Medic! Ants injured while hunting for termites get help from paramedic-style triage system

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Weaver ants collaborating to dismember a red ant (the two at the extremities are pulling the red ant, while the middle one cuts the red ant until it snaps). Image: Wikipedia.

Move over, ant farms—ant hospitals are where the real action is. Scientists studying the behavior of African Matabele ants in Ivory Coast have found that the insects act like paramedics in a crisis, triaging and treating the wounds of their injured peers.

The discovery, described in the Proceedings of the Royal Society B, documents a surprisingly sophisticated system that helps determine which ants are most likely to survive a combat injury.

Ants are often thought to live in systems where the life or death of an

individual worker doesn't matter much. That's because many ant species live in giant colonies whose workers usually have very short life spans relative to the queen, and because the queen can lay eggs for new workers at a fast rate.

"The benefit from helping injured ants in this scenario is small, because replacing them should be easier," the scientists wrote. "At the same time, if injuries were mainly fatal, the benefit of a rescue behavior focused on injured individuals would again be marginal."

That's not the case for ants such as Megaponera analis, which venture out in raiding parties of 200 to 600 individuals, attack termites and carry their unfortunate prey back home. The hard-headed termites don't go without a fight, though. Many invading ants lose legs or end up with termite mandibles dug into their bodies.

Surprisingly, the returning ants don't abandon all their casualties: Before returning home they look for their injured comrades, which send out a "distress signal" pheromone. Within 24 hours of being taken back to the nest and treated, maimed ants can switch to a four-legged or five-legged gait that lets them run almost as fast as their six-legged peers.

Because these injured ants can still do almost the same things as their healthy peers, it makes sense to bring them home and treat them—especially since roughly a third of the small-sized ants that run these termite raids have lost a leg at some point in their life.

Gravely injured peers are usually left behind. And open wounds from severed legs could easily become infected and spread disease in the ant nest, given that there's a lot of interaction and very low diversity within a single colony.

So for this paper, scientists from Universitat Wurzburg in Bavaria,

Germany, wanted to learn how the ants providing medical aid make decisions about which wounded ants to save—or whether it's their decision to make at all.

"While the benefit for the colony of leaving behind fatally injured ants is clear, the mechanism that regulates this behavior remains unknown: is the decision to rescue made by the helper or the fatally injured ant?" the study authors wrote.

To find out, the researchers tracked 208 ant raids of 16 different M. analis colonies in a humid savanna woodland in Comoe National Park in northern Ivory Coast. They dug up 14 colonies and surveyed the ant population, finding that the colony sizes ranged from around 900 to 2,300 ants, and also put captured ants in laboratory "nests" to document their behavior. They ran experiments on the ants, including placing maimed nest mates (missing either two or five legs) in the path of raiding parties that were returning home.

The scientists found that it was the injured ants, rather than the paramedics, that determined whether they'd be carried home or left to die. That's because the wounded ants behaved differently depending on their physical state.

The ants with less serious injuries (just a couple of maimed legs) walked slower and stumbled more often when their peers were nearby. They also curled up in a "pupae-like" position when another ant felt them up with her antennae—presumably this made the injured ant easier to carry.

The scientists aren't sure why the ants with relatively "minor" injuries slow down—perhaps it's to make sure they get noticed. But if the raiding party passed them by, they'd quickly speed up and follow the group home.

The gravely injured ants, on the other hand, flailed wildly—making it very difficult for potential rescuers to pick them up and take them home. After a few attempts, the helping ant would give up and move on. In this way, the lost causes kept their fellow ants from wasting any effort on them.

But that's not to say that the lightly injured ants are "faking it," the scientists said.

"While comparisons to human behavior and 'acting more injured' near conspecifics are easy to make, we want to emphasize that this is not the case here," the authors wrote. "This behavior cannot be considered cheating, because all these ants are truly injured and not only benefit themselves from being carried back, but so does the colony (by reducing foraging costs/mortality)."

That idea is further bolstered by the fact that the heavily injured ants did not try to save themselves by getting help, they added.

At the nest, the paramedic ants pulled off any tenacious termites off the injured insects' bodies and cleaned open wounds by "licking" them intensely, sometimes for several minutes in one sitting. The scientists think that the insects may have antimicrobial agents in their saliva that might help stave off deadly infection. Whatever the reason, their ministrations worked: only 10 percent of the ants that got treatment died. Without that medical attention, 80 percent of those ants would die.

The wounds of heavily injured ants did not get as much grooming time as the more lightly injured insects. They were quickly carried outside the nest, and died within 24 hours.

The findings show that even tiny-brained individual ants can serve the "greater good" without having qualities that humans usually associate

with that trait, such as empathy.

"These results are in line with prior studies concerning rescue behavior and support the hypothesis for the evolution of prosocial behavior without the necessity of empathy or cognition," the study authors wrote.

The next steps, they added, are to probe the nuances of the ants' triage-like behavior.

"How do the ants know where the injury is? How do they know when to stop treating the injury? Is the behavior purely prophylactic or also therapeutic in case of an infection outbreak? How big is the time-window after injury in which treatment is effective and how does wound clotting affect treatment?" the authors wrote. "We hope that further research will help answer these questions."