Frontonia atra

(Ehrenberg) Buetschli, 1889

Most likely ID: n.a.

Synonym: n.a.

Sampling locations: Simmelried, Ulmisried, Purren pond, Bussenried, Pond of the convent Hegne

Phylogenetic tree: *Frontonia atra*

Diagnosis:

- cell oval or ovoid with distinct tapered tail, dorsoventrally flattened
- Length 100–400 µm
- mouth opening in anterior half on right side
- on left side of oral opening 3 adoral membranelles
- a preoral and postoral suture present
- pellicle quadrangularly fielded (hard to see)
- macronucleus ellipsoid, 1–2 adjacent micronuclei
- one contractile vacuole, subequatorial on right side
- 2–6 excretion pores dorsally
- extrusomes 3 µm long
- cytoplasm black or black-violet by rod shaped granules (presumably bacteria)
- apically sometimes a dark pigment spot (of granules)
- 80-90 longitudinal rows of cilia

after Kahl

Frontonia atra

I find *Frontonia atra* frequently and regularly in several of my sampling sites. The species is particularly common in the Simmelried. In the samples, the specimens often collect on the surface.

Although *Frontonia atra* is not a rare ciliate and is easy to identify due to its shape and dark color, it has obviously not been studied very often. One of the most precise descriptions is given by Foissner, Berger and Kohmann (1994).

The specimens in my population were all 130–160 µm long. I have never found larger specimens, although Foissner, Berger and Kohmann give a range of 100–400 µm. A smaller range of 100–230 µm was given by Kahl (1935). The specimens were darkly colored to varying degrees. I have found both completely opaque, almost black specimens, as well as only very weakly colored ones. The latter often had a defined apical pigment spot (s. fig. 5), as also occurs in *Frontonia acuminata*.

The dark coloration as well as the pigment spot of *Frontonia atra* is caused by black-violet colored granules. At high magnification it can be seen that these are short rods (s. fig. 6). Foissner, Berger and Kohmann give the length of the rods as 0.3 µm, although this value was presumably taken from Kahl, who gives the same length. Foissner, Berger and Kohmann also assume that it could be bacteria. According to my measurements, the rods are 0.8 µm long and I was able to recognize cell divisions at the resolution limit (s. fig. 6). Therefore, they do indeed appear to be bacteria. Proof can probably only be provided by electron microscopic examinations.

Frontonia atra has a hyaline fringe of densely arranged extrusomes under the pellicle (s. fig. 2 b). The extrusomes of my population were symmetrically spindle-shaped and very consistently 10.0-10.2 µm long (s. fig. 8). Thus they deviate strongly from the description by Foissner, Berger and Kohmann, who state only 3 µm for the length of the extrusomes. Exentually, the length of the extrusomes may vary in different populations, but this is only an assumption without further investigation.

Fig. 1 a-b: *Frontonia atra*. L = 130 µm. Two focal planes of a freely swimming specimen. Note the tapered poterior tail and the dark colored granules scattered in the cytoplasm. Obj. 40 X.

