Creseis anatomy *Pteropoda / Thecosomata*

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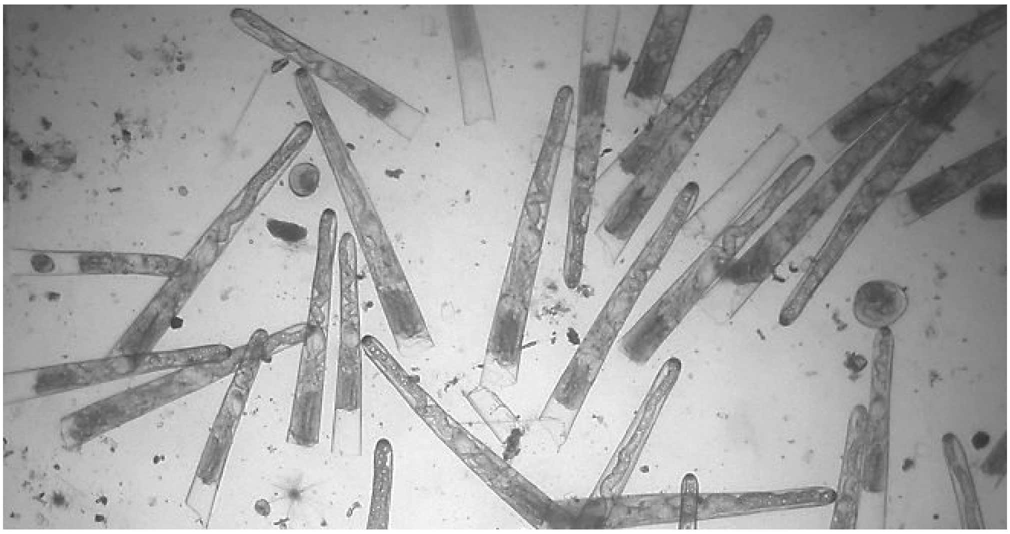
The pteropods (literally wings at the feet) changed their old name to Thecosomata for those with a shell and Gymnosomata for the others. The first time I met one I noticed the similarity of organs with snails; it was our late friend Walter Dioni who directed me to thecalosome: *Creseis.* Here is one of the first images I took, composed from 16 partial views of a living individual: (analog camera 380x 260 pixels!).

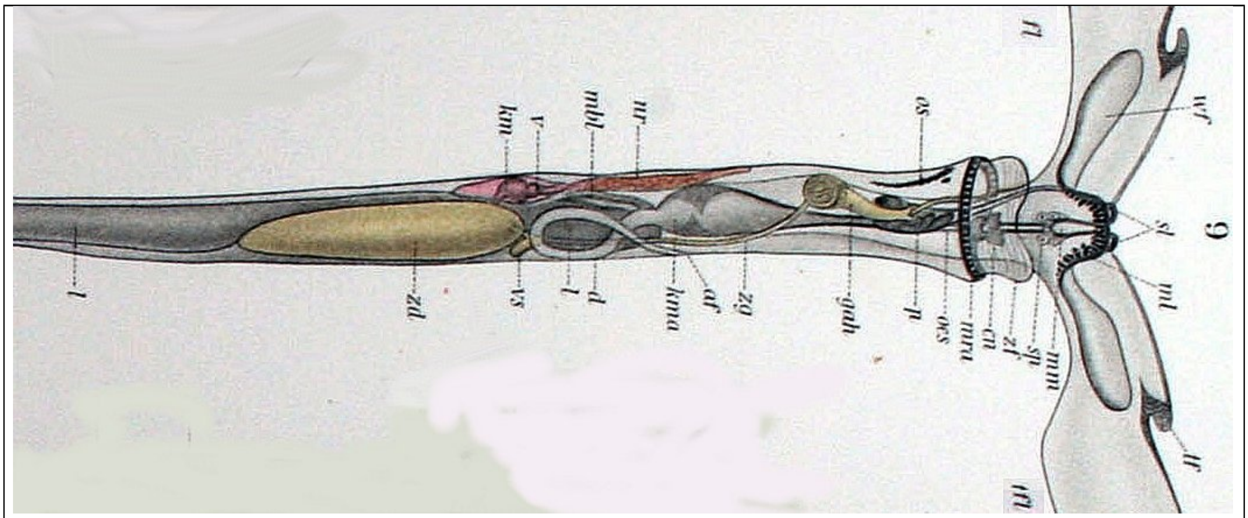
In this old article, which I did at the time, an animation shows the means of movement of a specimen using its "wings".

