Ceratium furcoides

(Levander) Langhans, 1925

Most likely ID: n.a.

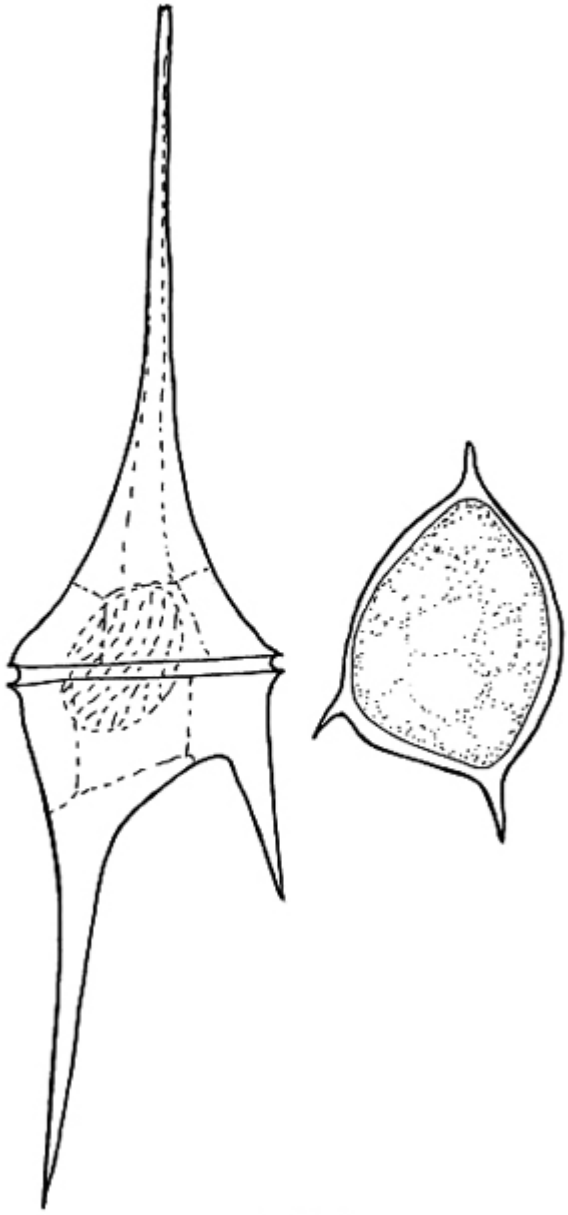
Synonym: *Ceratium hirundinella* var. *furcoides*, *Ceratium hirundinella* f. *furcoides*, *Ceratium furca* var. *lacustre*, *Ceratium furcoides* f. *gracile*

Sampling location: Lake Constance, Mühlhalden pond, Hagstaffel pond, Mühlweiher Litzelstetten, Pond of the waste disposal company Constance.

Phylogenetic tree: *Ceratium furcoides*

Diagnosis:

- cells elongated pyramidal or spindle-shaped
- length 123–300 µm, width 28–42 µm
- epitheca a long, slender horn
- hypotheca with 2 horns of different length
- sometimes hypotheca with third rudimentary horn
- theca arranged of several plates with reticulate ornamentation
- numerous yellowish-brown or greenish-orange chloroplasts
- oval nucleus located in epitheca
- two flagella (transversal and longitudinal)



after Dodge

Ceratium furcoides

I find *Ceratium furcoides* practically in all my sampling sites where plankton can be found. In several cases, I was also able to observe mass developments of *Ceratium furcoides*.

The specimens of *Ceratium furcoides* in my population were mostly between 250–320 µm long and thus at the upper end of the range given by earlier authors for the length. For example, Skuja (1948) measured a range of 193–222 µm and Huber-Pestalozzi (1968) 130–300 µm.

The distinction from the similar species *Ceratium hirundinella* is essentially made by the number of horns on the hypotheca and the shape and arrangement of the plates that make up the epitheca. The epitheca in both species is composed of 4 plates. In *Ceratium hirundinella*, all 4 plates reach the tip of the apical horn, whereas in *Ceratium furcoides* only 3 plates reach the tip. However, this

characteristic is very difficult to recognize in living specimens. Therefore, the number of horns and the body shape are decisive. In *Ceratium hirundinella*, the hypotheca has 3 horns that stand at wide angles to each other, while in *Ceratium furcoides* there are only 2 horns, with the longer one stretched almost straight backward. Only rarely does a rudimentary, very small third horn develop in *Ceratium furcoides*. As a result, *Ceratium furcoides* has a slender, elongated body shape, whereas *Ceratium hirundinella* appears much broader and stouter.