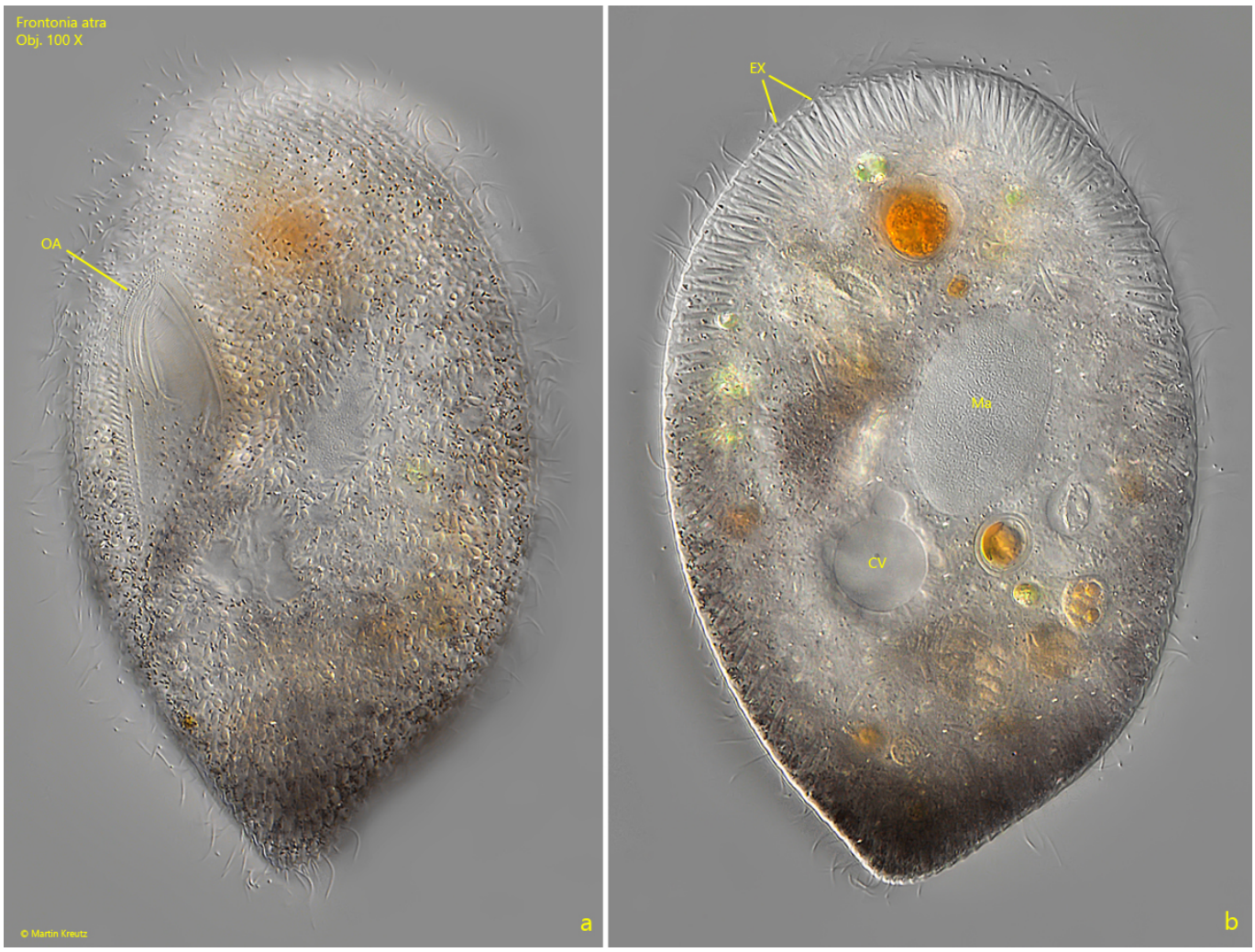

Fig. 2 a-b: *Frontonia atra*. L = 135 µm. Two focal planes of a slightly squashed specimen. CV = contractile vacuole, EX = extrusomes, MA = macronucleus, OA = oral apparatus. Obj. 100 X.