In 2018 in a marine plankton net sample, I was surprised to encounter a large quantity: picture: 2.5 x inverted microscope objective: (specimens released 2 hours later).



As the image quality is better this time, (5Mpx) it is possible to explore their anatomy a little more (hence the title!) Curiously, a search on the net often refers to a magnificent board taken from this link : Creseis is specimen N° 9.

The original plate from 1899 is documented in German, a language I do not speak so I have - tried - an automatic translation but the German compound words are difficult to translate. Here is drawing N° 9 extracted from the plate and the translated captions: (make zoom on the page).



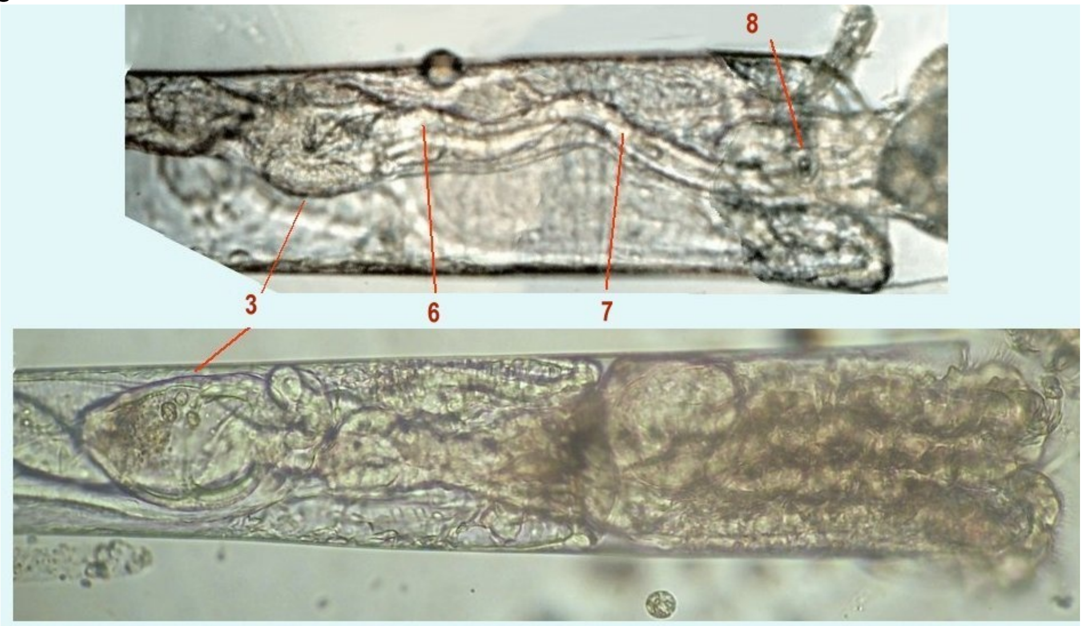
German	*English*	*French*
af After.	*af* after.	*af* après.
la Leberausführgang	*la* liver duct	*la* canal hépatique
sd Schalendrüse.	*sd* shell gland.	*sd* glande coquille .
afs Aftersipho.	*afs* Aftersipho.	*afs* Aftersipho.
m Mundöffnung.	*m* mouth opening.	*m* ouverture de la bouche.
sl Seítenlappen dës Fußes.	*sl* lateral lobe of the foot.	*sl* lobe latéral du pied.
bcg Buccalganglion.	*bcg* Buccal ganglia.	*Bcg* Ganglion buccal
mbl Magenblindsack.	*mbl* gastric blind sac.	*mbl* cul de sac gastrique .
sp Speicheldrüsen.	*sp* salivary glands.	*sp* glandes salivaires.
cc Cerebralkommissur.	*cc* cerebral commissure.	*cc* commissure cérébrale.
mds mantelholhlendrüse.	*mds* mantle cavity gland.	*Mds* glande de la cavité du manteau
sr Samenrínne.	*sr* seed gutter.(?)	*sr* gouttière alimentation
cg Cerebralganglien.	*cg* cerebral ganglia.	*cg* ganglions cérébraux.
mi Mittellaiflben des Fußes.	*mi* middle lobe of the foot.	*mi* lobe median du pied
t Tentakel.	*t* tentacle.	*t* tentacule.
cn Centralınervensystem.	*cn* central nervous system.	*cn* système nerveux central.
mm Mundmasse.	*mm* mouth mass.	*mm* masse buccale.
tf tentakelartiger Fortsatz der Flosse.	*tf* tentacle-like extension of the fin.	*tf* extension tentaculaire de la nageoire.
d Darm.	*d i*ntestine.	*d* intestin.
Mra Mantelrand.	*Mra* coat edge. _	*Mra* bord du manteau. _
fl Flosse.	*fl* fin.	*fl* ailette.
v Vorhof.	*v* atrium.	*v* oreillette.
ga eschlechtsausführgang..	*ga* sex passage..	*ga* passage du sexe..
vg Visceralganglíøn.	*vg* Visceral ganglion.	*vg* Ganglion viscéral.
Gah genitalanhangsdrüsen.	*Gah* genital appendages.	*Gah* appendices génitaux.
nr Niere.	*nr* kidney.	*nr* rein.
vs Vesicula seminalis	*vs*. seminal vesicle	*vs* vésicule séminale
oes Oesophagus.	*oes* esophagus.	*oes* œsophage.
wf wimperfeld des Fußes	*wf* ciliated field of the foot	*wf* zone ciliée du pied
os Osphradíum	*os* osphradíum	*os* osphradium
zd Zwitterdrüse.	*zd* hermaphrodite.	*zd* hermaphrodite.
p Penis.	*p* penis.	*p* pénis.
km Herzkammer.	*km* ventricle.	*km* ventricule .
pg Petalganglíon.	*pg* Petal Ganglion.	*pg* Ganglion des pétales.
kma Kaumagen.	*kma* gizzard.	*kma* gésier
ret Retractormuskel	*ret* retractor muscle	*ret* muscle rétracteur
zg Zwittergang.	*Zg* hermaphrodite.	*Zg* hermaphrodite.
l Leber_	*l* liver_	*l* foie_
rs Receptaculum seminis.	*rs* Receptaculum seminis	*rs* Receptaculum seminis.

