



Ants *for*—and *as*—Wildlife

RECONSIDERING THE LITTLE THINGS THAT “RUN THE WORLD”

By Aaron M. Ellison



Credit: Elizabeth Farnsworth

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Chances are that no matter where you are, you're never more than a few feet from an ant nest. Proximity, like familiarity, breeds contempt, and the near-daily interactions between “Us” and “Them” are rarely positive. Carpenter ants devour our woodwork. Sugar ants raid our kitchens. And nonnative ants like the red imported fire ant (*Solenopsis invicta*) compete with and even prey on a wide variety of mammals, reptiles, amphibians, and birds (Allen et al. 2004) including the chicks of endangered species like grasshopper sparrows (*Ammodramus savannarum floridanus*) and black-capped vireos (*Vireo atricapilla*) (Stake and Cimprich 2003, Tucker et al. 2010).

Despite such aggravations, ants prove more fascinating the more we learn—perhaps because they, like humans, work cooperatively in complex “societies.” Individual worker ants in a single colony coordinate with each other on tasks such as rearing offspring, collecting food, and constructing and cleaning the nest. New research has shown that worker ants shift among these different “careers” as needs shift within the colony (Gordon 2010)

and as they age (Mersch et al. 2013). Similarly, ants have developed their own “Anternet” to efficiently transmit information. For example, worker ants foraging for food vary the rate at which they touch each other's antennae and then “decide” how many more foragers to send out based on this rate—a method similar to how Internet protocols determine how much bandwidth is available for routing data most quickly and efficiently (Prabhakar et al. 2012).

Myrmecologists—scientists like me who study ants—also laud the many ecosystem services ants provide, such as soil creation and aeration, decomposition of leaf litter and animal carcasses, and recycling of nutrients through ecosystems (Del Toro et al. 2012, Ellison 2012). Indeed, numerous studies have supported noted conservationist E. O. Wilson's assertion that ants are “the little things that run the world” (Wilson 1987).

Birds to Bears: Ants for Wildlife

These “little things” also play a significant role as a source of food for wildlife. Many omnivorous animals feed opportunistically on ants, but some have turned to myrmecophagy—literally, the eating of ants—as a way of life. Specialist myrmecophages that feed exclusively on ants include the North American horned lizard (*Phrynosoma* species), neotropical iguana (*Plica umbra*), Socotra geckos (*Pristurus samhaensis* and *P. sokotranus*), African thread snake (*Leptotyphlops scutifrons*), Australian echidna (*Tachyglossus aculeatus acanthion*), several species of anteaters and armadillos (*Priodontes* and *Tolypeutes* species), and a number of tropical frogs. In particular, poison-dart frogs in the family Dendrobatidae feed extensively on ants and other small invertebrates. The alkaloid poisons that suffuse the frogs' brightly-colored skin are synthesized from pumiliotoxins found in litter-dwelling ants in the genera *Brachymyrmex* and *Nylanderia* (Saporito et al. 2004).



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Poison-dart frogs such as the *Dendrobates pumilio* (above right), often eat ants in the genus *Brachymyrmex* (above)—commonly known as rover ants. Though harmless to the frogs, these ants contain pumiliotoxins, poisons that can affect contraction of the heart and other muscles. Poison-dart frogs sequester these toxins in their skin, a defense against predators.

Birds also rely on ants for food, and occasionally also for protection from predators. The inaptly



named antbirds rarely eat ants, but several species parasitize army-ant swarms, picking off other insects and even small vertebrates that are trying to escape from the columns of marauding army ants (Wrege et al. 2005). Other birds, including gulls, kingbirds, and woodpeckers, feed on ants foraging on the ground, living inside of trees, or snagged on the wing during ant mating swarms.

One of North America's rarest and most intensively managed birds, the red-cockaded woodpecker (*Picoides borealis*), feeds extensively on ants. A detailed study of its diet revealed that a single species of ant, *Crematogaster pinicola*, made up nearly 60 percent of the arthropods that the woodpecker ate in Florida's Apalachicola National Forest (Hess and James 1998). This degree of specialization is unusual among insectivorous birds, but because *C. pinicola* makes large, abundant colonies that can live for decades, it provides a reliable food supply for this endangered woodpecker. In fact, it is the loss of habitat—mature stands of large longleaf pines—not the loss of prey that threatens this woodpecker (Deyrup and Cover 2007). Similarly, the largest North American woodpecker, the pileated woodpecker (*Dryocopus pileatus*), relies on large trees not only for nesting and roosting, but also for the abundance of carpenter ants (*Camponotus* species) that can be found in their rotting heartwood (McClelland and McClelland 1999).

Hundreds of mammals also thrive on ants (Redford 1987). Besides the eponymous anteater, bears the world over (except the polar bear) consume ants—and not just incidentally when grubbing for roots or feeding on berries. Though eaten year-round, ants are most important in a bear's diet in the summer months when plant forage quality is relatively low, animal prey is scarce, and temperatures are warm. In North America, for example, from 5 percent to more than 50 percent of the volume of bear scat collected in midsummer can be made up of ants (Noyce et al. 1987, Mattson 2001).

Bears generally feed on larger ants (greater than 5 mm long), such as carpenter ants or *Formica* species. Among the latter, red wood ants (different species in the *Formica rufa* group) are the most-preferred species as they can have huge colonies with tens of thousands of workers living in easily accessible meter-high mounds of soil. In Scandinavian forests, there can be nearly 45 tons of red wood



Credit: Nathaniel Rayl



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Credit: Elizabeth Farnsworth

ants available per brown bear (*Ursus arctos*), and these, along with carpenter ants and other, smaller species, account for 20 percent of the bear's caloric consumption in midsummer (Swenson et al. 1999).

