NORTHWEST LICHENOLOGISTS

Spring 2010 Newsletter

Upcoming Events

Northwest Lichenologists Meeting March 24-27

The Northwest Science meeting will soon be upon us - March 24 -27. There will be a session for lichens. Meeting information can be found at:
http://www.centralia.edu/academics/earthscience/nwsa/2010meeting.htm
http://home.comcast.net/~nwlichens/events.htm

The meeting social will be Wednesday evening with paper sessions on Thursday and Friday.

NW Lichenologists will have an *Usnea* workshop. Bring samples to examine, share, and discuss. We will have a room with dissecting scopes to help us navigate through the challenges of the *Usnea* World.

Currently we do not know which day the workshop and paper sessions will occur. They will be on either Thursday or Friday.

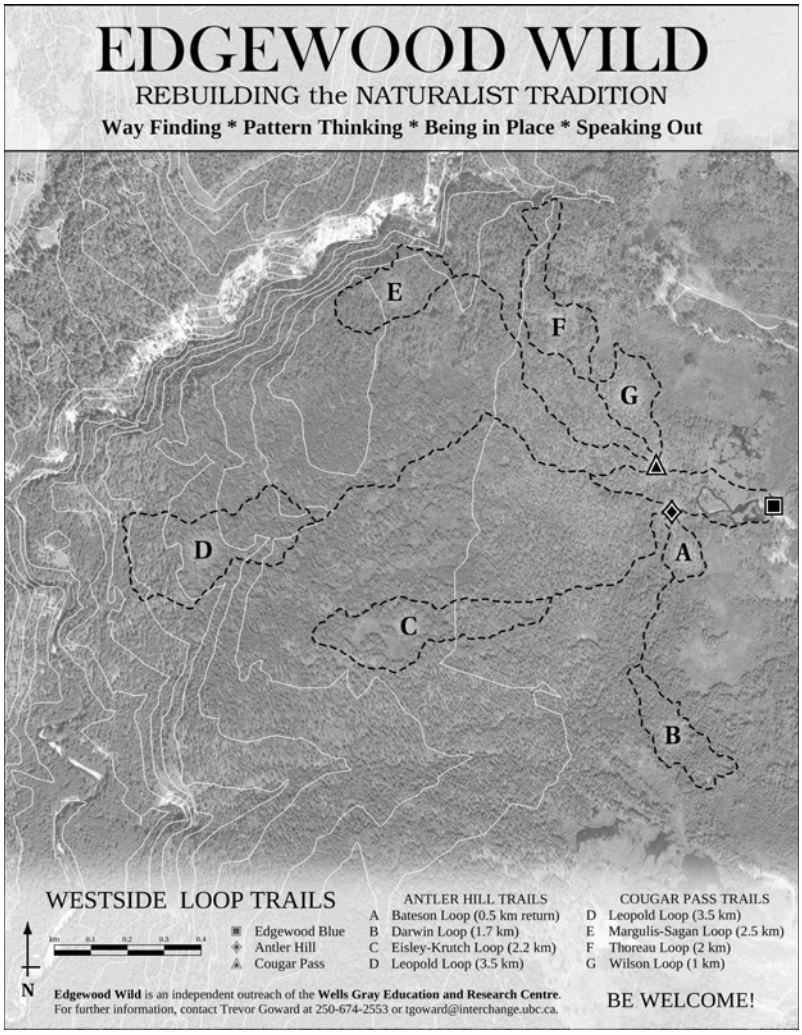
Jim Riley has suggested a "lichen exchange". If you have duplicates of collections you would like to trade in for species you have been longing to have, bring them to the workshop and you can own new collection. For the exchange, it would be best to have the lichens curated in packets with location information on the label.

The Lichen Foray this year will be at the Mima Mounds, just north of Centralia. Descriptions of the site and maps will be available.
We will car pool to the site. This will be held on Saturday, March 27.
I did not arrange for lunches, since most folks like to bring their own food. If you cannot bring a lunch, several of us with cars could take you to a grocery store to get you set up.

