

# A house for Protists

About testate amoebae shells  
- *You don't need brains  
to be a builder* (Mike Hansell)



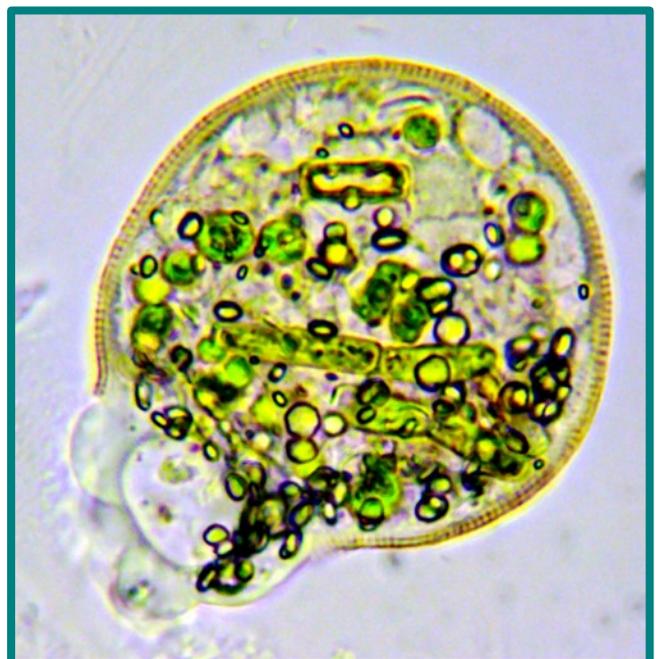
A naked Amoeba

**M**oving about naked is a dangerous way of life. Evolution therefore once decided to equip some Amoebae with shells.

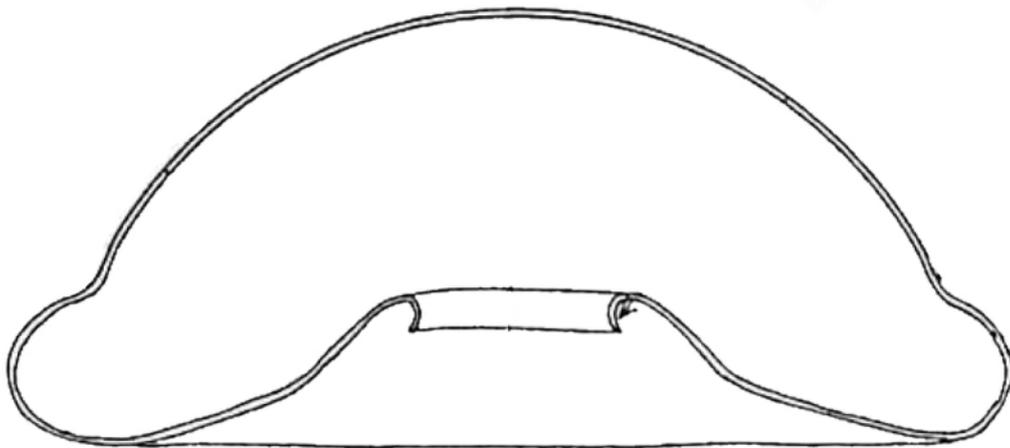
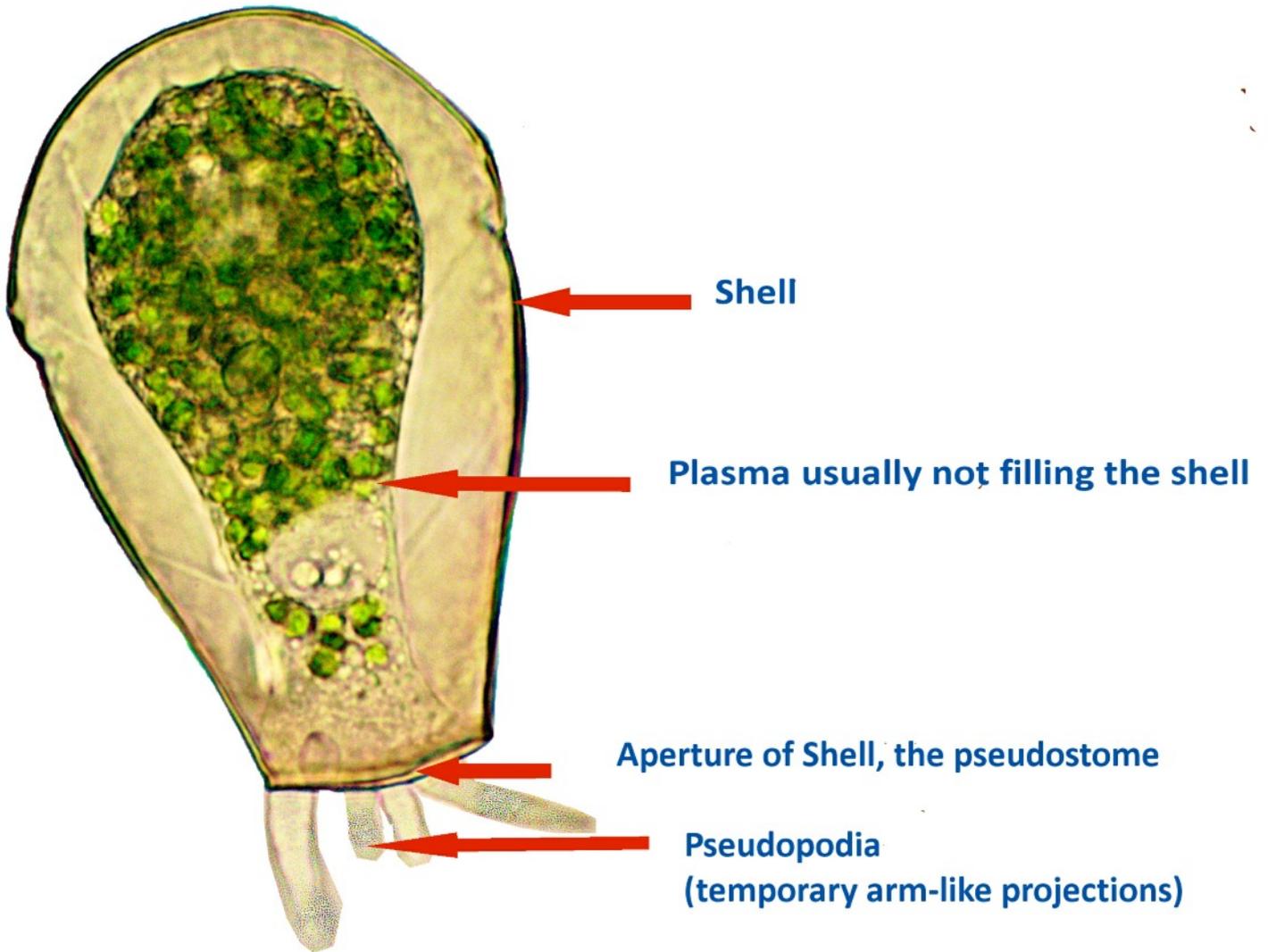
The structure of the shells is the main distinguishing feature of the Testacea species. I'll show you some typical examples:

Evolutions first attempt was  
**Cochliopodium**

Cochliopodium species are covered by a flexible layer of scales termed “tectum” and are considered as the link between the naked and the testate lobose amoebae.



