Botryococcus braunii Kützing, 1849

Most likely ID: n.a.

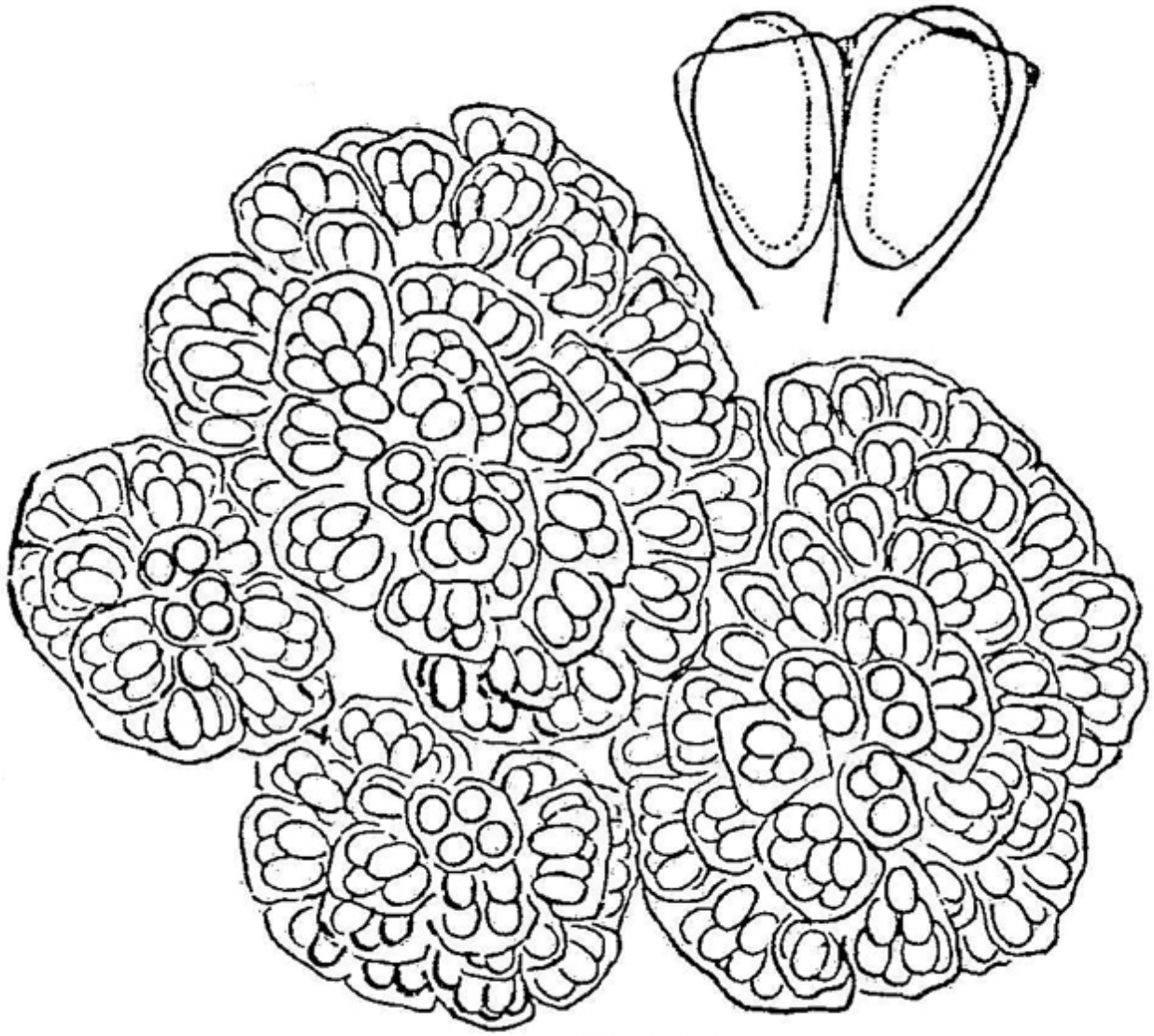
Synonym: n.a.

Sampling location: Simmelried, Mühlhalden pond, Ulmisried, Pond St. Ulrich

Phylogenetic tree: *Botryococcus braunii*

Diagnosis:

- colonies irregular shaped, green, yellow or orange
- oval or obovoid cell embbeded in oily matrix
- cells 6–12 long
- cells contain numerous oil globules
- colonies covered by gelatinous sheath
- one chloroplast, prietal
- one pyrenoid



Botryococcus braunii

I find *Botryococcus braunii* exceedingly common, both in plankton and among aquatic plants. The irregularly shaped colonies are easy to identify, because when you squeeze these colonies slightly under a coverslip, oily droplets emerge. The obovoid or oval cells of the colony secrete an oily matrix, which consists mostly of unsaturated hydrocarbons. This matrix is either colorless or intensely yellow or orange.

