
Ant



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For Mary, who is pretty wise for a two-legged animal.

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Contents

[1 Introduction](#)

[2 Ants as Minions](#)

[3 Ants as Models](#)

[4 The Enemy Without](#)

[5 The Enemy Within](#)

[6 Ants as Machines](#)

[7 The Ambiguous Ant](#)

[Timeline](#)

[References](#)

[Bibliography](#)

[Associations](#)

[Websites](#)

[Acknowledgements](#)

[Photo Acknowledgements](#)

[Index](#)



Ants (Formicae) on an anthill, a miniature from a French bestiary of c. 1450.

1 Introduction

It is extraordinarily difficult to avoid using grandiose adjectives in the description of ants.

Ants command a respect from their fans out of all proportion to the insects' size. Ants, they affirm, are the '-est' insects: the cleverest, most organized, hardest working, most numerous, most fecund, most dominant; they are older than humans, more bellicose, more cooperative, more communicative. Frequently these comparisons border on the bizarre. A children's web site asserts: 'Ant brains are the largest amongst insects . . . It has been estimated that an ant's brain may have the same processing power as a Macintosh II computer.'¹

At least, all this is what myrmecologists (those who study ants) would have us believe. Though their precise claims have changed over time, western students of ants always seem to have made hyperbolic assertions about them.

The eighteenth century natural philosopher Réaumur started at a basic level in his catalogue of the extraordinary qualities of ants: 'we have for them none of those aversions that are frequently entertained towards so many other insects'. Our dispassionate attitude towards them compared to, say, cockroaches, signals their human status; their existence is parallel with our own. Unlike fleas, they have no particular dependence upon us, and we have no need for them as we do for bees. This independent existence of ants has, at various times, been a source both of wonder and of horror. Thomas Mouffet, a sixteenth-century physician, noted that the ants

. . . are so exemplary . . . it is no wonder that Plato, Phaedone, hath determined that they who without the help of philosophy have lead a civill life by custom or from their own diligence, they had their souls from Ants, and when they die they are turned to ants again.³

Here, the ants' lack of reliance upon philosophy marks out the alternative yet equivalent nature of their civic lives: a parallel so wondrous that, according to Pliny, they are the only creatures besides us that bury their dead with funeral rites. More contemporary analogue-myths assert with equal confidence that ants, magnified to the size of sheep, would rule the earth, and that in the event of

nuclear holocaust they would outlast humans.

In between the eras of Plato and NATO, observers have concocted a canon of astounding facts and figures concerning the numbers of ants, their distribution, their reproduction and modes of life. They are habitually scaled up to 'equate' to human terms, upon which basis their nests are compared to the pyramids, or to the Great Wall of China, and their movement with that of a speeding train. They have recently been enumerated at ten thousand trillion; collectively they are asserted to weigh as much as the earth's human population. E. O. Wilson, the most renowned living myrmecologist, claims that the behaviour of ants is scientifically more interesting than that of humans' bestial cousin and the psychologists' current favourite, the chimp. The reason for this, he writes, is that ants can be studied for the meaning of their social interaction, whereas the most impressively trained chimp is only performing individual tricks, devoid of any social or ecological import.⁴

The remainder of *Ant* explores this process of myth-making and suggests some reasons for the precise images and values that have been attached to ants at various times and in various places. The rest of this chapter, however, is devoted to a summary of the contemporary scientific understanding of ants: the stories that are told by myrmecologists today.⁵

The animal kingdom is divided into successively smaller categories, which as they decrease in size reflect a greater degree of similarity and presumed evolutionary connection between their members. Phyla are the largest groups, which are then successively divided into classes, orders, families, genera, and finally into species. Insects are one class of the phylum Arthropoda. (Non-insectan arthropods include crustaceans and spiders.) The class Insecta is made up of various orders, including Coleoptera (beetles) and Lepidoptera (butterflies and moths). The order Hymenoptera contains ants, as well as their evolutionary cousins, the bees and wasps. Termites, although often referred to as 'white ants' have long been assigned to a different order, the Isoptera, which they share with their less loveable relations, cockroaches. Within the order Hymenoptera, one family – Formicidae – contains all the true ants. Ants are easy to recognize compared with many other insects. All are the same basic shape and have a characteristic kink in their ever-busy antennae. The Formicidae are split down into around three hundred genera, some of which have informal descriptive names such as sugar ants, bulldog ants or meat ants. Individual species vary in size between 0.7 millimetres and centimetres in length.