# Their cell morphology simplified



Cut through a typical Arcella shell (*Arcella vulgaris*),

Drawing after Deflandre 1928

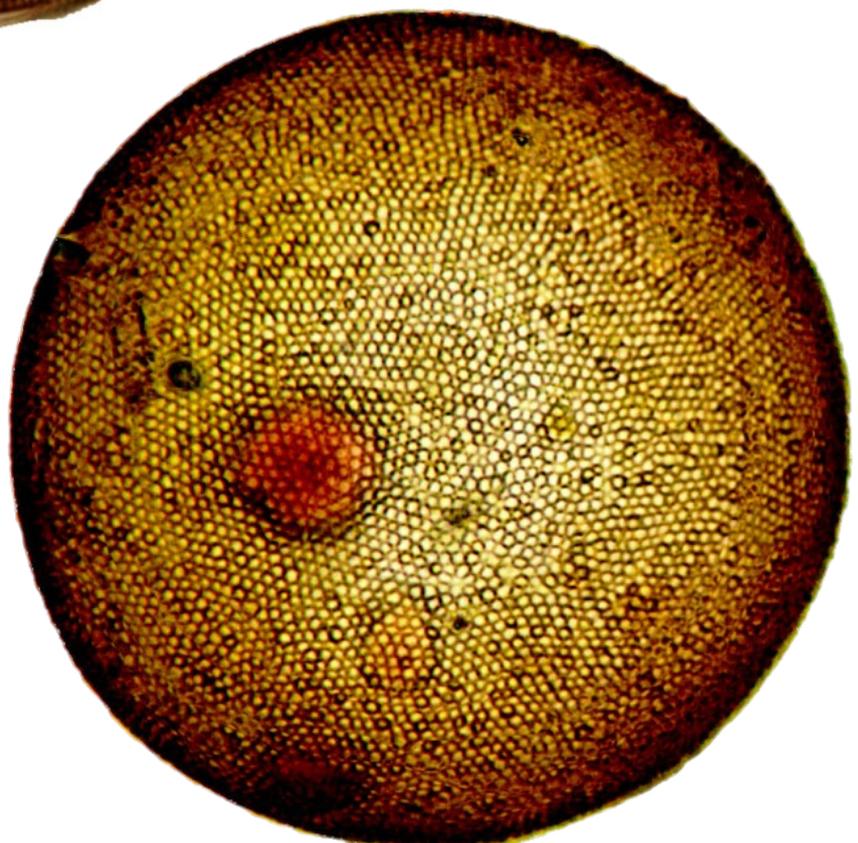
# Arcella

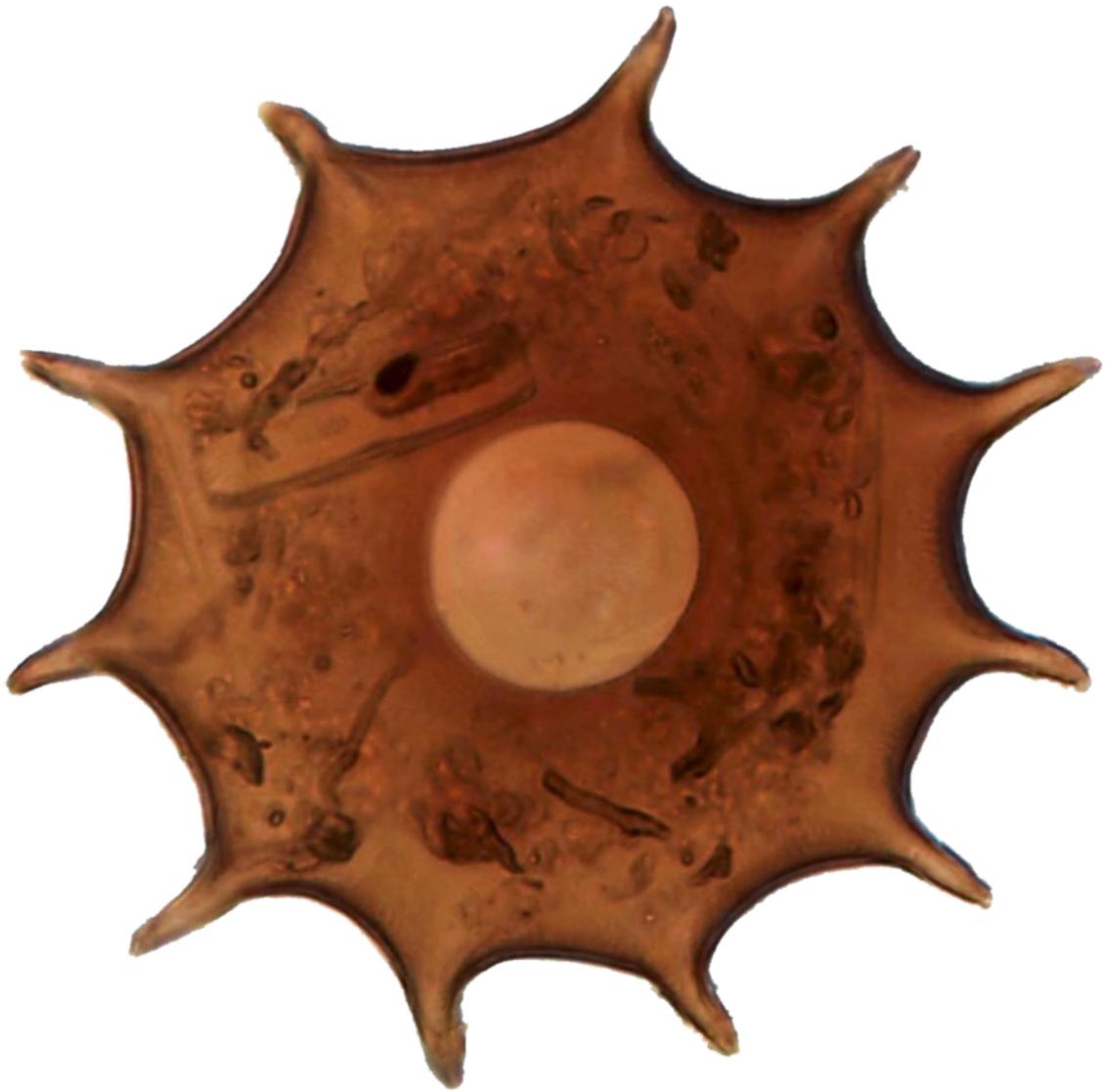
Their skin consists of self secreted minute honeycomb-like chambers of between 0.5 and 1.5  $\mu\text{m}$  diameter:

