Achromatium oxaliferum Schewiakoff, 1893

Most likely ID: n.a.

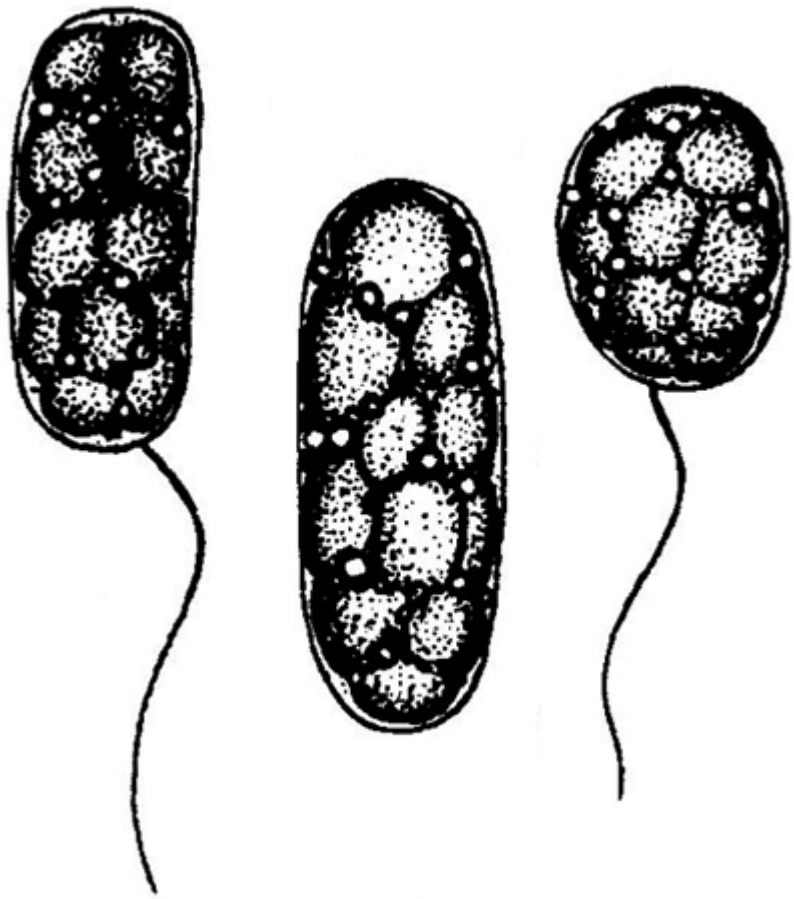
Synonym: n.a.

Sampling location: Simmelried

Phylogenetic tree: *Achromatium oxaliferum*

Diagnosis:

- cells oval, ovoid or oblong
- length 15–100 µm, width 9–36 µm
- cells filled with spherolites of calcium carbonate
- between spherolites and in periphery globules of sulfur
- cells coverd by thin gelatinous sheath (hard to see)
- motile cells with one flagellum can be formed



Achromatium oxaliferum

So far I have only found *Achromatium oxaliferum* in the Simmelried, where it occurs in the deeper mud layers. However, the distribution in the area and at depth is extremely heterogeneous. I use pointed bottom vessels for enrichment. *Achromatium oxaliferum* collects in these at the bottom.

Achromatium oxaliferum is one of the largest bacteria with a length of up to 100 µm. Therefore, the mostly ovoid or oblong cells are easily recognizable even at low magnifications. They also appear almost black at lower magnifications in bright field, as the cells are completely filled with large spherulites and globules. However, the larger spherulites do not consist of oxalates, as one might assume from the name. It has been proven that the larger spherulites are instead calcium carbonate (dissolved in acids) and the small globules, which are mainly found in the periphery of the cell, are elemental sulfur.

Sulfur is the end product of the oxidation of hydrogen sulfide with oxygen (sulfur-oxidizing bacteria). In contrast, the carbonate is actively absorbed from the environment to form calcium carbonate and is brought to crystallization. It is therefore not a metabolic product

of *Achromatium oxaliferum*. The purpose of this mass storage of calcium carbonate is still unclear, although it is assumed that this increases the sedimentation rate of the bacterium in hydrogen sulfide rich, deeper layers.

