

Fleas

Flea is the common name for any of the small wingless insects of the order Siphonaptera (some authorities use the name Aphaniptera because it is older, but names above family rank need not follow the ICZN rules of priority, so most taxonomists use the more familiar name). Fleas are external parasites, living by hematophagy off the blood of mammals and birds. Genetic and morphological evidence indicates that they are descendants of the Scorpionfly family Boreidae, which are also flightless; accordingly it is possible that they will eventually be reclassified as a suborder within the Mecoptera. In the past, however, it was most commonly supposed that fleas had evolved from the flies (Diptera), based on similarities of the larvae. In any case, all these groups seem to represent a clade of closely related insect lineages, for which the names Mecopteroidea and Antliophora have been proposed.

Some well known flea species include:

- Cat flea (*Ctenocephalides felis*),
- Dog flea (*Ctenocephalides canis*),
- Human flea (*Pulex irritans*),
- Northern rat flea (*Nosopsyllus fasciatus*),
- Oriental rat flea (*Xenopsylla cheopis*).

Morphology and behavior

Diagram of a Flea

Fleas are small (1/16 to 1/8-inch (1.5 to 3.3 mm) long), agile, usually dark coloured (for example, the reddish-brown of the cat flea), wingless insects with tube-like mouthparts adapted to feeding on the blood of their hosts. Their bodies are laterally compressed (that is, flattened side to side), permitting easy movement through the hairs or feathers on the host's body. Their legs are long, the hind pair well adapted for jumping (vertically up to seven inches (18 cm); horizontally thirteen inches (33 cm)) - around 200 times their own body length, making the flea the best jumper out of all animals (in comparison to body size). The flea body is hard, polished, and covered

with many hairs and short spines directed backward, allowing the flea a smooth passage through the hairs of its host. Its tough body is able to withstand great pressure, likely an adaptation to survive scratching etc. Even hard squeezing between the fingers is normally insufficient to kill the flea; it may be necessary to capture them with adhesive tape, crush them between the fingernails, roll them between the fingers, or put them in a fire safe area and burn them with match or lighter.

Hooke's drawing of a flea in *Micrographia*

Fleas lay tiny white oval shaped eggs. Their larvae are small and pale with bristles covering their worm-like body. They are without eyes, and have mouthparts adapted to chewing. While the adult flea's diet consists solely of blood, their larvae feed on various organic matter including the feces of mature fleas. In the pupae phase the larvae are enclosed in a silken, debris covered cocoon.

Life cycle and habitat

Fleas are holometabolous insects, going through the four life cycle stages of embryo, larva, pupa and imago (adult). The flea life cycle begins when the female lays after feeding. Adult fleas must feed on blood before they can become capable of reproduction. Eggs are laid in batches of up to 20 or so, usually on the host itself, which easily roll onto the ground. As such, areas where the host rests and sleeps become one of the primary habitats of eggs and developing fleas. The eggs take around two days to two weeks to hatch.

Micrograph of a flea larva.

Flea larvae emerge from the eggs to feed on any available organic material such as dead insects, feces and vegetable matter. They are blind and avoid sunlight, keeping to dark places like sand, cracks and crevices, and bedding. Given an adequate supply of food, larvae should pupate within 1-2 weeks. After going through three larval stages they spin a silken cocoon. After another week or two the adult flea is fully developed and ready to emerge from the cocoon. They may however remain resting during this period until they receive a signal that a host is

near - vibrations (including sound), heat and carbon dioxide are all stimuli indicating the probable presence of a host. Fleas are known to overwinter in the larval or pupal stages.

Once the flea reaches adulthood its primary goal is to find blood - adult fleas must feed on blood in order to reproduce. Adult fleas only have around a week to find food once they emerge, though they can survive two months to a year between meals. A flea population is unevenly distributed, with 50 percent eggs, 35 percent larvae, 10 percent pupae and 5 percent adults. Their total life cycle can take as little as two weeks, but may be lengthened to many months if conditions are favourable. Female fleas can lay 500 or more eggs over their life, allowing for phenomenal growth rates.