The beautiful globular  
*Arcella mitrata* ...



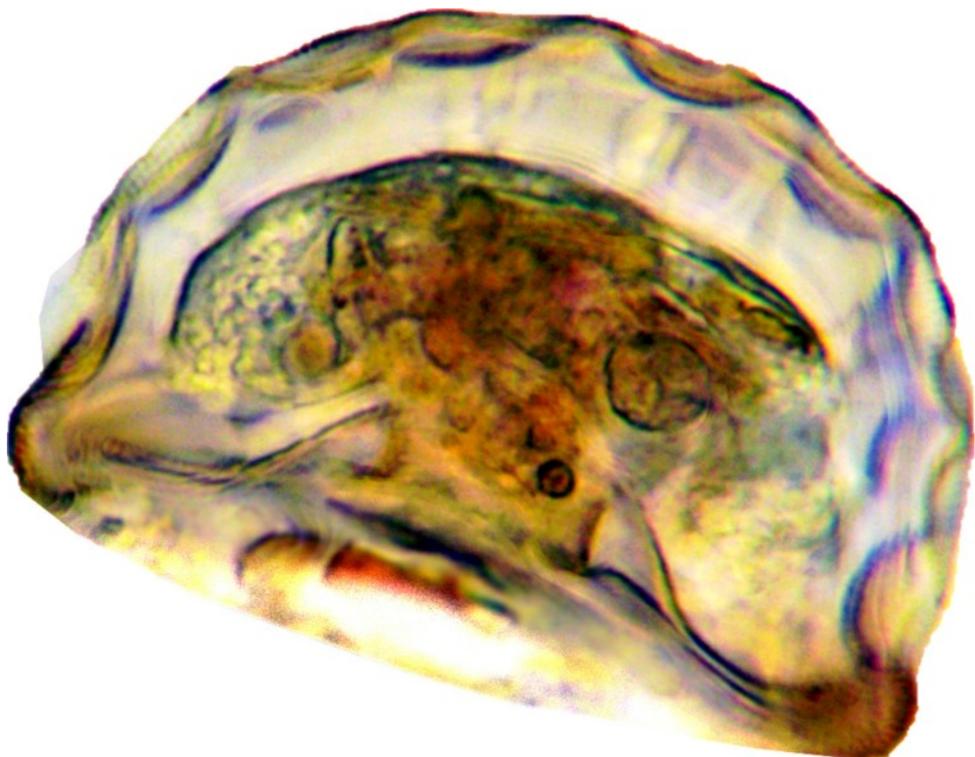
... and its honeycomb  
structure





Two more Arcella, just because they are so beautiful:

Arcella dentata (top) and Arcella gibbosa, a lateral view inside.