For further questions, please feel free to contact:
kglew@u.washington.edu

Edgewood Wild (South Central BC)

Trevor Goward and Curtis Bjork look forward to hosting the Northwest Lichenologists later this summer at Edgewood Wild (see the map to the trail system). We know it's a long way from the US PNW to our lichen-rich home valley in south-central British Columbia (Google Earth: 51 52'08.26"N, 120 01'19.41"W). So to make the trip worthwhile, we're planning two activities we hope will entice at least a few of you. The first is a day-long field course dedicated to a certain much-loved, yet tricky group that happens to be well represented in the subboreal forest hereabouts. What group we handle will depend the majority decision of those who take part in our outing. Good candidates are *Bryoria*, *Cladonia*, *Hypogymnia*, *Peltigera*, or the biatoroids! Our second activity is an afternoon - again in the field - in the company of a dozen or so lichens - both macros and micros - you're guaranteed never to have seen before. We're pretty sure about this claim since many of the species we have in mind are new to science; they haven't even been described yet. Watch for updates on this event as the summer progresses. An exact date in the late summer will be set among those interested in attending. For more information on this and arranging a carpool/caravan, please contact John Villella at johnvillella@yahoo.com.



Recent Events

Board of Directors Meeting
January 2010
Bruce McCune

The 2010 Board of Directors meeting of Northwest Lichenologists was attended by 12 people, including board members, officers, and other interested people. Participants were John Davis, Linda Geiser, Katie Glew, Martin Hutten, Sarah Jovan, Dave Kofranek, Scot Loring, Bruce McCune, Peter Nelson, Rory Nichols, Heather Root, and Daphne Stone.

Last year eight people were certified at the Deer Creek Center, Siskiyou Field Institute, with 13 people attending, some for training only. See the certification summary further down in this newsletter for more information.

The next certification is planned for 2011. At that time, the first group of certified lichenologists will need to renew their certification if they wish it to continue. For a list of the certified lichenologists, see http://home.comcast.net/~nwlichens/certified.htm

The board meeting agenda included discussion of the finances of the organization, liaison with NW Scientific Association, election of new officers and board members, educational activities, promotional materials, the NWL website, the newsletter, and the upcoming Annual General Meeting at Centralia College, Centralia, Washington.

We discussed at length the problem of maintaining our list of species that are considered rare, threatened, or endangered by one or more states or provinces in our region < http://home.comcast.net/~nwlichens/listed.htm>. This is partly tied to the give and take with state Heritage Program lists. The large problem of assembling and maintaining the available data does not seem likely to disappear. We resolved to work more on the Washington list this year. At the spring meeting we hope to come up with a plan for improving the Washington list.

The first volume of *Monographs in Lichenology* has been a financial success so that we now have a small bit of capital to fund new projects. We have also had anonymous contributions to the Monograph Fund totaling $1200 over the last 2 years. Although publication of another volume is not imminent, several projects may come to fruition in the next few years.

If any of this sounds interesting to you, please participate in the Board meeting next year. As always, we meet the second Saturday in January at 10 a.m. Everyone is welcome. Since NWL is not a "members" organization, anyone is welcome to participate. For more information on this and other NWL activities, see our website: www.nwlichens.org

2009 Certification Test and Results

The 2009 NWL certification took place at the Siskiyou Field Institute's Deer Creek Center (http://thesfi.org/Page.asp?NavID=108), a beautiful retreat near Selma, Oregon tucked into the Siskiyous and backed-up against wilderness. It has an interesting history including ownership by John Wayne and headquarters of an elaborate Y2K scam (the two facts not being related)! A variety of accommodations were offered along with a full kitchen and other facilities. The area surrounding the Center is a diverse mosaic of habitats including differing forest types, oak woodlands, shrub communities, riparian zones, and meadows, much of which has serpentine or influence from this interesting rock type. This of course contributes to a high diversity of lichens, making this location a great place to lichenize and hold the certification.

