

Dr. ALIDA BAILLEUL

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INSTITUTE OF VERTEBRATE PALEONTOLOGY AND PALEOANTHROPOLOGY
CHINESE ACADEMY OF SCIENCES
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EDUCATION

- 2015** *Ph.D.*, Earth Sciences, **Montana State University**, Bozeman, MT.
Title : Osteohistology of cranial sutural fusion in the skulls of archosaurs: implications for maturity assessment in non-avian dinosaurs and for the evolution of skeletal tissues.
Advisor : Dr. John R. Horner.
- 2010** *M.S.*, Systematics-Evolution-Paleobiodiversity, **Université Paris VI**, Pierre et Marie Curie, Paris, France.
- 2008** *B.S.*, Biology of the Organisms and Ecosystems-Ecology, **Université Paris-Sud XI**, Orsay, France.

ACADEMIC APPOINTMENTS

- 2020-Present** Associate Research Fellow/Associate Professor, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing, China.
- 2018-2020** Postdoctoral Research Fellow, Chinese Academy of Sciences - President's International Fellowship Initiative (CAS-PIFI). Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing, China. Advisors: Dr. Zhou Zhonghe and Dr. Jingmai O'Connor.
- 2018-2015** Postdoctoral Research Associate (funded by the National Science Foundation-IOS), Department of Pathology and Anatomical Sciences, University of Missouri. Advisors: Dr. Casey Holliday and Dr. Kevin Middleton.
- 2015** Postdoctoral Research Associate, Museum of the Rockies & Department of Cell Biology and Neurosciences, Montana State University. Advisors: Dr. Dana Rashid and Dr. John R. Horner.

PUBLICATIONS (Peer-reviewed)

2021

27. **Alida M. Bailleul**. Fossilized cell nuclei are not that rare: Review of the histological evidence in the Phanerozoic. 2021. *Earth-Science Reviews* 216 (2021) 103599.

26. **Alida M. Bailleul**, Zhiheng Li. DNA staining in fossil cells beyond the Quaternary: Reassessment of the evidence and prospects for an improved understanding of DNA preservation in deep time. 2021. *Earth-Science Reviews* 216 (2021) 103600.

25. **Alida M. Bailleul**, Jing Lu, Zhiheng Li. DiceCT applied to Fossilized Hard Tissues: A preliminary case study using a Miocene bird. 2021. *Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*. doi: 10.1002/jez.b.23037

24. Zhiheng Li, **Alida M. Bailleul**, Thomas A. Stidham, Min Wang, Tao Deng. Exceptional preservation of an extinct ostrich from the Late Miocene Linxia basin of China. *In Press. Vertebrata Palasiatica*. doi: 10.19615/j.cnki.1000-3118.210309

23. Qian Wu, Jingmai O'Connor, Zhiheng Li, **Alida M. Bailleul**. Cartilage on the furculae of living birds and the extinct bird *Confuciusornis*: a preliminary analysis and implications for flight style inferences in Mesozoic birds. *In Press. Vertebrata Palasiatica*. doi: 10.19615/j.cnki.1000-3118.201222

22. Qian Wu, **Alida M. Bailleul**, Zhiheng Li, Jingmai K. O'Connor, Zhonghe Zhou. Osteohistology of the scapulocoracoid of *Confuciusornis* and preliminary analysis of the shoulder joint in Aves. 2021. *Frontiers in Earth Science*. doi: 10.3389/feart.2021.617124

21. Shumin Liu, Zhiheng Li, **Alida M. Bailleul**, Min Wang, Jingmai Kathleen O'Connor. Investigating possible gastroliths in a referred specimen of *Bohaiornis guoi* (Aves: Enantiornithes). 2021. *Frontiers in Earth Science* 9 (2021): 62.

2020

20. **Alida M. Bailleul**, O'Connor, J., Li, Z. *et al.* Confirmation of ovarian follicles in an enantiornithine (Aves) from the Jehol biota using soft tissue analyses. *Communications Biology* 3, 399 (2020). <https://doi.org/10.1038/s42003-020-01131-9>.

