Supplement 1

Van Vliet, H.J, Bosselaers, Paijmans, T., Verheijen, I. & Zboray, A., 2025. Pachycetines from the Hampshire Basin, England and the distribution of pachycetines in Europe, with a note on *Pachycetus humilis* Van Beneden, 1883. *Cainozoic Research* 25(2): 213-228.

Geological setting

Sediments of the Selsey Formation, overlain by the lower part of the Barton Clay Formation, outcrop near Studley Wood in the New Forest National Park, Hampshire, England (West, 2016). The Lutetian Selsey Formation belongs to the Bracklehams Group (BSG, British Geological Survey). The uppermost part of the Selsey Formation is named the Studley Wood Member (Todd, 1990). It consists of sandy clays with shells and nummulites (BSG). The overlying Huntingbridge and Coral beds belong to the Lutetian Elmore Member, the lowest part of the Barton Clay Formation (Hooker, 1986; Todd, 1990; King, 2016). The silty clays and sands of the Elmore Member differ from the sandy clays of the Selsey Formation and are separated from the latter by a disconformity (Hooker, 1986). The humeral head, here described, originates from the Nummulite Bed of the Selsey Formation or the Huntingbridge Bed of the Barton Clay Formation (Suppl. fig. 1).

Archaeoceti indet.

Material – Humeral head, NHMUK96499

Comments – label: head of humerus?/ Zygorhiza?/ Studley Wood Hbr or Barton Clay Frm,/ late Lutetian, Eocene/ ex situ in stream bed,/ Studley Wood, Hampshire/ Coll'd Greteli Morton, pres'd 23/1/14. M96499.
Letter by Mr. Alan Morton to Jerry Hooker, 16 January 2014: A bone fragment, possibly head of femur or humerus from Studley Wood, New Forest. Found *ex-situ* in stream bed by Mrs. Greteli Morton, probably from the Lower Barton Clay Formation, (Huntingbridge Shell Bed), but possibly from the Upper Selsey Formation (Nummulite Bed).

Description – Fragment of a presumably right humerus with a part of the humeral head, consisting of spongious bone. Most of the cortex is gone; fragments of a thin cortex are present on the humeral head. Half of the humeral head and a small part of the shaft are preserved. The neck of the humeral head shows a well pronounced furrow. Three imprints made by foraging gastropods are present (Suppl. fig. 2; Suppl. table 1).

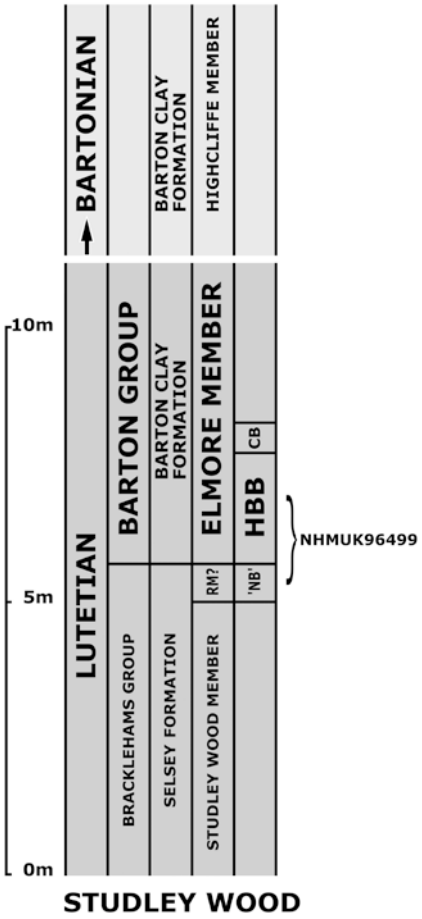
Discussion – Both the Huntingbridge Shell Bed and the Nummulite Bed at this site exposed, are Lutetian in age. Although it is fragmentary, dimensions of NHMUK96499 (57 mm) seems to be comparable to those of the humeral head of *Dorudon atrox* Andrews, 1906 (four individuals with a mean proximal-distal diameter of 54.7 mm, Uhen, 2004: table 18). NHMUK96499 can be assigned to a small archaeocete. The Lutetian age points to a protocetid or an early basilosaurid. The neck is however far more pronounced in humeri of the protocetids *Aegicetus gehennae* and *Peregocetus pacificus* Lambert *et al*., 2019. Although maybe representing an early basilosaurid, the humerus fragment NHMUK96499 is too fragmentary to be described to a specific archaeocete taxon.

NHMUK96499 is one of the very few remains of archaeocetes known from the Lutetian of Europe. The two other examples are:

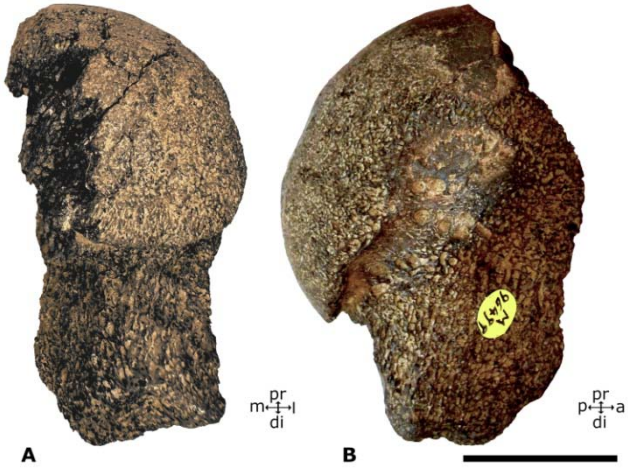
- the associated teeth of probably a small pachycetine species (catalogue number unknown) from the Lutetian of St. Pankraz, Austria (Uhen & Tichy, 2000);
- associated bones of a small hindlimb, NMNHU-P CS 26–31 from the Lutetian of Bulhakivka, Ukraine, which were assigned to a fully-aquatic cetacean, possibly an early pachycetine basilosaurid (Davydenko *et al*., 2023).

Supplementary table 1. Dimensions humeral head of an indeterminable archaeocete from Studley Wood, England (in mm).

Collection number & bone	Length	Width	Caput	Reference
NHMUK PV M 96499 Caput humeri Archaeoceti indet.	71	51	57 9	This article (& Fig. 10)



Supplementary figure 1. Section of the Lutetian sediments at Studley Wood, England. The beds from which the humeral head, NHMUK96499 originated, are indicated with a brace. CB, Coral Bed; HBB, Huntingbridge Bed; NB, Nummulite Bed; RM, Ramnor Member. Section after Todd (1990: text-figure 2), King (2016), and West (2016, part 4.1, Huntingbridge strata, two sections of the Eocene succession in Studley Wood, New Forest, England).



Supplementary figure 2. Fragment of a presumably right humerus (part of the humeral head), NHMUK96499, Archaeoceti indet. from the Lutetian Lower Barton Clay Formation, (Huntingbridge Bed), or possibly from the Lutetian Upper Selsey Formation (Nummulite Bed), Studley Wood, New Forest, England in posterior (A) and lateral (B) view. Scale bar is 25 mm.