Daphne Stone was the examiner. Richard Brock, Jason Clark, Amanda Hardman, Scot Loring, Kristi Mergenthaler, Jesse Miller, Peter Nelson, and Gretchen Vos passed, bringing the total of certified Northwest Lichenologists up to thirty-two.

Due to the high number of attendees, there were two study plots designated for the field exam, both a short walk away from the Deer Creek Center and from each other. Daphne oversaw the lower plot while John Villella oversaw the upper. Though the collecting was limited to epiphytic macrolichens only, the lower plot had a total of 73 species present while the upper plot had 63, reflecting how diverse this area is. See result tables below.

This was the first year that a training was offered alongside the actual certification. Participants collected specimens from a study plot as if it were part of the exam and then were assisted with identifications, which took place in a group setting. Although no version of a written exam could be offered, lichens from the NWL list of rare species and their look-alikes were discussed in-depth. To view example questions from the written test, see http://home.comcast.net/~nwlichens/examples.htm. This training is an excellent means of preparation, as participants can learn more about the test itself and the lichens involved without the pressure of attempting certification. Julie Knurowski, Zach Mohatt, and Jenny Moore attended this training, taught by John Villella.

The written exam is meant to be very difficult, as it is a dissection of knowledge for all lichen species listed in the northwest as rare, sensitive, etc. I have heard talk of deleting the written portion altogether, but a goal of the overall certification program is to assess skills at recognizing listed species. You can expect few to no listed species to be found in the field exam (they are supposed to be rare after all), giving someone little opportunity to display skills in identifying them, whereas studying for the written part (few will pass this without intense study) makes one became innately familiar with such species. This allows the examinee to demonstrate knowledge of these species while at the same time adding to their awareness of them and perhaps then becoming better lichenologists. Also, the written exam is closed-book while the field exam is open-book – one must really know their rare lichens and look-alikes in order to pass the former, not relying on readily available literature. It is therefore my opinion to keep the written portion.

If you desire to take the certification and it comes to your area, I would highly recommend taking it while you have “home-court advantage”.

-Scot Loring

Results from 2009 Certification:

Lower Plot

species	**surveyor**							
	DS	1	2	3	4	5	6	7
Alectoria imshaugii	1						1	
Alectoria sarmentosa	1			1	1	1		
Alectoria vancouverensis		1	1	1				1
Bryoria capillaris	1		1		1	1	1	0.5
Bryoria fuscescens	1							
Candelaria "pacifica"		1	1					
Cetraria chlorophylla	1	1	1	1	1	1	1	1
Cetraria merrillii	1	0.5	1	1	1	1	1	1
Cetraria orbata	1				1		1	1
Cetraria pallidula		1		1				
Cetraria platyphylla			1	1				
Cladonia carneola								1
Cladonia fimbriata			1			0.5		
Cladonia furcata							1	
Cladonia chlorophaea	1	1		1				
Cladonia ochrochlora	1							
Cladonia pyxidata	1							
Cladonia transcendens	1	1	1	1	0.5	1		1
Collema nigrescens	1	1	1	1		1	1	1
"Dendriscocaulon"							1	
Esslingeriana idahoensis		1	1		1	1	1	1
Evernia prunastri	1	1	1	1	1	1	1	1
Hypogymnia enteromorpha	1		1		1		0.5	
Hypogymnia imshaugii	1	1	1	1	1	1	1	1
Hypogymnia inactiva			1		1	1		
Hypogymnia metaphysodes			1			0.5		1
Hypogymnia occidentalis	1		1	1	1		0.5	1
Hypogymnia physodes	1	1	1	1	1	1	1	1
Hypogymnia tubulosa	1	1	1	1	1		1	1
Imshaugia aleurites	1		1					
Leptogium cellulosum	1					1		
Leptogium lichenoides	1			0.5				
Leptogium polycarpum				1		1		
Leptogium saturninum							1	
Letharia vulpina	1	1		1	1	1	1	1
Lobaria hallii							1	
Lobaria pulmonaria	1	1	1	1	1		1	1
Lobaria scrobiculata							0.5	1
Melanohalea exasperatula			1					
Melanohalea multispora	1	1	1			1	1	
Melanelixia fuliginosa	1	1	1	1		1		1
Melanelixia subaurifera			1	1		1		1
Nephroma helveticum				1	1		1	1

