

Mario Coiro

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Research statement

My main research interest lies in the evolution of form and function in plant lineages through macroevolutionary time. Plants are arguably the most important component of terrestrial ecosystems, and they had a profound impact not only on the evolution of the earth's biota, but on the geological and climatological development of the planet itself. Though the fossil record is often thought of as an incomplete representation of evolutionary history, and has thus been often marginalized in discussions about the macroevolution of plants, I believe that the integration of fossil data is fundamental to obtain any accurate answer about the evolutionary dynamics of plants through geological time.

Work experience and education

Work Experience

- 2022-current **Lise Meitner Postdoctoral Fellow**, *Leyla Seyfullah's group*, Department of Paleontology, University of Vienna, Austria.
- 2019–2021 **Technical/Postdoctoral assistant**, *Sven Bacher's group*, Department of Biology, University of Fribourg, Switzerland.
- 2015–2019 **Doctoral Student**, *Peter Linder's group*, Department of Systematic and Evolutionary Botany, University of Zürich, Switzerland.
- 2013–2015 **Research assistant**, *Samuel Zeeman's group*, Department of Biology, ETH Zürich, Switzerland.

Education

- 2015–2019 **PhD program in Evolutionary Biology**, *University of Zürich*, Switzerland.
Thesis title: "*Evolutionary studies in the Cycadales*"
Thesis advisor: Professor H. Peter Linder.
- 2010–2012 **MSc in Biological Sciences**, *Università di Napoli "Federico II"*, Italy, 110/110 with honours.
Thesis title: "*Nymphaeaceae: micromorphological investigations*"
Thesis advisor: Professor Maria Rosaria Barone Lumaga
- 2006–2009 **BS in Agrofood Biotechnologies**, *Università di Napoli "Federico II"*, Italy, 110/110 with honours.

Funding, Awards, and Prizes

- 2015 **SYNTHESYS**, *Funding for the project "Palaeobiology of the cycads: insights from fossil leaves from the Jurassic of Yorkshire."*, European Unions Seventh Framework Programme (FP7/2007-2013), SYNTHESYS project GB-TAF-5763.
- 2015 **SYNTHESYS**, *Funding for the project "Palaeobiology of the cycads: reevaluating Florin's collection in a phylogenetic framework"*, European Unions Seventh Framework Programme (FP7/2007-2013), SYNTHESYS project SE-TAF-5774.
- 2015 **Vernon I. Chadle Award**, *Developmental and Structural Section, Botanical Society of America*, 500 dollars to attend the Botany 2015 Conference in Edmonton, Canada.
- 2017 **Georges and Antoine Claraz-Donation**, 1000 Swiss Francs for research costs and attending the British Ecological Society Macro SIG Meeting.
- 2018 **Linnean Society Travel Grant**, *The Linnean Society*, 500 dollars to attend the EPPC 2018 conference in Dublin, Ireland.
- 2021 **SNF**, *Postdoc Mobility Grant for the project "A window into the past: disentangling the geological and biological drivers of the Jurassic amber gap"*, 101,380 CHF for salary and research funds.

- 2021 **FWF**, *Lise Meitner Postdoctoral Fellowship for the project "The birth of the modern world: understanding the evolutionary arena of the Cretaceous Terrestrial Revolution by inferring plant dynamics in the late Mesozoic"*, 164,080 EUR for salary and research funds.

Teaching experience

Teaching assistant

- 551-0359-00L *Plant Biochemistry*. ETH Zürich
BIO121 *Evolution und Biodiversität II: Wirbeltiere und Pflanzen*. University of Zürich.
BIO113 *Evolution*. University of Zürich.
BIO225 *Species and Speciation*. University of Zürich.

Lectures or seminars

- BIO265 *Evolution and paleobiology of plants*. University of Zürich.
BIO232 *Tropical plant families*. University of Zürich.

Student Supervision

- 2016 *Biology Olympiad project*, Hanna Neuenschwander.
2017 *Bachelor Internship*, Nicola Jelmini.

Academic service

Institutional service

- 2017-2019 **Library Committee Member**, *Department of Systematic and Evolutionary Botany, University of Zurich, Zurich, Switzerland*.
2016 **Deputee representative for the student body**, *Department of Systematic and Evolutionary Botany, University of Zurich, Zurich, Switzerland*.

Editorial service

- 2018-current **Moderator**, *paleorXiv*.
2022-current **Member of the Editorial Board**, *Open Paleontology*.
2021-2022 **Topic Editor**, *Frontiers in Cell and Developmental Biology*.

Reviewing experience

Invited reviewer for **American Journal of Botany; Annals of Botany; Applications in Plant Science; Aquatic Botany; Biology Letters; Diversity; Feddes Repertorium; Frontiers in Cell and Developmental Biology; Industrial Crops and Products; International Journal of Plant Sciences; Journal of Experimental Botany; Journal of Molecular Evolution; New Phytologist; Philosophical Transactions of the Royal Society B: Biological Sciences; Phytotaxa; Plant Biosystems; Plants, People, Planet; Review of Palaeobotany and Palynology; Scientific Reports; Systematic Biology; Taxon; Taxonomy**

Outreach

- 2015 -2019 **Multiple talks and guided tours for the general public**, *Botanical Garden of the University of Zurich, Switzerland*.
2019-current **Creation and curation of the "Extant Plant Paleoart Database" together with Nathan Jud**, https://github.com/PaleoNate/extinct_plants.
2020-current **Multiple article for the general public**, *mariocoiro.blog*.