At the time of writing, the latest count of ant species was 11,006. Although this represents a tiny proportion of known insect species (about 750,000, of which most are beetles), the combined weight of all living ants has been estimated to constitute half the mass of all extant insects. This figure, out of all proportion to the number of insect species, shows the success of ants in exploiting a variety of habitats around the world: just about everywhere apart from the polar regions.



Frontal view of worker ant (*Paratrechina* sp.) showing the antennal kink characteristic of all modern ants.

Virtually all of the ants one sees are infertile female workers, engaged in functions such as foraging, nest maintenance or defence, and tending the young. Inside the nest there are also sexual forms, both male and female. At some point these ants will fly up into the air and mate; these are the swarms of winged ants that are commonly seen in late summer. Most will be eaten by birds, and the males have no function at all in the colony beyond this brief task of fertilization. A few fecundated females, however, return to earth to found a new colony. Each will shed her wings, digest the muscles that powered her short flight, and lay her first batch of eggs. She may have to leave the young from time to time in order to search for food; if need be, she may even consume some of the eggs or larvae in order to sustain herself. The larvae pupate, and emerge in the adult form. Once raised, the first generation of workers can take over the care of subsequent broods, leaving the queen to the business of egg-laying for the remainder of her life.



An entire colony of *Brachymyrmex* (top right, behind antenna) would fit into the head of the large Bornean carpenter ant filling most of this scanning electron micrograph.



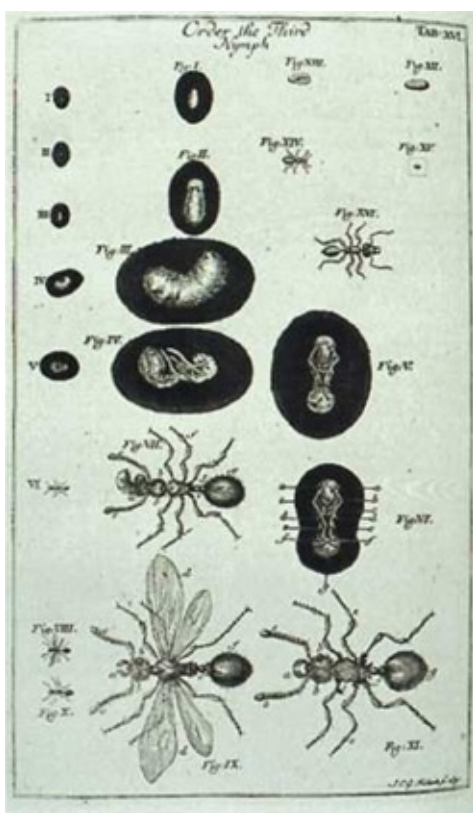
Dramatic size differences between ants can also be observed in real life. Here, in Auguste Forel's *The Social World of the Ants Compared with That of Man* (1928), seemingly unmatched species are locked in battle.



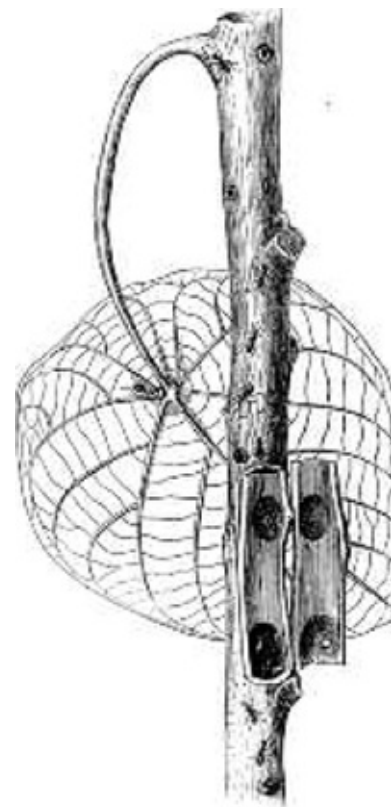
An alate (winged) queen sets off to found her colony, accompanied by tiny workers from the nest where she was born clinging to her legs.

As the nest matures, the number of workers increases, their labour becomes divided and the nest grows still more. When it has grown to a sufficient size, the queen will produce sexual forms ready for the next mating season. Since fertilization, she has been storing sperm and releasing them one or several at a time with each egg produced. Now, she releases some unfertilized eggs, which will become the males. Sexual females are produced, like their infertile sisters, from fertilized eggs. They are turned into a sexual form simply by being fed a different diet. In almost all species, the colony will last as long as the queen is alive, generally between five and twenty years. When the queen dies, the colony gradually declines until the last worker dies out.

