Roswell Pits, Ely, Cambridgeshire

[TL 555 808], [TL 552 807]

Highlights

Roswell Pits, Ely are famous for the remains of sauropod dinosaurs and of pliosaurs which have been found there. The site includes a mix of terrestrial and marine Kimmeridgian age reptiles, including turtles, crocodilians, dinosaurs, plesiosaurs and ichthyosaurs.

Introduction

The Roswell Pits, or Roslyn Hole, at Ely, excavated in Lower Kimmeridge Clay, have produced a large range of fossil reptiles that includes several type specimens and finds are still being made.

The large pit at Roswell [TL 555 808] was excavated in the 19th century, largely for clay to repair the banks of the local fen dykes, and it was mentioned as a source of several reptiles by Seeley (1869a, pp. 100–1), Whitaker *et al.* (1891, p. 15) and Gallois (1988, pp. 40–2). H.B. Woodward (1895, pp. 170–1) noted that the large pit of 'Roslyn Hole' exposed 'about 30 feet of dark shales and clays, in places bituminous and arenaceous, with thin ochreous layers and bands of septaria'. He believed that 'both lower and upper portions of the Kimmeridge Clay are present'.

Description

Whitaker *et al.* (1891, pp. 15–16) described a section in the Roswell Pits, but this does not provide enough evidence for a link to be made with a modern zonation scheme. *Nanogyra virgula* is recorded in abundance in several beds in the upper 5–6 m of the section, and this suggests a position for these units in the *eudoxus* Zone (Early Kimmeridgian). Whitaker *et al.* (1891) and H.B. Woodward (1895) believed that the fossil evidence pointed to the presence of 2–3 m of Upper Kimmeridge Clay at the top of the section.

Arkell (1933, pp. 468–9) ascribed all the beds to the Lower Kimmeridge Clay: 'the opinion formerly held, that at the Roslyn (or Roswell) Pit, 1 mile north-east of Ely, some 8 ft of paper-shales and clays with *Orbiculoidea latissima* are above the limit of *Exogyra virgula,* is not sustained by recent work. Dr Kitchin and Dr Pringle inform me that they have carefully examined the highest beds there and found that their position is not above the zone of *Aulacostephanus pseudomutabilis.'* These beds occupy about 26 ft (8 m) and the main *N. virgula* bed is within 3 ft (1 m) of the top; Arkell (1933) also noted that the 'lowest 4 ft [1.3 ml of clay and shale exposed… are marked by a band crowded with *Astarte supracorallina,* and from this level Dr Pringle has recorded *Pararasenia desmonota* (Oppel), characteristic of the *mutabilis* zone' (Pringle, 1923, p. 135). *Nanogyra virgula* is abundant throughout the *eudoxus* Zone, and particularly near the top, in the area of The Wash (Gallois and Cox, 1976), in the Warlingham borehole (Callomon and Cope, 1971), in the Oxfordshire–Buckinghamshire area (Cope, *in* Cope *et al.,* 1980b) and in Dorset (Cox and Gallois, 1981, pp. 5, 15). The ammonite zones present, then, appear to be from the *mutabilis* and *eudoxus* Zones. The second Roswell Pit [TL 552 807] was excavated in the 1930s (Gallois, 1988). Several recent finds of teeth and vertebrae have been made on the north side of this pit.

The total thickness of Lower Kimmeridge Clay recorded by Arkell (1933) at Roswell is 8 m of *eudoxus* Zone and 1.3 m of *mutabilis* Zone, thus 9.3 m altogether. Gallois (1988, pp. 40–1) gives a section in the modern pit (T1, 552 807), comprising about 12 m of *eudoxus* Zone and 1.55 m of *mutabilis* Zone. Gallois and Cox (1976) note, from borehole data, that the Kimmeridge Clay thins southwards along its outcrop from an estimated 84 m in The Wash to 42.3 m at Denver Sluice [TF 591 011], 20 km north of Ely.

