

RARE ICHTHYOSAUR AND PLESIOSAUR MATERIAL FROM THE LOWER JURASSIC OF IRELAND

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Abstract

Fossil marine reptile material is described from the restricted outcrops of Lower Jurassic strata exposed in Ireland. The remains consist of a single isolated fragment of rostrum from an ichthyosaur and two blocks of matrix that contain disarticulated and weathered plesiosaur vertebrae, rib fragments and a putative ilium. Although fragmentary and indeterminate, this material is a rare and significant occurrence of marine reptiles in Ireland and provides additional data on the distribution of ichthyosaurs and plesiosaurs in Europe during the Jurassic Period.

Introduction

Ichthyosaurs (Ichthyosauria) and plesiosaurs (Plesiosauria) are extinct reptiles that formed a major component within Mesozoic oceanic ecosystems. Although the fossil remains of these Mesozoic marine reptiles are commonly found throughout Europe (e.g. Persson 1963), they are exceedingly uncommon in Ireland. This is primarily an artefact of the geology of Ireland: there are no exposures of Jurassic-age rock anywhere in the Republic of Ireland, and only limited exposures in Northern Ireland. The Lower Jurassic deposits in Northern Ireland consist of grey calcareous mudstones intercalated with bands of nodular limestone and range in age from the Hettangian to the Pliensbachian (Mitchell 2004). Only the Waterloo Mudstone Formation is recognised but exposures are limited and generally result from periodic landslips and slumps. The calcareous mudstones are occasionally visible in slumped blocks or short outcrops around the margins of the Antrim Plateau and on the Co. Antrim Coast (Mitchell 2004). These deposits have yielded a typical Jurassic fauna of fossil invertebrates including ammonites and belemnites. Fossil bones of marine reptiles are also occasionally found (Bryce 1831; Bell

1903; James 1981). This paper describes some isolated plesiosaur and ichthyosaur material from the Jurassic rocks of Ireland, housed in the National Museum of Ireland (NMI)—Natural History Division. Although fragmentary, the material is a significant record that provides data on the distribution of marine reptiles in Europe during the early part of the Jurassic Period.

Anatomical abbreviations

Cen—vertebral centrum; Cr—crinoid ossicles; D—dentary; Il?—possible ilium; TP—transverse process of vertebra; N—nasal(s); NA—neural arch; NCS—neurocentral suture of vertebra; NF—nutritive foramen; NS—neural spine; Pmx—premaxilla; Poz—postzygapophysis; Prz—prezygapophysis; R—rib; R?—possible rib; Sur?—possible surangular; ?—unidentified element.

Institutional abbreviations

NMING—National Museum of Ireland, Natural History Division, national geological collections.

Systematic palaeontology and description

Reptilia
Ichthyosauria indet.

Material

The ichthyosaur material consists of a single isolated fragment of rostrum (NMING: F14889) (Fig. 1). The specimen was collected from the Lower Lias of Hillsport, near the Gobbins, Bland Magee, Co. Antrim on 23 December 1895. It was purchased from R. Bell by the NMI for £15 (NMI Registration Number 1915.64). The fragment is excellently preserved in three dimensions although the elements to the right have shifted dorsally. The medial articular surface of the right premaxilla is therefore partially visible in left lateral view (Fig. 1B, H). The specimen includes parts of both mandibular rami (dentaries and surangular), preserved in occlusion with the cranium (premaxilla). Nine teeth are preserved *in situ* and visible on the left side (Fig. 1B, H). The right surface of the specimen is partially obscured by grey mudstone and the presence of a large gastropod (Fig. 1E, K). There are also crinoid ossicles associated with the left side of the specimen (Fig. 1J, K). The total length of the jaw fragment as measured along the premaxilla is 81mm. The posterior cross-section is 67mm deep and the smaller anterior cross-section is 44mm deep. The anterior and posterior faces of the specimen provide cross-sections that show the implantation of the teeth and other details (Fig. 1A, C, G, I). These cross-sections compare very well with other lower Jurassic ichthyosaurs (e.g. McGowan and Motani 2003). The nasals are not visible on the dorsal surface, but can be seen in posterior cross-section as thin splints underlying the premaxillae (Fig. 1C, I). The narrow morphology of the jaws, the loose implantation of the teeth in a groove, and labyrinthiform structure of the teeth are typical ichthyosaurian characteristics (McGowan and Motani 2003).