The cells are arranged radially on the surface of the colonies and protrude from the oily matrix by about one fifth of their length. In addition, the colonies are surrounded by a thin gelatinous layer that is difficult to see (s. fig. 2). The cells themselves often also contain large amounts of spherical hydrocarbons, which makes it difficult to discern their internal structure. Only in young cells with few hydrocarbon droplets can the chloroplast be seen (s. fig. 5).

The ability to produce and secrete unsaturated hydrocarbons is limited among algae to the genus *Botryococcus*. In particular, much research is being conducted on *Botryococcus braunii* to make this capability industrially useful. The alga mainly produces unsaturated hydrocarbons with a chain length of C20-C40. In its natural habitat, these hydrocarbons provide buoyancy.

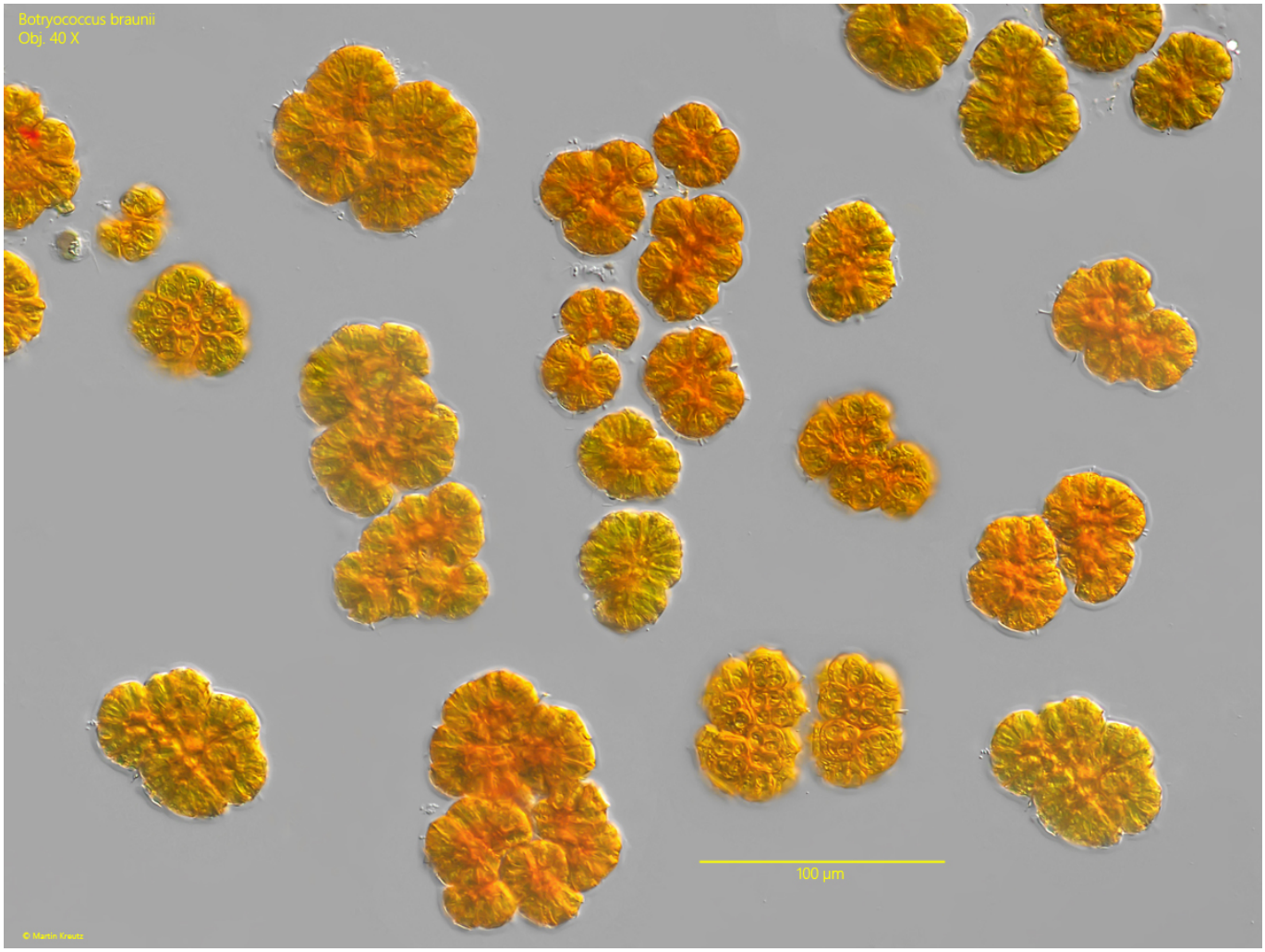


Fig. 1: *Botryococcus braunii.* D = 40–100 µm (of colonies). A mass development of intense orange colored colonies. Obj. 40 X.