The exact provenance of the reptiles has not been recorded. It can only be assumed that most of them came from sediments of the *eudoxus* Zone which are thicker. Recently found specimens have all come from these upper portions of

the section. Specimens are generally fragmentary — isolated teeth, vertebrae or limb bones. However, some associated series of vertebrae and partial skulls are also known. The bones are generally well preserved, but may lack delicate processes. There has clearly been some postmortem transport and disturbance of the skeletons.

Fauna

Newton (in Whitaker *et al.,* 1891, pp. 16–18) reviewed a collection of reptiles and fishes from Roswell Pits, and H.B. Woodward (1895, p. 171) specifies Roswell (Roslyn) pit as having yielded a large number of reptile and fish remains. It is also assumed that most of the reptiles labelled 'Ely' came from these pits (Gallois, 1988, p. 40). There were no other extensive pits at Ely, and early authors (e.g. Seeley, 1869a, pp. 92–108) specified nearby sites separately (e.g. Chettisham, Littleport, Stretham, Haddenham, Cottenham).

Type specimens are indicated below, and an estimate of the number of specimens from Roswell Pits is given for each species, based on collections in the BMNH and CAMSM.

	Numbers
Testudines: Cryptodira: Thalassemyidae	5
Thalassemys hugii Rütimeyer, 1873	
Archosauria: Crocodylia: Thalattosuchia	
Dakosaurus lissocephalus Seeley, 1869 Type specimen: CAMSM J.29419	1
Dakosaurus maximus (Plieninger, 1846)	1
Dakosaurus sp.	3
Metriorhynchus hastifer (Deslongchamps, 1868)	1
Metriorhynchus sp.	2
Steneosaurus sp.	1+
Archosauria: Dinosauria: Saurischia: Sauropoda	
Pelorosaurus humerocristatus (Hulke, 1874)	4
Gigantosaurus megalonyx Seeley, 1869. Paratype specimen: cast of claw (CAMSM)	1
Sauropterygia: Plesiosauria: Elasmosauridae	
Colymbosaurus trochanterius (Owen, 1840)	6
Colymbosaurus sp.	12
Sauropterygia: Plesiosauria: Pliosauridae	
Pliosaurus brachydeirus Owen, 1842	33
Pliosaurus brachyspondylus (Owen, 1840) (Figure 7.2) Neotype: CAMSM J.29564	4
Pliosaurus sp.	15
Liopleurodon macromerus (Phillips, 1871)	7
Ichthyopterygia: Ichthyosauria	
Macropterygius tri gonus (Owen, 1840)	2
Ichthyosaurus sp.	24

Interpretation

The turtle *Thalassemys hugii is* represented by limb hones and carapace elements. This marine turtle, with a shell length of up to 1.2 m, is well known from the Late Jurassic of Germany and Switzerland (M■ynarski, 1976, p. 35). The remains in CAMSM include those of *Enaliochelys chelonia*Seeley, 1869 (p. 108, *nomen nudum*).

The crocodilian remains consist of teeth, jaws and vertebrae, which have been ascribed to the genera *Dakosaurus, Metriorhynchus* and *Steneosaurus.* Seeley (1869a, pp. 92–3) erected the species *D. lissocephalus* on the basis of a partial skull, and he ascribed several vertebrae, ribs, limb bones and skull hones to it. He did not specify how this differed

from the well-known *D. inaximus,* and a restudy will probably show that the two forms are identical (Steel, 1973, p. 42). *Metriorhynchus hastifer is* represented by the anterior end of a snout which was identified by Watson (1911b, p. 9). *Dakosaurus* and *Metriorhynchus* are metriorhynchids, highly aquatic forms. *Steneosaurus,* represented by a vertebra and other remains, is a long-snouted marine fish-eating crocodilian. Without skull material, the identification is not certain.

