

however, workers will begin to produce eggs if the queen dies. Because these eggs are unfertilized, they usually develop into males (see the discussion of haplodiploidy and the evolution of eusociality later in this chapter). In rare cases, however, workers can produce new queens either from unfertilized eggs (parthenogenetically) or after mating with a male ant.

An ant colony will continue to grow in size and add workers, but at some point it becomes mature and will begin sexual reproduction by producing virgin queens and males. Many species produce males and reproductive females just before the nuptial flight. Others produce males and reproductive females that stay in the nest for a long time before the nuptial flight. Our largest carpenter ant, *Camponotus herculeanus*, produces males and virgin queens in late summer. They are groomed and fed by workers throughout the fall and winter before they emerge from the colonies for their mating flights in the spring. Finally, some species, including *Monomorium pharaonis* and *Myrmica rubra*, have large colonies with multiple queens that create new colonies asexually by fragmenting the original colony. However, even these polygynous (literally, many queens) and polydomous (literally, many houses, referring to their many nests) ants eventually go through a phase of sexual reproduction in which males and new queens are produced.

The ant colony thus functions as a highly social, organized “super-organism.” The queens and most workers are safely hidden below ground or protected within the interstices of rotting wood. But for the ant workers that must go out and forage for food for the colony, life above ground is short and dangerous. The single ant that you see running across the forest floor or your kitchen counter is, in reality, a short-lived, specialized extension of the colony itself, just as an individual leaf is a specialized part of a single living tree.

What Makes an Ant an Ant?

Ants are insects, and insects are arthropods: invertebrates (animals without backbones) within the larger group of animals that includes lobsters, spiders, and lice (Box 2.1). Like all insects, ants have a segmented body consisting of three major regions (head, thorax, and abdomen), compound eyes and antennae on the head, three pairs of jointed legs on the thorax, and an external (outer) skeleton made of chitin (a stiff, starchy compound that feels like fingernails) covering the entire body. Ants are all members of one insect order: the Hymenoptera. This order also includes the sawflies, bees, and wasps. With nearly 150,000 described species, the order Hymenoptera contains more species than any other order of insects except for the beetles (Coleoptera) and the butterflies and moths (Lepidoptera). All Hymenoptera have membranous wings, an egg-laying organ (called an ovipositor) that is frequently modified into a stinger, chewing mouthparts

are predators: New England's three *Proceratium* species prey only on spider eggs, and our *Pyramica* species stalk centipedes.

Social Parasitism—Guests, Inquilines, Temporary Parasites, and Slave-Makers

Parasites have evolved to exploit almost every kind of organism. The primary characteristic of a parasite is that it is physically dependent on another species (the host) for at least part of its life cycle; the parasite cannot survive and reproduce successfully without the host. For example, parasitic plants attach to roots or other parts of other plants and suck nutrients and carbon from the host. Without this source of essential nutrients and energy, the parasite dies. Parasitic roundworms take up residence inside humans, feeding on blood, tissue, or your last meal. Without the food and shelter provided by your body, these roundworms could not survive. Parasitic protozoa, including the species that cause malaria in humans and birds, have evolved complex life cycles that require multiple species of hosts to house them, feed them, and move them around.

Many kinds of parasitism have evolved among the ants, too. Myrmecologists recognize four different kinds of social parasites (the term *social* refers to the fact that these parasites have evolved in the eusocial insects): guest ants (also called xenobiotics), temporary social parasites, slave-makers (also called permanent social parasites with slavery, dulosis, or pirates), and inquiline social parasites (also called permanent social parasites without slavery). Among the ants, fewer than 2% of species are known to be parasites, but continued exploration and study of ant natural history, especially in the tropics, regularly uncover new parasitic species. And a surprising number of temperate-zone species in the ant subfamilies Myrmicinae and Formicinae are parasitic. In New England alone, we have at least 42 species of social parasites—over one-third of our resident species!

Guest ants are fed by, and live in the same nest as, their host. Unlike the other three kinds of social parasites, guest ants rear all of their own workers. In New England, we know of only one such guest ant: *Formicoxenus provancheri* is a guest of *Myrmica incompleta*. *Formicoxenus* forms small nest chambers within the nest of *M. incompleta*, and the hosts regurgitate food into the mouths of the guests. This behavior co-opts some of the energy from the host colony but does not compromise its existence.

Temporary social parasites depend on their hosts only to found a new colony. After she has mated, the founding parasitic queen enters a host colony and kills or otherwise removes the host queen. As the parasitic queen lays her own eggs, the host workers care for them, rearing her brood as if they were the hosts' sisters. As the host workers age and die, they are

will do. Add about 0.5 mL of ethanol to each of a dozen or more sampling vials so that you don't have to carry a container of ethanol while you collect. Stuff your pockets or your day pack with these vials so that you'll have them when you need them.

White paper and a pencil or alcohol-resistant pen (such as a very fine-line [#005] Pigma Micron pen, available for a few dollars at any art supply store) can be used to make simple, but temporary, labels for your vials while you are in the field. We find it easiest to precut the paper into vial-sized strips before we go into the field so we don't have to fumble for a scissors every time we collect an ant. A couple of hundred of these precut labels, stored in a small sandwich bag, will last a long time. You may also want to carry a 5 \times , 10 \times , or 15 \times hand lens for looking at specimens in the field; a small hand trowel for turning over stones and logs; baits and the cards to put them on; and a white plastic or metal pan along with a plastic or metal mesh screen (2 mm diameter) for sifting samples of leaf litter (Figure 3.6).

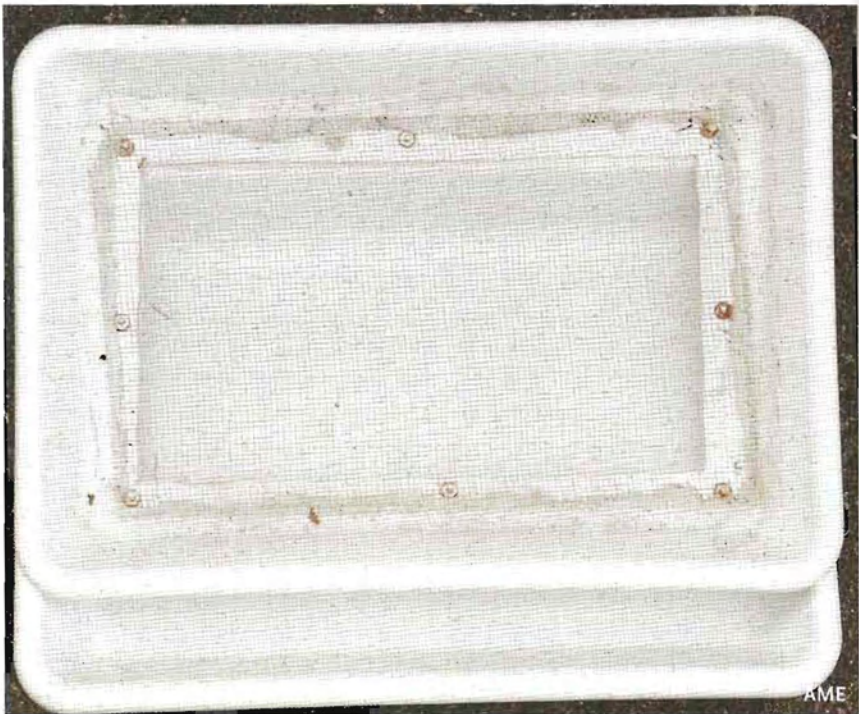


Figure 3.6. A simple and inexpensive litter sifter based on a design by [Mark Deyrup](#). This one is made from two white plastic trays; 3-mm (eighth-inch) mesh hardware cloth; a few nuts, bolts, and washers; and a silicon seal. Cut the bottom out of one of the trays, attach the hardware cloth using nuts and bolts (the washers, which are larger than the mesh, keep the nuts from slipping through the mesh), and seal the edges with silicon to prevent ants from escaping and so you don't cut yourself on the sharp edges of the hardware cloth.

Don't be intimidated by what seems to be a long list of named parts. By looking at the illustrations, working through the keys, and looking up the terms as you go along, you'll learn them in no time!

Characters of the Head

Let's start with the ant's **head**. The **compound eyes** of the worker ant are one of its most distinguishing features. They can be large or small and can consist of several to many lenses or facets, called **ommatidia**, that are used to collect light; the overall size of the eye and the number of ommatidia are important diagnostic characters in several genera. Many species also have three "simple" eyes, called **ocelli**, that look like small, raised dots near the top of the head; each **ocellus** has only one lens. Between the compound eye and the base of the mandible is the **cheek** (sometimes referred to as the **gena**), which may or may not have **erect hairs** of varying length and density. Erect hairs stick up and out from the head (or other parts of the body). In contrast, appressed hairs lie flat.

The segmented (technically, jointed) **antennae** originate from the head. The **condyle** is the rounded "ball joint" at the base of the antenna (see also Figure 5.1 on page 264); it sits in a rounded depression called the **antennal fossa** (plural: fossae) located on either side of the **front**^(frons) of the head. In some species, the fossae are covered by the **frontal lobes**, whereas in other species (especially in the genus *Myrmica*), the fossae are exposed. The condyle is at the basal end of the *elongated* first segment of the antenna, which is called the **scape**. In some species, the scape nestles into a groove, or **scrobe**, that runs upward (technically, rearward) along the head. A raised edge of chitin (a **carina**) forms the rim of the scrobe. In workers and queens, the scape is much longer than the successive antennal segments (or **antennomeres**). Collectively, these smaller segments make up what is called the **funiculus**, and they join the scape at a pronounced angle, which gives the antennae their characteristic elbowed look. The last 2 to 4 segments of the funiculus may be swollen to form a distinctive **club**. The presence or absence of a scrobe, the total number of antennal segments (counting the scape *plus* all the segments of the funiculus; most worker or queen ants have 11 or 12 antennal segments, but some have as few as 6, and males often have 13), the presence or absence of a club, and the number of segments in the club are all characters that distinguish many ant genera. In the genus *Myrmica*, the base of the scape often is adorned with a protruding ridge, flange, or scoop (a small lamina or a larger lamella), and the shape and appearance of these laminae or lamellae are key characters used to distinguish among species.

The overall shape of the head is also important. Technically speaking, the ant's head is prognathous—the jaw (*gnathos* in Greek) protrudes forward

(Greek: *pro*) from the plane of the head—so what looks like the top of the head is considered by myrmecologists to be *behind* (posterior to) the rest of the head. As indicated in the illustration on the inside back cover, the location of each part is determined by this prognathous orientation: top is *posterior*, lower edge is *anterior*, front is *dorsal*, underneath is *ventral*.

Start by looking at the head in full-face view: look at the front (that is, *dorsal view*) of the head so that you can draw an imaginary plane in which the *y* (up-and-down)-axis runs from the top (posterior) edge of the head to the bottom of the clypeus (or “upper lip”) of the ant and in which the *x* (left-and-right)-axis runs across the widest part of the head. Note whether the top (*posterior*) margin of the head in this full-face view is convex, straight, or concave and what kind of *rugae* (sculpturing) may be present. From the top of the head, move down (anteriorly) to the front. The width of the front—from scape base to scape base—is used to distinguish some species. The front of the head ends in the aforementioned frontal lobes.

