***Haematococcus lacustris***

**(Girod-Chantrans) Rostafinski 1875**

**Most likely ID:** n.a.

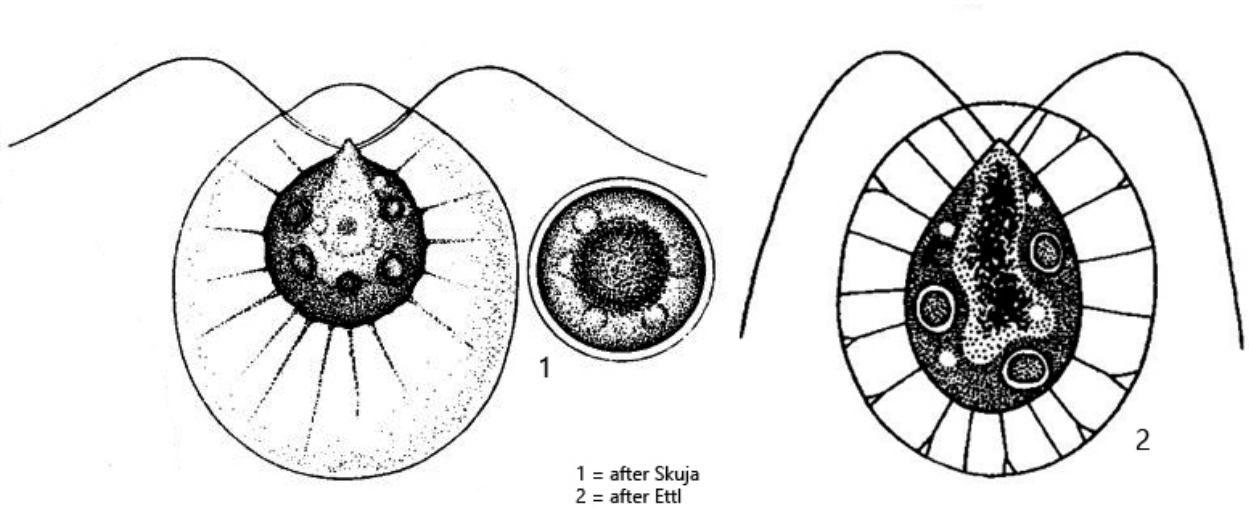
**Synonym:** *Haematococcus pluvialis*

**Sampling location:** cattle trough

**Phylogenetic tree:** *Haematococcus lacustris*

**Diagnosis:**

- cell spherical or ellipsoidal
- cell covered by large, spherical envelope
- spherical envelope limited by distinct membrane
- cell connected to membran with fine filaments
- two flagella guided in tubes through spherical envelope
- length 10–50 µm (of cell)
- one eyespot in anterior third
- several, scattered contractile vacuoles
- nucleus central with spherical nucleolus
- one chloroplast, cup-shaped with many pyrenoids
- central part of cell filled with orange or red haematochrome granules



Haematococcus lacustris

*Haematococcus lacustris* is an extremely common, volvococcal alga. It is found in small and very small bodies of water, such as rock puddles, cattle troughs or bird baths, which can dry out regularly and are exposed to intense sunlight in summer. The algae can therefore cope with the most extreme conditions. When the water points dry out, the cells encyst and form red-orange coatings.

The most striking feature of *Haematococcus lacustris* is the large, spherical envelope with a distinct membrane in the middle of which the cell is located. It is attached to cytoplasm filaments, which are connected to the outer membrane. These cytoplasm filaments are often dichotomously branched at the distal end. Apically, the cell has a nose-shaped projection from which the two flagella extend. They are guided outwards through the sphere by two hollow tubes. The cell is thus completely shielded from the environment by this construction. Another characteristic feature is the large amount of orange-red haematochrome granules (a mixture of carotinoids) that accumulate around the central nucleus. One can assume a function as UV protection.

Many small contractile vacuoles are distributed over the entire cell. The cell has a cup-shaped chloroplast with several pyrenoids (usually more than 4). This distinguishes *Haematococcus lacustris* from the similar species *Haematococcus droebakensis* and *Haematococcus Bütschlii*, which have only two pyrenoids.

