HOLGER PETERMANN

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RESEARCH INTERESTS

I focus on vertebrate life-history reconstruction, and organism-environment interaction to understand vertebrate paleobiology and paleoecology, paleoecosystem reconstruction, and to predict reactions of tetrapods to environmental perturbation at different timescales and to climate change. I pull evidence from extant and extinct faunas and floras with a strong emphasis on the Cenozoic. Methods of my choice include CT-scanning and 3d reconstruction, skeletochronology and other histological methods, Raman spectroscopy, ancestral state reconstruction and other phylogenetic analytical approaches.

POSITIONS HELD

2020-present — **Denver Museum of Nature and Science**, *Denver, CO*
Postdoctoral Fellow – Colorado Springs Project
Supervisors: Dr. Ian Miller and Dr. Tyler Lyson
Research: Ecosystem recovery after the K/Pg extinction event

2019-2020 — **Denver Museum of Nature and Science**, *Denver, CO*
Research Associate
Supervisor: Dr. Tyler Lyson
Research: CT-reconstruction and re-evaluation of the cranium of the stem-turtle *Eunotosaurus africanus*

EDUCATION

2012–2018 — **Yale University**, *New Haven, CT*
Ph.D. Geology & Geophysics
Adviser: Prof. Jacques Gauthier (Vertebrate Paleontology)
Thesis: "Life-history studies on squamates from the Mojave and Colorado deserts of California as a test for paleoecological application of skeletochronology"

2009–2012 — **University of Bonn**, *Bonn, Germany*
M.Sc. Organismic, Evolutionary, and Paleobiology
Adviser: Prof. Martin Sander
Thesis: "Histological evidence for muscle insertion in extant amniote femora: Implications for muscle reconstruction in fossils"

2005–2009 **Technical University Bergakademie Freiberg (TUBAF)**, *Freiberg, Germany*
B.Sc. Geology and Mineralogy
Advisers: Prof. Jörg Schneider, Dr. Sebastian Voigt
Thesis: „Zur litho- und biofaziellen Charakteristik der deltaisch – lakustrinen Sequenz im Top der Madygen-Formation (M- bis O-Trias, SW-Kirgisien, Zentralasien)“ (in German; „On the litho- and biofacial characteristics of the deltaic – lacustrine sequence at the top of the Madygen formation (M- to U-Triassic, SW Kyrgyzstan, Central Asia)”)

PUBLICATIONS

9. Lyson, T. R., **Petermann, H.**, and I. M. Miller. In review. A new plastomenid trionychid turtle, *Plastomenus joycei*, sp. nov., from the earliest Paleocene (Danian) Denver Formation of south-central Colorado. *Journal of Vertebrate Paleontology*.
8. Fabbri, M., Navalon, G., Mongiardino-Koch, N., Hanson, M., **Petermann, H.**, and B.-A. Bhullar. In review. A fundamental ontogenetic transformation produced the unique sauropod skull. *Proceedings B.*
7. McCoy, V.E., Wiemann, J., Lamsdell, J., Whalen, C., Lidgard, S., Mayer, P., **Petermann, H.**, and D.E.G. Briggs. 2020. Chemical signatures of soft tissues distinguish between vertebrates and invertebrates from the Carboniferous Mazon Creek Lagerstätte of Illinois. *Geobiology*.
6. **Petermann, H.**, and J. A. Gauthier. 2020. Skeletochronology reconciles differences in growth strategies and longevity in the Common Chuckwalla (*Sauromalus ater*) with implications for squamate life-history studies. *Copeia* 108:72-82, 11.
5. **Petermann, H.**, and J.A. Gauthier. 2018. Fingerprinting fossil snakes: paleontological and paleoecological implications of zygantral growth rings in Serpentes. *PeerJ*
4. Amenta, E., King, H.E., **Petermann, H.**, Vuk, U., Tommasini, S.M., and C.M. Macica. 2018. Vibrational spectroscopic analysis of hydroxyapatite in HYP mice and individuals with X-linked hypophosphatemia. *Therapeutic Advances in Chronic Disease* 9, 268-281
3. **Petermann, H.**, Mongiardino Koch, N., and J.A. Gauthier. 2017. Osteohistology and sequence of suture fusion reveal complex environmentally influenced growth in the teiid lizard *Aspidoscelis tigris* — Implications for fossil squamates. *Palaeogeography, Palaeoclimatology, Palaeoecology* 475, 12-22.
2. McCoy, V.E., Saupe, E.E., Lamsdell, J.C., Tarhan, L.G., McMahon, S., Lidgard, S., Mayer, P., Whalen, C.D., Soriano, C., Finney, L., Vogt, S., Clark, E.G., Anderson, R.P., **Petermann, H.**, Locatelli, E.R., and D.E.G Briggs. 2016. The ‘Tully monster’ is a vertebrate. *Nature* 532, 496-499.

1. **Petermann, H.**, and P.M. Sander. 2013. Histological evidence for muscle insertion in extant amniote femora: Implications for muscle reconstruction in fossils. *Journal of Anatomy*, 222:419-436.

