Brian J. Knaus

Curriculum vitae

PERSONAL DETAILS

Title	Research Plant Pathologist
Organization	USDA Agricultural Research Service
Department	Horticultural Crops Research Unit
Address	3420 NW Orchard Avenue Corvallis, OR 97330
E-mail	brian.knaus@gmail.com
Website	http://brianknaus.com

EDUCATION

Ph.D. Botany and Plant Pathology 2008
Oregon State University

B.J. Knaus. *A fistful of* Astragalus*: phenotypic and genotypic basis of the most taxon rich species in the North American flora.* PhD thesis, Oregon State University, 2008. http://hdl.handle.net/1957/9510.

Co-advised by Drs. Rich Cronn (USDA PNW) and Aaron Liston (OSU).

B.S. Ecology and Evolutionary Biology 1997
The University of Arizona With an incorporated minor in chemistry, math and physics

RESEARCH INTERESTS

Population genetics: *The study of the structure and demographics of populations.* Inference of subdivision, effective size and migration are central topics to understanding the dynamics of populations. My research has sought to infer the structure and demographic processes which may have led to the structure we observe in populations.

Evolutionary biology: *The synthesis of biological pattern and process.* Evolution provides the theoretical background to describe the patterns of diversity we observe. My research has employed evolutionary models to identify processes which may have led to the patterns we observe in nature.

Bioinformatics: *The union of biology, computer science and statistics.* As the cost of genome scale sequencing has plummeted the practicality of assaying these genomes has become increasingly feasible. We are currently standing on the threshold of connecting the phenotypes we observe with their genetic basis. In biology, much of our work has recently become largely computational. My work ranges from the quality control of large datasets to the visualization of these data and their analysis.

WORK EXPERIENCE

Research Plant Pathologist 2013-present
Horticultural Crops Research Unit, USDA Agricultural Research Service

Genomic architecture of fungicide resistance and mating type as well as the community ecology of plant pathogens in the genus *Phytophthora*.

Post-doctoral scholar 2012-2013
Department of Botany and Plant Pathology, Oregon State University
Modeling dispersal of the causative agent of sudden oak death (*Phytophthora ramorum*).

Research geneticist 2008-2012
Pacific Northwest Research Station, USDA Forest Service
Transcriptome *de novo* assembly and differential expression analysis (RNA-Seq) in Douglas-fir (*Pseudotsuga menzeisii*) to identify transcripts associated with spring bud-burst and the transition from dormancy to physiological growth.

Botanist 2006, 2007, 2008
Pacific Northwest Research Station, USDA Forest Service
Developed an R package for microsatellite analyses. Analysed population genetic diversity for antelope bitterbrush (*Purshia tridentata*).

Graduate teaching assistant 2002-2003, 2006-2008
Oregon State University
See teaching experience.

Graduate research assistant 2003-2006
Oregon State University
Generated and analyzed molecular genetic datasets (AFLP, CpSSR) for several intermountain plant taxa.

Ecologist 2003
USDA Forest Service, Sierra Nevada Forest Plan Ammendment
Led a team of field plant community data collectors in meadows of the Sierra Nevada Mountains of California, USA.

Biological science technician 1998, 1999, 2000, 2000, 2000-2001
US Geological Survey, Sequoia and Kings Canyon Field Station; Sequoia and Kings Canyon National Parks; Pacific Southwest Research Station, Riverside Fire Lab, USDA Forest Service; Dorena Tree Improvement Center, USDA Forest Service; Death Valley National Park
Participated in field collection teams for demographic monitoring, fire history reconstruction, relocation of historic study sites, breeding of disease resistant trees and surveys for rare plants.

Student research assistant 1996-1998
Laboratory of Tree-Ring Research, The University of Arizona
Field collection and dendrochronological data processing to infer historic tree-lines in the Sierra Nevada mountains of California, USA.

PUBLICATIONS

Google scholar site: http://scholar.google.com/citations?user=19wcuSwAAAAJ&hl=en

J. Parke, **B.J. Knaus**, V.J. Fieland, C. Lewis, and N.J. Grünwald. *Phytophthora* community structure analyses in Oregon nurseries inform systems approaches to disease management. *Phytopathology*, 2014. http://dx.doi.org/10.1371/journal.pgen.1003496.

B.S. Gilmore, N.V. Bassil, D.L. Barney, **B.J. Knaus**, and K.E. Hummer. Short-read DNA sequencing yields microsatellite markers for *Rheum*. *Journal of the American Society for Horticultural Science*, 139:22–29, 2014.

K.J. Hayden, M. Garbelotto, **B.J. Knaus**, R.C. Cronn, H. Rai, and J.W. Wright. Dual RNA-seq of the plant pathogen *Phytophthora ramorum* and its tanoak host. *Tree Genetics and Genomes*, 2014. http://dx.doi.org/10.1007/s11295-014-0698-0.