Sauropterygia
Plesiosauria indet.

Material

The plesiosaur material includes two isolated blocks containing disarticulated and weathered vertebrae and other postcranial elements (Figs 2 and 3).

NMING: F16430 is a block that contains three vertebrae, from the *Psiloceras planorbis* zone, Hettangian, Lower Lias, Jurassic, of Carr's Glen, Cave Hill, Co. Antrim. The specimen was collected by Robert Bell of Belfast on 7 September 1902, who listed it the following year (Bell 1903, 56). The remains

were purchased by the NMI in 1913 (NMI Registration Number 1913.26) for the sum of £1. A.S. Woodward originally identified them as plesiosaurian (see specimen label) and this identification is confirmed here on the basis of proportions of the vertebral centra. The vertebrae possess short transverse processes indicating that they are from the dorsal region (Brown 1981) (Fig. 2). The neural spines are laterally compressed, the zygapophyses are quite gently inclined, and the vertebral centra are subcircular in outline. The neurocentral suture between centrum and neural arch is visible in cross-section in all vertebrae and appears almost straight. The proportions and morphology of these vertebrae is typical for plesiosaur dorsal vertebrae (Brown 1981). The specimen is listed in the NMI database as *Plesiosaurus* sp., however, no diagnostic features are present to confirm this diagnosis and the specimen is indeterminate past the level of Plesiosauria.

NMING: F14890 is a weathered block of iron-rich limestone matrix containing four vertebrae, several rib fragments, and possibly an almost complete ilium (Fig. 3). The maximum length of the block is 235mm and the maximum width (measured transverse to the long axis) is 138mm. Several indeterminate molluscs are embedded in the matrix. The specimen is from the *Ammonites angulatus* zone, Hettangian, Lower Lias, Lower Jurassic, of Barney's Point, Magheramorne, Islandmagee, Co. Antrim. The fossil was collected on 9 February but the year of collection is uncertain and is listed on the specimen label as '18?'. The NMI registration number is listed on the label as 1913.26, but this is uncertain (see note below). Most of the bone in the specimen is only visible in cross-section so interpretation is difficult. There are at least three disarticulated vertebrae preserved in the block. A clear transverse process is visible in one vertebra (Fig. 3E) suggesting that it is a dorsal vertebra (Brown 1981). A small but distinct nutritive foramen is visible in cross-section on the ventral part of one of the vertebral centra (Fig. 3E). There is an elongate element that is interpreted as an ilium, the shaft is narrow and circular in cross-section and the end expanded. However, given the poor state of preservation of the fossil, this interpretation is tentative. The specimen can be diagnosed as plesiosaurian based on the presence of the nutritive foramen (Storrs 1993). However, no more specific diagnostic features are present and the specimen is indeterminate past the level of Plesiosauria.

Note. Both plesiosaur specimens share the same original NMI registration number (1913.26), however, the provenance details and rock matrix differs and they are clearly unassociated. The separate blocks may have been acquired by the NMI simultaneously, however,