The epitheca and the hypotheca are separated by a transverse groove called the cingulum (s. fig. 2 a-b). The transverse flagellum runs in it, performing a wavelike movement there (s.fig. 4). In freely swimming specimens, it is difficult to see. A second, much longer flagellum originates from the longitudinal sulcus, which has a complex structure in *Ceratium furcoides*. This longitudinal flagellum extends beyond the posterior horn and provides propulsion (s. fig. 3 a-b).

The theca of *Ceratium furcoides* consists of cellulose and is composed of 16 plates. The plates exhibit a net-like pattern of depressions. In the area of the sulcus, there is a region where the two flagella originate.

Ceratium furcoides can eject very delicate, needle-shaped extrusomes. These originate from the contents of the Golgi apparatuses, which are distributed in the cytoplasm and can release their contents (Leadbeater & Düdge, 1967). I was also able to observe these extrusomes, as they are ejected en masse in heavily compressed specimens (s. fig. 6). They are about 10–40 µm long.

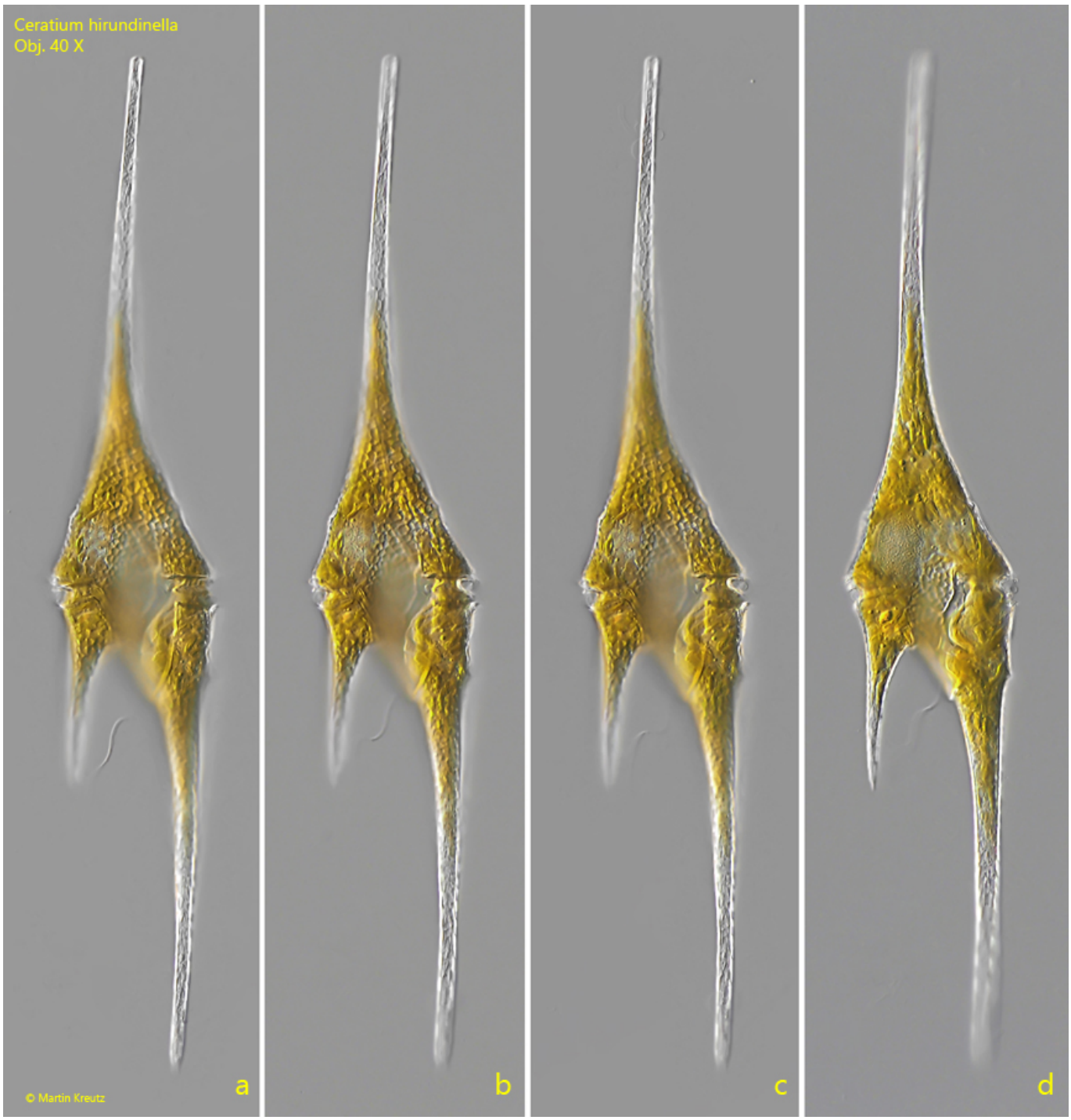


Fig. 1 a-d: *Ceratium furcoides*. L = 297 µm. Different focal planes of a freely swimming specimen from ventral. Obj. 40 X.