Some labels remain difficult to translate, even imprecise (ie: receptaculum seminis). They also concern other specimens of the board and not only *Creseis*! but I left them in the translation.
It is necessary to underline the precision of these drawings, which suppose a great number of observations, the various organs being often entangled.

It is interesting to see what modern techniques, (inclusions and multiple cuts plus 3D software) make it possible to obtain (but in a less artistic way!):

https://academic.oup.com/mollus/article/80/5/585/2883244

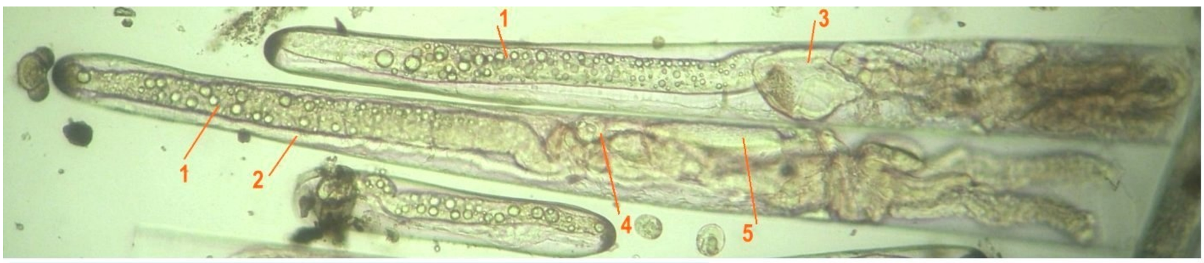
See fig. 3 especially for the digestive system.
Using these sources of information, let's try to find the main organs on the real images:



