

# Camilla CRIFÒ

## Vitae

Institut des Sciences de l'Évolution - Montpellier (ISEM)  
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### Education

- 2019**      **Ph.D.** University of Washington, Department of **Biology**  
Research: *Using modern (Costa Rican) and deep-time (Patagonian) fossil phytolith assemblages to infer changes in vegetation and habitat structure.*  
Advisor: **Caroline Strömberg**
- 2013**      **Masters (M.Sc.)** Miami University, Department of **Geology and Environmental Earth Sciences**  
Thesis: *Variations in angiosperm leaf vein density have implications for interpreting life form in the fossil record.* <https://etd.ohiolink.edu/>  
Advisor: **Ellen Currano**
- 2010**      **Masters**, Université Montpellier 2 (France), **Paleontology, Phylogeny, Paleobiology (honors)**  
Thesis: *Vein density variations on the tropical specie *Brosimum alicastrum* (Moraceae) from Panama and its possible application to the fossil record.*  
Advisors: **Paul Roiron** (CNRS, UMR CBAE), and **Carlos Jaramillo** (Smithsonian Tropical Research Institute, Panama).  
1<sup>st</sup> year project: *Chronology of the vegetation in the Déoule valley, thanks to the study of vegetal rests included in the travertine of Barcillonnette.* Advisors: **Paul Roiron**, and **Laurent Bremond** (CNRS, UMR CBAE).
- 2008**      **B.S.** Université Montpellier 2 (France), **Organismal Biology**  
Advisors: **Claude Edelin**, and **J. Francois Barczy** (CNRS, UMR AMAP).

### Professional Experience

- Currently**      **ATER (post-doc)** At École Pratique des Hautes Études (EPHE) and Institut des Sciences de l'Évolution de Montpellier (ISEM), France.
- 2013-2019**      **Teaching Assistant**, University of Washington, Department of Biology, for the following courses:
- **Plant Identification and Classification** (BIOL 317/517; 2 academic quarters): graduate and undergraduate level laboratory sections, and fieldtrips.
  - **The Greening of the Earth** (BIOL 447; 2 academic quarters) Influence of plants on the evolution of past ecosystems: graduate and undergraduate level laboratory sections, field trips, group research projects.
  - **Introductory Biology Course – Animal and plant physiology** (BIOL 220; 5 academic quarters): undergraduate level laboratory sections.
  - **Introductory Biology Course – Mendelian genetics, evolution, biodiversity, ecology, conservation biology** (BIOL 180; 5 academic quarters): undergraduate level laboratory sections.
- 2015-2016**      **Research Assistant and Project manager (University of Washington):** management of the Strömberg lab (during Dr. Strömberg's Sabbatical year), and of a team of undergraduate researchers on the project "*Tracking the evolution of grasses and grasslands: Using phytoliths to unravel evolution-ecology links in deep time*".
- 2011-2013**      **Teaching Assistant**, Miami University of Oxford, Department of Geology and Environmental Earth Science, for the following courses:

- **Understanding the Earth** (GLG112), Miami University, Department of Geology and Environmental Earth Science (1 academic semester): undergraduate level lectures and laboratory sections.
- **Survival on an Evolving Planet** (GLG204), Miami University, Department of Geology and Environmental Earth Science (1 academic semester): undergraduate laboratory sections.

**2010-2011**      **Research Intern** at Smithsonian Tropical Research Institute, Centre for Tropical Paleocology and Archaeology, Panama.

## Publications

- Crifò, C.**, and Strömberg, C.A.E., (2021). *Spatial patterns of soil phytoliths in a wet vs. dry Neotropical forest: implications for paleoecology*. Accepted for publication in *Paleogeography, Paleoclimatology, Paleoecology*. 562, 110100. <https://doi.org/10.1016/j.palaeo.2020.110100>
- Crifò, C.**, and Strömberg, C.A.E. (2020). Small-scale spatial resolution of the soil phytolith record in a Neotropical rainforest and a dry forest in Costa Rica – applications to the deep-time fossil phytolith record. *Paleogeography, Paleoclimatology, Paleoecology*, 537, 109107. <https://doi.org/10.1016/j.palaeo.2019.03.008>
- Baresch, A., **Crifò, C.**, and Boyce, C.K., (2018). Competition for epidermal space in the evolution of leaves with high physiological rates. *New Phytologist*, 221, 628-639. <https://doi.org/10.1111/nph.15476>
- Strömberg, C.A.E., Dunn, R.E., **Crifò, C.**, Harris, E.B. (2018). Phytoliths in paleoecology: analytical considerations, current use, and future directions. In D.A. Croft, S.W. Simpson, and D.F. Su (eds.), *Methods in Paleocology: Reconstructing Cenozoic Terrestrial Environments and Ecological Communities*. Springer (Vertebrate Paleobiology and Paleoanthropology Series), Cham, Switzerland. [https://doi.org/10.1007/978-3-319-94265-0\\_12](https://doi.org/10.1007/978-3-319-94265-0_12)
- Crifò, C.**, Currano, E.D., Baresch, A., and Jaramillo, C., (2014). Variations in angiosperm leaf vein density have implications for interpreting life form in the fossil record. *Geology* 42(10), 919-922. <https://doi.org/10.1130/G35828.1>