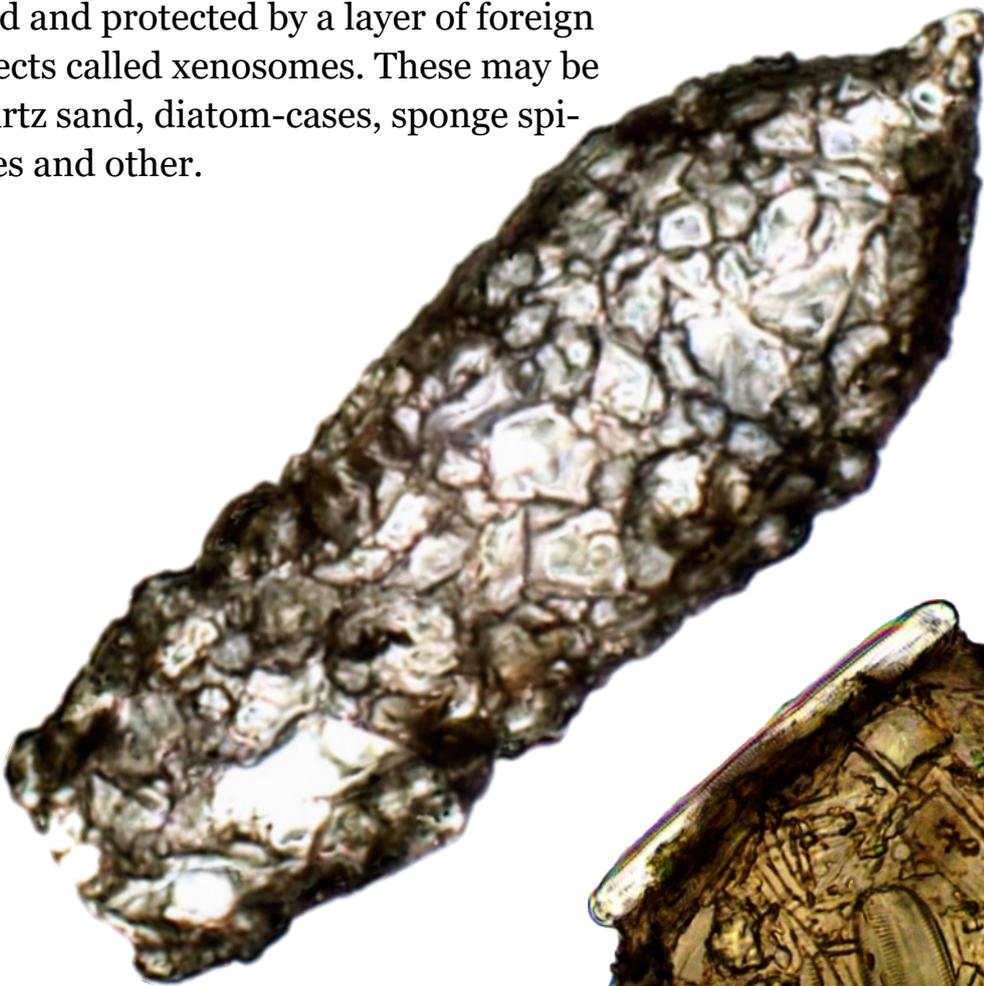


# The genus *Diffflugia*

is the most species-rich and very diverse group,  
some call it overcrowded

**T**heir shell is made of a chitinous opaque membrane, usually strengthened and protected by a layer of foreign objects called xenosomes. These may be quartz sand, diatom-cases, sponge spicules and other.

Here is a small collection showing the diverse shapes and forms:



*Diffflugia acuminata* (above) has covered itself with rough quartz stones,

while *Diffflugia capreolata* (right) has chosen a mix of sand grains, especially around its mouth, and diatoms.



