MARINE CLADOCERANS

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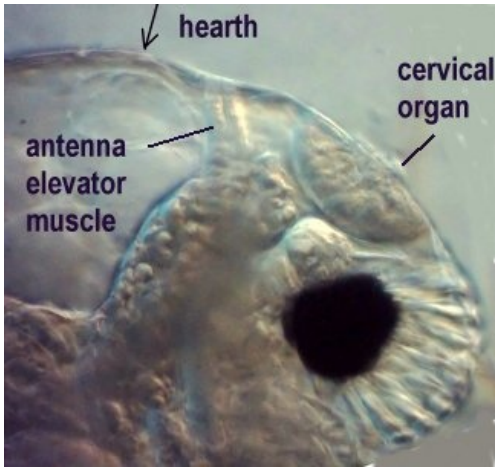
There are about 120 species of cladocerans distributed in 44 genera. The majority of these are freshwater organisms commonly referred to as "water flies", the best known of which is *Daphnia pulex*, often used in dried form to feed aquarium fish.

But there are also far fewer marine species: half a dozen to my knowledge of which we will see 3 of the most frequent representatives.

The first is *Podon*: Length 0.4 mm; the abdomen is filled with an egg.

Second species: *Evadne*: several embryos on left specimen; length 1.4mm; image at right *Evadne spinifera.*

Detail of compound eye:



These two species are carnivorous (copepods, etc.)
See the very beautiful images of these two species described in the articles by Wim van Egmond cited in the link below:

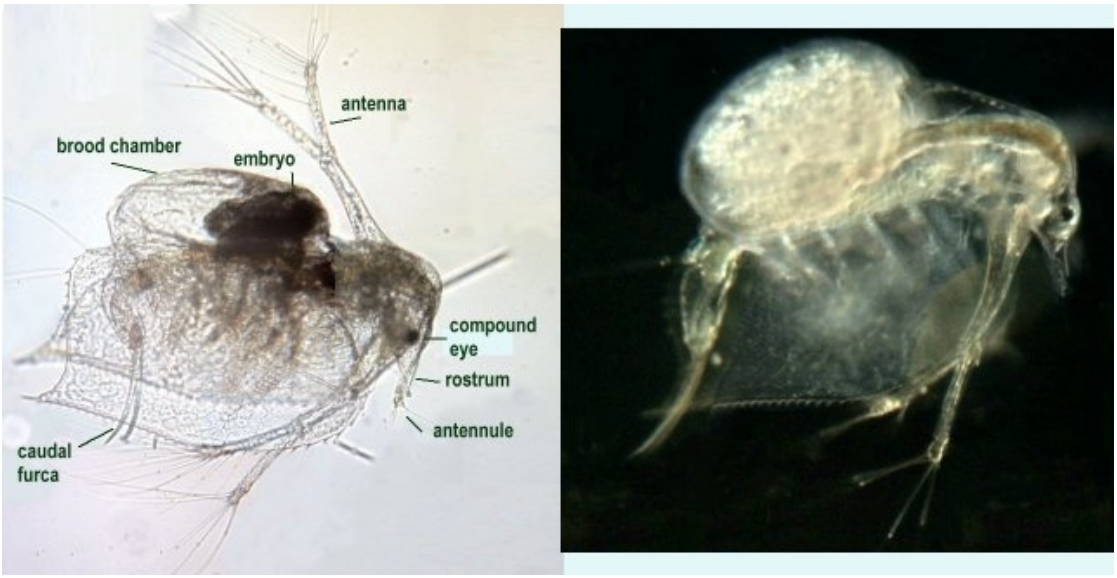
http://www.microscopy-uk.org.uk/mag/artjun99/wflea3.html

But we are going to examine a third species, rarer, because appearing episodically: it is *Penilia avirostrils* which is the only marine filter-feeding cladoceran. It should be noted that these specimens are fragile and do not live more than a few hours in a sample, but which gives time to observe them and release them.

A documented image for the specimen size (two different specimens): Length: 1 mm

Penilia avirostrils has a bivalve carapace, with ventral opening, a compound eye, and six pairs of thoracic filter-feeding limbs. The ventral edges of the carapace wear fine spines. The head has a rostrum, like a bird's beak (probably origin of its name!). The caudal furca has two long spines. The antennule is very short in the female. They use antennas to swim.

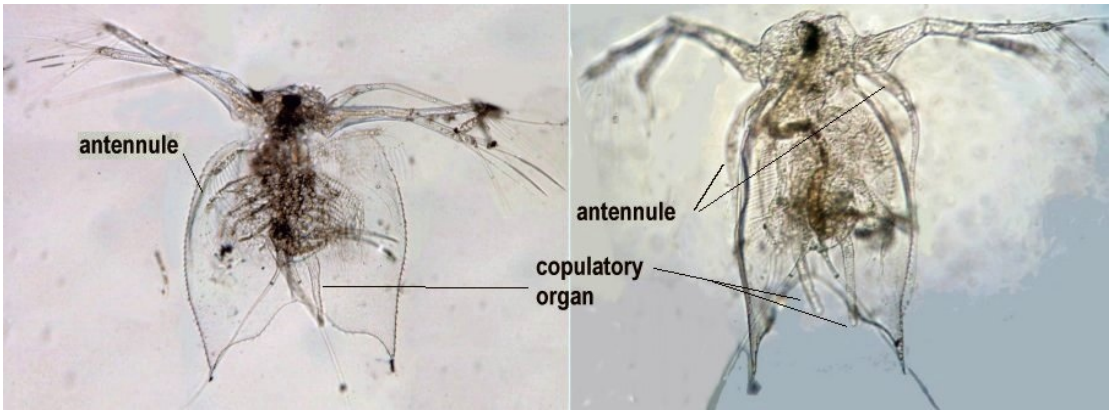
A documented brightfield and darkfield image: This is a female carrying embryos (not the same specimen):



