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SUPPLEMENTARY DATA 1

Osteology and relationships of *Colymbosaurus* Seeley 1874, based on new material of *C. svalbardensis* from the Slottsmøya Member, Agardhfjellet Formation of central Spitsbergen

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Additional Information On PMO 222.663

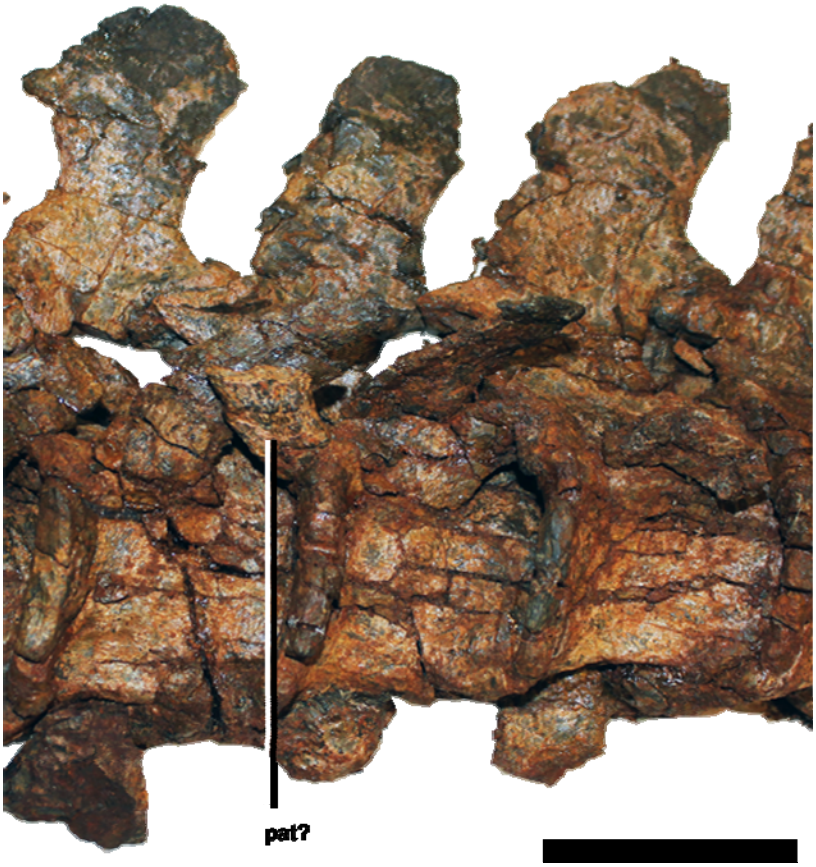

FIGURE 1S. A detailed image of the anterior process on the sixth caudal vertebra in the articulated series of PMO 222.663 in lateral view. **Abbreviations**: **pat?**, pathology? Scale bare equals 5 cm.

***Colymbosaurus* Specimens In UK Museums**

Eighteen propodials from the Kimmeridge Clay Formation were measured at UK museums, the measurements are summarized in Table S1. Note that two propodials where included for a single individual (OUM J.3300) and was included to show individual variability and differences if any between the humerus and femur.

TABLE S1. A selection of observations on cryptoclidid propodials from the Kimmeridge Clay Formation (United Kingdom) examined in this study. The presence/absence and extent of a bisecting anteroposteriorly oriented ridge on the distal end of the propodials are noted, along with other remarks. **Abbreviations**: **CAMSM**, Sedgwick Museum of Earth Science, Cambridge University, Cambridge, U.K.; **MANCH**, The Manchester Museum, Manchester, U.K.; **NHMUK**, Natural History Museum, London, U.K.; **OUM**, Oxford University Museum of Natural History, Oxford, U.K.; **PMO**, Paleontological Museum Oslo, University of Oslo, Oslo, Norway; **YORKM**, York Museum and Art Gallery, York, U.K.

Specimen number	Humerus	Ridge observations	Remarks
NHMUK R31787	Right	Present	Postaxial flange broken
NHMUK R10062	Right	Absent	
OUM J.13815	Left	On ulna facet	Reconstructed middle
OUM J.3300/38	Left	Present	
OUM J.9290	Right	On radius facet	
CAMSM J68344	Left	Absent	Juvenile?
YORKM 2005.2224.2	Left	Present	Compressed distal end
PMO 222.663	Right	Absent	Ulna fused to distal end
	Femur		
OUM J.13827	Right	Absent	
OUM J.3300/45	Left	Present	
CAMSM J29654-91	Left	Present	Postaxial flange broken
CAMS J.59736-43	Right	Present	Postaxial flange and proximal edge broken
CAMSM J29740	Right	On fibula facet	

CAMSM J.29738	Left	Present	
MANCH LL.5513	Right	Absent	
MANCH LL.5514	Left	On fibula facet	
PMO 222.663	Right	Absent	
PMO A27745	Right	Absent	
PMO 216.838	Left	Absent	
	Unidentifiable		
OUM J.13826	X	Present	Proximal end missing
OUM J.13841	x	Present	Proximal end missing
YORKM 2005.2223.1	X	Absent	Proximal end missing

Phylogenetic Methods

As the character list is the same as that used in Benson and Druckenmiller (2014), it is not included here. The character list and original matrix is available freely as online supplementary material with that publication. A number of scores were changed for the cryptoclidid plesiosaur taxa examined by *AJR* and *PSD* from the Slottsmøya Member, Kimmeridge Clay Formation (UK) and Oxford Clay Formation. Following Benson and Druckenmiller (2014), *Spitrasaurus* spp. was scored as a composite of the two species *S.* wensaasi and *S. larseni*. The following changes were made in these taxa (char/original score→new score):

- *Muraenosaurus leedsi*: (183/1→0) coding mistake.
- *Kimmerosaurus langhami*: (151/1→0) based on own observations of referred material and holotype (NHMUK R)
- *Colymbosaurus megadeirus*: (142/?→1) (Benson and Bowdler, 2014), (144/? →1) (Benson and Bowdler, 2014), (189/0→1), (234/1→0) no preaxial element preserved, (240/1→0) the curvature of the long axis of the femur is straight or almost straight. (243/2→0) not a valid character state due to significant variation
- *Djupedalia engeri*: (7/0→?), (13/0→?), (200/1→0) do not meet along the midline.
- *Spitrasaurus spp*.: (13/0→?), (159/1→?) not possible to confirm due to the preservation of the vertebrae, (200/1→0) do not meet along the midline.

Settings used in TNT (V1.1)—The original data matrix by Benson and Druckenmiller (2014) was run in TNT (V1.1; Goloboff et al., 2008), using first the New Technology analysis – Ratchet. The 'random addition sequences' was set to 5000, four iterations where utilized, random seed was set at 1 and all trees were kept. The resulting trees from this initial analysis

was then analyzed using TBR. The consistency and retention indexes were generated using the “stats.run” script and the bremer support values were found using the “bremer.run” script, both of which can be found on the webpage for TNT: http://phylo.wikidot.com/tntwiki. A resampling analysis was run on all data sets using bootstrap set at 1000 replicates, which yielded poor (<50) support values within Cryptoclididae.

LITERATURE CITED

Benson, R. B. J., and T. Bowdler. 2014. Anatomy of *Colymbosaurus megadeirus* (Reptilia, Plesiosauria) from the Kimmeridge Clay Formation of the U.K., and high diversity among Late Jurassic plesiosauroids. Journal of Vertebrate Paleontology 34:1053–1071.

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