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SYRINGOPORA GOLDFUSS (TABULATA) ON AN ENIGMATIC SUBSTRATE, MISSISSIPPIAN, THE NETHERLANDS

BY

S. KENNETH DONOVAN[1]

Abstract — This paper reports only the second example of a *Syringopora* – substrate association in the common Mississippian building stones of the Netherlands. The present specimen is in a bridge coping stone in Hoofddorp, province of Noord Holland. The first example had a readily identifiable molluscan substrate; in contrast, that discussed herein remains enigmatic. The substrate is preserved as an irregular, lobate mass of recrystallized, white calcite. This is unlikely to be an inorganic clast, but, if organic in origin, its affinities are puzzling. Most likely it was a sponge or colonial invertebrate which was subsequently recrystallized. This distinctive and peculiar organism-substrate association is recorded, but its precise interpretation remains elusive.

INTRODUCTION

I lived in the Netherlands for more than 19 years. It was only in the last few years of my residence that I took an active interest in its Upper Paleozoic geology. This is not apparent except in very rare *in situ* exposures (various papers in Wong et al., 2007); there are no exposures of fossiliferous carbonate rocks of pre-Mesozoic age buried under a thick succession of Cenozoic sands and muds. However, imported carbonate rocks are common as building stones, particularly Mississippian limestones, such as described by Dubelaar et al. (2011, 2014) and Donovan (2019: figs 1b, 5b, 6a, c), and coeval erratic clasts in the bedload of the rivers Maas and Rhine (see Van der Lijn, 1974; Bosch, 1992; Blankers and Nelissen, 2013; Donovan et al., 2016, 2020, 2021, and references therein).

Studying the paleontology of Mississippian building stones has its problems. Except for rare, lucky specimens, situated at corners of rock slabs, fossils are apparent only in two-dimensions. Specimens can only be collected by camera; there are no hammers and no excavation or slabbing of rocks in the laboratory. Most specimens, with the notable exception of corals (Van Ruiten and Donovan, 2018), can be determined only to a high taxonomic level, such as productid brachiopods or fenestrate bryozoans (Donovan and Harper, 2018; Donovan and Wyse Jackson, 2018). However, there are rare and notable examples of organism – organism interactions apparent in two-dimensions, such as corals encrusting shelly substrates (Donovan, 2016).

[1]Apartment 5 Worsley Point, 251 Worsley Road, Swinton, Manchester M27 0YE, UK (SKennethDono@gmail.com)

FIGURE 1 — A view of the locality, a canal bridge on Hoofdweg – Westzijde, Hoofddorp, the Netherlands. It is photographed from near the corner of Graan voor Visch and Hoofdweg – Oostzijde. The windmill – Korenmolen De Eersteling – is a notable local landmark. This site is about 1.3 km northwest of Hoofddorp railway station, on the Amsterdam Schiphol to Leiden line. The asterisk (*) marks the position of the fossiliferous coping stone of interest.

In consequence, it is significant to record a feature that I have seen many times without being able to interpret it adequately. Publishing details of this association may spark the interest in someone more knowledgeable in recrystallized fossils and/or sedimentary structures; I hope so. The feature was of particular interest in that it is exposed in a bridge cladding within a few hundred meters of my former home in Hoofddorp, the Netherlands. In a country with no natural outcrops of Mississippian limestones, this man-made edifice exposes an enigmatic association between a tabulate coral and a recrystallized structure of unknown organic(?) origin.

LOCALITY

Hoofddorp in the province of Noord-Holland is the first railroad station southwest from Amsterdam Schiphol International Airport, on the line to Leiden, Den Haag, and Belgium. Approximately 1.3 km northwest of the station, following the road Graan voor Visch, is a crossroads with the Hoofdweg separated into two sides — Westzijde and Oostzijde — by a major canal. The site of interest is a canal bridge on the Hoofdweg – Westzijde (Fig. 1), northeast of the crossroads, but close to it, and near to a major local landmark, the Korenmolen De Eersteling, a large windmill that still produces flour.

The specimen of interest (Figs. 2, 3) is in a coping stone at the northeast end of the bridge on the southeastern side (Fig. 1). The coping stones of this bridge are Mississippian limestones. These rocks contain a marine fauna typical of such limestones, particularly crinoid debris, brachiopods, and colonial corals (rugose *Michelinia* sp. and tabulate *Syringopora* sp.).

DESCRIPTION

The specimen of interest consists of two distinct structures, but, in truth, there is little to describe. Most prominent is an irregularly rounded, lobate mass of crystalline, white calcite (Figs. 2, 3). This was drilled by man near its upper edge, as illustrated; this presumably once supported a fence post but is now infilled by cement.