Just below the frontal lobes is the clypeus. The shape of the clypeus is important: Does the center of the clypeus bulge out, or is it flattened? Is the lower edge, or *anterior clypeal margin*, convex, straight, or concave, or does it have teeth, a shallow *concavity* in the middle, or a deep central *notch*? Do the left and right ends, or *clypeal wings*, extend smoothly to the edge of the face, are they pinched in, or are they raised into a sharp ridge that forms, or connects to, the antennal fossae (like a waxed handlebar mustache)? Beneath the clypeus are the powerful jaws, or *mandibles*, which usually have conspicuous teeth (the number of teeth, which ranges from 0 to 8 or more, often distinguishes species or genera). The first, the *basal tooth*—the one at the top of the mandible just below the clypeus—may be offset from the line of all the others. The last, the *apical tooth*—at the anterior end of the mandible—is often longer than all the others. Beneath the head are the delicate, segmented *maxillary palps* and *labial palps*, which the ant uses to further sense the environment. The number of segments of the maxillary palps, along with their relative size, is an important character for distinguishing among species in the genus *Lasius*.

Characters of the Mesosoma, the Pedicel, and the Gaster

In ants, the segments of the *thorax* and the *abdomen* have been dramatically modified by evolution (see Chapter 2). You can see some of these modifications by looking at the *numbered abdominal segments* on the drawings on the inside back cover.

In adult ants, the first segment (I) of the abdomen (called the *propodeum*) is fused with the last segment of the thorax (the *metanotum*); this combination of the thorax + propodeum is called the *mesosoma*. The overall shape of the mesosoma, viewed in profile view (from the side) or in dorsal view

Key to the Subfamilies and Genera, Based on the Workers (and Queens)

Key to the Subfamilies

1a. Gaster with a visible constriction between the 1st and 2nd segments(Poneroids) 2



Constriction between first two gastral segments of the poneroids

1b. Gaster without a visible constriction 4

2a (from 1a). Teeth present and prominent on the lower (anterior) margin of the clypeus; the attachment of the petiole to the gaster is broad....Amblyoponinae (1 genus, 1 species—*Stigmatomma pallipes*), p. 89



Teeth on the anterior margin of the clypeus of *Stigmatomma*

2b. No teeth on the anterior margin of the clypeus; the attachment of the petiole to the gaster is narrow, resulting in distinct anterior, posterior, and dorsal surfaces of the petiole.....3

3a (2b). The 2nd segment of the gaster is greatly enlarged and arched so that it appears as the hindmost section of the gaster when the ant is viewed in profile; the remaining segments of the gaster curl underneath the 2nd segment and point toward the front of the ant.....Proceratiinae (1 genus—*Proceratium*, 3 species), p. 93



Enlarged second gastral segment of *Proceratium*

3b. The 2nd segment of the gaster is not enlarged and not strongly arched; the remaining segments of the gaster point away from the front of the ant..... Ponerinae (3 genera, 1 species each) 6

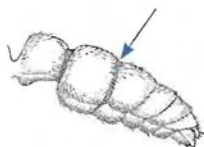


"Normal" second gastral segment of Ponerinae

Key to the Subfamilies and Genera, Based on the Males

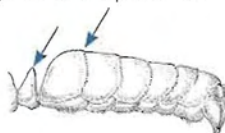
Key to the Subfamilies

1a. Gaster with a distinct constriction between the 1st and 2nd segments Poneroids (5 genera) 3



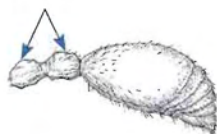
Constriction between the first two segments of the gaster of the poneroids

1b. Gaster lacking a distinct constriction between the 1st and 2nd segments 2



One-segmented pedicel and unstricted gaster of the Dolichoderinae and Formicinae

2a (1b). Postpetiole absent (pedicel with only 1 segment)
..... Dolichoderinae (2 genera) + Formicinae (8 genera) 7



Two-segmented pedicel of the Myrmicinae

2b. Postpetiole present (pedicel with 2 segments)
..... Myrmicinae (17 genera) 16

Key to the Genera

Numbering continues from the subfamilies.

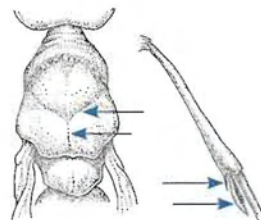
3a (2a). Poneroids). Males wingless, resembling workers ("ergatandrous"); antennae with 12 segments *Hypoponera*



Workerlike males with 12-segmented antennae of *Hypoponera*

3b. Males with wings, distinct from workers; antennae with 13 segments 4

4a (3b). Y-shaped sutures ("Mayrian furrows") visible on the top (dorsal) surface of the pronotum; hind tibia with 2 spurs—1 large, 1 small 5

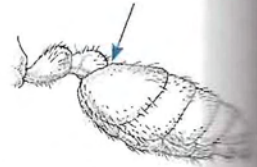


Mayrian furrows (left) and double-spurred hind tibia (right) of *Stigmatomma* and *Pachycondyla*

18a (17b). Antennae with 12 segments.....19

18b. Antennae with 13 segments.....25

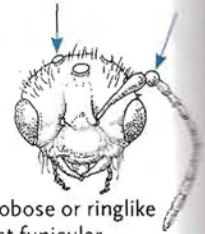
19a (18a). Gaster is heart shaped; the postpetiole appears to be attached to the top (dorsum) of the gaster..... *CreMATogaster*



Postpetiole that appears to attach dorsally to the gaster of *CreMATogaster*

19b. Gaster is not heart shaped; the postpetiole is attached to front (anterior) of gaster 20

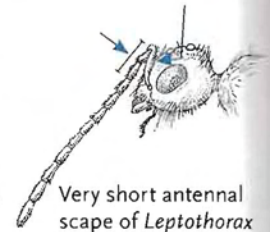
20a (19b). First segment of funiculus ringlike or nearly spherical (globose); Y-shaped grooves (Mayrian furrows) visible on top (dorsal surface) of the pronotum; simple eyes (ocelli) protrude noticeably from head *Solenopsis*



Globose or ringlike first funicular segment of *Solenopsis*

20b. First segment of funiculus cylindrical; Mayrian furrows absent; ocelli present but do not protrude from head..... 21

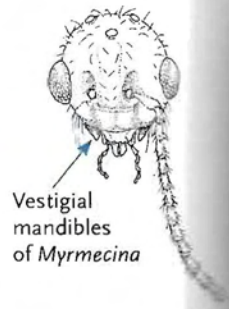
21a (20b). Antennal scape not longer than the sum of the lengths of the first 2 segments of the funiculus; antennal scrobe absent
..... *Leptothorax*



Very short antennal scape of *Leptothorax*

21b. Antennal scape longer than the sum of the lengths of the first 2 segments of the funiculus; antennal scrobe may be present or absent..... 22

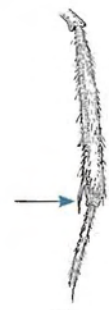
26a (25b). Mandibles absent or present only as short, toothless stubs; petiole cylindrical and barrel shaped when viewed from the side
 *Myrmecina*



Vestigial mandibles of *Myrmecina*

26b. Mandibles present; petiole triangular, with or without a pronounced peduncle..... 27

27a (26b). Tibial spurs on middle and hind legs with distinct teeth; antennae with a distinct 4- or 5-segmented club *Myrmica*

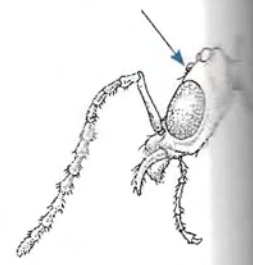


27b. Tibial spurs lacking distinct teeth; antennae without a distinct club 28



Pectinate tibial spur (top) and clubbed antenna (bottom) of *Myrmica*

28a (27b). Head viewed in profile distinctly flattened; eye as tall as the head
 *Aphaenogaster*



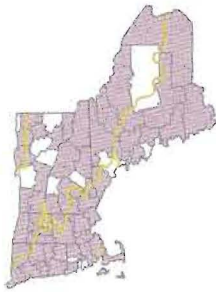
Flattened head of *Aphaenogaster*

28b. Head viewed in profile not distinctly flattened; eye not as tall as the head 29

Tapinoma sessile (Say, 1836)

*The Odorous House Ant

Refers to its gaster and concealed petiole: *sessilis* (Lat: stalkless)



Tapinoma

Habitat: Nests in shallow soil and under boards, rocks, debris, litter. Also found in commercial beehives and in damp spaces in houses near pipes, heaters, and drains, and under and around toilets.

Geographic range: United States and Canada.

Natural history: Because of its propensity to forage for sugar left on kitchen counters, *T. sessile* is one of the most common ants that you will see in New England. People often call it the sugar ant, but its official common name refers to the characteristic odor of rotten coconuts or over-ripe bananas it exudes when squeezed. Most *T. sessile* nests are outside; the workers on your counter are usually foraging along well-marked scent trails that can extend for tens of meters. But this species will also nest indoors, wherever there is enough moisture. *Tapinoma sessile* is not an aggressive ant, and some myrmecologists have hypothesized that its increasing abundance in houses and apartments has resulted from the use of insecticides to kill other species of ants that nest outside but near to houses. In addition, *T. sessile* will nest in bark mulch, which is used in suburban landscaping.

Tapinoma sessile colonies range from small to large and have one to many queens. These nests are not permanent; *Tapinoma* moves from one covered place to another every few days or so when food becomes locally scarce or when the nest is disturbed or damaged. In urban areas, however, it can form large supercolonies with multiple queens and many nests. This transition from a rural to an urban lifestyle among *T. sessile* has evolved at least four times in different parts of North America. *Tapinoma sessile* workers are scavengers, predators, and tenders of aphids and other scale insects. They forage alone but rapidly recruit nestmates to resources using scent trails.

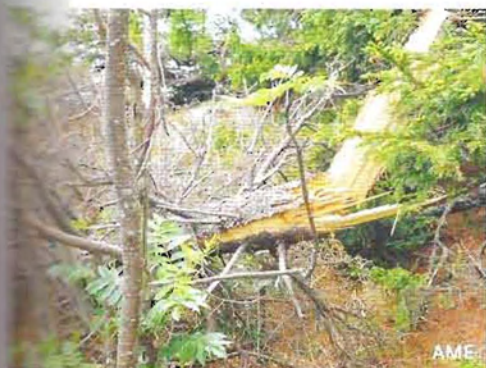
Look-alikes: *Brachymyrmex*, *Lasius*, unnamed species of *Tapinoma*; presence or absence of acidopore and petiolar scale distinguish the genera. The undescribed species of *Tapinoma* has no workers and

Camponotus herculeanus

(Linnaeus, 1758)

The Great Carpenter Ant

Refers to its size: *Herakles* (in Gk mythology, the son of Zeus and Alkmene; as a name, means great).

