

Creation of Virtual Museums Available
to All through Use of

MORPHO SOURCE



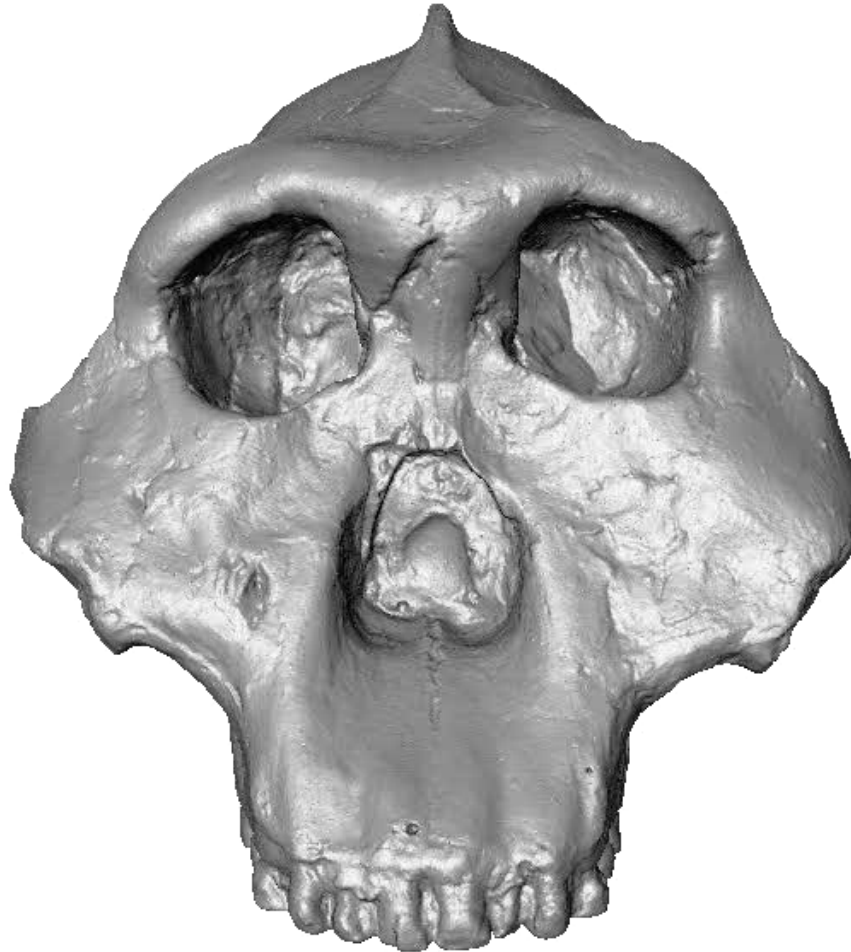
By

Doug M. Boyer, Ph.D. / Assistant Professor

Duke University / Dept. of Evolutionary Anthropology

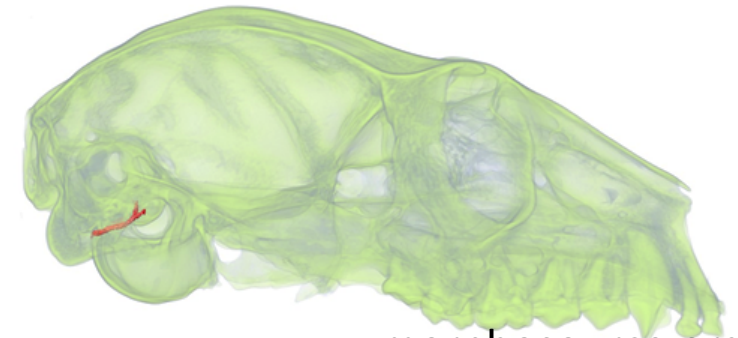
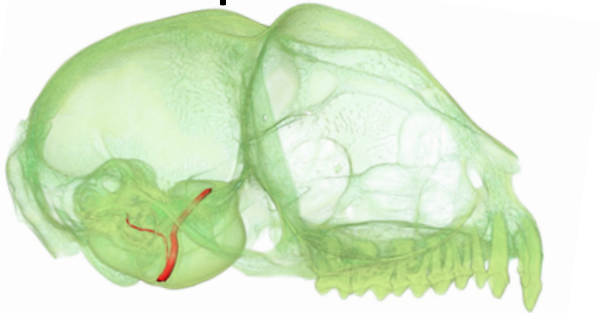


What's the big deal about 3D models?



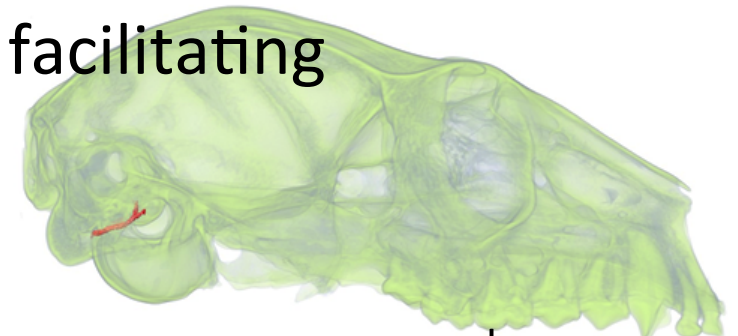
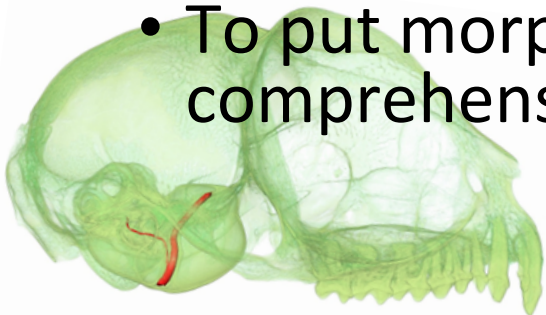
Benefits of Digital Data

- **Easier access** to specimens in remote locations
- **More rapid access** to larger sample sizes
- **More quantitative** approaches
- Access **internal morphology**
- Relax demand to handle fragile museum specimens
- Involve **beginning students and public** with unique and valuable specimens



Organism Structure is integral to understanding evolution

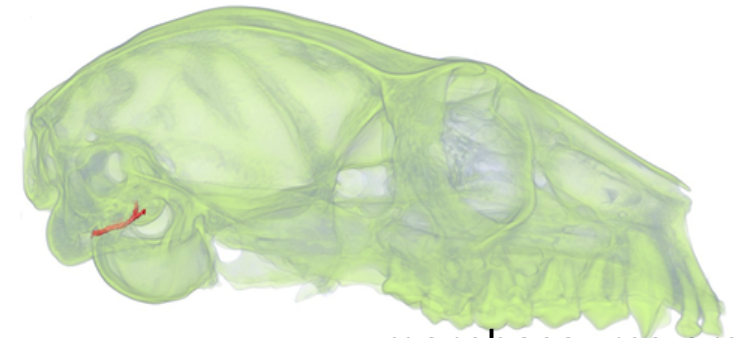
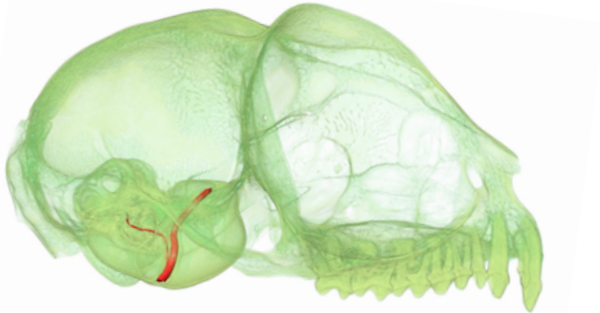
- Observation of morphological variation is a foundation of evolutionary theory.
- Interactions between physical environment and an organism (via its anatomy) explain selective pressures and evolutionary histories.
- Genomic advances stem partly from relative ease of **accessing** its information content. (i.e., Genbank)
- The **information content** and explanatory power of morphology remains virtually untapped due to difficulty of access.
- To put morphology on the same level as genomics, facilitating comprehensive **access** is the among the first steps.



Access is key

How to best promote access?

