Macrofauna – Formicidae

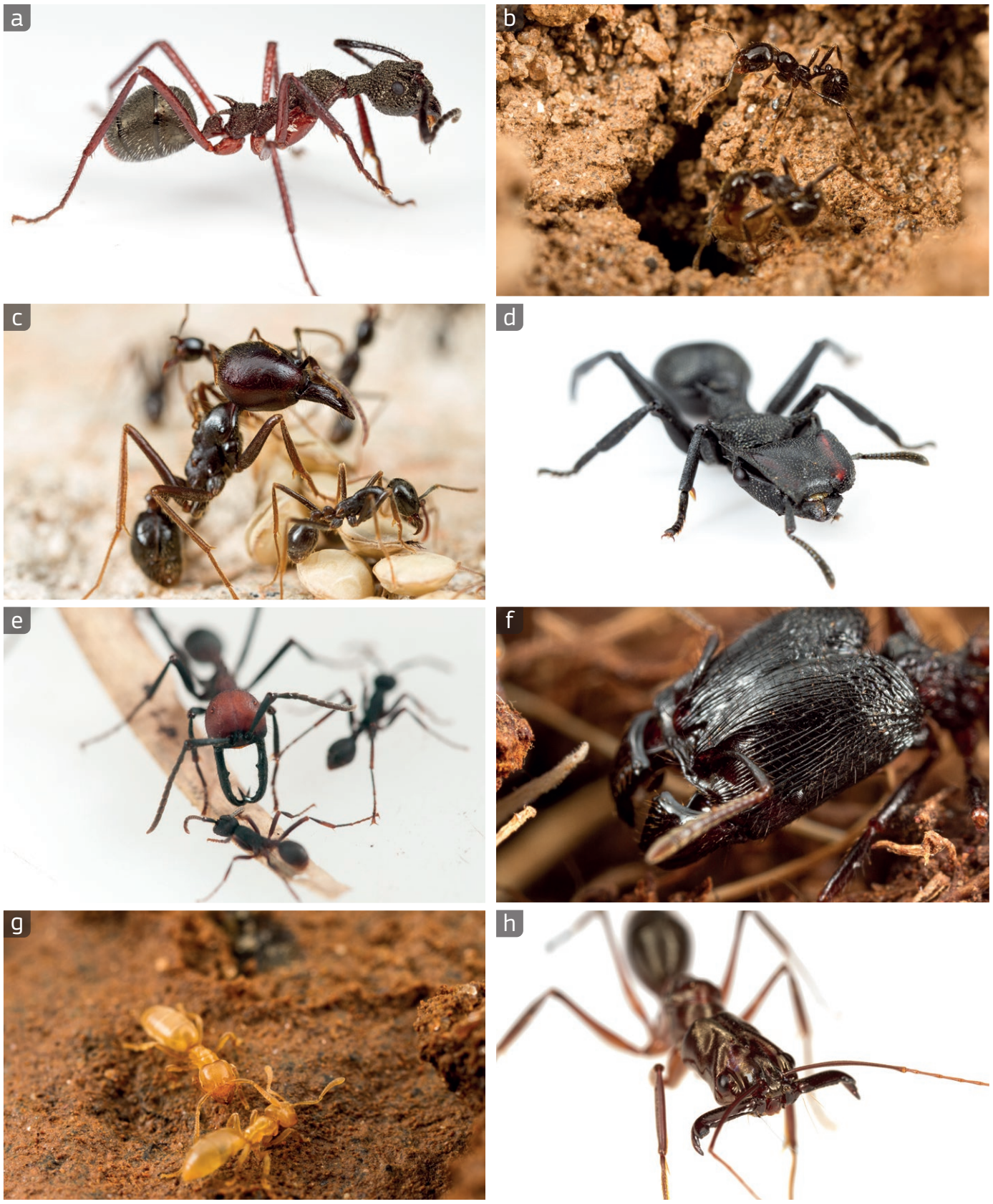
Morphology

Ants are social insects, among the most abundant in the world. Many ants have a sting but some groups have lost theirs and instead spray formic acid. They are distinguished from other closely related groups by the petiole (a constriction between the abdomen and thorax with either one- or two-nodes or scales) and their elbowed antennae. Ants live in large complex colonies with a division of labour, involving reproductive and non-reproductive individuals, cooperative care of the young and overlapping generations. This defines them as eusocial insects. This division of labour leads to different castes (groups of individuals with the same function). The reproductive caste is the queen, while the sterile caste are workers (and in a few species also soldiers). Reproductively active males are produced only during the breeding season and die soon after mating. The workers perform all the other functions of the colony, including protection, foraging, cleaning, building nests and care of the larvae. [60, 61]

Taxonomy

Ants have been around for over 120 million years. They belong to the family Formicidae of the order Hymenoptera (the group containing also bees and wasps).

Importance of ants in the ecosystem: (**a**) *Pseudomyrmex concolour* is just one of a plethora of ant species that establish very close relationships with trees. This tree is *Tachigali myrmecophila*; (**b**) *Odontomachus* sp. preying on another arthropod; (**c**) *Lasius niger* ant tending aphids. (RRCS, PB, KS)



Diversity of ants, the most species-rich and ecologically diverse group of social insects on the planet: (**a**) *Dolichoderus atellaboides*; (**b**) *Solenopsis* sp.; (**c**) *Labidus praedator*; (**d**) *Cephalotes atratus*; (**e**) *Eciton* sp.; (**f**) *Pheidole fimbriata*; (**g**) *Acropyga goeldii*; (**h**) *Odontomachus* cf. *chelifer*. (RRCS)

Microhabitat

Ant colonies form nests in which the colony lives. In most cases the colony centre is fixed, but some army ants have no fixed colony centre. Ants can have nests that are arboreal (in tree canopies), epigeic (on the soil surface) or hypogeic (underground). Ants that nest underground dig tunnels that are interconnected by larger chambers, some of which give access to the outside world. The chambers can have