Side view showing half of 6 pairs of thoracic limbs always moving to filter particles through setae; note the heart (arrow):

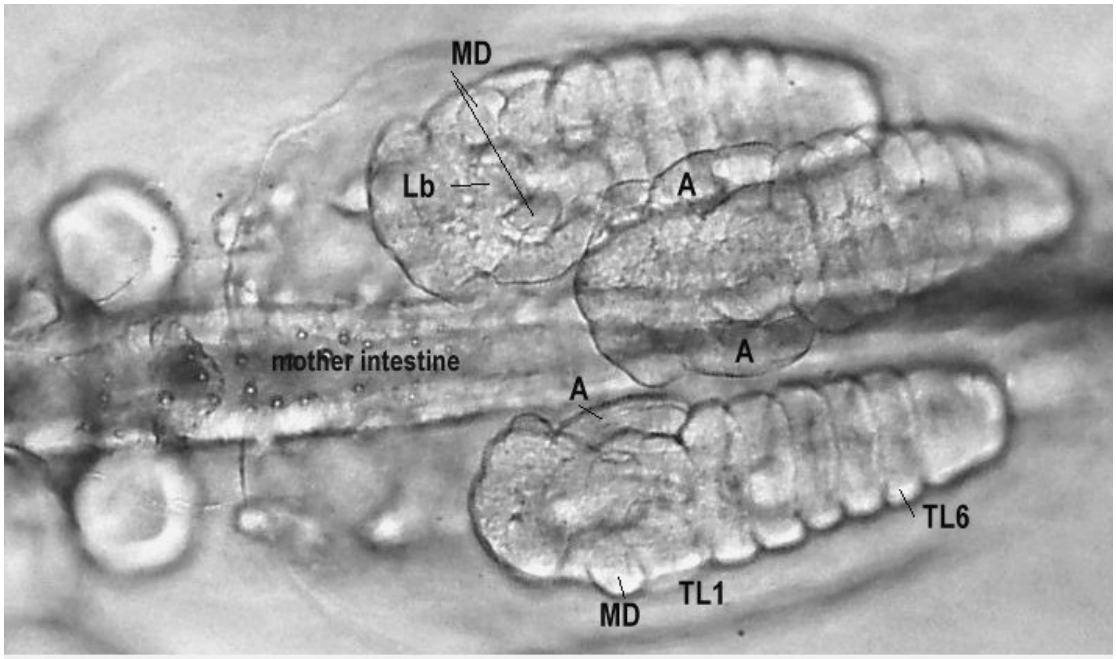
These cladocera are parthenogenic females, the eggs hatch in the dorsal brood pouch and the embryos develop until they can be ejected. When living conditions become difficult, males (rarer) appear and mating results in resting eggs that will develop under more favorable conditions.

Images of two males easily identifiable by the length of the antennules (almost that of the entire body), the presence of two copulatory organs, and a rounded rostrum. (Specimens a little flattened under the cover slip.)



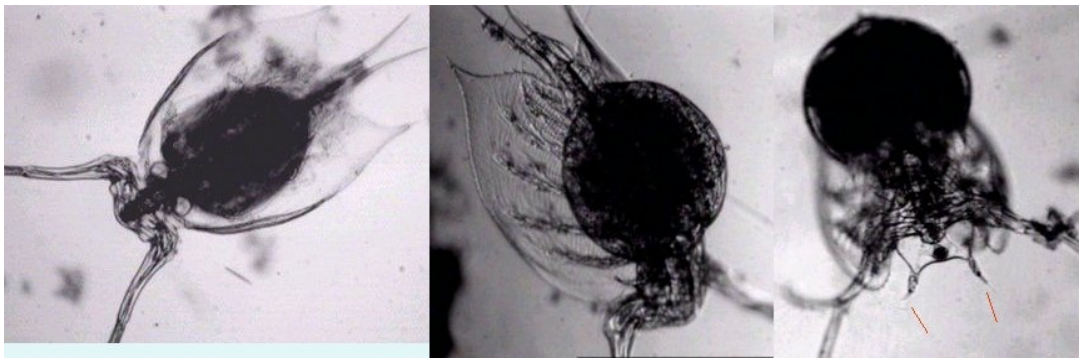
A higher resolution image (inverted microscope) of a female carrying 3 well-developed embryos in a dorsal position:

Zoom on the three embryos which allows to see the outline of the various organs:



A : Antenna MD : mandible TL1- TL6 : 6 thoracic limbs Lb : labrium

A last picture (taken in year 1999!) showing an unusual image of the head of a pregnant female where we can clearly see the antennules (red lines).



References :

Podonidae : https://www.marinespecies.org/aphia.php?p=taxdetails&id=106264

Penilia : https://www.marinespecies.org/aphia.php?p=taxdetails&id=106272

https://www.photomacrography.net/forum/viewtopic.php?p=91338

https://www.researchgate.net/publication/239946406_Unraveling_the_origin_of_Cladocera_by_identifying_heterochrony_in_the_developmental_sequences_of_Branchiopoda

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