19. Dana J. Rashid, Roger Bradley, **Alida M. Bailleul**, Kevin Surya, Holly N. Woodward, Ping Wu, Yun-Hsin Wu, Douglas B. Menke, Sergio G. Minchey, Ben Parrott, Samantha L. Bock, Christa Merzdorf, Emma Narotzky, Nathan Burke, John R. Horner, Susan C. Chapman. 2020. Distal spinal nerve development and divergence of avian groups. *Scientific Report*, (2020) 10:6303 | <https://doi.org/10.1038/s41598-020-63264-5>.

18. **Alida M. Bailleul**, Wenxia Zheng, John R. Horner, Brian K. Hall, Casey M. Holliday, Mary H. Schweitzer. Evidence of proteins, chromosomes and chemical markers of DNA in exceptionally preserved dinosaur cartilage. *National Science Review*, **nwz206**, <https://doi.org/10.1093/nsr/nwz206>

2019

17. Min Wang, Jingmai K. O'Connor, **Alida M. Bailleul**, Zhiheng Li. Evolution and distribution of medullary bone: evidence from a new Early Cretaceous enantiornithine bird. *National Science Review*, **nwz214**, <https://doi.org/10.1093/nsr/nwz214>

16. **Alida M. Bailleul**, Zhiheng Li, Jingmai O'Connor, Zhonghe Zhou. 2019. Origin of the avian predeontary and evidence of the unique form of cranial kinesis in Cretaceous ornithuromorphs. *Proceedings of the National Academy of Sciences of the United States of America*. <https://doi.org/10.1073/pnas.1911820116>

15. **Alida M. Bailleul**, Jingmai O'Connor, Mary H. Schweitzer. 2019. Dinosaur Paleohistology: review, trends and new avenues of investigation. *PeerJ* 7:e7764 <https://doi.org/10.7717/peerj.7764>

14. **Alida M. Bailleul**, Jingmai O'Connor, Shukang Zhang, Zhiheng Li, Qiang Wang, Matthew C. Lamanna, Xufeng Zhu, Zhonghe Zhou. 2019. An Early Cretaceous enantiornithine (Aves) preserving an unlaidd egg and probable medullary bone. *Nature Communications* 10: 1275. <https://doi.org/10.1038/s41467-019-09259-x>

2018

13. Jingmai O'Connor, Gregory M. Erickson, Mark Norell, **Alida M. Bailleul**, Han Hu, Zhonghe Zhou. 2018. Medullary bone in an Early Cretaceous enantiornithine (Aves) and

discussion regarding its identification in fossils. *Nature Communications* 9: 5169.
<https://doi.org/10.1038/s41467-018-07621-z>.

12. Dana Rashid, Kevin Surya, Luis Chiappe, Nathan Carroll, Kimball Garrett, Bino Varghese, **Alida Bailleul**, Jingmai O'Connor, Susan Chapman, and John Horner. 2018. Avian tail ontogeny, pygostyle formation, and interpretation of juvenile Mesozoic specimens. *Scientific Reports* 8: 9014.

2017 11. **Alida M. Bailleul**, Casey M. Holliday. 2017. Joint histology in *Alligator mississippiensis* challenges the identification of synovial joints in fossil archosaurs and inferences of cranial kinesis. *Proceedings of the Royal Society Biological Sciences*. DOI: 10.1098/rspb.2017.0038

10. **Alida M. Bailleul**, Lawrence M. Witmer, Casey M. Holliday. 2016. Functional joint histology in the mallard duck (*Anas platyrhynchos*): new insights on avian cranial kinesis. *Journal of Anatomy*. DOI: 10.1111/joa.12562

2016 9. Aaron R. H. LeBlanc, Robert R. Reisz, David C. Evans, **Alida M. Bailleul**. 2016. Ontogeny Reveals Function and Evolution of the Hadrosaurid Dinosaur Dental Battery. *BMC Evolutionary Biology* 16:152

8. **Alida M. Bailleul**, John R. Horner. 2016. Comparative histology of some craniofacial sutures and skull-base synchondroses in non-avian dinosaurs and their extant phylogenetic bracket. *Journal of Anatomy* 229:252-285.