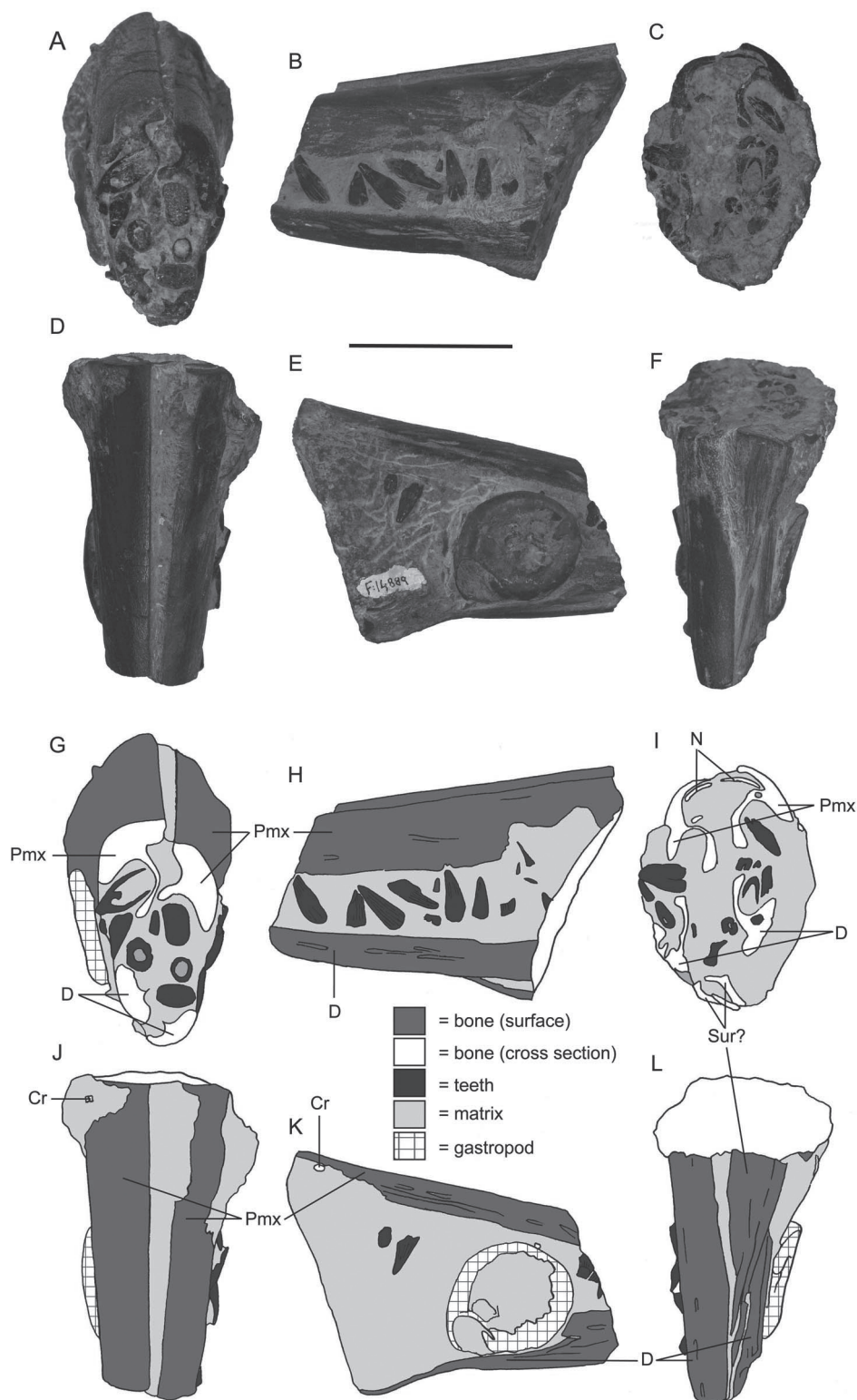


Fig. 1—Fragment of ichthyosaur jaw (NMING: F14889) from the Lower Lias of Hillsport, Co. Antrim, Northern Ireland. A–F photographs, G–L interpretive illustrations. A and G, anterior view showing transverse cross-section; B and H, left lateral view showing *in-situ* teeth; C and I, posterior view showing transverse cross-section; D and J, dorsal view; E and K, right lateral view showing associated gastropod and crinoid ossicles; F and L, ventral view. Scale-bar equals 50mm, for abbreviations see text.

