

## Emma R. Fryer

### Curriculum Vitae

330 Ramona Drive  
San Luis Obispo, California 93405, USA  
(559) 824-9678  
Emma.R.Fryer@gmail.com

#### EDUCATION

Master of Science, Biological Sciences. California Polytechnic State University (Anticipated 2023)  
Bachelor of Science, Botany, *summa cum laude*. Humboldt State University (2016)

#### GRANTS, AWARDS, SCHOLARSHIPS & HONORS

2022 – Graduate Research Award, California Polytechnic State University – \$500  
2021 – Malcolm McLeod Scholarship, San Luis Obispo CNPS Chapter – \$800  
2021 – Paul Silva Student Research Grant, California Botanical Society – \$600  
2021 – Student Research Scholarship, Northern California Botanists – \$1,000  
2021 – Research Grant, Alta Peak CNPS Chapter – \$500  
2021 – Howard-Kohn Memorial Scholarship, Marin CNPS Chapter – \$3,000  
2021 – Graduate Student Research Fellowship, Torrey Botanical Society – \$1,000  
2021 – Summer Scholarship in Field Botany, Garden Club of America – \$3,000  
2021 – Gertrude R. Hardman Native Plant Research Award, California Native Plant Society – \$600  
2021 – Jessica Mae Orozco Grant, Southern California Botanists – \$1,000  
2020 – Sally Casey Graduate Research Scholarship, Santa Clara Valley CNPS Chapter – \$1,500  
2020 – Honorable Mention, Graduate Research Fellowship Program, National Science Foundation  
2020 – David & Frieda Wertman Scholarship, California Polytechnic State University – \$2,500  
2016 – Dennis Walker Award, Department of Biological Sciences, Humboldt State University – \$1,000  
2015 – Blanche G. Williams & Gertrude G. Graham Award, Humboldt State University – \$1,000  
2015 – PLANTS Grant, Botanical Society of America & National Science Foundation – \$1,000

#### PUBLICATIONS

1. **Fryer, E. R.**, M. A. Afonin, B. Bomfleur, and A. M. F. Tomescu. (*In preparation*). A new species of Protocedroxylon from the Lower Cretaceous of California. Target journal: The International Journal of Plant Sciences.
2. Burnett, J. K., **E. R. Fryer**, C. R. Unger, and A. M. F. Tomescu. 2016. Pinaceous wood from the Lower Cretaceous (Barremian-early Aptian) of California, USA – Lower Chikabally Member, Budden Canyon Formation. *Ameghiniana*, 53(6): 685-694.

#### PRESENTATIONS (\* - with published abstract)

1. **Fryer, E. R.**, R. E. O'Dell, and N. Rajakaruna. 2022. The Role of Invasive Species and Soil Chemistry in the Community Assembly of the Vertic Clay Endemic Annual Plant Communities of the San Joaquin Desert. Botanical Society of America 117th Annual Meeting, Anchorage, Alaska\*.

2. Eulensen-Wallace, J., C. Hodge, M. Mulroy, **E. R. Fryer**, and N. Rajakaruna. 2022. Lichens of Carrizo Plain. Biological Sciences Frost Research Symposium, California Polytechnic State University, San Luis Obispo, California.
3. **Fryer, E. R.**, R. E. O'Dell, and N. Rajakaruna. 2022. How Invasive Species and Soil Chemistry Shape the Vertic Clay Endemic Annual Plant Communities of the San Joaquin Desert. California Native Plant Society San Luis Obispo Chapter Meeting, virtual meeting.
4. **Fryer, E. R.**, and M. Mulroy. 2022. A Brief Introduction to Lichens. Student workshop, San Luis Obispo, California.
5. **Fryer, E. R.**, Rajakaruna, N., Shon, A., and S. McKinnon. 2022. Community Assembly of Vertic Clay Endemic Annual Plants of the San Joaquin Desert. College of Science and Mathematics Student Research Conference, California Polytechnic State University San Luis Obispo, California\*.
6. Shon, A., **E. R. Fryer**, and N. Rajakaruna. 2021. Determining Edaphic Factors of Vertic Clay Communities. Biological Sciences Frost Research Symposium, California Polytechnic State University, San Luis Obispo, California.
7. McKinnon, S., **E. R. Fryer**, and N. Rajakaruna. 2021. Effects of edaphic factors and competition on flowering phenology and reproductive output of native California desert annuals. Biological Sciences Frost Research Symposium, California Polytechnic State University, San Luis Obispo, California.
8. **Fryer, E. R.**, R. E. O'Dell, and N. Rajakaruna. 2021. Community Assembly of Vertic Clay Endemic Annual Plants of the San Joaquin Desert. Botanical Society of America 116<sup>th</sup> Annual Meeting, virtual meeting\*.
9. **Fryer, E. R.**, R. E. O'Dell, and N. Rajakaruna. 2021. Community Assembly of Vertic Clay Endemic Annuals of the San Joaquin Desert. California Botanical Society 28<sup>th</sup> Graduate Student Symposium, virtual meeting\*.
10. **Fryer, E. R.** 2019. Rare Lichens and Bryophytes. Workshop provided for Caltrans Central Region at Central Region Off-site Conference, Stockton, California.
11. **Fryer, E. R.**, and A. M. F. Tomescu. 2016. Conifer wood from the Lower Cretaceous of northern California: implications for *Protocedroxylon* taxonomy. Botanical Society of America 111<sup>th</sup> Annual Meeting, Savannah, Georgia\*.
12. **Fryer, E. R.**, and A. M. F. Tomescu. 2015. Early Cretaceous permineralized wood with araucarioid characters in the Budden Canyon Formation of California. Botanical Society of America 110<sup>th</sup> Annual Meeting, Edmonton, Canada\*.

