Re-evaluation of the taxonomic and systematic status of “Halitherium” antillense Matthew, 1916 (Mammalia, Sirenia)

Manja Voss

Received: 28 March 2020 / Accepted: 29 June 2020 / Published online: 27 October 2020
© The Author(s) 2020

Abstract

Halitherium antillense Matthew, 1916 was established on a left mandibular fragment and two vertebrae from late Oligocene deposits of Puerto Rico. This species was only provisionally referred to the genus Halitherium and its taxonomic status and systematic affinities remained doubtful. In the course of the revision of the Halitherium-species complex and the meanwhile invalid generic name “Halitherium”, the holotype, and only known specimen, is re-investigated. A number of morphological characters usually diagnostic in sirenians are determined. However, the holotype material of “H.” antillense is not informative enough and, as such, neither can be assigned to any known species nor is it possible to define a taxon that can be clearly distinguished from other species. Unlike other, now revised species originally grouped under “Halitherium”, the establishment of a new taxonomic combination for “H.” antillense is not possible. As a nomenclatural consequence, the name “H.” antillense is only applicable to a single specimen, the holotype, and declared as a nomen dubium.

Keywords Sea cows · Oligocene · Puerto Rico · Taxonomy · Morphology

Introduction

From its establishment, the genus “Halitherium” Kaup, 1838 has served as a mingle-mangle term for poorly known sire-nian fossils found world-wide (Domning et al. 2010), as is also the case for the late Oligocene “H.” antillense Matthew, 1916 from Puerto Rico. Matthew (1916), only provisionally, referred this sirenian to “Halitherium”, which is also indicated in Domning (1996), who additionally stated that the status and affinities of this species are uncertain. The re-evaluation of “H.” antillense especially proved necessary after the revision of the genus “Halitherium” (Voss 2013). Due to a non-diagnostic premolar holotype, the early Oligocene-type species “H. schinzii” is recognized as a nomen dubium (Voss 2014; Voss and Hampe 2017). As one of the consequences, this generic name is not applicable to any sirenian species, including all other congeneric taxa. This short communication complements the taxonomic revision of species originally referred to “Halitherium” based on a morphological re-investigation as objective as possible.

Systematic palaeontology

Abbreviations. AMNH, American Museum of Natural History New York (USA). Amr, ascending mandibular ramus; bl of cnp, break line coronoid process; cnf, coronoid foramen; hmr, horizontal mandibular ramus; m1-3, lower molar or alveolus 1–3; ma, mandibular angle; mdf, mandibular foramen.

Order Sirenia Illiger, 1811
Family Dugongidae Gray, 1821
Genus "Halitherium" Kaup, 1838

"Halitherium" antillense Matthew, 1916

Figure 1

Holotype. AMNH 9844, posterior part of left mandible with m1–3 and one cervical and one thoracic.
Referred material. No other material has ever been referred to this nominal species. As such, only the holotype is known.

Type horizon and locality. Bluff, west bank of Rio Jacaguas, 1 km N and 1 km W of Juana Diaz, Puerto Rico. Principal reference section of the Juana Diaz Formation (Monroe 1980: 68) within the higher *Globigerina ampliapertura* zone (Moussa and Seiglie 1970: 1892), lower Chattian, late Oligocene.

Description. 

Mandible—Although broken anteriorly (Fig. 1), the horizontal mandibular ramus appears to be slender with its ventral border moderately concave and not tangent to the angle. The anterior border of the coronoid process extends slightly anteriorly having an enlarged coronoid foramen at its basis. The mandibular foramen is undivided revealing the dental capsule exposed posteroventrally (Fig. 1b).

Dentition—In front of the heavily worn m1–3, the alveoli for a three-rooted dp5 are present indicating no tooth replacement at this locus. Anteriorly to dp5, two alveoli are interpreted to represent p3 and p4, which are single-rooted. The remains of m1–3 prevent most details of their cusp pattern. However, all molars can be identified as being characteristically two-rooted with mesiodistally elongated crowns that slightly increase in relative size from anterior to posterior within the tooth arcade (Fig. 1). Two transverse lophs, the protolophid and hypolophid, are still indicated. On the labial side of the molars, the maximum height of the preserved crowns measures 4 mm in m1, 5 mm in m2, and 7 mm in m3 (Fig. 1b). The maximum thickness of enamel varies from less than 1 mm in m1, 2 mm in m2, and about 2.5 mm in m3.

Vertebral column—Two vertebrae, one cervical and one thoracic, are present mainly preserving the vertebral body, which is flat and oval in the first and thick and heart-shaped in the latter.

