

DNM 16 QUARRY MAP AND CRANIAL OSTEOLOGICAL FEATURES

Electronic Supplementary Material 3 for:

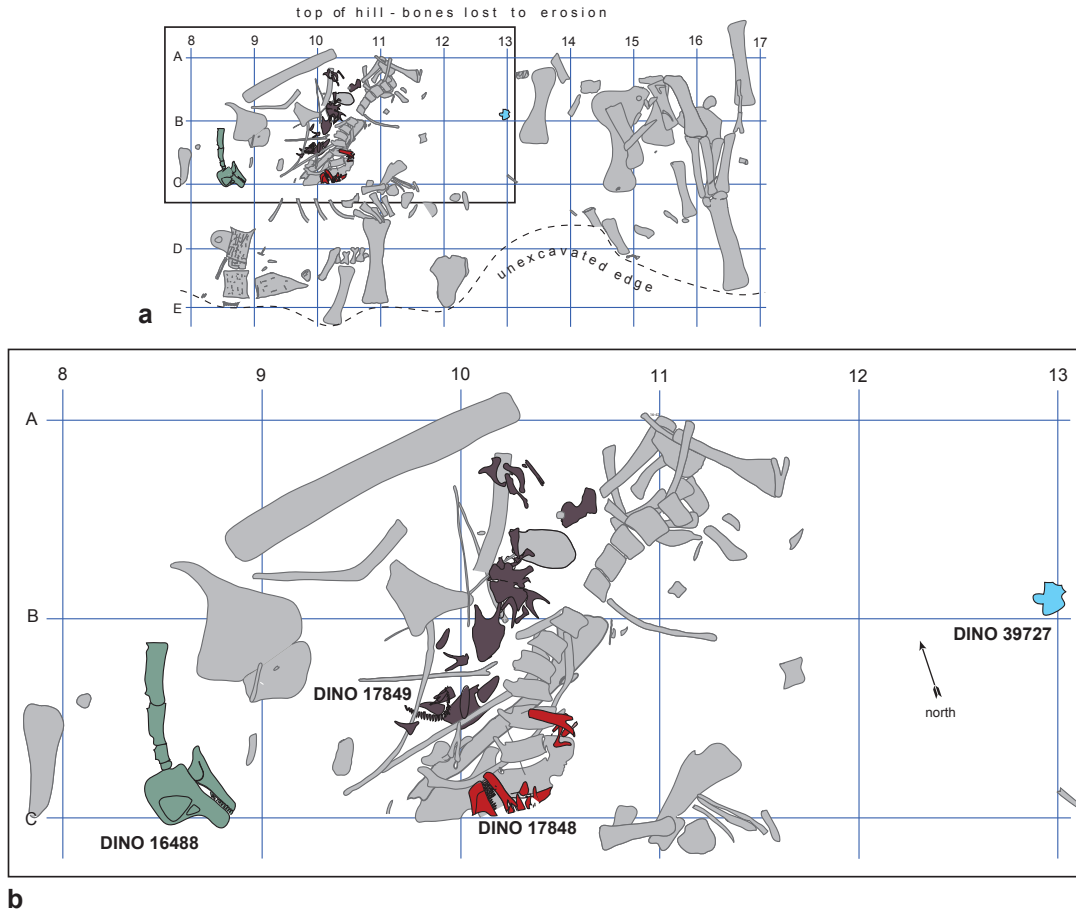
**“First complete sauropod dinosaur skull from the Cretaceous
of the Americas and the evolution of sauropod dentition”**

