

Pierre Gueriau
PhD. in palaeontology



Date of birth: 8 June 1987
Nationality: French

Revealing fossil anatomies and preservation pathways using advanced imaging

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Research topics and keywords

- **Development of advanced 2D and 3D imaging techniques:** synchrotron X-ray fluorescence, absorption, diffraction and scattering scanning, semi-quantitative micro-tomography, ultraviolet-visible-near infrared luminescence imaging and excitation spectroscopy
- **Taphonomy of well-preserved fossils:** microbial authigenic mineralization of soft-tissues, depositional environments and trace element geochemistry, organic geochemistry, taphonomic biases
- **Palaeobiology:** taxonomy, systematics and palaeoecology of Palaeozoic arthropods
- **Field work:** fossil collection and stratigraphical study

Current Position

02/2023- **Junior lecturer (“premier assistant”)** University of Lausanne, Switzerland

Former Positions and Education

- 07/2021-01/2023 **Research engineer** Muséum national d’Histoire naturelle (MNHN), Paris, France
Advanced imaging of fossils and other natural history specimens
- 12/2019-01/2021 **SNSF researcher** University of Lausanne, Switzerland
Organic geochemistry of Cambrian fossils. PI of a *Spark* funding from the SNSF
- 2018/06-2019/11 **SNSF post-doctoral researcher** University of Lausanne, Switzerland
Shedding new light on the Fezouata biota (Lower Ordovician, Morocco) using advanced spectro-imaging techniques. PI: A. Daley
- 2016/05-2018/05 **Post-doctoral researcher** CNRS, USR 3461 IPANEMA, Gif-sur-Yvette, France
Fossilization and diagenesis in a Cretaceous Lagerstätte. Supervisor: L. Bertrand
- 2014/11-2016/05 **Post-doctoral researcher**, DIFFABS beamline, SOLEIL synchrotron, Gif-sur-Yvette
X-ray imaging and spectroscopy. Supervisor: D. Thiaudière
- 2011/11-2014/10 **PhD, Palaeontology**, MNHN, Paris, France, *best distinction*
The continental aquatic arthropod fauna from the Famennian (Late Devonian) of Strud, Belgium: taxonomy, palaeoecology and taphonomy using synchrotron 2D imaging.
Supervisors: G. Clément & S. Charbonnier

Publications

60 international peer-reviewed publications and 1184 citations; H-index = 20 (from Google Scholar).

Recent notable publications related to the research outlook (complete list of publications on the website):

Lustri L., **Gueriau P.** & Daley A.C. 2024. Lower Ordovician synziphosurine reveals early euchelicerate diversity and evolution. *Nature Communications* 15, 3808. [Open Access]

Saleh F., Lustri L., **Gueriau P.** et al. 2024. The Cabrières Biota (France) provides insights into Ordovician polar ecosystems. *Nature Ecology and Evolution* 8, 651–662. [OA]

Celex G., Cohen S.X., Grimaud A. & **Gueriau P.** 2022. Hierarchical clustering of spectral images with spatial constraints for the rapid processing of large and heterogeneous datasets. *SN Computer Science* 3, 194.

Gueriau P. et al. 2020. Visualizing mineralization processes and fossil anatomy using synchronous synchrotron X-ray fluorescence and X-ray diffraction mapping. *Journal of the Royal Society Interface* 17: 20200216. [OA]

Approved Research Projects

Research grants obtained:

2023 call for project funding of the SNSF. 662'220 CHF for the project "A multi-proxy approach for untangling the diversity and paleoecology of the first marine turtles (Thalassochelydia)" (**Project partner**, *Principal Investigator J. Anquetin (JURASSICA Museum, Porrentruy, Switzerland)*).

2022 call for "BRAIN-be 2.0 Research Program" of the Belgian Science Policy Office. 230'999 € for the project "To colour or not to colour: COLOUR patterns and pigments in INvertebrates from the PALAEOzoic of Belgium" (**Co-coordinator**, *with B. Mottequin (Royal Belgian Institute of Natural Sciences, Bruxelles, Belgium)*).

2020 call for "BRAIN-be 2.0 Research Program" of the Belgian Science Policy Office. 154'551 € for the project "Deciphering early stages of VERTEbrate evolution: insights from long IGnored Belgian Devonian fossil Organism" (**Co-coordinator**, *with B. Mottequin (IRSNB) and P. Janvier (MNHN)*).

2019 call for "Spark rapid funding of unconventional ideas" projects of the SNSF. 109'168 CHF for the project "Breathing new life into dead fossils: Can geochemical characterization of biomolecules be used to enhance paleontological anatomy descriptions and reveal the affinities of enigmatic fossil animals?" that employed me from Dec. 2019 to Jan. 2021. (**Principal Investigator**).

2015-2016 call for "Collaborative Research Projects" of the "France-Stanford Center for Interdisciplinary Studies. 15'000 US\$ for the project "X-Ray Imaging of Cultural Heritage – Bringing to Light our History" (**Co-proposer**, *in collaboration with U. Bergmann (SLAC, Stanford University) and L. Bertrand (IPANEMA)*).

2014 call for projects of the "ATM Interactions Minéral–Vivant" (MNHN). 1'500 € to conduct quantifications of trace elements in well-preserved fossils (**Principal Investigator**).

2014 call for projects of the "ATM Formes" (MNHN). 1'500 € to perform X-ray micro-tomography on well-preserved fossil crustaceans (**Principal Investigator**).