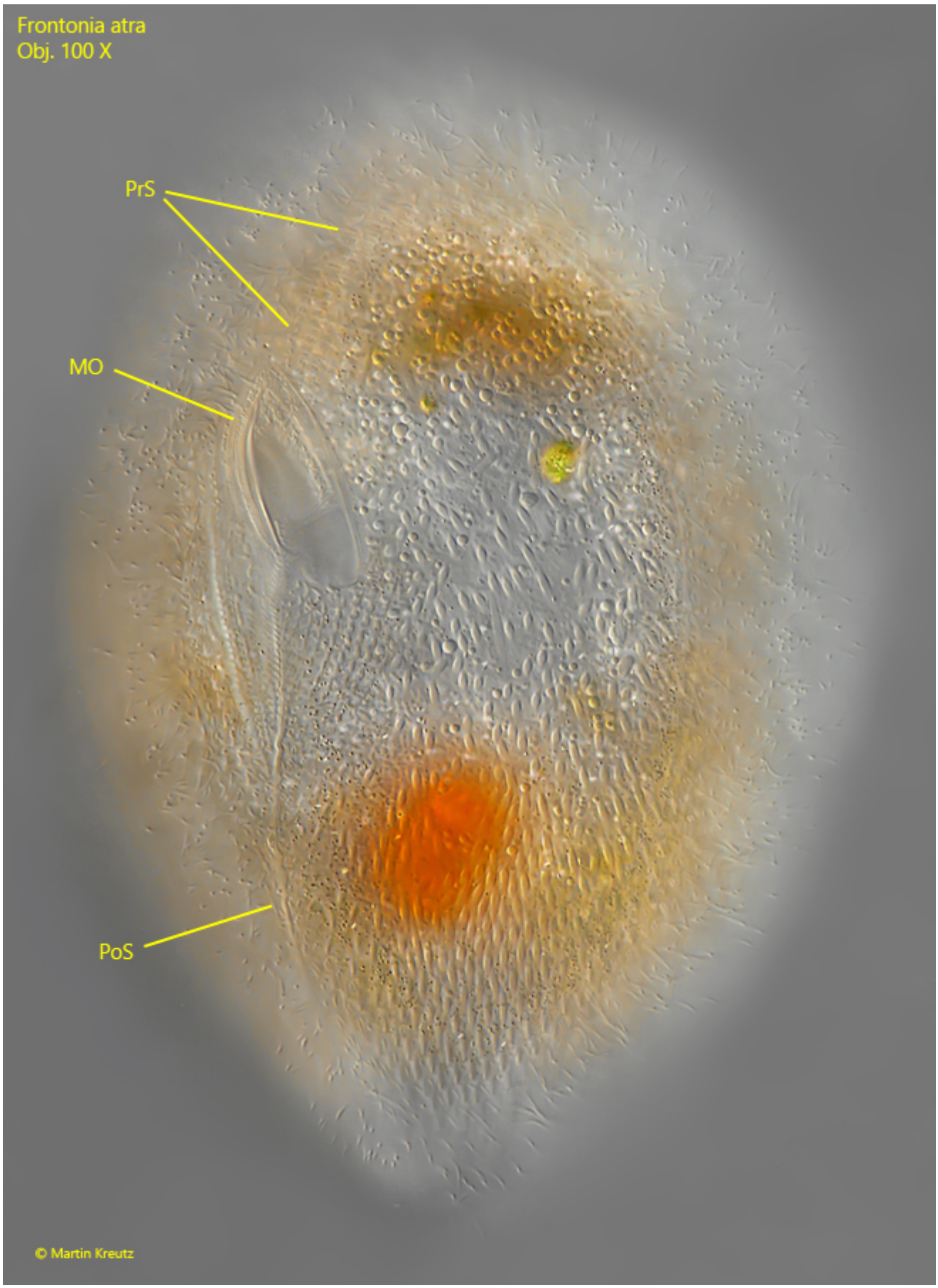

Fig. 3: *Frontonia atra*. L = 156 µm. A slightly squashed specimen with focal plane on the preoral suture (PrS) and the postoral suture (PoS). MO = mouth opening. Obj.

