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Article abstract

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On the holotype of "Astropolithon hindii"

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The holotype of the problematic structure "Astropolithon hindii" is described and interpreted as a deformed sand volcano, similar in morphology to many of the previously described sand volcanoes from the Cambro-Ordovician Meguma Group of Nova Scotia.

On redécrit l'holotype de la structure problématique "Astropolithon hindii" et l'interprète comme étant un volcan de sable déformé et semblable en morphologie à plusieurs volcans de sable crits auparavant dans le Groupe de Méguma (Cambro-Ordovician de la Nouvelle-Ecosse).

INTRODUCTION

In 1979 Pickerill and Harris attempted to demonstrate that the problematic structures referred to by Dawson (1878, 1890) from the Cambro-Ordovician Meguma Group of Nova Scotia as Astropolithon hindii were physical rather than biogenic sedimentary structures. Pickerill and Harris (1979) envisaged these structures as resulting from fluidization along discrete flow paths of rapidly deposited turbiditic or liquefied sheet sandstones, the A. hindii specimens merely representing sand volcanoes with a rather complex internal and external structure. At that time the "holotype" of Astropolithon hindii was unavailable. Indeed, Häntzschel (1975) in the Treatise of Invertebrate Paleontology stated "... no type specimen from Canada located" (1975, p. 180). Since 1979, the "holotype" has now been located in the Redpath Museum, McGill University, N. 2.101 (Alison and Caroll 1972, p. 154). More importantly, however, the name Astropolithon has since and recently been resurrected by Miller and Byers (1984) and interpreted as a distinctive biogenic structure. The purpose of this note is therefore to describe the "holotype" of A. hindii and to further comment on its physical, as distinct from biogenic origin.

The "holotype" of A. hindii was collected by Dawson (1878, 1890) from Waverley, 20 km to the north of Halifax, Nova Scotia (for location map see Pickerill and Harris 1979, p. 1030). Here, exposures are all within the Goldenville Formation of the Meguma Group.

DESCRIPTION

The "holotype" of Astropolithon hindii is an elongate ellipse-shaped structure, 10 cm in length and 2.7 cm in maximum width. The ellipse-shape has been considerably accentuated by deformation, the long axis of the ellipse lying in the foliation plane (cf. Henderson 1983). On the upper surface of the ellipse are at least 15 straight riges radiating outward from a diffuse and poorly preserved, slightly depressed matrix-rich central zone of the fine-medium grained host sandstone. This central zone is a darker colour than much of the remainder of the ellipse as a result of the increased proportion of matrix. The ridges or radial septae are only present on the lower half (as viewed in Fig. 1a) and on one side of the specimen. They extend from the outer margin of the diffuse central area to and then beyond the edge of the ellipse itself, gradually merging with and grading imperceptibly into the surrounding pale-green sandstone. The steep fractured surface where the ridges extend beyond the ellipse is parallel to the main foliation of the specimen. The ridges extend to a maximum of 15 mm down this fractured surface. They are relatively 'clean', possessing very little matrix in comparison to the intervening grooves which possess a higher proportion of matrix and, like the central zone, appear darker.

DISCUSSIONS AND CONCLUSIONS

The "holotype" of Astropolithon clearly exhibits similar if not identical characteristics to specimens from Waverly previously figured and described by Pickerill and Harris (1979). At Waverly the only exposures are horizontal ledge-like upper bedding plane surfaces. Most of these surfaces are covered with randomly distributed, truncated mounds, each possessing straight or slightly sinuous radial septae.