B.L. Wilson, R.E. Brainerd, N. Otting, **B.J. Knaus**, and J. Kierstead Nelson. Identification and taxonomic status of *Cordylanthus tenuis* subsp. *pallescens* (Orobanchaceae). *Madroño*, 61:64–76, 2014. http://dx.doi.org/10.3120/0024-9637-61.1.64.

A.J. Eckert, A.D. Bower, K.D. Jermstad, J.L. Wegrzyn, **B.J. Knaus**, J.V. Syring, and D.B. Neale. Multilocus analyses reveal little evidence for lineage-wide adaptive evolution within major clades of soft pines (*Pinus* subgenus *Strobus*). *Molecular Ecology*, 22:5635–5650, 2013. http://dx.doi.org/10.1111/mec.12514.

W.A. Wall, N.A. Douglas, W.A. Hoffmann, T.R. Wentworth, J.B. Gray, Q.-Y. J. Xiang, **B.J. Knaus**, and M.G. Hohmann. Evidence of population bottleneck in *Astragalus michauxii* (Fabaceae), a narrow endemic of the southeastern United States. *Conservation Genetics*, 15:153–164, 2013. http://dx.doi.org/10.1007/s10592-013-0527-2.

M.P. Miller, **B.J. Knaus**, T.D. Mullins, and S.M. Haig. SSR_pipeline: A bioinformatic infrastructure for identifying microsatellites from paired-end Illumina high-throughput DNA sequencing data. *Journal of Heredity*, 104:881–885, 2013. http://dx.doi.org/10.1093/jhered/est056.

T.N. Jennings, **B.J. Knaus**, K. Alderman, P. E. Hennon, D.V. D'Amore, and R. Cronn. Microsatellite primers for the Pacific Northwest conifer *Callitropsis nootkatensis* (Cupressaceae). *Application in Plant Sciences*, 1, 2013. http://dx.doi.org/10.3732/apps.1300025.

K.E. Bushley, R. Raja, P. Jaiswal, J.S. Cumbie, M. Nonogaki, A. Boyd, C.A. Owensby, **B.J. Knaus**, J. Elser, D. Miller, Y. Di, K.L. McPhail, and J.W. Spatafora. The genome of tolypocladium inflatum: Evolution, organization, and expression of the cyclosporin biosynthetic gene cluster. *PLoS Genomics*, 9:e1003496, 2013. http://dx.doi.org/10.1371/journal.pgen.1003496.

A.L. Ross-Davis, J.E. Stewart, J.W. Hanna, M.-S. Kim, **B.J. Knaus**, R. Cronn, H. Rai, B.A. Richardson, G.I. McDonald, and N.B. Klopfenstein. Transcriptome of an armillaria root disease pathogen reveals candidate genes involved in host substrate utilization at the host–pathogen interface. *Forest Pathology*, efp.12056, 2013. http://dx.doi.org/10.1111/efp.12056.

H.S. Rai, K.E. Mock, B.A. Richardson, R.C. Cronn, K.J. Hayden, J.W. Wright, **B.J. Knaus**, and P.G. Wolf. Transcriptome characterization and detection of gene expression differences in aspen (*Populus tremuloides*). *Tree Genetics and Genomes*, 9:1031–1041, 2013. http://dx.doi.org/10.1007/s11295-013-0615-y.

G.T. Howe, J. Yu, **B. Knaus**, R. Cronn, S. Kolpak, P. Dolan, W.W. Lorenz, and J.F.D. Dean. A SNP resource for Douglas-fir: de novo transcriptome assembly and SNP detection and validation. *BMC Genomics*, 14:137, 2013. http://dx.doi.org/10.1186/1471-2164-14-137.

B. Gilmore, N. Bassil, A. Nyberg, **B. Knaus**, D. Smith, D.L. Barney, and K. Hummer. Microsatellite marker development in peony using next generation sequencing. *Journal of the American Society for Horticultural Science*, 138:64–74, 2013.

R. Cronn, **B.J. Knaus**, A. Liston, P.J. Maughn, M. Parks, J.V. Syring, and J. Udall. Targeted enrichment strategies for next-generation plant biology. *American Journal of Botany*, 99:291–311, 2012. http://dx.doi.org/10.3732/ajb.1100356.

T.N. Jennings, **B.J. Knaus**, S. Kolpak, and R. Cronn. Microsatellite primers for the Pacific Northwest endemic conifer *Chamaecyparis lawsoniana* (Cupressaceae). *American Journal of Botany*, 98:e323–325, 2011. http://dx.doi.org/10.3732/ajb.1100317.