7. **Alida M. Bailleul**, John B. Scannella, John R. Horner, David C. Evans. 2016. Fusion patterns in the skulls of modern archosaurs reveal that sutures are ambiguous maturity indicators for the Dinosauria. *Plos One* 11(2) : e0147687.

6. John R. Horner, Holly N. Woodward, **Alida M. Bailleul**. Mineralized tissues in dinosaurs interpreted as having formed through metaplasia: a preliminary evaluation. 2016. *Comptes Rendus Palevol* 15 (1-2), 183-203.

5. **Alida M. Bailleul**, Catherine Nyssen-Behets, Benoît Lengelé, Brian K. Hall, John R. Horner. 2016. Chondroid bone in dinosaur embryos and nestlings (Ornithischia: Hadrosauridae): insights on the growth of the skull and the evolution of skeletal tissues. *Comptes Rendus Palevol* 15 (1-2), 51-66.

2015 4. **Alida M. Bailleul**. 2015. Osteohistology of sutural fusion in the skulls of archosaurs: implications for maturity assessment in non-avian dinosaurs and for the evolution of skeletal tissues. *PhD Thesis, Montana State University*.

2013 3. **Alida M. Bailleul**, Brian K. Hall, John R. Horner. 2013. Secondary cartilage revealed in a non-avian dinosaur embryo. *PLoS ONE* 8(2), e56937.

2012 2. **Alida M. Bailleul**, Brian K. Hall, John R. Horner. 2012. First evidence of dinosaurian secondary cartilage in the post-hatching skull of *Hypacrosaurus stebingeri* (Ornithischia, Lambeosaurinae). *PLoS ONE* 7, e36112.

2011 1. **Alida Bailleul**, Loïc Ségalen, Angela D. Buscalioni, Oscar Cambra-Moo, Jorge Cubo. 2011. Paleohistology and preservation of tetrapods from Las Hoyas (Lower Cretaceous,

Spain). *Comptes Rendus Palevol* 10 (5-6), 367-380.

AWARDS & FELLOWSHIPS

- 2021** **CAS-PIFI Fellowship for Young Staff 2021** (Chinese Academy of Sciences – President’s International Fellowship Initiative)
- 2020** **Award of Major Scientific Achievement (Top 5) of IVPP for 2020**
Award name in Chinese: 2020年度古脊椎所重大成果如
Project title: Tissues, cells and biomolecules in fossil birds and dinosaurs.
- 2019** **Award of Major Scientific Achievement (Top 5) of IVPP for 2019**
Award name in Chinese: 2019年度古脊椎所重大成果如
- 2019** **Outstanding Achievement of the Center of Excellence in Life and Paleoenvironment of the Chinese Academy of Sciences;** for ‘An Early Cretaceous enantiornithine (Aves) preserving an unlaidd egg and probable medullary bone’.
Award name in Chinese: 中国科学院卓越中心优秀成果
- 2018** **CAS-PIFI Postdoctoral Fellowship 2018-2020.** (Chinese Academy of Sciences – President’s International Fellowship Initiative)
- 2017** **Postdoctoral Fellow Platform/Oral Presentation Award** -2nd place (American Association of Anatomists)
- 2016** **Postdoctoral Fellow Poster Presentation Award** -2nd place (American Association of Anatomists)
- 2014** **Brian K. Hall Award** (Best Oral Presentation - Canadian Society of Zoologists)
- 2014** **Harold T. Stearns Fellowship Award** (Geological Society of America)

EXTERNAL GRANTS

- 2016** **AAA Short-term Visiting Scholarship** - American Association of Anatomists (\$1000)
- 2014** **Evolving Earth Foundation** Research Grant (\$2870)
- 2014** **Geological Society of America** Research Grant (\$2500)
- 2014** **Jurassic Foundation** Research Grant (\$2280)
- 2013** **Sigma-Xi** Grant-in-Aid of Research (\$400)