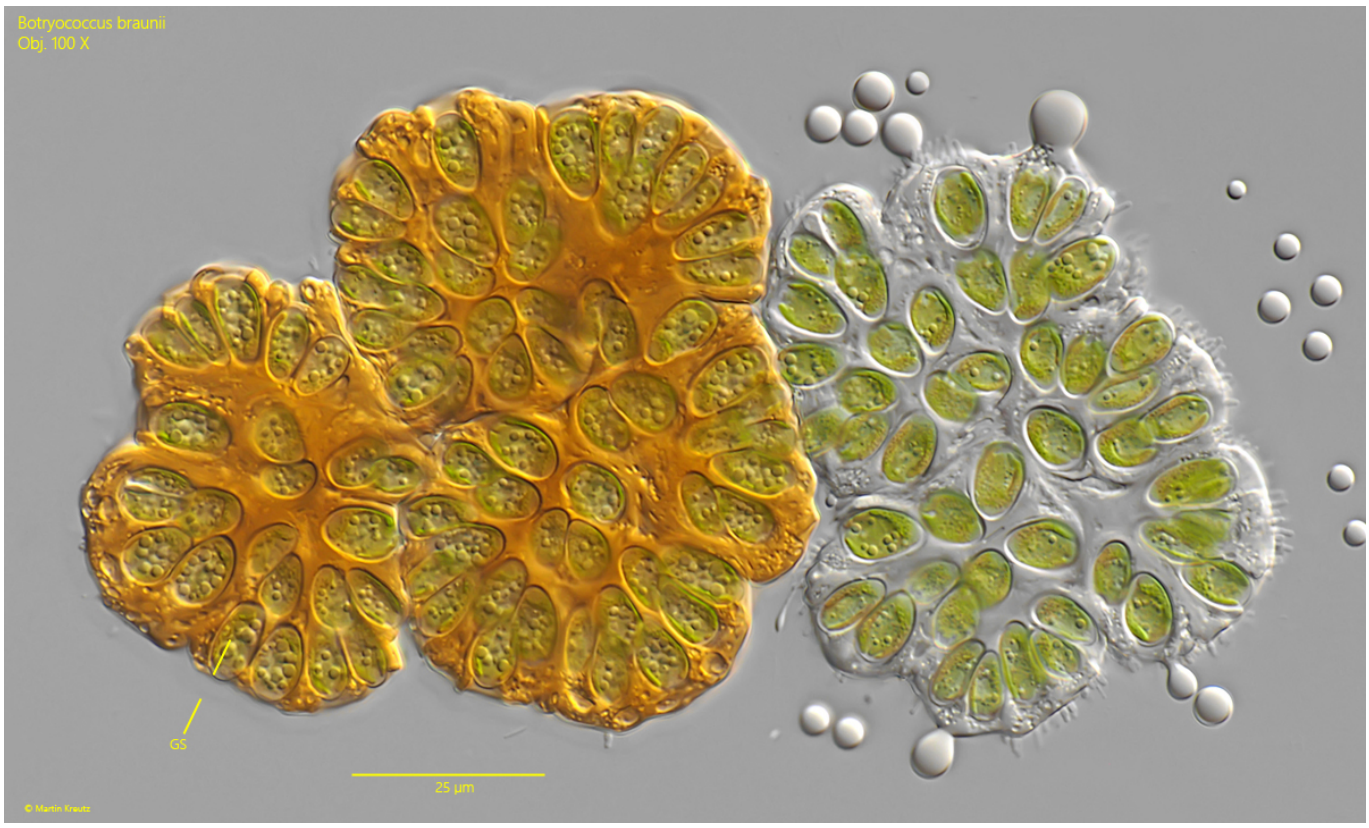


Fig. 2: *Botryococcus braunii.* D = 60–100 µm (of colonies). Two colonies with an orange colored and a colorless oily matrix. Note the delicate gelatinous sheath (GS) that covers the colonies. Obj. 100 X.