There are many variations on this basic life cycle. Some nests are founded by multiple queens, of which all but one may later be eliminated; some gradually branch out with new queens and workers to form satellite branches of the large 'supercolony'. Other nests may adopt supernumerary queens. Queens of some species take workers with them when they found a new nest; this process is known as swarming. In other species the queen is altogether incapable of raising the critical first brood by herself. In this case, she may invade another nest on a temporary or permanent basis, using its workers to raise her young alongside, or instead of, their own.



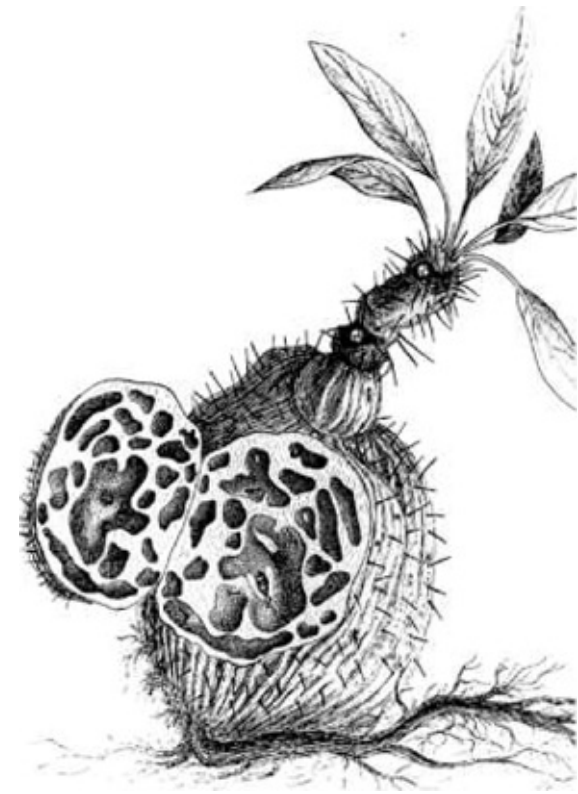
A very early depiction of the ant's life-cycle in John Swammerdam's *The Book of Nature, or, The History of Insects* (1758).



Ants' nests are found in all kinds of places including inside plants, such as this *Endospermum formicarum* inhabited by a colony of *Camponotus quadriceps* in an illustration of 1910.

Army ants, found in the tropics, have no physical base to their colony at a fixed location. They simply hang in a cluster overnight, forming a bivouac around their queen. When it is time to hunt, the whole colony goes on the march, swarming across the ground and eating anything in its path, until night falls once again. These ants, from several widely separated genera, are, however, in the minority. Most species have a fixed base, a nest around which their existence revolves. At its centre there is generally an enclosed dwelling constructed by the ants, the place to which a

the ants return at night and at the heart of which the queen shelters, producing young. Just outside the nest, there is often an area known as the midden, which is the refuse heap of the colony. Extending all around this area is the territory of the nest.



Ants often live in symbiosis with the plants they inhabit, offering them protection in return for shelter. Here a Papua New Guinean epiphyte is inhabited by *Iridomyrmex* ants, in an illustration of 1910.

The nest contains a number of different castes and ants in various stages of maturity. The workers perform a wide variety of tasks. The nurses tend the eggs, larvae and pupae. Many researchers have noted how they carry them off in times of threat, or move them from one part of the nest to another over the course of the day, in order to maintain them at the correct temperature as the nest warms and then cools with the passage of the sun. They lick the young constantly, coating them with antiseptic chemicals that inhibit the growth of bacteria within the nest.

Ant hill belonging to wood ants. During the day, workers are busy maintaining the hill.