In contrast, black bear (*Ursus americanus*) in Minnesota favor fuzzy ants and the fragrant citronella ants (two different groups of *Lasius* species),

Black bears (*Ursus americanus*)—like this one in Newfoundland—will often rip apart dead trees on the forest floor (center) to find and devour large colonies of carpenter ants (such as *Camponotus novaeboracensis*, bottom). High in protein and easily digestible, ants can provide 20 percent of a bear's calories in midsummer.



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A special caste of aptly named eastern honey pot ants (*Prenolepis imparis*) called repletes store sugars in their bloated gasters and use those sugars to feed their sister ants during times of food shortage.

which, despite their smaller size (3-5 mm long), make similarly large colonies and are easily sniffed out (Noyce et al. 1987). However, hungry bears will feed on any ants close at hand, which is not surprising given their high protein content (greater than 50 percent by weight) and easy digestibility. In fact,

when fall mast crops (mainly nuts) are scarce or fail completely, ants can help fill in a bear's diet before it begins to hibernate (Beeman and Pelton 1980).

Like bears, chimpanzees (*Pan troglodytes*) are also connoisseurs of large ant species, notably African driver ants (*Dorylus* species, a.k.a. African army ants). These are the largest living ants in the world, with some queens exceeding five centimeters in length. The importance of ants in chimpanzees' diets varies seasonally and geographically (Schoning et al. 2007). Driver ants live deep underground and can be aggressive, so chimpanzees have developed a sophisticated toolset including stripped saplings to perforate ant nests and dipping sticks (stems of herbaceous plants) to carefully extract the ants from the nest, providing a convenient stalk to cluster on and from which the chimpanzee can lick them off (Sanz et al. 2010).

Multitaskers: Ants as Wildlife

Beyond their role as prey, ants can also be able predators and scavengers. The fire ant *S. invicta*, for example, directly preys on hatchlings of a number of turtles including loggerheads, green sea turtles,

and snapping turtles (Allen et al. 2004). Ants also routinely scavenge road-killed birds along with other carcasses, providing an essential ecosystem service—decomposition (Antworth et al. 2005). In the northeastern U.S., where ants were thought to be preying on shorebird chicks, it now appears that the ants are actually moving in to clean up dead or dying chicks in abandoned nests (Lowe et al. 2007).

Conversely, ants also appear to protect some birds from nest predators and parasites. In northern Sweden, for example, various species of tits (*Parus* species) will intentionally nest near red wood ants (*Formica aquilonia*) when avian predators such as feral cats, magpies, crows, or jays are nearby, apparently because the ants will make such predators reluctant to approach. Yet tits will avoid nesting near the ants when predator-free sites are available (Haemig 1999, 2001).

Clearly ants can be viewed as “wildlife,” and humans might be wise look to the lowly ant as wildlife worth harvesting. Other than its chitinous exoskeleton, most of the weight of an ant is digestible protein; a fist-sized serving (100 grams) can contain as much as 500-600 calories of energy and many crucial amino acids and micronutrients (Bukkens 1997). If bears and woodpeckers can get up to a third of their daily energy intake from ants, why can't we?

We soon may: The Food and Agriculture Organization of the United Nations just released a report about the potential role of ants and other “edible insects” in global food security (FAO 2013). In truth, ants are already eaten by humans in most countries outside of Europe and North America (Rastogi 2011). Every stage the ant goes through in its life cycle—egg, larvae, pupa, adult worker, queen,

An eastern kingbird (*Tyrannus tyrannus*) feasts on a winged ant captured during a mating swarm, when clouds of airborne ants make easy targets. The tables turn when a horde of New World fuzzy ants (*Lasius neoniger*) scavenge the carcass of a common tern (*Sterna hirundo*) chick that died after its nest was abandoned.



Credit: Brooks Mathewson



Credit: Ellen Jedrey/Massachusetts Audubon Society



or male—is prized somewhere for its flavor, texture, or caloric content. Some of the most delectable are a specialized caste of honeypot ants (all 28 species in the genus *Myrmecocystus* and a few species in at least nine other genera) that store sugars in their distended gasters to feed the rest of the ant colony when food is otherwise scarce. Many humans, especially the Aboriginal peoples of Australia, find these six-legged gumballs irresistible, too (Conway 1985).

Ant farming may yet emerge as the next big thing in agriculture. Large-scale ant farming has come a long way from the sand-filled Plexiglas box. For example, weaver ants (*Oecophylla smaragdina*) not only are eaten in a variety of preparations but also are used as pet food, in traditional medicines in East Asia, and even for biological control of insect pests on tropical plantations. In an experimental trial in Thailand, it was estimated that collecting ants used for biological control and then selling them for food or traditional medicines provided up to a 4.5-fold rate of return on investment (Offenberg 2011).

Until such ventures are commercialized, however, ants for the dinner table will continue to be hunted

in the wild. Collecting this mini-game and finding the ones you want involves as much skill and attention to conservation as hunting big game (DeFoliart 1997). Unlike invasive species such as the red imported fire ant, most ants have specialized habitats and disappear when their favored sites are disturbed or fragmented by human activities (Elison 2012).

So the next time a phalanx of ants marches across your picnic blanket, shake them off knowing that they support other wildlife large and small. Even if you don't ever see a bear or hear a woodpecker, understand that they may exist because of ants. And as the human population continues to expand, you may one day find yourself living on ants, too. ■

This article has been reviewed by a subject-matter expert.



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