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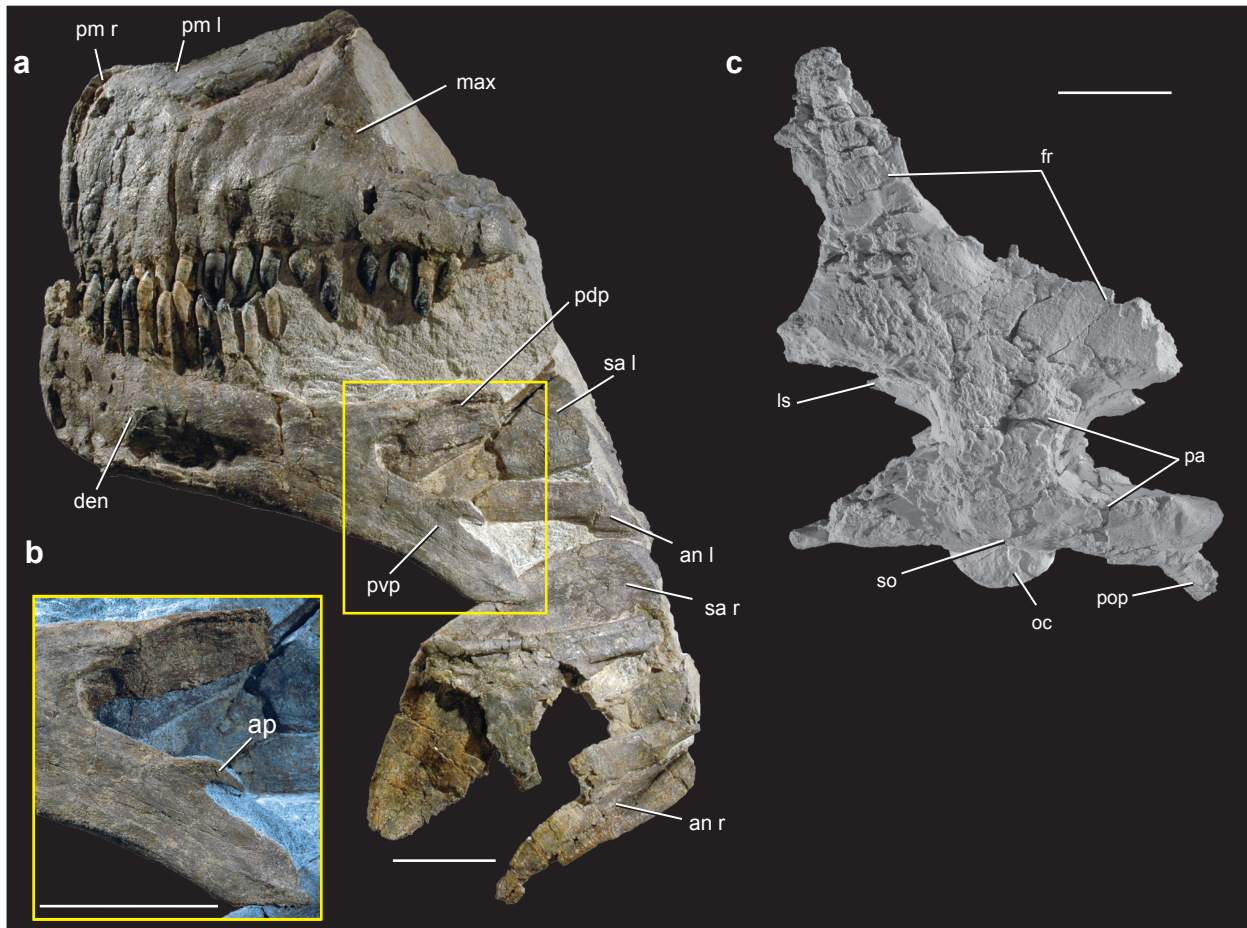
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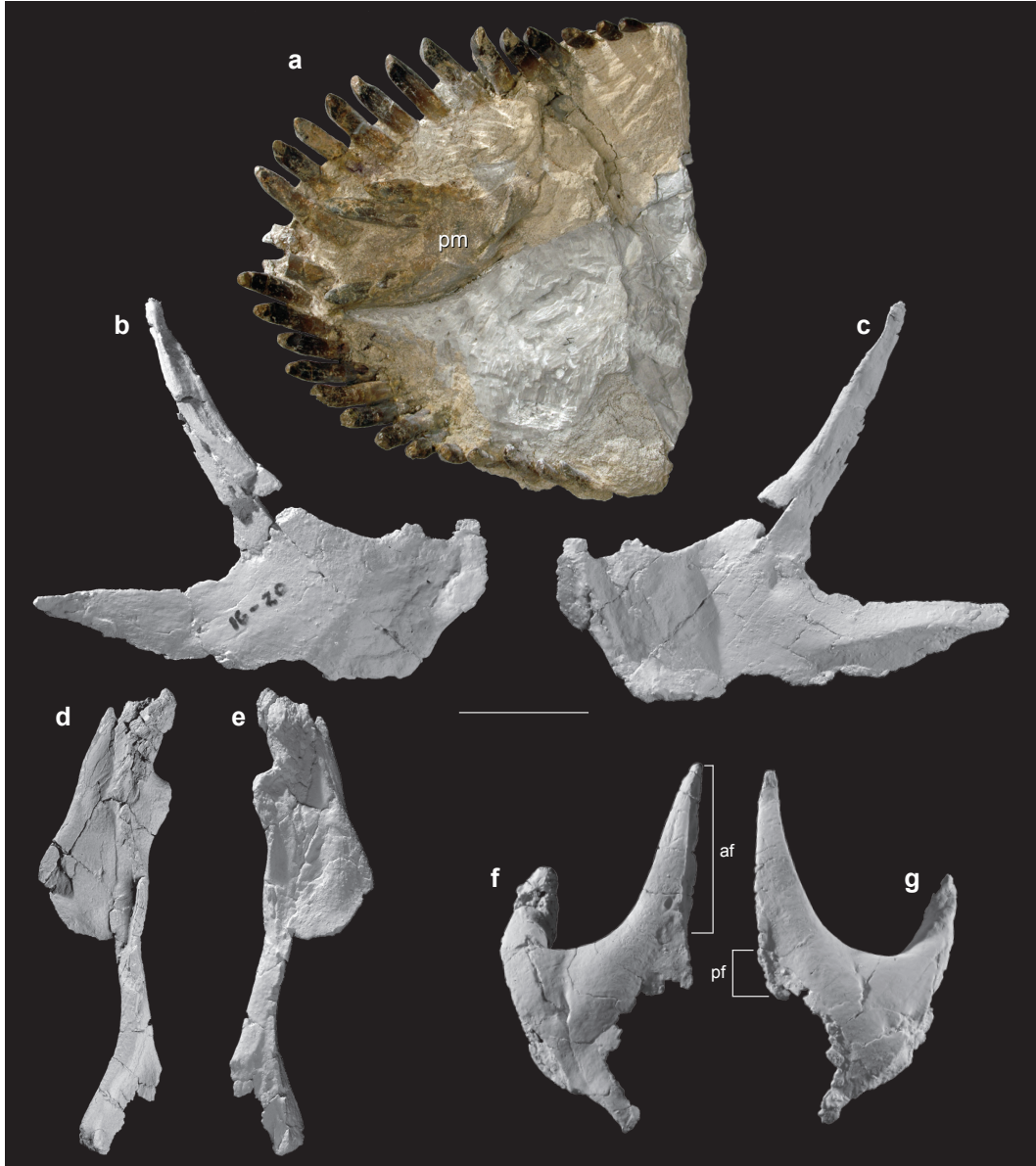
DINO 16488, the holotypic specimen of *Abydosaurus mcintoshi*, is a complete articulated skull found in articulation with four cervical vertebrae (see Text Figs. 3–4). In addition to the complete, well preserved holotypic skull, *Abydosaurus* is known from three other individuals, represented by (1) DINO 17848, an articulated snout, (2), DINO 17849, a nearly complete, disarticulated skull and (3) DINO 39728, a braincase with skull roof. In this supplement we provide a map showing the location and association of the all the cranial material and postcranial elements in the quarry. We also include photos of selected elements of the three referred skulls.