### In preparation

- Crifò, C.**, Bargo, S.M., Cuitiño, J., Kay, R., Kohn, M., Trayler, R., Vizcaíno, S., Zucol, A., Strömberg, C.A.E., Habitat heterogeneity and vegetation response to the Middle Miocene Climatic Optimum in the Santa Cruz Formation (Patagonia).
- Strömberg, C.A.E., Armos, B.\*\*, Brightly, W., **Crifò, C.**, Gallaher, K.T., Lavin, S.T., Lowe, A., Novello, A., Wilson, P.K. The utility of palm phytoliths for inferring the evolution and paleoecology of Arecaceae.

## Peer reviews

*Functional Ecology* (n=1), *Boreas* (n=1), *Plant Systematics and evolution* (1).

## Presentations

(\*\*undergraduate student, \* invited)

- Baresch A., **Crifò C.**, and Boyce C.K (2019). Competition for epidermal space in the evolution of leaves with high physiological rates. Botany 2019, Tucson, AZ, USA (Oral communication).
- Armos, B.\*\*, Lavin, S.\*\*, Akbar, S.\*\*, Brightly, W., **Crifò C.**, Gallaher, T., Lowe, A., Novello, A., Wilson, P., Strömberg, C.A.E. (2019). The utility of palm phytoliths for inferring the evolution and paleoecology of Arecaceae. Botany 2019, Tucson, AZ, USA (Poster).
- Crifò, C.**, and C.A.E. Strömberg (2018). Refining phytolith analysis in deep-time paleoecology through modern analogue studies. 10<sup>th</sup> European Paleobotany and Palynology Conference, Dublin, Ireland (Oral communication).
- Crifò, C.**, Bargo, M.S., Cuitiño, J.I., Kay, R.F., Kohn, M.J., Trayler R.B., Vizcaíno, S.F., Zucol, A.F., and C.A. E. Strömberg (2018). Habitat shift during the Middle Miocene Climatic Optimum of Southern Patagonia recorder in phytolith assemblages. 5<sup>th</sup> International Paleontological Congress, Paris, France (Oral communication).
- Grant, C.A.\*\*, **Crifò, C.**, and C.A.E. Strömberg (2017). Reconstructing a modern tropical rainforest using soil phytolith assemblages: Implications for phytolith studies in paleoecology. Geological Society of America Annual Meeting & Exposition, Seattle, WA. Geological Society of America, *Abstracts with Programs* Vol.49, No.6. doi: 10.1130/abs/2017AM-307218. (Poster).
- Crifò, C.**, Bargo, M.S., Cuitiño, J.I., Kay, R.F., Kohn, M.J., Trayler, R.B., Vizcaíno, S.F., Zucol, A.F., and C.A. E. Strömberg (2017). Fossil phytolith assemblages from Southern Patagonia indicate changing habitats during the Middle Miocene Climatic Optimum. Geological Society of America Annual Meeting & Exposition (Seattle, WA). Geological Society of America, *Abstracts with Programs* Vol.49, No.6. doi: 10.1130/abs/2017AM-298212 (Oral communication).