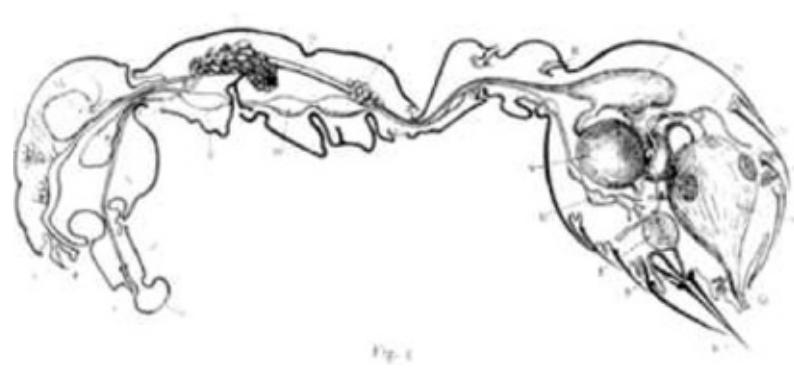
Meanwhile, maintenance workers gather up pieces of dirt and use them to mend

or build the nest. Patrollers inspect the nest and its surroundings, checking the ants they encounter to see if they are foreigners. It seems that they also pick out places to forage, and the routes to get there. Foragers, as their name implies, go out searching for food, or are recruited to exploit the food sources located by the nest-mates. They tend to follow trails made by their predecessors between the nest and food sources. Food is shared rapidly by the whole nest by mutual regurgitation, known as trophallaxis. Midden workers tend the refuse heap outside the nest, and may move it from place to place. Soldiers protect the nest and may also engage in aggressive behaviour, whether against other colonies of the same or different species or against other insects altogether.

Keeping control of the colony's territory is essential, as it yields the food necessary to maintain the population. As the colony grows, so it must extend its foraging territory. When the territories of adjacent colonies meet, battle occurs. The colony's soldiers fight by stinging or spraying one another with poison, as well as by wrestling and chopping with their mandibles. A frequent choice of poison spray is formic acid, which lends many species' nests their distinctive scent when disturbed. This odour, reminiscent of urine, gives ants their Middle English name *pismire*. Ants often enter into conflict with other insects as well, especially termites. Some species will even raid another ants' nest, stealing its young for food. An evolutionary arms race keeps the ecological balance between competing species; when ants are introduced into a new location they can wipe out native species unused to the battle tactics of the newcomers.



Ants can squirt formic acid to ward off threats, giving them their characteristic odour when disturbed. From Auguste Forel's *Social World of the Ants Compared with That of Man* (1928).



Trophallaxis is facilitated by a crop or 'social stomach' (L) from which ants can regurgitate food. From Auguste Forel, *Social World of the Ants Compared with That of Man* (1928).

According to some researchers, the nest itself may be regarded as going through a process of maturation, as evidenced in its collective behaviour. Following a 'timid' period after establishment, it may go through an aggressive phase, seeking out conflict with its neighbours, probably in an effort to expand. More mature colonies coexist more peacefully with nearby nests, keeping to their own foraging paths and avoiding confrontation.

Certain species of ant go beyond direct conflict for food; they raid other nests for ants to act as their slaves (a phenomenon referred to by contemporary myrmecologists as *dulosis*). Many steal pupae rather than adults; pupae can be imbued with their masters' nest odour and when they emerge they behave exactly as though they were working for their own species. Some slave-making ants depend utterly on their imported aliens, even to the extent of having no worker castes of their own and being unable to feed themselves. One of the most common slave relationships, between a species of red ant, *Polyergus rufescens*, and its black victims, *Formica fusca*, inspired many nineteenth century writers to speak unselfconsciously of 'Negro ants'. Others, finding the thought of slavery in the animal world abominable, have insisted that the aliens are not 'slaves' but 'auxiliaries', as Pierre Huber did as early as 1810. Abraham Lincoln took the opposite tack, suggesting that humans should rise above ant morality (albeit attributing something like that primitive Mac brainpower to black slaves):



In a phenomenon known as social parasitism, a single queen can intrude into a colony of another species, k

the host queen, and then use the host workers to rear her own brood. Here two species of the genus *Lasius* are involved.

The ant, who has toiled and dragged a crumb to his nest, will furiously defend the fruit of his labor, against whatever robber assails him. So plain, that the most dumb and stupid slave that ever toiled for a master, does constantly know that he is wronged.⁶

Other ants have modes of sustenance more acceptable to human reporter. Harvesting ants, which probably inspired Solomon to recommend that the sluggard should 'go to the ant . . . consider her ways and be wise', collect up seeds from their arid environments and store them in the nest. Many researchers have observed that they actually chew off the radicle, the germinating part of the seed to prevent its growth within the nest. If the seeds become damp, they are moved to the outside of the nest in order to dry. When needed, the seeds are chewed and moistened until they can be used for food.