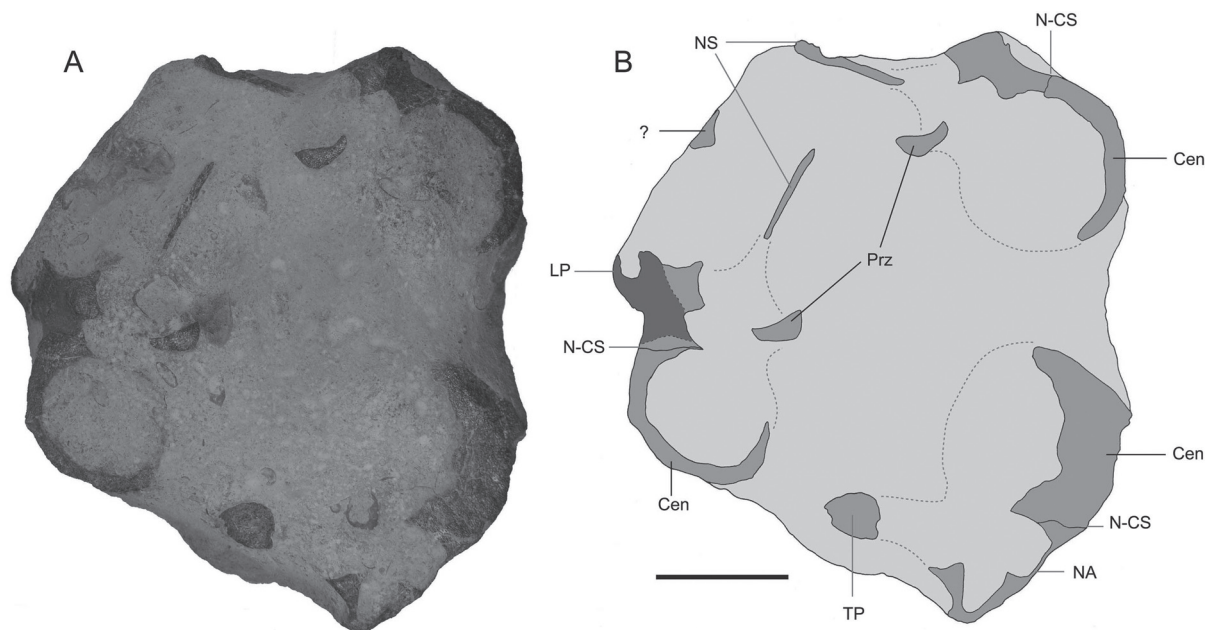


Fig. 2—Limestone block containing three plesiosaur vertebrae (NMING: F16430) from the Hettangian (Lower Lias) of Cave Hill, Co. Antrim, Northern Ireland. A photograph, B interpretive illustration. Light grey shading represents matrix; medium grey shading represents bone in cross-section; dark grey shading represents the finished bone surface; dashed lines indicate the probable outlines of the underlying bones. Scale-bar equals 50mm, for abbreviations see text.

