Geometry of *Nitzschia coarctata*

This article explores the geometry of the inside of a valve of the diatom *Nitzschia coarctata* by measuring the depths of optical slices downward through the valve from the highest focus point on the valve. This species is a marine nitzschioid diatom that was collected in Hawaii in 2015, cleaned in hydrogen peroxide, and mounted in Zrax.

A simple model may help to visualize the shape of the valve. With a rectangular sheet of paper, make a narrow fold on the long edge to represent the keel. Turn the paper so the keel is on the left. (The raphe slit would be along the left edge of the keel.) On the long axis, gently curve the left side upward and the right side downward. Since this specimen is presenting an internal view, the upward curve on the left is the downward undulation and the downward curve on the right is the upward undulation when viewed externally.

The identification follows Lobban et al. (2012) in their comparison to *N. constricta.* This specimen has a stria count of 10.5 in 10 µm which is in the range for *N. coarctata*. The scanning electron micrographs on plate 59 figs 6-8 of *N. constricta* resemble this species and may be useful for understanding the geometry. Sims (ed.) (1996) pl 182 fig 3 calls *N. coarctata* a *Tryblionella* but this specimen lacks the hyaline central area.

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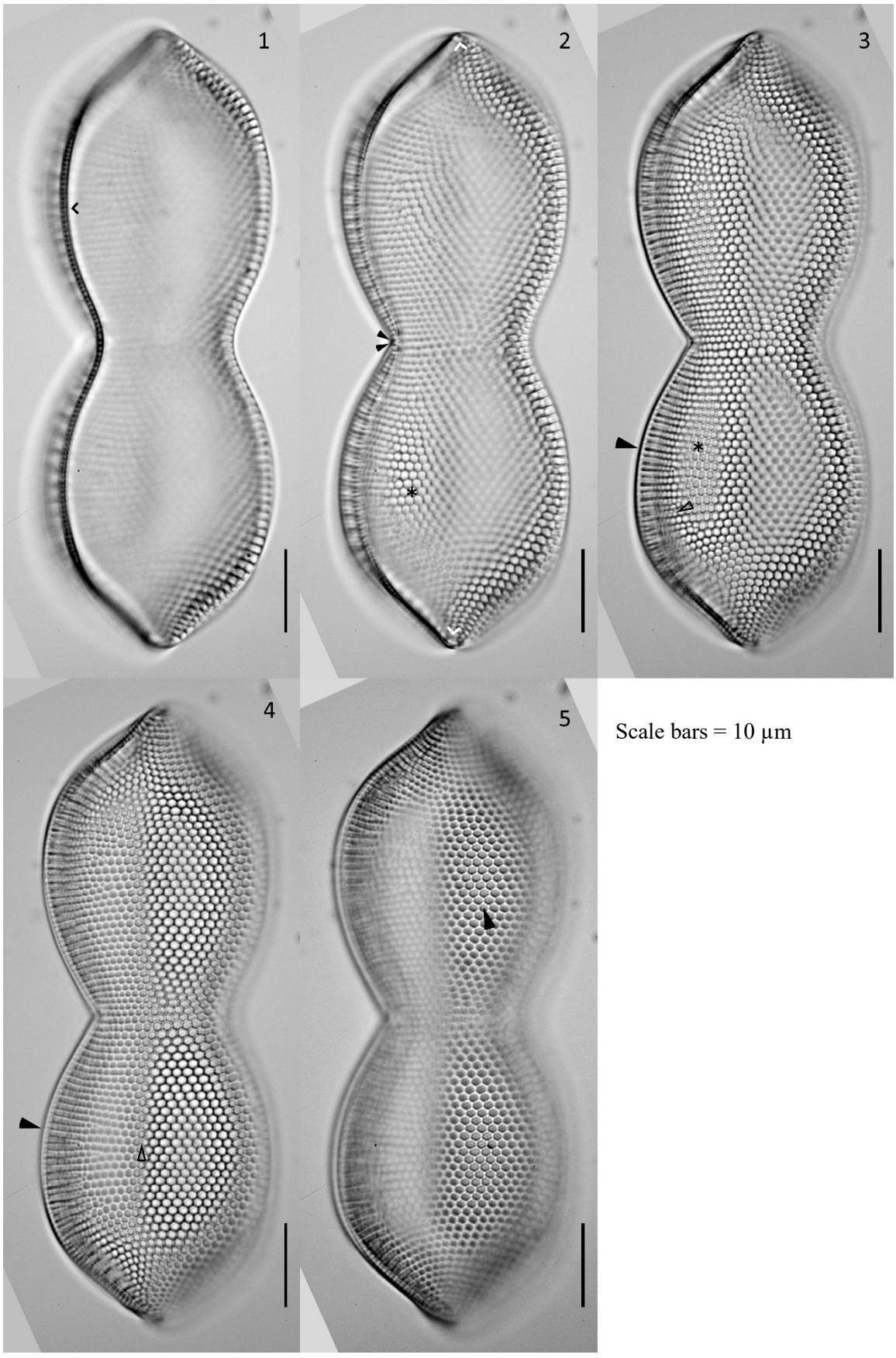
All images were taken with a 100x objective in bright field. Depth measurements were made with the calibrations on the fine focus knob of the Nikon Labophot-2 used here.

Depth is the apparent depth of an optical slice below the high focus. The author had no accurate way to measure the refractive index to find the real depth.

High focus is the optical slice closest to the slide side of the coverslip.

Figure	Depth	Note
1	0 µm	High focus. **Caret** marks edge of valve. Dark lines on the edge are ends of fibulae.
2	3 µm	**Asterisk** marks the inside of the areolae on inside of the low undulation. **White carets** mark distal raphe ends. **Black darts** mark the proximal raphe ends.
3	4 µm	**Asterisk** marks the outside of the areolae on the outside surface of the valve in the low undulation. These areolae form a network of hexagons [1]. **Solid dart** marks the edge of the keel and a fibula which appears as a dark bar on the keel. **Hollow dart** marks an example of a stria that is biseriate near the base of the keel.
4	4.5 µm	**Solid dart** on the keel marks a fibula which is now white because of the depth change. **Hollow dart** points along the apical fold between undulations.
5	5 µm	**Solid dart** on the right marks the outside of an areola in focus on the high undulation in the hexagon network on the outside of the valve.

1. Lobban et al. (2012) plate 59 figs 6-8 shows this pattern in a similar species, *N. constricta.*



Scale bars = 10 µm

References

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