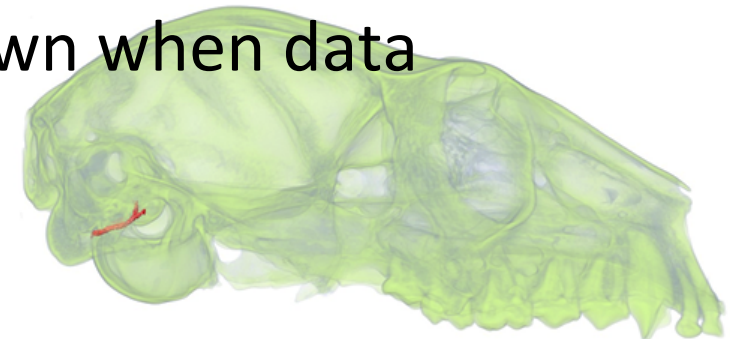
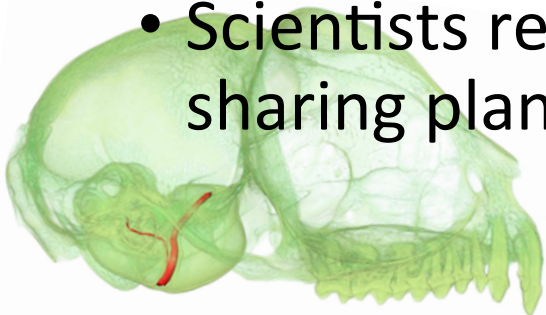
- **Consolidate** repository holdings
- Allow scan searches that will **highlight availability across repositories** (e.g., by taxon, element, data type, publication, geographic location, etc.)
- Allow efficient download of data records returned by searches.
- Give **EVERYONE** the opportunity to be direct contributors



Mandates for Data Sharing in USA

NSF requirements for data sharing tightened - need is critical

- Memorandum (Feb 22, 2013): “Increasing Access to the Results of Federally Funded Research”
- Executive Order (May 9, 2013): “Making Open and Machine Readable the New Default for Government Information”
- Memorandum (May 9, 2013): “Open Data Policy – Managing Information as an Asset”
- Scientists requests for grant support are turned down when data sharing plans are perceived to be inadequate.



Researcher-Generated, Repository-Consolidating archive (RG-RCA) is needed

MorphoSource (www.morphosource.org) is being developed as a proof-of-concept/testing ground

- Based out of Duke University
- Development started in 2012
- Active since Spring, 2013



Being used for PaleoTeach modules

MORPHO SOURCE

ABOUT | BROWSE | DASHBOARD |

K12 HUMAN EVOLUTION | MEDIA CART | STATS |

MANAGE: BIBLIOGRAPHY | FACILITIES | INSTITUTIONS | PROJECTS | TAXONOMY | SPECIMEN | USERS | STATS











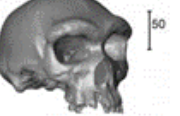

K-12 Human Evolution

MEDIA | BIBLIOGRAPHY | TAXONOMY | FACILITIES

12 Project Specimens

VIEW AS LIST | NEW SPECIMEN

Order by: [Specimen number](#) | [Taxonomic name](#)

 EA-CCC-01 , <i>Pan troglodytes</i>	 EA-CCC-02 , <i>Australopithecus africanus</i>	 EA-CCC-03 , <i>Australopithecus boisei</i>	 EA-CCC-04 , <i>Homo habilis</i>
 EA-CCC-05 , <i>Homo erectus</i>	 EA-CCC-06 , <i>Homo erectus</i>	 EA-CCC-07 , <i>Homo neanderthalensis</i>	 EA-CHC-01 , <i>Homo sapiens</i>
 EA-DCC-01 , <i>Australopithecus afarensis</i>	 EA-DCC-02 , <i>Australopithecus boisei</i>	 EA-DCC-03 , <i>Homo heidelbergensis</i>	 EA-HC-01 , <i>Homo sapiens</i>

MORPHO SOURCE

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K12 - HORSE EVOLUTION | MEDIA CART | STATS |

MANAGE: BIBLIOGRAPHY | FACILITIES | INSTITUTIONS | PROJECTS | TAXONOMY | SPECIMEN | USERS | STATS

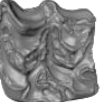

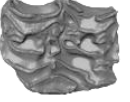
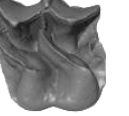
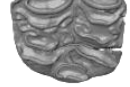

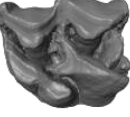

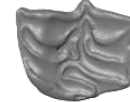


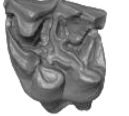
K12 - Horse Evolution

MEDIA | BIBLIOGRAPHY | TAXONOMY | FACILITIES

15 Project Specimens

VIEW AS LIST | NEW SPECIMEN

Order by: [Specimen number](#) | [Taxonomic name](#)

 UF-124196 , <i>Dinohippus mexicanus</i>	 UF-137889 , <i>Meshippus bairdi</i>	 UF-208601 , <i>Neohipparion eurystyle</i>	 UF-2211401 , <i>Anchitherium clarencei</i>
 UF-22614 , <i>Nannippus peninsulae</i>	 UF-252687 , <i>Sifhippus sandrae</i>	 UF-270648 , <i>Parahippus barbouri</i>	 UF-302417 , <i>Nannippus aztecus</i>
 UF-53577 , <i>Calippus elachistus</i>	 UF-60323 , <i>Calippus cerasinus</i>	 UF-62289 , <i>Neohipparion trampasense</i>	 UF-6597 , <i>Parahippus leonensis</i>

Being used for PaleoTeach modules

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Project: K-12 Megalodon

[BACK](#)

22 Project Specimens

Order by: [Specimen number](#) | [Taxonomic name](#)



[UF-311000_LL_01](#)



[UF-311000_LL_03](#)



[UF-311000_LL_04](#)



[UF-311000_LL_05](#)



[UF-311000_LL_06](#)



[UF-311000_LL_07](#)



[UF-311000_LL_08](#)



[UF-311000_LL_09](#)



[UF-311000_LL_10](#)



[UF-311000_LL_11](#)



[UF-311000_LR_02](#)



[UF-311000_UL_01](#)

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K12 - Horse Evolution

[MEDIA](#)[BIBLIOGRAPHY](#)[TAXONOMY](#)[FACILITIES](#)

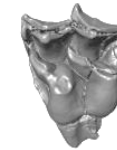
15 Project Specimens

[VIEW AS LIST](#)[NEW SPECIMEN](#)

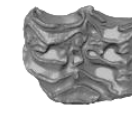
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[UF-124196, Dinohippus mexicanus](#)



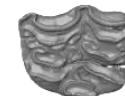
[UF-137889, Mesohippus bairdi](#)



[UF-208601, Neohipparion eurystyle](#)



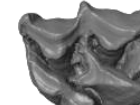
[UF-2241401, Anchitherium clarencei](#)



[UF-22614, Nannippus peninsulatus](#)



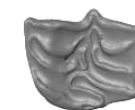
[UF-252687, Sifrhippus sandrae](#)



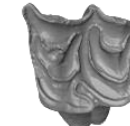
[UF-270649, Parahippus barbouri](#)



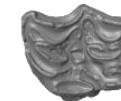
[UF-302417, Nannippus aztecus](#)



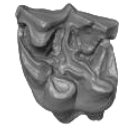
[UF-53577, Calippus elachistus](#)



[UF-60323, Calippus cerasinus](#)



[UF-62299, Neohipparion trampasense](#)



[UF-6597, Parahippus leonensis](#)

Being used for PaleoTeach modules

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22 Project Specimens

Order by: [Specimen number](#) | [Taxonomic name](#)



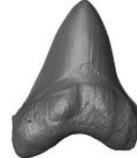
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[UF-311000_LL_03](#)



[UF-311000_LL_04](#)



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[UF-311000_LL_07](#)



[UF-311000_LL_08](#)



[UF-311000_LL_09](#)



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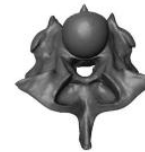
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Project: K12 - Titanoboa

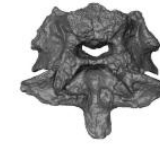
[BACK](#)

6 Project Specimens

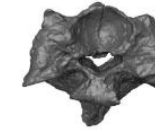
Order by: [Specimen number](#) | [Taxonomic name](#)



[UF-2210_Eunectes murinus](#)