100 X.

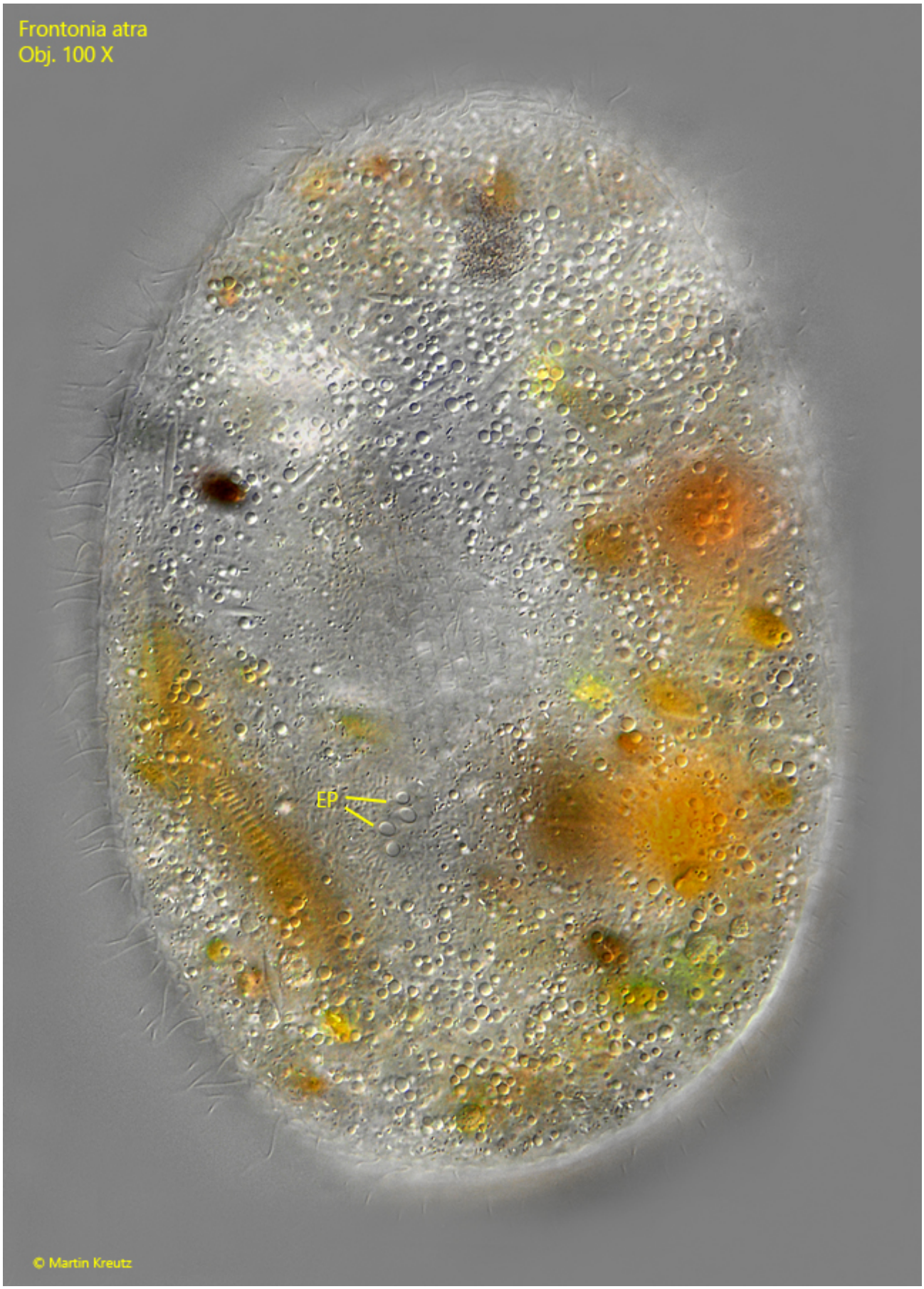

Fig. 4: *Frontonia atra*. A slightly squashed specimen from dorsal with 4 excretion pores (EP) of the contractile vacuole. Obj. 100 X.

Fig. 5: *Frontonia atra*. L = 140 µm. A slightly squashed specimen from ventral with a distinct apical pigmented spot (PS). Obj. 60 X.