T.N. Jennings, **B.J. Knaus**, T.D. Mullins, S.M. Haig, and R. Cronn. Multiplexed microsatellite recovery using massively parallel sequencing. *Molecular Ecology Resources*, 11:1060–1067, 2011. http://dx.doi.org/10.1111/j.1755-0998.2011.03033.x.

B.J. Knaus, R. Cronn, A. Liston, K. Pilgrim, and M.K. Schwartz. Mitochondrial genome sequences illuminate maternal lineages of conservation concern in a rare carnivore. *BMC Ecology*, 11:10, 2011. http://dx.doi.org/10.1186/1472-6785-11-10.

S.M. Haig, W.M. Bronaugh, R.S. Crowhurst, J. D'Elia, C.A. Eagles-Smith, C.W. Epps, **B.J. Knaus**, M. Miller, M.L. Moses, S. Oyler-McCance, W.D. Robinson, and B. Sidlauskas. Genetic applications in avian conservation. *The Auk*, 128:205–229, 2011. http://www.jstor.org/stable/10.1525/auk.2011.128.2.205.

B.J. Knaus. Morphometric architecture of the most taxon-rich species in the U.S. flora: *Astragalus lentiginosus* (Fabaceae). *American Journal of Botany*, 97:1816–1826, 2010. http://dx.doi.org/10.3732/ajb.0900145.

S.M. Haig, E. Beever, S.M. Chambers, H.M. Draheim, B.D. Dugger, S. Dunham, E. Elliott-Smith, J. Fontaine, D. Kesler, **B.J. Knaus**, I.F. Lopes, P. Loschl, T.D. Mullins, and L.M. Sheffield. Taxonomic considerations in listing subspecies under the U.S. Endangered Species Act. *Conservation Biology*, 20:1584–1594, 2006. http://dx.doi.org/10.1111/j.1523-1739.2006.00530.x.

B.J. Knaus, R.C. Cronn, and A. Liston. Genetic characterization of three varieties of *Astragalus lentiginosus* (Fabaceae). *Brittonia*, 57:334–344, 2005.

B.J. Knaus. Noteworthy collection: *Penstemon pahutensis*. *Madroño*, 52:207–208, 2005.

PRESENTATIONS

Invited presentations:

B.J. Knaus, M.K. Schwartz, K. Pilgrim, T.N. Jennings, and R. Cronn. Mitochondrial genomes: possibilities and limitations, October 2012. The Wildlife Society's Conference, Portland OR.

B.J. Knaus. Genomic data illuminates lineages of conservation concern, February 2010. The Department of Biology, Linnfield College.

B.J. Knaus. A fistful of *Astragalus*: characterization of the most taxon rich species in the North American flora, January 2009. Portland State University's Biology Department seminar series.

Contributed presentations:

B.J. Knaus, P.C. Dolan, D. Denver, and R. Cronn. Transcriptome dynamics in the dormancy-spring growth transition of Douglas-fir needles, July 2012. Botany 2012 Conference, Columbus, OH.

B.J. Knaus, P.C. Dolan, D. Denver, and R. Cronn. Transcriptome dynamics in the dormancy-spring growth transition of Douglas-fir needles, January 2012. The Plant and Animal Genomes Conference, San Diego, CA.

B.J. Knaus, P. Dolan, D. Denver, and R. Cronn. Early results from the Douglas-fir transcriptome observatory, July 2011. The Western Forest Genetics Association Meeting, Troutdale, OR.

J. Yu, **B.J. Knaus**, P. Dolan, G. Howe, and R. Cronn. Another step for conifer genomics: a Douglas-fir transcriptome, January 2011. The Plant and Animal Genomes Conference, San Diego, CA.

B.J. Knaus, R. Cronn, K. Pilgrim, and M.K. Schwartz. Genomic data illuminates lineages of conservation concern, June 2010. Evolution 2010, Portland, OR.

B.J. Knaus. Morphometrics, molecules and the coalescence: conserving evolutionary potential in *Astragalus lentiginosus*, the most taxon rich species in the U.S. flora, January 2009. The California Native Plant Society's Conservation Conference.

B.J. Knaus. A fistful of *Astragalus*: phenotypic and genotypic characterization of the most taxon rich species in the North American flora, September 2008. Ph.D. defense seminar, Oregon State University Department of Botany and Plant Pathology.

B.J. Knaus, R.C. Cronn, and A. Liston. A fistful of *Astragalus*: incipient speciation in the American West?, July 2008. Botany 2008, Vancouver, B.C. Recipient of the **George R. Cooley Award** (see awards).

B.J. Knaus, R.C. Cronn, and A. Liston. The architecture of infraspecific differentiation: a case study in *Astragalus lentiginosus* (Fabaceae), June 2007. Botany 2007, Chicago, IL.

