Walton-on-the-Naze, Essex

[TM 263 230]–[TM 268 245]

Introduction

The sea cliffs and foreshore at Walton-on-the-Naze expose a section of high division A1 and division A2 of the London Clay Formation ((Figure 4.4); King, 1981, text-fig. 14). The sediments seen here have been divided further into 11 units. Units 10–11 belong to division A2, the rest to Al. The lithologies are dominated by clays and silts, with ash bands in Al, and have been dated to Early Eocene times (Ypresian Stage; George and Vincent, 1977).

Vertebrate fossils are commonly found at Walton-on-the-Naze, and these include fishes, reptiles and birds. This is one of the most productive sites in Britain for fossil bird remains, and more than 40 sets of associated remains have been recovered (George and Vincent, 1977). These include a small falconid (Harrison, 1982a) and a specimen hailed as the world's oldest parrot fossil (Harrison, 1982b), a primitive swift (Dyke, 2001a), as well as other types. Extensive collections of excellent bird fossils have been made more recently at Walton-on-the-Naze (Daniels, 1994; Feduccia, 1999; Dyke and Cooper, 2000), but they remain in private collections and have not been studied extensively (except for Mayr and Daniels, 1998).

Description

The history of stratigraphical studies at Walton-on-the-Naze has been outlined by George and Vincent (1977). The site was first described by Prestwich (1854), who considered the sediments to reach a thickness of some 27.5 m. Further accounts, for example Whitaker (1877), Holmes (1890, 1891) and Stopes and Dalton (1880), did not add a great deal new to the geological and palaeontological description of the locality. Davis and Elliott (1951) recorded the presence of a blue clay beneath the Red Crag. Cooper (1970) described the section shown in (Table 4.1) below. (Table 4.2) shows the composite section recorded by George and Vincent (1977, p. 84).

The succession at Walton-on-the-Naze extends from the upper part of the Harwich Member (A1) to the Walton Member (A2) of the London Clay Formation (King, 1981, p.50). The Walton Member belongs to the *Wetzeliella antra* and W. *meckelfeldensis* dinocyst zones.

(Table 4.1) Section at Walton-on-the-Naze (Cooper, 1970)

	Thickness (m)
2. Silty to very silty clays, logs often preserved in concretions	10.0
1. Sandy clayey silts and clayey sandy silts, especially sandy at the top, contains erosive scours up to 30 cm deep and 3 m wide infilled with finely laminated silty fine sands. Small-scale ripple-cross-stratification occurs locally. Occasional small rounded flint pebbles are found, usually close to the upper junction. Intense bioturbation seen on weathered surfaces	at least 1.5

(Table 4.2) Composite section at Walton-on-the-Naze (George and Vincent, 1977, p. 84)

	Thickness (m)
Above 11 alternating slightly silty clay bands (0.60 m thick) and clay bands (0.30 m thick) are seen in the cliff	
11. Grey clay. Very low silt fraction. Wood and nodules occur, but no other fossils observed	seen to 0.30

10. Silty clay. Woody pockets still occur and occasionally large logs may be seen. Black flint pebbles and small nodules in this bed	0.61
9. Green silt band	0.05
8. Very silty clay. Wood fragments and woody accumulations are common. Small rounded black-coated flint pebbles also occur	0.45
7. Green silt band	0.05
6. Silty clay. Approximately 0.07 m into this unit is a discontinuous nodule band. The nodules are usually quite small, very hard and formed around pieces of wood containing much pyrite. Pieces of wood and woody pockets are common. Black pebbles occur. Shelly nodules probably come from this horizon	0.40
5. Blue-grey clay	0.85
4. Blue hard clay. Sometimes represented by mattings of bioturbation	0.05
3. Blue-grey clay with woody fragments and pockets	0.23
2. Blue hard clay. Sometimes represented by mattings of bioturbation	0.05
1. Blue-grey clay with isolated pockets of vegetation. A band of whitish soft nodules may be seen at the top of this unit in close proximity to Unit 2	0.30

Vertebrate fossils have been recovered from many of the units described by George and Vincent (1977), and they generally are preserved in small pockets within the London Clay Formation. The more common vertebrates are fishes (units 8, 4, 3 and 1) and reptiles, for example articulated turtle fossils (unit 6).