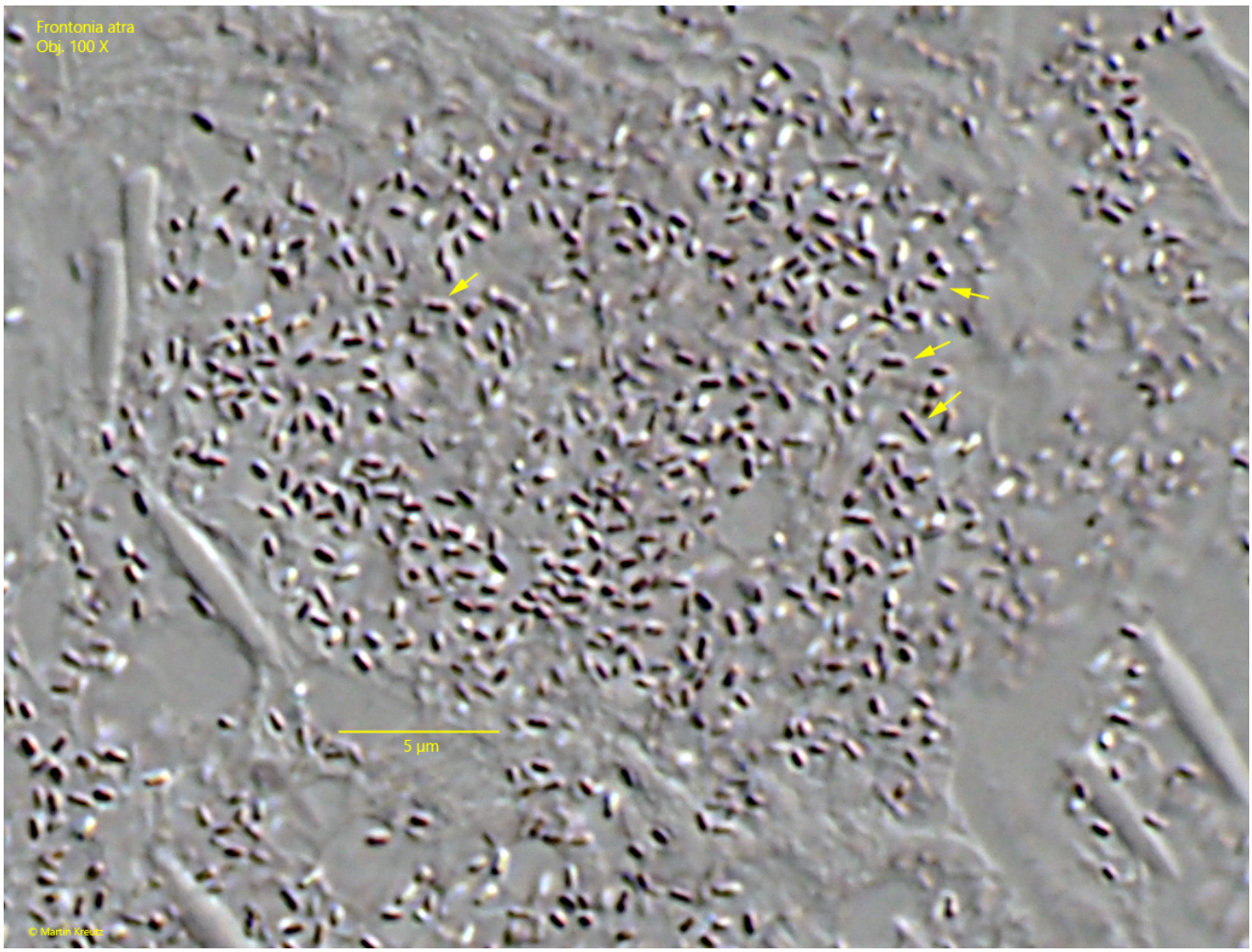

Fig. 6: *Frontonia atra*. The dark granules in a strongly squashed specimen in detail. The granules have a black-violet color. It is highly probable that they are bacteria, as cell divisions can be recognized at the optical resolution limit (arrows). Obj. 100 X.

