

**Genetic Analyses of Members
of *Penstemon* section *Glabri* from
northwestern Colorado with a focus on *P.*
gibbensii, *P. scariosus*, and *P. luculentus***



UNIVERSITY OF
**NORTHERN
COLORADO**

Mit McGlaughlin
University of
Northern Colorado

Funding and Collaborators



Field work

- Laura Meadows
- Sami Naibauer

Lab work

- Sami Naibauer
- Natalie Hieber
- Juliette Simpson



Funding



Goals

- What are the genetic characteristics of rare *Penstemon* species from northwestern Colorado?
 - Which species exist and how are they distributed?
 - What management units can be defined?
- Why genetics?
 - Provides data on aspects of organisms that we cannot directly observe
 - Is helpful in defining species and management units, particularly in species with difficult taxonomy



P. scariosus var.
albifluvis
©Phil Krenning



P. luculentus
©Phil Krenning

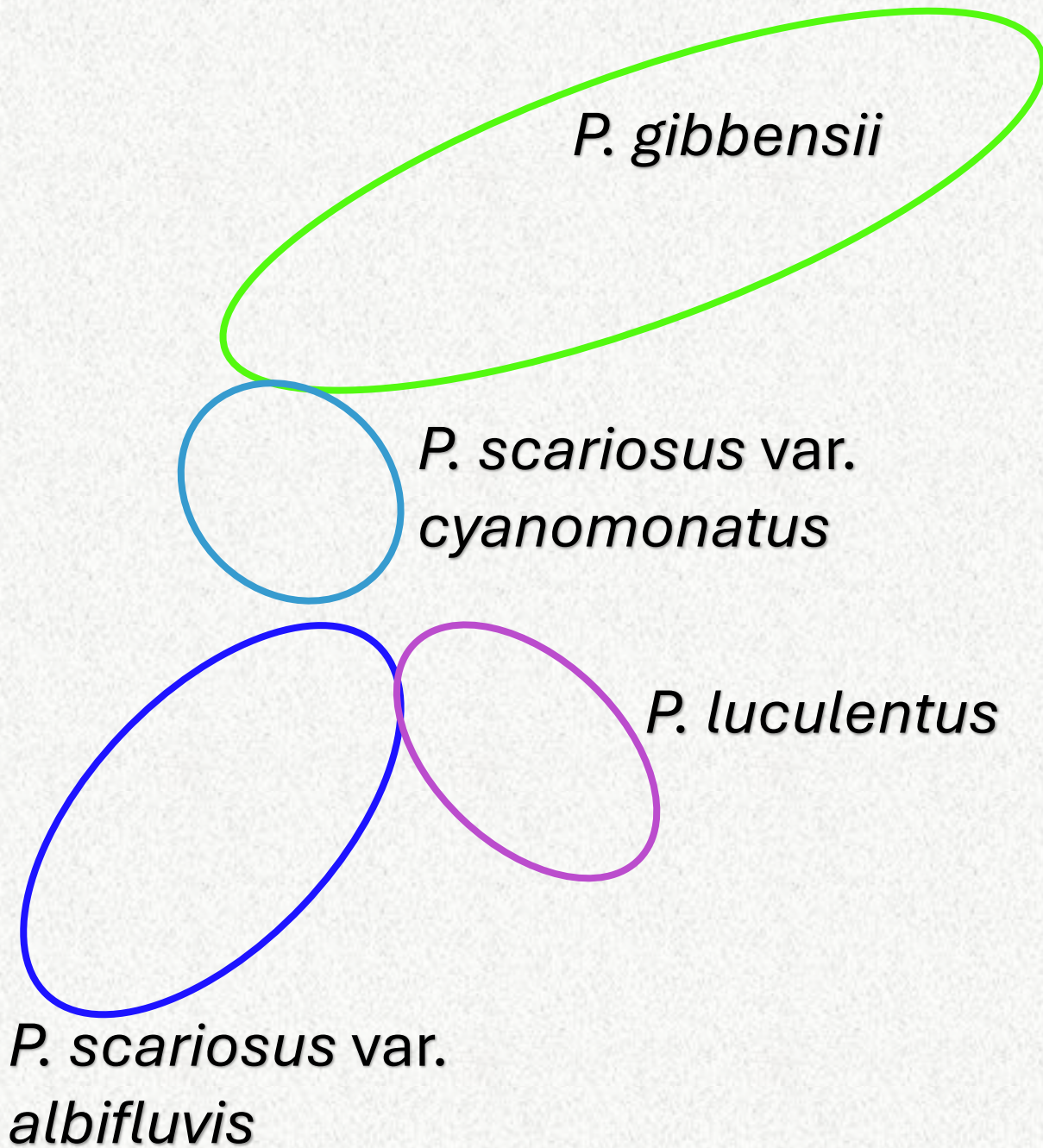


P. scariosus var.
cyanomontanus
©Phil Krenning



P. gibbensii
©Phil Krenning





- *P. gibbensii*
 - G1/S1 - CO, UT, WY
 - 2011 – FWS did not warrant ESA listing
- *P. scariosus* var. *albifluvis*
 - T1/ S1 CO, S2 UT
 - 2013 – FWS proposed ESA listing
 - 2014 – CO, UT, and several other partners entered into a Conservation Agreement to prevent ESA listing
- *P. scariosus* var. *cyanomontanus*
 - T2/S2 – CO, UT
- *P. luculentus* (Johnson 2016)
 - *P. fremontii* var. *glabrescens*
 - T2/S2 - CO

Penstemon section
Glabri Phylogeny

38/44 species
+ 2 section Elmigera
species

Alternatively:
Subgenus
Haboranthus

P. scariosus

P. scariosus var.
albifluvis

P. scariosus var.
cyanomontanus

P. paysoniorum

P. gibbensii

*P. penlandii, compactus,
idahoensis, saxosorum, glaber,
cyaneus, absarokensis*

P. luculentus

P. fremontii + P. cyanocaulis

*P. tdestomii, speciosus, leiophyllus, eatonii, laevis, wardii,
uintahensis, cyanthus, lemhiensis, payettensis, perpulcher*