[UF-IGM-1_Titanoboa cerrejonensis](#)



[UF-IGM-2_Titanoboa cerrejonensis](#)



[UF-IGM-4_Titanoboa cerrejonensis](#)



[UF-IGM-5_Titanoboa cerrejonensis](#)



[UF-IGM-13_Titanoboa cerrejonensis](#)

Stats

- 5,820 media files
 - Tiff/DICOM stacks
 - 3D Mesh files
- 1,915 specimens
- 435 taxonomic names
- 57 institutions
- 20 scanning facilities
- 306 user accounts

Specimen Information

Specimen: [DPC-18651](#), *Parapithecus grangeri*

Specimen taxonomy: *Parapithecus grangeri*

Institution: Duke Lemur Center Division of Fossil Primates, Durham, NC, USA

Scan Information

Type: Image (TIFF)

Filesize: 710.14 MB

Is this media copyrighted?: Yes

Copyright permission: Person loading media owns copyright and grants permission for use of media on MorphoSource

Copyright license: Attribution-NonCommercial CC BY-NC - reuse but noncommercial

Copyright Holder: Duke Division of Fossil Primates

Facility: Duke SMIF

X res: 0.035305630415678 mm

Y res: 0.035305630415678 mm

Z res: 0.035305630415678 mm

Voltage: 140 kv

Amperage: 200 µa

Watts: na

Projections: 2900

Frame averaging: 2

Wedge: none

Scanner calibrations: No calibrations are listed

Technicians: Gabriel Yapuncich

Media created on: June 6 2013 at 13:04:26

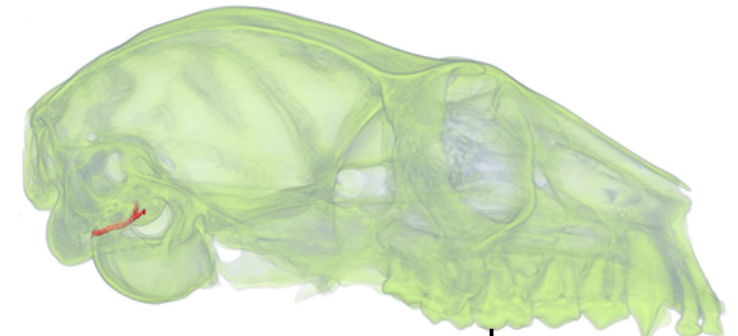
Media last modified on: September 8 2014 at 12:50:55



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Challenges

- Format and quality standards
- Appropriate funding model and physical location (inviting partners)
- Researcher & museum concern about maintaining control of shared data and credit for its production
- Ease of use by all stakeholders (researchers, museums, public)

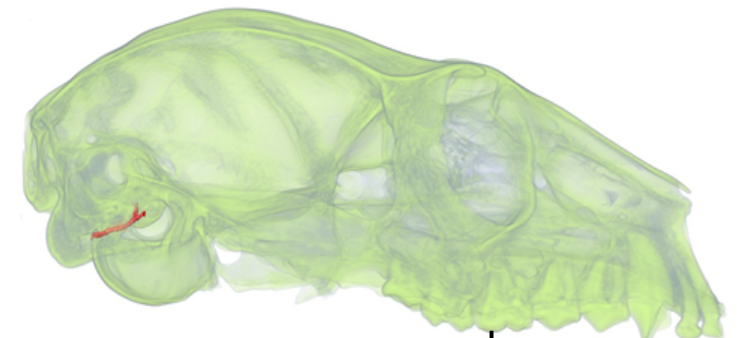


MORPHO SOURCE development

Goals

To provide

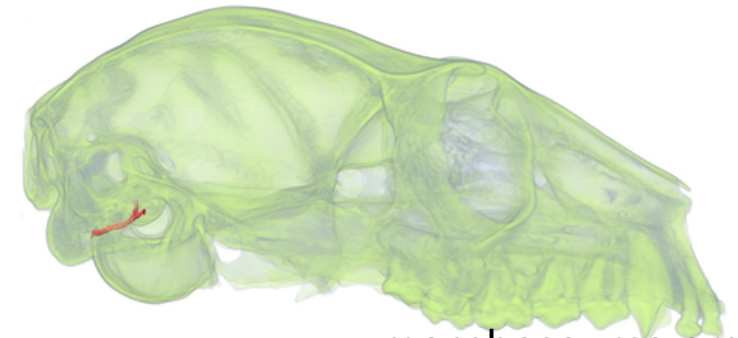
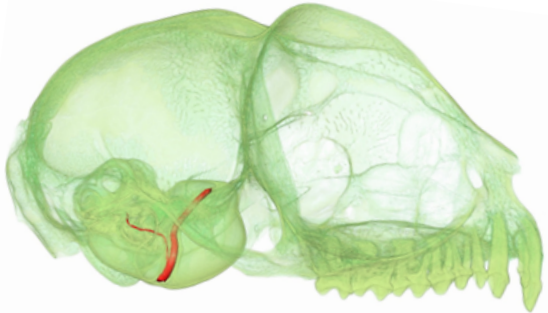
1. researchers a way to access and distribute 3D data as efficiently and effectively as possible
2. researchers & museums tools to manage & track 3rd party data usage
3. A framework for the public education through unprecedented access to research quality natural science objects



MORPHO SOURCE development

Outline

- Examples of contributed datasets
- How to use the site
- Storage model
- Features for promoting ethical conduct
- Summary and Conclusions



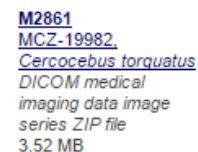
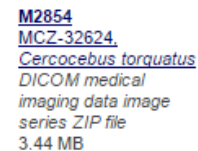
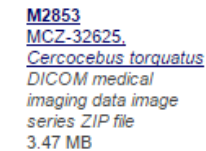
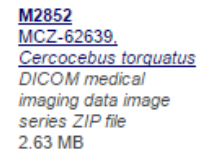
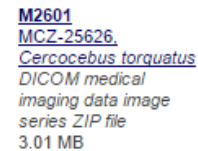
Media results

308 results

- Harvard Museum of Comparative Zoology (MCZ)
- Media includes tiff/dicom stacks
- Data author is Prof. Lynn Copes of Quinnipiac School of Medicine

311 results

OPTIONS :



[MCZ-10131. *Saimiri oerstedii*](#)
[MCZ-10132. *Saimiri oerstedii*](#)
[MCZ-10133. *Saimiri oerstedii*](#)
[MCZ-10134. *Saimiri oerstedii*](#)
[MCZ-10138. *Ateles geoffroyi*](#)
[MCZ-12758. *Macaca fascicularis*](#)
[MCZ-14657. *Euoticus elegantulus*](#)
[MCZ-14659. *Galago alleni*](#)
[MCZ-14725. *Cercocebus albigena*](#)
[MCZ-15312. *Pan troglodytes troglodytes*](#)
[MCZ-15324. *Saguinus sp.*](#)
[MCZ-16075. *Galago senegalensis*](#)
[MCZ-16354. *Eulemur fulvus fulvus*](#)
[MCZ-16356. *Eulemur fulvus rufus*](#)
[MCZ-16370. *Eulemur fulvus rufus*](#)
[MCZ-16375. *Propithecus verreauxi*](#)
[MCZ-16382. *Varecia variegata variegata*](#)
[MCZ-16390.](#)
[MCZ-16391. *Lemur catta*](#)
[MCZ-16392. *Lemur catta*](#)
[MCZ-16393. *Eulemur fulvus rufus*](#)
[MCZ-17548. *Perodicticus potto*](#)
[MCZ-17550. *Perodicticus potto*](#)
[MCZ-17589. *Galago alleni*](#)
[MCZ-17590. *Euoticus elegantulus*](#)
[MCZ-17591. *Euoticus elegantulus*](#)
[MCZ-17592. *Euoticus elegantulus*](#)
[MCZ-17593. *Euoticus elegantulus*](#)
[MCZ-18607. *Perodicticus potto*](#)

Datasets on MorphoSource

Published Datasets for open access download

- 124 specimens of lower second molars used to compute dental topographic metrics in Boyer (2008)
 - AMNH, USNM, MCZ collections
 - Media includes tiff/dicom stacks
 - Surface meshes

124 Project Specimens

[VIEW AS LIST](#)

[NEW SPECIMEN](#)