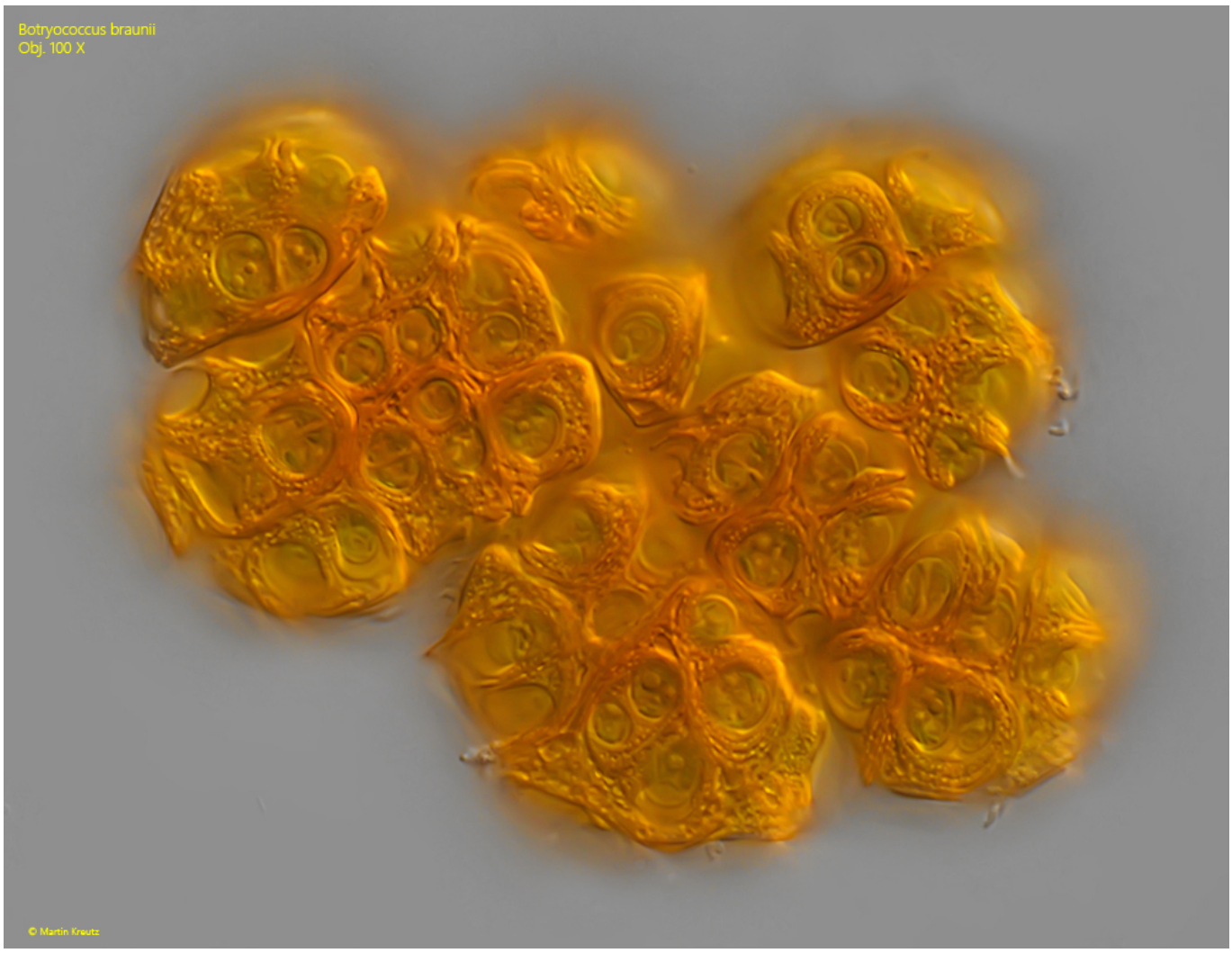


Fig. 3: *Botryococcus braunii.* D = 105 µm (of colony). Focal plane on the surface of a colony. The cells are embedded in a thick, oily matrix of hydrocarbons. Obj. 100 X.