The bird remains from Walton-on-the-Naze occur as groups of associated bones that may be referable to single individuals. It has been suggested that these associations of bones were preserved in small hollows in the sea bed (Harrison, 1983). The average number of bones for each specimen ranges from 2 to 30 (George and Vincent, 1977). The musophagid bones were found in a woody pocket in Unit 10 (basal division A2). Bird remains also occur in unit 8 and are often concentrated some 0.75 m below the upper boundary of the bed (division Al). Two associations of bird bones have been recovered from woody accumulations beneath the nodules in unit 6 (George and Vincent, 1977).

Fauna

Walton-on-the-Naze has yielded a mixed fauna of fishes (mainly sharks, Hooker *et al.,* 1980), turtles (Benton and Spencer, 1995, p. 277) and birds (Harrison, 1982a,b, 1983). Associated fossils include insects, other arthropods, gastropods, bivalves, echinoderms, foraminifera and abundant plant remains (George and Vincent, 1977). The faunal list is from Harrison (1983, 1984b), with modifications from Dyke and Cooper (2000), Dyke (2001a, b), and Dyke and Gulas (2002).

AVES

Galliformes

?Gallinuloididae

Paraortygoides radagasti Dyke and Gulas, 2002

Anseriformes

Anatidae

Anatalavis oxfordi Olson, 1999

Procellariiformes

Procellariidae

two procellariids

Gruiformes

large rail '*Pediorallus'* sp.

Charadriiformes

two waders

Columbiformes

Columbidae

a pigeon

Falconiformes

Falconidae

Parvulivenator watteli Harrison, 1982a

Accipitridae

a small accipitrine bird of prey

?Caprimulgiformes

?Caprimulgidae ?a caprimulgid

Apodiformes

Apodidae

Eocypselus vincenti Harrison, 1984b

Laputavis robusta (Dyke, 2001a)

Coliiformes

Eocolius walkeri Dyke and Waterhouse, 2000

Psittaciformes

Pseudasturidae

Pulchrapollia gracilis Dyke and Cooper, 2000

Psittacidae

[*Palaeopsittacus georgei* Harrison, 1982b]

three parrot species (species A, B and C of Mayr and Daniels, 1998)

Coraciiformes

three coraciiform specimens

Cuculiformes

Parvicuculidae

Procuculus minutus Harrison and Walker, 1977a

Musophagidae

a large musophagid

Most of the bird remains from Walton-on-the-Naze have been identified to ordinal, or familial, level only. The 20 or so specimens collected by W. George and S. Vincent and identified by Harrison (1983) are mainly isolated limb bones. Some of the specimens provided further important information, showing the existence of large rails of the genus *Pediorallus,* although the specimen might belong to the palaeognathous bird *Lithornis,* according to the revisions of Houde (1988). In addition, the Walton-on-the-Naze sediments produced the type specimens of a small falconid, *Parvulivenator watteli,* based on a partial tarsometatarsus (Harrison, 1982a; (Figure 4.5)), and the supposed parrot *Palaeopsittacus georgei,* based on a set of 11 postcranial elements (Harrison, 1982b), but which Dyke and Cooper (2000) regarded as *incertae sedis.* These authors named a new parrot based on different specimens from the same location, *Pulchrapollia gracilis.* Further type specimens from Walton-on-the-Naze are the duck *Anatalavis oxfordi,* the mousebird *Eocolius walkeri,* and the swifts, *Eocypselus vincenti* Harrison, 1984b and *Laputavis robusta* (Dyke, 2001a) (N.B. *L. robusta* was first placed in the genus *Laputa.* When this name was found to be preoccupied by a fish, it was changed to *Laputavis* (Dyke, 2001c))

Interpretation

The Harwich Member (division Al) of the London Clay Formation is a silty clay with ash bands and occasional concretions containing marine fossils, indicating shallow marine conditions.

