

Rapid Formation of Calcium Carbonate Concretions in a North Norfolk Marsh

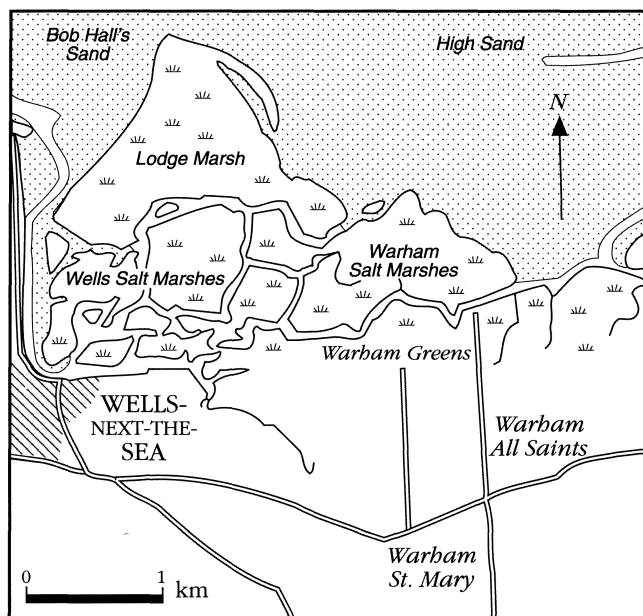
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ON WEDNESDAY 5th October 1994, the *Eastern Daily Press* carried a remarkable story headlined 'Magic in the marsh: amazing geological find of mud turning to stone'. The article claimed that scientists were astonished by the speed at which calcium carbonate concretions—irregular or rounded lumps of rock—were forming in sediments in a Norfolk salt marsh.

To understand the significance of these observations, we need to know a little about what happens to a sediment after it has been laid down. After clays, muds, or sands are deposited, they undergo a variety of processes which are collectively called diagenesis. In simple terms, diagenetic processes are the changes which take place in sediments which ultimately lead to them becoming sedimentary rock. During diagenesis some constituents of sediments have a tendency to concentrate in certain parts of the incipient rock, and may form hard masses which geologists call concretions. Such nodules are fairly common in the geological record. It is usually assumed that diagenetic processes take very long periods of time—modelled growth rates for carbonate concretions imply that their formation may take more than 100,000 years (Berner, 1968).

However, creationists who hold to the young-earth model do not have 100,000 years of earth history to play with! If the major sedimentary rock formations of our planet have been deposited very recently, perhaps in the last 5,000–6,000 years, diagenetic processes—such as concretion growth—must have taken place much more rapidly than geologists usually assume. The data on concretion growth in sediments near Warham on the north Norfolk coast provide clear evidence that these processes can occur in very short time spans, just as creationists have suspected. More technical information to that provided in the *Eastern Daily Press* article is available in scientific papers on these concretions published in *Marine Geology*, *Nature* and *Sedimentology* (Pye, 1981; Pye, 1984; Pye *et al.*, 1990; Coleman *et al.*, 1993). Several further papers are in preparation (Kenneth Pye, personal communication, 1994).

The Warham intertidal marsh and sandflat sediments are known to have been deposited since the Second World War, and are therefore less than 50 years old, yet they contain concretions up to 0.4 metres in diameter (Pye *et al.*, 1990). It is clear from descriptions of these nodules that they have formed *in situ* in the marsh sediments—for instance, laminations have been traced through some



concretions into the surrounding sediment. In some places continuous cemented layers 15–25 centimetres thick can be traced laterally for 3 or 4 metres (Pye, 1981).

Many of the Norfolk concretions contain intact and broken shells, and plant remains, and may help geologists to interpret similar fossil-bearing concretions in the geological record. Fossiliferous concretions are known from many localities—for instance, the Santana Formation of Brazil (Martill, 1988; 1989) and the Francis Creek Shale of Illinois (Baird *et al.*, 1986; Maples, 1986; Schopf, 1979; Woodland and Stenstrom, 1979). The beautiful preservation of fossils in these ancient concretions should have already caused us to question the long time spans normally assumed for concretion growth.

In fact, as creationists have pointed out, there is an increasing weight of evidence that cementation of sediments can proceed very rapidly indeed. Rapid lithification is known to have occurred in modern times on the ocean

bottom, on reefs, on beaches (beachrock), in backshore sand dunes (æolinite), and in freshwater rivers and springs (cayrock). Rapid lithification of marine sediments has been documented at the volcanic island of Surtsey (Alexandersson, 1970). A cannon, a battery, barbed wire, tin cans, beer bottles, and Coca-Cola bottles have all been found embedded in solid 'limestone'. Beachrock formation takes place in nature in only a few weeks, and can be reproduced in the laboratory in hours (Wise, 1986). The term marshrock has been proposed for the Warham cemented sediments by analogy with beachrock (Pye, 1981).

The rapid growth of concretions on the north Norfolk coast adds to the accumulating evidence that the young-earth creationist time scale is not necessarily an unreasonable one, and also highlights how little is actually known concerning the processes and rates of cementation of sediments. Diagenesis is likely to be a fruitful area for further study by creationists.

Acknowledgements

I would like to thank Mike Sockolov for bringing the article in the *Eastern Daily Press* to my attention, and Professor Kenneth Pye of the Postgraduate Research Institute for Sedimentology at The University of Reading for kindly sending me reprints of his papers on the north Norfolk concretions.

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GENESIS AGENDUM

A new Creationist project has recently been launched. It is not competing with existing UK organisations but complementing them. The objective is to help people in their thinking about the origins of the world. The name has been adapted as an umbrella title to cover a range of projects such as publishing, video production, exhibitions and conferences. But the big dream of the originators (sorry, no pun meant!) is to found a Museum of Creation and Earth History in London, hopefully in the South Kensington area!

Such a project demands much, much prayer and a lot of money. Though this is not a BCS project, we do commend it to our members as worthy of consideration for prayer support. (See our editorial on the need for this). If you are interested in receiving more details, contact Sean McCormack at 34 Calvert Road, Greenwich, London SE10 0DF. If you want a full report, please send a stamped and self-addressed A5 envelope to Sean.