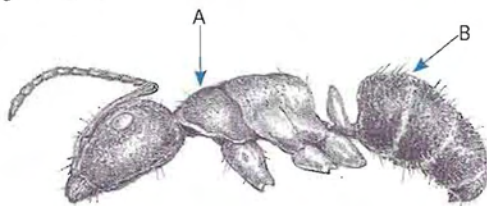
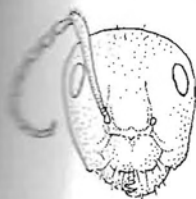
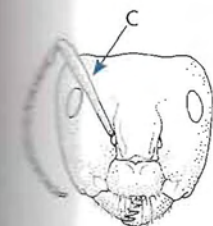


Habitat: Nests in living trees, stumps and logs, occasionally rotting beams and timbers in houses.

Geographic range: High latitudes around the world. In North America, in all the northern-tier states, in the Rocky Mountains and the Southwest at high elevations; rare in northern states with scant forests (e.g., North Dakota). In New England, common in the far north and at higher elevations; in central New England, found only in really cold spots, including Mount Washington and Mount Monadnock (New Hampshire).

Natural history: The most cold-tolerant ant species known, it can survive temperatures well below -40°C . Bears eat it in summer and fall; woodpeckers hunt for it in winter. Queens and males are produced in late summer, are fed and groomed throughout the winter, and emerge for mating flights on warm spring days. Multiple unrelated queens can coexist in a single nest.

Look-alikes: *Camponotus novaeboracensis*; color, shininess, pilosity distinguish them.

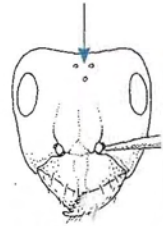


Distinguishing features:

- Mesosoma is black on top and front, red underneath and on legs (cf. *C. novaeboracensis*).
- Short gastral pubescence reveals microsculpturing.
- Scapes of largest majors are short, rarely reaching corners of head.

Key to the Species of *Formica*

1a. Top (posterior margin) of head distinctly concave; nests are large-sized mounds that can exceed 1 m in diameter (*exsecta* group) 2



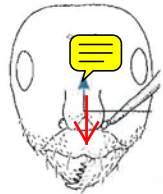
Concave head of the *exsecta* group

1b. Top (posterior margin) of head not distinctly concave; nests variable in size..... 3

2a (1a). Ant virtually hairless; head and mesosoma yellow-red, gaster dark..... *F. exsectoides*, p. 154

2b. Ant has many erect hairs; head dark on top, red below; mesosoma red, gaster black *F. ulkei*, p. 176

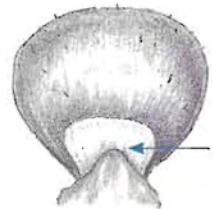
3a (1b). Clypeus notched; ant bicolored (head and mesosoma reddish orange, gaster dark); these ants are slave-makers (*sanguinea* group) 4



Notched clypeus of the *sanguinea* group

3b. Clypeus not notched; ant may be either concolorous or bicolored; these ants are free-living or temporary social parasites 8

4a (3a). Few (normally <6) very short (<0.06 mm) hairs or no erect hairs on dorsum or gaster; petiole large (broad), fan-shaped, and lacking erect hairs on its crest; this is a northern species found at high elevations in Massachusetts as well as throughout northern New England *F. aserva*, p. 148



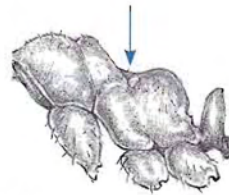
Hairless, fan-shaped petiole of *F. aserva*

4b. At least 6 hairs > 0.06 mm long on dorsum and gaster; petiole with at least a shallow notch at the crest and with 1 or more erect hairs on its crest 5

5a (4b). Erect hairs on the dorsum of the mesosoma and gaster short (0.06–0.14 mm), stiff, and bristlelike, usually flattened and blunt tipped or abruptly tapered; these ants enslave only ants in the *fusca* group 6

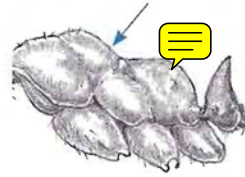
5b. Erect hairs on the dorsum long (0.10–0.25 mm), evenly tapering to the top; these ants enslave ants of many *Formica* groups.....7

6a (5a). Mesosoma saddle backed in profile; erect hairs absent on the propodeum; crest of petiole blunt in profile *F. subintegra*, p. 174



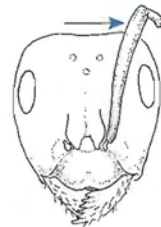
Saddle-backed mesosoma of *F. subintegra*

6b. Mesosoma more curvaceous in profile; erect hairs present on the propodeum; crest of petiole sharp..... *F. rubicunda*, p. 172



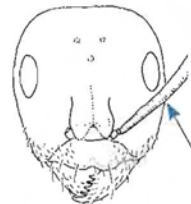
Curvaceous mesosoma of *F. rubicunda*

7a (5b). Head at least as broad as it is long, usually broader; scape shorter than the length of the head; erect hairs on the gaster ≥ 0.13 mm long; hairs on the second gastral tergites dense and closely packed (separated by a distance less than their own length); this ant enslaves *neogagates*, *pallidefulva*, and *fusca*-group ants; it is widespread throughout New England.....
..... *F. pergandei*, p. 168



Face of *F. pergandei*, wider than long, and scape shorter than head

7b. Head distinctly longer than it is broad; the antennal scape is longer than the length of the head; erect hairs on the gaster < 0.13 mm long; erect hairs on the second gastral tergite separated by at least 0.1 mm (longer than the lengths of the hairs themselves); this ant enslaves *neogagates*-group ants; it is a Midwestern species rarely collected in New England..... *F. creightoni*, p. 149



Face of *F. creightoni*, longer than wide, and scape longer than head



14a (13b). Promesonotum usually lacking hairs; dense silvery pubescence on segments 1–2, fading on segment 3; this ant is found in boreal, cold climates *F. glacialis*, p. 155

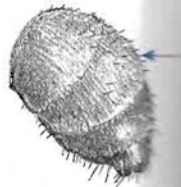
14b. Promesonotum usually with erect hairs; silvery pubescence prominent on segments 1–3; this ant extends into warmer climates.....
..... *F. podzolica*, p. 169

15a (8b). Brown-to-black concolorous ants.....
.....(*neogagates* group) 16
15b. Yellow-to-red concolorous or bicolored ants (head and mesosoma red or yellowish red, gaster brown to black) 17

16a (15a). An ant of open fields; at least 3 white, erect hairs on scape (not including hairs at the junction of the scape and the funiculus).....
..... *F. lasioides*, p. 161

16b. An ant of forests; no (or rarely 1–2) erect hairs on scape; this ant is brown, smooth, and shiny..... *F. neogagates*, p. 163

17a (15b). Large yellow-to-red or reddish-brown, mostly concolorous, shiny ants; eyes large (eye nearly as long as cheek); top of the head strongly rounded; body long and slender (mesosoma nearly 2× as long as high).....
..... (*pallidefulva* group) 18



Dense silvery pubescence on the first two gaster segments of *F. glacialis*



At least three erect, white hairs on the scape of *F. lasioides*

20a (17b). Middle and hind tibiae of workers with 2 rows of white, erect hairs on their inner surfaces; the head is distinctly longer than broad; the top (posterior) of the head is rounded and evenly convex.....
*F. morsei*, p. 162

20b. Middle and hind tibiae of workers (and queens) with 2 or more rows of black or copper-colored erect hairs (rarely white); head proportions vary from broader than long to longer than broad; posterior head shape rounded to more square..... 21

21a (20b). Middle and hind tibiae of workers and queens with 2 rows of erect hairs on their inner surface 22

21b. Middle and hind tibiae of workers and queens with hairs on all surfaces 27

22a (21a). Erect hairs absent on the dorsum of the mesosoma and also absent on the top edge (posterior margin) of the head 23

22b. Erect hairs present at least on the dorsum of the pronotum, often elsewhere on the mesosoma; erect hairs present or absent on the posterior margin of the head 24



Many erect hairs on all surfaces of the hind tibiae of *F. dirksi*, *F. impexa*, *F. knighti*, *F. nepticula*, and *F. obscuriventris*

26a (25b). Erect hairs present on the corners of the head..... *F. difficilis*, p. 151



Erect hairs at the corners of the head of *F. difficilis*

26b. Erect hairs absent on the corners of the head *F. querquetulana*, p. 170

27a (21b). A few erect hairs on the compound eyes (visible at 25–50 \times) and scapes; dense, copper-colored hairs on the mesosoma and gaster, overlaying dense gray to silvery pubescence; there is often a splotch of yellow color on the anterior part of the gaster *F. knighti*, p. 160



Erect hairs on the compound eyes of *F. knighti*

27b. No hairs on the compound eyes; hairs on body not copper colored; no yellow splotches on the gaster 28

28a (27b). Hairs on pronotum sharp and tapered (thinner at the top than at the bottom); queens at least as large as the largest worker; body very hairy *F. obscuriventris*, p. 166



Sharp hairs of the *rufus* group

28b. Hairs on pronotum blunt, clublike (clavate), or spoon-like (spatulate), wider at the top than at the bottom; queens smaller than the largest worker 29



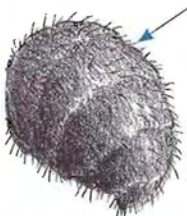
Blunt hairs of the *microgaster* group

29a (28b). Gaster with very short and sparse pubescence that does not hide the surface sculpturing; this is a shiny ant with a dark red to burgundy-colored head and mesosoma and a black gaster; workers have many erect hairs on the antennal scape, but queens have at most 3–5 erect hairs on the scape.....
 *F. nepticula*, p. 165



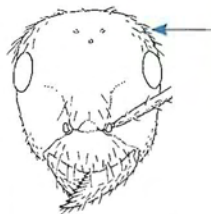
Shiny, nearly hairless gaster of *F. nepticula*

29b. Gaster with long and dense pubescence that hides the surface sculpturing; this is a dull-surfaced ant with a red or yellow head and mesosoma and a brown or black gaster; both workers and queens have many blunt-tipped, erect hairs on the antennal scape..... 30



Hairy, matte, hairy gaster of *F. impexa* and *F. dirksi*

30a (29b). Queen with flattened or horizontal erect hairs on the upper corners of the head; mandibles with 8 teeth; workers with many erect hairs all across the top of the head; erect hairs on legs whitish or pale yellow.....
 *F. impexa*, p. 157



Flattened hairs at head corners of *F. impexa* (queen)



Formica lasioides Emery, 1893

The Fuzzy *Formica*

Refers to *Lasius niger*, the European Black Fuzzy Ant: *lasios* (Gk: hairy, fuzzy) + *-oides* (Gk: resembling).

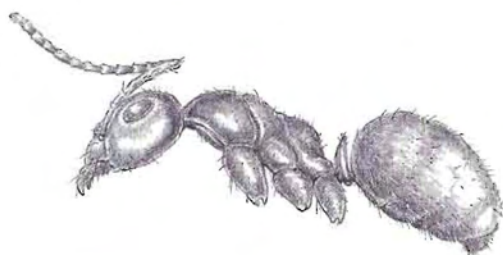
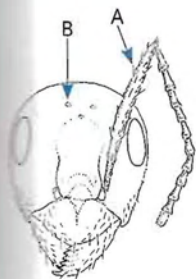


Habitat: Open fields; makes inconspicuous nests in soil or under small rocks and grass clumps.

Geographic range: Throughout northern North America and Canada.

Natural history: Enslaved by *Formica pergandei* and *F. creightoni*.

