

## Brandon P. Hedrick

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Department of Biology

University of Massachusetts-Amherst

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### **CURRENT RESEARCH EXPERIENCE**

Postdoctoral Fellow, Laboratory of Dr. Elizabeth Dumont, 2015–Present

Biology Department, University of Massachusetts- Amherst, Amherst, MA

### **EDUCATION**

- University of Pennsylvania, Philadelphia, PA, 2010-2015  
Ph.D. in Earth and Environmental Sciences (Advisor: Peter Dodson):  
Emory University, Atlanta, GA, 2005- 2010  
B.S. in Biology  
B.S. in Environmental Studies

### **RESEARCH EXPERIENCE**

*Doctoral Research:* Department of Earth and Environmental Science, University of Pennsylvania, Fall 2010-2015, (research advisor: Dr. Peter Dodson)

- Applied 3D geometric morphometrics to dinosaur paleontology for the first time to analyze the distribution of skull shapes in *Psittacosaurus* with reference to diagenetic distortion and taxonomy of *Psittacosaurus* species
- Fully described an assemblage of 24 juvenile *Psittacosaurus* with one larger specimen including osteology, mineralogy, and taphonomy. Analyzed long bone trends in a large number of *Psittacosaurus* to test previous hypotheses about stance transitions in *Psittacosaurus* through ontogeny
- Examined fluctuating asymmetry using 2D geometric morphometrics on the appendicular skeleton of a number of bird species and *Psittacosaurus* to quantify the impacts of diagenetic distortion
- Used bone histology on a group of juvenile *Psittacosaurus* specimens and on a larger pathologic *Psittacosaurus* to understand very early ontogeny of bone morphogenesis and also bone growth after injuries in dinosaurs
- Collected a large dataset of Mesozoic theropod appendicular measurements to test hypotheses about transitions in long bone ratios from basal theropods to early birds
- Used bone histology on the sauropod dinosaur *Suuwassea* to examine ontogeny, sauropod histologic structure, and the validity of the genus

### **RESEARCH INTERESTS**

- Test hypotheses on how internal (cross-sectional geometry) and external (holistic shape analyses) limb structure relate to locomotor mode in mammals and bats
- Evaluate evolutionary rates of limb structural changes in relation to adaptive radiations

- Test hypotheses of integration, fluctuating asymmetry, and evolutionary rates in phyllostomid (Chiroptera) skulls in relation to diet
- Examine dinosaur ontogeny through bone histology

## **TEACHING EXPERIENCE**

### *Instructor:*

BIOL793G (UMass–Amherst): Introduction to Geometric Morphometrics (2016)

GEOL615 (UPenn): Evolutionary History of the Mammalia (2015)

GEOL615 (UPenn): Special Topics in Paleontology: Morphometrics (2014)  
 -Created, organized, and taught a course on the principles of geometric morphometrics and the application of morphometric theory to real data

*Teaching Assistant:* Environmental Studies, Emory University, (2009-2010)  
 ENVS 141: Introduction to Geology with lab (2010)  
 ENVS 190: Introduction to Dinosaurs (2009)

*Teaching Assistant:* Earth and Environmental Science, University of Pennsylvania (2012-2014).  
 GEOL 125: Earth and Life through Time (2012, 2013)  
 GEOL 103: Natural Disturbances and Human Disasters (2013)  
 GEOL 205: Paleontology (2014)

*Guest Lectures:* Earth and Environmental Science, University of Pennsylvania (2012-2014).  
 GEOL 125 Earth and Life through Time: 2012 (2), 2013 (2)  
 GEOL 477 Introduction to Vertebrate Paleontology: 2011 (2)  
 GEOL 406 Advanced Paleontology: 2012 (1)  
 GEOL 478 Evolution of the Dinosaurs: 2012 (2), 2014 (2)

### *Informal Teaching:*

Lead weekly journal club (2010 - present)

## **WORKSHOPS ATTENDED**

- Geometric Morphometrics, University of California, Berkeley, Berkeley, USA, 2014
- Micro CT Training, University of Pennsylvania, PA, USA, 2014
- Paleohistology Short Course, University of Bonn, Bonn, Germany, 2012
- 3D Geometric Morphometrics, Transmitting Science, Barcelona, Spain, 2012

## **PUBLICATIONS**

1. Rivera-Sylva, H. E., **Hedrick, B. P.**, Dodson, P. in press. A new centrosaurine (Dinosauria: Ceratopsia) from the Aguja Formation (Late Campanian) of northern Coahuila, Mexico. PLoS One.
2. **Hedrick, B.P.**, Gao, C. Tumarkin-Deratzian, A. R., Shen, C., Holloway, J., Zhang, F., Kankenson, K. D., Liu, S., and Dodson, P. In press. A pathologic Psittacosaurus (Dinosauria: Ceratopsia) from the Yixian Formation (Liaoning, China): Implications for Psittacosaurus biology. The Anatomical Record.
3. Foth, C., **Hedrick, B. P.**, and Ezcurra, M. D. in press. Cranial ontogenetic variation in early saurischians and the role of heterochrony in the diversification of predatory dinosaurs.
4. Zhao, B., **Hedrick, B. P.\***, Gao, C., Tumarkin-Deratzian, A. R., Zhang, F., Shen, C., and Dodson, P. 2016. Histologic examination of an assemblage of *Psittacosaurus* (Dinosauria: Ceratopsia) juveniles from the Yixian Formation (Liaoning, China). The Anatomical Record.
5. **Hedrick, B. P.**, Manning, P. L., Lynch, E. R., Cordero, S. A., and Dodson, P. 2015. The geometry of taking flight: limb morphometrics in Mesozoic theropods. Journal of Morphology. 276:152–166.
6. **Hedrick, B. P.**, Zanno, L. E., Wolfe, D. G., and Dodson, P. 2015. The slothful claw: Osteology and taphonomy of *Nothronychus mckinleyi* and *graffami* (Dinosauria: Theropoda) and anatomical considerations for derived therizinosaurs. PLoS ONE 10(6): e0129449.
7. **Hedrick, B. P.**, Tumarkin-Deratzian, A., and Dodson, P. 2014. Bone microstructure and relative age of the holotype specimen of the diplodocoid sauropod dinosaur *Suuwassea emilieae*. Acta Palaeontologica Polonica 59 (2): 295–304.
8. **Hedrick, B. P.**, Gao, C., Omar, G. I., Zhang, F., Shen, C., and Dodson, P. 2014. The osteology and taphonomy of a *Psittacosaurus* bonebed assemblage. Cretaceous Research 51: 321–340.
9. **Hedrick, B. P.** and Dodson, P. 2013. Lujiatun psittacosaurids: understanding individual and taphonomic variation using 3D geometric morphometrics. PLoS ONE. 8(8) e69265.