SELECTED TRAVEL GRANTS

- 2017-2016** American Association of Anatomists Travel Grants
- 2015** Third International Symposium on Paleohistology Travel Grant
- 2014** M.A Fritz Travel Grant for the Advancement of Studies in Paleontology (Royal Ontario Museum)
- 2014** Genomes to Biomes Conference Travel Grant (Canadian Society of Zoologists)
- 2013** College of Letters and Science Student Travel Grant (Montana State University)

CURATION EXPERIENCE

- 2017-2015** Curation of the University of Missouri Vertebrate Collections in the Holliday Lab.
- 2015-2013** Curation of the Histology Collections of the Museum of the Rockies.

TEACHING EXPERIENCE

- 2017** Workshop Attended : Active Learning Strategies (Dr. Cheryl Hill, University of Missouri).
- 2014** Invited Lecture : ‘*Intermediate skeletal tissues between bone and cartilage*’. Montana State University (for the course ‘Comparative Osteology and Histology’).
- 2014** BIOB-170IN. Graduate Teaching Assistant at Montana State University for ‘Principles of Organismal Diversity (Inquiry-based labs)’
- 2013-2012** BIOB-258. Graduate Teaching Assistant at Montana State University for ‘Introduction to Biology and Ecology: Organisms to Populations’

INVITED SEMINAR

- 2018** ‘*Skeletal tissues of living reptiles : a window into the lives of extinct dinosaurs.*’ First Friday Seminar, February 2018, Oklahoma State University, Tulsa, OK.

LABORATORY EXPERIENCE

Paleohistology and extant bone histology (undecalcified ground sections)

- Molding and casting fossil vertebrates (small fossils with sil-putty and larger fossils with fiberglass, plaster and silicone).
- Painting casts to mimic their fossilized aspect and glueing them back into real fossils (i.e., "fossil restoration").
- Histological preparation of undecalcified bones (100-micron thick slides).
- Paleohistological preparation of small and large fossil bones (100-micron thick slides).

Histology (decalcified, paraffin thin sections)

- Extant and fossil bone decalcification, wax/paraffin embedding and microtome sectioning (e.g., 5 microns thin-sections).
- Histological staining (e.g., Masson’s trichrome, Alcian blue).

Developmental Biology

- Cryoembedding/Cryosectioning
- Immunohistochemistry on cryosections

Molecular Paleontology

Initial training in the lab of Mary Schweitzer by Wenxia Zheng

- Demineralization of fossil tissues
- Immunohistochemistry on fossil tissues
- Histochemistry on fossil tissues
- Isolation of fossil cells

Further Development of New Methods (at IVPP)

- diceCT (contrast-enhanced iodine staining for computed tomography) applied to fossil tissues
- Paleohistochemistry: Histochemistry applied to fossil tissues

FIELD EXPERIENCE (PALEONTOLOGY)

- 2017-2016** Paleontological excavation and fossil collection. Hell Creek Fm, Montana, USA, (near Ekalaka).

- 2013** Paleontological expedition and prospection. Khulsangol Fm, Gobi Desert, Mongolia.
- 2010** Paleontological excavation and fossil collection. Field sites of Las Hoyas & Cerro de los Batallones, Spain.
- 2007** Paleontological excavation and fossil collection. Gres des Estous Fm. Esperaza, France.
- 2005, 2006, 2008, 2009, 2011**
Paleontological prospection, excavation and fossil collection. Two Medicine Fm, Judith River Fm and Hell Creek Fm, Montana, USA.

PRESENTATIONS/PUBLISHED ABSTRACTS

Some Selected Oral presentations

Alida M. Bailleul, Jingmai O'Connor, Zhiheng Li, Qian Wu and Zhonghe Zhou. First histological examination of ovarian follicles in a Cretaceous enantiornithine. Presented at *IMERP (International Meeting of Early-Stage Researchers in Palaeontology)*, Cuenca, Spain, June 2019; *5th ISPH (International Symposium on Paleohistology)*, Cape Town, South Africa, August 2019; *VII International Symposium on Dinosaur eggs and babies*; Shiyang City, China; August 2019.