Another famous ant lifestyle is based upon aphids and other, similar, small bugs (Homoptera). Aphids are able to suck juice out of plants using their sharp mouth parts. The ants, in turn, stroke the bugs with their antennae, an act of solicitation which induces them to secrete a droplet of 'honeydew' for the ant. The precise manner of this exchange causes some disquiet to Woody Allen, as Z in the film *AntZ*. When asked 'Don't you want your aphid beer?' he protests 'Call me crazy but I have a thing about drinking from the anus of another creature.' More decorously Victorian writers were fond of comparing ants' aphids to cows, kept for their milk. However described, this relationship is just one example of the many symbiotic relationships in which ant species engage, both with other insects and with plants. In this particular case, the aphids enjoy the protection from predators afforded by the ants; some ants even go so far as to enclose them safely in their own nests.

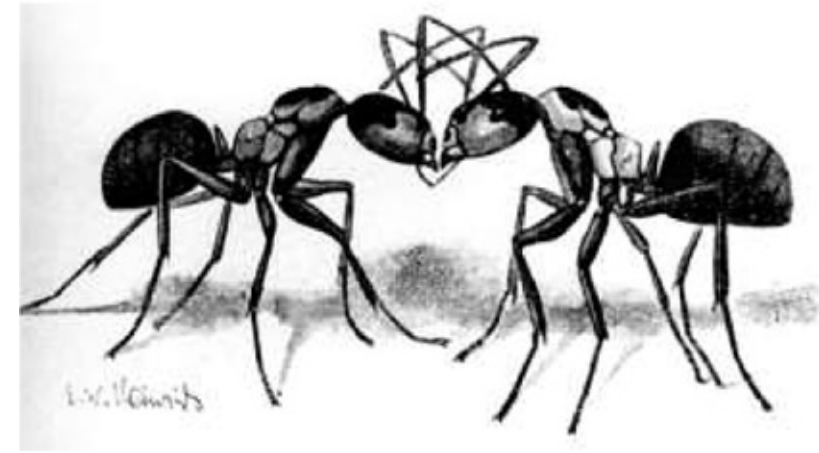
Honey ants store food in their own relatives' bodies. These desert-dwelling species feed up selected workers during times of plenty, until their bodies are distended balloons of sugary liquid. These workers then hang from the roof of the nest until, in time of dearth, the contents of their crops are required by the colony and they feed the others by trophallaxis. Sometimes the strategy does not work; for Australian Aboriginals are skilled at finding and digging them up; the ants are considered a sweet delicacy.

Leafcutter ants cultivate a fungus, which they use for food. As their name suggests, they gather fragments of foliage (so successfully that they are an agricultural pest in their home, the American tropics), and transport them back to the nest. Here the leaves are impregnated with a fungus, which is left to grow until ready for consumption. Comparisons with human farming have come easily to observers of this phenomenon.

From slave-makers to gardeners, ants each have 20 to 40 different acts in their repertoire of behaviour, depending on the species. According to some, the exact repertoire is tightly linked to the caste of the ant concerned. Others see a greater

degree of behavioural flexibility in each individual, allowing her the ability to exercise a greater proportion of the total acts exhibited by the population as a whole.

Coordinating the functions of the nest members - of which there can be two million or more - requires a reliable system of communication. To find and retrieve food with maximum efficiency, foragers need to be able to recruit their fellow workers to good sources. They must be able to recognize their own nest mates and distinguish them from potentially hostile foreigners.



Antennal communication, using the sense of touch and especially that of smell, is crucial to ants' organized behaviour. From Forel's *Social World of the Ants* (1928).

If enemies are detected they need to be able to signal their presence to their own kind, recruiting some to the battle and others to the task of saving eggs, larvae and pupae. All these tasks and more are completed in the main through chemical communication - pheromones. Ants produce ten or twenty different chemicals to signal specific requests and warnings, passing them through physical contact or leaving them behind as chemical trails. Apparently complex tasks can be carried out through a simple reinforcement system. Weaver ants, for example, join together to bend two leaves together and glue them in place. The 'decision' to pick a particular leaf for this team effort is set in motion by a single worker; if she succeeds in bending a leaf slightly, she releases a 'success' pheromone, which recruits another to the task. If she too finds the leaf bendable, she will reinforce the signal with her own, and so on in a positive feedback loop. In a like manner, ants will gradually carve out an optimal homeward route from a good food source. Pheromones also exercise more long-term control: those secreted by the queen prevent the sexual maturation of the workers, while those produced by soldiers limit the numbers of their caste to a level suitable for the colony as a whole. Hölldobler and Wilson summarize colony communication thus: 'Ants, like humans, to put it in a nutshell, succeed because they talk so well.'⁷



Ants of the Lower Miocene in Dominican amber (about 20 million years old). One is holding the other's abdomen with its jaws.