SELECT CONFERENCE ABSTRACTS

Oral presentations:

8. **Petermann, H.**, Fabbri, M., Hanson, M., and B.-A.S. Bhullar. A reappraisal of the basal sauropodomorph *Anchisaurus polyzelus* and its implications for heterochrony in sauropod skull evolution. *Society of Vertebrate Paleontology Annual Meeting*, Albuquerque, NM, USA.
7. **Petermann, H.** 2018. Investigating Squamate Life-History Records using New Approaches in Skeletochronology and their Paleoecological Implications. *Biology of Lizards 2018*, Rodeo, NM, USA.
6. **Petermann, H.**, and M. Fabbri. 2017. Using Osteohistology and Computed Tomography to Reconstruct the Ontogeny of the Basal Sauropodomorph *Anchisaurus polyzelus*. *International Symposium on Paleohistology*, Trenton, NJ, USA.
5. **Petermann, H.**, and J.A. Gauthier. 2016. Growth rings and suture fusions reveal complex organism-environment interaction in lizards: new insights for inferences about size, age, and developmental stage in fossils. *Society of Vertebrate Paleontology Annual Meeting*, Salt Lake City, UT, USA.
4. **Petermann, H.**, and J.A. Gauthier. 2015. A novel non-destructive method for skeletochronology and its paleontological and paleoecological applications. *Society of Vertebrate Paleontology Annual Meeting*, Dallas, TX, USA.
3. **Petermann, H.**, and J.A. Gauthier. 2015. Study of the Teiid Lizard *Aspidoscelis tigris* Reveals Environmentally Controlled Growth in Squamates. *International Symposium on Paleohistology*, Bonn, Germany.
2. **Petermann, H.**, and M. Sander. 2013. Investigating Muscle-Bone Interactions Using Bone Histology. *International Symposium on Biomineralization*. Freiberg, Germany.
1. **Petermann, H.**, and M. Sander. 2013. Using bone histological evidence for muscle reconstruction. *International Symposium on Paleohistology*, Bozeman, MT, USA.

Poster presentations:

6. **Petermann, H.**, Fabbri, M., Ranger, B. and H.C.W. Skinner. 2016. Raman spectroscopy reveals phylogenetic and physiological signals for carbonate content in bone mineral. *Geological Society of America Annual Meeting*, Denver, CO, USA.
5. Macica, C.M., **Petermann, H.,** Skinner, C., and S. Tommasini. 2016. Raman spectroscopy in HYP mouse teeth and bone reveal tooth dentin as a proxy for XLH bone carbonate ion substitution. Journal of Bone Mineral Research 31 (Suppl 1)

4. **Petermann, H.,** Skinner, H.C.W. and J.A. Gauthier. 2014. Using Raman spectroscopy to infer compositional differences between fossil and modern lizard osteoderms. *Geological Society of America Annual Meeting*. Vancouver, Canada
3. **Petermann, H.,** and J.A. Gauthier. 2014. Testing osteological features for identification of sex in modern lizards – implications for fossil groups. *Society of Vertebrate Paleontology Annual Meeting*, Berlin, Germany.
2. **Petermann, H.,** and D.J. Field. 2013. A new CT-based analytical approach for exploring taphonomic biases in terrestrial vertebrate assemblages. *Society of Vertebrate Paleontology Annual Meeting*, Los Angeles, CA, USA.
1. **Petermann, H.** 2012. Implications for muscle reconstruction in fossils from histological evidence for muscle insertion in extant amniote femora. *Society of Vertebrate Paleontology Annual Meeting*, Raleigh, NC, USA.

FELLOWSHIPS, GRANTS, AND AWARDS

2013-2017	Hewett Fellow, Department of Geology and Geophysics, Yale University
2016	Yale Institute for Biospheric Studies (YIBS) Small Grants Program – Doctoral Dissertation Improvement Grant for the proposal: Influence of Changes in Climate on Squamate Growth: Implications for Future Biodiversity Loss
2016	Jurassic Foundation Student Research Grant for the proposal: Using Stable Metal Isotope Geochemistry to Reconstruct Evolution of Feeding Ecology in Dinosaurs
2016	Honorary Lifetime Member of Sächsische Turnerjugend (youth gymnastics organization in Saxony, Germany; awarded for lifelong commitment to advancing youth gymnastics)
2015	Student Travel Grant to attend the 3rd International Symposium on Paleohistology (ISPH) in Bonn, Germany
2014	GSA Geology and Health Division Student Research Grant for the proposal: Bone Mineral Variations Reflect Growth and Environment in Vertebrates
2014	YIBS Small Grants Program – Doctoral Pilot Grant for the proposal: Sexual Dimorphism in Growth Rates of the Teiid Lizard *Aspidoscelis tigris* (BAIRD AND GIRARD, 1852): Implications for Assessment of Growth and Age in Extinct Squamates.
2012	Bateman Prize for incoming graduate students, Department of Geology and Geophysics, Yale University
2011	Ehrennadel des Sächsischen Turnverbands in Silber (service award in silver awarded by the gymnastics association of Saxony, Germany)