specific functions, such as nurseries, larders and rubbish dumps. Among the ants that nest in the ground some of the most impressive are the leaf-cutter ants, especially in the genus *Atta*, that build very large nests up to 300 m^2 in surface area, and excavate a great deal of soil. *Atta laevigata* nests may be up to 7 m deep and contain over 7 800 chambers.

‘Ant cow’ aphids

- Certain aphid (small sap-sucking insects) species have a symbiotic relationship (see box on page 33) with various species of ants, which resembles that of domestic cattle to humans; hence the name ‘ant cow’.
- The ants tend to the aphids, transporting them to their food plants at the appropriate stages of the aphids’ life cycle and sheltering their eggs in their nests during the winter.
- The aphids, in turn, provide sugary secretions (honeydew) for the ants to feed on.

Many ants are predators or herbivores, but others are omnivorous (with a diet consisting of a variety of food sources) or specialist predators (e.g. on termites). Leaf-cutting ants use leaves as a substrate for their symbiotic fungus (fungus-growers), which they use as food source. Ants interact closely with many other organisms and are fundamental for some functions of ecosystems; for example, protection of certain plant species (‘ant plants’) from herbivory and facilitation of seed germination in appropriate locations by carrying them to their nests. Ants also play an important role in the maintenance and functioning of soils, as they dig tunnels and chambers, thus promoting nutrient cycling through soil bioturbation (the reworking of soil) and water infiltration. They produce soil organic debris, thus enabling the processes of decomposition performed by fungi (see pages 38-41) and bacteria (see pages 33-35) and increasing the heterogeneity of the soil resource.

Diversity, abundance and biomass

The family Formicidae is subdivided into 22 extant subfamilies, 300 genera and 14 000 described species. The diversity of species varies among world regions, with peaks in South America, Central and South Africa and Australia. They are dominant invertebrates in many ecosystems, particularly tropical ones, and occur on all continents except Antarctica. The biomass of ants in tropical rainforests is often thought to be greater than that of all vertebrates in the rainforest combined.