B.J. Knaus, R.C. Cronn, and A. Liston. Incongruence between chloroplast and morphological data in the varietal complex *Astragalus lentiginosus*, June 2006. Evolution 2006, SUNY Stoneybrook, NY.

B.J. Knaus, R.C. Cronn, and A. Liston. Relationships in the most variable species of *Astragalus* inferred from chloroplast microsatellites, April 2006. EVO-WIBO (evolutionary biologists of Washington, Idaho, British Columbia, and Oregon). Port Townsend, WA.

B.J. Knaus, R.C. Cronn, and A. Liston. Genetic characterization of three varieties of *Astragalus lentiginosus* (Leguminosae), July 2006. Poster at Botany 2006. Austin, TX.

AWARDS AND FUNDING

George R. Cooley Award. 2008. Award for best contributed presentation by a researcher in the early part of their career (within five years of defense). Awarded by the American Society of Plant Taxonomists at the internationally attended Botany meetings in Vancouver Canada. http://www.inhs.uiuc.edu/~kenr/ASPT/current.html.

Bonnie C. Templeton Award for Plant Systematics. 2007. An endowment to support research in plant systematics. $1,500.

Anita Summers Travel Grant. 2006. An award to help facilitate travel of graduate students to academic meetings. $300.

The Hardman Foundation, Inc. 2004. Support for graduate student research concerning the native plants of Oregon. $1,500.

Native Plant Society of Oregon Field Research Grant. 2004. Award to finance the field study of varieties of *Astragalus lentiginosus* Douglas ex Hooker native to Oregon. $750.

Nevada Native Plant Society. 2004. Grant for the field study of varieties of *Astragalus lentiginosus* Douglas ex Hooker native to Nevada. $500.

TEACHING EXPERIENCE

Introductory Biology for Majors. (OSU BI21X). Lead laboratories of ∼48 students in organismal diversity, organ systems, plant and animal physiology, genetics, evolution and ecology. Terms taught: Fall 2002, Winter 2003, Fall 2006, Winter 2007, Spring 2007, Fall 2007, Winter 2008.

Plant Systematics. (OSU BOT321). Lead laboratories in vascular plant identification, diversity, and evolutionary relationships. Terms taught: Spring 2003.

Botany for Non-Majors. (OSU BOT101). Lead laboratories of ∼24 students in the relevance of botany to everyday life. Terms taught: Spring 2008.

BIOINFORMATICS

Proficient in **R** and **Perl** in the Windows and **Linux** operating systems. Experienced in the use of queueing systems such as the Sun Grid Engine (SGE) as well as the Portable Batch System (PBS) as implemented on the XSEDE national cyberinfrastructure system (i.e., the Pittsburgh Super Computing Center). Active projects maintained at GitHub: https://github.com/knausb.

Authored software:

vcfR An R package to view and analyze chromosomal variant data.

Short Read Toolbox A set of perl scripts (including R and shell scripts) for quality control and barcode sorting of Illumina short-read sequences.

Genomatic An R package which automates fragment analysis projects.

SERVICE

Peer reviewer of research journals: American Journal of Botany, Botanical Journal of the Linnaean Society, Journal of the American Society for Horticultural Science, Madroño, Molecular Ecology and Molecular Phylogenetics and Evolution.

Organizer of the RNA-Seq workgroup. A group exploring the methods of differential expression using RNA-Seq. http://people.oregonstate.edu/~knausb/rna_seq/.

Organizer of the R Statistical Programming Group. A group of Oregon State University Biologists interested in use of the R programing environment. http://oregonstate.edu/~knausb/R_group/R_User.html.

Presentations:

B.J. Knaus, R. Cronn, A. Liston, K. Pilgrim, and M.K. Schwartz. Genomic data illuminates lineages of conservation concern, July 2011. Presentation to the Southern Sierra Fisher Working Group, Fresno, CA (via video conference).

B.J. Knaus. What's in a name? The taxonomic history of *Astragalus lentiginosus*, February 2008. The Native Plant Society of Oregon's Corvallis chapter.

B.J. Knaus. Introduction to the R programming language, December 2007. Presentation at the Portland Linux/Unix Users Group, Portland, OR.

B.J. Knaus. Rare *Astragalus* of Oregon, January 2004. Presentation to the Corvallis chapter of the Native Plant Society of Oregon on the 24 rare *Astragali* of Oregon presented in Barneby's system of Phalanxes.

OTHER AFFILIATIONS

Professional/Societal membership:
American Association for the Advancement of Science
American Phytopathological Society
American Society of Plant Taxonomists
Botanical Society of America
Society for the Study of Evolution