The Walton Member (division A2) of the London Clay Formation consists of clayey silts and silty clays, with thin bands of fine-grained sand and silt and bioturbated fine-grained sand (*Chondrites).* Some bivalves and shark teeth have been reported, as well as abundant pyritized diatoms and lignitic debris, logs and twigs. This facies is interpreted (King, 1981) as indicating a low-energy marine environment of deposition. The bioturbated horizons indicate slow deposition, and the thin coarser clastic units point to periodic storm events. The lignitic plant debris is probably the remains of driftwood. Vertebrate fossils include various shark, marine turtles, a single mammal specimen and the bird specimens, all of which make sense in terms of the shallow marine habitat indicated by the sediments.

Harrison (1983) noted a 'small game bird' from Walton-on-the-Naze, and Dyke and Gulas (2002) named this as the type of the species *Paraortygoides radagasti.* The specimen consists of associated vertebrae from the neck and pelvis area, parts of the shoulder girdle and wing and partial hindlimbs. It is a close relative of *P. messelensis* Mayr, 2000 from the mid Eocene Messel deposits in Germany, and falls low in the cladogram of Galliformes. *P radagasti* is one of the oldest galliform birds on record.

The duck *Anatalavis oxfordi* Olson, 1999 is based on an incomplete specimen, one of the most complete from the London Clay, comprising parts of the skull, vertebral column, shoulder girdle, pelvis, and wings. Olson (1999) suggested that *Anatalavis* was a member of the Family Anseranatidae, and hence a relative of the living Australian Magpie goose. On the basis of a more extensive cladistic analysis, Dyke (2001b) allied *Anatalavis* with the living true ducks, the Family Anatidae, and the fossil flightless duck-like *Presbyornis.*

The swifts *Eocypselus vincenti* Harrison, 1984b and *Laputavis robusta* (Dyke, 2001a) were named on the basis of an associated pair of humeri, a coracoid and a partial ulna and radius (Harrison, 1984b) and an associated sternum, coracoids, humerus, radius, wing and vertebral elements (Dyke, 2001a) respectively. In Dyke's (2001a) cladogram, *Eocypselus* is sister group to the modern Apodidae, while *Laputavis* falls low in the cladogram as the most basal apodiform. Mayr (2001a) was highly critical of Dyke's (2001a) cladistic analysis, and later (Mayr, 2003) offered a revised version, in which *Eocypselus* falls low in the Apodiformes, but *Laputavis is* not included.

When it was described, *Palaeopsittacus georgei* was the oldest known parrot in the world, and it is recorded as such by Unwin (1993). Some doubts were, however, expressed about the identification (Olson, 1985, pp. 120–1), and Mayr and Daniels (1998, pp. 164–5) stated unequivocally that it is not a parrot, whereas Dyke and Cooper (2000) confirmed that the specimens are not diagnostic at ordinal level. They did not, however, assign it elsewhere. Mayr and Daniels (1998, pp. 162–4) did describe three postulated species of parrots, termed species A, B and C, from Walton-on-the-Naze, and Dyke and Cooper (2000) named the new parrot genus and species *Pulchrapolliagracilis* from Walton-on-the-Naze. Mayr (2001a, 2002) was critical of some of Dyke and Cooper's interpretations of *Pulchrapollia,* and he assigned it to the related psittaciform family Pseudasturidae. The next oldest parrots are from the Mid Eocene deposits of the Messel site, Germany (Mayr and Daniels, 1998), and the Late Eocene sediments of France. An even older parrot recently has been reported from the Late Cretaceous Lance Formation of North America (Stidham, 1998), but the record is suspect (Dyke and Mayr, 1999).

The birds include a couple of marine procellariids and a wader, but the remainder, the birds of prey, the gamebird, the pigeon, the parrots, the ?caprimulgid (nightjar), the musophagid (touraco or plantain-eater), the coraciiforms (rollers, kingfishers) and the swifts, are all either arboreal, ground-dwelling or associated with fresh waters. These terrestrial birds must all have been blown out to sea by storms, or perhaps their carcasses were washed into the sea.

Some of these bird groups are typical of Europe today, but others (the parrots and touracos) are distinctly tropical, being known today from Africa. In earliest Eocene times, Great Britain lay a little farther south, and climates were much warmer than today.

