87. Eiffellithus keio Shamrock in Shamrock & Watkins (2009)

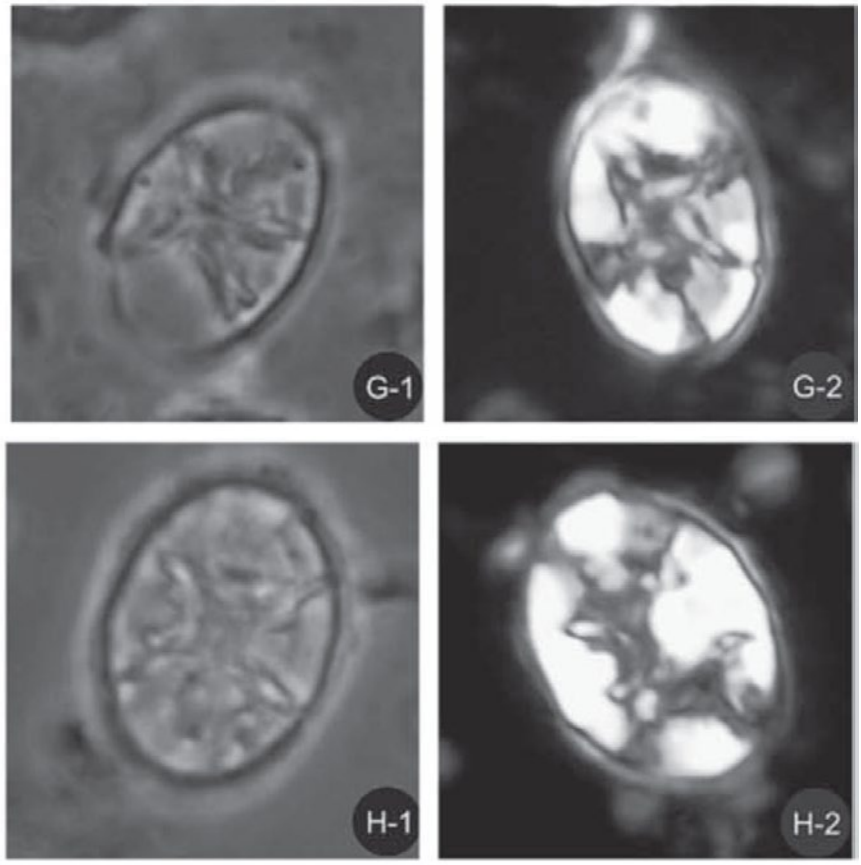

Fig. 13, G-H

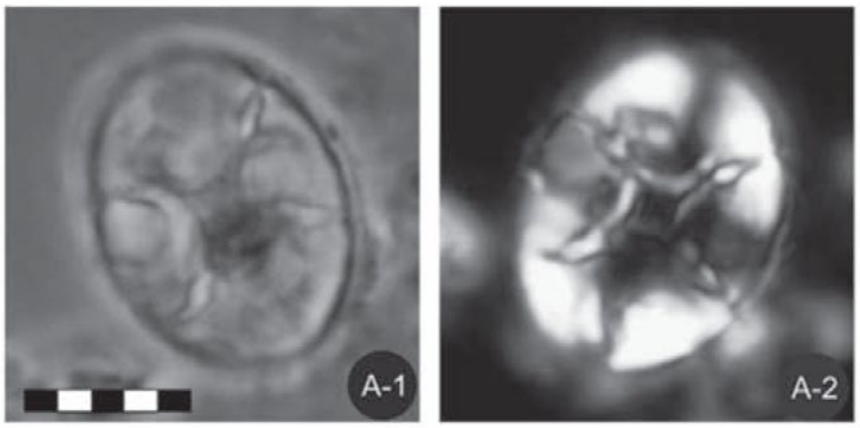

Fig. 14, A

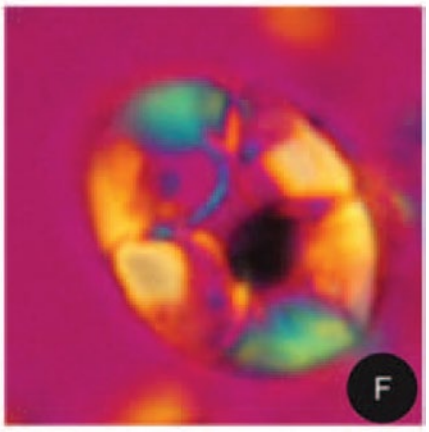

Fig. 17, F

1976 *Eiffellithus turriseiffeli* (Deflandre) Reinhardt, Hill, pl. 2, Figure 37–38
1985 *Eiffellithus turriseiffelii A*, Perch-Nielsen, Figure 12

Etymology: (Gr.) *keio* — to cleave or to split, in reference to the distal tip morphology and the lineage that evolves from this form

Types*:* Holotype: Figure 14-A, 17-F. Paratypes: Figure 13-G, 13-H

Type Section: Hartland Mbr, Greenhorn Limestone Fm, Hattin (1975) Loc. 6

Type Level: 13.45 m, lower Turonian

Diagnosis: Medium to large, broadly to normally elliptical eiffellithid, with a stem base consisting of four disjunct cross-bars with bifurcate to trifurcate terminations, forming a roughly symmetrical diagonal cross aligned ≥45° to the axes of the coccolith.

Description: Species of eiffellithid with a broadly to normally elliptical rim consisting of 40–70 steeply inclined elements giving a smooth to serrate outline. The inner rim consists of 8–15 radially oriented, roughly triangular back plates, which converge in the center to form an elliptical opening. This opening can occupy >50% of the long axis. Overgrowth of the back plates is common, forming additional crystal boundaries, occasionally obscuring the central opening. The rims display first order birefringence, though inner plates tend to be much brighter than the outer rim. The cross-bars are symmetrical about the axes, but distal terminations are highly variable both between specimens and within an individual specimen, giving a slightly asymmetrical appearance to the cross itself. Bifurcate to trifurcate terminations occur on all cross-bars, with both lobate and highly forked forms common.