INVOLVEMENT IN CONSERVATION

2018-present	Consultant for the Coordinator of the Invasive Alien Species Center of New Caledonia (age-determination of invasive snakes)

COMMUNITY SERVICE AND OUTREACH

2019-present	Denver Museum of Nature and Science instructor to museum staff, high-school students, interns, and volunteers in 3d-segmentation and reconstruction of fossils using Dragonfly, Maya, and other software
2015-2018	Tour guide "Behind the Scenes of the Vertebrate Paleontology Collections" tour for Night at the Museum at Yale Peabody Museum
2013-2018	Volunteer for Meet the Scientist during the DinoDays at the Yale Peabody Museum
2015-2016	Elected representative for the Department of Geology and Geophysics at the Graduate Student Assembly, Yale (graduate student governing body)
2012	Volunteer for the Yale Paleoknowledge Bowl at the Yale Peabody Museum
2004-2012	Licensed judge for artistic gymnastics for the Sächsischer Turnverband (gymnastics organization in Saxony, Germany) and Deutscher Turnerbund (federal gymnastics association), Germany
2001-2012	Gymnastics coach for kids and young adults for SV Pesterwitz (local sports club), licensed since 2003, Germany
2003-2011	Board member Sächsische Turnerjugend (youth gymnastics organization in Saxony, Germany), various functions (event organization, children's gymnastics, education, liaison to other sports branches), Germany
2009-2011	Instructor for the campaign "Kinder stark machen" (anti-drug programme) of the Bundeszentrale für gesundheitliche Aufklärung (Federal Center for Health Education), Germany
2005-2008	Representative of the Sächsische Turnerjugend on the managing board of the Turngau Dresden (district level), Germany

Reviewer:	The Anatomical Record, PLOS One, Zoomorphology

FIELDWORK

2018	Herpetological Collection Expedition to the Chiricahua Mountains, Arizona, organized by the Yale Peabody Museum
2013, 2014, 2018	Excavation in Petrified Forest National Park, Arizona, organized by the Yale Peabody Museum

2010, 2011	Excavation Winterswijk, Netherlands, organized by University of Bonn and Naturalis Leiden
2008	Field expedition and excavation in Madygen, SW-Kyrgyzstan, organized by TUBAF

MENTORING AND TEACHING EXPERIENCE

Interns supervised, Denver Museum of Nature and Science

Spring 2020	Dustin Warford, Colorado Springs Project: 3d-reconstruction of mammal fossils from Corral Bluffs

Students advised, Yale University, Department of Geology & Geophysics

Spring 2016	Brian Ranger, High School Capstone Project titled: "Confronting the Dinosaur Cold-Blooded Concept"

Primary Instructor, Yale University, Department of Geology & Geophysics

Spring 2015	G&G 757: Studies in Global Geoscience. Developed syllabus, selected papers for discussion, and co-taught graduate level course on geologic history of the Alps and Central Europe.

Teaching Fellow, Yale University, Department of Geology & Geophysics

Spring 2018	G&G 275: Renewable Energy. Undergraduate level course on renewable energy including policies, resources, and technologies
Fall 2017	G&G 325/525: Vertebrate Paleontology. Graduate level course. Included designing, preparing, and teaching labs (on tetrapod osteology, phylogenetic systematics, all vertebrate groups), teaching selected lectures (on Sauropodomorpha), and specimen selection for lectures.
Spring 2016	G&G 125: History of Life. Undergraduate level paleontology course. Included teaching sections and labs, specimen selection for labs and lab tests, dissection demonstration, and selection of essay topics.
Fall 2015	G&G 631: Vertebrate Paleontology. Graduate level course
Fall 2014	G&G 631: Vertebrate Paleontology. Graduate level course
Spring 2014	G&G 126L: History of Life – Lab. Undergraduate level paleontology course. Included lab design, setup, and teaching.
Spring 2013 & 2014	G&G 125: History of Life. Undergraduate level paleontology course. Included teaching sections and reviews, and selection of essay topics.
Fall 2013	G&G 100: Natural Disasters. Undergraduate level geology course.

Fall 2012 G&G 120: Earth's Changing Climate. Undergraduate level geology course.

Teaching Assistant, University of Bonn, Steinmann Institute of Geology, Mineralogy, and Paleontology

Spring 2012 Lab TA for international short course on paleohistology attended by 10 students from Europe and North America.

FIELD TRIPS ORGANIZED

2015 Co-leader field trip of the Yale University Department of Geology and Geophysics to Europe, topics: Geology of the Alps, with excursions to the Mesozoic of Germany and Central Italy.

PROFESSIONAL ASSOCIATION AFFILIATIONS

American Society of Ichthyology and Herpetology
Geological Society of America, Paleobiology and Geology and Health divisions
Herpetologists League
Paleontological Society
Paläontologische Gesellschaft (German palaeontological society)
Society of Vertebrate Paleontology