Order by: [Specimen number](#) | [Taxonomic name](#)



[AMNH-M-100503](#), *Indri indri*



[AMNH-M-100504](#), *Indri indri*



[AMNH-M-100512](#), *Varecia variegata variegata*



[AMNH-M-100513](#), *Varecia variegata rubra*



[AMNH-M-100514](#), *Varecia variegata rubra*



[AMNH-M-100517](#), *Eulemur fulvus rufus*



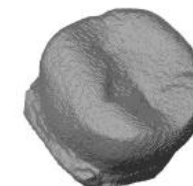
[AMNH-M-100569](#), *Eulemur fulvus rufus*



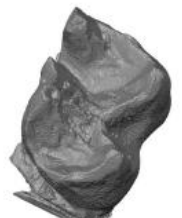
[AMNH-M-100598](#), *Lemur catta*



[AMNH-M-100632](#), *Daubentonia*



[AMNH-M-100632](#), *Daubentonia*



Datasets on MorphoSource

251 Project Specimens

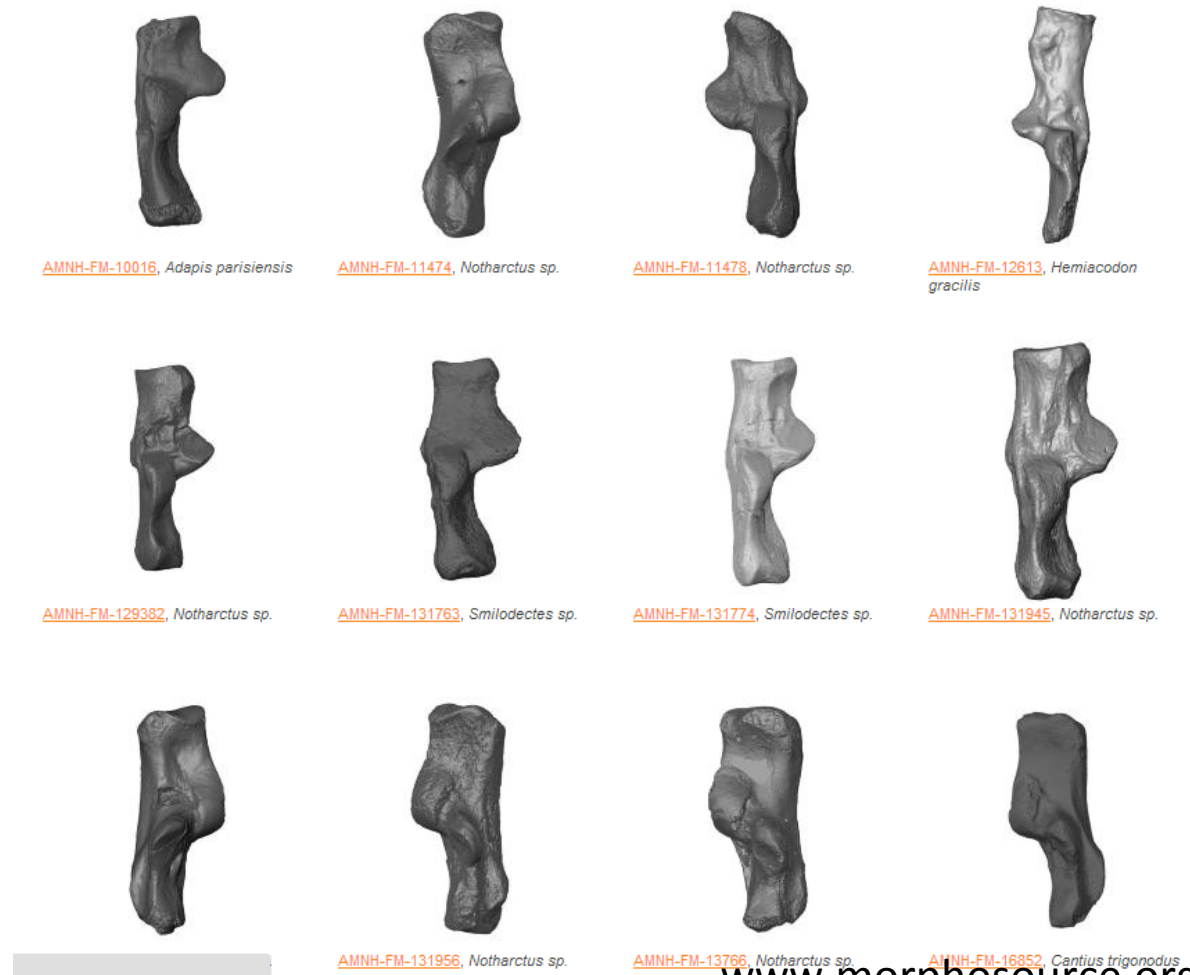
[VIEW AS LIST](#)

[NEW SPECIMEN](#)

Order by: [Specimen number](#) | [Taxonomic name](#)

Published Datasets for open access download

- 251 specimens of calcaneal scans used in Boyer et al. (2013) to generate basic anatomical measurements
 - AMNH, USNM, MCZ, NMB, UCM, UCMP collections and more
 - Media includes tiff/dicom stacks
 - Initial & smoothed surface renderings
 - Some fossils include Photographs



Datasets on MorphoSource

UCMP 38762

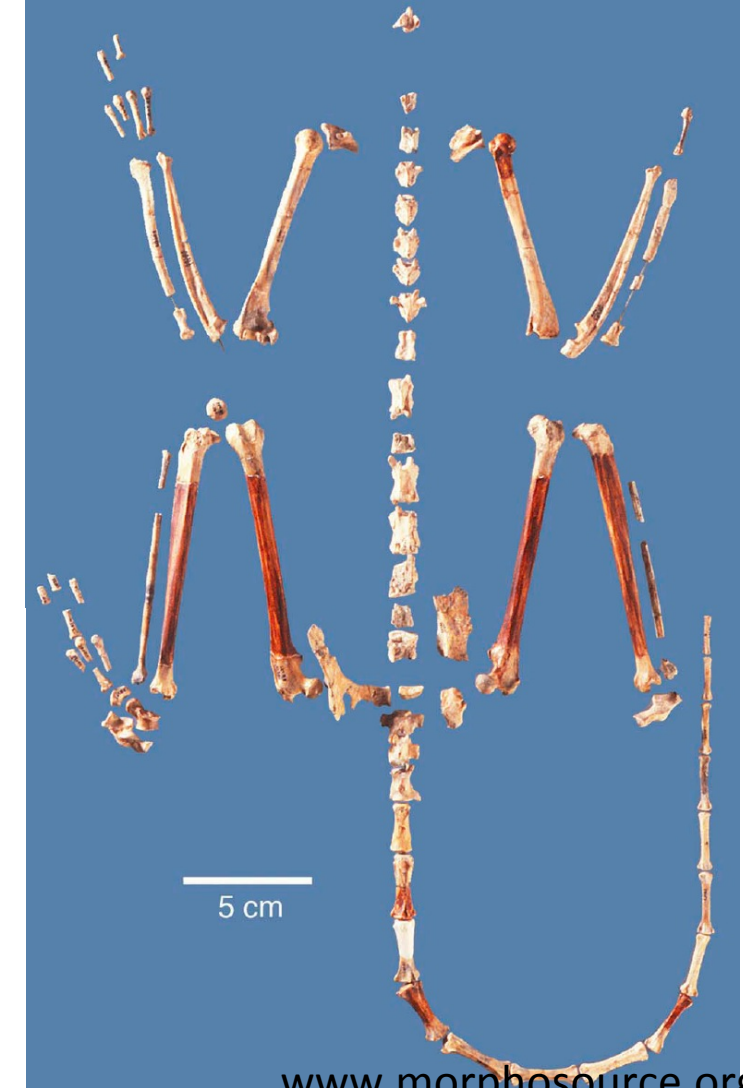
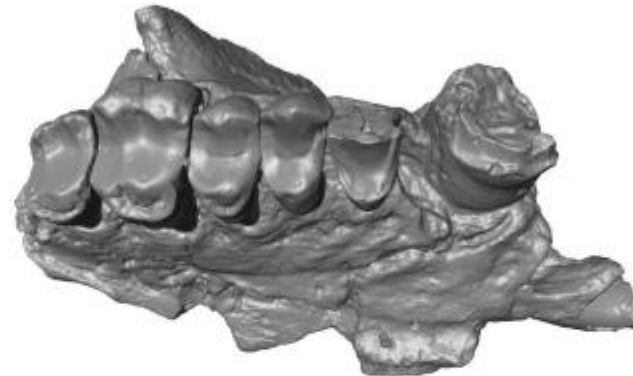
Holotype for