Look-alikes: *Formica neogagates*, *Prenolepis imparis*; habitat and scape hairs distinguish the two *Formica* species; presence of ocelli and robust mesosoma eliminates *P. imparis*.



Distinguishing features:

A. Scape with at least 3 erect hairs (cf. *F. neogagates*)

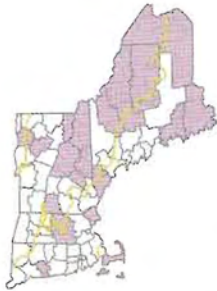
B. Ocelli apparent (cf. *Prenolepis imparis*)

Formica

Formica neorufibarbis Emery, 1893

The New World Red-bearded Ant

Refers to its red cheeks: *neo-* (Gk: new [New World] + *rufus* (Lat: red) + *barba* (Lat: beard, hair).

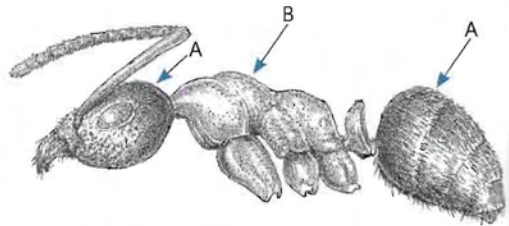
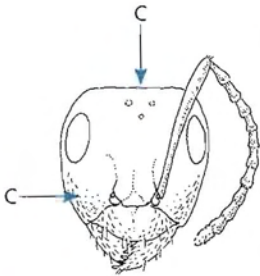


Habitat: Nests in dead wood and under rocks, in *Sphagnum* moss in peatlands.

Geographic range: Across North America: Alaska south to Arizona east to Newfoundland. Widespread in New England.

Natural history: One of the most cold-tolerant ants in North America is found up to the edge of the taiga in northern Canada. Occasionally enslaved by *F. aserva*.

Look-alikes: *Formica hewitti*, *F. ulkei*. Red color on the body and few hairs eliminate *F. hewitti*; a flat-topped head identifies *F. neorufibarbis* which is also free-living, unlike the concave-headed, socially parasitic *F. ulkei*.



Distinguishing features:

- A. Bicolored: head and gaster dark, mesosoma dark red
- B. Faint silvery pubescence, few erect hairs (cf. *F. hewitti*)
- C. Head flat; hairy cheeks with elongate punctures (cf. *F. ulkei*)

Formica

Formica querquetulana

Kennedy and Dennis, 1937

The Oak-grove Ant

Refers to its type habitat: *querquetum* (Lat: oak forest).

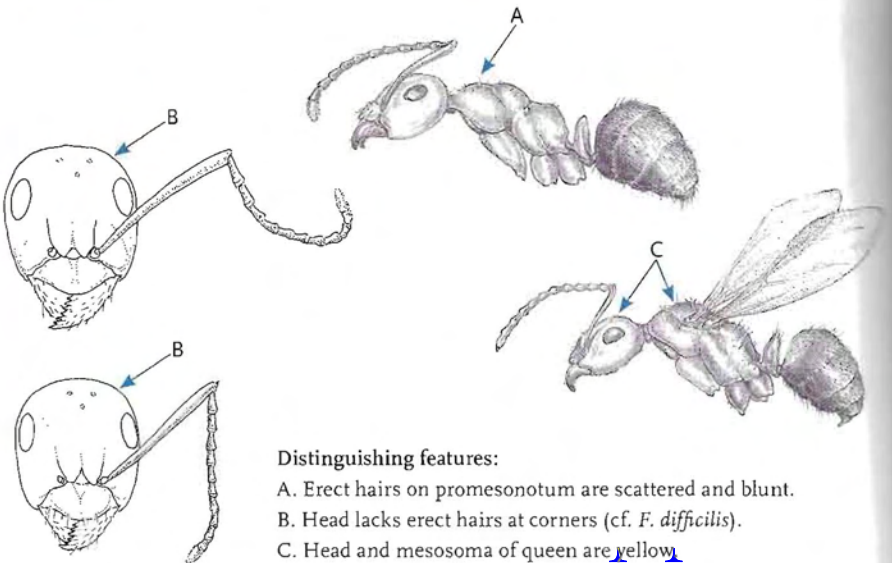


Habitat: Very dry, sandy soils in oak woodlands, open pine barrens, shrublands. Nests under leaves, rocks, other debris.

Geographic range: New England to the Midwestern states.

Natural history: One of the most commonly collected *F. microgyna*-group species in New England. Forms polygynous colonies of 1,000–5,000 workers. A temporary social parasite of *pallidefulva*-group species. Queens and males are produced late June–early July.

Look-alikes: *Formica difficilis*; *F. querquetulana* lacks erect hairs at the corners of its head.



Distinguishing features:

- A. Erect hairs on pronotum are scattered and blunt.
- B. Head lacks erect hairs at corners (cf. *F. difficilis*).
- C. Head and mesosoma of queen are yellow.

Formica

Formica rubicunda Emery, 1893

The Ruddy Slave-making Ant

Refers to its color: *rubicundus* (Lat: ruddy, reddish, red).

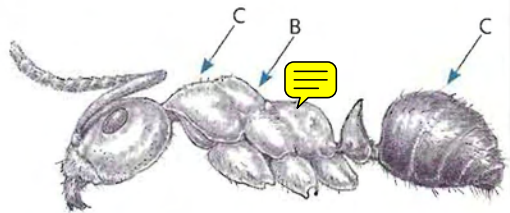
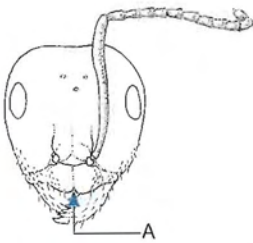


Habitat: Nests in soil or under rocks in many open habitats. Its small mound nests are often topped with gravel or other debris.

Geographic range: Quebec and Ontario south to the Carolinas; western Montana, New Mexico. In New England, predominantly on the coastal plain: Down East Maine to southern Rhode Island.

Natural history: Enslaves *Formica fusca*-group species.

Look-alikes: *Formica pergandei*, *F. subintegra*: promesonotal hair length and density, body color, and especially mesosomal profile distinguish these species.



Distinguishing features:

A. Clypeal notch deep (cf. *F. subintegra*)

B. Mesosoma curved in profile (cf. *F. subintegra*)

C. Hairs on promesonotum and gaster short, bristly (cf. *F. pergandei*)

An undescribed species of *Formica* that is closely related to *Formica fossiceps*

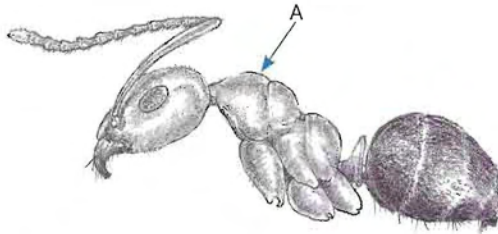
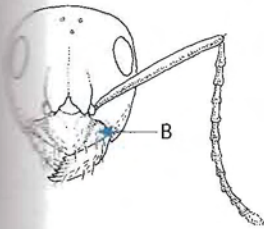


Habitat: Blueberry barrens and woodland edges.

Geographic range: Unknown. Collected so far from Down East Maine and Prince Edward Island.

Natural history: Unstudied. Its namesake makes small mound-shaped nests using leaf litter and other plant parts, and maintains extensive foraging trails.

Look-alikes: *Formica integra*, *F. obscuriventris*; hairlessness eliminates *F. obscuriventris*. The pinched clypeus of *F. cf. fossiceps* is distinctive and is the origin of the name *fossiceps*—from the Latin *fossatus*, meaning dug, + the combination form *-iceps*, referring to its head.



Distinguishing features:

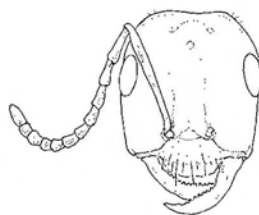
A. Body nearly hairless (cf. *F. obscuriventris*)

B. Sides of the clypeus pinched (cf. *F. integra*)

Polyergus Latreille, 1804

The Hard-working Ants

From the Greek *poly*, meaning very, much, or many, + *ergos*, meaning work



Polyergus species commonly have been called Amazon ants in reference to the mythical ancient warrior women, but they are found neither in Amazonia nor anywhere else in the tropics. Until very recently, this small genus included three Eurasian and two North American species. As we were writing this book, James Trager was revising our understanding of this genus, and he is in the process of describing ~~at least a dozen~~ other North American species!

Within the subfamily Formicinae, *Polyergus* species uniquely possess sickle-shaped mandibles that lack teeth, but the mandibles do have fine serrated edges on their inner border. *Polyergus* species enslave workers of a wide variety of *Formica* species, mostly in the *fusca* and *pallidefulva* groups, and to varying degrees of specificity. Our three New England species, *P. lucidus*, *P. montivagus*, and *P. cf. longicornis*, enslave *Formica incerta*, *F. pallidefulva*, and *F. dolosa*, respectively. These “hard-working” ants neither rear their own brood nor feed themselves; rather, they steal brood from the nests of their hosts, which mature in the *Polyergus* nest under the care of *Formica* workers already living there and doing all the usual work that keeps a colony of ants functioning. The only time hard work is done by *Polyergus* is when all of the dozens to hundreds of *Polyergus* workers in a single colony leave the nest on a highly concerted brood-pillaging excursion to a nearby host *Formica* nest. The length, pace, and efficiency of these spectacular summer afternoon raids truly are sights to behold.

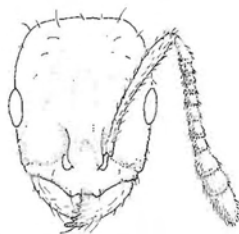
Identifying the Species of *Polyergus*

We follow Trager in recognizing three species in the New England area. The three *Polyergus* species are distinguished by the number of erect hairs on their heads: *P. montivagus* has fewer than 5, *P. lucidus* 5–10, and *P. cf. longicornis* at least 20. Note that the erect hairs may be lost during the adult life of the ant or after some time in a collection. However, each hair arises from a conspicuous black- or brown-rimmed socket that can be seen at 25x or greater magnification, so the hair counts mentioned in the key that follows refer to the total number of erect hairs plus the number of empty sockets. Each of our three species also enslaves only a single species in the *Formica pallidefulva* group, so it is important to collect and identify the host along with the slave-maker. As of 2011, only *P. lucidus* and *P. cf. longicornis* have

Monomorium Mayr, 1855

The One-Segmented Ants

From the Greek *monos*, meaning one, + *morion*, referring to a member or segment, here, of the maxillary palp



Monomorium is a very diverse genus; nearly 600 species have been described, and approximately 400 species are currently recognized as valid. Fortunately for us, fewer than 20 species of *Monomorium* can be found in North America. Of these, only 4 are known from New England, 2—*M. pharaonis* and *M. floricola*—are tropical tramp species, and only 1, *Monomorium emarginatum*, is commonly collected in the field.