Comparison with other localities

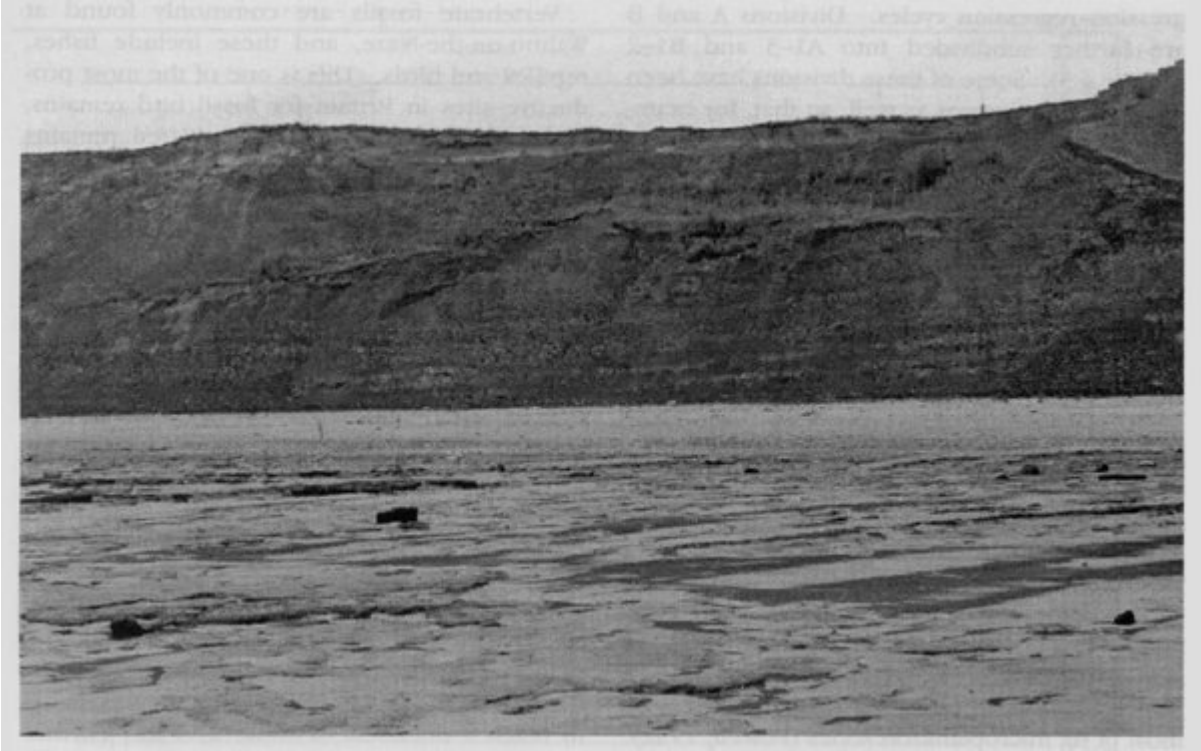
The nearest comparable bird fauna is from Grange Farm, South Ockendon, Essex [TQ 611 833]–[TQ 615 833], also in division A of the London Clay Formation, from which isolated specimens of the owl *Eostrix vincenti* Harrison, 1980b, a small gamebird, a pigeon and a small wader have been reported (George and Vincent, 1978; Harrison, 1980b, 1983). Note, however, that the identity of the owl has been challenged by Peters (1992a) in his description of an owl from the Middle Eocene Messel site in Germany.

Some earliest Eocene avifaunas are known from continental Europe, but diversity is low. In France, the Sables de Laon of the Paris Basin have produced specimens of the large flightless bird *Diatryma,* and the Lower Eocene 1 Fehmarn Clay of Katharinenhof, Schleswig-Holstein, in Germany, is the source of a possible phoenicopteriform. The only reasonable avifauna with which the Walton-on-the-Naze fauna may be compared comes from the Mo Clay (Fur Formation) of Denmark. This is the source of an accipitrid (?), a phasianid (pheasant), a rallid (rail) and a musophagid (touraco), all of which are groups represented at Walton-on-the-Naze.

Conclusions

The cliffs and foreshore at Walton-on-the-Naze expose an excellent section of the upper Harwich Member (division Al) and the Walton Member (division A2) of the London Clay Formation. The avifauna consists of 14 different bird groups, and it is the most extensive earliest Eocene bird fauna known in Europe, and probably the world. The cliffs at Walton-on-the-Naze continue to be eroded, renewing the sections for collectors, although under certain conditions the London Clay Formation outcrop may become obscured by clay slips.