Cebupithecia sarmientoi
(largely complete skeleton)

Published Datasets for download

- 4 type specimens of Miocene Primates from La Venta, Columbia
 - UCMP collection
 - Media includes tiff stacks
 - Mesh files
 - 296 media files

DOWNLOAD MEDIA



Datasets on MorphoSource

Published Datasets for download

- New centipedes from Croatia

Specimen Media



[M1642](#), New centipede source images
unknown image series ZIP file, 1.86
GB

Specimen Information

Specimen: CBSS-CHP517-1, *Eupolybothrus cavernicolus*,
Unvouchered, Female

The Croatian Biospeleological Society (CBSS) is non-governmental, non-profit organization acknowledged, registered and supported by Ministry of Science, Education and Sport that has been working successfully since its foundation in 1996. It is an organization for biospeleology that deals with research and conservation of subterranean fauna and its habitats on the whole territory of the Republic of Croatia with its members being both scientists, experts and cavers.

Locality: country: Croatia; stateProvince: Knin; locality: NP Krka, village Kistanje, Hydroelectric power plant Miljacka, cave Miljacka II; verbatimElevation: 115 m;
44.000306, 16.016250

Institution: Croatian Biospeleological Society (CBSS), Zagreb, Croatia

Bibliography

Pavel Stoev, Ana Komericki, Nesrine Akkari, Shanlin Liu, Xin Zhou, Alexander M. Weigand, Jeroen Hostens, Christopher I. Hunter, Scott C. Edmunds, David Porco, Marzio Zapparoli, Teodor Georgiev, Daniel Mietchen, David Roberts, Sarah Faulwetter, Vincent Smith, Lyubomir Penev. 2013.
Eupolybothrus cavernicolus Komericki & Stoev sp. n. (Chilopoda: Lithobiomorpha: Lithobiidae): the first eukaryotic species description combining transcriptomic, DNA barcoding and micro-CT imaging data. *Biodiversity Data Journal*. Vol. 1. Pensoft Publishers.

Datasets on MorphoSource

How to get datasets

- Enter DOI's into browser or search by specimen, taxon, institution, publication **project**
- Login/Create an account (anyone)
- Click “download”

Media results

Jump to page: GO

45 results

« Previous page 4/6 Next »

OPTIONS »



M502
[AMNH-M-109366](#),
[Tarsius spectrum](#)
DICOM medical
imaging data image
series ZIP file
283.48 KB



M503
[AMNH-M-196485](#),
[Tarsius spectrum](#)
3D Mesh (Polygon File
Format)
18.93 MB



M504
[AMNH-M-196485](#),
[Tarsius spectrum](#)
3D Mesh (Polygon File
Format)
8.03 MB



M505
[AMNH-M-196485](#),
[Tarsius spectrum](#)
3D Mesh (Polygon File
Format)
8.31 MB

Specimen results

12 results

[AMNH-M-203297](#), [Tarsius syriacta carbonarius](#)
[AMNH-M-187935](#), [Tarsius syriacta syriacta](#)
[AMNH-M-109367](#), [Tarsius spectrum](#)
[AMNH-M-109369](#), [Tarsius spectrum](#)
[AMNH-M-203296](#), [Tarsius syriacta carbonarius](#)
[AMNH-M-106649](#), [Tarsius bancanus](#)
[AMNH-M-106754](#), [Tarsius borneanus](#)
[AMNH-M-109368](#), [Tarsius spectrum](#)
[AMNH-M-109366](#), [Tarsius spectrum](#)
[AMNH-M-196485](#), [Tarsius spectrum](#)
[AMNH-M-196480](#), [Tarsius spectrum](#)
[AMNH-M-166856](#), [Tarsius syriacta carbonarius](#)

Datasets on MorphoSource

How to get datasets

- Enter DOI's into browser or search by specimen, taxon, institution, publication, **project**
- Login/Create an account (anyone)
- Click “download”

Specimen Information

EDIT

Specimen: AMNH-106649, *Tarsius bancanus*, Vouchered, Female

Relative Age: recent, **Absolute Age:** recent
Body Mass: 123*

Institution: American Museum of Natural History, New York, NY, USA


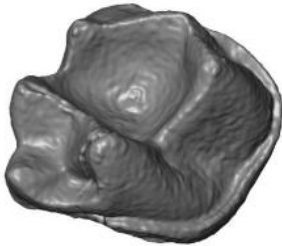


Bibliography

Doug M. Boyer. 2008. Relief index of second mandibular molars is a correlate of diet among prosimian primates and other euarchontan mammals. *Journal of Human Evolution*. Vol. 55.

Jonathan M. Bunn, Doug M. Boyer, Jukka Jernvall, Yaron Lipman, Ingrid Daubechies. 2011. Dirichlet normal surface energy of tooth crowns, a new technique of molar shape quantification for dietary inference, compared with previous methods in isolation and in combination. *American Journal of Physical Anthropology*. Vol. 145.

Julia Winchester, Doug M. Boyer, Elizabeth St. Clair, Ashley Gosselin-Ildari, Siobhan Cooke, Justin Ledogar. 2013. Dental topography of platyrrhines and prosimians: convergence and contrasts. *American Journal of Physical Anthropology*. Vol. 153(1).

Specimen Media



[M2243](#), Raw surface file (Left) (Calcaneus)
3D Mesh (Polygon File Format), 46.18 MB

[M2244](#), Smooth surface file (Left) (Calcaneus)
3D Mesh (Polygon File Format), 21.3 MB

[M489](#), Cropped Surface/Smooth (second mandibular molar)
3D Mesh (Polygon File Format), 9.24 MB

[M490](#), Zipped microCT image stack (second mandibular molar)
TIFF image series ZIP file, 663.61 KB

Datasets on MorphoSource

How to get datasets

- Enter DOI's into browser or search by specimen, taxon, institution, publication, **project**
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Specimen Information

Specimen: [AMNH-M-106754](#), [Tarsius borneanus](#)

Specimen taxonomy: *Tarsius borneanus*

Institution: American Museum of Natural History, New York, NY, USA

Scan Information

Type: 3D Mesh (Polygon File Format)

Filesize: 10.21 MB

Notes: Smooth crop.

Grant support: American Society of Mammalogists Grant Evolving Earth Foundation NSF DDIG BCS-0622544

Is this media copyrighted?: Yes

Copyright Holder: Doug Boyer

Facility: Stony Brook Univ. Center for Biotechnology

X res: 0.01 mm

Y res: 0.01 mm

Z res: 0.01 mm

Frame averaging: 1

Wedge: air

Scanner calibrations: No calibrations are listed

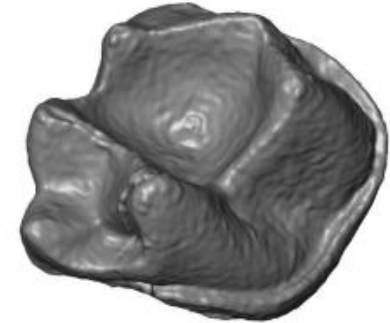
Technicians: Doug Boyer

Media created on: June 28 2013 at 16:02:36

Media last modified on: February 18 2014 at 10:39:53


Bibliography

Doug M. Boyer. 2008. Relief index of second mandibular molars is a correlate of diet among prosimian primates and other euarchontan mammals. *Journal of Human Evolution*. Vol. 55. pp. 1118-1137.



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foot of Daubentonia madagascariensis scanned at 38micron resolution at Duke Evolutionary Anthropology department's new high resolution microCt facility. [Click here if you are interested in details on the facility](#)

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PROJECT

Projects

K12 - Base-Ten Conversions

Sets of scans of fossilized mammalian teeth from the FLMNH to help students understand multiplying and dividing by tens, the amount of difference that place values represent, scientific notation, and other concepts related to the base-ten system.