Nephroma parile								1	
Nephroma resupinatum								1	
Parmelia hygrophila	1		1	1		1			1
Parmelia sulcata	1	1	1	1	1	1		1	1
Peltigera collina	1		1	1	1	1		1	1
Physcia adscendens	1	1	0.5	0.5	1			0.5	
Physcia aipolia	1	1	0.5	1	1	1		1	1
Physcia tenella (actually adsc w/out hoods)					1	1			
Physconia americana	1	1		1	1	1		1	1
Physconia enteroxantha		0.5	1						
Physconia perisidiosa	1		1		1			1	1
Platismatia glauca	1	1	1	1	1	1		1	1
Platismatia herrei	1	1	1	1	1	1			1
Platismatia stenophylla	1		1						1
Pseudocyphellaria anomala	1	1	1	1	1	1		1	1
Pseudocyphellaria anthraspis	1		1		1				
Ramalina dilacerata	1	1	1	1	1	1		1	1
Ramalina farinacea	1	1	1	1	1	1		1	1
Sphaerophorus venerabilis				1					1
Sticta fuliginosa		1	1	1	1	1		1	1
Usnea cavernosa	1		1	1		1		1	
Usnea filipendula/scabrata	1	1	1	1	1	1		1	1
Usnea flavocardia			1						
Usnea glabrata	1	1	1	1	1			1	1
Usnea sp. (tufted)incl lapponica		1	1			1		1	1
Usnea sp. UV+	1	0.5		1	1	1			1
Vulpicida canadensis	1	1	1	1	1	1		1	1
Xanthomendoza hasseana	1	1	1	1	1	1			1
Xanthoria polycarpa	1	1						1	
Xanthoria candelaria				1					
other m (same as something correctly ID'd, but this pkt ID'd wrong)			0.5	1				1	
TOTAL [ttl number species on plot 74]	46	**33.5**	**44.5**	**39**	**35.5**	**36**	3 of these may be off plot	**38**	**40.5**
passing score: 46*0.7=32.2									
written exam score (must get 80%)		73	**100**	**89**	**-2007**	**96**		**85**	**96**
passed certification		**no**	**yes**	**yes**	**yes**	**yes**		**yes**	**yes**

Upper Plot

species	**surveyor**			
	JV	1	2	3
Alectoria imshaugii	1	1		
Alectoria sarmentosa		1		
Bryoria capillaris				0.5
Bryoria fuscescens	1			
Cetraria chlorophylla	1	1	1	1
Cetraria merrillii	1	1	1	1
Cetraria orbata			1	
Cetraria pallidula	1			1
Cetraria platyphylla	1		1	1
Cladonia carneola				
Cladonia fimbriata				1
Cladonia chlorophaea		1		
Cladonia ochrochlora			1	
Cladonia pyxidata	1		0.5	
Cladonia transcendens	1			
Collema furfuraceum		1		
Collema nigrescens	1		1	1
"Dendriscocaulon"				1
Esslingeriana idahoensis		1		1
Evernia prunastri	1	1	1	1
Hypogymnia enteromorpha				1
Hypogymnia imshaugii	1	1	1	1
Hypogymnia metaphysodes		1		
Hypogymnia occidentalis	1	1	1	1
Hypogymnia physodes	1			1
Hypogymnia tubulosa		1	1	1
Imshaugia aleurites	1			
Leptogium lichenoides				1
Leptogium saturninum	1	1		
Letharia vulpina	1	1	1	1
Lobaria hallii	1			
Lobaria pulmonaria	1	1	1	1
Lobaria scrobiculata	1	1		1
Melanohalea elegantula	1			
Melanohalea multispora	1	0.5	0.5	1
Melanelixia fuliginosa		1		1
Nephroma helveticum	1	1	1	1
Nephroma laevigatum				1
Nephroma resupinatum	1			1
Parmelia hygrophila	1			
Parmelia sulcata	1	1	1	1
Peltigera collina	1	1		1
Physcia adscendens	1		1	1
Physcia aipolia	1	1		1
Physconia americana	1		1	1
Physconia enteroxantha	1	1		1
Physconia perisidiosa	1	1		0.5
Platismatia glauca	1	1	1	1
Platismatia herrei	1	1	1	1
Platismatia stenophylla		1		