*Haematococcus lacustris* is one of the few industrially utilized algae. It produces the carotenoid astaxanthin, which is used as a colorant in the fish (salmon), food and cosmetics industries. The increased formation of astaxanthin in direct sunlight is exploited.

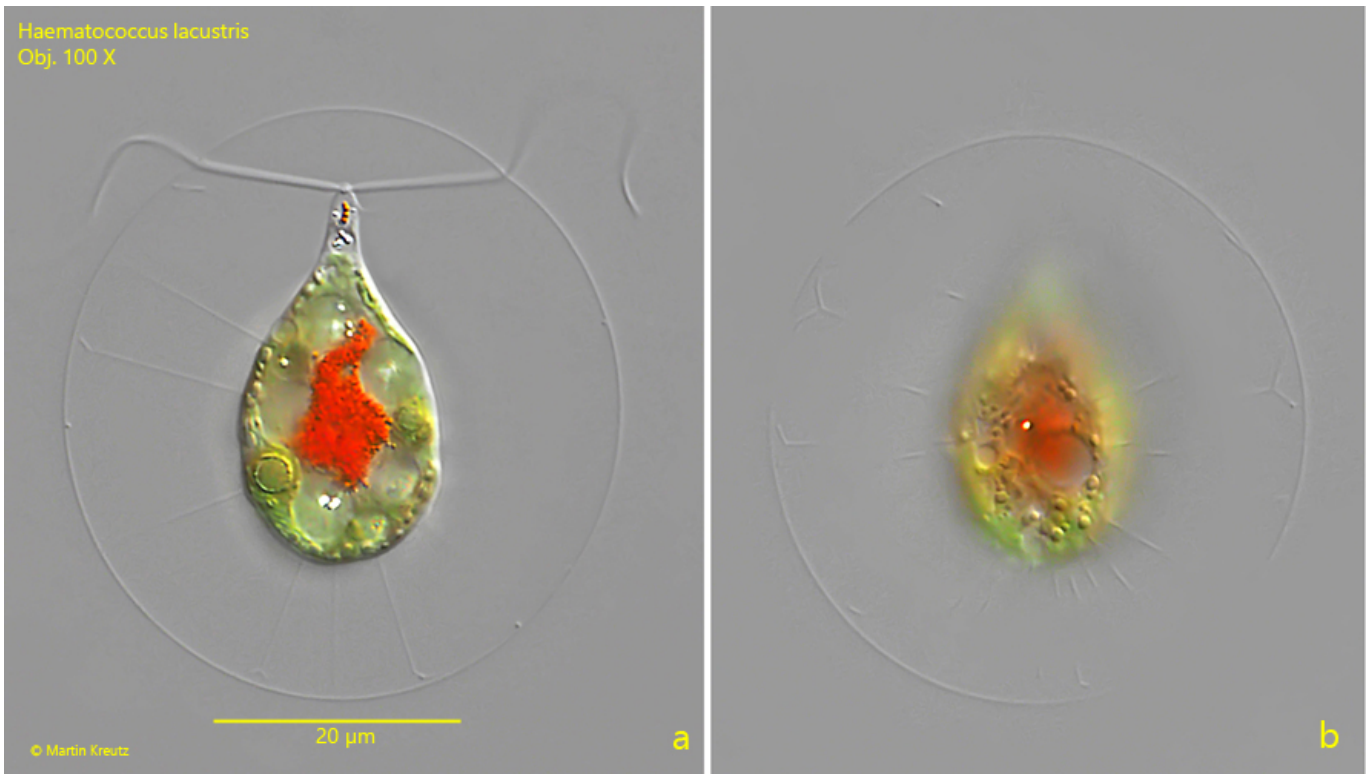



**Fig. 1 a-b:** *Haematococcus lacustris*. L = 34 µm (of cell). Two focal planes of a freely swimming specimen. Obj. 100 X.