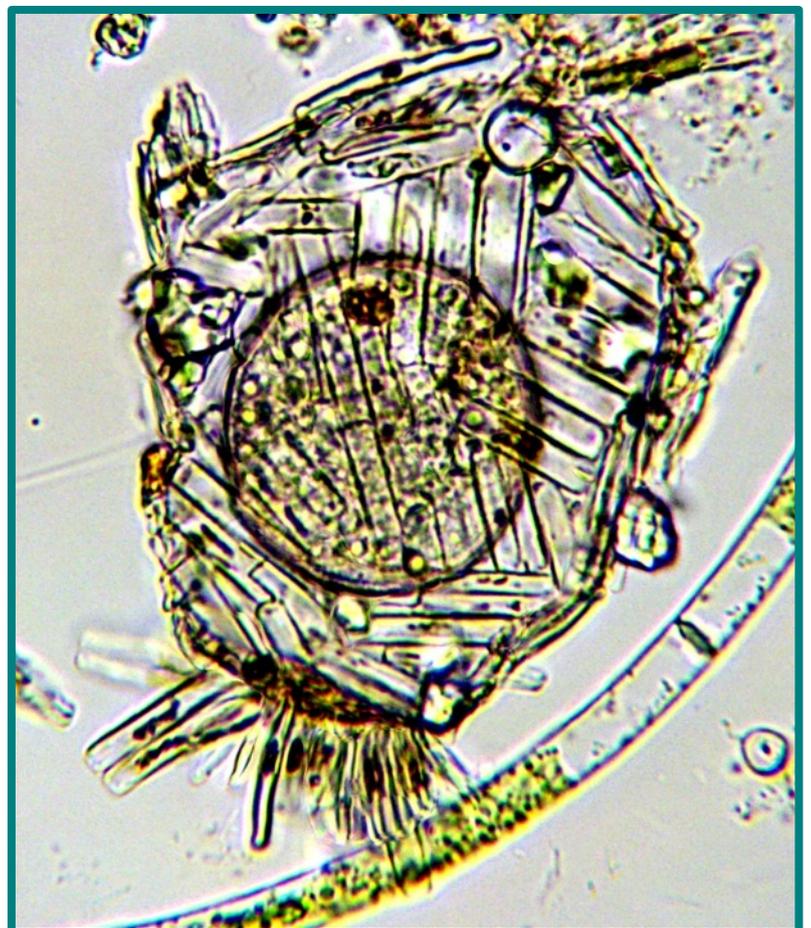


This *Difflugia bacillifera* (Bacillariophyta = diatoms) has selected some large diatom shells.

It is an enigma: Had it accumulated this building material, before cell division (like the example below), or had the new cell actively collected these large items, fishing for them from the environment, during the division process?

This transparent encysted *Difflugia leidyi* has evenly covered itself with many uniform diatoms.

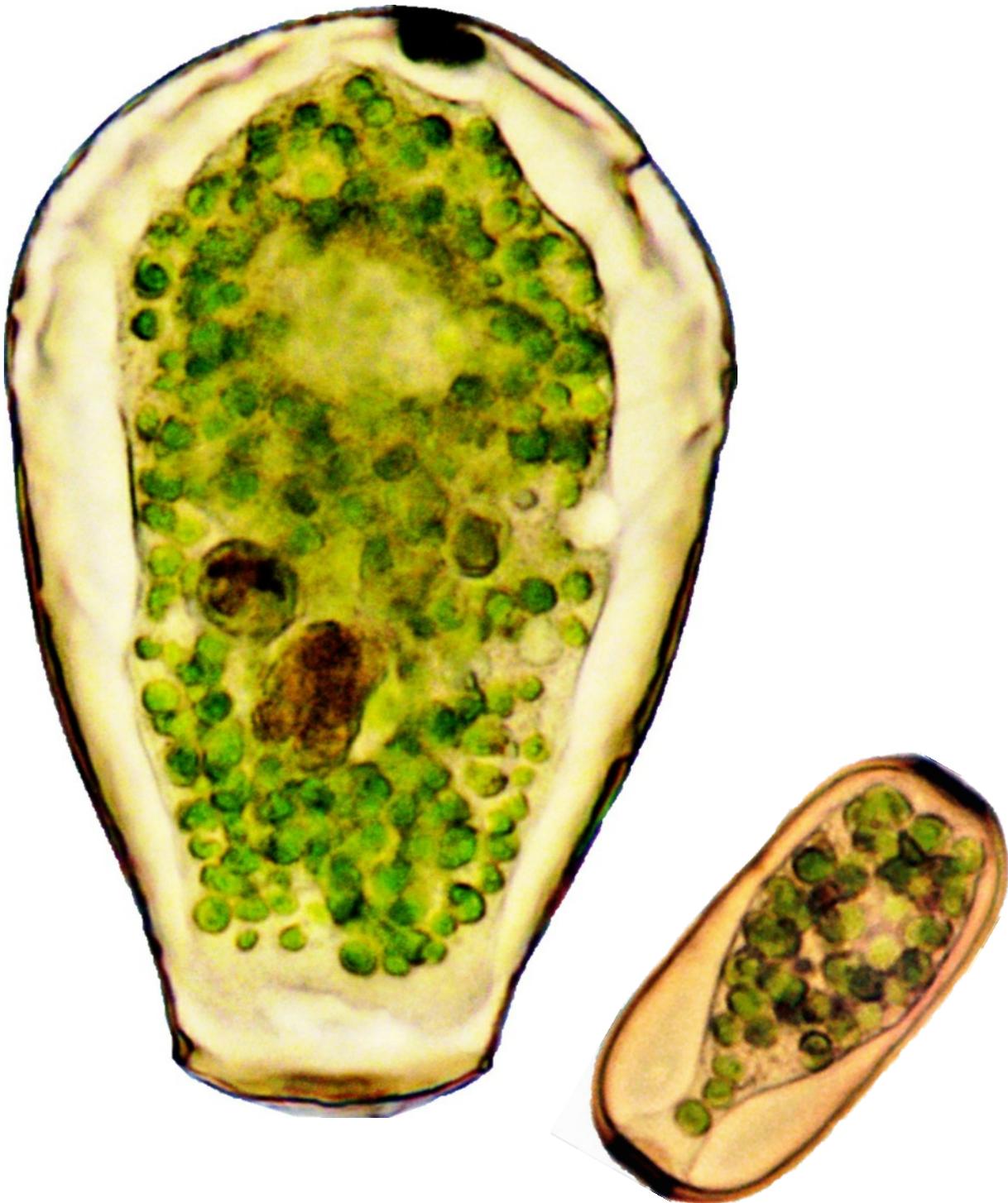
Interesting here: For the next generation it has accumulated a supply of diatoms **outside** its shell .