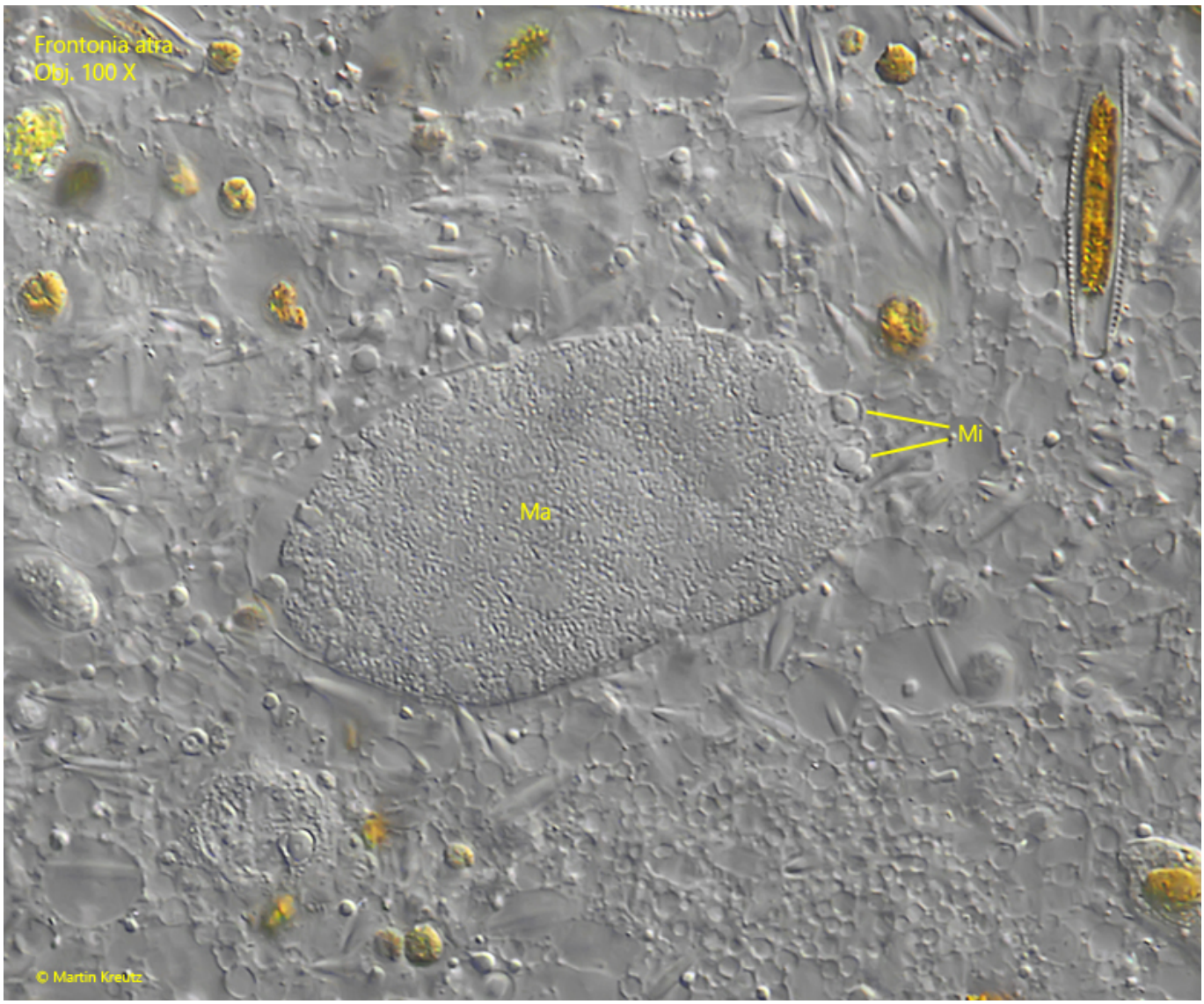

Fig. 7: *Frontonia atra*. The macronucleus (Ma) with two adjacent micronuclei (Mi) in a squashed specimen. Obj. 100 X.

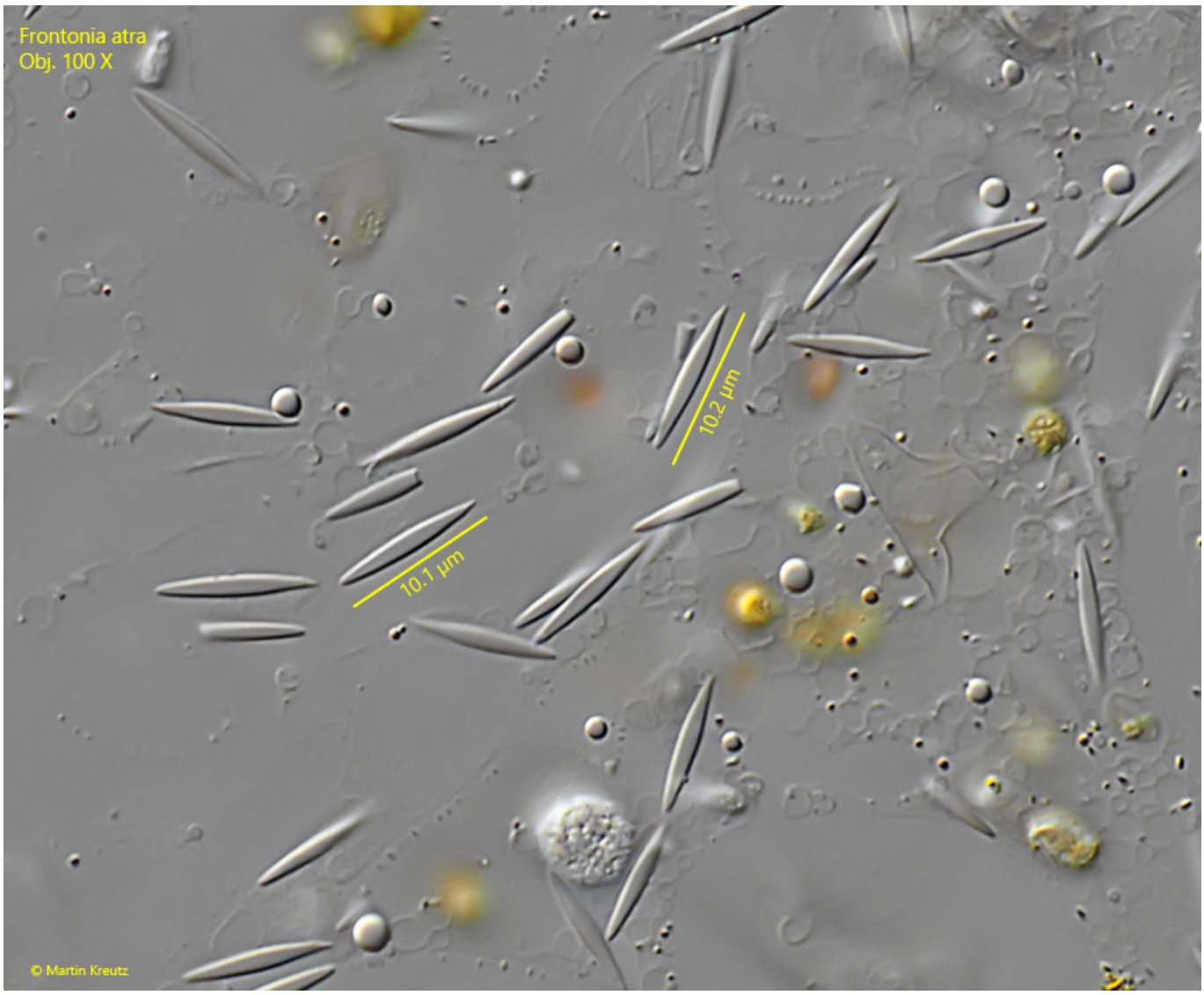

Fig. 8: *Frontonia atra*. The spindle-shaped extrusomes have a constant length of 10.0–10.2 µm. Obj. 100 X.