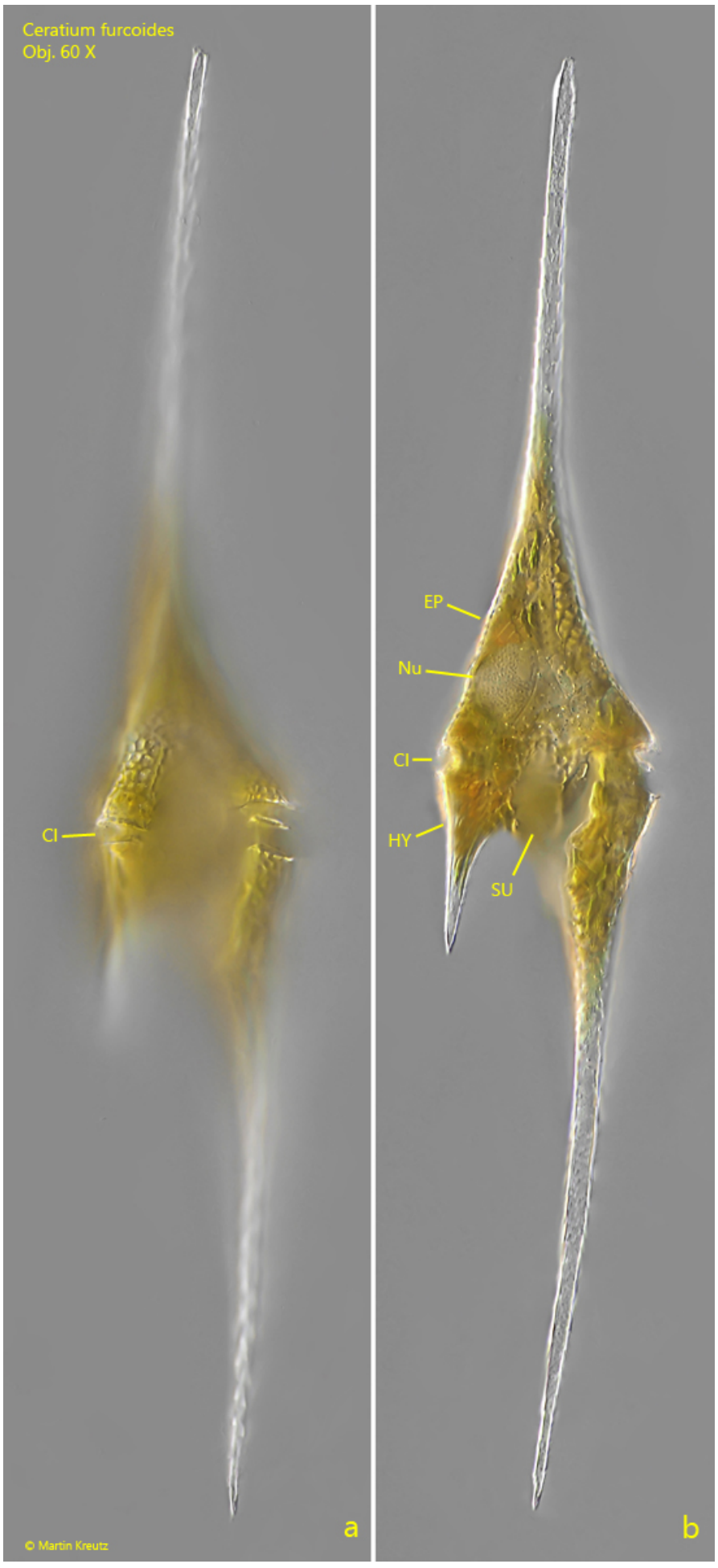

Ceratium furcoides
Obj. 60 X
Cl
a
© Martin Kreutz
EP
Nu
Cl
HY
SU
b

Fig. 2 a-b: *Ceratium furcoides*. L = 297 µm. The same specimen as shown in fig. 1 a-d at higher magnification. The anterior epitheca (EP) is separated by the transverse cingulum (CI) separated from the posterior hypotheca (HY). In the epitheca the nucleus (Nu) is located. The sulcus (SU) is a longitudinal, ventral furrow. Obj. 40 X.


