



## Pests or Beneficials?

### Ants, Mosquitoes, Clothes Moths and Cockroaches

#### The benefits of ants

- **Member of the food chain**  
They serve as a food source for endangered bird species such as the grouse, grey-headed woodpecker, green woodpecker, and black woodpecker, but also for other insect species and large mammals such as the brown bear.<sup>1</sup>
- **Biological significance in soils**  
Because of the translocation, mixing and aeration of soil material, ants promote the formation of humus, just like earthworms. They also make it easier for plants to build a root system on fallow landscapes.
- **Seed exchange**  
Wood ants carry the seeds of about 150 plant species through the natural environment.<sup>2</sup> Many herbaceous plants in the forest understorey are spread by ants. Examples include *Corydalis*, violets and liverwort. Most of the plants that are spread by ants provide a nutritious fleshy appendage on the seed that is particularly attractive to ants (elaiosome) and practically represents a reward for the successful transportation service.
- **Decomposition of carrion and rotten wood**  
Carrion, fungi, rotten wood and organic waste are removed by ants. In this way, they help to keep the forest clean.
- **Extermination of pests**  
Thanks to their high food requirement and efficient hunting behaviour, they significantly regulate the populations of other insects, including species that can cause damage to the forest.<sup>1</sup>
- **Creation of habitats**  
Organic material and nutrients are concentrated in anthills. For this reason, there are often more soil organisms living in and around anthills than in the surrounding area. In the microcosm of an anthill, for example, the following specialized small animals are found: woodlice, Collembola, flower scarab (*Cetonia floricola*) and leaf beetle (*Clytra quadripunctata*) larvae, hoverflies from the *Microdon* genus, and last but not least, the shining guest ant (*Formicoxenus nitidulus*), a tiny Myrmicinae that is fed by its larger relatives. Many of these species are only found in anthills.
- **Role in biocoenoses**  
For example, particular *Myrmica* ant species are essential for the development of the endangered Alcon Blue, because they feed and care for its caterpillars in their nest. Wood ants promote colonisation with *Sternorrhyncha* species, especially the bark louse. A series of other insects also benefit from the increased honeydew production, including many adversaries of forestry-relevant herbivores such as parasitic wasps; and last but not least, beekeeping also profits from the increased forest honeydew production.<sup>3</sup>
- **Natural source of formic acid**  
Formic acid was used as a preservative in fish, fruit and vegetable products until 1998 under the E-number E236 (no longer authorised today). It is used as an antirheumatic agent in the medical sector, and for staining and impregnation in the textile and leather industries. Because it kills bacteria, it is sometimes also used as a disinfectant (also in acidic cleaning agents). In the chemical industry, the acid is used for neutralisation, for rubber production, and for organic synthesis in general. In the electronics-manufacturing sector, formic acid is used as a reducing agent for soldering processes. Beekeepers use it to treat the bees against varroa mites. In private households, formic acid is often



used for descaling washing machines. In the genetics sector, formic acid can be used in combination with the enzyme AP endonuclease to produce random insertion mutations, called in-vitro mutagenesis. In airports, sodium formiate is used to de-ice the runways, because the sodium chloride that is used for this purpose in other areas can cause corrosion on aircrafts. In the plastics industry, it is used for the adhesion of polyamide plastics. Concentrated formic acid is used to clean raw gemstones, because it strongly attacks limestone and other impurities and thus exposes the gemstone without damaging it. Experimental research by scientists at the Leibniz Institute for Catalysis has succeeded in extracting hydrogen from formic acid at ambient temperatures, e.g. for use in fuel cells. This possibility can be used for the compact storage of (electric) energy.<sup>2</sup>

## The benefits of mosquitoes

- **Member of the food chain**  
Especially in watercourses, the eggs and larvae of mosquitoes are an important food source for insects, spiders, birds, fish and other insectivores.
- **Plant pollinators**  
Both male and female mosquitoes feed on nectar and other sugary plant or fruit saps. The females only require a blood feeding after fertilisation. Mosquitoes have been described as being effective pollinators for two plant species: for the orchid *Habenaria obtusata* and for campion (*Silene otites*). It is suspected that the pollination function is of great significance particularly in northern tundras where there is an abundance of flowers and mosquitoes yet very few bees, but this theory has not yet been sufficiently investigated.<sup>2</sup>
- **Role in biocoenoses**  
Particularly in tundras, the huge swarms of mosquitoes play a role in the annual deer and caribou migrations, because they cause the animals to climb higher into the mountains. Without these periodic migrations, the sensitive tundras of the high North would be very rapidly overgrazed.<sup>2</sup>
- **Contribution to research**  
Every life form is of inestimable value, from which man can gain knowledge and develop new technologies. For example, three researchers from the Georgia Institute of Technology have found that because of their small mass, mosquitoes are capable of surviving collisions with raindrops. In doing so, they bear g-forces between 100 and 300, which are, according to research, the highest accelerations in the animal kingdom.<sup>2</sup>
- **Strengthening the immune system**  
Because mosquitoes also insert small amounts of diseased material from others into our bodies, our defence system is updated and kept on track. Mosquitoes are our natural firewall.<sup>4</sup>



## The benefits of clothes moths

- **Member of the food chain**  
They serve as a food source for birds, parasitic wasps, spiders and their specific parasites.
- **Promotion of biodiversity**  
A natural environment with a high diversity of life forms can better adapt to changing conditions (climate change) than an environment with less diversity. There are still many organisms today whose purpose in their environment is not yet known, and where we also do not know what would happen if one or several members of the chain would be removed.<sup>5</sup>
- **Contribution to research**  
Every life form is of inestimable value, from which man can gain knowledge and develop new technologies.<sup>2</sup> For example, the sense of smell of a common clothes moth is about 100 times more sensitive than that of people.<sup>6</sup>

## The benefits of cockroaches

- **Member of the food chain**  
Cockroaches are at the bottom of the food chain and serve as a food source for birds or reptiles, among others. Representatives of the ensign wasps, a family of the Hymenoptera, are parasites that are specialized on the eggs of certain cockroach species.<sup>2</sup>
- **Decomposition of organic matter**  
As so-called detritivores, cockroaches feed on organic plant wastes and thus fulfil an important function in the natural matter cycles.<sup>7</sup>
- **Feed and terrarium animals**  
Cockroaches have meanwhile also made their appearance in the terrarium hobby scene. They are raised and bred as feed for other animal species, but sometimes also for their own value.<sup>2</sup>
- **Source of protein and delicacy**  
In Asian countries, cockroaches are served as a delicacy and therefore already have significance for the human food supply. If need be, the animals could also gain significance in western countries as a protein source in the future.<sup>8</sup>
- **Promotion of biodiversity**  
A natural environment with a high diversity of life forms can better adapt to changing conditions (climate change) than an environment with less diversity. There are still many organisms today whose purpose in their environment is not yet known, and where we also do not know what would happen if they were removed from the food chain.<sup>5</sup>

### References

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