A *Pistosaurus*-like Sauropterygian from the Rhaeto-Hettangian of England

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Abstract: *Pistosaurus* is an enigmatic sauropterygian, now considered a plesiosaurian, known from the Middle Triassic (Anisian) of southern Germany. The humerus recorded here came from a Leicestershire (UK) locality, and possibly from a pre-*planorbis* (Rhaetian?) horizon. Its significance is discussed, and comments are made on the functional evolution of sauropterygian limbs.

Introduction

In the spring of 1989 the late Robert Zanon, visiting the Earth Sciences Section of the Leicestershire Museums, Arts and Records Service, The Rowans, College Street, Leicester LE2 0JJ (abbreviation LEICS), identified an unnumbered sauropterygian humerus in the palaeontology collections as ". . . left humerus of *Pistosaurus longaevus*". The original label accompanying the specimen is of the style dating from the time (c. 1849 *et seq*) when the Museum was known as the Town Museum, Leicester, and states that the specimen had been included in the Biology Section's collections. The earliest accessions into these collections date from 1884 and were discontinued in the early years of the 20th Century. However, large quantities of fossil material were being incorporated into the Museum around 1889, chiefly through the efforts of Montagu Browne, the Museum's Curator (Anon, 1890). The specimen's locality was given as "Barrow-on-Soar, Leicestershire" and the horizon as "Lias Limestone". It was catalogued with its current number (LEICS G5.1989) on the 24th November 1989.

"Barrow-on-Soar" (more correctly Barrow upon Soar) is an old quarrying village (NGR SK57 17) whose workers exploited the local Rhaeto-Hettangian limestones for many years. The last recorded quarrying activities ended in the 1920s, but many small-to-medium sized quarries existed before then, each being backfilled when worked out. The history of the workings at Barrow upon Soar has been summarized by Martin *et al.* (1986), who identify about 3m of Pre-*planorbis* Beds in the area (underlying known *planorbis* Zone sediments (Cruickshank, 1994; Taylor and Cruickshank, 1989), and ascribe them to the Rhaetian stage of the Triassic. Several bivalves, identified as *Atreta* and *Liostrea*, are cemented to the dorsal surface of this bone but do not assist dating of the specimen as they are both wide-ranging taxa in the Mesozoic.

Few traces remain of the old quarries, although surface irregularities persist in places and some greener patches are visible from the air in the fields surrounding the village. The provenance of this specimen cannot, therefore, be located precisely at present.

The specimen

The bone (Fig. 1) is a left humerus of a sauropterygian. It is grey-coloured and approximately 245 mm long and 45 mm wide at the mid-shaft. The specimen lacks its postero-distal corner, and the distal end is generally severely cracked. The axis is straight, with the distal end slightly expanded posteriorly, so that the posterior margin is curved. Proximally, the head is dished and rugose, showing that there was originally a substantial cap of cartilage, and is offset from the insertion for the *m. supracoracoideus*. The bone lacks any entepicondylar foramen and has a low ridge on its dorsal surface for the insertion of the *m. latissimus dorsi*. The distal end is flattened, with a curved articular face that does not appear to be sub-divided into radial and ulnar facets, though this confusion could be caused by the missing postero-distal corner or by ontogenetic factors. Apart from this damage, the description agrees in all essentials with the *Pistosaurus* humerus figured by Sues (1987, Figure A-D).

Discussion

Important features of this specimen are its location, horizon and size. If it is *Pistosaurus* then it becomes the youngest known member of that taxon and the first to be recorded outside continental Europe. It is also larger than the specimens recorded by Sues (1987); 245mm as against 174mm. On this basis the implication is that a primitive plesiosaurian lived in the Rhaetian Sea of midland England. However, a search of the literature shows that this form of humerus occurred in several plesiosaurians in the Lias of Street (Somerset), Whitby (Yorkshire) and elsewhere (Hawkins, 1834; Owen, 1865; Storrs, 1993; Taylor and Cruickshank 1989). Storrs (1993) has discussed the functional evolution of the sauropterygian locomotory apparatus, and concludes that there was a progressive trend towards a more lift-oriented propulsion system in the plesiosaurians, compared with the 'nothosaurians'. This is indicated by the evolution of paddles ending in a fine point, rather than the blunt-ended, rowing-adapted paddles of the 'nothosaurs'. Within the plesiosaurians, humeri tend to become symmetrical across the distal end, so that the posterior curvature is obscured and the end looks fan-shaped. This is turn has implications concerning the proportions of the paddle and its function, though these considerations are outside the scope of the present paper. In conclusion, it is clear that the limb adaptations of *Pistosaurus* remained successful from the Anisian to the Rhaeto-Hettangian. Other collections of Rhaeto-Hettangian (or earlier) vertebrate remains may be worth examining to see if additional, similar but better provenanced material can be identified.

