An Investigation of the Reworking of Ammonite Fossils

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ABSTRACT

Reworking by gentle water currents has been invoked by evolutionists to explain how 'Jurassic' ammonite fossils are found in the 'Upper Pliocene' Red Crag Formation (Great Britain). Investigation of hydraulic reworking of ammonite fossils by the Middle Bosque River near McGregor (Texas) clearly shows that gentle water currents are incapable of plucking such fossils from limestone bedrock. Only very rapid to violent currents will do such work, but even then considerable erosion occurs en route *to deposition, so that with increasing distance and time of transport rapid destruction occurs. Thus the 'explanation' for the ammonite fossils in the Red Crag Formation is without merit.*

INTRODUCTION

This investigation grew out of examination of the geologic literature describing the Red Crag Formation of the East Anglia coast of Great Britain, with its rich phosphate beds and extraordinary fauna encompassing most of the supposedly evolved types of the geologic column from the Jurassic/ammonites to man/his artifacts.[1] The mixed occurrence of so many species, including a wide variety of land mammals, whales, fishes, reptiles and molluscs, postulated as having lived at separate times, many without overlap (timewise) of previous species, was explained by Sir Charles Lyell, Joseph Prestwich, S. V. Wood and others as the result of a gentle destruction of a landmass of unknown shape and extent now occupied by the North Sea.[2] Further postulation assumed that the gentle currents doing the reworking caused no erosional wear[3] of the landmass' fossils[4] as they were plucked, transported and redeposited in the Red Crag Formation(Upper Pliocene).

However, my experience as a hydrologist/geologist along the Middle Bosque River near McGregor, Texas, where large ammonites of the Cretaceous Weno Limestone are being reworked by river currents, suggested that the postulations may have no basis in reality with regard to the hydraulic reworking of fossil ammonites from limestone by water currents. This investigation was conducted on April 5, 1993 by John A. Watson, hydrologist with the Texas Water Commission, assisted by Professor M.E. Clark, engineer/hydrologist at the University of Illinois.

INVESTIGATION

We commenced the investigation from the highway bridge at the FM 3047 crossing of the Middle Bosque River (the railroad bridge adjacent downstream is abandoned), five miles (8 km) north-east of McGregor, Texas. Proceeding progressively downstream, measurements of channel water widths averaging 82½ feet (25.2 m) indicated that the 3/4 mile (1.2 km) long reach of the river is statutorily navigable (>30 feet or >9.1 m average width between gradient boundaries) and publicly accessible. River stage (a high base flow) was observed to be near the level of the gradient boundaries.

Plate 1 pictures a one-third mile (540 m) long river reach downstream from the highway bridge bathed by the clear base flow, which was observed to sweep across several large ammonite fossils exposed by channel erosion. The alluvium pictured by the photograph includes the many pieces of rock of the channel plucked up by hydraulic action and deposited during flooding events. No hydraulic plucking was observed to be occurring by the action of the relatively gentle base flow during the investigation. Plate 2 shows a mostly complete cast of a 15 inch (38 cm) diameter ammonite fossil taken from the alluvium (Holocene) seen in Plate 1, and shows considerable erosion from hydraulic transport. Plates 3–5 document various stages of exposure of ammonite fossils by the erosive action of flood waters along the channel banks of the river. These specimens are above the base flow levels of the river.

Plate 1. *View is generally upstream to the bridge at FM3047 on the Middle Bosque River and laterally along Holocene alluvium from which were taken a piece of an ammonite mould and the ammonite cast of Plate 2.*

Plate 2. *This much abraded/eroded ammonite fossil was found in the river channel seen in the lower left-hand corner of Plate 1. It is a portion of the Holocene alluvium deposited there. The diameter of the fossil is 15 inches (38 cm).*

Plate 3. *Eighteen inch (45.7 cm) diameter ammonite cast in limestone of the right river bank about 2 feet (60 cm) above the base flow water level of the river.*