- Strömberg, C.A.E., Abouafia, E.\*\* , Brightly, W., **Crifò, C.**, McManus, B.\*\* , O'Keefe, C.\*\* , Schorr, A.\*\* , Senske, A.\*\* (2016). Grass phytolith shape: towards a key to the evolution and paleoecology of grasses and grasslands. Botany 2016, Savannah, GA, USA (Poster).
- Crifò, C.**, M.S. Bargo, R.F. Kay, M.J. Kohn, S.F. Vizcaíno A.F. Zucol, and C.A.E. Strömberg (2016). Using phytolith to attest vegetation changes during the MMCO of the Santa Cruz Formation, Patagonia (Argentina). XIV International Palynological Congress & X International Organization of Paleobotany Conference, Salvador, Bahia, Brazil (Oral communication).
- Crifò, C.** & C.A.E. Strömberg (2016). Phytoliths in Paleoecology: a tool for reconstructing habitat structure and heterogeneity. GSA Annual Meeting & Exposition, Denver, CO, USA. Geological Society of America, *Abstracts with Programs* Vol.48, No.7, 2016. doi: 10.1130/abs/2016AM-288001 (Poster).
- Baresch A, **C. Crifò**, C. Jaramillo, and C.K. Boyce (2016). The role of developmental constraints on leaf architecture and the evolution of uniquely high leaf vein densities in angiosperms. Geological Society of America Annual Meeting & Exposition, Denver, CO, USA. Geological Society of America, *Abstracts with Programs* Vol.48, No.7. doi: 10.1130/abs/2016AM-28703 (Oral communication).
- \***Crifò, C.**, E. D. Currano, A. Baresch, and C. Jaramillo (2016). Vein density: why should we access the forest canopy? GSA Annual Meeting & Exposition (Denver, CO). Geological Society of America, *Abstracts with Programs* Vol.48, No.7. doi: 10.1130/abs/2016AM-287876 (Oral communication).
- Crifò, C.**, E. D. Currano, A. Baresch, and C. Jaramillo (2014). Variations in angiosperm leaf vein density have implications for interpreting life form in the fossil record. 9<sup>th</sup> European Paleobotany and Palynology Conference, Padova, Italy, (Oral communication).
- Crifò, C.**, & A. Baresch (2012). Leaf vein density as a proxy to characterize forest structure; possible applications to the fossil record. GSA Annual Meeting & Exposition, Charlotte, NC, USA. Geological Society of America, *Abstracts with Programs* Vol.44, No.7, p 265, (Oral communication).
- Crifò, C.** (2012). Leaf vein density, a trait to assess forest structure in the fossil record. 29th Mid-Continent Paleobotanical Colloquium, Yale University, New Haven, CT (Oral communication).
- Baresch, A., T.S. Field, **C. Crifò**, and C. Jaramillo (2010). Similar venation densities on two fossil tropical forests before and after the K/T boundary, implications for the evolution of this ecosystems and the water cycle. 8<sup>th</sup> European Paleobotany and Palynology Conference, Budapest, Hungary (Poster).
- \*Gounand I., **C. Crifò**, M. Freychet, and S. Jacquet (2008). Vulgarisation du modèle AmapSim et conception d'un tutoriel pour son paramétrage. Séminaires Jeudi de l'AMAP (Compte-rendu), AMAP, CIRAD Montpellier, France – Projet tutoré de Licence (Oral communication).

## Field Expeditions

- 2019**                    **Colombia:** Collection of modern soil samples for phytolith, pollen, and isotope analysis at the Reserva natural Rey Zamuro (savannah), San Martín (Colombia). Expedition and collection leading role (10 days). Collaborators: C. Jaramillo, A. Correa-Metrío, J. Escobar, C. Strömberg, et al.
- 2016**                    **Costa Rica:** collection of modern soil samples for phytolith analysis at La Selva (rainforest) and Palo Verde (dry forest) biological stations. Expedition and collection leading role (1 month). PhD dissertation work.
- 2015**                    **Peru:** collection of rock samples for phytolith analysis in Espinar (Cuzco region). Collection leading role (10 days). Collaborators: C. Jaramillo et al.
- 2015**                    **Bolivia:** stratigraphic section logging and rock sample collection for phytolith analysis at fossil locality Quebrada Honda, Bolivian Altiplano. Collection leading role (10 days). Collaborators: D.A. Croft.
- 2015**                    **Argentina:** stratigraphic section logging and rock sample collection for phytolith analysis in the Santa Cruz Formation, Patagonia. Collection co-leading role (1 month). Collaborators: S.M. Bargo, J. Cuitiño, R. Kay., M. Kohn, R. Trayler, S. Vizcaíno, A. Zucol, C. Strömberg.
- 2014**                    **Costa Rica:** field-based course in Tropical Plant systematics (Organization for Tropical Studies). Participant (5 weeks). PhD dissertation work.
- 2014**                    **Maryland (U.S.A.):** collection of leaf samples for leaf vein density analysis for my master's thesis project at the Smithsonian Environmental Research Center (SERC). Expedition and collection leading role (10 days).
- 2010**                    **Panama:** leaf sample collection for leaf vein density analysis for my master's thesis project in the forest understorey and canopy cranes of San Lorenzo (Colón) and Parque Natural Metropolitano (Panama City). Expedition and collection leading role (over several months).