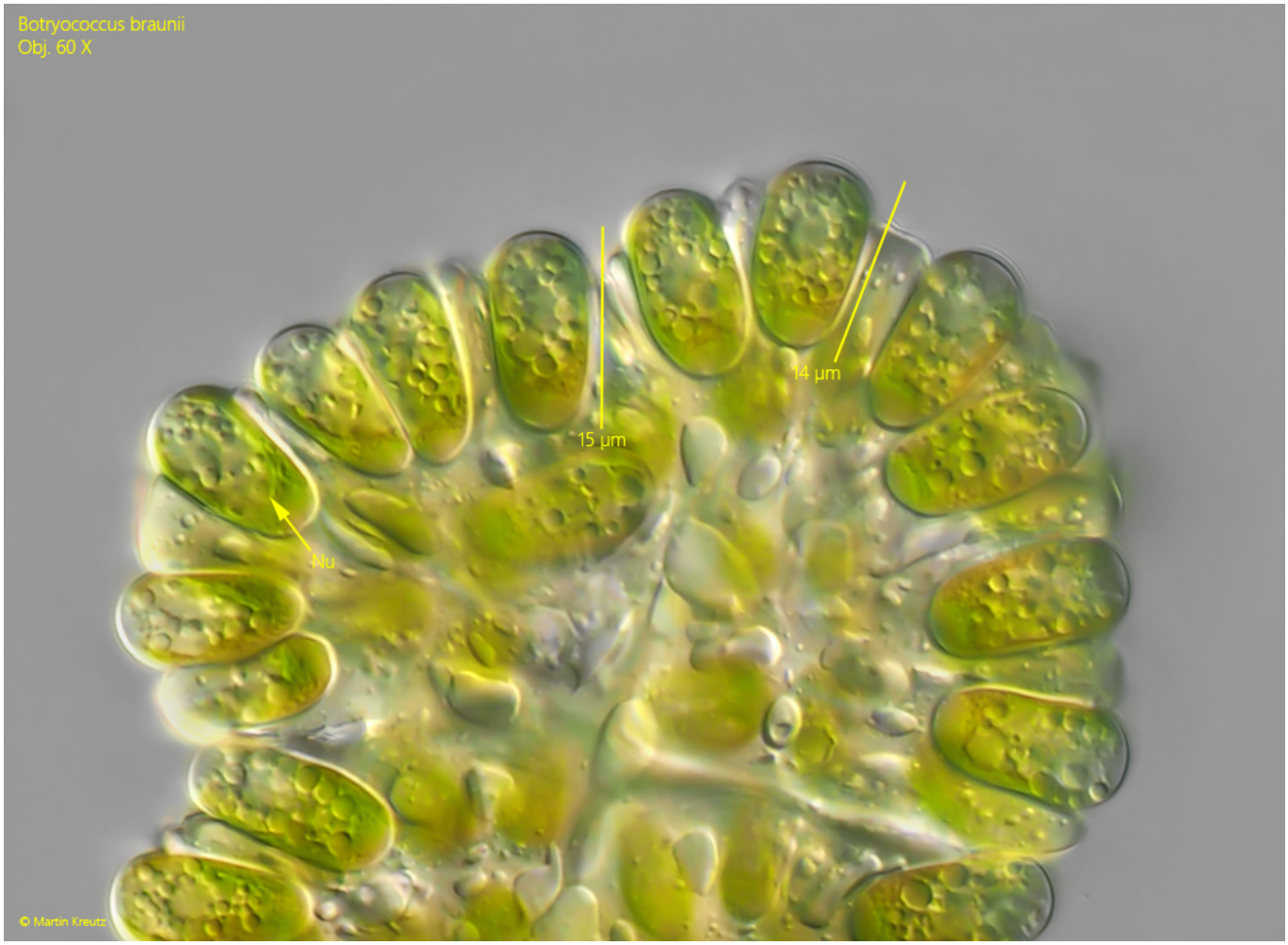


Fig. 4: *Botryococcus braunii.* L = 12–16 µm (of cells). The oval and obovoid cells protrude from the oily matrix by about 10-20% of their length. Nu = nucleus. Obj. 100 X.