ESM3 Figure 1. DNM16 Quarry Maps. (a), quarry map showing bones recovered through August 2009. (b), detail of map showing the four *Abydosaurus* skulls and their relationships to postcranial elements. The loosely articulated vertebral series consists of caudal vertebrae and a sacral vertebra articulated with a partial ilium adjacent to DINO 17848. Postcranial elements are colored grey. Each grid is 1 meter square.



ESM3 Figure 2. Referred specimens of *Abydosaurus mcintoshi*. (a), partial skull and mandibles (DINO 17848) in left lateral view showing premaxilla, partial maxilla, dentary and associated mandibular elements. Balance of the skull was sawn through during excavation of the block containing a disarticulated skull (DINO 17840). (b), Detail of the dentary showing a small accessory process (**ap**) on the posteroventral process, which *Abydosaurus* shares with *Brachiosaurus brancai*. Matrix and non-dentary elements shaded. (c), braincase and skull roof (DINO 39728) in dorsal view, anterior facing up. Abbreviations: **an**, angular; **ap**, accessory process; **den**, dentary; **fr**, frontal; **l**, left; **ls**, laterosphenoid; **max**, maxilla; **oc**, occipital condyle; **pa**, parietal; **pdp**, posterodorsal process; **pm**, premaxilla; **pop**, paroccipital process; **pvp**, posteroventral process; **r**, right; **sa**, surangular; **so**, supraoccipital. See ESM 3 Figure 1 for locations and associations of these specimens in the quarry. Scale bars = 5 cm.



ESM3 Figure 3. Select elements of nearly complete, disarticulated skull (DINO 17849) referred to *Abydosaurus mcintoshi*. (a), complete set of upper teeth preserved as “dentures” – articulated teeth with no little or surrounding dentigerous bone – in ventral view. The left premaxilla (pm) is present and posteriorly offset relative to its erupted teeth. Anterior is to the left. (b,c), right jugal in lateral and medial views. (d,e), right lacrimal in lateral and medial views. (f,g), left and right nasals in dorsal view, with the anterior toward top of page. The nasal bones meet each other on the midline in an asymmetrically overlapping fashion in which (1) the anterior ramus of right nasal sits atop a facet (af) on the left nasal, which itself fits into a facet on the underside of the right and (2) posteriorly, the left nasal overlaps a facet (pf) on the right nasal. See ESM 3 Figure 1 for location and association of DINO 17849 in quarry. Scale bar = 5 cm.