Pseudocyphellaria anomala	1	1	1	1
Pseudocyphellaria anthraspis	1	0.5	1	1
Ramalina dilacerata	1	1	1	
Ramalina farinacea	1	0.5	1	1
Sphaerophorus venerabilis		1		1
Sticta fuliginosa	1			1
Usnea filipendula/scabrata	1	1	1	1
Usnea glabrata	1		1	1
Usnea sp. (tufted)incl lapponica	1		1	1
Usnea sp. UV+	1			1
Vulpicida canadensis	1	1	1	1
Xanthomendoza hasseana	1	1		1
Xanthoria polycarpa	1		0.5	1
other m (same as something correctly ID'd, but this pkt ID'd wrong)			0.5	
Total [total species on plot 63]	45	**33.5**	27	**44**
passing score 45*0.7=**31.5**				
written exam		**85**	**87**	**96**
passed certification		**yes**	**no**	**yes**

Upcoming Workshops / Courses:

Introduction to Lichens: Another World

Dates: October 15th (evening) 16th - 17th, 2010
Location: Deer Creek Center, Selma, OR
Instructor: Daphne Stone, PhD
Tuition: $100

Discover the complex world of lichens by examining their structures and learning terminology needed to discuss the basics of identification. Collect lichens from the meadows and forests around the Deer Creek Center, then return to the lab to identify and preserve specimens. Learn to key your lichens using *Macrolichens of the Pacific Northwest*. Complete the workshop with a small personal lichen reference collection to further your studies. Don't miss the Free Evening Program, "Lichens," October 15th at the Deer Creek Center.

Summer Lichenology Field Course (Fairbanks, AK)

Toby Spribille will be giving an introductory lichen course at the University of Alaska Fairbanks on Aug. 13-15, 2010, with accompanying field trips in the vicinity of Fairbanks. The course is taking place in the framework of the UAF Summer Sessions Program and will be posted on their website in February for early registration: http://www.uaf.edu/summer/
The focus will be introductory-level macrolichens of forest and alpine habitats in interior Alaska. In-state tuition applies to all summer courses so this won't be as costly as a regular course. There will also be field trips in the weeks thereafter, with a crustier emphasis, that are part of a program Toby is doing for the University of Graz summer 2010 lichen course with Lucia Muggia. Anybody interested in "tagging along" should let Toby know.

Opal Creek Lichen and Bryophyte Workshop (Near Salem, OR)

This is an announcement for the 2010 Opal Creek Lichen and Bryophyte workshop. It is taking place on April 24th and 25th at the Opal Creek Ancient Forest Center in the Opal Creek Wilderness of the Willamette National Forest, Oregon.

This workshop is designed as an introduction to Pacific Northwest cryptogams with an emphasis on old-growth Cascadian rain forest floras. Time is split between field observations, lectures and lab identification. The food and lodging are included in the price of the workshop. There are close to 200 lichens recorded for this area and

guaranteed field observations of rare lichens during the workshop include: *Pseudocyphellaria mallota, P.rainierensis, Pilophorus nigricaulis, Usnea longissima, Dendriscocaulon, Leptogium rivale, Peltigera hydrothyria* and others.