Due to the overlapping nature of the crystal laths, the crystal boundaries along each cross-bar are also highly variable. The crossbars rise above the plane of the coccolith, and the resultant base contains a deep, square-shaped opening which tapers away from the center in well-preserved specimens. This structure can be overgrown or obscured by the

circular stem projecting distally from this base at 60°–90°. The central cross has high relief, making it impossible to focus on the cross-bar terminations and central structure simultaneously. Overall the coccolith is thin and whole specimens are rare, though it can be seen frequently through its range as fragments. Fragments containing at least half of the central cross can be positively identified by the highly ornate cross-bar terminations.

Measurements*:*

Length = 7.3–11.3 μm (μ = 9.0, s.d. = 1.11, n = 30)

Width = 5.3–9.5 μm (μ = 7.1, s.d. = 0.97, n = 30)

Eccentricity = 1.15–1.42 (μ = 1.3, s.d. = 0.07, n = 30)

Occurrence: upper Cenomanian - Turonian?

Remarks: *Eiffellithus keio* can be differentiated from most species by the diagonal central cross whose cross-bars are symmetrical about the axes of the coccolith. *Eiffellithus turriseiffelii* has blunt, pointed, or weakly forked cross terminations, a simpler cross construction, and is more uniformly birefringent than *E. keio. Eiffellithus casulus* has blunt to pointed terminations and is considerably smaller in size. Other species with a symmetrical diagonal cross, such as *E. parallelus* and *E. gorkiae,* are constructed far differently and have non-overlapping ranges with *E. keio*.

Shamrock, J.L. & Watkins, D.K., 2009. Evolution of the Cretaceous calcareous nannofossil genus Eiffellithus and its biostratigraphic significance. *Cretaceous Research*, **30(5):** 1083-1102.