



Morphbank: An Avenue to Document and Disseminate Anatomical Data. I: Phylogenetic Test Case

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WHAT IS MORPHBANK?

Morphbank (<http://www.morphbank.net>) is an open web repository for digital images utilized in specimen-based biological research. Established in 1998 by a consortium of systematic entomologists, Morphbank serves as a permanent archive to store and distribute images from any of the anatomical sciences. Here, we show its application to phylogenetic studies.

HOW CAN MORPHBANK BE USED TO DISCOVER, ORGANIZE, AND DOCUMENT MORPHOLOGICAL PHYLOGENETIC CHARACTERS?

Matrices of character codings can be created or generated from a nexus file imported to Morphbank. Each collection of images illustrates a character. Alternatively, collections of images can be used to conduct direct anatomical comparisons among specimens in order to assess or discover new characters. Authors can link matrices published in journals to matrices or collections in Morphbank, supplementing the amount of images or data attached to it.



A matrix of characters from a phylogeny is utilized, in this case that for hadrosauriform dinosaurs. Character 16 is the focus of this example

	Characters										
	1-5	6-10	11-15	16	20	21-25	26-30	31-35	36-40	41-45	46-47
<i>I. bernissartensis</i>	00000	00000	00000	00000	00000	00000	00000	00100	00000	00000	00
<i>P. byrdi</i>	1????	??700	10100	000??	??0??	00??0	00000	??7??	??7??	??7??	??
<i>B. canadensis</i>	21110	21121	02111	10010	10011	10011	00220	11011	01010	11	??
<i>E. annectens</i>	31110	21131	0?113	10011	10000	00021	00110	111?1	01010	10	??
<i>Gryposaurus</i> sp.	21110	21111	01112	10010	10010	10001	00120	111?1	01010	10	??
<i>H. stehingeri</i>	21111	11101	11110	001??	01100	01121	11011	21101	11111	10	??
<i>M. peeblesorum</i>	21110	21111	02111	10000	10011	200?1	00220	11011	01010	11	??
<i>P. blackfeetensis</i>	21110	21121	01112	10011	10012	10001	00111	11101	01010	10	??
<i>S. osborni</i>	31110	21111	0?112	01001	10012	10001	00111	211?1	01000	1?	??
<i>T. transsylvanicus</i>	01011	11001	0?000	?0000	00000	000?1	00200	00???	0????	??	??

Character 16 is the position of the jugal joint in the maxilla of hadrosauroid dinosaurs

Character 16, State 0

Jugal rostral process elevated relative to lateral margin of ectopterygoid shelf.



Image Record: [141230] *Paratitanodon isanensis*

Contributor: Albert Prieto-Marquez
 Submitted: Albert Prieto-Marquez
 Date Submitted: 04-26-2007
 Last Modified: 04-26-2007
 Published Date: 12-25-2007

Resolution (PP2): 7
 Submitted as: JPG

View ID: 141230
 Specimen part: Maxilla
 Angle: Lateral
 Technique: Digital camera
 Preparation: UNPREPARED

Download: 17 (2 Bytes) (170 KB)

Specimen ID: 141230
 Basis of record: [1] - Specimen
 Sex: Unknown
 Parity: Not Applicable
 Stage: Adult
 Catalog number: JPS 304.22
 Collector: unknown
 Date collected: 04-01-2000

Locality ID: 141231
 Continent name: [10] - EUROPE
 Country: [102] - GERMANY
 Locality: [101] North Grube
 Latitude: 0
 Longitude: 0
 Elevation (m): 0

Determination
 Class: Mammalia
 Order: Primates
 Family: Hominidae
 Genus: *Paratitanodon*
 Species: *Paratitanodon isanensis*

External Links

Determination annotations

Other Annotations

Title: Character 16 on Maxilla, state 0
 Date: 04-27-2007
 User: Albert Prieto-Marquez

My Collection

ICVHPoster-164 (4 images)

Image Size: 1024x768 px Post Size: 1024x768 px
 Image ID: 141230 141231 141232 141233
 View: 141230 141231 141232 141233
 Download: 17 (2 Bytes) (170 KB)

Each cell of the character matrix is linked to a collection of objects stored in Morphbank. (Objects in Morphbank can be images, publications, annotations, specimens, locations, etc.).

Image Record: [141247] *Brachylophosaurus canadensis*

Contributor: Albert Prieto-Marquez
 Submitted: Albert Prieto-Marquez
 Date Submitted: 04-26-2007
 Last Modified: 04-26-2007
 Published Date: 12-25-2007

Resolution (PP2): 7
 Submitted as: JPG

View ID: 141247
 Specimen part: Maxilla
 Angle: Lateral
 Technique: Digital camera
 Preparation: UNPREPARED

Download: 17 (2 Bytes) (170 KB)

Specimen ID: 141247
 Basis of record: [1] - Specimen
 Sex: Unknown
 Parity: Not Applicable
 Stage: Adult
 Catalog number: JPS 302.74-80-75
 Collector: unknown
 Date collected: 04-01-2000

Locality ID: 141248
 Continent name: [100] - NORTH AMERICA
 Country: [101] UNITED STATES
 Locality: [101] North Grube, 500 Quarry LN, USA
 Latitude: 0
 Longitude: 0
 Elevation (m): 0

Determination
 Class: Mammalia
 Order: Primates
 Family: Hominidae
 Genus: *Brachylophosaurus*
 Species: *Brachylophosaurus canadensis*

External Links

Determination annotations

Other Annotations

Title: Character 16 on Maxilla
 Date: 04-27-2007
 User: Albert Prieto-Marquez

Each image is documented with information regarding the specimen (in the case of vertebrate fossils this will include osteological and geological data).

Character 16, State 1
Ventral margin of jugal rostral process articulates flush with lateral margin of ectopterygoid shelf.



Annotations, such as arrows and explanations of characters, can be added to the images to explain one's interpretation of the morphological character states.

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