This genus is very easy to identify. *Monomorium* is nearly unique among New England Myrmicinae in that it lacks propodeal spines; our only other spineless Myrmicinae genus is *Solenopsis*. But our native *Monomorium* species have 12-segmented antennae with 3-segmented clubs and are dark green to jet black. In contrast, our *Solenopsis* species have 10-segmented antennae with 2-segmented clubs and are brownish yellow or lemon yellow in color. In describing the genus, Gustav Mayr named it for its one-segmented maxillary palp; he explicitly stated that the name is “in Beziehung auf die Kiefertaster” (in reference to the maxillary palp). Although the type species (*M. monomorium*) and our occasional *M. floricola* indeed have 1-segmented maxillary palps, our other New England *Monomorium* species have 2-segmented maxillary palps. In some Malagasy species, the maxillary palps may have 3 or even 5 segments.

Identifying the Species of *Monomorium*

Only one species of *Monomorium*—*M. emarginatum*—is common throughout New England. It is dark black in color and is distinguished from *M. viride* by the greater length of the sloping posterior surface (the declivity) of its propodeum relative to the shorter dorsal surface. In *M. viride*, the dorsal surface is longer than the declivity. Furthermore, *M. viride* is a warm-climate species that is restricted to pure sand and has been collected so far only in the pine barrens of Massachusetts and southwestern Rhode Island. In contrast, *M. emarginatum* is much less particular about its nesting sites, although it also prefers sandy soils; it has been collected throughout New England, as far north as central Maine. The two other species are exotic, tropical species that survive only indoors in New England. The Pharaoh Ant, *M. pharaonis*, is easily identified by its overall yellow to light brown or reddish and black-tipped gaster, whereas *M. floricola* is bicolored, with a dark head and gaster and a light brown mesosoma.

Key to the Species of *Monomorium*

- 1a. These ants are concolorous, dark green to black 2
- 1b. These ants are bicolored or concolorous, but if they are concolorous, they are yellow to light brown and have a black-tipped or entirely black gaster 3

2a (1a). The length of the dorsal surface of the propodeum is shorter than the length of the sloping posterior surface of the propodeum (the declivity); the ant's body is black; it is widespread throughout New England.....
 *M. emarginatum*, p. 255



Relatively long declivity
M. emarginatum

2b. The length of the dorsal surface of the propodeum is longer than the length of the declivity; the ant's body is dark green to black; it nests only in pure, sandy soils
 *M. viride*, p. 258



Relatively short declivity
M. viride

- 3a (1b). The ant is uniformly yellow-red or light brown except for the gaster, which is dark brown or black at least at the tip, or throughout *M. pharaonis*, p. 257
- 3b. The ant is bicolored, with a dark head and gaster and a light brown mesosoma..... *M. floricola*, p. 256

Monomorium emarginatum DuBois, 1986

The Furrowed *Monomorium*

Refers to its furrowed (emarginate) mesonotum.

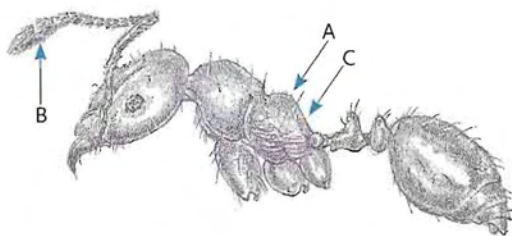
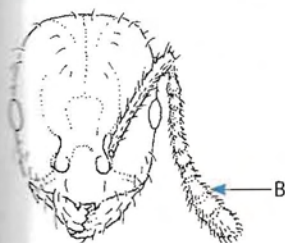


Habitat: Open areas in sandy or sandy-clayey soils.

Geographic range: Northeastern United States south to Virginia.

Natural history: Little is known of this species because it was identified as a unique species only 25 years ago. It makes small crater nests in open habitats. Colonies vary in size and are frequently polygynous. The omnivorous workers forage during the day and use scent trails to direct nestmates to good food supplies.

Look-alikes: *Monomorium viride*, *Solenopsis*; antennal segments and clubs distinguish the genera; dorsum-to-declivity ratio of the propodeum distinguishes the species.



Distinguishing features:

- A. Propodeum without spines
- B. Antenna 12 segmented with 3-segmented club (cf. *Solenopsis*)
- C. Length of propodeal posterior surface < declivity (cf. *M. viride*)

Monomorium

Monomorium floricola (Jerdon, 1851)

The Flower Ant

Refers to the flowers from which it was first collected: *floris* (Lat: flowers) + *-i(n)cola* (Lat: one who dwells in).

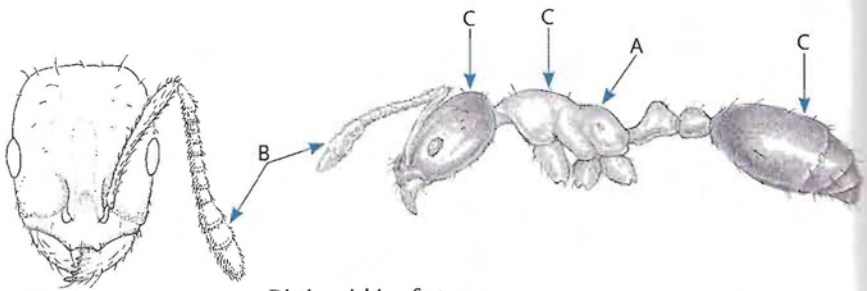


Habitat: Nests in hollow twigs and branches, under bark, and in dead plant stems in its native, tropical habitats. In New England, *Monomorium floricola* turns up hiding inside the hollow stems of sugarcane imported from tropical countries and sold in food markets, and it can survive only in heated structures.

Geographic range: Native to Asia; now worldwide in tropical regions.

Natural history: A tropical tramp. Queens of *M. floricola* are wingless. New colonies are formed by fission and fragmentation of larger colonies. The species' ability to make nests in very small spaces has undoubtedly helped it disperse widely.

Look-alikes: Unmistakable; we have no other similarly colored, tiny ant.



Distinguishing features:

- A. Propodeum without spines
- B. Antenna 12 segmented with 3-segmented club (cf. *Solenopsis*)
- C. Bicolored (cf. *M. emarginatum*, *M. viride*); dark head and gaster, light mesosoma

Monomorium viride Brown, 1943

The Green *Monomorium*

Refers to its color: *viridis* (Lat: green).



Habitat: Nests in open pine barrens, only in pure sand.

Geographic range: Eastern United States: Kingston, Rhode Island; Myles Standish State Forest and Cape Cod, Massachusetts; New Jersey Pine Barrens; coastal Georgia and Florida.

Natural history: Little is known of this species because it is geographically restricted in its distribution and has been confused with other *Monomorium* species. In the pine barrens of New Jersey and on Long Island, *M. viride* forms enormous polygynous colonies with large craterlike openings. Queens with and without wings are produced, but it is not known if there is any adaptive reason for producing these two types of queens.

Look-alikes: *Monomorium emarginatum*, *Solenopsis*; antennal segments and club distinguish the genera; propodeum dorsum-to-declivity ratio distinguishes the species. Queens of *M. viride* are more brown than green, and the queen's head and mesosoma are noticeably sculptured.



Distinguishing features:

- A. Propodeum without spines
- B. Antenna 12 segmented with 3-segmented club (cf. *Solenopsis*)
- C. Length of propodeal posterior surface > declivity (cf. *M. emarginatum*)

in New England, so identifying the species group is the same as identifying the species. Otherwise, once the species group has been identified, we look to the clypeus, propodeal spines, and habitat to distinguish among species within groups of the antennal bend curved category. We also use sizes and shapes of the processes, lobes, and flanges decorating the antennal bend itself to distinguish species within groups of the antennal bend angular category. The variation in shape, form, and sculptured processes visible on the scape is best seen on pinned specimens viewed at 25–50× under a dissecting microscope.

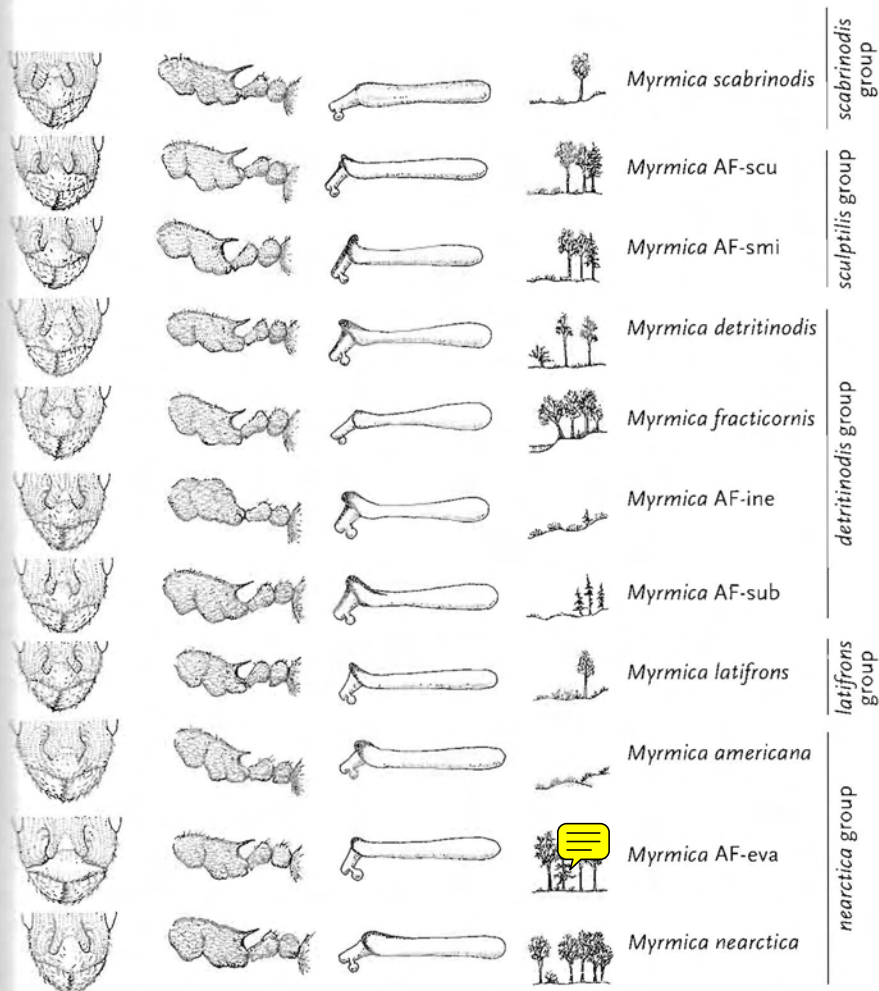
Once again, we start with the groups in the antennal bend curved category. Many of these species are habitat specialists, which can often help you make a reliable species determination if you got the species group right.

The *incompleta* group—If you are in a deciduous forest, you most likely have *M. incompleta*, which also has a bulging clypeus with a straight to concave anterior margin and netlike rugae on the top of its head. If you are in a boreal forest in Maine or near the tree line in the mountains of Vermont or New Hampshire, you most likely have *M. alaskensis*, which has a convex margin on its flattened clypeus and very parallel rugae on the top of its head. The other two species in this group are inquiline social parasites of *M. alaskensis* that produce only queens and males and are distinguished by the size and shape of the process protruding from the bottom of their petiole. The process below the petiole of *M. quebecensis* is long and rectangular, whereas the process below the petiole of *M. lampra* is conically shaped. Neither of these parasitic species has much sculpturing, but of the two, *M. lampra* has virtually none at all, whereas *M. quebecensis* has light sculpturing. To date, *M. alaskensis* has been collected only in Maine, but neither *M. lampra* nor *M. quebecensis* has yet been collected in New England.