Members: Richard Hulbert, Suzanne Strait, Natasha Vitek

Data: 2 published media, 3 specimens

PROJECT INFO

K12 - Horse Evolution

These set of fossil horse teeth have been selected by Florida Museum scientists to help K12 students understand concepts related to horse evolution and climate change. In collaboration with science teachers, we have created a unit (3 lessons) that c... [More >](#)

Members: Douglas Boyer, CLAUDIA GRANT, Sean Moran

Data: 15 published media, 15 specimens

PROJECT INFO

K12 - Titanoboa

Members: Douglas Boyer, CLAUDIA GRANT, Sean Moran

Data: 6 published media, 6 specimens

Specifically for educators

Project: K-12 Megalodon

[BACK](#)

Members

Douglas Boyer, CLAUDIA GRANT, Sean Moran

Data

22 published media
24 specimens

More Information

<http://www.paleoteach.org/specimens/megalodon/>

About the project

This page is dedicated to the learning of EVOLUTION and EXTINCTION of the giant shark *Carcharocles megalodon*. Here, you will find all the information you need in order to access the specimen in a scientific database, download and print the files, science lessons, math lessons, and rubrics. Our hope is that your students learn about what scientists do by mimicking their scientific process. Ultimately, your students will be able to reconstruct a megalodon jaw and calculate the size of the animal. The availability of his jaw is made possible by Dr. Gordon Hubbell, who has donated the specimen to the Florida Museum of Natural History for K12 purposes.
<http://www.paleoteach.org/specimens/megalodon/>

22 Project Specimens

Order by: [Specimen number](#) | [Taxonomic name](#)



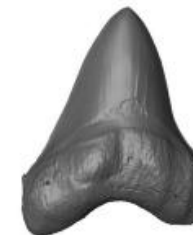
[UF-311000 LL 01](#)



[UF-311000 LL 03](#)



[UF-311000 LL 04](#)



[UF-311000 LL 05](#)

Are there other sites?

Project: K-12 Megalodon

[BACK](#)

Members

Douglas Boyer, CLAUDIA GRANT, Sean Moran

Data

22 published media
24 specimens

More Information

<http://www.paleoteach.org/specimens/megalodon/>

About the project

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22 Project Specimens

Order by: [Specimen number](#) | [Taxonomic name](#)



[UF-311000 LL 01](#)



[UF-311000 LL 03](#)



[UF-311000 LL 04](#)



[UF-311000 LL 05](#)

Yes

Project: K-12 Megalodon

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Members

Douglas Boyer, CLAUDIA GRANT, Sean Moran

Data

22 published media
24 specimens

More Information

<http://www.paleoteach.org/specimens/megalodon/>

About the project

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<http://www.paleoteach.org/specimens/megalodon/>

22 Project Specimens

Order by: [Specimen number](#) | [Taxonomic name](#)



[UF-311000 LL 01](#)



[UF-311000 LL 03](#)



[UF-311000 LL 04](#)

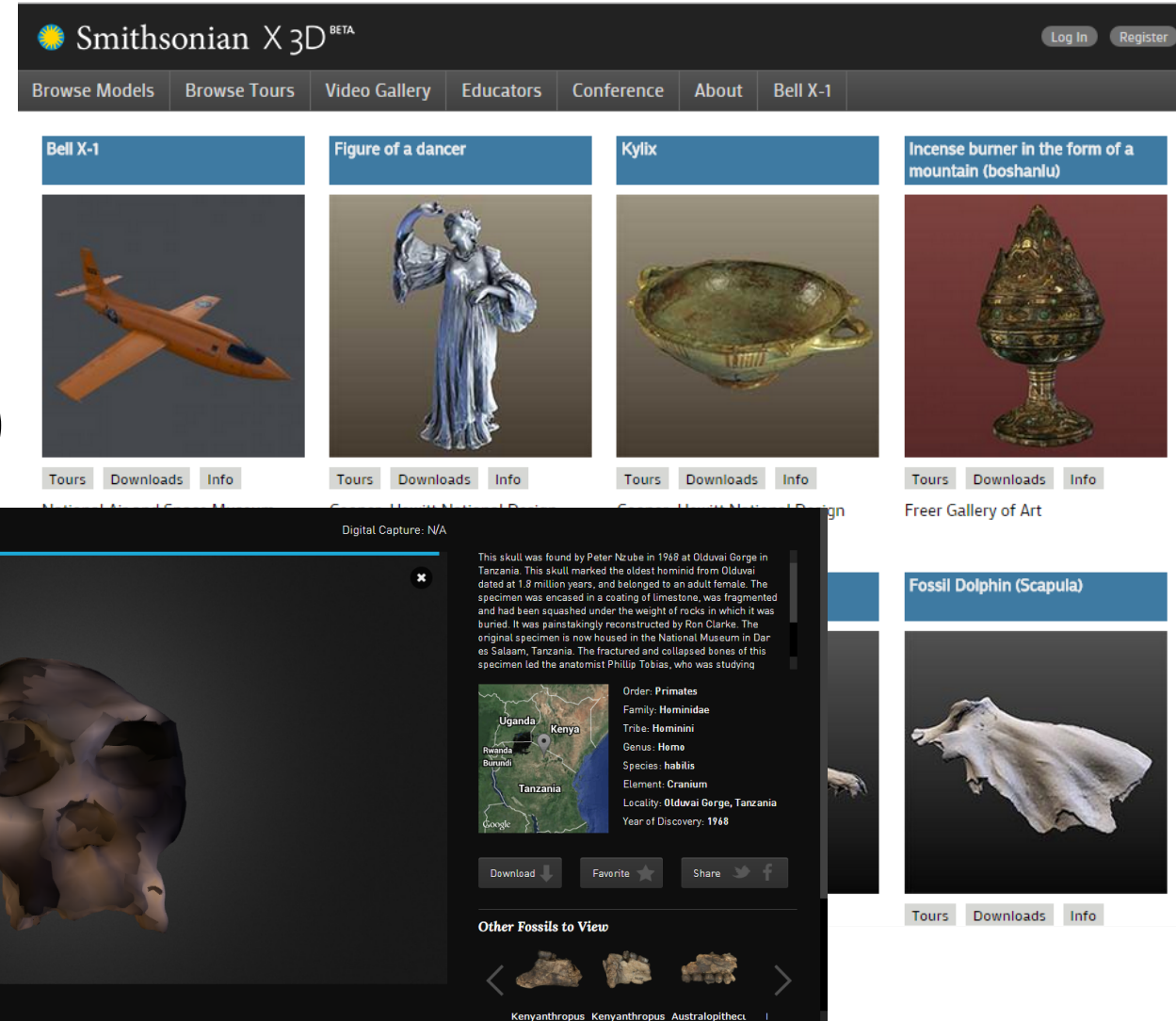


[UF-311000 LL 05](#)