## WORK EXPERIENCE

### Employment

#### **California Polytechnic State University – Teaching Associate** (January 2021 – present)

Taught lab sections of BOT 121 (General Botany), BIO 162 (Organismal Form & Function), BIO 111 (General Biology), and MCRO 221 (Microbiology). Prepared and delivered lab lectures in coordination with instructing professors. Prepared course materials, syllabi, assignments, and curricula. Held office hours and provided student guidance on plant and animal physiology and anatomy, and microbiology.

#### **California Polytechnic State University – Graduate Assistant** (September 2020 – present)

Prepared grant applications and conducted literature reviews, drafted and executed experimental design and implementation. Planned and coordinated summer research projects and provided guidance, mentoring, and day-to-day supervision for undergraduate fellows in the Frost Undergraduate Research Program.

**HDR Engineering, Inc. – Field Biologist** (October 2017- November 2019)

Provided staff augmentation and acted as a specialist environmental planner and field biologist for Caltrans Central Region Biology, preparing technical environmental documents, biological impact assessments, permit applications for Fish and Game Code Section 1602 Lake and Streambed Alteration Agreements, Clean Water Act Section 404 Nationwide Permits, and Clean Water Act Section 401 Water Quality Certifications. Prepared permit compliance reports, managed conservation measure compliance, conducted biological monitoring, worker environmental awareness training, and mitigation monitoring and reporting. Planned, lead, and reported for protocol- and reconnaissance-level surveys for special status species.

**Research Projects**

Saxicolous and terricolous lichens of Carrizo Plain National Monument (ongoing) – with Dr. Nishanta Rajakaruna and Michael Mulroy (California Polytechnic State University).

Quantifying clay endemism and association with clay soils in California’s flora (ongoing) – with Dr. Nishanta Rajakaruna (California Polytechnic State University) and Ryan O'Dell (Bureau of Land Management Central Coast Field Office).

Community dynamics of the vertic clay endemic annual flowering plants of the San Joaquin Desert (ongoing) – with Dr. Nishanta Rajakaruna (California Polytechnic State University) and Ryan O'Dell (Bureau of Land Management Central Coast Field Office).

Processing micrographs of an anatomical fossil of the dicksoniaceae fern *Onychiopsis* for 3D rendering and producing a 3D reconstruction of *Onychiopsis* vasculature – with Dr. Alexandru Tomescu (Humboldt State University)

Taxonomic placement and description of a Lower Cretaceous araucarioid fossil conifer wood from the Budden Canyon Formation of northern California – with Dr. Alexandru Tomescu (Humboldt State University)

Identification and description of a Lower Cretaceous pinaceous fossil conifer wood from the Budden Canyon Formation of northern California – with Dr. Alexandru Tomescu (Humboldt State University)

Chemical analysis of *Apis mellifera*-collected pollen from Humboldt County, California – In General Plant Physiology (BOT 310) (Humboldt State University)

Collection and mounting of a sample flora of the disturbed areas and roadsides of Humboldt County, California – directed study with the Humboldt State University Herbarium and Dr. J.P. Smith (Humboldt State University)

Investigation into the effects of media sucrose content and gas availability on gemmae production by cultured *Marchantia polymorpha* – directed study with Dr. Casey Lu (Humboldt State University)

Metabolic comparison of culturable endophytic and epiphytic bacteria associated with *Chenopodium quinoa* seeds – in General Bacteriology (BIOL 412) (Humboldt State University)

**Field Work and Survey Experience**

Collecting Devonian plant fossils from Cottonwood Canyon, Wyoming – with Dr. Alexandru Tomescu (Humboldt State University; July 2017).