Discussion and conclusions

It is assessed that the diagnostic quality of the holotype, and only known specimen, of “*H.*” *antillense* is extremely low. The posterior fragment of the left mandible (Fig. 1) and two vertebral elements yield no identifying features on species level. This is corroborated by direct morphological comparisons. Taking into account the representatives of the former “*Halitherium*-”species complex alone, the preserved character combination described above is likewise shared by “*H.*” *taulannense*, the taxonomic–morphological revision of it is still in progress (Voss 2013), *Kaupitherium gruelli* Voss and Hampe, 2017, *K. bronni* (Krauss, 1858) Voss and Hampe, 2017, and *Lentiarenium cristolii* (Fitzinger, 1842) Voss et al. 2016. As such, neither it is possible to define a species on the holotype material that can be clearly distinguished from other taxa, nor is this West Indian sirenian unambiguously assignable to any known species.

Additionally, Voss (2013) pointed out that a cladistic treatment of “*H.*” *antillense* does not lead to a reliable phylogenetic signal. In practical terms, “*H.*” *antillense* covers less than 9% of the characters contained in the data matrix from Voss (2013: Appendix 4), and this does not provide a sufficient morphological data basis for the establishment of any phylogenetic hypothesis. This becomes clear when “*H.*” *antillense* is included into the cladistic analyses, which resolved in random positions within Sirenia causing a disruptive impact on the topology of other sirenian groupings.

For these reasons, it is concluded that a taxonomic and, in further consequence, a systematic assignment of “*H.*” *antillense* is not possible and that the respective species name must be declared a *nomen dubium*. 

---

**Fig. 1** Posterior part of left mandible and holotype specimen of “*Halitherium antillense*” AMNH 9844: **a** in lateral view; **b** in medial view. Scale bar equals 2 cm.
Acknowledgements I am grateful for the kind assistance of Judy Galkin (American Museum of Natural History New York, USA) in providing access to the fossil marine mammal collections. I also thank Iyad Zalmout (Howard University, Washington D.C., USA) and D.P. Domning (American Museum of Natural History, New York, USA) for their constructive feedback and helpful comments, as well as the PalZ editors, Mike Reich and Thomas Mörs, for their improvements of the present paper. This study received funding from the SYNTHESYS Project https://www.synthesys.info/ which is financed by European Community Research Infrastructure Action under the FP7 "Capacities" Program (GB-TAF-5171, HU-TAF-5158). I also thank the Deutsche Forschungsgemeinschaft (DFG, HA 1776/11-1 to O. Hampe) and O. Hampe (Berlin) for supporting this project.

Funding Open Access funding enabled and organized by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

References

Domning, D.P. 1996. Bibliography and index of the Sirenia and Desmostyia. Smithsonian Contributions to Paleobiology 80: 1–611.
Domning, D.P., I.S. Zalmout, and P.D. Gingerich. 2010. Sirenia. In Cenozoic Mammals of Africa, eds. L. Werdelin, and W.J. Sanders, 147–160. Berkeley, Calif.: University of California Press.

Fitzinger, L.J. 1842. Bericht über die in den Sandlagern von Linz aufgefundenen fossilen Reste eines urweltlichen Säugers (H. cristolii). Bericht über das Museum Francisco-Carolinium Linz 6: 61–72.
Gray, J.E. 1821. On the natural arrangement of vertebrate animals. The London medical repository 15: 296–310.
Illiger, J.K.W. 1811. Prodomus systematis mammalium et avium: add. terminis zoographiae urbis et aequus classis, eorumque versione, xviii + 1–301. Berolini [=Berlin]: Salfeld.
Kaup, J.J. 1838. Halytherium und Pugmeodon im Maynzer Becken. Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde 1838: 318–320.
Krauss, C.F.F. 1858. Beiträge zur Kenntnis des Schädel-Bauens von Halitherium. Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde 1858: 519–531.
Matthew, W.D. 1916. New sirenian from the Tertiary of Porto Rico, West Indies. Annals of New York Academy of Science 27: 23–29.
Monroe, W.H. 1980. Geology of the middle Tertiary formations of Puerto Rico. Geological Survey, Professional Paper 953: 1–93.
Voss, M. 2013. Revision of the Halitherium-species complex (Mammalia, Sirenia) from the late Eocene to early Miocene of Central Europe and North America. Dissertation, Humboldt-Universität zu Berlin. https://edoc.hu-berlin.de/browsing/dissertationen/.
Voss, M. 2014. On the invalidity of Halitherium schinzii Kaup, 1838 (Mammalia, Sirenia), with comments on systematic consequences. Zoosystematics and Evolution 90: 87–93.
Voss, M., and O. Hampe. 2017. Evidence for two sympatric sirenian species (Mammalia, Tethytheria) in the early Oligocene of Central Europe. Journal of Paleontology 91(2): 337–367.
Voss, M., B. Berning, and E. Reiter. 2016. A taxonomic and morphological re-evaluation of “Halitherium” cristolii Fitzinger, 1842 (Mammalia, Sirenia) from the late Oligocene of Austria, with the description of a new genus. European Journal of Taxonomy 256: 1–32.