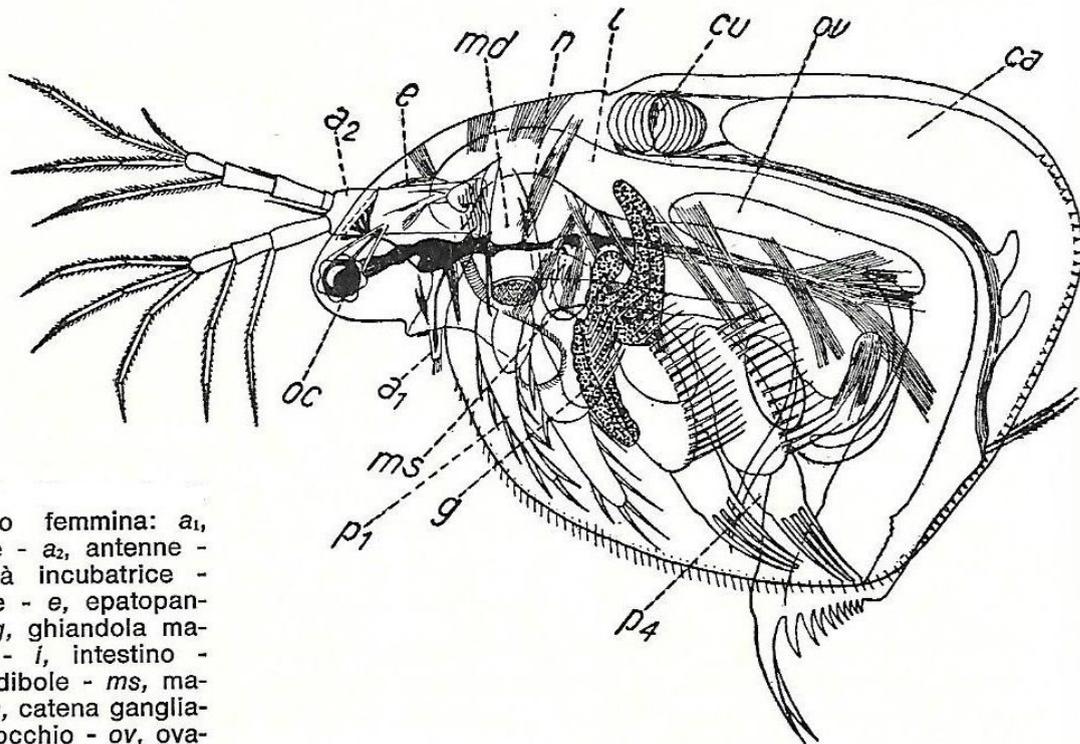


DAPHNIA MAGNA: A BIOLOGICAL MARKER

Crustaceans make up the majority of freshwater species and are at the base of the lake food chain because they are part of the plancton. Freshwater crustaceans are divided into two subgroups: cladocera and copepods. The body of these invertebrates is equipped with a carapace that protects it and is subdivided into cephalothorax (head fused with the chest) and abdomen. The cladocera differ from the copepods because they are characterized by a carapace used as a dorsal incubation chamber, by compound and enormous eyes with respect to the body. Daphnia Magna is a genus of small cladocera crustaceans. They are commonly known as "water fleas" because of their swimming style. They are 0.2 to 2 mm long and they live in lakes, ponds, streams and rivers.



cladocero femmina: a₁, antennule - a₂, antenne - ca, cavità incubatrice - cu, cuore - e, epatopancreas - g, ghiandola mascellare - i, intestino - md, mandibole - ms, mascelle - n, catena gangliare - oc, occhio - ov, ovario - p₁, p₄, primo e quarto paio di piedi toracici

Daphnia Magna, how it is formed (picture taken from the book "Istituzioni di zoologia, S.Ranzi, 1977")

REPRODUCTION

They reproduce by parthenogenesis, that is, the embryo develops from an unfertilized egg, usually in spring and until the end of summer. One or more embryos are carried inside the mother's body. Newborn daphnia have to make several molts before becoming mature adults, and this usually takes about two weeks. The juveniles are small copies of the adults, therefore there are no nymphal or larval stages. Mature females are able to reproduce every 10 days under ideal conditions. The reproductive process continues until the environmental conditions are favorable. As winter approaches or conditions change, the production of parthenogenetic females ceases and males are generated. However even in adverse environmental conditions males are only half of the total population and in some species they are completely absent. Males are much smaller than females and have a specialized abdominal appendage used during mating to attach to the female, open its carapace and fertilize the eggs. These are called winter eggs and have a shell called an ephippus, which preserves and protects them until spring, where appropriate stimuli favor their hatching, so as to restart the cycle by parthenogenesis.



*Daphnia Magna seen through the microscope at scientific laboratory in Insubria University.
In the picture eggs are visible in the body of the female.*

USE OF DAPHNIA MAGNA AS BIOLOGICAL INDICATOR



Composition of the mixture for algae growth with professional tools of the scientific laboratory at Insubria University of Como

Daphnia don't live for more than a year and life is largely dependent on temperature because they are very sensitive to changes. Some organisms can live up to 108 days at 3 ° C while others live only 29 days at 28 ° C. A clear exception to this rule occurs in winter, when adverse conditions limit the population and females have been observed to live for more than six months. Daphnia can be used in some environments to test the toxic effects of many contaminants on an ecosystem. This makes the daphnia as biological indicators particularly useful because of their short life cycle and their reproductive capacity. The term "biological indicator" means an animal species, particularly sensitive to changes brought about by polluting factors in the ecosystem in which it lives. Few

daphniaes feed on small crustaceans, but most eat unicellular algae and bacteria.



Unicellular algae to feed Daphnia Magna