41. Helicolithus blairiae Kita et al. (2017)

For each specimen, odd numbers – specimens aligned with polarizers, even numbers – 45° to polarizers. (XP) cross-polarized light, (PC) phase contrast.

Figs. 1-1 to 1-4. *H. blairiae*, holotype, Smoky Hill type area, Loc. 23B, -4.0m.
Figs. 2-1 to 2-4. *H. blairiae*, paratype, Smoky Hill type area, Loc. 23B, -4.0m.
Figs. 3-1, 3-2. *H. blairiae*, Miner County 33-4, 156.1m.
Figs. 4-1, 4-2. *H. blairiae*, Lake Waxahachie S13-14, 22' from top.
Figs. 5-1, 5-2. *H. blairiae*, Lake Waxahachie S13-21, 41' from top.
Fig. 2

Fig. 2. Stylized drawing showing birefringence and extinction patterns of *Helicolithus blairiae* aligned at 0° and 45° to the polarizers.

**Derivation of name:** Named after Dr. Stacie Blair, nannofossil paleontologist, friend, and mentor.

**Diagnosis:** A small to medium-sized species of *Helicolithus* having an axial cross structure nearly filling the central area. A lozenge-shaped longitudinal bar separates two very short, but diagnostic, disjunct segments along the minor axis of the ellipse.

**Description:** This species is a small to medium-sized (4.3–5.3 μm), normally elliptical murolith. The broad inner rim cycle displays pronounced birefringence while the narrow outer rim cycle is dull in cross-polarized light. A broad, lozenge-shaped bar aligned with the major axis nearly fills the central area and is constructed of numerous lath-shaped elements. When aligned with the polarizers, this bar exhibits a distinct ‘s’-shaped extinction pattern as the two sets of elements that form the bar on each side do not exhibit simultaneous extinction. When aligned at 45° to the polarizers, the opposite elements appear birefringent. This longitudinal bar bisects two short, disjunct bar segments aligned with the minor axis which, in cross-polarized light, resemble two bright, birefringent dots when aligned with the polarizers. These disjunct segments are not orthogonal to the longitudinal bar. The central area elements display birefringence equal to the broad inner rim cycle.

**Differentiation:** *Helicolithus blairiae* differs from most *Helicolithus* species by having an axial cross instead of a diagonal cross. *Helicolithus compactus* contains a near-axial cross that is offset from both the major and minor axis. *Helicolithus blairiae* differs from *H. turonicus* by being smaller in size and having a lozenge-shaped bar along the major axis. In less well-preserved specimens, the central area of *H. blairiae* can resemble that of *Broinsonia signata*, but with a very different rim structure. *Helicolithus blairiae* differs from *H. varolii* by being smaller in size (*H. varolii* averages 6.24 μm) and by not having triangular-shaped crossbar elements with medial sutures in the central area (Blair & Watkins, 2009).
**Dimensions:** (N = 15) L = 4.3–5.3µm, 4.9µm (mean), 0.08 (std. error), 0.10 (var.). W = 3.1–3.8µm, 3.4µm (mean), 0.06 (std. error), 0.05 (var.).

**Holotype:** Pl. 1, fig. 1.

**Holotype size:** L = 5.1µm; W = 3.6µm.

**Paratype:** Pl. 1, fig. 2.

**Type level:** 4 meters below marker unit 14 in Locality 23B of the Smoky Hill Member type area described in Hattin (1982).

**Type locality:** Smoky Hill Member type area of the Niobrara Formation, Gove County, Kansas.

**Observed range:** Upper Santonian.

**Depository:** Micropaleontology Collection at the University of Nebraska-Lincoln.