Alida Bailleul, Jingmai O'Connor, Hailu You, Daqing Li, Zhonghe Zhou. A new specimen of enantiornithine from the Lower Cretaceous Xiagou Formation with preservation of an unusual mineralized tissue. *Annual Meeting of the Society of Vertebrate Paleontology*, Albuquerque, New Mexico, October 2018.

Alida Bailleul*, Jingmai O'Connor, Mary Schweitzer, Wenxia Zheng, Zhonghe Zhou. Histochemical staining of biomineralized and soft-tissues in fossil dinosaurs and birds: new avenues for XXIst Century Paleohistology. *International Paleontological Congress*, Paris, France, July 2018. ***Keynote Speaker**

Alida Bailleul, Jingmai O'Connor, Mary Schweitzer, Wenxia Zheng, Hailu You, Daqing Li, Zhonghe Zhou. Histochemical staining of biomineralized and soft-tissues in fossil dinosaurs and birds. *5th International Conference on Earth Systems*, Shanghai, China, July 2018.

Alida M. Bailleul, Casey M. Holliday. Retracing the evolution of the otic joint in birds and fossil theropods through histology: new insights on streptostyly. *Society of Integrative and Comparative Biology Annual Meeting*, Jan 2018, San Francisco, CA.

Alida M. Bailleul, John R. Horner, John B. Scannella, Casey M. Holliday. *Tyrannosaurus rex* Shows Histological Evidence for Avian-Style Cranial Kinesis. 4th International Symposium on Paleohistology. July 2017, Trenton, NJ.

Alida M. Bailleul, John R. Horner, Casey M. Holliday. *Tyrannosaurus rex* Shows Histological Evidence for Avian-Style Cranial Kinesis. American Association of Anatomists at EB 2017. April 2017, Chicago, IL.

Alida M Bailleul, Horner JR, Witmer LM, Holliday CM. Functional cranial joint histology in reptiles and birds and its significance for avian cranial kinesis. *International Congress of Vertebrate Morphology*, 2016, Washington DC.

Alida M. Bailleul. Ontogeny of sutural closure in the skulls of extant archosaurs: reconsidering maturity assessment in non-avian dinosaurs. *Annual Meeting of the Society of Vertebrate Paleontology*, 2015, Dallas, TX.

Alida M. Bailleul, John R. Horner. Comparative sutural histology of non-avian dinosaurs and their Extant Phylogenetic Bracket. *Third International Symposium on Paleohistology*, 2015, Bonn, Germany.

Alida M. Bailleul. Secondary cartilage and chondroid bone in dinosaur embryos: Insights on the evolution of skeletal tissues. *Genomes to/aux Biomes Conference*, 2014, Montreal, Canada.

Alida M. Bailleul, John R. Horner. Sutural closure in the skull of pachycephalosaurs (Ornithischia: Marginocephalia): a preliminary histological study. *Second International Symposium on Paleohistology*, 2013, Bozeman, MT.

Alida M. Bailleul, John R. Horner. Early ossification and calcified tissues in the skull of *Hypacrosaurus stebingeri* (Ornithischia, Lambeosaurinae). *International Hadrosaur Symposium*, 2011, Alberta, Canada.

Alida M. Bailleul, John R. Horner. Perinatal histomorphogenesis of craniofacial elements of *Hypacrosaurus stebingeri* (Ornithischia, Lambeosauridae): A preliminary study. *First International Symposium on Paleohistology*, 2011, Barcelona, Spain.

Alida Bailleul, Loïc Ségalen, Angela D. Buscalioni, Jorge Cubo. Paleohistology and geochemistry of tetrapods from Las Hoyas (Lower Cretaceous, Spain). *International Meeting - "Perspectives On Vertebrate Evolution: Topics And Problems" - To Celebrate The Retirement Of Pr. Armand De Ricqlès*, 2010, Collège de France, Paris, France.

Ronan Allain, **Alida Bailleul**. First revision of the theropod from the Toarcian of Wazzant (High Atlas Mountains, Morocco): the oldest known Tetanurae? *First International Congress on North African Vertebrate Palaeontology*, 2009, Marrakech, Morocco.