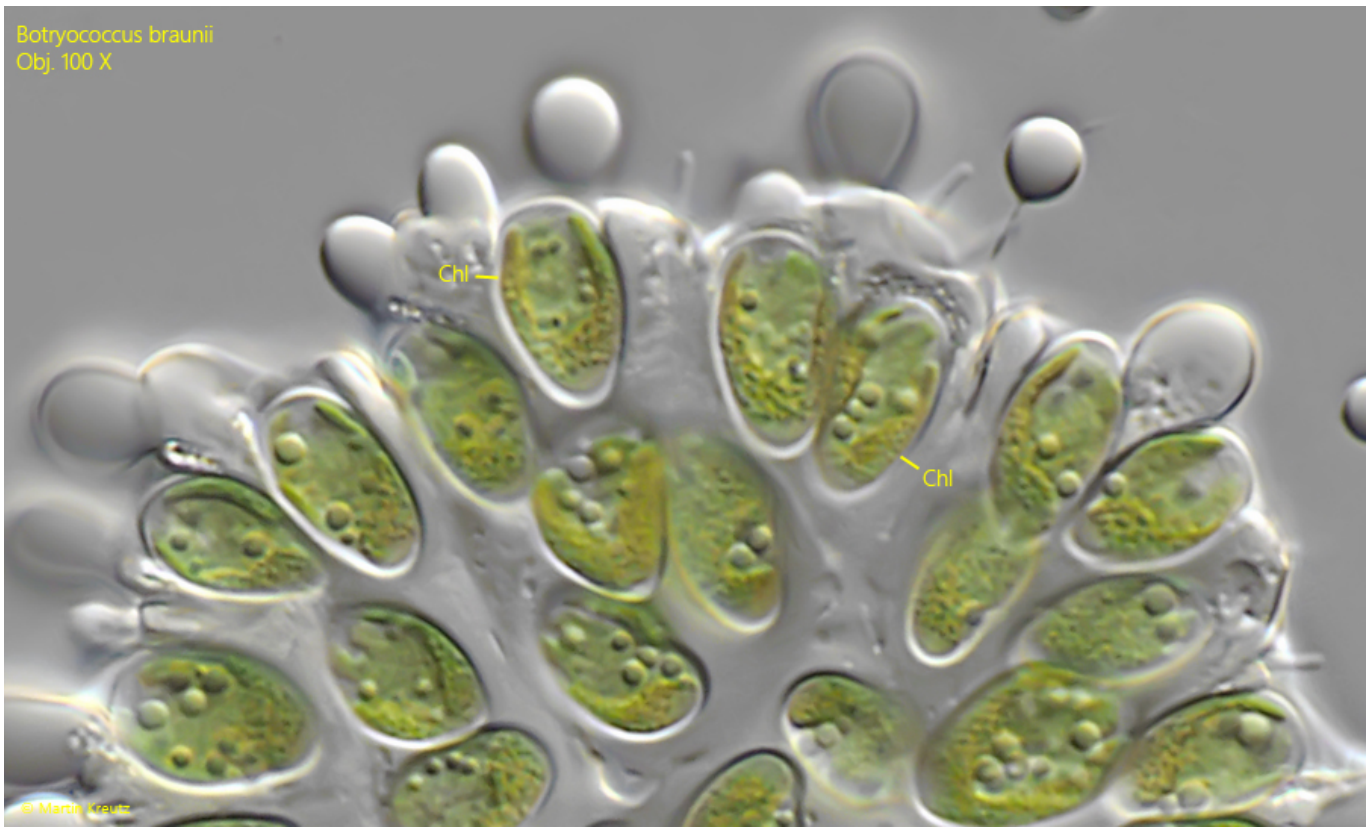


Fig. 5: *Botryococcus braunii.* L = 11–14 µm (of cells). The cells of this colony contain only few oily globules and the parietal chloroplast (Chl) is visible. Obj. 100 X.

In September 2026, I found many colonies of *Botryococcus braunii* in old samples from the pond at St. Ulrich, which were surrounded by yellowish-green flagellates (s. fig. 6). These flagellates moved very slowly and had only a very short flagellum. They were 10–14 µm long. Upon closer examination, I was able to observe that these flagellates emerged from the colonies of Botryococcs braunii (s. fig. 7 a-b). It could therefore be a case of zoospores, although more recent literature reports that Botryococcus braunii reproduces exclusively via non-motile autospores.

However, the older literature contains indications that *Botryococcus braunii* can indeed form motile zoospores. In 1897, Engler reported on the genus *Botryococcus*: “The swarm spores (of *Botryococcus*), which develop cilia even before emerging, surround themselves with a membrane once they have come to rest and begin to divide… “. About 40 years later, in 1935, Fritsch reported on *Botryococcus*: “When the colonies become too large, they break up into clumps of various sizes. The green cells are able to emerge from them and, equipped with flagella that, according to Klebs, develop very early, seek to get away.” On the basis of these earlier reports, I consider it possible that I was indeed able to observe the motile zoospores of *Botryococcus braunii* here.

