Taxonomic clarifications concerning the crocodyliform genus *Isisfordia*

Lachlan J. Hart

Palaeoscience Research Centre, School of Environmental and Rural Science, University of New England, Armidale, New South Wales, Australia

### ABSTRACT

**Background.** In a recent paper, a new species of the crocodyliform genus *Isisfordia* was erected based on, in part, a specimen previously designated as the holotype of *‘Crocodylus (Bottosaurus)’ selaslophensis*. This new species was given the name *Isisfordia molnari*. However, because the holotype of *‘Crocodylus (Bottosaurus)’ selaslophensis* displays a unique combination of characters and does not overlap with the holotype of *I. molnari*, both names remain valid according to ICZN regulations.

**Results.** The present work instates *Isisfordia selaslophensis* comb. nov., recognising the seniority of the original specific epithet given to the specimen. The specimen is also reaffirmed as the holotype of the species. *Isisfordia molnari* is rediagnosed based on non-overlapping material but is potentially referable to *Isisfordia selaslophensis*. All other analyses, descriptions, diagnoses and conclusions stated by the original study remain valid.

**Subjects** Paleontology, Taxonomy

**Keywords** *Isisfordia, Selaslophensis, Molnari, Duncani, Griman creek, Lightning ridge*

### INTRODUCTION

*Hart et al. (2019)* recently described a new species of the crocodyliform *Isisfordia* from the Cenomanian-aged Griman Creek Formation at Lightning Ridge (northern New South Wales, Australia). The new taxon, *Isisfordia molnari*, was based on the holotypic braincase (AM F125553) and a referred maxillary fragment (AM F15818). The maxillary fragment was previously designated as the holotype of *‘Crocodylus (Bottosaurus)’ selaslophensis Etheridge, 1917 emend. Molnar (1980)* but was regarded as a *nomen dubium* by *Mannion et al. (2015; supp. info)* owing to a lack of “taxonomic opinion data” (pg. 9). As discussed by *Hart et al. (2019)*, AM F15818 does not show any significant similarity to either *Crocodylus* or *Bottosaurus*, yet shares characteristics consistent with *Isisfordia*, namely a caudal maxillary alveolar groove. However, differences in the tooth and alveolar morphology separate AM F15818 from *Isisfordia duncani*, the type, and only other known species of the genus (*Hart et al., 2019*). Based on this, AM F15818 (together with AM F125553) was considered to represent a distinct species of *Isisfordia*. *Hart et al. (2019)* gave this new species the name *Isisfordia molnari* and diagnosed in based on features of the holotype (the braincase) and referred specimen (the maxilla). However, because the referred specimen (AM F15818) displays a unique combination of characters (caudal maxillary alveolar groove, labiolingually compressed, lingually curved tooth crowns, thickening
of the medial alveolar wall, rounded alveolar shape, and the continuous arrangement of the
caudal maxillary alveolar septa), the previously-designated specific epithet has taxonomic
seniority. *Isisfordia molnari* remains a valid nomenclatural act under ICZN (International
Commission on Zoological Nomenclature) guidelines but is likely synonymous with
*I. selaslophensis* comb. nov.

The present work clarifies this taxonomic synonymy and has been registered in ZooBank,
thus meeting the ICZN regulations.

**MATERIALS & METHODS**

The electronic version of this article in Portable Document Format (PDF) will represent a
published work according to the International Commission on Zoological Nomenclature
(ICZN), and hence the new names contained in the electronic version are effectively
published under that Code from the electronic edition alone. This published work
and the nomenclatural acts it contains have been registered in ZooBank, the online
registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) can be
resolved and the associated information viewed through any standard web browser by
appending the LSID to the prefix [http://zoobank.org/](http://zoobank.org/). The LSID for this publication
is urn:lsid:zoobank.org:pub:0FD2AD7B-F46D-42C6-B925-D09BACFEFFB0. The online
version of this work is archived and available from the following digital repositories: PeerJ,
PubMed Central and CLOCKSS.

**SYSTEMATIC PALAEONTOLOGY**

CROCODYLIFORMES Hay, 1930  
MESOEUCROCODYLIA Whetstone and Whybrow, 1983  
NEOSUCHIA Clark, 1988  
EUSUCHIA Huxley, 1875  
Genus ISISFORDIA *Salisbury et al., 2006*

Diagnosis (autapomorphies marked with an ‘a’): Broad exposure of the prootic within
the supratemporal foramen rostral to the rostral aperture of the posttemporal canal (a);
caudal maxillary alveolar groove (a); maximum diameter of the caudal aperture of the
cranioquadrate siphonium approximately one-third the mediolateral width of the foramen
magnum, with the lateral wall of the siphonium formed exclusively by the quadrate (a);
maximum mediolateral width of the secondary choanae exceeds the minimum mediolateral
width of the palatines; naris with a distinctly pear-shaped outline (a); caudal dentary teeth
confluent and set in a shallow alveolar groove (shared with some alligatoroids); dentary
and maxillary teeth flattened labiolingually at the base of the crown, but become conical
towards the apex; cervical, thoracic and cranial-most caudal vertebrae weakly procoelous
at maturity (a); caudal vertebrae weakly procoelous (a); sacral vertebra II with a low caudal
condyle (a); distal extremity of ulna expanded transversely with respect to the long axis of
the bone (shared with *Susisuchus* spp. and *Theriosuchus pusillus*).
**Isisfordia duncani** Salisbury *et al.*, 2006

Holotype: QM F36211 (near complete skeleton, missing the rostral part of the skull).
Referred material: QM F44320 (skull) QM F44319 (partial maxilla and mandible), QM F34642 (partial articulated skeleton).
Locality, horizon and age: ‘lower’ Winton Formation, uppermost Albian–Cenomanian, Queensland.
Diagnosis: Species of *Isisfordia* with the following autapomorphies: median ridge on parietal; ridges on the parietal forming the medial margin of the supratemporal foramina; caudal maxillary tooth crown bases and alveoli ovate.