Ants preserved in amber show, rather beautifully, that they have been abundant in Northern Europe in something very like their modern form for 25 to 40 million years. It has puzzled many, including Darwin, how ants have reached this modern form, with its highly developed form of social life. Until the 1930s myrmecologists got their best answers by looking at living wasps. There are no ants that live independently, but there are some species of wasp that do.

Different solitary wasp species raise their offspring in different ways. Some leave food with their eggs, ready for the larvae when they hatch. Others continue to bring food after they have hatched. Still other species bring their progeny living paralyzed prey, or prey that has been softened and made more edible in pellet form. Early twentieth-century researchers saw these as steps towards a social interaction between the generations.⁸ Moreover, they posited that in order to make best use of available food resources, back in time the female had facultatively switched from one of these behaviours to another. These acquired behaviours, they concluded, subsequently and gradually became fixed forms of life for future generations, culminating in the mother's dependence on a trans-generational worker caste (i.e. her daughters) to maintain reproductive success. This, entomologists concluded, was how primitive, solitary wasp-ants had gradually acquired a socialized form of life, and hence evolved into modern ants.

Ants still found in Australia provide a tantalizing glimpse of primitive sociality, just as its marsupials seem to illustrate a very undeveloped form of mammalian anatomy. These ants maintain rather small colonies, and their workers are not divided into specialized castes for care of the young, fighting, foraging and so on. Nor do they seem to communicate much amongst themselves, but forage for food individually, like solitary wasps.

Three species of extant primitive ant. The one on the left is from Madagascar, the others from Australia. Note their unusual anatomical forms. From Forel's *Social World of the Ants*.



Meanwhile, the 'waisted' appearance of modern wasps and ants, along with other anatomical similarities, also suggest a close evolutionary relationship between the two families. From this and other morphological information, entomologists predicted the physical characteristics that they expected to find in the earliest ants, during the transitional period from solitary insects into the social form. In 1966, while searching on their local beach, a retired couple from New Jersey found the oldest amber-preserved specimens yet. Fulfilling myrmecologists' expectations, the new fossils shared some key characteristics with modern ants, and some with wasps. They therefore placed them in a new genus, *Sphecomyrma*, meaning 'wasp ant'. For entomologists, it was as exciting as the discovery of the missing link between primates and human beings. They speculated that *Sphecomyrma* lived much like the Australian primitives. Inside the amber they had caught a glimpse of the birth of society, 100 to 120 million years ago.

These facts, then, represent the current scientific consensus about ants. But they may also be seen as myths, just like Plato's and Pliny's. I do not mean to suggest that one should consider them fiction. There is, however, no single correct way of studying ants; like everything else in our universe, they can be described on multiple levels. At various times, investigators have chosen different aspects of ant life to study, including anatomy, classification, evolution, physiology, psychological attributes and social behaviour. These choices, neither right nor wrong in themselves, have simply reflected the preoccupations of the observers at the time they were made: collecting, dissecting, telling origin stories, knowing the human mind, understanding crowd behaviour.



One way to study ants: observation of their behaviour in nature.



Another way to study ants: scanning electron microscopy (SEM) of their physiology.

More than this, the language and models we use to try and capture and explain any natural phenomenon are drawn from our culture ('queens', 'sisters'), and reflect something about our own perspectives at the same time as they describe the outside world. As this chapter began by remarking, even modern, 'factual' myrmecologists are drawn to mythic language in describing their findings. Rather than seeing all this as a limitation on scientific objectivity, Ant suggests that by understanding the cultural contingencies of science, we gain a much richer and fuller picture of it. In the following chapter, a little digging beneath the surface reveals some possible reasons why myrmecologists consistently describe the tiny in such magnified terms.

2 Ants as Minions

Looking down on the tiny world of the ants, humans have long been tempted to imagine that the colonies they see are kingdoms at their own disposal. The Ancient Greeks' mythical loyal soldiers, the Myrmidons, share the root of their name with ants – the same base from which we get several English ant-related words such as myrmecology or the genus *Myrmecia*. Ants march together with such astonishing organization and indefatigable persistence that the Ancient Greeks saw in them the qualities of the most desirable or dreaded troops, depending on whose side they were fighting.