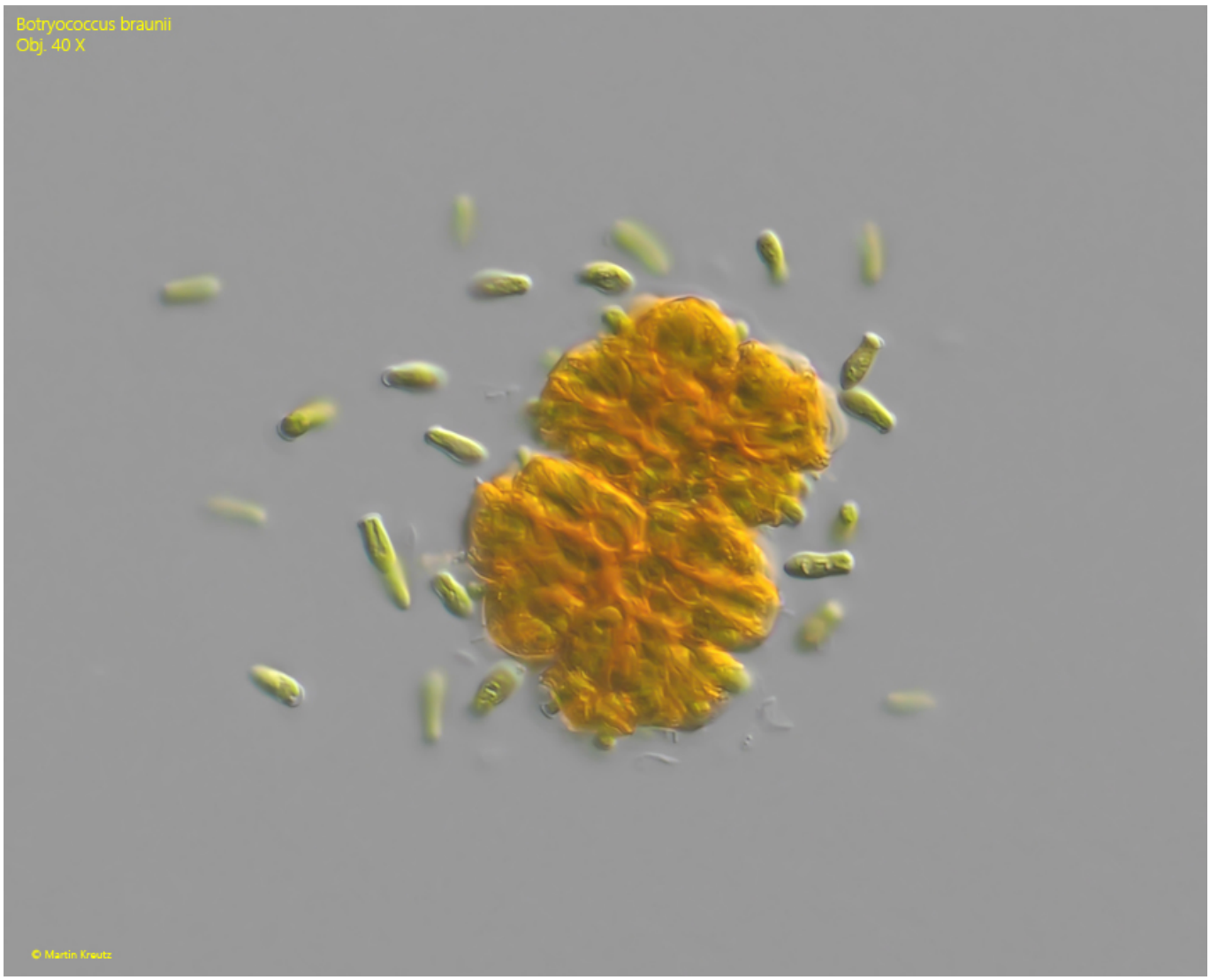


Fig. 6: *Botryococcus braunii.* A colony surrounded by slowly swimming flagellates with a yellowish-green coloration. Obj. 40 X.