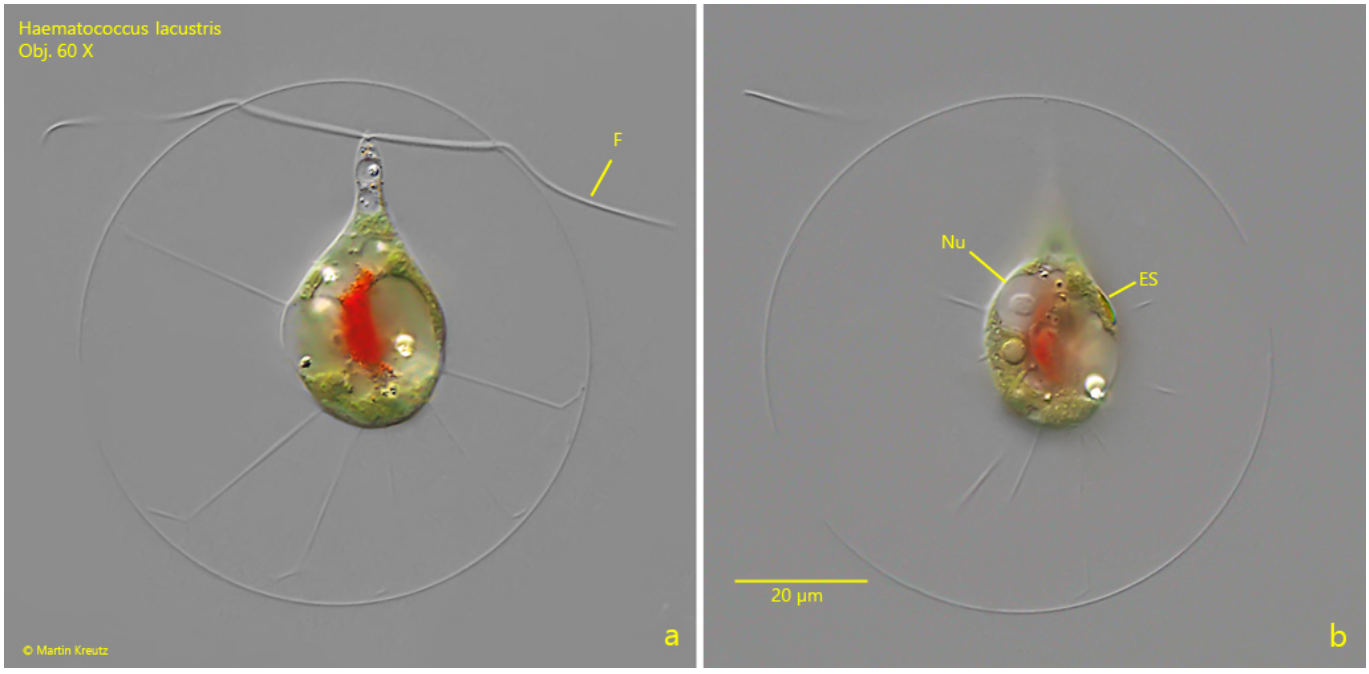



**Fig. 2 a-b:** *Haematococcus lacustris*. L = 38 µm (of cell). Two focal planes of a second, freely swimming specimen. ES = eyespot, F = flagellum, Nu = nucleus. Obj. 60 X.

