The riddle of the **brick-red Amoeba**



Pseudonebela cf. africana 135 µm.

cf. is used here to express a possible identity, or at least a significant resemblance.

1. Difflugia rubescens

D*ifflugia rubescens* is a well known and not rare *Difflugia* with worldwide distribution, mainly found in the northern moderate hemisphere.

Habitat: Aquatic vegetation and among *Sphagnum* or moss, rather low pH. Where it occurs it is usually abundant.

Penard described two size groups: 58 - 60 and 83 - 90 µm high.

The protoplasm containing numerous granules of brick-red colour.



Ogden & Hadley described it 1980 as follows: "The shell is yellow or light brown, pyriform. It is usually encrusted with sand-grains or diatom frustules. The aperture is circular and bordered by an organic collar, the inner margin of which is crenulated to form tooth-like structures."

Difflugia rubescens, both about 85 μm high.



2. Pseudonebela africana

In 1953, Madame Lucienne Gauthier-Lièvre discovered in Burkina Faso and Senegal this new species and described it as: 90-100 μ m high, round cross-section, flat underside, pseudostome with 3 to 5 lobes, cross- or clover-shaped, shell transparent with round scales like in Nebela (hence Pseudonebela).

Then, in 2011 Lahr et al. found it in Brazil and expressed



that due to the shape of the pseudostome it cannot be confused with any other species. It was considered a Gondwana-species, restricted to the areas of the former southern super-continent.

However, in the year 2013 Ferry Siemensma and Angie Opitz found *Pseudonebela africana*, as described by Gauthier and Lahr, in several bogs in Tyrol/Austria.

3. Incertae sedis:

(Latin for "of uncertain placement")

 ${f B}$ ut Siemensma and Opitz also found in Tyrol specimen very similar to *Difflugia rubescens*, but of almost twice its size, about 130 - 185 µm high. They identified them as *Pseudonebela africana*.

And in 2019 I found many of these large organisms in a sample from another Austrian bog. I feel that they resemble large *Difflugia rubescens* rather than large *Pseudonebela*.



One of my specimen, 140 µm high, very transparent shell, obscured by many transparent diatoms. Pseudostome surrounded by seven irregular lobes.





Crenulated pseudostome of one of my large specimen, ornamented with *heliozoan* shells.



Both, the well known *Difflugia rubescens* and these new large species are known to feed by drilling holes into various types of desmidian algae and sucking out the contents.

It took this large specimen 24 minutes to empty the desmid.

What all three have in common:

- The general shape of the test
- The red granules, 1.0 1.5 µm wide
- They prey on desmids in a unique way
- They have lobed pseudostomes.

It appears that they all share a common ancestor. But where are the transitional forms?

Ernst Jung believed (1936) that larger variants of testate amoebae usually occur [and evolve?] in wetter locations.

 ${f S}$ o let us talk in general about the evolution of protists with asexual reproduction, the so-called *agamospecies*.

The generations of protists are chains of identical clones. With each mutation a modified new line of clones begins. With time going by the latest transmuted So far, no DNA sequencing has taken place to clarify their relationships.

variation of clones may differ so much from the originating form that it could be considered a new species.

Relations are often concealed as many transitional stages have died out.

<u>Further reading:</u>

- Ferry Siemensmas page on Pseudonebela africana.
- My relevant page.

Other Literature:

L. Gauthier-Lièvre, 1953: Les genres *Nebela, Paraquadrula et Pseudonebela* en Afrique. Extrait du Bulletin de la Société naturelle de l'Afrique du Nord.

Ferry Siemensma & Angie Opitz: Beobachtungen an *Pseudonebela africana*, Mikrokosmos 104, Heft 4, 2014

Ernst Mayr, 2004, What Evolution is, ISBN 978-0753813683,

All comments to the author Hans Rothauscher are welcome.

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