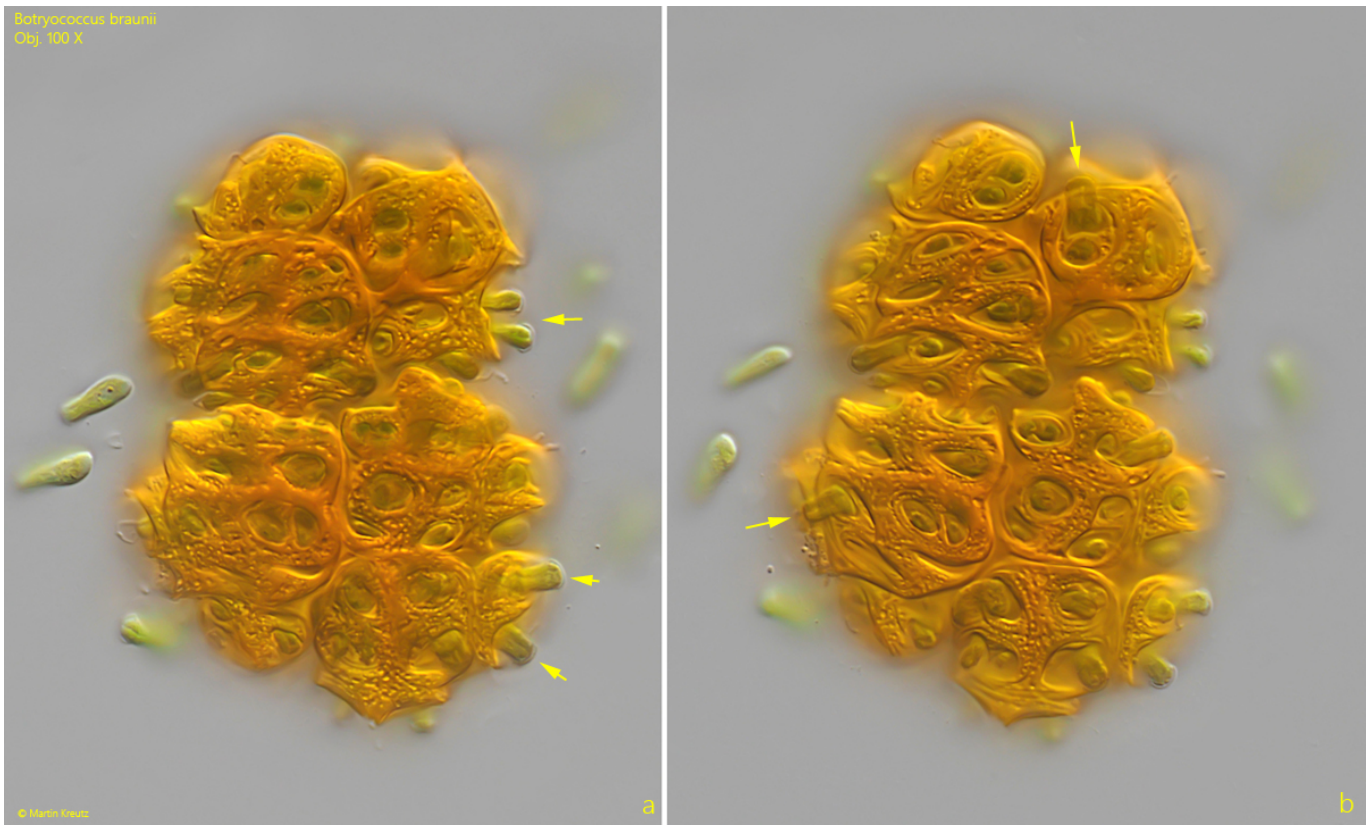


Fig. 7 a-b: *Botryococcus braunii.* The flagellates emerged from the colony (arrows) and left empty cavities in the oily matrix. Obj. 100 X.

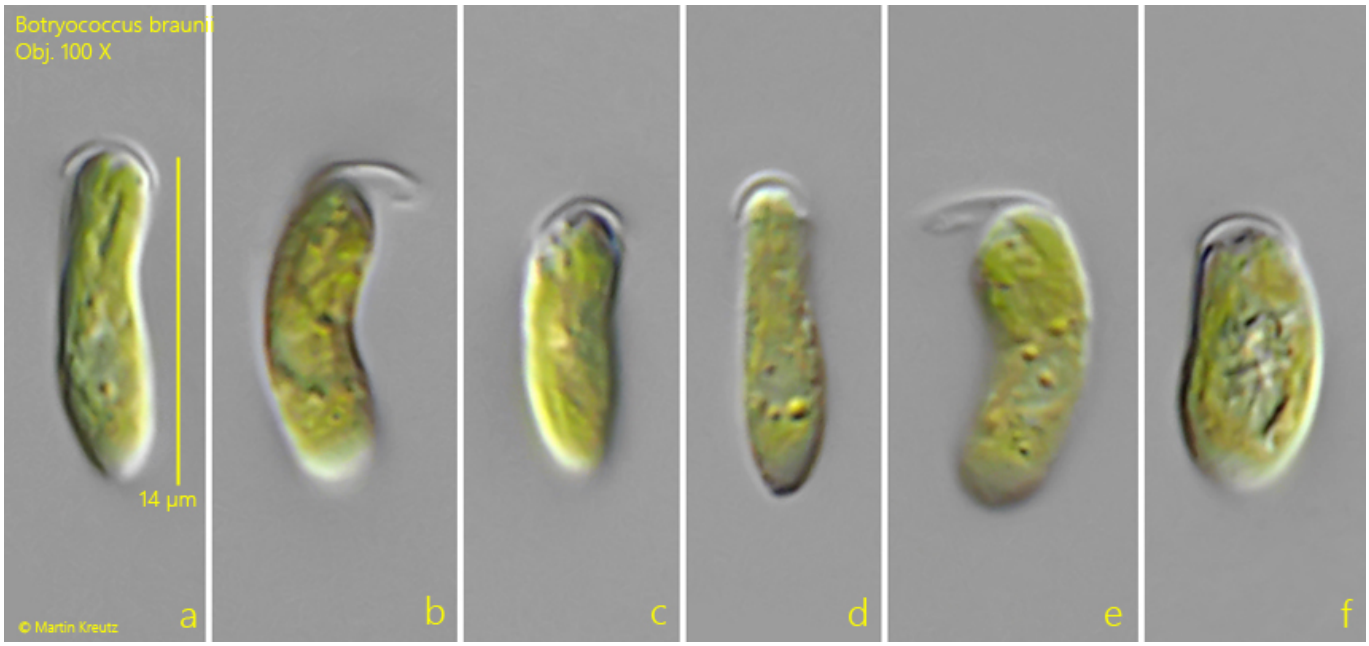


Fig. 8 a-f: *Botryococcus braunii.* L = 10–14 µm. Some of the yellowish-green flagellates in detail. Obj. 100 X.