## Grants

- 2019 **Experiment.com**, crowdfunding, <https://experiment.com/phytoliths> (\$2,140).
- 2018 **Graduate School Conference Travel Award**, University of Washington (\$500).
- 2018 **Graduate & Professional Student Senate Travel Award**, University of Washington (\$500).
- 2017 **Steve Porter Award**, Quaternary Research Center (\$1,879).
- 2015 **Graduate Research Fellowship**, Organization for Tropical Studies (\$4,200).
- 2015 **Lewis and Clark Fund**, American Philosophical Society (\$1200).
- 2015 **Graduate Student Research Grant**, Geological Society of America (\$1,250).
- 2015 **Ellis L. Yochelson Award**, Paleontological Society (\$800).
- 2014 **Washington Research Foundation and Benjamin Hall Graduate Fellowship** (\$4,500).
- 2012 **Graduate Student Research Grant**, Geological Society of America (\$2,500).
- 2012 **Kenneth E. & Annie Caster Award**, Paleontological Society (\$800).

## Fellowships

- 2017 **Frye-Hotson-Rigg Graduate Fellowship**, University of Washington (3 months).
- 2014 **Washington Research Foundation and Benjamin Hall Graduate Fellowship** (3 months).
- 2013 **Plant Royalty Research Assistantship**, University of Washington (9 months).
- 2010 **Short Term Research Fellowship**, Smithsonian Tropical Research Institute (3 months).
- 2010 **Fellowship for International Mobility**, CROUS Montpellier, French Minister of National Education (4 months).
- 2008-10 **“Bourse sur critères sociaux”** (fellowship based on revenue), CROUS Montpellier, French Minister of National Education.

## Awards

- 2014 **OTS Outstanding Student Paper Award**, Honourable mention, Organization for Tropical Studies

## Service

- 2020 **Member of the organizing committee**, 37th Midcontinent Paleobotanical Colloquium (May 29<sup>th</sup>-31<sup>st</sup>, *ONLINE*)
- 2017 **Organizer, Topical Session**. GSA Annual meeting & Exposition 2017 (Session title: Ancient Ecosystems of South America).
- 2016/2017 **Senator, Graduate Professional and Student Senate**, University of Washington, Department of Biology.
- 2015, 2018 **Speaker, Graduate Student Symposium**. University of Washington, Department of Biology.

2014/2015 **Student member, Diversity Committee.** University of Washington, Department of Biology

## Mentoring

2017/2019 **Kailyn Zard:** “*Measuring changes in grass phytolith size in response to increased aridity during the onset of the Middle Miocene Climatic Optimum in the Santa Cruz formation, Patagonia (Argentina)*”.

2017/2018 **Claire A. Grant:** “*Modern palm phytoliths from a Neotropical Rainforest (La Selva, Costa Rica)*”.

2015/2016 **Elie Aboulaflia, Brittany McManus, Casey O’Keefe, Anna Schorr, Ashly Senske.** “*Tracking the evolution of grasses and grasslands: Using phytoliths to unravel evolution-ecology links in deep time*”.

2014/2020 Individual training of **18 undergraduate students and 2 doctoral students** in laboratory paleobotanical research: Thy Huyhn, Erin Sofinoski, Sarah Larson, Kevin Jackson, Matt Butrim, Una O’Connell, Matt Bloch, Gabrielle Alampay, Kirsten Olson, Kristen Hamel, Claire Grant, Kailyn Zard, Alexander Arrendale, Keylin Tobin, Katie Hill, Xu Ziqi, Frances Van Wordragen, Kelsie Abrams, Paige Wilson, Elena Stiles.

## Outreach & Science Education

2014-2019 **Presenter and assistant.** “*Girls In Science*” high school and middle school programmes. Burke Museum of natural History and Culture, University of Washington.

2014-2018 **Volunteer.** “*Dino day*” and “*Behind the scenes*”: museum annual outreach events. Burke Museum of Natural History and Culture, University of Washington.

2016 **Invited presenter.** “*NESSP Summer Camp 2016: Mission Earth Scout One/Misión Exploración Tierra*”. Summer field camp for bilingual (English/Spanish) 9<sup>th</sup> and 10<sup>th</sup> grade students (middle/high school). Washington NASA Space Grant Consortium, University of Washington.

## Other Skills

- **LANGUAGES:** **Italian** (native), **French, Spanish, English** (fluent speaking, writing, reading).
- **SOFTWARES:** Proficient in **R** programming language, **Adobe Suite, Microsoft Office, Image J, GIS** (with R).
- **DATA ANALYSIS:** **Descriptive statistics, multivariate analysis.**
- **LABORATORY TECHNIQUES:** Proficient in **fossil leaf cuticle** extraction, **phytolith extraction**, pressing and preparation of **herbarium samples, leaf clearing and staining**, standard measurement of **leaf physiological traits** for paleoclimate reconstructions, and **phytolith identification**.
- **MICROSCOPY:** **Light and fluorescence microscopy**, Scanning Electron Microscopy (**SEM**, including Energy Dispersive X-Ray Spectroscopy).