P. scariosus



Bootstrap support

*** >99%

** 95-98%

* 90-94%

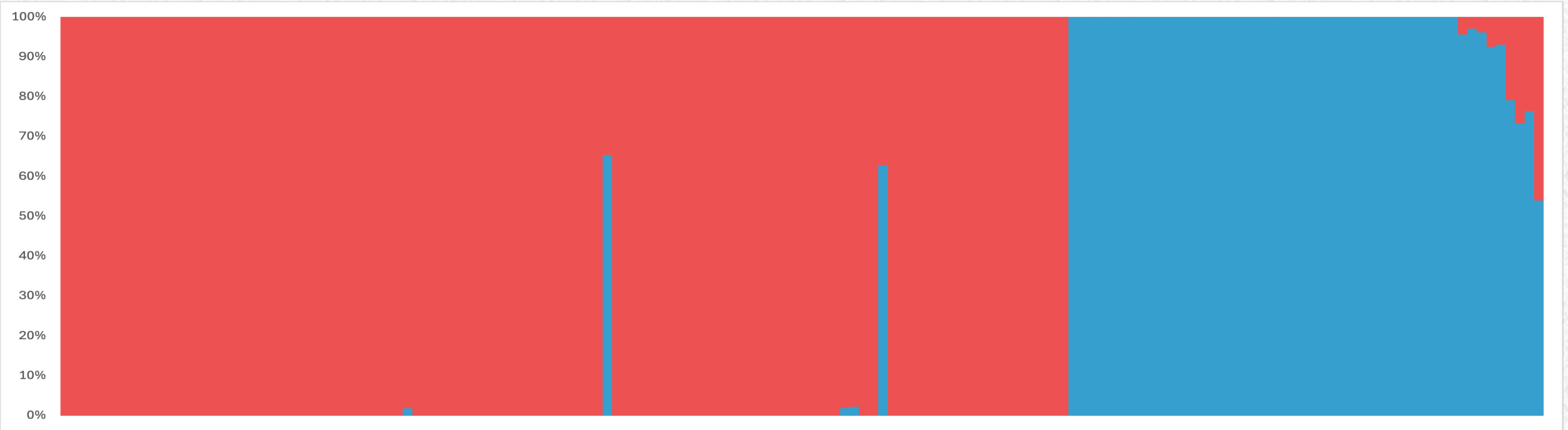
**
**

P. scariosus var. *cyanomontanus*

P. scariosus var. *garrettii*

P. scariosus var. *scariosus*

P. scariosus var. *albifluvis*



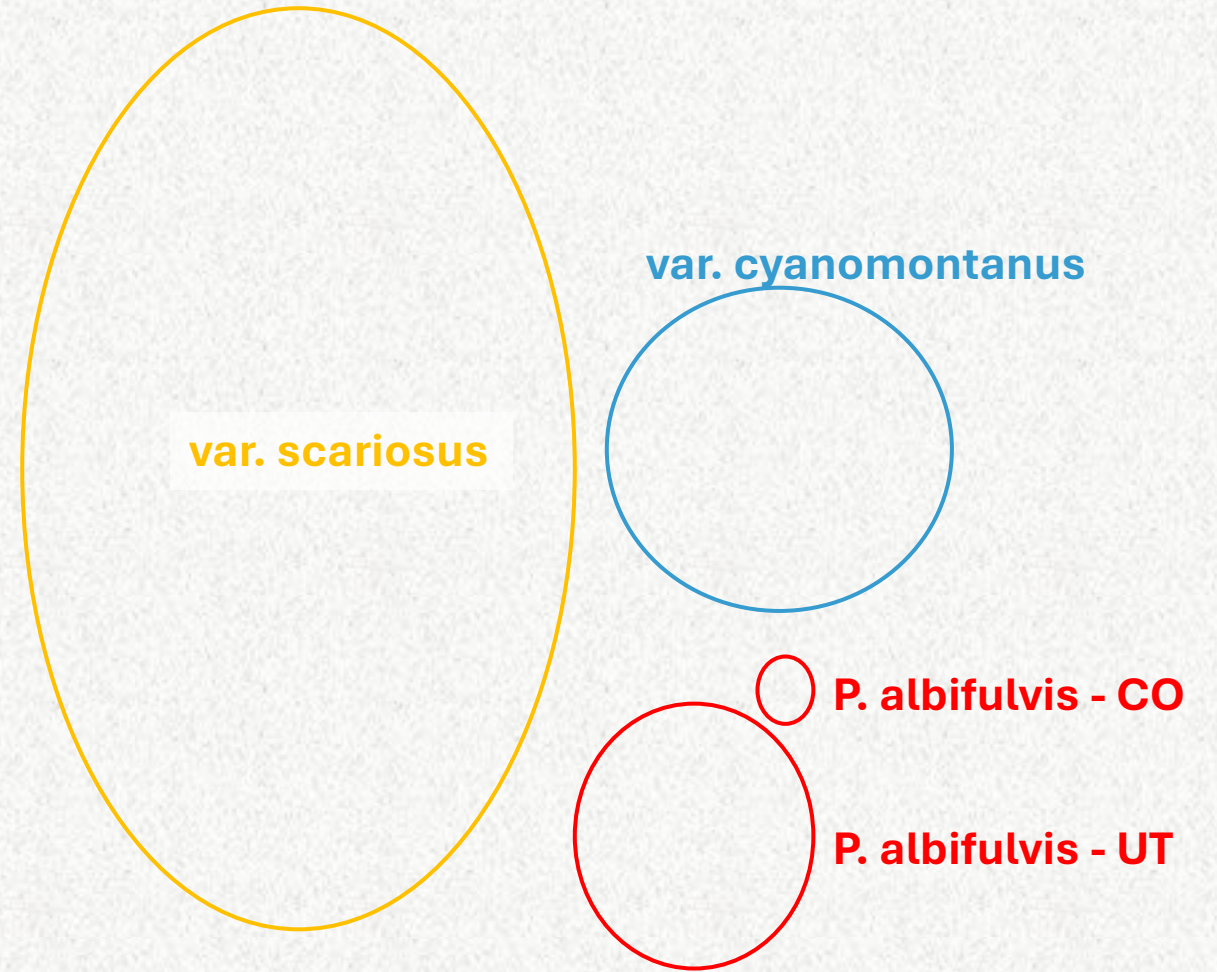
var. albifluvis

var. cyanomontanus

var. garrettii

var. scariosus

P. scariosus



P. luculentus



Bootstrap support

*** >99%

** 95-98%

* 90-94%

**

P. cynanocaulis

P. fremontii

P. luculentus

P. luculentus



P. luculentus



P. gibbensii



Bootstrap support

*** >99%

** 95-98%

* 90-94%

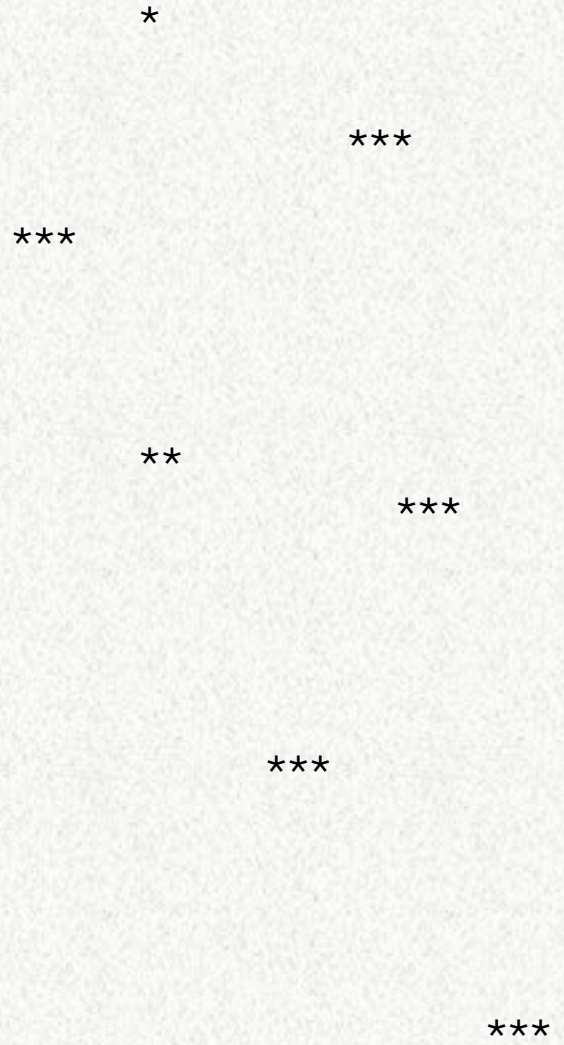
P. paysoniorum

West

Central

P. gibbensii

East



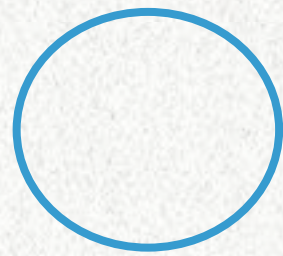


West

Central

East

P. paysoniorum



Conclusions

- *P. scariosus* var. *albifluvis*
 - Distinct species -> *P. albifluvis*
- *P. scariosus* var. *cyanomontanus*
 - Not genetically distinct from var. *garrettii*
 - Combined distribution is wider -> G3?
- *P. luculentus*
 - Distinct species with close relationship to *P. cyanocaulis*
 - Southern populations form a distinct group
- *P. gibbensii*
 - Distinct genetic structure – West/ Central/ East
 - Genetically very similar to *P. paysoniorum* -> single species ?



Funding and Collaborators



Field work

- Laura Meadows
- Sami Naibauer

Lab work

- Sami Naibauer
- Natalie Hieber
- Juliette Simpson



Funding