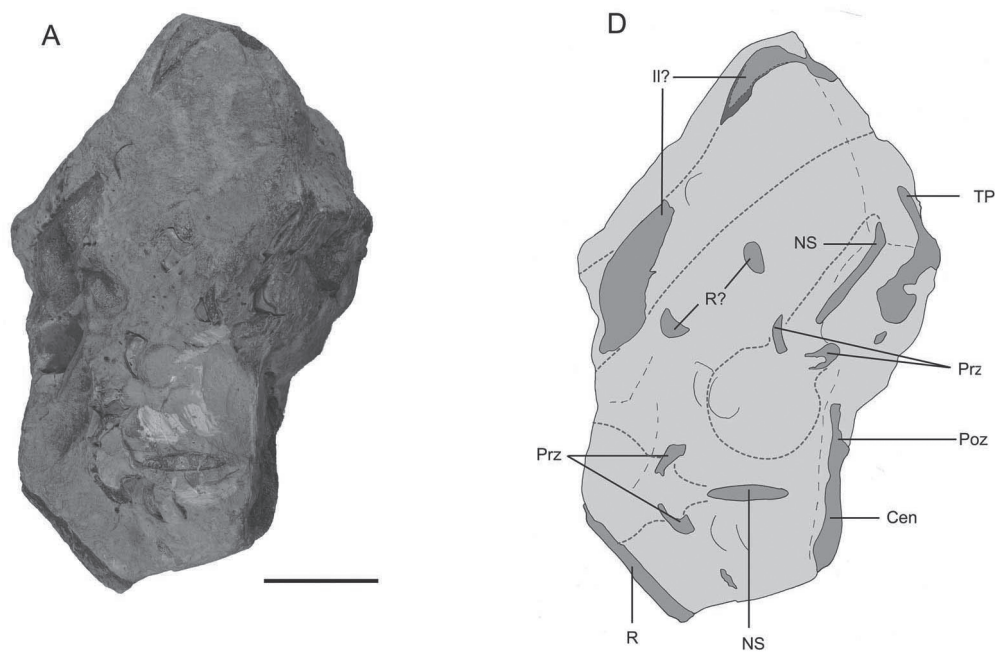
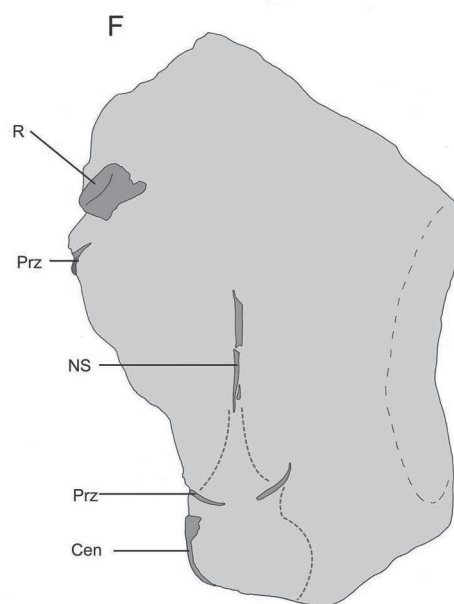
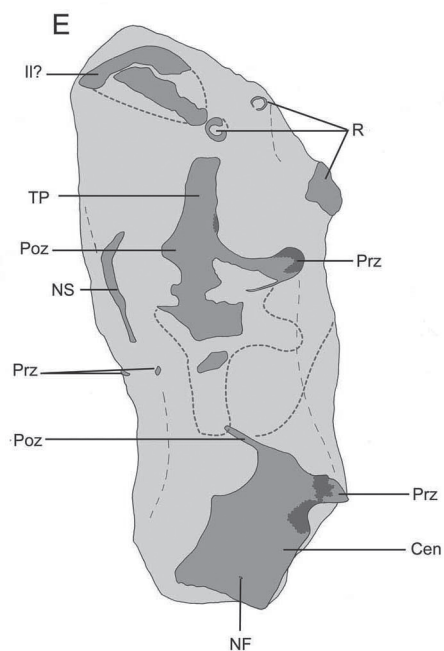


Fig. 3—Block of iron-rich limestone containing plesiosaur vertebrae, ribs and putative ilium (NMING: F14890) from the Hettangian (Lower Lias) of Islandmagee, Co. Antrim, Northern Ireland. A–C photographs, D–F interpretive illustrations of the block in various views (B,C and E,F are opposite). Light grey shading represents matrix; medium grey shading represents bone in cross-section; dark grey shading represents finished bone surface; heavy dashed lines indicate the probable outlines of the underlying bones; light dashed lines represent sharp edges on the block. Scale-bar equals 50mm, for abbreviations see text.



details in the register and literature (Bell 1903) seem to implicitly refer to only one block of singular origin. It is therefore possible that the acquisition consisted of only one block (the register details match NMING: F16430), with the second block (NMING: F14890) having been retrospectively and wrongly allocated Registration Number 1913.26 at a later date.

Discussion

The fossil ichthyosaur (NMING: F14889) and plesiosaur (NMING: F16430, NMING: F14890) material is significant because it represents a rare occurrence of Jurassic marine reptiles in Ireland. This material represents one of the westernmost occurrences of Mesozoic marine reptiles in the British Isles and Europe as a whole, and confirms the presence of both ichthyosaurs and plesiosaurs in this region during the Early Jurassic Period. A small number of marine reptile remains from Ireland are also housed in the Ulster Museum (James 1981; P. Crowther pers. comm. 2007). Future investigation of this additional material may provide more definitive data on the taxonomic identity and diversity of Irish Mesozoic marine reptiles.

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