Languages

- Italian Native
English C2
German A1

French A1

Full Publication list

Journal articles

25, 9 as first/corresponding* author

1. R.A.E. Glos, S. Salzman, M. Calonje, A.P. Vovides, **M. Coiro**, M.A. Gandolfo, C.D. Specht (2022) **Leaflet Anatomical Diversity in *Zamia* (Cycadales: Zamiaceae) Shows Little Correlation with Phylogeny and Climate.**, The Botanical Review, ahead of print.
2. M. Vieira, R. Zetter, **M. Coiro**, F. Grimsson (2022) ***Pliocene Lythrum (loosestrife, Lythraceae) pollen from Portugal and the Neogene establishment of European lineages.***, Review of Palaeobotany and Palynology, 296: 104548.
3. **M. Coiro***, M.R. Barone Lumaga, P.J. Rudall (2021) ***Stomatal development in the cycad family Zamiaceae.***, Annals of Botany, 128(5): 577-588.
4. J.L. Sampaio Mayer, G. Scopece, M.R. Barone Lumaga, **M. Coiro**, F. Pinheiro, S. Cozzolino (2021) ***Ecological and phylogenetic constraints determine the stage of anthetic ovule development in orchids.***, American Journal of Botany, 108(12): 2405-2415.
5. M. Steinthorsdottir, C. Elliot-Kingston, **M. Coiro**, J.C. McElwain (2021) ***Searching for a nearest living equivalent for Bennettitales: a promising extinct plant group for stomatal proxy reconstructions of Mesozoic pCO₂.***, GFF, 1-2.
6. F. Grimsson, S. Ulrich, **M. Coiro**, S. A. Graham, B. F. Jacob, E. D. Currano, A. Xafis, R. Zetter (2021) ***Hagenia from the early Miocene of Ethiopia: Evidence for possible niche evolution?***, Ecology and Evolution, 11(10): 5164-5186.
7. A. P. Vovides, R. Guevara, **M. Coiro**, S. Galicia, C. Iglesias (2021) ***Pollen morphology of the Megamexican cycads reveals the potential of morphometrics to identify cycad genera.***, Botanical Sciences, 99(1): 182-1970.
8. K. Koutroumpa, B. H. Warren, S. Theodoridis, **M. Coiro**, M. M. Romeiras, A. Jiménez, E. Conti (2021) ***Geo-Climatic Changes and Apomixis as Major Drivers of Diversification in the Mediterranean Sea Lavenders (*Limonium Mill.*)***, Frontiers in Plant Science, 11: 612258.
9. **M. Coiro***, L.C.A. Martinez, G. Upchurch, J.A. Doyle (2020) ***Evidence for an extinct lineage of angiosperms from the Early Cretaceous of Patagonia and implications for the early radiation of flowering plants.***, New Phytologist, 228(1): 344-360.
10. **M. Coiro***, N. Jelmini, H. Neuenschwander, M. A. Calonje, A. P. Vovides, J. E. Mickle, M. R. Barone Lumaga (2020) ***Evolutionary signal of leaflet anatomy in the Zamiaceae***, International Journal of Plant Sciences, 181(7): 697715.
11. **M. Coiro***, J.A. Doyle, J. Hilton (2019) ***How deep is the conflict between molecular and fossil evidence on the age of the angiosperms?***, New Phytologist, 223(1): 83-990.
12. E. Karasev, G. Forte, **M. Coiro**, E. Kustatscher (2019) ***Mutoviaspermum krassilovii gen. et sp. nov.: A Peculiar Compound Ovuliferous Conifer Cone from the Lopingian (Late Permian) of European Russia (Vologda Region)***, International Journal of Plant Sciences, 180(8): 779-799.
13. B. Erdei, **M. Coiro**, I. Miller, K.R. Johnson, P.M. Griffith, V. Murphy (2019) ***First cycad seedling foliage from the fossil record and inferences for the Cenozoic evolution of cycads.***, Biology Letters, 15(7): 20190114.
14. F. Grimsson, S.A. Graham, **M. Coiro**, B.F. Jacobs, A. Xafis, F.H. Neumann, L. Scott, J. Sakala, E.D. Currano, R. Zetter (2019) ***Origin and divergence of Afro-Indian Picrodendraceae: linking pollen morphology, dispersal modes, fossil records, molecular dating and paleogeography.***, Grana 58(4): 227-275.
15. M. Thalmann, **M. Coiro**, T. Meier, T. Wicker, S.C. Zeeman, D. Santelia (2019) ***The evolution of functional complexity within the -amylase gene family in land plants.***, BMC Evolutionary Biology, 19(1): 66.
16. M. Calonje, A. Meerow, P. Griffith, D. Salas-Leiva, A. Vovides, **M. Coiro**, J. Francisco-Ortega (2019) ***A time-calibrated species tree phylogeny of the New World cycad genus *Zamia* L. (Zamiaceae, Cycadales).***, International Journal of Plant Sciences, 180(4): 286-314.
17. M. Ehmig, **M. Coiro**, H.P. Linder (2019) ***Ecophysiological strategy switch through development in heteroblastic species of mediterranean ecosystems an example in the African Restionaceae.***, Annals of Botany, 123(4): 611-623.
18. **M. Coiro***, M.R. Barone Lumaga (2018) ***Disentangling historical signal and pollinator selection on the micromorphology of flowers: an example from the floral epidermis of the Nymphaeaceae.***, Plant Biology, 20 (5): 902-915.
19. **M. Coiro***, G. Chomicki, J.A. Doyle (2018) ***Experimental signal dissection and method sensitivity analyses***