A veteran of the Spanish-American and American Civil Wars, Henry McCook, was also fascinated by ants. McCook had raised a division of volunteers in Illinois, acting as their captain and their chaplain. But for him, ants were the ideal army. He described how ants would be the perfect minions to command:

. . . our mountain mound-builder . . . [ants] remind us of the militia organization of our earlier frontier States – Ohio, for example, which made every adult male, not disqualified by age or otherwise, subject to military duty. Indeed, such is, in theory, the relation of all citizens of the American republic to the general government. Among our ants that duty is never dodged. There are no desertions. Lazy, cowardly and skulking ants one does not see. With heartiest good-will the call to service is met . . .¹

Marching Through Georgia



'Marching Through Georgia' (1957) portrays ants as an invading Union army of the American Civil War.

There exists a variety of ways in which humans indulge their dream of the form of an army. Some, like McCook, enjoy the opportunity to experience a comparative sense of grandeur over their tiny subjects. There is also a sense in which ants exemplify the massed power of the individually insignificant, providing a comforting alternate reality for the downtrodden. Others take consolation from the thought of empathetically entering the little world of the individual ant, who, even on his own, functions as the archetypal fairy-tale victor over apparently superior forces. What these visions share - from entomologists' reminiscences, to children's fiction, to ancient myth - is a fantasy about ants based on power.

ARMIES OF THE INSIGNIFICANT

Few people get to command armies, but everyone can dream of being on the right-hand end of the order-giving process. Hence the pleasure of an army of toy soldiers, a battalion of model Myrmidons in the original Greek sense. The fantasy of a kingdom of ants under one's rule amounts to much the same thing. The fantasist becomes, comparatively, a giant in his own world; a hectored child in the house can enter the garden and find there a realm in which he is gigantically and incontestably godlike.

Auguste Forel was such a child; he was born in 1848 in the Swiss countryside near Lausanne to a well-connected and wealthy family. Eventually Auguste was to become an influential psychiatrist and an internationally recognized expert upon ants. As a child, however, he was timid and sickly, lonely and miserable. He detested his mother's over-protective, neurotic Calvinist company. 'Apart from visits to my grandparents', he wrote in later life, 'I was cut off from all human intercourse. My mother would not even let me go into the garden alone.' He found

his escape among the ants, whose social life began to fascinate him from the age of six. He watched colonies of three different species around the house, feeding them 'lovingly . . . with bread, sugar and so forth'.² It would be no exaggeration to say that the little Auguste loved his ants. He was moved to despair when his favourite nest was raided by an army of red ants, and angrily poured boiling water over the invaders, but to no avail. A little later, having been taught some of the classics, he began writing a Homeric epic, 'Wars of the Ants', a 'Fourmiad' in which the ant-hill building *Formica pratensis*, the meadow ant, played the part of the Greeks, while the blood-red robber ants, *Formica sanguinea*, were the deceitful Trojans. Forel's notebooks, which he kept from an early age, are full of sketches, notes and coded script, all of which show how intently he absorbed himself into the tiny realm of the ants as an escape from his mother and the 'continual surfeit of the Bible and religious doctrine'.³ He had found in the ants' kingdom a miniature topos, which though part of the larger world seemed to him to be independent of it. It was autonomous and utopian, and crowned him as its sovereign.



The Swiss myrmecologist Auguste Forel as an old man; as a boy, ants were his only consolation.

Forel was by no means unique in his formic consolation. As a child in the 1930s E. O. Wilson was shuffled from place to place by his separated parents. The nomadic existence made him, like Forel, lonely and socially anxious. Now the world's best-known myrmecologist, he suggests that 'loneliness in a beautiful environment might be a good if risky way to create a . . . field biologist'.⁴ This was certainly true for him: instead of making human friends, he too found comradeship amongst the mythic armies of the minuscule. 'I rescued bits of Spanish moss . . . They were my friends . . . I kept harvester ants in a jar of sand under my bed . . . discovered fairy tales. . .'.⁵