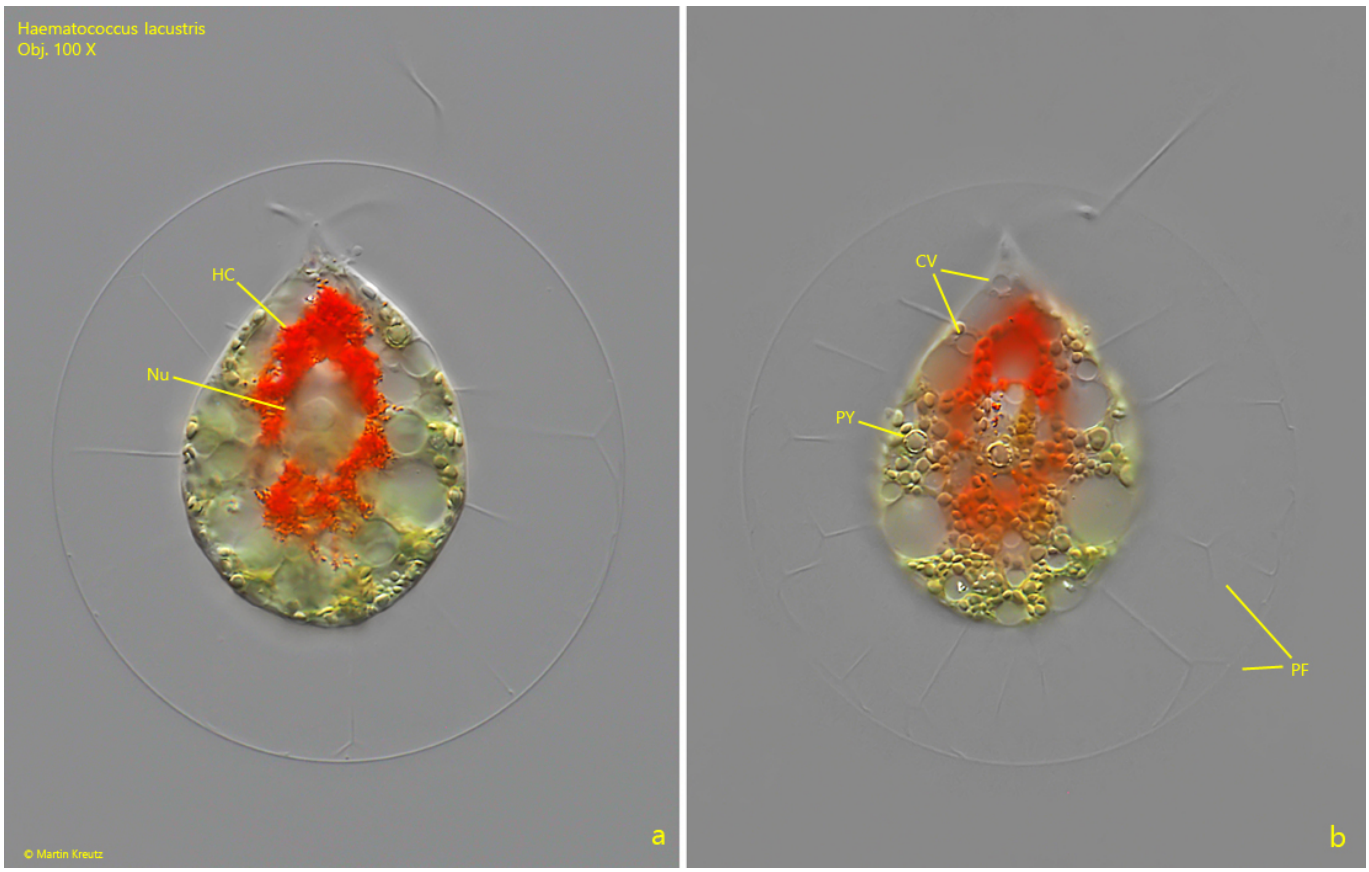



**Fig. 3 a-b:** *Haematococcus lacustris*. Two focal planes of a slightly squashed specimen. Note the scattered contractile vacuoles (CV) and pyrenoids (PY). The nucleus (Nu) is located centrally and surrounded by an accumulation of orange-reddish haematochrome granules (HC). The cell is connected via plasm filaments (PF) with the outer membrane . Obj. 100 X.