Some species have a transparent chitinous shell not being covered by foreign objects.

Examples are *Hyalosphenia papilio* (left) and *Archellera flavum*.

These are mainly bog dwellers housing symbiotic algae. The sunlight passes freely for the benefit of the algae.

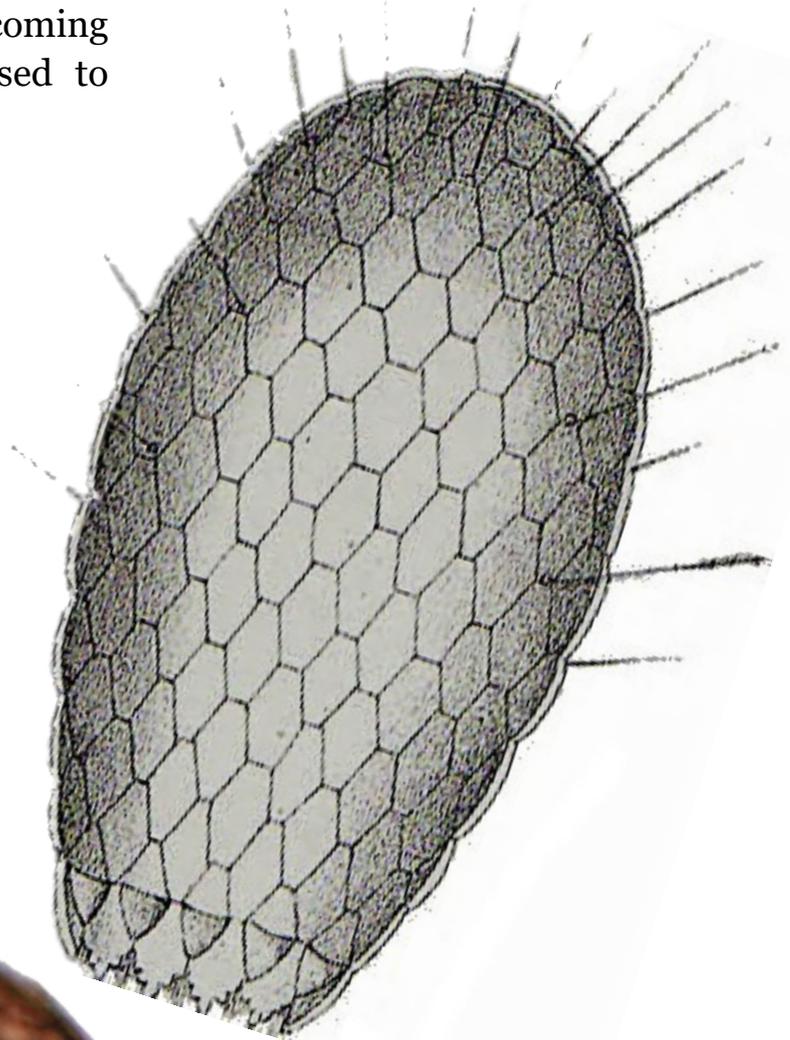


The empty shells of these species are extremely enduring, making them valuable proxies for past peat land surface wetness, and therefore climate.

# Euglyphidae

The members of the Order Euglyphida produce in their golgi apparatus silica scales, and some of them spines, which they store inside until the coming cell division, when these are used to strengthen the new shell.