Opal Creek is a 35,000 acre low elevation old-growth Douglas fir / Western hemlock forest in Oregon's central Cascades with an exceedingly diverse cryptogamic flora. A list of the lichens known from Opal Creek can be accessed at:

http://discussions.crustose.net/index.php/topic,41.0.html
For details on participating please visit: http://opalcreek.org/

Northwest Botanical Institute

Dear Friends,

This spring I will be able to offer a beginning field bryology class during Spring Break on the University of Oregon campus. The class will meet Monday-Wednesday, March 22-24. The objective will be to help folks with a general botany background to learn to identify local bryophytes: mosses, liverworts, and hornworts. We will use hand specimens to get a practical grasp of the nature of each major group and to learn how to recognize the common species on sight. Pictures, micropreparations, and demonstration specimens will lead the participants to an understanding of the descriptive terms necessary to use technical keys. I will instruct participants in the lab techniques needed to observe the features used in keying and supervise practice of these techniques. We will have the use of a classroom with microscopes for all students. Most of our time will be spent in the teaching lab, with an afternoon excursion on the first day for field experience.

This will be an intensive three day course. If you or anybody you know might be interested in this introductory class, please contact me directly.

David H. Wagner, Ph.D.
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http://web.mac.com/davidwagner/Site/FernZenMosses.html

Note from editor:

David Wagner also teaches an amazing advanced bryology class. My apologies, but I could not locate an announcement for the 2010 course during the abnormally short contribution period for this newsletter. Anyone interested in taking the class or learning more should contact Dave directly.

The most recent advanced course took place in late September of 2009 at the H. J. Andrews Experimental Forest, where everyone was housed (nice accommodations) and the lectures/lab time were held. Field trips were made to nearby areas of great bryological interest. Lectures and labs covered many topics of interest, including liverworts (which I unfortunately missed) and the genus *Sphagnum*.

Dave is a great teacher and incredibly knowledgeable – his courses are fun and interesting. I highly recommend them to everyone!

Recent Workshops / Courses:

Brodo's Crustose Lichens Class (through Jepson Herbarium)

Recently, several Northwest Lichenologists were able to attend a class devoted to crustose lichens, taught by Irwin Brodo and Judy Robertson, at Bodega Bay, CA. What a great week!

Each morning, Ernie gave a lecture on a group of crusts (complete with handouts), telling us about morphology, ascus characters, phylogeny and helpful hints for identification. His lectures were illustrated by lots of slides of west and east coast species. The lectures were informal and we were free to ask questions as he went. This worked well; some of the lectures lasted all morning, and at the end all felt they had really soaked up the information.

Afternoons were field-trip time. We collected locally at the Bodega Bay Marine Lab, and as is the way of lichenologists, progressed slowly in each habitat. Huge old Monterey cypress trees yielded *Gyalecta, Topelia,* and *Coenogonium*, real treats for northwesterners not used to these genera. One afternoon we went to the rolling oak covered hills of Pepperwood Preserve, north of Santa Rosa, to collect inland species on trees, wooden fences and low rock outcrops. This foray yielded two *Thelomma* species, several *Caloplaca* species, and a very diverse epiphytic crust community. A rocky point above Bodega Bay yielded a lot of coastal endemics. Lichens found there included *Pertusaria californica, Cladidium bolanderi*, *Buellia halonia, Lecanora phryginitus*, and amazingly, a minute forest of the non-lichenized pin *Sphinctrina leucopoda,* growing as a parasite on *Lecanora californica* on exposed rock! On the rocky coastline we found *Caloplaca coralloides* along with the tiny *Collemopsidium halodytes*, just perithecia in a microscopic patch of brown thallus.

Late afternoons and after dinner, we got to work on identification. Here, Judy Robertson showed her expertise in identifying the local flora. Her enthusiasm for the crusts was infectious, as she made the rounds through the lab her ooh's and aah's could be heard as she looked at a plethora of specimens being examined. Many local species were unfamiliar to Ernie, so he worked along with us on their identification. Often hours went into the identification of one specimen, and many of us worked in teams, sharing knowledge and skills. Identified collections were shared so we all benefited from the hard work of others. Both Judy and Ernie were incredibly patient with us as we absorbed terminology and techniques. Notable quote: "My kingdom for a spore!"