The *lobifrons* group—The two species in the *lobifrons* group are best distinguished by habitat, clypeus, and propodeal spines. *Myrmica lobifrons* is a bog specialist with a deeply notched clypeus and long propodeal spines that curve downward at their tips. *Myrmica brevispinosa* is a boreal species known in New England up to now only from the White Mountains of New Hampshire and Down East Maine. It has a shallowly notched clypeus and short spines that point straight upward.

The *punctiventris* group—The three species in this group are distinguished by characteristics of their propodeal spines. *Myrmica punctiventris* has long, wavy spines that are reminiscent of the curving horns of a long-horned steer. The spines are much longer than the distance separating their tips. In contrast, *M. pinetorum* has shorter spines that point straight upward at an angle of approximately 45°, and these spines are only as long as, but usually shorter than, the distance separating their tips. Finally, *M. semiparasitica* is a temporary social parasite of *M. punctiventris*. It has very short propodeal spines with large, thick bases and small teeth along their



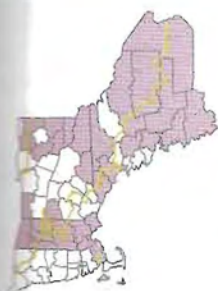


species in this group are distinguished by the lamina at the bend of the scape—small in *M. sp. AF-scu*, large in *M. sp. AF-smi*—and by whether the frontal lobes cover the antennal insertion (*M. sp. AF-scu*) or not (*M. sp. AF-smi*). The antennal scape tapers toward its base (toward the head) in the *detritinodis* group but is untapered in the *latifrons* and *nearctica* groups. In the *detritinodis* group the species are distinguished by the size of the lamina at the antennal bend (small in *M. fracticornis*, large in *M. sp. AF-sub*, and intermediate in *M. detritinodis* and *M. sp. AF-ine*), the presence or absence of propodeal spines (absent in *M. sp. AF-ine*), and habitat (*M. detritinodis* in northern forests and open woodlands; *M. fracticornis* in moist forests and wet meadows and at streamsides and riversides; *M. sp. AF-sub* in boreal forest and tundra; and *M. sp. AF-ine* in areas about which we are uncertain because it has so far been collected only in a blueberry barren). The *latifrons* and *nearctica* groups are distinguished by the shape of the lower surface of

Myrmica detritinodis Wheeler, 1917

The Eroded or Detrital Ant

Refers to its unsculptured petiole or its habitat: *detritus* (Lat: worn away or of the Earth).

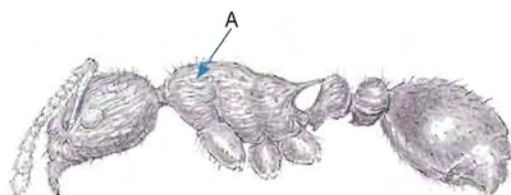


Habitat: Boreal cool coniferous and mixed deciduous forests; nests in soil, under moss, or under moist lichens.

Geographic range: Throughout Canada, Alaska, the upper Midwestern United States; west to North Dakota; high elevations in the western mountains south into New Mexico.

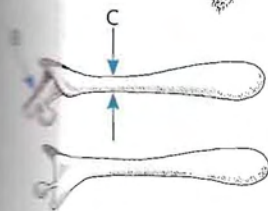
Natural history: A good indicator of mature forests, it also nests in clear-cuts, recent fire scars, and other disturbed areas if competitively dominant ant species are absent.

Look-alikes: *M. fracticornis*; size of the antennal lamina and sculpturing on the petiole distinguish them. Favored habitats differ, but they will co-occur.



Distinguishing features:

- A. Mesosomal rugae wavy, anastomosed, triangular in cross section
- B. Scape sharply bent to insertion; lamina continues down scape base
- C. Scape tapered basally (cf. *M. nearctica* group)

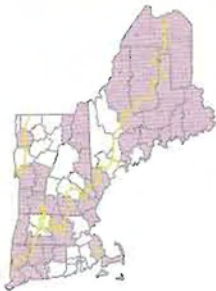


Myrmica

Myrmica fracticornis Forel, 1901

The Broken-horned Ant

Refers to the angled base of its antenna: *fractus* (Lat: broken) + *cornu* (Lat: horn).

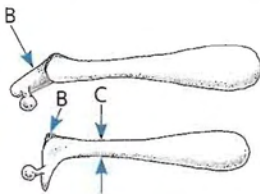
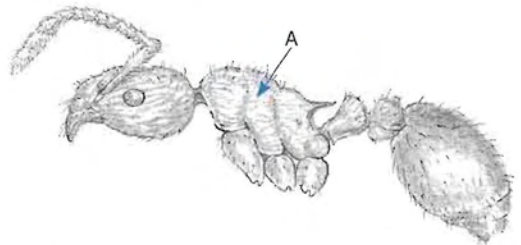
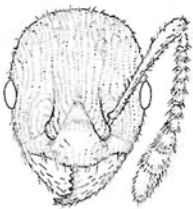


Habitat: Nests in moist soils of shrubby woodlands, forest edges, stream margins, and river banks.

Geographic range: Eastern Canada south to Tennessee; geographically separated (disjunct) records from the Ozark Mountains west to the Rocky Mountains.

Natural history: Feeds on honeydew from tended aphids and lacewings.

Look-alikes: *M. detritinodis*; size of antennal lamina and sculpturing on petiole distinguish them. Favored habitats differ, but they will co-occur.



Distinguishing features:

A. Mesosomal rugae wavy, anastomosed, triangular in cross section

B. Scape sharply bent to insertion; small lamina not extended down the base of the scape

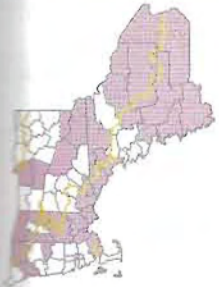
C. Scape tapered basally (cf. *M. nearctica* group)

Myrmica

Myrmica incompleta Provancher, 1881

The Incomplete Ant

Named for the incomplete ridges on the wings at the base of the propodeum.

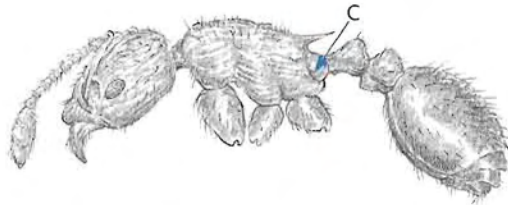
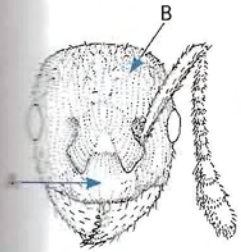


Habitat: Deciduous forests; nests in moist soil and moss mounds.

Geographic range: Canada and Alaska; lower United States south to New Jersey; west to Nevada.

Natural history: Feeds on honeydew of root-feeding aphids and scale insects. Host of the trophic parasite *Formicoxenus provancheri*. Brood preyed on by larvae of the myrmecophilous syrphid fly *Microdon albicomatus*, which live in *M. incompleta* nests.

Look-alikes: *Myrmica alaskensis*; a concave clypeal margin, bulging clypeus, and netlike rugae on the head identify *M. incompleta*.



Distinguishing features:

A. Clypeus bulges out; clypeal margin is even or shallowly concave.

B. Rugae atop the head are netlike.

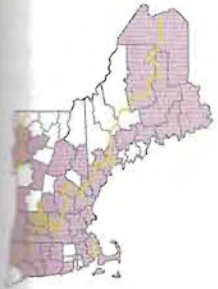
C. Basal propodeal ridge does not reach bottom of propodeal wing.

Myrmica

Myrmica punctiventris Roger, 1863

The Punctured Ant

Refers to the punctate hairs on its gaster: *punctus* (Lat: pricked, punctured) + *ventris* (Lat: belly).

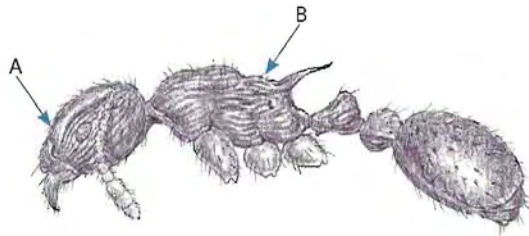
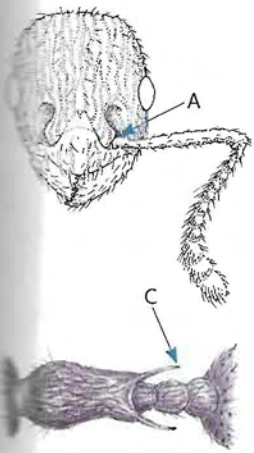


Habita: Mixed deciduous forests; nests under bark of standing and fallen dead trees, in rotten logs and leaf litter, in soil under rocks, and in empty shells of nuts.

Geographic range: New England and Quebec south to Georgia; west to Arkansas, Nebraska.

Natural history: Our most common forest-dwelling *Myrmica*; an important disperser of seeds of spring-flowering forest herbs.

Look-alikes: *Myrmica pinetorum*, *M. rubra*; larger frontal lobes and stepped-down pronotum eliminate *M. rubra*. The propodeal spines of *M. punctiventris* are long and wavy, like the horns of a long-horned steer, and the spines are longer than the distance between their bases; its frontal lobes are angled up, revealing the antennal bases.



Distinguishing features:

A. Scape gently curved to insertion; insertions not covered by frontal lobes

B. Propodeum lower than promesonotum (cf. *M. incompleta* group)

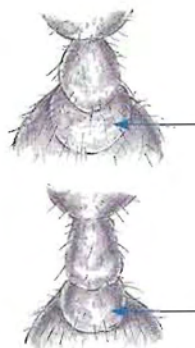
C. Propodeal spine length > distance between them (cf. *M. pinetorum*)

Myrmica

(the common Weeping Fig tree that grows in shopping malls and pizza shops) that was purchased at a Stop & Shop market in Cheshire, Connecticut, on September 1, 1987. The label also notes that the plant (and presumably the colony of *S. invicta*) was shipped to Connecticut from the Republic Nursery of Wauchula, Florida. Because potted plants and bark mulch for landscaping are regularly shipped from the southeastern United States to New England, *S. invicta* will probably show up again here. But until climatic change eliminates our winters entirely, *S. invicta* will probably not survive here. In the meantime, you can distinguish *S. invicta* from our two native *Solenopsis* species by the presence of a single long hair (seta) projecting from a triangular, toothlike structure in the center of the lower (anterior) margin of its clypeus.

Key to the Species of *Solenopsis*

- 1. In dorsal view, the postpetiole is noticeably wider than the petiole; in profile view, the summit of the petiole is relatively narrow; the ant is yellow-brown and nests in a wide variety of soils but never in pure sand..... *S. molesta*, p. 314
- 2. In dorsal view, the postpetiole is approximately as wide as the petiole; in profile view, the summit of the petiole is relatively broad; this is a lemon-yellow ant that nests only in pure sand..... *S. cf. texana*, p. 319



Wide postpetiole of *Solenopsis molesta* (top) versus narrow postpetiole of *Solenopsis cf. texana* (bottom)

Easily Confused Species

Both *Solenopsis* and *Monomorium* lack propodeal spines, but these genera can be distinguished by their two- or three-segmented antennal clubs: *Solenopsis* has a two-segmented club, whereas *Monomorium* has a three-segmented club.