Achromatium oxaliferum can also form motile stages with a flagellum. I have never been able to observe these stages myself. Skuja (1946), too, was only able to observe motile stages once after years of studying the waters in Swedish Lapland. According to his description, however, they do not swim freely in the water, but glide over the substrate with a wobbling movement.

Fig. 1: *Achromatium oxaliferum*. L = 40–76 µm. An accumulation of several cells. Note the cells in division (CD). Obj. 40 X.


Achromatium oxaliferum
Obj. 100 X
50 µm
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a

Fig. 2 a-b: *Achromatium oxaliferum*. L = 35–56 µm. Two focal planes of five cells. Obj. 100 X.

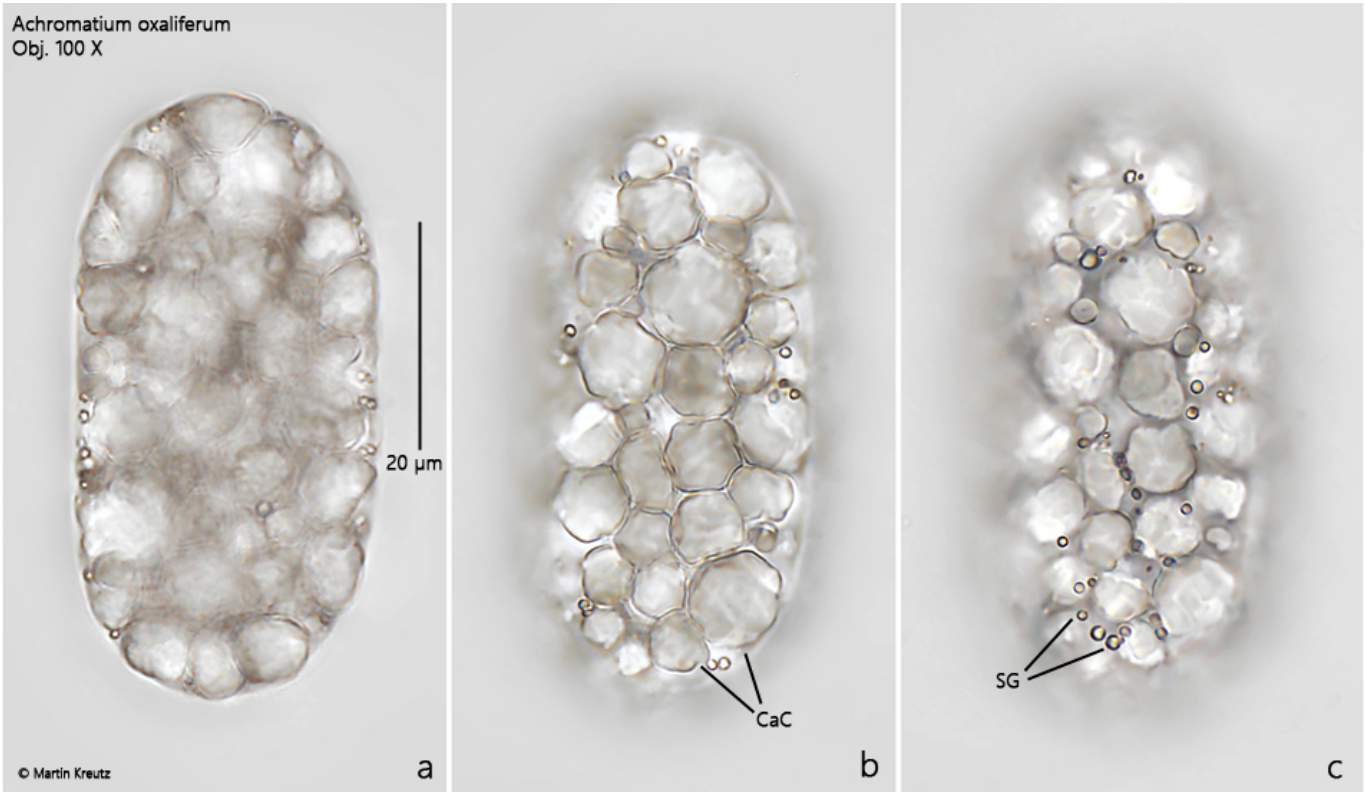

Fig. 3 a-c: *Achromatium oxaliferum*. L = 52 µm. Three focal planes of a cell in brightfield illumination. Note the large spherolites of calcium carbonate (CaC) and the small globules of sulfur (SG). Obj. 100 X.

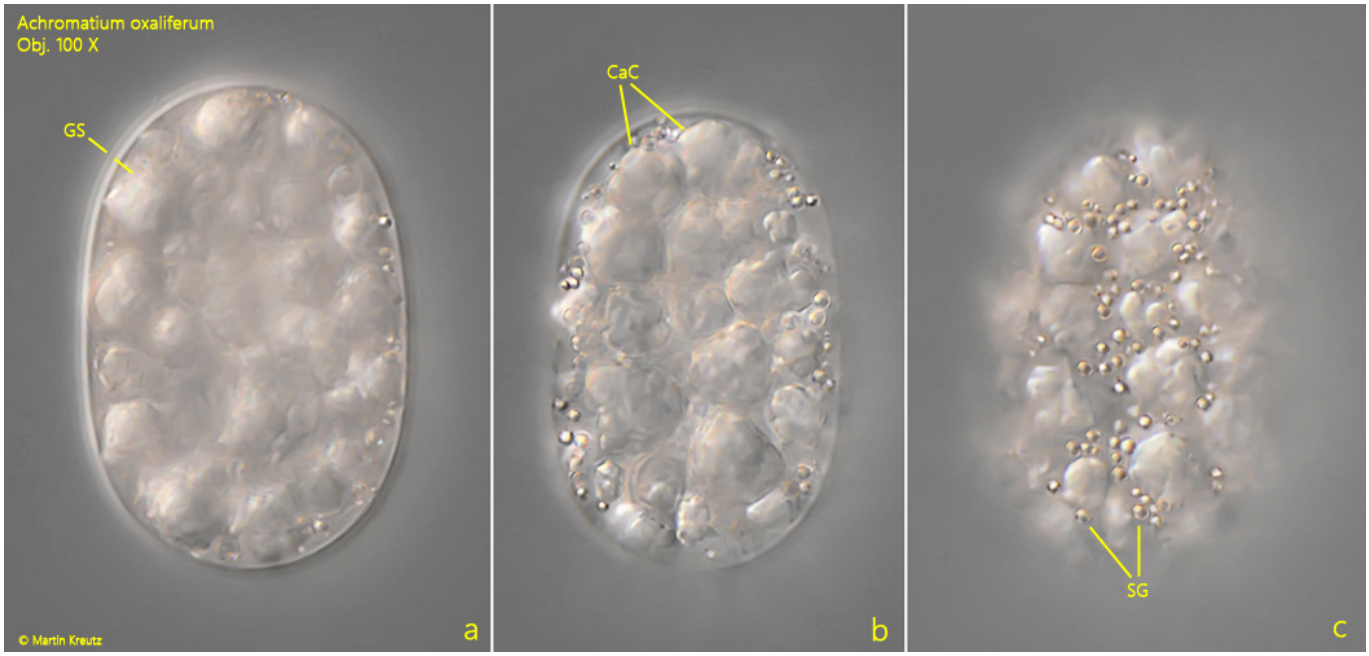

Fig. 4 a-c: *Achromation oxaliferum*. L = 36 µm. Three focal planes of a cell in DIC. Note the thin gelatinous sheath (GS) covering the cell. CaC = spherolites of calcium carbonate, SG = globules of sulfur. Obj. 100 X.