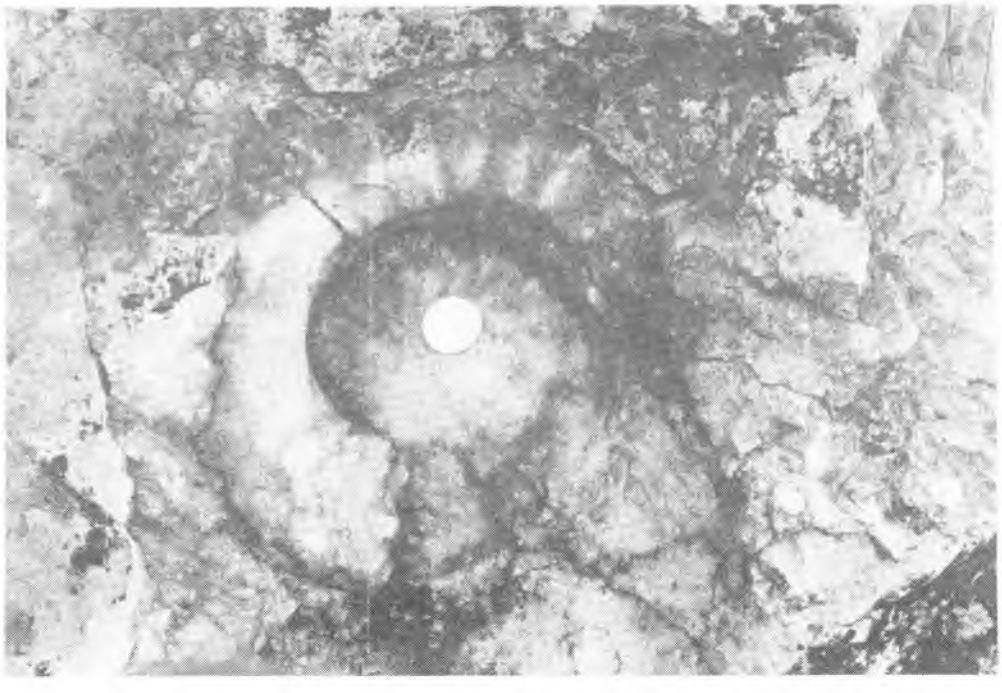

Plate 4. *Ammonite cast in limestone of the high right river bank. The coin (a U.S. quarter) at the centre of the fossil is indicative of its size.*

Plate 5. *Ammonite cast in limestone of a flooding channel behind the right bank of the river. The coin (a U.S. quarter) at the centre of the fossil is indicative of its size. Note the inner structure of the shell (chambering) exposed in the outer coil to the right of the coin.*

Plate 6. *This series of six ammonite fossils (right) was collected from the bed of the Middle Bosque River along the outcrop of the Cretaceous Weno Limestone in the reach of this investigation. They were collected by this writer over a period of several years. They illustrate various degrees of hydraulic erosion suffered by the fossils as they were exposed increasingly by channel erosion, then violently plucked up during river flooding, and abraded/eroded increasingly by recurring flooding transport — the most eroded fossil generally having been transported the farthest.*

The most eroded fossil is at the top of the photograph, thence grading to the least eroded at the bottom. The fossil second from the top/fifth from the bottom is that of Plate 2.

Plate 7. *This predominantly limestone gravel Holocene alluvium is the next most emergent deposit from that of Plate 1. Its fossil fragments exhibit a great deal of erosional wear because of their having been reworked and transported from their original occurrence in Cretaceous strata exposed along the river or its tributaries. View is upstream.*

Plate 8. *The Holocene alluvium here is seen in the bottom half of the photo. This alluvium has the characteristics of that of Plate 1 (exhibiting bedding surfaces), only is smaller in the average size of the fragments. The ammonite mould fragment near the lower left hand corner of the plate is 6 inches (15 cm) in diameter. The deposit is about three feet (almost 1 m) above the river water level.*

Plate 9. *This predominantly limestone alluvium forming a high right bank about 3,100 feet (945 m) downstream from the bridge averages about seven feet (2.1 m) above the water level of the river. Fossil fragments were scarce; one is seen in the lower left hand corner of the plate.*

Plate 10. *The highest alluvium that appeared to be related to deposition by the river is a cemented gravel (conglomerate) forming the highest ledge of the river bank (near top of plate). Its pebbles showed signs of deep-seated weathering suggesting old age. This combined with the cementing aspect suggests that it is a Pleistocene deposit. Note the boulder, tumbled down from the ledge above, lying in front of Professor Clark.*