Large sauropod dinosaurs are represented by several postcranial skeletal elements. The proximal end of a right tibia and a late caudal centrum (casts of CAMSM specimens in BMNH: Lydekker, 1890a, p. 241) were ascribed to *Pelorosaurus humerocristatus.* Seeley (1869a, pp. 94–5) erected the species *Gigantosaurus megalonyx* on the basis of various vertebrae and limb bones from Ely and other sites nearby. Lydekker (1890a, p. 241) ascribed some of these to *P. humerocristatus* and some to *P. manseli.* It is not clear whether all of the remains described by Seeley (1869a) pertain to the same species and which of them he regarded as the type specimen. Hulke (1869a, p. 389) mentioned a cast of the 'large tibia' in the BMNH, as well as 'great ungual phalanx from Ely', and introduced Seeley's name *Gigantosaurus megalonyx* in a footnote. Steel (1970, p. 70) suggests that *G. megalonyx* may be included in *P. humerocristatus,* while McIntosh (1990, p. 356) regards it as a *nomen dubium.* There is clearly a taxonomic problem here, exacerbated by the shortage of comparable material.

Among the commonest remains from Roswell Pits are plesiosaur vertebrae, teeth, and limb bones. The common Kimmeridgian species *Colymbosaurus trochanterius,* up to 6 m long, is well represented. All three Kimmeridgian pliosaurs recognized as valid by Tarlo (1960) are present in the Ely fauna. The Ely material formed the basis for much of the revision carried out by Tarlo (1958, 1959b, 1959c, 1960). *Pliosaurus brachydeirus* is represented by teeth, jaw remains, vertebrae and limb bones (Figure 7.2). It is distinguished from *P. brachyspondylus* on the basis of characters of the vertebrae. This latter species was based on some vertebrae from Headington Pits, near Oxford, which have since been lost, and Tarlo (1959b) selected as neotype a closely matching vertebra from Ely. More important was a skeleton collected at Ely in 1889 (CAMSM J.35991) which consisted of 'numerous teeth, the complete mandible, the greater part of the vertebral column, two limb bones, and fragments of limb girdles' (Figure 7.2). Tarlo (1959b) described this specimen in detail and used it in a revision of pliosaur taxonomy. Characters of the jaw, limbs and limb girdles showed that there were two genera of Kimmeridgian pliosaur and Tarlo (1959c) erected the genus *Stretosaurus* for *P. macromerus,* but this has since been synonymized with *Liopleurodon.* Some teeth, vertebrae and limb elements of this form are also known from Ely.

Roswell Pits have yielded several ichthyosaur vertebrae, teeth, skull elements and limb bones. Lydekker (1889a, p. 27) mentioned some specimens of *Macropterygius trigonus,* but other bones have not been identified.

Comparison with other localities

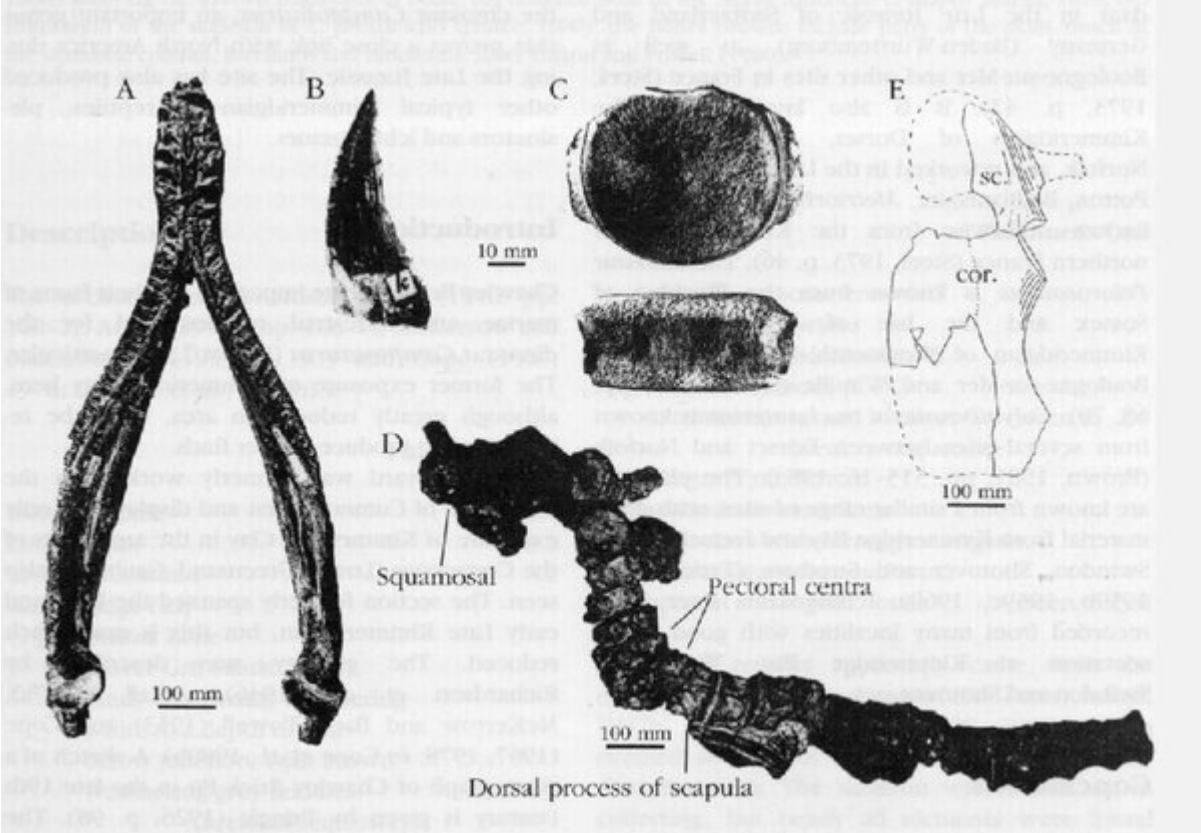
Reptiles from the Kimmeridge Clay are known from many other sites in the Wash area, largely old brick-pits, in Northamptonshire, Cambridgeshire and Norfolk, all of which have produced smaller faunas of similar marine and non-marine reptiles (listed at the beginning of this chapter).