Yes

Many sites now provide collections with associated resources

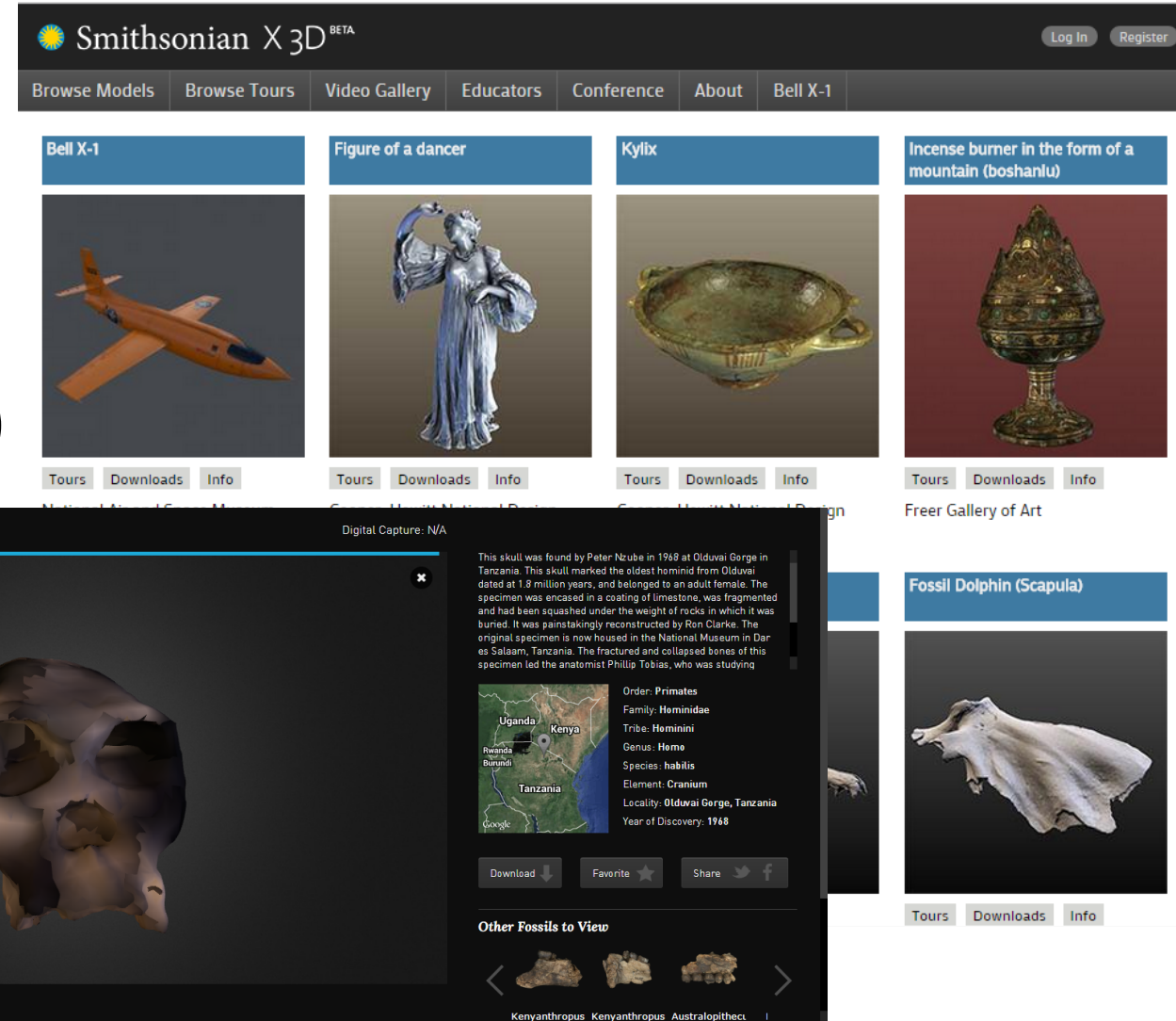
- Smithsonian (<http://3d.si.edu/>)
- TBI (<http://africanfossils.org/>)
- Digimorph (<http://www.digimorph.org/>)
- Check them out regularly they are excellent resources!



Why are we using MorphoSource?

Many sites now provide collections with associated resources

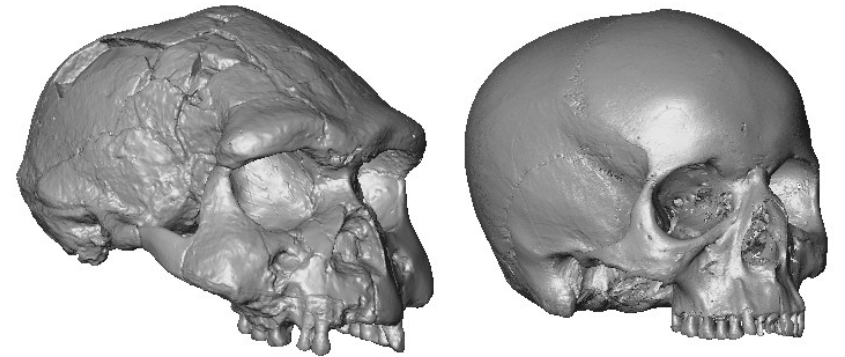
- Smithsonian (<http://3d.si.edu/>)
- TBI (<http://africanfossils.org/>)
- Digimorph (<http://www.digimorph.org/>)
- Check them out regularly they are excellent resources!



Why are we using MorphoSource?

Only site that

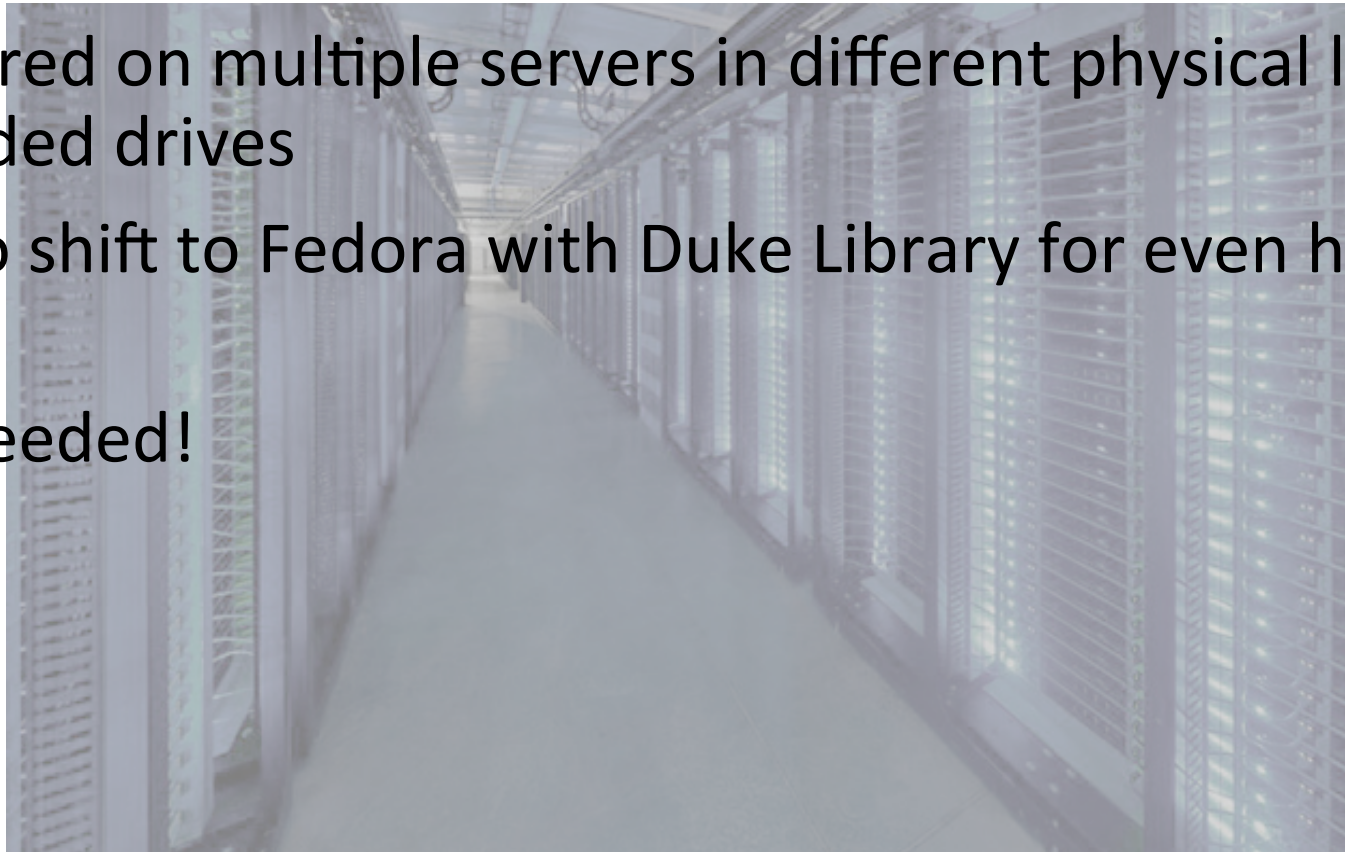
- Designed to allow new academic and educational contributors on a moments notice.
- Can be used to reorganize materials contributed by others into new lesson plans.
- Provides research-quality specimens for broad scale consumption at the click of a 'download' button
- No taxonomic or temporal limits to scope



MorphoSource behind the Scenes

Supported by Duke University Information Technology and Library

- Currently planned for 10-20 Terabytes of growth/year
- Data mirrored on multiple servers in different physical locations on RAID encoded drives
- Planning to shift to Fedora with Duke Library for even higher security
- Partners needed!