## **ABSTRACTS**

1. **Hedrick, B. P.**, Mitchell, P., Cordero, S. A., Kassutto, M., Monge, J., and Dumont, E. 2015. Disparity in the cross-sectional geometry of limb bones in birds and bats. SICB [abstract]
2. **Hedrick, B. P.**, Mitchell, P., Cordero, S. A., Kassutto, M., Monge, J., and Dumont, E. 2015. Disparity in the cross-sectional geometry of limb bones in birds and bats. NASBR [abstract]
3. **Hedrick, B. P.**, Lynch, E. R., and Dodson, P. 2015. Quantifying the Impact of Diagenetic Deformation of Dinosaur Fossils on Geometric Morphometrics Studies. Journal of Vertebrate Paleontology [abstract]
4. Laing, A., **Hedrick, B. P.**, and Dodson, P. 2015. New Quantitative Methods for Discriminating Posture of Vertebrates Based on Long Bones. Journal of Vertebrate Paleontology [abstract]
5. **Hedrick, B. P.**, Lynch, E. R., Manning, P. L., and Dodson, P. 2014. A geometric

- morphometric approach to quantifying the interaction between biologic and taphonomic influences on fossil shape variation using *Psittacosaurus*. Journal of Vertebrate Paleontology. [abstract]
6. Cordero, S. A., **Hedrick, B. P.**, and Dodson, P. 2014. A geometric morphometric analysis of archosaur claw shape and its implications for keratinous sheath morphology in extinct taxa. Journal of Vertebrate Paleontology. Abstracts Volume.
  7. **Hedrick, B. P.**, Laing, A., Cordero, S., Omar, G., Wolfe, D. Dodson, P. and McDonald, A. 2014. The stratigraphy and sedimentology of new vertebrate localities in the Menefee Formation of New Mexico. GSA Abstracts with Programs 46 (2). [abstract]
  8. McDonald, A. T., Wolfe, D. G., **Hedrick, B. P.**, Cordero, S. A., Laing, A. 2014. New discoveries of dinosaurs and other vertebrates from the Upper Cretaceous (Campanian) Menefee Formation of New Mexico. [abstract]
  9. **Hedrick, B. P.** and Dodson, P. 2013 Lujiatun psittacosaurids: understanding individual and taphonomic variation using 3D geometric morphometrics [abstract]
  10. **Hedrick, B. P.** and Dodson, P. 2012 Myological reconstruction of the basal ceratopsians, *Psittacosaurus* and *Protoceratops*: understanding muscle relocation relevant to gait transition. [abstract]
  11. **Hedrick, B. P.**, Manning, P., and Dodson, P. 2011 Deciphering the dinosaur body plan: using morphometrics to infer functional morphology. [abstract]
  12. **Hedrick, B. P.**, Manning, P., McDonald, A., Morschhauser, E., Dodson, P., Margetts, L., Stevens, K., and Sellers, W. 2011 *Shantungosaurus giganteus*: the implication of body size on bipedality. [abstract]
  13. Rivera-Sylva, H., **Hedrick, B. P.**, Guzman-Gutierrez, R., Gonzalez, A., and Dodson, P. 2011 A new vertebrate locality from Northwestern Coahuila, Mexico. [abstract]

### **AWARDS and GRANTS**

University of Pennsylvania Outstanding Teaching Assistant Award 2014

Benjamin Franklin Fellowship (2010-2015) \$22,000/ yr

University of Pennsylvania Paleontology Fund (2010) \$3,100

University of Pennsylvania Paleontology Fund (2011) \$4,500

The Greg and Susan Walker Endowment (2011) \$530

University of Pennsylvania Research Foundation (2012) \$35950

Paleontological Association: Sylvester Bradley Grant (2012) £1,100

University of Pennsylvania Paleontology Fund (2012) \$1,300

Western Interior Paleontological Society Karl Hirsch Memorial Grant (2012) \$1000

The Greg and Susan Walker Endowment (2013) \$1170

University of Pennsylvania Paleontology Fund (2013) \$3300

University of Pennsylvania Paleontology Fund (2014) \$3500

Jurassic Foundation (2015) \$2069

University of Pennsylvania Paleontology Fund (2015) \$2800

### **FIELDWORK**

Belize (Spring 2016)  
New Mexico, Menefee Formation (Summer 2011, 2012, 2013)  
Gansu, China (Summer 2011, 2013)  
Coahuila, Mexico (Spring 2011)  
South Dakota, Hell Creek Formation (Summer 2011)  
Shandong, China (Winter 2010)  
Kenya (Summer 2009)  
Wyoming, Morrison Formation (Summer 2009)  
San Salvador, Bahamas (Fall 2007)