Ceratium furcoides
Obj. 60 X
Cl
LF
Nu
a
b
© Martin Kreutz

Fig. 3 a-b: *Ceratium furcoides*. L = 312 µm. A second specimen from dorsal with focal plane on the cingulum (CI) and on the nucleus (Nu). Posterior the longitudinal flagellum (LF) is visible. Obj. 60 X.


Ceratium furcoides
Obj. 100 X
TF
Chl
LF
© Martin Kreutz

Fig. 4: *Ceratium furcoides*. In the furrow of the cingulum the transverse flagellum (TF) is visible in a wavy movement. Chl = chloroplasts, LF = longitudinal flagellum. Obj. 100 X.

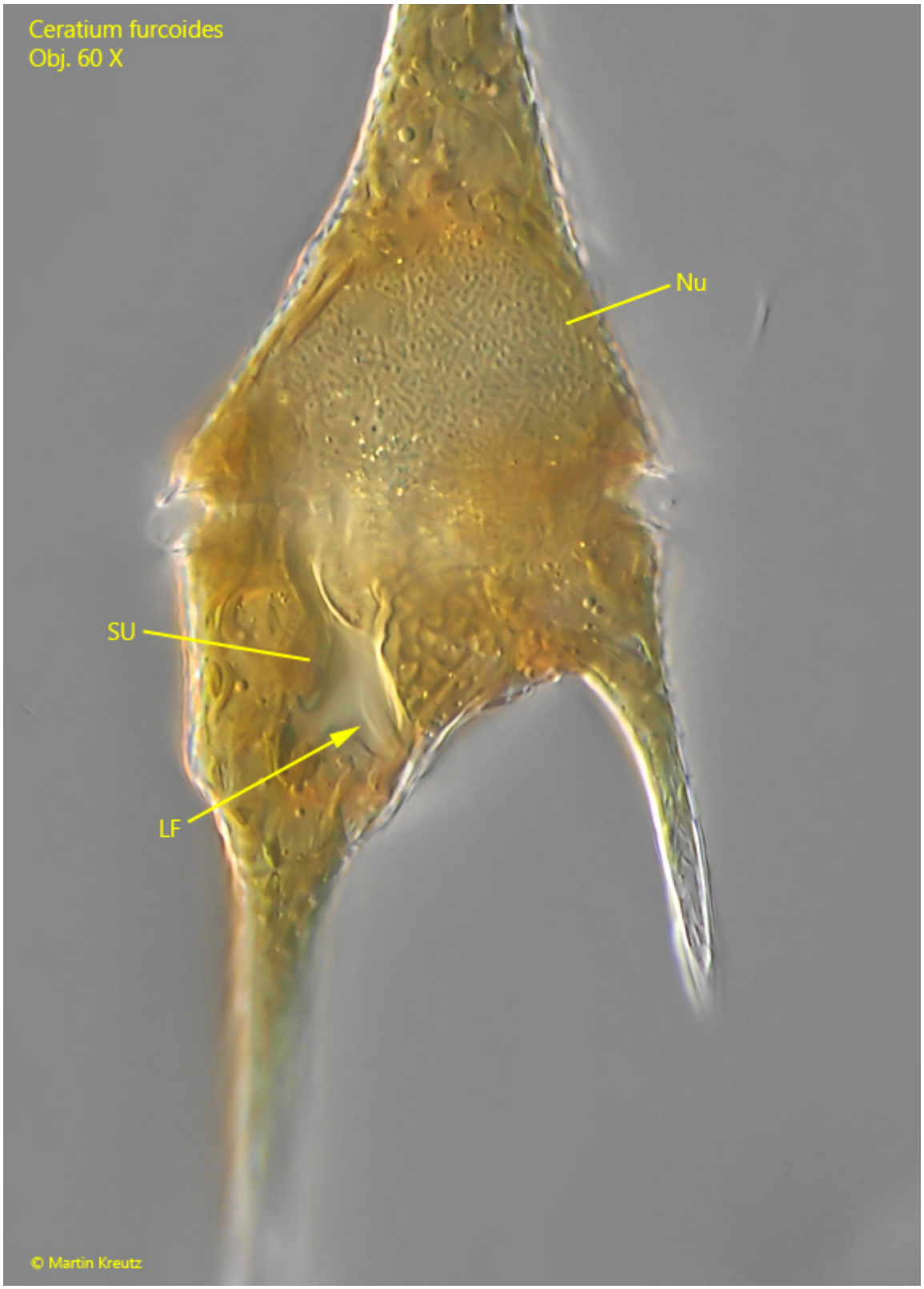


Fig. 5: *Ceratium furcoides*. Focal plane on the longitudinal furrow of the sulcus (SU) from dorsal. The longitudinal flagellum (LF) arise from the sulcus. Nu = nucleus. Obj. 60 X.