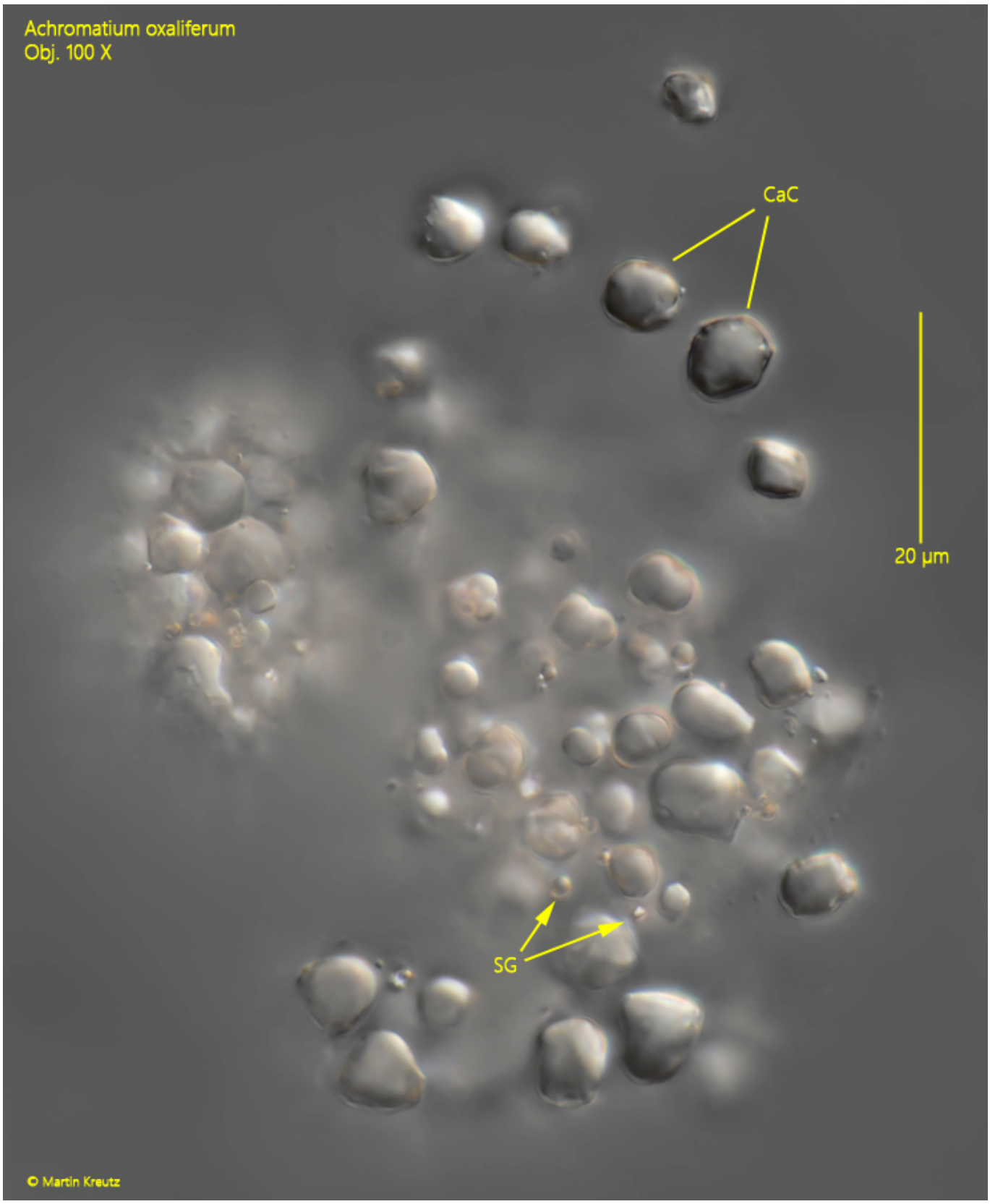

Fig. 5: *Achromatium oxaliferum*. A squashed cell with released spherolites of calcium carbonate (CaC) and globules of sulfur (SG). Obj. 100 X.