Solenopsis

An undescribed species of *Solenopsis* that is closely related to *Solenopsis texana* ■

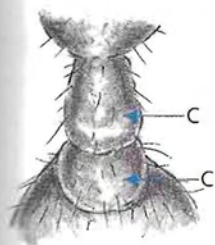
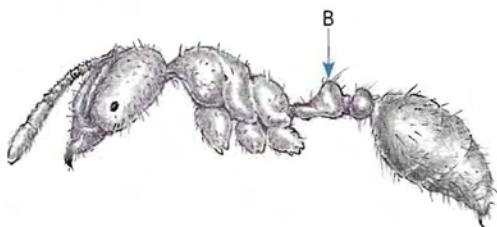
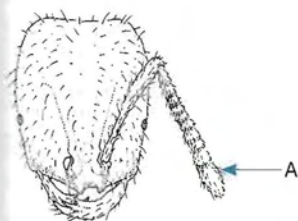


Habitat: Pure sand in pine barrens.

Geographic range: Unknown. Recorded from Nantucket Island, Martha's Vineyard, and south central Massachusetts. A fuller assessment of its range awaits a revision of the *Diplorhoptrum* group.

Natural history: Like other thief ants, *S. cf. texana* often nests with or near a wide variety of other ant species, from which it steals food and perhaps brood.

Look-alikes: *Solenopsis molesta*; petiolar and postpetiolar size and shape, habitat, and color distinguish them.



Distinguishing features:

A. Antennae 10 segmented with 2-segmented clubs (cf. *Monomorium*)

B. Petiole with a broad profile (cf. *S. molesta*)

C. Postpetiole and petiole \pm equal in width (cf. *S. cf. texana*)

Temnothorax Mayr, 1861

The Divided Ants

From the Greek *temno*, meaning cut or divided, + *thorax* and referring to the constriction between the ant's mesonotum and metanotum

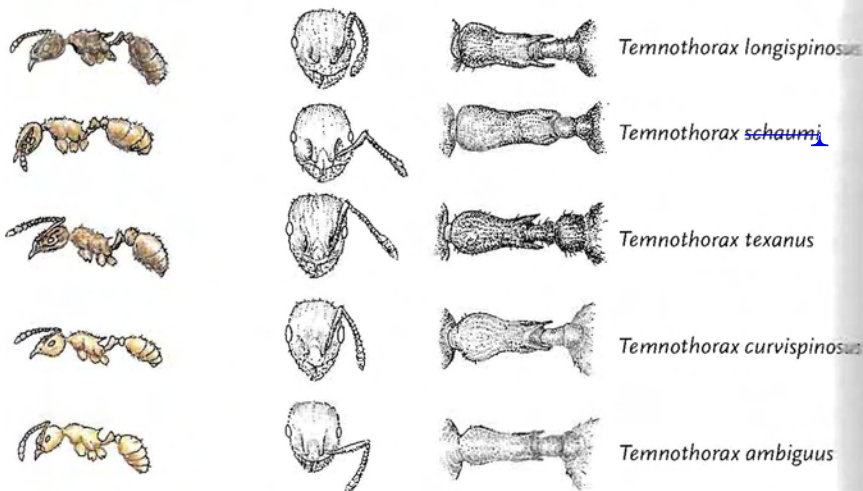


Once considered part of *Leptothorax*, the diverse genus *Temnothorax* includes nearly 400 species, the majority of the ant tribe Leptothoracini. *Temnothorax* species live all over the world in boreal, temperate, and tropical climates. There are approximately 50 species in North America, 5 of which occur in New England. Although *Temnothorax* was named for a constriction between the second and third segments of its thorax, this constriction is rarely apparent. Instead, *Temnothorax* can be distinguished from the other Leptothoracini (*Cardiocondyla*, *Formicoxenus*, *Harpagoxenus*, *Leptothorax*, and *Protomognathus*) by its distinctively pedunculate petiole, its five-toothed mandibles, and the lack of any impression or suture between the mesonotum and the metanotum.

Identifying the Species of *Temnothorax*

Three species of *Temnothorax*—*T. ambiguus*, *T. curvispinosus*, and *T. longispinosus*—are common in New England. *Temnothorax longispinosus* is the largest and most widespread of our *Temnothorax* species (its workers are nearly 3 mm long). It has very long propodeal spines, and its dark brown to black color is distinctive. The two yellow-orange *Temnothorax* species, *T. ambiguus* and *T. curvispinosus*, are distinctively colored and can be separated by their short and widely spaced (*T. ambiguus*) or long, curved, and narrowly spaced (*T. curvispinosus*) propodeal spines. *Temnothorax curvispinosus* also has a dark blotch or strip on its gaster that can be seen in the field using a low-power (5× or 10×) hand lens. The last two species, *T. texanus* and *T. schaumii* are warm-climate species restricted to southern New England. *Temnothorax texanus* has an unusually wide postpetiole. *Temnothorax schaumii* has unusually short propodeal spines and nests under the bark of old oak trees.

The matrix key on p. 324 illustrates five morphological characters that can be used to separate the five New England *Temnothorax* species. Each species is shown in profile; the size shown is approximately 10 times the size of a worker, and the colors illustrate differences ranging from black to orange-yellow. The species are ordered by size, from largest to smallest. The primary character to look at on the head is the number of segments on the antenna (12 in *T. texanus*, 11 in all the other New England *Temnothorax*



species). Next, look at spines and the pedicel from above. The black *T. longispinosus* has long propodeal spines, whereas the dark *T. schaumii* has very short propodeal spines. The spines of *T. texanus* are intermediate in length, but unlike the other four species, it has a postpetiole that is much wider (more than 1.5 times wider) than the petiole. Finally, the two yellow-orange species have either short, widely set propodeal spines (*T. ambiguus*) or long, close-set propodeal spines (*T. curvispinosus*).

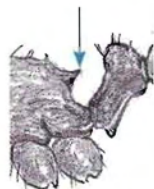
Key to the Species of *Temnothorax*

- 1a. The postpetiole is massive—its width is $\geq 1.5\times$ the width of the petiole; this ant has antennae with 12 segments; it is roughly sculptured, with rugae on the head, mesosoma, petiole, and postpetiole; its gaster is smooth and glossy; its color is dark brown or black *T. texanus*, p. 330
- 1b. The postpetiole is $< 1.25\times$ the width of the petiole; these ants have antennae with 11 segments; their colors are black or orange-yellow 2



Very wide postpetiole of *T. texanus*

- 2a (1b). Head covered with fine lines (striae); propodeal spines short, with their length $<$ half the distance between their bases; the ant's color is normally dark brown *T. schaumii*, p. 329



Short propodeal spines of *T. schaumii*

Temnothorax longispinosus (Roger, 1863)

The Long-spined *Temnothorax*

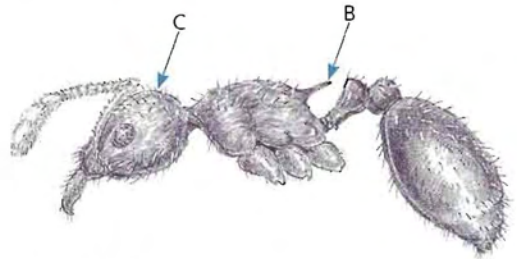
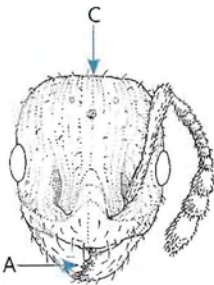
Refers to its propodeal spines: *longus* (Lat: long) + *spina* (Lat: spine, thorn).



Habitat: Forests; nests in acorns, under rocks, under bark of living trees.
Geographic range: Throughout North America east of the Mississippi River.

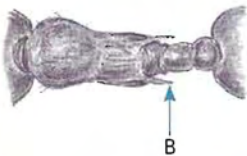
Natural history: Feeds on honeydew, plant nectar, tiny insects. Enslaved by *Protomognathus americanus*. Although abundant in hardwood forests, it is the only *Temnothorax* species we find in hemlock forests. Look for it under the rocks of New England's thousands of kilometers of stone walls.

Look-alikes: Unmistakable; the black, long-spined *T. longispinosus* is unlikely to be confused with any other species in New England.



Distinguishing features:

- A. Mandibles with 5 teeth (cf. *Leptothorax*)
- B. Propodeal spines long and pointing straight back (cf. *T. schauinslandi*)
- C. Top of head smooth and shiny



Temnothorax

Temnothorax schaumii (Roger, 1863)

Schaum's *Temnothorax*

Honors its collector, German entomologist Hermann Rudolph Schaum (1819–1865).

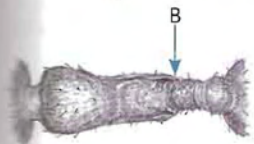
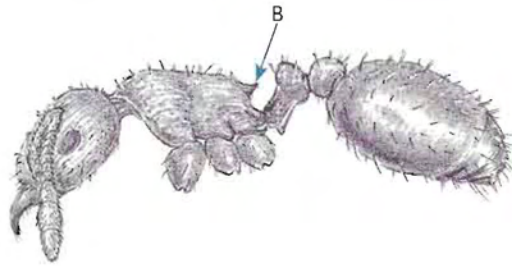
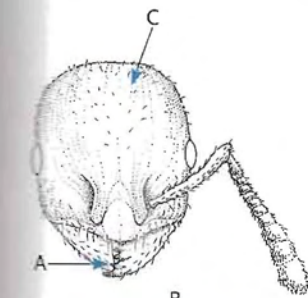


Habitat: Nests under bark of large oak trees (*Quercus* species) and Pitch Pine (*Pinus rigida*).

Geographic range: Maine to Florida; west to the upper Midwestern states; south to Texas.

Natural history: Very little is known of the behavior or diet of this species, which is one of the few arboreal ant species in New England. Workers forage on dead branches of otherwise live trees, on standing dead snags, and especially on the trunks of white oaks. Most commonly collected in warmer regions of New England.

Look-alikes: *Stenammina*, other *Temnothorax* species, *Tetramorium caespitum*; large eyes eliminate *Stenammina*, fine sculpturing eliminates *Tetramorium*, and short propodeal spines and striations on the head eliminate the other New England *Temnothorax* species.