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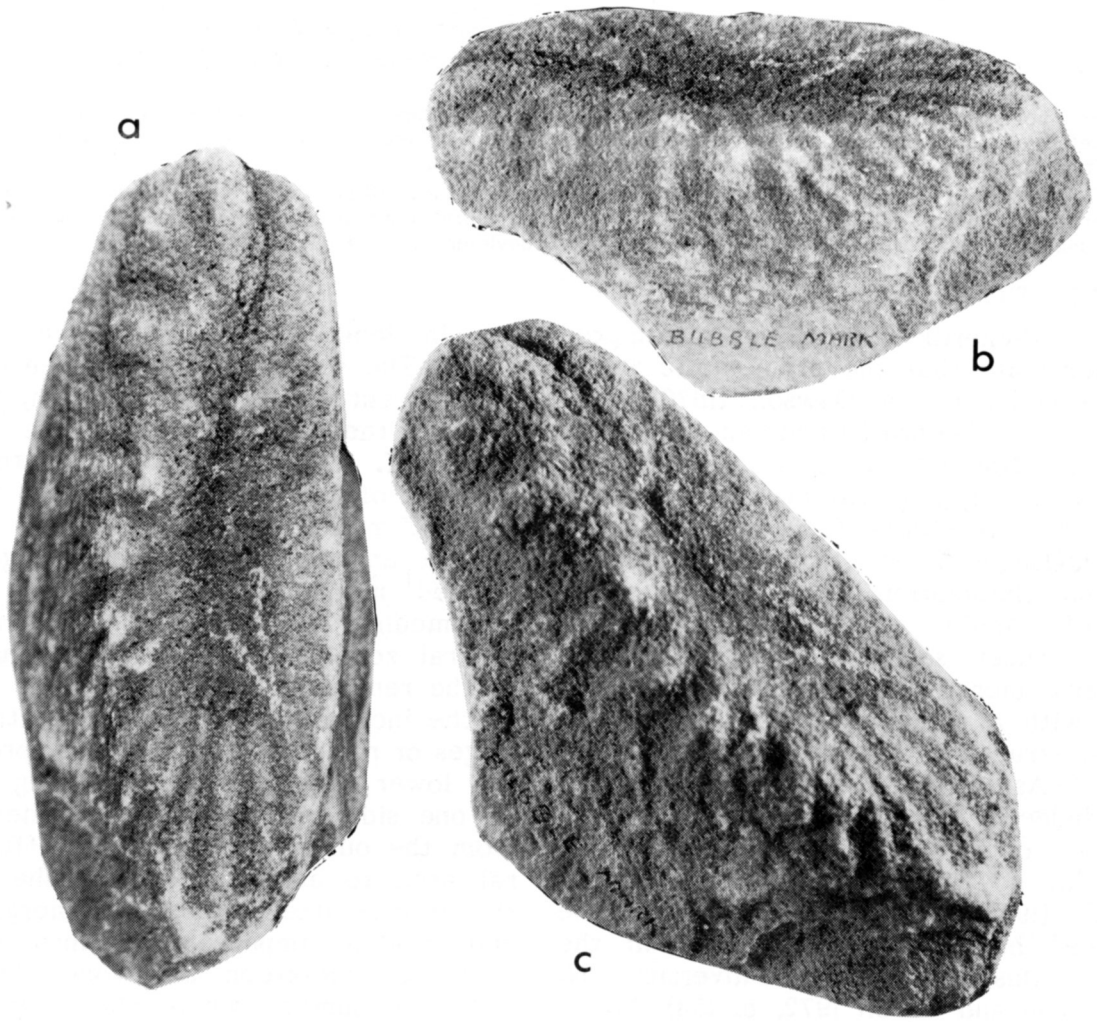

Fig. 1 - The "holotype" of Astropolithon hindii, (a) as viewed from above, (b) as viewed from the side, and (c) as viewed obliquely. Scales as follows: a = X 1.1, b = X 0.85, c = X 1.1

Invariably, the radial septae extend beyond and interconnect with septae from adjacent mounds (cf. Pickerill and Harris 1979, fig. 2a). Like the "holotype" itself, the ridges or septae possess a low matrix content in comparison to the intervening grooves and therefore appear as much cleaner structures in contrast to the darker grooves. Petrographic analysis of these structures reveals pronounced effects of quartz diagenesis (pressure solution welding of quartz grains and quartz precipitation) in the ridges in comparison to the grooves. Based on such observations Pickerill and Harris (1979) concluded that the mounds represented sand volcanoes which possessed vertical radial septae which extended beyond the actual volcanoes as vertical dewatering sheet structures. The ridge and groove appearance was simply a function of differential weathering processes on matrix-rich (grooves) and matrix-poor elutriated (ridges) structures.

Although petrographic analysis of the "holotype" is obviously impossible, the specimen is remarkably similar to the truncated sand volcanoes observed at Waverley. There is no evidence to suggest that the ridges and grooves are "radi-

ating trails" (Dawson 1890) nor is there any evidence to suggest that the structure is biogenic in origin. Indeed, the curating staff of the Redpath Museum have labelled the specimen "probable bubble mark but not a plant", an interpretation more in accord with that presented herein.

Thus the "holotype" of Astropolithon hindii is regarded as a truncated sand volcano similar to those described previously by Walter (1972) and Pickerill and Harris (1979). As such, the name Astropolithon must not be utilized for any biogenic sedimentary structure, as also noted by Pickerill (1984) in his discussion on the paper by Miller and Byers (1984). Specimens formally designated to Astropolithon and clearly of biogenic origin (e.g. Moreno **et al.** 1976, Crimes **et al.** 1977) should now be referred to **Astropolichnus** (Crimes and Anderson 1985).

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