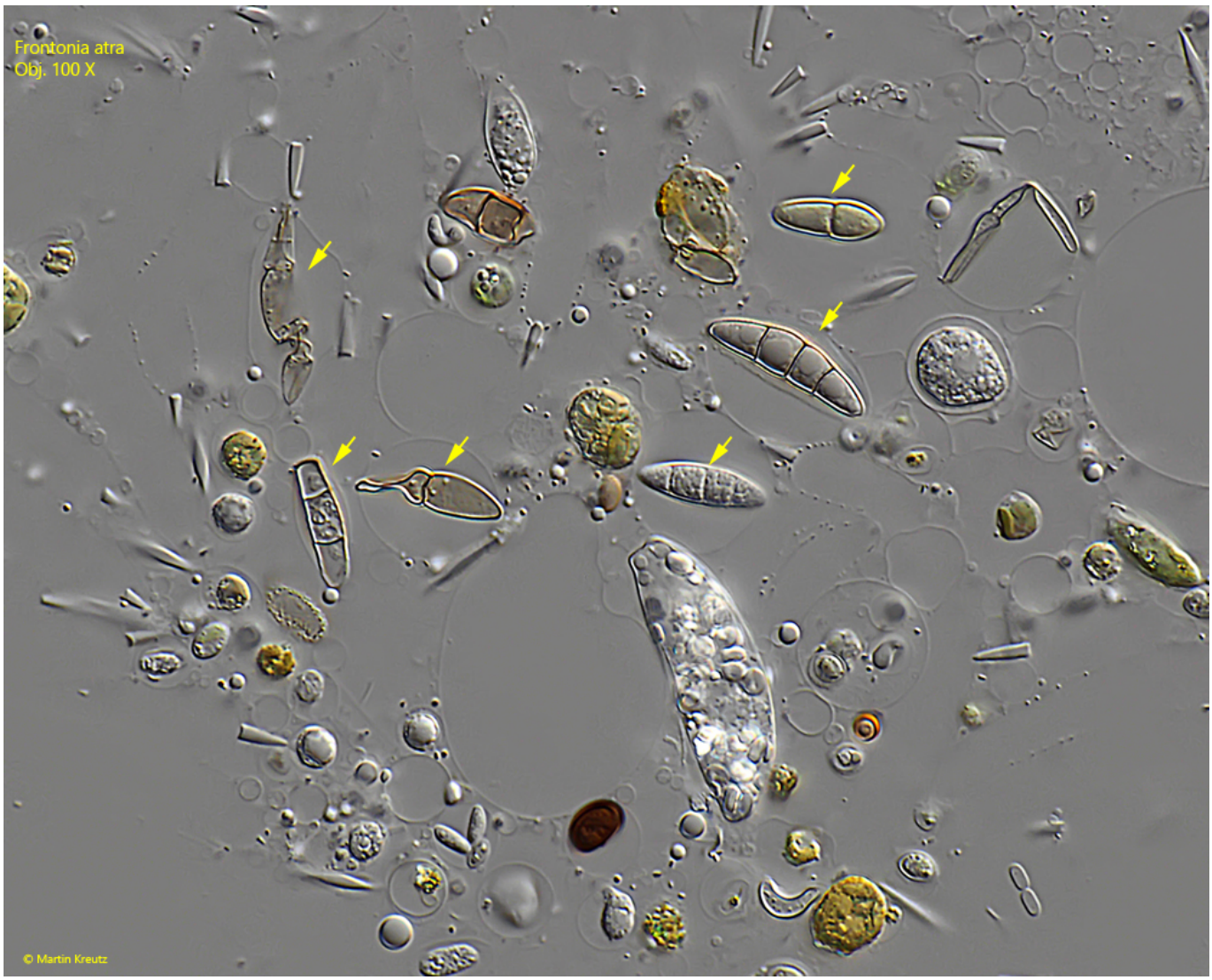

Fig. 9: *Frontonia atra*. A number of ingested fungus spores (arrows) in a strongly squashes specimen. Obj. 100 X.