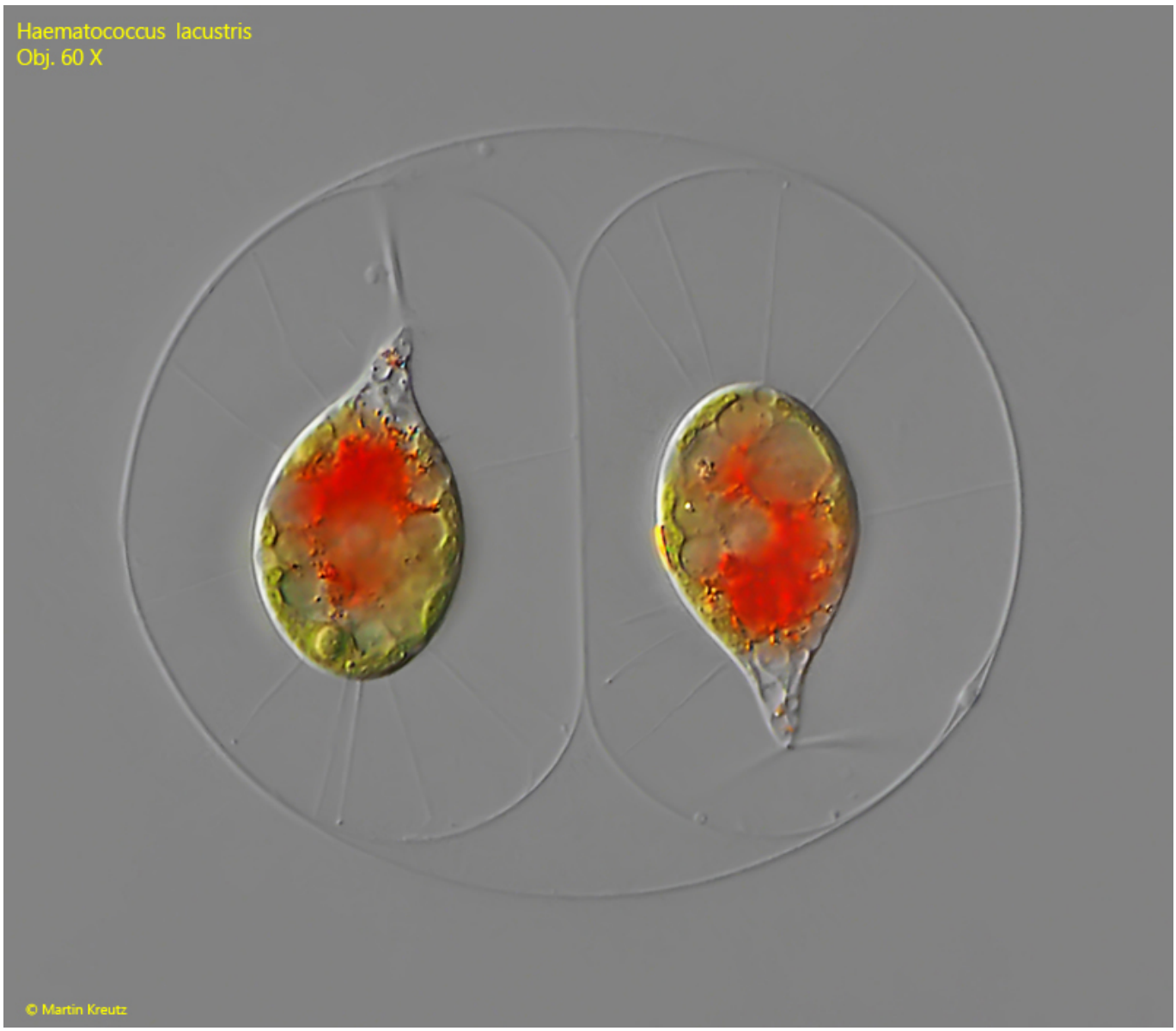



**Fig. 4:** *Haematococcus lacustris*. Two cells in a common spherical envelope after cell division. Obj. 60 X.

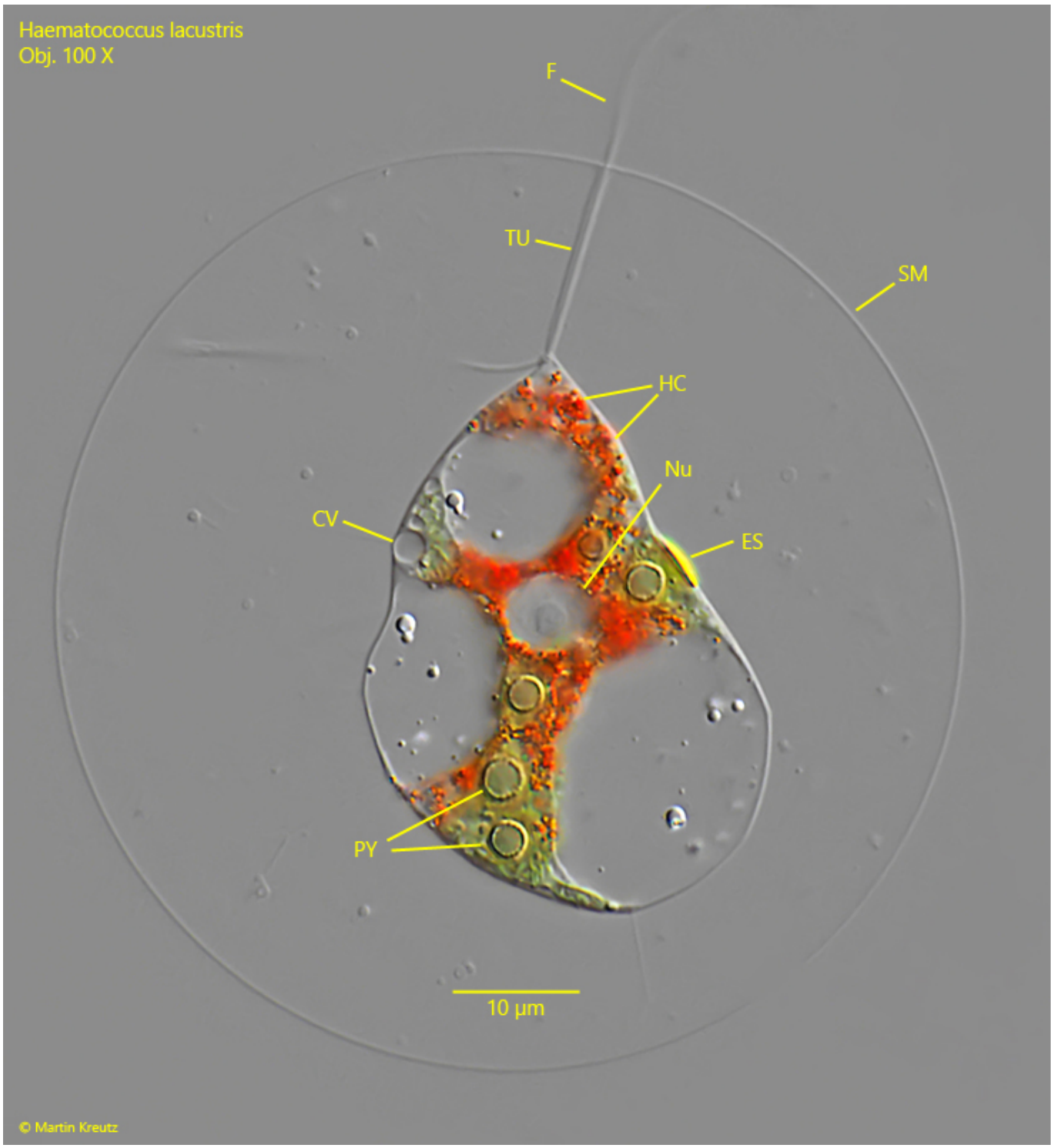



**Fig. 5:** *Haematococcus lacustris*. In a strongly squashed specimen the scattered pyrenoids (PY) are visible and the nucleus (Nu) with a central nucleolus. One of the tubes (TU) is in the focal plane, which guides the flagellum (F) through the spherical envelope and membrane. CV = contractile vacuole, ES = eyespot, HC = haematochrome granules, SM = spherical membrane. Obj. 100 X.