reaffirm the potential of fossils and morphology in the resolution of the relationship of angiosperms and Gnetales., *Paleobiology*, 44 (3): 490-510.

20. **M. Coiro***, C. Pott (2017) **Eobowenia gen.nov. from the Early Cretaceous of Patagonia underlines morphological stasis and niche conservatism in the evolutionary history of Bowenia**, *BMC Evolutionary Biology* 17 (1): 97.
21. D. Feike, D. Seung, A. Graf, S. Bischof, T. Ellick, **M. Coiro**, S. Soyk, S. Eicke, T. Mettler-Altmann, K. J. Lu, M. Trick, S. C. Zeeman, A. M. Smith (2016) **A novel starch-granule-associated protein required for the control of starch degradation in Arabidopsis thaliana leaves.** *The Plant Cell*,28: 1472-1489.
22. M. R. Barone Lumaga, **M. Coiro***, E. Truernit, B. Erdei, P. De Luca (2015)**Epidermal micromorphology in Dioon: did volcanism constrain Dioon evolution?**, *Botanical Journal of the Linnean Society*, 179: 236254.
23. D. Seung, S. Soyk, **M. Coiro**, B. A. Maier, S. Eicke, S. C. Zeeman (2015) **PROTEIN TARGETING TO STARCH Is Required for Localising GRANULE-BOUND STARCH SYNTHASE to Starch Granules and for Normal Amylose Synthesis in Arabidopsis**, *Plos Biology*, 13(2).
24. G. Chomicki, L. P. R. Bidel, F. Ming, **M. Coiro**, X. Zhang, Y. Wang, Y. Baissac, C. Jay-Allemand, S. S. Renner, (2015) **The velamen protects photosynthetic orchid roots against UV-B damage, and a large dated phylogeny implies multiple gains and losses of this function during the Cenozoic**, *New Phytologist*, 205(3): 1330-1341.
25. **M. Coiro**, M. R. Barone Lumaga, (2013) **Aperture evolution in Nymphaeaceae: insights from an ultra-structural and micromorphological investigation**, *Grana*, 52(3): 192-201.

Preprints

26. G. E. Budd, R. P. Mann, J. A. Doyle, **M. Coiro**, J. Hilton (2021)**Fossil data do not support a long Pre-Cretaceous history of flowering plants**, *BioRxiv*, 431478
27. S. Klopstein, R. Ryser, **M. Coiro**, T. Spasejovic (2019)**Mismatch of the morphology model is mostly unproblematic in total-evidence dating: insights from an extensive simulation study.**, *BioRxiv*, 679084

Book chapters

28. **M. Coiro**, E. Truernit (2017)**Modified pseudo-Schiff propidium iodide staining for xylem characterization using confocal laser-scanning microscopy on whole-mount samples**, in Lucas and Etchells(eds.) *Xylem*, *Methods in Molecular Biology*, Springer

Conference Talks and Seminars

- 2012 **Talk: "Morphology and Seed plant Phylogeny - Exploring LBA in a morphological dataset"**, *San Michele Institute - Edmund Mach Foundation*, San Michele all'Adige, Italy, Invited talk.
- 2015 **"Much more lively than most fossils: the evolutionary history of cycads."**, *Montgomery Botanical Center*, Coral Gables, USA, Invited talk.
- 2017 **"Untangling diversity and disparity in the macroevolutionary history of the Cycadales"**, *British Ecological Society Macro SIG Meeting*, London, UK, Conference talk.
- 2018 **"Much more than living fossils: a new phylogenetic hypothesis of the Cycadales"**, *EPPC 2018*, Dublin, Ireland, Conference talk.
- 2019 **"The importance of fossil data in inferring the macroevolutionary history of plants"**, *Biology19*, Zurich, Switzerland, Conference talk.
- 2019 **"Seeing with new eyes: historical collections and novel hypotheses"**, *Palaeobotany and Palynology Specialist Group Meeting, the Linnean Society*, London, UK, Invited talk.
- 2020 **"Molecular timetrees and the macroevolution of plants: open questions and potential solutions"**, *I Meeting of Systematics, Biogeography and Evolution (SBE)*, online, Invited speaker.