Synchrotron beamtime allocated:

51 proposals allocated (12 as Principal Investigator) since February 2013 at SOLEIL, LCLS (Campinas, Brazil), the ESRF (Grenoble, France) and Diamond (Didcot, UK), accounting for a total of 265 days of beam time. I have also participated in experiments at SSRL (Stanford, USA) and the Swiss Light Source (Villigen, Switzerland).

Conference Presentations

26 talks (including 3 invited) in international conferences; 7 in national or local events.

Invited Seminars

6 invited in-person seminars, at the *MNHN* (2013), *SLAC National Accelerator Laboratory* (Stanford, USA, 2016), *Muséum d'Histoire Naturelle de Genève* (2019), *Laboratoire de géologie de Lyon* (2021), *IPANEMA* (Gif-sur-Yvette, 2021), and *Centre de Recherche sur la Conservation* (Paris, 2022).

1 invited virtual seminar in the framework of the Pal(a)eo EaRly Career Seminar series (2023).

Awards

Prize for the best poster presented by a student. 9th SOLEIL Users' Meeting, Palaiseau/ Saint-Aubin (France), January 23–24 2014.

Winner of the "Palaeovision Fossil Contest" organized during the 64th Annual Meeting of the Palaeontological Association (virtual meeting), on December 18, 2020.

Teaching and Supervision of Students

Teaching: in total, and embracing all the rare opportunities I had to teach, I have a teaching experience of 134h30, including 52h30 of lectures and 82h of practicals (including the implementation of virtual practicals during the Covid-19 pandemics) about **palaeontology**, **taphonomy** and **imaging**, and 54 days of field camps of **palaeontology**, **geological mapping** and **sedimentology**.

Supervision of 5 Bachelor, 6 M.Sc. and participation in the supervision of 5 PhD students.

The exhaustive list and details of my teaching activities are provided on the website.

Collections Activities and Responsibilities

Reorganization and databasing of the early vertebrate material from the Lower Devonian of Svalbard (1969 CNRS-MNHN expedition), MNHN Palaeontological Collections, 2011 (10 months).

Assistance in the organization and management of the Fezouata Collection (Ordovician of Morocco), UNIL, 2018-2020.

Other Academic Activities

Organisation of scientific conferences and meetings:

Initiator and organiser of the *Young Natural History scientists' Meetings* (2014–2019).

Chairman of the Palaeontology and Palaeo-environments session during the *Synchrotron Radiation in Art and Archaeology 2014 Meeting* (Musée du Louvre, Paris, September 2014).

Organiser of a symposium about fossil imaging and a mid-congress excursion at the SOLEIL synchrotron during the *5th International Palaeontological Congress* (MNHN, Paris, July 2018).

Chairman during the *66th Annual Meeting of the Palaeontological Association* (Cork, Ireland, July 2022).

48 Peer-reviewing work for international journals:

Multidisciplinary journals: incl. Science Advances, PNAS, Scientific Reports, PLoS ONE, Royal Society Open Science, The Science of Nature, PeerJ.

Earth Sciences and Palaeontology journals: incl. Geology, Earth-Science Reviews, Geobiology, Palaeo3, Palaeontology Journal of Systematic Palaeontology, Cretaceous Research, Palaeontologica Electronica, Palaios, Lethaia.

Others reviewing activities:

4 Synchrotron proposals (SSRL) and 3 regional funding proposals (Ile-de-France, DIM MAP).

Science Outreach Activities

4 invited public conferences in local geology or palaeontology events (France).

Participation to the job fair of my former middle school (Héricourt, France) to present the job of palaeontologist, almost each year since 2016.

4 interviews for radio programs (1 international: *Science in Action*, BBC World Service [March 28th 2024], and 3 national: *La tête au carré*, France Inter [November 11th 2016]; *La terre au carré*, France Inter [April 2nd 2024]; *CQFD*, RTS [May 27th 2024], 6 interviews for print media, and I also acted as scientific advisor for French scientific magazine articles.

1 web article on early terrestrial ecosystems (URL: <https://www.encyclopedie-environnement.org/en/life/first-terrestrial-ecosystems/>) [available in English and French], 1 international scientific magazine article (Gueriau P. & Bertrand L. 2015. Deciphering exceptional preservation of fossils through trace elemental imaging. *Microscopy Today* 23(3): 20–25).

3 chapters in books for the general public (book titles: “Paléontologie d’aujourd’hui”, EDP Sciences, and “La Terre, le vivant, les humains : petites et grandes découvertes de l’histoire naturelle”, La Découverte).

Institutional Activities and Responsibilities

2022-	Member of the board and Treasurer of the <i>Association Paléontologique Française</i>
2021-	Member of the Steering Committee of the <i>AST-RX μCT platform</i>, MNHN, Paris
2021-2023	Member of the Imaging Pole of the <i>Plateforme Analytique du Muséum</i>, MNHN, Paris
2016-2018	Referent of the <i>USR 3461 IPANEMA within the RTP Tomo3D of CNRS-INEE</i>
2016-2018	Manager of the <i>3D imaging workstation</i>, USR 3461 IPANEMA, Gif-sur-Yvette
2014	Student representative, council of the Department of Earth Sciences, MNHN, Paris
2013-2014	Organizer of 3 palaeontological fieldwork campaigns, Belgium (6 weeks in total)