

Enigmatic 3-meters long vertical structures in the Turonian deposits of Poland - biotic (paramoudra-like structures) versus abiotic origin

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The Middle Vistula Valley section in south central Poland exhibits Albian through Maastrichtian successions. The Turonian deposits, represented by limestone and opoka facies (siliceous limestone), are accessible in series of natural and artificial exposures along the bank of the Vistula River. The studied Turonian succession to the south borders on the Mid-Polish Anticlinorium. The latter structure represents an inverted part of the former Danish-Polish Trough. Accordingly, the Upper Cretaceous deposits bordering on the recent Mid-Polish Anticlinorium were consequently considered to represent relatively deep, shelf type deposits linked with the axial and deepest part of the Danish-Polish Trough. However, recent studies of the Author show that the host opokas for the investigated vertical structures to the south are surrounded by clearly shallow-marine deposits represented by detrital limestone (Janików Limestone) deposited over the storm-wave base. Therefore, it might be expected that the host rock for this enigmatic structures were shallow-water as well.

The studied structures occur in medium to thick bedded opokas and can be up to 3–3.5 m long; the largest are up to 20 cm in diameter. All these tubes are straight and vertical with no branches. These structures are dispersed chaotically throughout the rock with no preferential horizons for their start or end. The bottom part of those tubes seem to be U-shape or J-shape. The sediment inside and outside the tube is at first glance completely structure-less; there are not traces or remnants of internal bedding; the sediment neither outside of the tube nor inside is bent upward at margins and the lateral contact of the sediment and the tube is abrupt. Interestingly, the host sediment is devoid of any macrofauna (ammonites, inocerams, echinoderms etc.), but the sediment is definitely of marine origin what is confirmed by foraminifera and sponge spicules etc. Such structures might be biotic in origin and could be interpreted as a giant burrows linked with paramoudra columnar flints widely recognizable in English Chalk. On the other hand several abiotic explanations have been considered like dewatering, fluid escape structures, gas bubble escape structures or even specific kind of cold seeps. The crustacean burrows are the most likely candidate however the answer of true origin is still matter of debate.

WALASZCZYK, I. & REMIN, Z., 2015. Przewodnik LXXXIV Zjazdu Polskiego Towarzystwa Geologicznego, Chęciny, 9–11 września 2015, 41–50.