Botanical surveys: percent-cover, presence/absence, and protocol, following *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* – with Caltrans Central Region Biology staff (HDR and Caltrans Central Region Biology; October 2017 - November 2019).

Relocation and transplantation of a population of Sanford's arrowhead (*Sagittaria sanfordii*) in Cameron Slough, Fresno County, California – with Caltrans Central Region staff (HDR and Caltrans Central Region Biology; November 2017).

Percent-cover surveys of vegetation for correlation to soil features of collected vertic clay soils from Cantua Creek, California – with Ryan O'Dell (Bureau of Land Management; April 2021).

Botanical surveys: point-intercept, line-intercept, and percent cover, following project-specific protocols for vegetation sampling on Santa Cruz Island – with California Polytechnic State University (California Polytechnic State University and The Nature Conservancy, March 2022).

Botanical surveys: point-intercept and percent cover, following project-specific protocol – with Dr. Tim Bean, Dr. Lorelei Larios (California Polytechnic State University and University of California Riverside; April 2022).

### **Botanical Illustration**

*Paleoleucobryum yamaguchii* – Bippus, A. C., C. R. Unger, R. A. Stockey, G. W. Rothwell, and A. M. F. Tomescu. (In preparation). Permineralized moss gametophytes from Vancouver Island reveal that major lineages within Leucobryaceae (Bryophyta: Dicranidae) had already diverged by the Early Cretaceous. Target journal: *The Bryologist*.

### **Volunteer Work**

Mounting plant collections from the Central Valley region, processing and evaluating collections – with Dr. Katherine Waselkov and the Fresno State University Herbarium; October 2017 to March 2020.

Rare plant status reviewer – with California Native Plant Society; March 2019 to present.

Student panelist, “Finding Your Way (in College and in Life)” – with Cal Poly Department of Biological Sciences; November 2020.

### **Workshops**

California Environmental Quality Act Impact Assessment – with the California Native Plant Society Berkeley, California, October 2019

Poaceae – with Dr. Travis Columbus and the Jepson Herbarium Berkeley, California, May 2019

Wetland Delineation – with the Wetland Training Institute Roseville, California, April 2019

Rare Plant Survey Protocols – with the California Native Plant Society Imperial Beach, California, March 2019

### **PROFESSIONAL AFFILIATIONS**

Botanical Society of America

California Native Plant Society

Southern California Botanists

American Bryological & Lichenological Society

### **SKILLS**

R statistical software

Basic Arcmap/GIS

Basic bacterial and plant tissue media preparation, aseptic technique

Keying to vascular plants to species with *The Jepson eFlora*

Keying bryophytes, lichens, macrofungi, and microfungi to species

Keying vegetation types with the *Manual of California Vegetation*

Cellulose-acetate peel technique for plant fossil sectioning  
Scientific botanical illustration  
Basic map and compass skills, backpacking and survival skills

### RELEVANT COURSEWORK

|                              |                              |
|------------------------------|------------------------------|
| Botany                       | Lichens & Bryophytes         |
| Field Botany                 | General Bacteriology         |
| Paleobotany                  | Organic Chemistry            |
| Ascomycetes & Basidiomycetes | Genetics                     |
| Biology of the Microfungi    | Evolution                    |
| Plant Taxonomy               | Spatial Ecology              |
| General Plant Physiology     | Cellular & Molecular Biology |
| Principles of Ecology        | Biostatistics                |

### REFERENCES

#### **Dr. Nishanta Rajakaruna**

Professor  
Department of Biological Sciences  
California Polytechnic State University  
San Luis Obispo, California, USA  
nrajakar@calpoly.edu  
(805) 756-2836

#### **Marie Antoine**

Lecturer  
Department of Biological Sciences  
Humboldt State University  
Arcata, California, USA  
mea24@humboldt.edu  
(707) 826-4151

#### **Dr. Dena Grossenbacher**

Assistant Professor  
Department of Biological Sciences  
California Polytechnic State University  
San Luis Obispo, California, USA  
dgrossen@calpoly.edu  
(805) 756-2135

#### **Dr. Alexandru Tomescu**

Professor  
Department of Biological Sciences  
Humboldt State University  
Arcata, California, USA  
amt32@humboldt.edu  
(707) 826-3229