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Specimen taxonomy: *Otolemur crassicaudatus*

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Media: M2376

Specimen Information

Specimen: [CGM-40237, *Aegyptopithecus zeuxis*](#)

Specimen taxonomy: *Aegyptopithecus zeuxis*

Institution: Cairo Geological Museum, Cairo, Egypt

Scan Information

Type: Image (TIFF)

Filesize: 1.1 GB

Grant support: Pennsylvania State University

Media citation instructions: Alan Walker provided access to these data originally appearing in Simons et al. 2007, the collection of which was funded by Pennsylvania State University. The files were downloaded from www.MorphoSource.org, Duke University.

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Facility: Center for Quantitative Imaging

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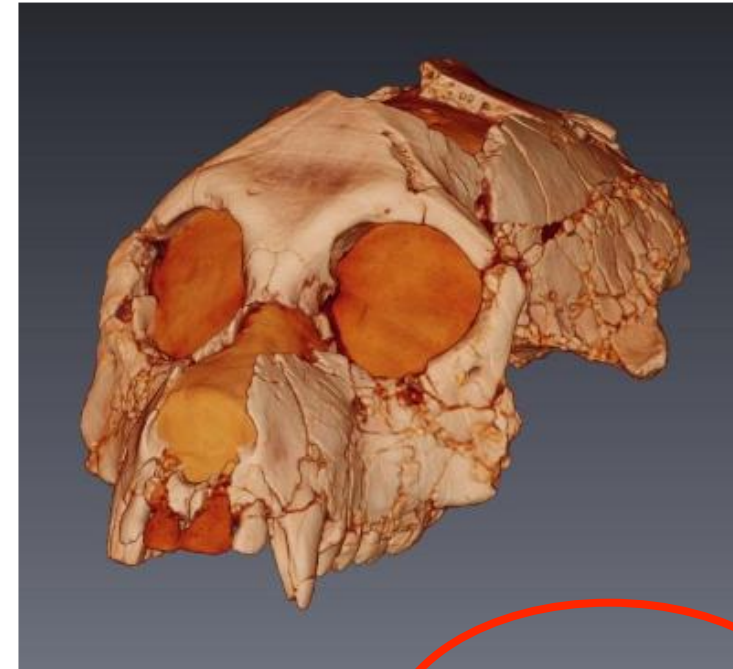
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Technicians: Timothy Ryan



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Specimen taxonomy: [Notharctus sp.](#)

Institution: [American Museum of Natural History](#), New York, NY, USA

Type: 3D Mesh (Polygon File Format)

Filesize: 21.3 MB

Notes: smooth crop.

Grant support: [NSF BCS 1317525](#) to DMB and ERS

Media citation instructions: [Doug Boyer](#) provided access to these data originally appearing in [Boyer et al. \(2013\)](#), the collection of which was funded by [NSF BCS 1317525](#). The files were downloaded from [www.MorphoSource.org](#), [Duke University](#).

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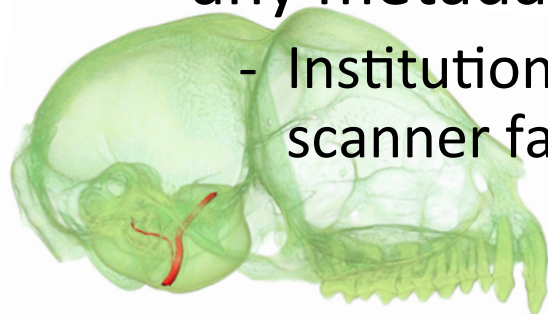
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- Leverages help from the entire community instead of placing the burden on individual institutions
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Demonstrating value of collections

Demonstrating Data Impact

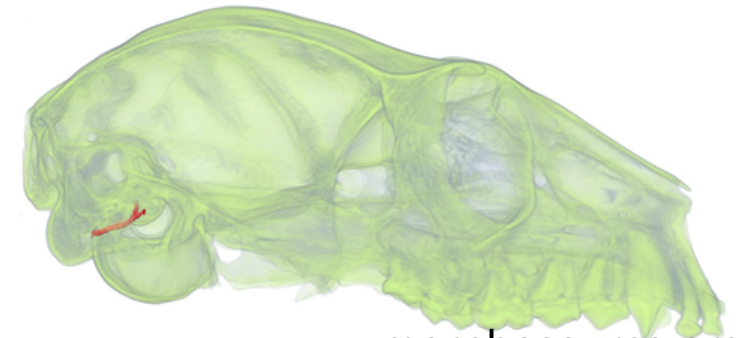
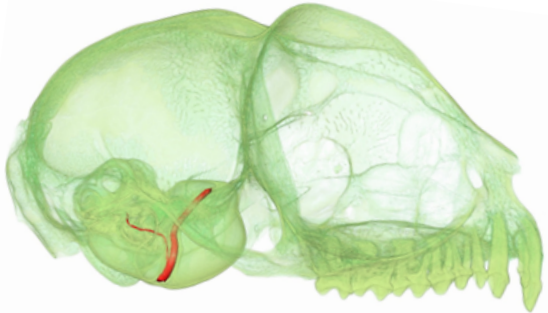
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Summary & Conclusions

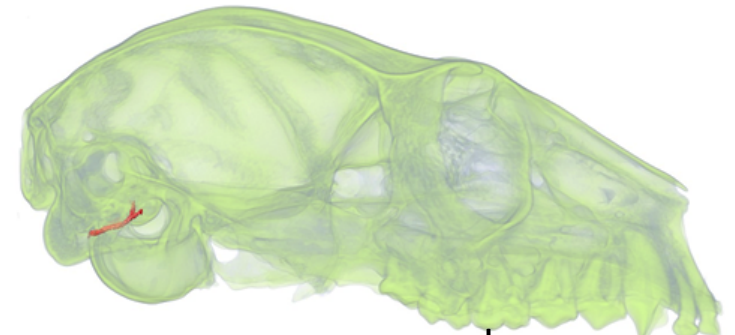
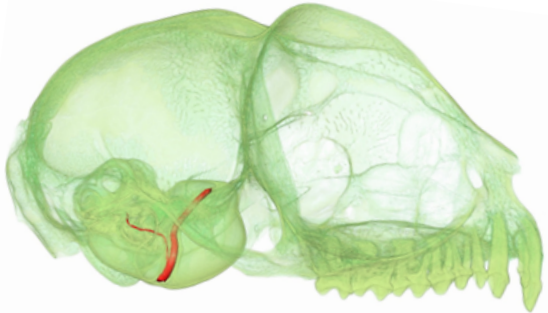
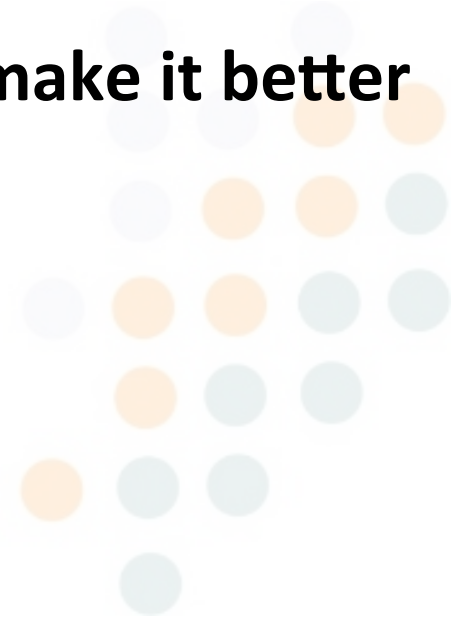
3D digital avatars of natural history collections can be rapidly accumulated and accessed by **anyone**

This is a potentially transformative tool for researchers and educators



We need your help!

- MorphoSource is a work-in-progress **we want to make it better**
- We need feedback from
 - Researchers
 - Curators
 - Teachers
 - Students
- Thanks for your help!





Acknowledgments



For invitation to speak and support to attend

- Claudia Grant & Bruce MacFadden

For support & funding of MorphoSource Development

- Duke University Trinity College of Arts & Sciences (major funder so far)
- NSF (BCS 1317525, BCS-1304045)
- Duke Shared Materials Instrumentation Facility
- Duke Biology IT Center

For discussion leading to development of concepts

- Jukka Jernvall, Alistair Evans, & Gudrun Evans

For work loading specimen media

- Workstudy students: Mercedes Zapata-Garcia, Shane Daly, Sunghoon Liu, Ksenia Sokolova, Anne Driscoll, Kevin Vo, Annie Lott.
- Dr. Lynn Copes & Dr. Kari Allen