Selected Poster presentations

Jingmai O'Connor, **Alida Bailleul**, Min Wang, and Zhonghe Zhou

Histology of juvenile enantiornithines from the Early Cretaceous Jehol Biota. *5th ISPH (International Symposium on Paleohistology)*, Cape Town, South Africa, August 2019

Qian Wu, **Alida Bailleul**, Zhiheng Li, Jingmai O'Connor, and Zhonghe Zhou

Fusion of the scapulocoracoid in the Mesozoic bird *Confuciusornis* and the extant paleognath *Struthio camelus* (common ostrich). *5th ISPH (International Symposium on Paleohistology)*, Cape Town, South Africa, August 2019

Alida M. Bailleul, Lawrence M. Witmer, John R. Horner, Casey M. Holliday. New histological data on the cranial joints of archosaurs: significance for the evolution and functional inferences of dinosaur cranial kinesis. *76th Annual Meeting of the Society of Vertebrate Paleontology*, October 26th-29th 2016, Salt Lake City, UT.

Dana Rashid, **Alida Bailleul**, John R. Horner. The DinoChicken Project: Development and evolution of the avian tail. *Pan-American Society for Evolutionary Developmental Biology*. 2015, Berkeley, CA.

Alida M. Bailleul, John B. Scannella, John R. Horner. Ontogeny of cranial sutures in *Alligator mississippiensis*: implications for maturity assessment in non-avian dinosaurs. *73rd Annual Meeting of the Society of Vertebrate Paleontology*, October 30th-November 2nd 2013, Los Angeles, CA.

Alida M. Bailleul, John R. Horner. Early ossification and calcified tissues in the skull of *Hypacrosaurus stebingeri* (Ornithischia, Lambeosaurinae): A preliminary study. *Annual Meeting of the Society of Vertebrate Paleontology*, 2011, Las Vegas, NV.

OUTREACH ORAL PRESENTATIONS

- 2018** Alida Bailleul, 'How slicing-up the skull of *Tyrannosaurus rex* reveals how it ate'. Paleofest, Burpee Museum of Natural history, Rockford, IL, March 2018.
- 2017** Alida Bailleul, 'The skull of *Tyrannosaurus rex* under the microscope.' *5th Annual Dino Shindig* public outreach event (Ekalaka, Montana, July 2017).
- 2016** Alida Bailleul, 'Evolution of cranial kinesis in dinosaurs.' *4th Annual Dino Shindig* public outreach event (Ekalaka, Montana, July 2016).

PROFESSIONAL MEMBERSHIPS

- Since 2009** Society of Vertebrate Paleontology
- Since 2019** Polynesian Ornithological Society (Société d'Ornithologie de Polynésie)
- Since 2020** World Wildlife Fund

OTHER SERVICES

- 2018-2016** I participated in outreach events, live auctions or art exhibits promoting art in science using histology slides I made.
Events: **Science to Art 2017** (KCALS), Kansas City, MO; **Perceived Contrasts**, Tulsa, OK, 2017; **SVP 2017 Paleoart Exhibition**, Calgary; The University of Calgary Paleoart Exhibit, 2017; **PaleoFest 2018**, Burpee Museum of Natural History.
- Public outreach during the NSF-funded *Dinosaurs and Cavemen 2016, 2017 & 2018* (Columbia, MO). (I helped design activities for kids explaining why birds are dinosaurs.
- 2015-Present** Review Editor for *Frontiers in Earth Science* & *Frontiers in Ecology and Evolution*.
- 2015-2010** Paleontology outreach during multiple public events of the Museum of the Rockies.
- 2013** Conference Organization and Abstract Book Editor. Second International Symposium on Paleohistology, Bozeman, MT.
- 2010** Outreach to Elementary Schools (Bozeman, MT). Introduction to Dinosaur Biology and Histology.

LANGUAGES

French : Bilingual/fluent ; English : Bilingual/fluent ; Spanish : Conversational.