Thalassemys hugii is best known from the Late Jurassic of Switzerland and Germany (M■ynarski, 1976, p. 35). *Dakosaurus maximus* is also abundant in the Late Jurassic of Switzerland and Germany (Baden-Württemburg), as well as Boulogne-sur-Mer and other sites in France (Steel, 1973, p. 42). It is also known from the Kimmeridgian of Dorset, Oxfordshire and Norfolk, and reworked in the Lower Greensand of Potton, Bedfordshire. *Metriorhynchus bastifer* is known otherwise from the Kimmeridgian of northern France (Steel, 1973, p. 46). The dinosaur *Pelorosaurus* is known from the Wealden of Sussex and the Isle of Wight, and the Kimmeridgian of Weymouth, Kimmeridge Bay, Boulogne-sur-Mer and Wimille (Steel, 1970, pp. 68, 70). *Colymbosaurus trochanterius* is known from several sites between Dorset and Norfolk (Brown, 1981, pp. 315–16; 1984). The pliosaurs are known from a similar range of sites, with good material from Kimmeridge Bay and former sites at Swindon, Shotover and Stretham (Tarlo, 1958, 1959b, 1959c, 1960). Ichthyosaurs have been recorded from many localities with good representation at Kimmeridge Bay, Weymouth, Swindon and Shotover.

Conclusions

The Roswell Pits, Ely are important for the range of Kimmeridgian reptiles that they have yielded. The sauropod dinosaurs and pliosaurs are of particular significance, and there are type specimens of three species from this site. The sauropods are important because of their rarity elsewhere in the European Kimmeridgian, and the pliosaurs from Roswell formed the basis for the taxonomic status of the group in the Late Jurassic. The selection of reptiles present at Ely differs from other good faunas from Dorset and Oxfordshire in the dominance by pliosaurs, and in the apparent absence of pterosaurs. The high conservation value of the site lies in its having yielded one of the richest and most varied Kimmeridgian reptile faunas, being the best site in the northern part of the outcrop of the Kimmeridge Clay and having considerable potential for future finds.

References



(Figure 7.2) The pliosaur Pliosaurus brachyspondylus (Owen, 1840), an associated skeleton found in 1889 in the Kimmeridge Clay of Roswell Pits, Ely. (A) The lower jaw in crown view; (B) tooth; (C) cervical vertebra in anterior and ventral views; (D) vertebral column, and associated elements, in dorsal view; (E) reconstructed shoulder girdle. After Tarlo (1959a).