Plate 2 depicts the culmination of the hydraulic action, when the ammonite cast is loosed completely from its entombment in the limestone and transported some distance, where it becomes a part of an alluvial deposit of the river. The considerable abrasion/erosion that the fossil has sustained in the plucking and transport is quite apparent. Plate 6 shows a series of six ammonite fossils from the bed of the river which illustrate the various degrees of hydraulic erosion suffered by the fossils as they were exposed increasingly by channel erosion, violently plucked up during river flooding, and abraded/eroded by recurring flood transport.

Plates 7–10 are views of river alluvium at increasingly higher elevations above the high base flow level of the Middle Bosque River at the time. Plate 7 depicts alluvium that is next more emergent from the base flow than the alluvium of Plate 1. The reworked deposit of gravel-size pebbles had in it single valves of recent freshwater clams (not fossilized), and we observed one identifiable valve of a *Gryphea* species fossil (identification in doubt). Plate 8 depicts a 10 inch (25 cm) diameter external mould of an ammonite fossil in Holocene alluvium about five feet (1.5 m) above the water level of the river, and in the next more emergent reworked deposit of the river. Plate 9 depicts the subsequent next more emergent Holocene alluvium in a high river bank averaging about seven feet (2.1 m) above the river water level. We found one small part of a cephalopod (identification in doubt). The highest alluvium of the river is a few feet (around one metre) thick cemented gravel deposit (conglomerate) pictured in Plate 10. We found no identifiable parts of ammonites or other fossils during a close examination of that deposit, which is probably a Pleistocene bed.

CONCLUSIONS

Based on this investigation it must be concluded that gentle water currents can do very little or nothing to pluck identifiable fossil ammonite casts, or parts of casts, from indurated limestone. It is the very rapid to violent currents/flows (erosive power increasing exponentially) that are able to pluck out and transport complete or nearly complete specimens. The evidence we collected indicates that considerable erosion of any specimen occurs *en route* to being deposited. Also, in general, with increasing age/emergence of the river deposits, there is a corresponding decrease in the concentration of fossils/fossil fragments occupying each successive deposit, until in the Pleistocene there are virtually no reworked fossils left. Thus, increasing distance and time of transport are parameters that give rise to rapid destruction of reworked fossils.

Application of these principles to Red Crag Formation sedimentation (Upper Pliocene) would require the North Sea landmass to have been eroding no further back in time than about Middle Pliocene in order for the reworked fossils to not have been destroyed. However, extensive geological work in development of the North Sea oilfields has shown that no such landmass existed at or near this supposed time. In fact, none has existed in the North Sea region since the so-called early Cretaceous.[5] Thus, only a landmass marginal to the North Sea could have been postulated as a source of the alleged reworked fossils of the Red Crag Formation and carry any appearance of credibility. But, no specific site(s) has been identified, studied, and confirmed as having been the specific source of the reworked fossils — just reference to a phantom North Sea landmass as the source.[6]

Therefore, postulation of reworked Jurassic (Lias) ammonite fossils being the source of the Upper Pliocene Red Crag Formation ammonites, **and** exhibiting little or no erosional wear from their reworking and transport,[7] is without merit. In my search for more substantiating evidence presented in the literature I have thus far found none, only postulation/speculation based on theory alone. After all, those ammonite fossils have to be reworked because evolutionary theory insists they belonged to an earlier 'age' than that of the Red Crag Formation.

REFERENCES

1. Forbes, D., 1951. **British Fossils**, Adam & Charles Black, London, p. 86.
2. Dawkins, W. B., 1880. **Early Man in Britain**, MacMillan & Co., p. 71.
3. Wood, S. V., 1859. On the extraneous fossils of the Red Crag. **Quarterly Journal of the Geological Society of London, 15**:33.
4. Forbes, Ref. 1.
5. Kent, P. E., 1975. Review of North Sea Basin development. **Journal of the Geological Society of London,131** (1):435 (summary).
6. Dawkins, Ref. 2.
7. Wood, Ref. 3, p. 38.

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