



Considering ant trails

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“There be four things which are little upon the earth, but they are exceeding wise: the ants are a people not strong, yet they prepare their meat in the summer” (Prov. 30:24,25).

ANTS ARE indeed “exceeding wise”, and this wisdom has been highlighted before in *The Testimony*.¹ The way in which “they prepare their meat in the summer” demonstrates the infinite wisdom of the Creator. Elsewhere in Proverbs we again read of ants providing and gathering food for themselves: “Go to the ant, thou sluggard; consider her ways, and be wise: which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest” (6:6-8). In this article we discuss some research carried out by scientists who have considered the ways of ants.² The research relates to the way the traffic flow of army ants (*Eciton burchelli*) is optimised as they gather food and bring it back to their nest.

Army ants

Colonies of army ants can consist of over half-a-million individuals. They are carnivores, feeding on arthropod prey such as insects. To collect such food they set up trail systems between their nests and the prey. These trails may involve as much as 200,000 foragers, and may be up to twenty metres wide and 100 metres long. A single raid may result in around 300,000 prey items being retrieved.

The researchers developed a general computerised model of how ants form trails. They then took account of data they acquired by filming ant trails in Panama. They analysed the trajectories of individual ants and the way they interacted with each other. This data was incorporated into the model to explore how turning rates of ants, together with the perceptions by ants of their local context, influenced the traffic flow.

Sense of direction

There were two key aspects of movement analysed by the researchers. The first related to the

way ants collectively select a direction in which to travel: “After a period of disorder, the ants all begin moving in the same direction. This behaviour is likely to reflect the ability of army ant colonies collectively to select a raid direction” (p. 142). The trajectory that the ants take involves following the chemical (pheromone) trails which they lay down. It also depends on the way the ants interact with each other. The researchers write that “The results of the [computerised] model suggest that army ants have evolved a behavioural response that results in a general tendency for them to all move in the same direction along a trail” (pp. 142-3).

They further conclude that their model and empirical observations “suggest that individual army ants, in a real raid, have a sense of direction” (p. 143). This “sense of direction” has to have come from somewhere. The researchers claim it evolved, but, as they developed their computer programme to take account of lane formation in the trail, they had to build this sense of direction into their model: “We assume that the ants have a sense of direction . . . Hence, each simulated ant is now supplied with a supplementary internal directional vector . . .” (p. 143). If the scientists had to supply such a vector for their simplified model, then does not this suggest that the sense of direction in the ant itself was also supplied by an intelligent Designer?

We now consider the second aspect of movement, namely the formation of lanes.

1. J. Nicholls, “The wise little ant”, Jul. 1986, pp. 220-221.
2. Couzin, I. D. and Franks, N. R. (2003). “Self-organized lane formation and optimized traffic flow in army ants”. *Proceedings of the Royal Society of London, Series B*, 270, 139-146, available at http://www.bio.bris.ac.uk/research/behavior/Army_Ant_Traffic_Flow.pdf.

Lane formation

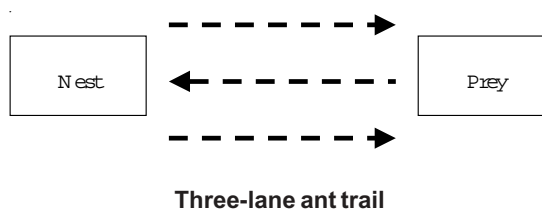
As ants travel back and forth between the nest and the prey, they do so in an orderly way, forming three distinct traffic lanes (see diagram opposite). As ants travel away from the nest they take one of two outside lanes, either to the right or to the left. On their return journey they travel down a single middle lane towards the nest. How do these lanes form? The researchers concluded from their observations and model that ants travelling away from the nest have “a higher rate of turning during avoidance manoeuvres than do returning ants” (p. 143). They are more likely, therefore, to move out of the way, either to the right or left, when confronted by an ant travelling towards them. On the other hand, the ants returning to the nest are burdened with prey and therefore are less able to take avoidance manoeuvres. This leads to a highly efficient way for the ants to move between the nest and the prey. The researchers claim that this predilection for outward-bound ants more readily to avoid collisions is a result of natural selection, but a more obvious conclusion to draw is that ants behave in this way because that is the way they have been programmed to behave by the Creator.

Lessons for ourselves

The way in which army ants gather their food provides us with evidence of the wisdom of our heavenly Father. They have “no guide, overseer, or ruler”, but they are able to form trails in a highly efficient manner. Such is the efficiency of the ants that the researchers go on to make comparisons between them and the way human crowds behave. They note that human pedestrians tend to form lanes on walkways. However, unlike the ants, the number of lanes is not fixed, but varies according to the width of the walkway. In commenting on the difference between ants and humans, the researchers, amongst other things, note the following: “A further difference between ants and humans is that pedestrians can typically be expected to behave selfishly. That is, they will tend to minimize their own travel time, but this may be at the cost of others. An army ant colony, however, is composed of cooperative individuals” (pp. 144-5). As such the ants provide us with an example of how we should cooperate in ecclesial life.

Ezekiel’s temple

There is an apparent example of lane formation being incorporated into Ezekiel’s temple, which



helps overcome man’s selfishness. In chapter 46 we read: “But when the people of the land shall come before the LORD [Yahweh] in the solemn feasts, he that entereth in by the way of the north gate to worship shall go out by the way of the south gate; and he that entereth by the way of the south gate shall go forth by the way of the north gate: he shall not return by the way of the gate whereby he came in, but shall go forth over against it” (v. 9).

Here we see that the crowds visiting the temple will move either north to south or south to north, but will not be able to turn around and leave the temple by the same gate they entered. In writing of the east gate Ezekiel says: “Then came he unto the gate which looketh toward the east, and went up the stairs thereof, and measured the threshold of the gate, which was one reed broad; and the other threshold of the gate, which was one reed broad” (40:6).

Brother Sulley interprets this as showing that, because there are two thresholds, the gate is divided into two. He then applies this pattern to the other gates, such as those in the north and south. In the case of these gates, because people are flowing in both directions, one threshold could be used as an exit and the other as an entrance. As he writes: “Compliance with this law [46:9] will secure orderly fraternal intercourse, where confusion might otherwise reign. It is an arrangement, in fact, for passing to the right and to the left, and to carry this out in the most effectual manner through the gates, each gateway is divided into two parts; hence ‘two thresholds’ are specified at the entrance of the gates”.³

Whatever the exact arrangements for temple worship in the age to come, there will obviously be a need for the crowds to be directed in an orderly way. Meanwhile, the ants will continue to form their trails in the way they have been designed to do.

3. Sulley, H. (1949, fifth edition), *The Temple of Ezekiel’s prophecy*, Birmingham, The Christadelphian, p. 49.