To the upper and upper right of the calcite mass there is a colony of the tabulate coral *Syringopora* sp. This colony curves around the calcite crystals in this region (best seen in Fig. 3). Individual corallites are conspicuously raised above the surface of the coping stone, having been etched out by weak acid rain, and more than one example of branching is apparent.

DISCUSSION

It is assumed that the coping stone was cut parallel to bedding, so the Figures 2 and 3 show a transverse section of the limestone bed. This specimen poses two simple questions:

FIGURE 2 — Detail of the coping stone, a highly fossiliferous Mississippian limestone. The lobate mass of white calcite crystals, left of center, was presumably organic in origin, but is now unidentifiable. After slabbing, it was bored, but this hole is now infilled with cement. *Syringopora* sp. is prominent towards the top. Scale bar represents 50 mm.

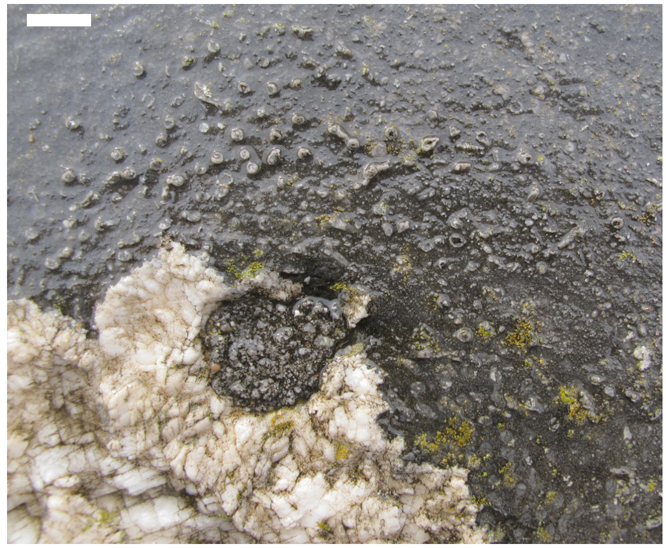

FIGURE 3 — Detail of Figure 2, showing corallites of *Syringopora* sp. etched out of the surface. Scale bar represents 10 mm.

was the coral colony growing attached to what is now a recrystallized mass of calcite; and, if so, what was the nature of the substrate at that time? The former question is the easier and answerable in the affirmative. Although rare, at least one other *Syringopora* — substrate association has been reported from Dutch building stone, the coral growing on a coiled mollusk (gastropod or cephalopod(?)) shell (Donovan, 2016; Van Ruiten and Donovan, 2018). An analogous association is determinable in the present specimen. Evidence includes some corallites of the colony occurring within a few millimeters of the calcite mass and the colony itself curving around the presumed substrate (Figs 2, 3). An intimate relationship during the life of the colony was thus highly likely, perhaps near-certain.

A more difficult problem of interpretation is presented by the crystalline calcite mass. Was it crystalline calcite when encrusted by the coral or, as seems probable, does this represent a later diagenetic alteration? If the former, was it an inorganic clast? Alternately, could it be a reworked bioclast of unusual outline that was already recrystallized? Neither seems likely, particularly an inorganic clast; there is nothing else in this shelly limestone that suggests a conglomeratic origin. Further, the lobate shape with an internal crystalline structure would not have survived energetic transport.

Could the calcite mass be some form of stromatactis, with an early diagenetic infill subsequently exposed by seafloor erosion (see, for example, Bathurst, 1982, 1998; Bourque and Boulvain, 1993; Bourque, 2003)? It seems unlikely: the shelly limestone is not a marine carbonate mudrock; and there is no evidence of a biohermal association or a series of labyrinthine cavities. The two-dimensional shape is superficially stromatactis-like, but not stromatactis.

Alternately, is the calcite mass a recrystallized bioclast, with recrystallization only occurring after final burial? This is the preferred interpretation, yet it is pulled up short by the outline which does not confidently propose any particular biotic affinity. The irregular outline suggests some massive organism, such as a coral, or a sponge or stromatoporoid, but, if so, why is it recrystallized? *Michelinia* sp. occurs in coping stones in this bridge without any indication of major diagenetic alteration. Perhaps most probably, but uncertainly, it was a non-calcareous sponge preserved by diagenetic alteration after encrustation and final burial. Only further specimens available for laboratory study can test the accuracy of this speculation.

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Museum of Paleontology, The University of Michigan
1105 North University Avenue, Ann Arbor, Michigan 48109-1085
Matt Friedman, Director

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