3 gizzard 6 stomach 7 oesophagus 8 statolith

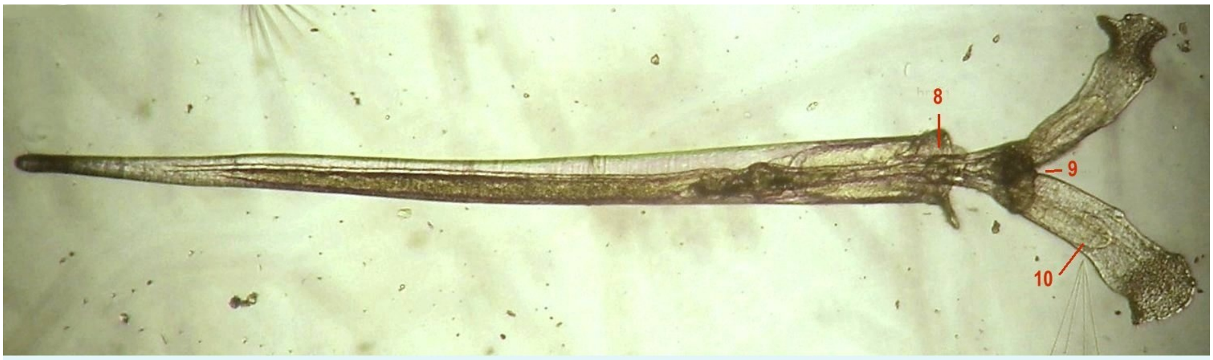
The gizzard contains plates P to grind food, S designates the 2 statoliths.

On other images we can better see the retractor muscle (2) of the body and what is designated as liver (1) or digestive gland but it is probably a hepato-pancreas.



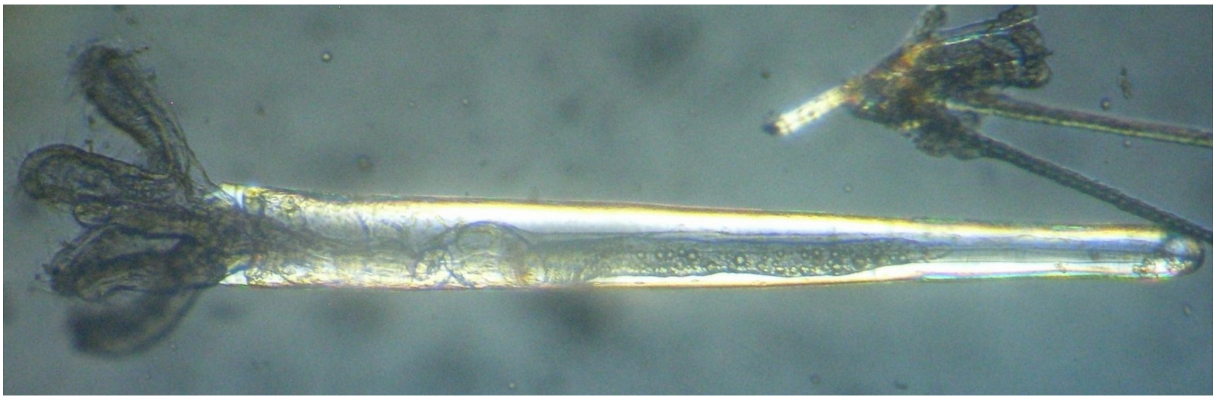
1 liver 2 retractor muscle 3 gizard 4 ventricule (?) 5 kidney (?)

Here we see the position of the brain, the mouth and the feet (wings) deployed: they are used for rapid movement (see previous animation) and are covered with ciliae which bring the nutrient particles back to the mouth. The two statoliths used for equilibrium are located at the base of feet.
Creseis acicula specimen:



8 brain 9 mouth 10 ciliated fields of the feet

The shell is composed of aragonite, a variety of unstable form of carbonate mineral limestone and gives this characteristic effect with polarized light:



This shell is thin and fragile and becomes a good indicator of water acidification when its thickness decreases.

A view of the ciliae contained within the “wings”:

In fact, in the two images above we see that there would be 4 wings: I think that two of them are remnants of the structures of the veliger stage which are used by the larva to move it.

Which would lead to think that the specimens studied above would be juvenile forms, the image below shows, on the same photo from the same sample, a "young" and an adult which measures more than 6 mm (vigneting on picture taken with 2,5 X objective is due to an inadequate bulb which has been replaced by an LED).

For their reproduction, pteropods are hermaphroditic, first male then female on the same individual.

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