**Isisfordia selaslophensis** (Etheridge, 1917) comb. nov.

**Taxonomic assessment**
Holotype: AM F15818 (maxillary fragment; holotype of ‘*Crocodylus (Bottosaurus)*’ *selaslophensis*).
Illustrations of material: *Hart et al.* (2019: figs. 4, 5).
Locality, horizon and age: Griman Creek Formation, Cenomanian, New South Wales (see *Hart et al.*, 2019: fig. 1).
Diagnosis: Species of *Isisfordia* with the following autapomorphy: caudal maxillary alveoli circular and separated by interalveolar septa along entire caudal portion of the maxillary alveolar groove.
**Remarks**
AM F15818 is affirmed as the holotype specimen of *I. selaslophensis* comb. nov., as its earlier description holds taxonomic seniority. It belongs to *Isisfordia* as it displays the following two apomorphies of the genus, as defined above: caudal maxillary alveolar groove; labiolingually compressed, lingually curved tooth crowns.

**Isisfordia molnari** Hart *et al.*, 2019

**Taxonomic assessment**
Holotype: AM F125553 (braincase).
Illustrations of material: *Hart et al.* (2019: figs. 2, 3).
Locality, horizon and age: Griman Creek Formation, Cenomanian, New South Wales (see *Hart et al.*, 2019: fig. 1).
Diagnosis: Species of *Isisfordia* with the following autapomorphies: flat dorsal surface of the parietal; parietal contribution to medial margin of supratemporal fenestrae flat (does not form raised rim).
**Remarks**
AM F125553 belongs to *Isisfordia* as it displays the following apomorphy of the genus, as defined above: broad exposure of the prootic within the supratemporal foramen rostral...
to the rostral aperture of the posttemporal canal. Although *I. selaslophensis* comb. nov. and *I. molnari* are morphologically divergent from the type species, *I. duncani*, the former two are based on non-overlapping material. It is therefore likely that *I. molnari* is referable to *I. selaslophensis* comb. nov. and, given the taxonomic seniority of the latter, should be considered a subjective junior synonym of *I. selaslophensis* comb. nov. Definitive assessment of this synonymy is not possible, but should overlapping material be described in the future, this diagnosis can be revised. Although both nomenclatural acts remain valid, there is no compelling evidence at this stage for the presence of two sympatric species of crocodylomorph from the Griman Creek Formation (*Hart et al., 2019*).

**CONCLUSIONS**

- *Isisfordia selaslophensis* comb. nov. is instated, with AM F15818 (a partial maxilla) allocated as the type specimen for this species.
- *Isisfordia molnari* remains a valid nomenclatural act, currently represented by AM F125553 (a braincase).
- *Isisfordia molnari* is likely a junior subjective synonym of *I. selaslophensis*. However, as both taxa are currently represented by non-overlapping material, this cannot be determined with certainty.

**ACKNOWLEDGEMENTS**

I would like to thank Stephen Poropat, Jay Nair and Adam Yates for signaling this issue with our original paper. Jacqueline Thai (PeerJ) and Richard Pyle (ZooBank) provided very helpful advice for this work. I would also like to thank Phil Bell, Steve Salisbury and Elizabeth Smith who supervised and co-authored the original work. Insightful reviews by Mark Young and Stephen Poropat, and editorial comments from Andrew Farke improved the final version of this manuscript.

**ADDITIONAL INFORMATION AND DECLARATIONS**

**Funding**

The author received no funding for this work.

**Competing Interests**

The author declares that they have no competing interests.

**Author Contributions**

- Lachlan J. Hart conceived and designed the experiments, performed the experiments, analyzed the data, prepared figures and/or tables, authored or reviewed drafts of the paper, and approved the final draft.

**Data Availability**

The following information was supplied regarding data availability:

- No raw data or code are associated with this study.
New Species Registration
The following information was supplied regarding the registration of a newly described species:

*Isisfordia selaslophensis* comb. nov.

Publication LSID: urn:lsid:zoobank.org:pub:0FD2AD7B-F46D-42C6-B925-D09BACFFE7B0

New combinations do not require an individual ZooBank entry.

REFERENCES

Etheridge R. 1917. Reptilian notes: *Megalania prisca*, Owen, and *Notiosaurus dentatus*, Owen; lacertilian dermal armour; opalized remains from Lightning Ridge. *Proceedings of the Royal Society of Victoria* 29:127–133.

Hart LJ, Bell PR, Smith ET, Salisbury SW. 2019. *Isisfordia molnari* sp. nov., a new basal eusuchian from the mid-Cretaceous of Lightning Ridge, Australia. *PeerJ* 7:e7166 DOI 10.7717/peerj.7166.

Mannion PD, Benson RBJ, Carrano MT, Tennant JP, Judd J, Butler RJ. 2015. Climate constrains the evolutionary history and biodiversity of crocodylians. *Nature Communications* 6:Article 8438.

Molnar RE. 1980. Procoelous crocodile from Lower Cretaceous of Lightning Ridge, N.S.W. *Memoirs of the Queensland Museum* 20:65–75.

Salisbury SW, Molnar RE, Frey E, Willis PMA. 2006. The origin of modern crocodyliforms: new evidence from the Cretaceous of Australia. *Proceedings of the Royal Society B: Biological Sciences* 273:2439–2448 DOI 10.1098/rspb.2006.3613.