The 1960s Spanish children's book *Ladis and the Ant* might almost be a fictionalized account of Forel's or Wilson's childhood, featuring as it does a colony of ants acting as saviour of its unhappy protagonist. An eight-year-old boy, Ladis, is sent away to the countryside for the summer on account of his poor health. He takes with him his timidity and sense of inferiority; like Solomon's ants he is described in the very first paragraph as 'not strong'. It is only when Ladis

magically reduced to the size of an ant by a friendly queen, and becomes familiar with the interior of the ants' nest, that he learns to be at ease and starts getting better. The ant carries him like an obedient horse and anxiously tells Ladis 'You might suddenly take it into your head to make yourself grow inside the anthill, and destroy us all.' Ladis learns to wrestle with the ants, discovering that he can defeat them if he grabs their antennae. Ladis' new-found sense of power and confidence lasts even when he is back among humans: 'how lucky he was to be able to do just what he liked, whenever he liked'. The memory of his personal army sustains him.

Thus the massed power of individually insignificant ants is a source of hope to the impotent. Moreover, this vision of ants is shared by a variety of cultures. In Vietnam there is a saying, 'con kien cong con vua'; by sticking together the tiny ants can carry the elephant. The writer Le Ly Hayslip has described how this saying took on additional significance during the Vietnam War: 'The American elephant could rage and stomp the Vietnamese anthill, but time and weight of numbers guaranteed that it would eventually be the ants, not the elephant, who danced on the bones of the victims.'⁷ Vietnamese literature from the war compared Vietnamese teamwork with communal insect labour, while the US military were likened to mere swarms of insects without virtues: flies and locusts. It is therefore no surprise that although the Vietnamese have oxen, their cliché asserts that someone is 'kien cang' - strong as an ant.



Another boy who found courage through commanding an army of ants was Ladis. An illustration from José Maria Sanchez-Silva, *Ladis and the Ant* (1968).

TOYING WITH SCALE

When people brought mathematics to bear upon the fantasy of formic minion they concluded that having an army of ants would be even better than an army of

miniature humans (or, conversely, that an army of giant ants would win over humans). Henry McCook's calculations made ants seem even more attractive as agents under his control. He wondered how ants' nests compared with the Ancient Egyptians' greatest achievements, the pyramids, and calculated how the volume of each edifice (ant mound and pyramid) related to the bodily size of its builder. 'Man's bulk to his building is as 1 to 12½ millions', he concluded; 'the ant's bulk to her building is as 1 to 5800 millions. A simple calculation will show how great this exhibits the comparative superiority of the insect.'⁸

On reading McCook, the Belgian playwright and author Maurice Maeterlinck commented that compared to anthills, London and New York would be 'no more than villages'. He went on to describe the most common assessment of ant-human scale: 'When we see ants . . . carrying . . . with the greatest ease, with the tips of their mandibles . . . pine needles or fragments of wood which to us would represent beams or posts which two or three men could barely handle, we believe them to be endowed with a muscular force . . . eight or ten times as great as our own.'⁹ Truly it would be wonderful to have such soldiers under one's command.

The little Auguste Forel, while dreaming of ants, toyed with scale in order to triumph, mentally, over his enemies. He used to imagine that he had a magic balloon that could alter the scale of things around him, putting his own personal tyrants in their place.

If [I] put one of my pet ants into the balloon, allowed the latter to expand, and then opened it, the ant was magnified in proportion, and had now become a giant creature, able to tear things to pieces and swallow them. If, on the other hand, a nasty little boy, or one of my enemies, was placed in the balloon, he was diminished accordingly. So everything happened as I wished.¹⁰

Such calculations reveal another important facet of ant representation. Leaving aside the massed aspect of ant allies, there is comfort to be found in their scale alone. The myths of many cultures relate victory for the poor man over the prince, the boy over the man, the David over the Goliath. Ants perfectly fulfil this role in art and literature, signifying the success, against the odds, of the 'little guy'. The Indonesian version of the game 'scissors, paper, stone' illustrates the point well. In Indonesia, the three categories are ant, human and elephant. Though the human can trample the ant, and the elephant squash the human, ant triumphs over elephant since, in this game, the elephant cannot stand the ticklish sensation of having it inside its ear. In this mould also comes Frank Sinatra's ant with his [sic] 'high hopes' about moving the rubber tree plant; within this tradition the very unlikelihood of the feat justifies his optimism. By a curious coincidence, when George Bush Jr named North Korea as part of the post-9/11 'axis of evil', the North Koreans reached for a similar formic metaphor to describe their heroic conflict with the Americans. Amongst other animal comparisons, they likened their efforts to

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