Distinguishing features:

- A. Mandibles with 5 teeth (cf. *Leptothorax*)
- B. Short, widely spaced propodeal spines (cf. *T. longispinosus*)
- C. Very finely striated head (cf. other New England *Temnothorax*) and eyes large (cf. *Stenammina*)

Temnothorax

- male ants (*continued*)
 morphology of, 48, 49
 sex determination for, 18–19
 winged, 11
- mandibles
 characters of, 47
 measurement of length of, 49
- Mansfield, Mount, 5
- maps
 of counties, 393
 of ecoregions, 5
 of species distribution, 57, 333
 of species richness, 345–346
- marble, 1
- Martha's Vineyard, 2, 3, 6
- Mary's *Aphaenogaster* (*Aphaenogaster mariae*), 229
 collection of, 337, 342
 identification of, 223–225
 relative abundance of, 336
- Mary's *Dolichoderus* (*Dolichoderus mariae*), 99
 habitat of, 6
 identification of, 96–97
- Massachusetts
 ecoregions of, x, 5–6
 geology of, 1–3
 species richness in, 347–349
- mating. *See* reproduction
- matrix identification keys, 54–55
- maxillary palps, 47
 of *Lasius flavus*, use in identification, 187, 191
 of *Lasius nearcticus*, use in identification, 187, 196
 of *Monomorium*, in nomenclature, 253
 of *Tetramorium*, in nomenclature, 331
- Mayr, Gustav, 178, 242, 253
- measurements, 49–50
- mesonotum, 48
- mesosoma
 characters of, 47–48
 in identification keys, 53
 measurement of, 49
- Metacomet Range, 1
- metanotum, 47–48
- metapleural gland, 16, 48
- methane, 350
- microclimates, vegetation in, 7
- Microdon*, myrmecophily in, 23–24
- Microdon ocellaris*, 24
- micrometers, ocular, 50
- microscopes
 in identification of ants, x, 50–51, 60
 light sources for, 50–51
 measurements taken through, 50
 photographs taken through, 43, 51
 types of, 50–51
- mimicry
 of ants, 25–27
 types of, 25
- mole rats, eusociality in, 18
- Monomorium*, 253–258
 identification of species of, 253
 key to species of, 254
 species easily confused with, 313
- Monomorium emarginatum* (Furrowed *Monomorium*), 255
 identification of, 253
- Monomorium floricola* (Flower Ant), 256
 identification of, 253
 as introduced species, 341
 range of, 339
 relative abundance of, 336
- Monomorium monomorium*, 253
- Monomorium pharaonis* (Pharaoh Ant), 257
 establishment of colonies by, 15
 identification of, 253
 as introduced species, 341
 nests of, 4
 range of, 339
- Monomorium viride* (Green *Monomorium*), 258
 habitat of, 6
 identification of, 253
- Montague Sandplains, 2
- moraine, glacial, 2
- morphology
 of ants, 44–50
 diversity of, x

- Tapinoma melanocephalum* (Ghost Ant),
105
identification of, 103–104
as introduced species, 340
range of, 339
relative abundance of, 336
- Tapinoma sessile* (Odorous House Ant),
106–107
identification of, 103–104
relative abundance of, 335
species easily confused with, 109
tarsal claws, 48
tarsus (pl. tarsi), 48
Taschenberg, Ernst Ludwig, 102
Taschenberg's *Dolichoderus*
(*Dolichoderus taschenbergi*), 102
identification of, 96–97
Tawny *Aphaenogaster* (*Aphaenogaster*
fulva), 228
identification of, 223–225
taxonomic authority, 55
taxonomic rarity, 336–337
taxonomy
classification of ants in, 15–18, 45
definitions in, 45
evolutionary relationships in, 16–18
identification keys in, 51–55
phylogenetic trees in, 53
suffixes in, 45
teeth, 47, 48
- Temnothorax*, 323–330
history of classification of, 244, 323
how to find, 29
identification of species of, 323–324
key to species of, 324–325
morphology of, 48
social parasitism of, 305
species easily confused with, 234,
247, 260, 325
- Temnothorax ambiguus* (Doubtful
Temnothorax), 326
how to find, 31
identification of, 323–324
nests of, 4
- Temnothorax curvispinosus* (Bent-spined
Temnothorax), 327
identification of, 323–324
nests of, 7
- Temnothorax longispinosus* (Long-spined
Temnothorax), 328
identification of, 323–324
nests of, 4
- Temnothorax schaumii* (Schaum's
Temnothorax), 329
collection of, 337
identification of, 323–324
nests of, 4
- Temnothorax texanus* (Texas *Temno-*
thorax), 330
collection of, 334
habitat of, 6
identification of, 323–324
morphology of, 247
range of, 338
species easily confused with, 325
- temperatures
and climatic change, 350–351
sensitivity/tolerance to, 7, 339, 351
and species richness, 348–349
- temporary social parasites, 21–22, 128
- Tennessee *Aphaenogaster* (*Aphaeno-*
gaster tennesseensis), 232
identification of, 223–225
- tergite, 48
- termites
vs. ants, 11–13
eusociality in, 18, 19
- territorial competition, among ants, 20
- Tetramorium*, 331–332
identification of species of, 331
species easily confused with, 234,
260
- Tetramorium caespitum* (Pavement Ant),
332
identification of, 331
as introduced species, 341
social parasitism of, 22, 221
species easily confused with, 302, 318
- Tetramorium* species E, 331
- Texas *Temnothorax* (*Temnothorax*
texanus), 330
collection of, 334

- Red Carpenter Ant (*Camponotus chromaiodes*), 120
 habitat of, 6–7
 identification of, 111–113
 myrmecophily and, 23
 range of, 338–339
- Red List of Threatened Species, IUCN, 55
- redstone, 1
- relative abundance, 335–341. *See also* rarity
 ranking of species by, 335–336
 reasons for, 336–341
 in species accumulation curve, 343–344
- Remington, Charles, 334
- reproduction
 in life cycle of colonies, 11–15
 sex determination in, 18–19
- resources
 competition among ants for, 20
 rarity of, 339–340
- Reticulitermes flavipes* (Eastern Subterranean Termite), 12. *See also* termites; white ants
- Rhode Island
 ecoregions of, x, 6
 geology of, 3
 species richness in, 347–349
- ring lights, 50–51
- Roger, Julius, 307
- Rough *Aphaenogaster* (*Aphaenogaster rudis*), 231
 identification of, 223–225
 relative abundance of, 335, 337
 reproduction of, 13
 seed dispersal by, 20
- roundworms, 21
- Ruddy Slave-making Ant (*Formica rubicunda*), 172
 identification of, 134–135
- rugae, of gaster, 48
- Salticidae (family), ant mimicry in, 25, 26
- sampling. *See also* collections
 and rarity, 335–341
 techniques for, 35–38, 337–338
 tools for, 32–35
 and undetected species, 342–349
- sand, 2, 3, 4, 129, 253, 312
- Sarinda hentzi*, ant mimicry by, 26
- Scabrous Ant (*Myrmica scabrinodis*), 294
 identification of, 266–267, 270–271
 as introduced species, 341
- scale bars, 58
- scale insects, 20
- scape. *See also* antenna
 characters of, 31, 46, 47
 measurement of length of, 49
- Schaum, Hermann Rudolph, 329
- Schaum's *Temnothorax* (*Temnothorax schaumii*), 329
 collection of, 337
 identification of, 323–324
 nests of, 4
- schist, 1
- Schlick-Steiner, Birgit, 331
- Schmitt, P. Jerome, 322
- Schmitt's *Stenamamma* (*Stenamamma schmitti*), 322
 identification of, 316–317
- scoop, 46
- scratchboard, 41
- scrobe, 46. *See also* antenna
- sculpturing, of gaster, 48
- seed dispersal, 8, 20, 223
 sex determination, 18–19
- Shaded Fuzzy Ant (*Lasius umbratus*), 203
 collection of, 334
 establishment of colonies by, 12
 identification of, 182–183
- Shiny-bellied Fuzzy Ant (*Lasius speculiventris*), 200
 identification of, 182–183
 nests of, 7
- Shiny *Polyergus* (*Polyergus lucidus*), 216
 identification of, 214–215
 social parasitism of, 22
 species easily confused with, 146

- F. subsericea*
- F. ulkei*
- F. cf. fossiceps*
(an undescribed species)
- Lasius alienus*
- L. claviger*
- L. flavus*
- L. interjectus*
- L. latipes*
- L. minutus*
- L. murphyi*[†]
- L. nearcticus*
- L. neoniger*
- L. pallitarsis*
- L. plumopilosus*[†]
- L. speculiventris*
- L. subglaber*
- L. subumbratus*
- Aphaenogaster fulva*
- A. mariae*
- A. picea* (a species complex)
- A. rudis* (a species complex)
- A. tennesseensis*
- A. treatae*
- Cardiocondyla obscurior*^{*}
- Crematogaster cerasi*
- C. lineolata*
- Formicoxenus provancheri*
- Harpagoxenus canadensis*
- Leptothorax retractus*[†]
- L. sphagnicola*[†]
- L. wilsoni*
- L. sp. AF-can*
(an undescribed species)
- L. sp. AF-erg*
(an undescribed species)
- Monomorium emarginatum*
- M. floricola*^{*}
- M. g...onis*^{*}
- M. viride*
- Myrmecina americana*
- M. new species* (an inquiline
social parasite of *M. americana*)
- L. umbratus*
- L. cf. niger*^{*} (this may be an
undescribed species)
- L. cf. umbratus*
(an undescribed species)
- Nylanderia flavipes*^{*}
- N. parvula*
- N. new species* (an inquiline
social parasite of *N. parvula*)
- Paratrechina longicornis*^{*}
- Polyergus lucidus*
- P. montivagus*[†]
- P. cf. longicornis*
(an undescribed species)
- Prenolepis imparis*
- Myrmicinae** (63 species)
- Anergates atratulus*^{*}
- Myrmica alaskensis*
- M. americana*
- M. brevispinosa*
- M. detritinodis*
- M. fracticornis*
- M. incompleta*
- M. lampra*[†]
- M. latifrons*
- M. lobifrons*
- M. nearctica*
- M. pinetorum*
- M. punctiventris*
- M. quebecensis*[†]
- M. rubra*^{*}
- M. scabrinodis*^{*}
- M. semiparasitica*
- M. sp. AF-eva*
(an undescribed species)
- M. sp. AF-ine*^{*}
(an undescribed species)
- M. sp. AF-scu*
(an undescribed species)
- M. sp. AF-smi*
(an undescribed species)

- | | |
|--|--|
| <input type="checkbox"/> <i>M. sp. AF-sub</i> [†]
(an undescribed species) | <input type="checkbox"/> <i>S. impar</i> |
| <input type="checkbox"/> <i>Pheidole flavens</i> [‡] | <input type="checkbox"/> <i>S. schmitti</i> |
| <input type="checkbox"/> <i>P. pilifera</i> | <input type="checkbox"/> <i>Temnothorax ambiguus</i> |
| <input type="checkbox"/> <i>Protomognathus americanus</i> | <input type="checkbox"/> <i>T. curvispinosus</i> |
| <input type="checkbox"/> <i>Pyramica metazytes</i> | <input type="checkbox"/> <i>T. longispinosus</i> |
| <input type="checkbox"/> <i>P. pergandei</i> | <input type="checkbox"/> <i>T. schaumi</i> |
| <input type="checkbox"/> <i>P. pulchella</i> | <input type="checkbox"/> <i>T. texanus</i> |
| <input type="checkbox"/> <i>Solenopsis invicta</i> [‡] | <input type="checkbox"/> <i>Tetramorium caespitum</i> [‡] |
| <input type="checkbox"/> <i>S. molesta</i> | |
| <input type="checkbox"/> <i>S. cf. texana</i>
(an undescribed species) | |
| <input type="checkbox"/> <i>Stenamamma brevicorne</i> | |
| <input type="checkbox"/> <i>S. diecki</i> | |