Fig. 10: *Frontonia atra*. Two dark colored specimens in conjufgation. Obj. 100 X.

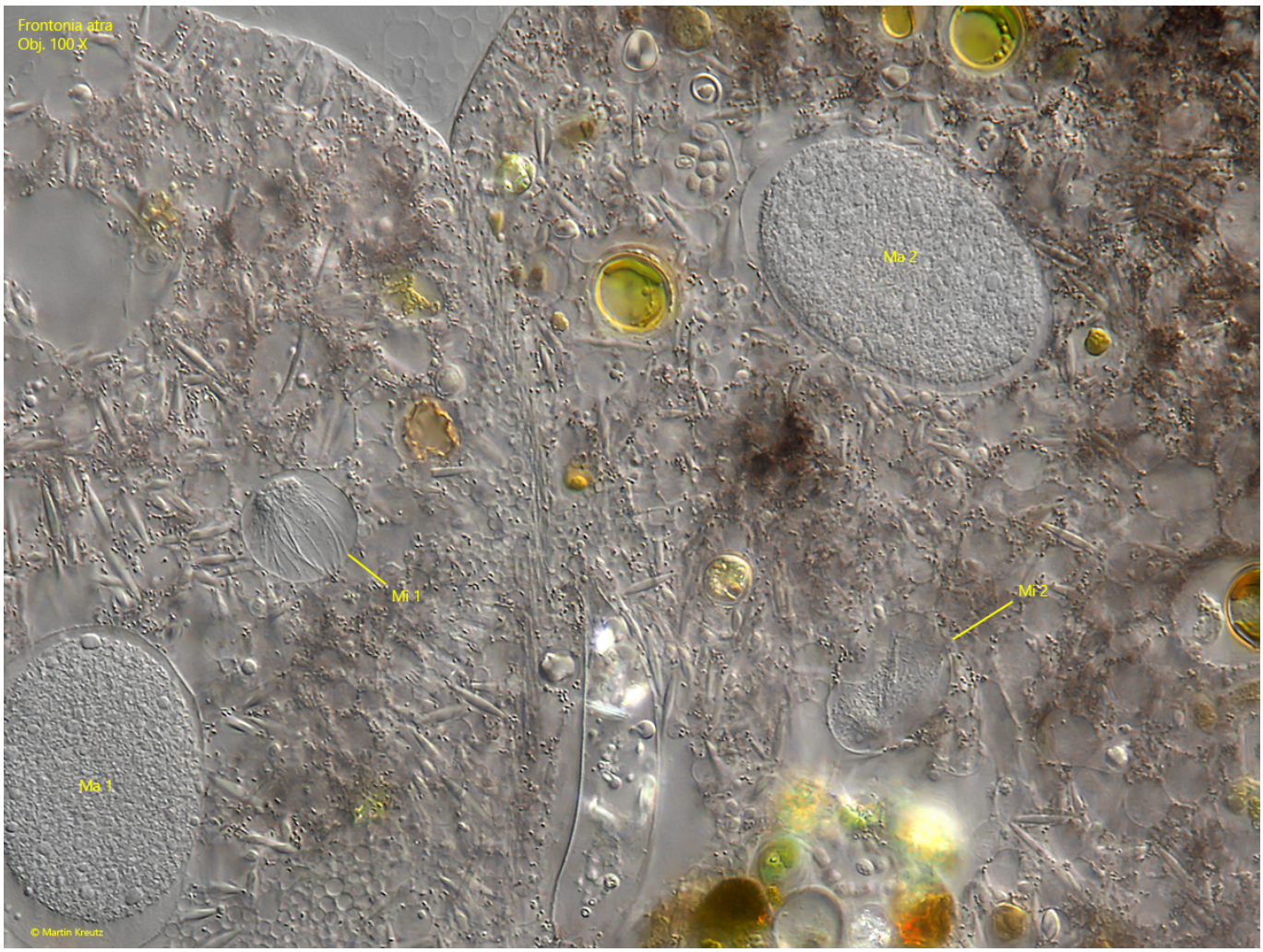

Fig. 11: *Frontonia atra*. The strongly squashed specimens as shown in fig. 10. The two macronuclei (Ma 1, Ma 2) as well as each one micronucleus (Mi 1, Mi 2) in both cells are visible. In the micronucleus Mi 1 the filaments of the spindle apparatus are visible to separate the chromosomes for the meiotic division. Obj. 100 X.