecision or indifference of many of the workers may last for days or even for weeks, during all which time files of ants move back and forth between the two nests carrying their larvae and pupae in both directions. But more and more workers keep joining the ranks of the radicals till the conservative individuals constitute such a hopeless minority that they are compelled to abandon the old nest and join the majority." In one instance observed by Wheeler, "it re-

quired nearly three weeks to overcome the attachment of all the workers to their old home."

The first evidence that ant colony F8 was moving was noticed on July 7 and the movement continued until August 5 when ants carrying other ants were last observed moving toward the new nest. The old nest site was surrounded by matted bluegrass *Poa pratensis*) near the foot of a steep hill; the new nest site was up the hill (27.5 feet higher) and 207 feet to the west, where a small thatched mound about nine inches in diameter had been established. The increase in elevation for the first 65 feet from the old site was 17.5 feet and the cover mostly matted blue grass; in the next 31 feet there was a five foot increase in elevation, cover matted wheat grass (*Agropyron Smithii*); the remaining 111 feet with a rise of five feet: regularly mown blue grass 31 feet; erect wheat grass 53 feet, and unmown blue grass 27 feet. Most of the observations and counts were made in the mown blue grass stretch.

In making counts two methods were used: the numbers of ants present in the mown area was counted or a string was stretched above and across the path of the ants, and the number passing in each direction, whether unloaded or loaded was counted; sometimes, if enough observers were present, the type of load carried was separately recorded.

The workers of *Formica rufa melanotica* vary in size from about 4 mm. to 8 mm. All workers are extensively and deeply infuscated with black; the minor workers are usually completely dark; as a rule only the heads of the major workers are clear red and these too are often tinged with black, so that the majors are easily differentiated from the minors. In estimating the size of individuals the scape of the right antenna was removed and measured with an ocular micrometer of which one division was equal to 25 microns. The scape of the smallest individual was 41 divisions, that of the largest 73 divisions; so that the largest individual was approximately 5.5 times as large as the smallest.

Thirty-one ants which each carried another ant were captured on the route; the carried carefully separated from the carrier, and measurements made. The scape of the average carrying ant was 67.3 divisions (range 55-72); the average carried ant was 60.5 divisions (range 46-72). In only seven pairs was the carried larger than the carrier, and three of the carried ants had the characteristic yellowish-red head of a newly emerged major worker. Sixty-four ants caught carrying pupae were measured: the average was 68.0 (range 60-73); 49 carrying larvae averaged 67.4 (range 62-71); 73 unloaded averaged 66.7 (range 44-73); the average of all carriers was 67.6 (range 55-73), and the average of 93 individuals captured on the old nest was 52.1 (range 41-71). These figures confirm the conclusion, earlier reached from observations on head color, that most of the individuals actively engaged in moving were major workers.

During the whole period only two ants were observed carrying anything toward the old nest; both of these were major workers,

one carried another major worker, the other carried an ant of a different genus (*Lasius* sp.); the other 385 ants recorded as loaded were going toward the new nest. About 31% of all ants going toward the new nest carried an ant, a pupa or a larva; the average speed of a loaded ant is usually about three-fifths of that of an unloaded ant which may be as great as four feet per minute. Counts made at intervals during a two-day period showed 720 ants moving toward the new nest and 639 toward the old nest. The counts made on July 8 were made by five observers; each entry in the table is the average ants per minute over a ten or twenty-minute period.

Table

		Ants per minute			
	time	temp. °C.	to new nest	% carrying load	to old nest
July 8	8:30 A.M.	.....	3.4	.....	2.8
	9:00	.....	4.0	.....	3.3
	10:10	27.5	2.8	19	3.2
	10:30	27.5	2.0	12	1.8
	11:10	27.5	0.2	0	0.2
	1:55 P.M.	30.0	0.2	0	0.2
	3:35	29.5	2.2	20	1.5
	5:25	30.0	5.2	29	4.0
	7:10	29.0	6.2	44	2.4
	July 9	5:50 A.M.	29.0	0.1	.....	0.0
6:35		29.0	1.0	.....	1.2
7:20		29.0	4.6	.....	1.7
7:40		29.0	3.5	.....	1.9
11:40		30.0	0.0	.....	0.0
12:10 P.M.		30.0	0.0	.....	0.0
2:00		30.0	0.0	.....	0.0
5:00		30.0	4.7	.....	9.1
5:15		30.0	5.0	.....	3.6
5:30		30.0	2.2	.....	2.2
7:00		30.0	5.8	.....	6.9
7:30		30.0	4.5	.....	3.4
8:35		29.0	0.4	.....	0.4
10:00	26.0	0.0	.....	0.0	

From the table it may be seen that movement to and from the new nest ceases during the middle of the day and during most of the night. There is evidence from the general activities of other colonies that there is little travel to and from the nest when the temperature is above 34°C. and that travel may last throughout the night when the temperature is as low as 19°C. The cessation of activity during the day is probably correlated with the height of the sun; in the species under discussion, activity generally lessens during the middle of the day when the temperature is 30°C. or higher. During the heat of midday ants on the mound tend to concen-

trate on the side of the nest where there is some shade from the surrounding vegetation. Air temperatures are probably no measure of the actual temperature of the ants' surroundings.

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