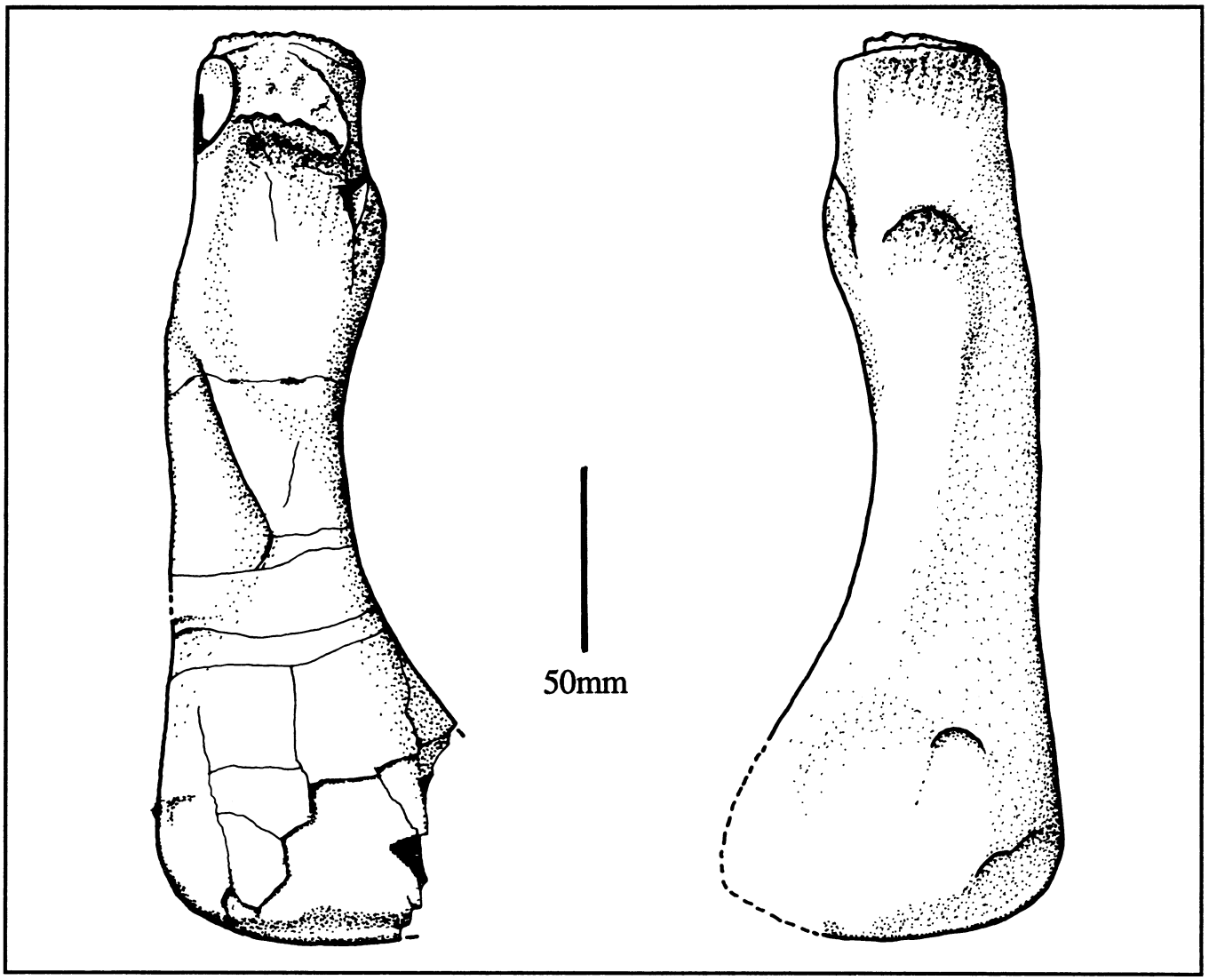

Fig. 1. Left humerus of *Pistosaurus* sp. from Barrow upon Soar, Leicestershire, as preserved in dorsal view (left) and as reconstructed in ventral view (right). Scale bar is 50mm.

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