Ant

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ANT

Ants are INSECTS belonging to a single family Formicidae, coextensive with superfamily Formicoidea and containing perhaps 10,000 species. Superfamily Formicoidea is one of the major groups of Hymenoptera, falling nearest the solitary fossorial wasps of superfamily Scolioidea, family Tiphiidae, with which it probably had common origin during the Cretaceous. Structurally, ants are distinguished from other Hymenoptera, many of which are wingless and superficially antlike, by the presence of a large gland, with bulla and orifice, on either side of the metathorax; the function of these metapleural glands, although they secrete to the outside, is unknown.

All modern ants are social, living in perennial colonies consisting, in the usual case, of two or more castes of females; winged males, like honeybee drones, appear at intervals and serve to fertilize the winged females. The two basic female castes, derived, as in other Hymenoptera, from fertilized (diploid) eggs, are the worker or "neuter" and the queen or true female. The worker is normally small and does not develop wings or flight muscles, and is specialized to perform most of the labor in the established colony; it is the form universally recognized as "the ant." The queen usually bears wings up to the time of the nuptial flight, but they are shed after mating. The queen functions as the primary reproductive; she founds the new colony alone, or is adopted by an established colony.

The male develops from unfertilized eggs. It mates with the female, often after a mass nuptial flight from the nest, and normally does not return to the colony. The individual ant develops through a typical holometabolous sequence: egg, grublike larva, pupa with or without cocoon, adult. The number of larval instars is not known certainly for any species, but may be 3 to 5. As with all true social insects, the generations overlap, and the adults rear the immatures, feeding the larvae by progressive provisioning. In congenial climates, two or more broods may be reared in a single season. Differentiation of the females into queen and worker castes, and subdivision of the worker caste into soldiers, minor workers, etc. (where it occurs) is determined by the type of food the larva is given, and to a lesser extent, in some cases, by the nourishment the embryo receives in the egg.

Ants vary by species from highly specialized monophagous predators to near-omnivores, seed harvesters, and even to one whole tribe, the Attini, in which all species cultivate and feed upon special fungi. Some, perhaps most, ants feed the youngest larvae and the nest queen primarily on unfertilized eggs laid by the workers. Many ants are fond of the excretions, called honeydew, of homopterous insects, and some of them, particularly subterranean genera such as *Acropyga* and *Acanthomyops*, are obligatory tenders of certain root-feeding plant lice.

Studies of communication and orientation in ants are hardly begun, and the very great differences in behavior between different taxa render generalizations hazardous. Communication among adults, and between adults and larvae, employs five known modalities: (1) olfactory, in which volatile pheromones are secreted by specific glands upon specific stimulus, and which elicit a specific response, such as trail-following or alarm behavior; (2) gustatory, particularly during food exchange by regurgitation from the adult crop or social stomach, which has an elaborately modified valve in many groups, permitting prolonged storage of liquid food; (3) auditory, including stridulation, tapping and other sounds, probably transmitted most importantly through the substrate; (4) mechanical, including antennal stroking, body recoil and generalized jostling; various types of interindividual licking and grooming are probably combined with (1) and (2); (5) visual, as suggested by striking color patterns in some forms with well-developed eyes.

Foraging in ants apparently involves two main types of orientation: (1) by individual foraging fields, in which an individual worker tends to revisit the same restricted feeding area, becoming familiar with the routes to and from the nest by learning based on olfactory, visual, kinemetric, gravity-sensitive and other faculties; (2) *by trail* following, in which foraging is induced and oriented by means of a chemical trail laid by appropriately stimulated workers between food source and nest. The mass foraging practiced by army-ants is apparently a special kind of trail-following.

Ants usually inhabit more or less permanent, definitely structured nests, excavated in the ground or in wood, or utilizing pre-existing cavities in plants or in rocks. Some ants live in apparently mutualistic relations with certain kinds of plants, offering some protection against browsing mammals which fear their stings and bites, and receiving from the plant nectar from special nectaries, and often also a ready-made domicile on the plant. Some arboreal ants build nests of leaves joined by silk produced by their larvae (*Oecophylla*), and others build papery carton nests from masticated plant fibers (*Crematogaster*).

Ant colonies may contain as few as 8 or 10 adults, or several millions, as in the African *Anomma* army-ants; probably most species average less than 1,000 workers per colony. The colonies, however, may be very numerous, especially in tropical forest or warm semidesert. Upwards of 150 species have been found nesting in a single square kilometer of tropical rain forest, whereas the same area in a deciduous forest in New England or Central Europe might harbor 25 or 30 species. Ants in general do not thrive in very cold climates or in cool, wet, poorly insolated forests. Their great abundance and relatively high activity rates make ants one of the most important animal influents in temperate and tropical climates.

Family Formicidae is currently divided into nine subfamilies: Myrmeciinae, Ponerinae, Cerapachyinae, Pseudomyrmicinae, Dorylinae, Myrmicinae, Dolichoderinae, Formicinae and Leptanillinae.

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Reference: WHEELER, W. M. "Ants." N. Y. Columbia University Press, 1910.