

Atta cephalotes (Leaf-cutter Ant or Bachac)

Order: Hymenoptera (Ants, Wasps and Bees)

Class: Insecta (Insects)

Phylum: Arthropoda (Arthropods)



Fig. 1. Leaf-cutter ant, *Atta cephalotes*.

[<http://en.wikipedia.org/wiki/File:Atta.cephalotes.3.jpg>, downloaded 30 March 2015]

TRAITS. The leaf-cutter ants (Wikipedia, 2015) are reddish-brown in colour with long slender legs and shiny in appearance (Fig. 1). The body is divided into three parts: a head, thorax and abdomen. Each colony is divided into different castes consisting of a queen, female workers, soldiers and the males. The queen is winged, dull brown and large in size around 3cm (Holldobler and Wilson, 2011). The female workers are about 12mm in length, dark brown with spikes on their back, a large head and mandibles with sharp fine teeth to cut vegetation. The soldiers are around 18mm, brown with spikes and a large head (Cherrett, 1968). The males are small in size and their wings extend past their entire body length. The reproductive females (queens) on the other hand are considerably larger in size and their wings spread beyond their thorax (Weber, 1972). The leaf-cutter ant is also known locally as the bachac.

DISTRIBUTION. This species is prevalent throughout Central and South America. It is widespread over Mexico, Ecuador, Brazil and extends to islands of the lesser Antilles such as Barbados and Trinidad (Correa et al., 2005).

HABITAT AND ACTIVITY. *Atta* are able to flourish and adapt to a large array of habitats. They are highly specialised to survive in forest gaps, farm plantations, rainforests and preferably on clearings or on the edges of forests due to the fact that these habitats provide an abundance of plant material used for cultivating food. They inhabit mainly tropical areas. They are able to survive at most altitudes, but prefer lower levels due to the abundance of food and the ideal semi-wet environment. The plants that they feed on also live in these environments. They live underground in large nests which can be up to 9m in depth and can expand to 30m in width (Correa et al., 2005). An experiment was conducted in order to record the activity of the ants. They found that the leaf cutters are predominately nocturnal foragers. Foraging usually starts after dusk at around seven at night and reaches a peak at around nine and then subsides by dawn in the early morning (Cherrett, 1968). The colonies have adapted this nocturnal feeding in the summer for thermoregulation, however during the winter they were able to adjust themselves to diurnal foraging (Holldobler and Wilson, 2011).

FOOD AND FEEDING. The leaf cutting ants cut the leaves and carry them back to their nest (Fig. 2) where they create a 'fungus garden' (Fig. 3). The cut leaves are given to the fungus and they then break down the cellulose that cannot be broken down by the ants. The ants then harvest special nutritional bodies made by fungi called "gongylidia" and distribute the food to larvae and worker ants (Cherrett, 1968). The ants and fungi have a mutualistic relationship in that the fungus provides xylan and starch for the ants, while the ants provide a well-conditioned environment for the fungus. The ants often get their plant material from palms and many crop trees such as coffee and cacao. The fungus isn't the only form of food provided to the ants, worker ants while out foraging will feed on plant sap that serves as "fuel" (Cherrett and Quinlan, 1979). Queen ants will feed on trophic eggs given to her by worker ants. These eggs will also be fed to the fungal garden when it is first growing and the first larvae hatched from the queen will start the colony (Mueller et al., 1998).

POPULATION ECOLOGY. *Atta* demonstrates a eusocial organization which is a very complex social arrangement and they have a queen for reproduction. They are organised in large colonies called a formicary and consists of a massive queen, soldier and millions of worker ants (Holldobler and Wilson 2011). The queens are the largest individuals in the colony and specialized to mate in the air and initiate new colonies. The soldier ants are the second largest ants of the colony and protect it the colony from intruders. There are also minima workers who dig new structures in the nest and work in the fungal garden. The media as well as the maxima workers cut leaf fragments and transport them back to the nest (Cherrett, 1968). While digging the workers are involved in coordinated movement and respond quickly to areas dug by the other ants. Even while they are solitary or in very small groups these workers react to environmental stimuli and would dig (Correa et al., 2005).

REPRODUCTION. During the rainy season, usually from late October to December, mating occurs towards the end of the day to night time. Fertile male and female ants take part in a flight where they mate, called a nuptial flight. Young female queen ants are taken down to the ground where many other males wait to inseminate them. Only the queen (Fig. 4) produces offspring and she can lay thousands of eggs (Baer and Boomsma, 2006). The queen will produce around 150-200 million female and worker ants in her lifetime, therefore, requiring a large amount of sperm. Unfortunately, out of the many females produced during the breeding season, only a handful out of the thousands hatched will survive and create new colonies (Hölldobler and Wilson, 2011).

The queen packs part of the mycelia garden into a wad and stored on her and feeds her first eggs to it to help it grow. The first larvae to hatch from the garden are also fed with her eggs. When the hatched colony is mature enough the queen stops taking the role of watching over the eggs (Baer and Boomsma, 2006).

BEHAVIOUR. Antipredator behaviour: The soldiers are the ones to protect the nest and attack invaders. Their head is large in size and their mandibles vary in shape to be used for different defensive mechanisms. Firstly, their mandibles can be used as shears or pliers to cut or tear the integument of their enemies. Secondly, their mandibles can be hook shaped to pierce the enemies' bodies. Thirdly, the soldier uses his head in order to block the entrance of the nest to prevent and predators from entering (Wilson, 1984).

Communication: Ants need to communicate with each other in order to find food and other activities. The term "tandem running" explains how one ant would follow directly behind the other and sometimes even touch their leader. One ant releases pheromones (volatile chemicals) and the other ants take up these pheromones using the antennae located on their head (Wilson, 1984).

APPLIED ECOLOGY. Pests: The leaf-cutter ant causes tremendous damage to agricultural ecosystems and is considered a major pest. The ant defoliates an extensive variety of plant species such as agricultural and forest crops. Studies have found that in territory of bachac up to 20 percent of plant growth would be cut and removed every year (Cherrett, 1968).

Conservation: The leaf-cutter ant maintains the stability of the ecosystem in both Central and South America by trimming vegetation, stimulating new plant growth and adding vital nutrients to the soil. No conservation measures have been put in place to protect the leaf-cutter since it is a crop pest (Mueller et al., 1998).

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Fig. 2. *Bachac* carrying a leaf segment.

[http://en.wikipedia.org/wiki/Atta_cephalotes, downloaded 24 April 2015]



Fig. 3. *Atta* in fungal garden.

[<http://www.alexanderwild.com/keyword/ysau/i-k6VjFPz/A>, downloaded 1 April 2015]



Fig. 4. *Atta* queen in her nest.

[<http://www.alexanderwild.com/Ants/Taxonomic-List-of-Ant-Genera/Atta/i-ZWDX94j/A>, downloaded 1 April, 2015]

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