It is difficult to take good photographs of Euglypha, so I am showing below one of the beautiful drawings by Joseph Leidy:

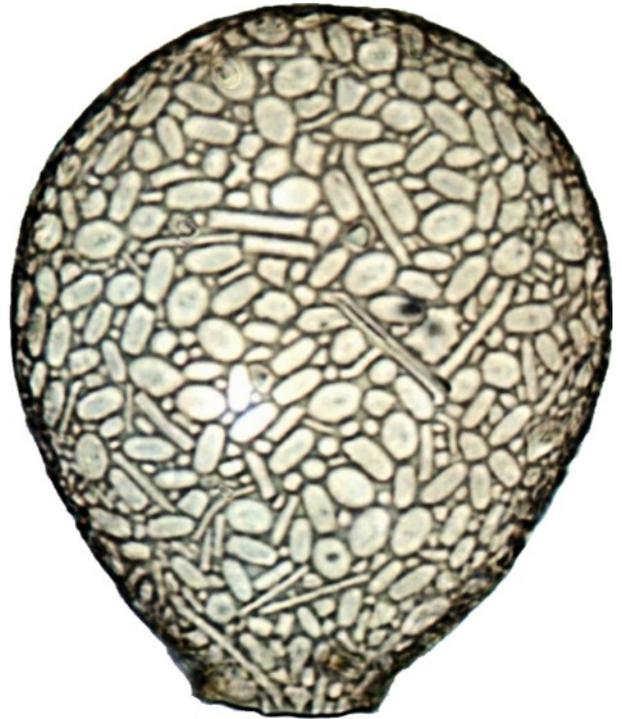


The order Assulina is another group of the Order Euglyphida.

# Nebelida

Members of the Nebelida family are notorious scavengers of Euglyphida.

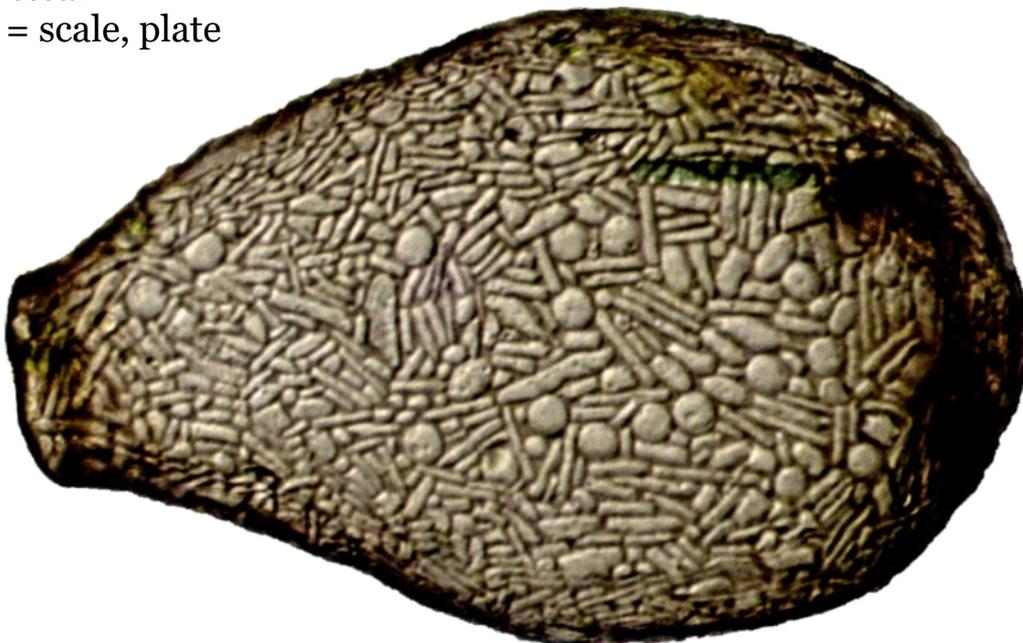
They not only eat them, but they also use their scales to arm and strengthen their own shells.



## Kleptosquamie:

clepto = steal  
squama = scale, plate

And they do it very properly indeed!



This *Planocarina marginata* has used a mix of euglyphid shells, diatoms and heliozoan axopodia.

Poor-mans-SEM: oblique light shots stacked.

Further reading:

- Ferry Siemensmas pages.
- The Joseph Leidy Portal.
- My pages.

All comments to the Autor Hans Rothauscher are welcome.

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