References



(Figure 4.4) The London Clay Formation at Walton-on-the-Naze. (Photo: Dave Evans.)

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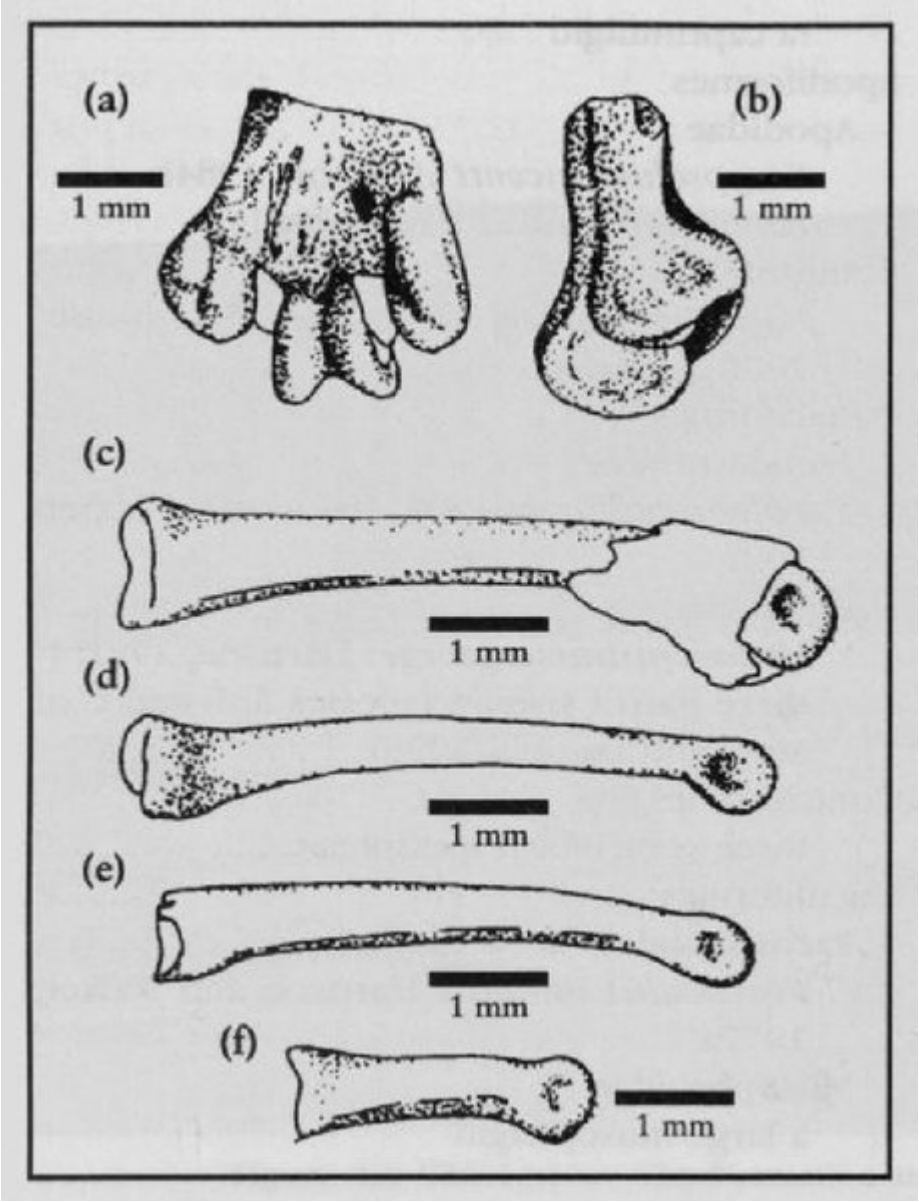

(Figure 4.5) The small raptor Parvulivenator watteli from the London Clay Formation of Walton-on-the-Naze. (a,b) Lower end of the tarsometatarsus in posterior (a) and internal (b) views. (c-f) External views of four toe bones; (c) the basal phalanx of the third digit; (d) the basal phalanx of the first digit; (e) a possible second phalanx of the second or third digit; (f) the basal phalanx of the second digit. (After Harrison, 1982a.)