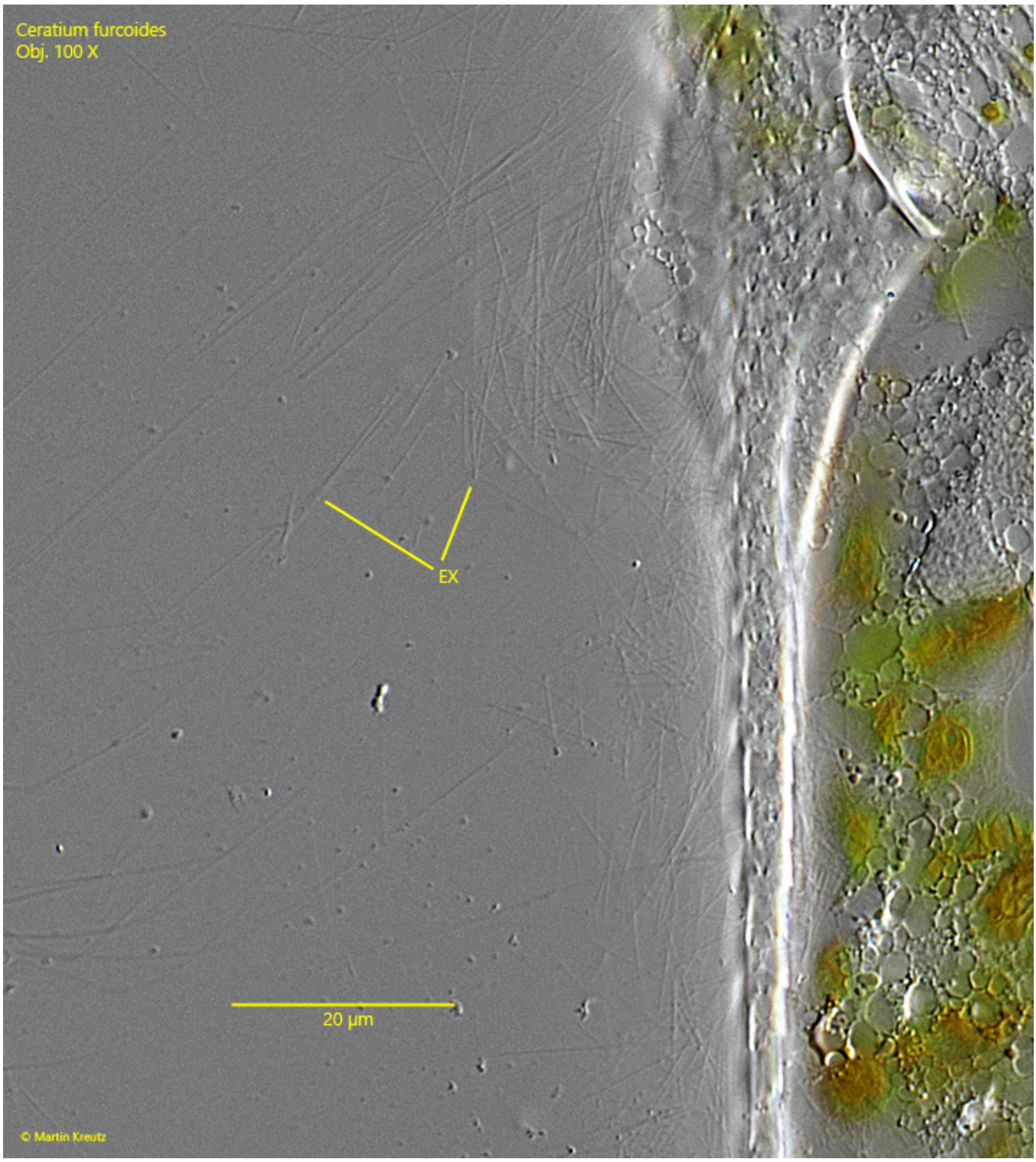


Fig. 6: *Ceratium furcoides*. In a strongly squashed specimen the fine, needle-shaped extrusomes (EX) become visible. They have a length of about 10–40 µm. Obj. 100 X.