Meals were a time to get to know our classmates. We came from all over the west: from NM, WA, OR, and CA. And our participant from Finland and her boyfriend really added to the enthusiastic atmosphere. Ernie and his wife Fenja were really enjoyable companions, giving us the opportunity to chat and get to know them during this relaxing time.

The class overall was a real boost for those learning microlichens. The Jepson Herbarium class was the perfect way to jump in to crusts!

-Daphne Stone & John Villella

Intermediate Lichens (at The Siskiyou Field Institute in Selma, Oregon)

Daphne Stone taught an excellent class on March 13-14, covering four lichen genera that are very common in the Pacific Northwest but have many species that are typically difficult to identify. The first day was spent on *Melanelia* and *Usnea*, while the second day included *Bryoria* and *Peltigera*. She lectured on each genus as a group, first describing the features that are needed for identification of the genus and its species. The focus then moved on to many individual species from each applicable genus, describing diagnostic characters of each and comparisons to similar look-alikes. The lectures were supported by photos and a live video macro-camera, all projected at the front of the classsroom. She demonstrated the use of chemical spot tests and how to photograph through a microscope. Numerous study collections were provided, allowing hands-on study of each species covered in the lectures. Many of these collections were of species that most students have at most only read about. Scot Loring assisted with teaching, which was merely a disguise as he was present primarily as a freeloader (no tuition) while absorbing Daphne's infinite lichenological wisdom. Daphne will be teaching additional courses this year at the beautiful Siskiyou Field Institute's Deer Creek Center (see the Upcoming Workshops / Courses section of this newsletter above).

-Scot Loring

News and Projects from NW Lichenologists at Home and Abroad

From Linda Geiser, Sarah Jovan, Doug Glavich, and Larissa Lasselle from the US Forest Service Pacific Northwest Air Program:

We continue to be actively engaged in the development of lichen based Critical Loads for nitrogen and are working on three national level projects and four regional level projects. Of these, two are in print: *Fenn et al. 2008 Env. Poll. 155:492-511*, and *Glavich & Geiser 2008 Bryologist 111:638-649*.
The Western Airborne Contaminants Assessment Program is still generating publications regarding semi-volatile organic contaminants in lichens and other western national parks ecosystem components, the most recent of which was a feature article in Environmental Science & Technology, *Landers et al. 2010 ES&T 44: 855-859*.

We have nearly completed our 10 year revisits to baseline lichen monitoring sites on forests of WA and OR and are continuing to add new monitoring locations each summer. At each site, we perform FHM-style lichen surveys and collect two of 10 regional target species for analysis of S, N, and metals. Data is accessible at http://gis.nacse.org. Our goal is to establish monitoring sites in all the class I Wilderness areas in Oregon and Washington and to continue monitoring our original sites in the Gifford Pinchot, Mt. Hood, Willamette, Umpqua, Winema, Deschutes, Wallowa-Whitman and Siuslaw National Forests and in the Columbia River Gorge NSA. During the past ten years, nitrogen concentrations in lichens have been increasing, whereas sulfur and lead concentrations continue to decrease. Lichen community composition is closely related to thallus N concentrations. Nitrogen deposition is currently the pollutant of greatest and most widespread ecological concern to the US Forest Service, followed by acidic deposition in Forests close to the Seattle and Portland metro areas.

Linda is working with Tom Nash at ASU to edit a special edition of Bibliotheca Lichenologica, which will feature papers from the 2008 IAL meeting in Asilomar, CA. Bruce McCune and Linda finished the revised addition of Macrolichens of Pacific Northwest Forests, which was again published by Oregon State University Press (please see additional info and online link for ordering under "Lichen Apparel and Publications"). In addition to many new photographs, improved keys, more species, and updated taxonomy, the book features updated air pollution sensitivity ratings for nearly 200 regional species.

From Heather Root:

Heather Root's been lichenizing in central Oregon and Alaska this past year. She worked with Laura Nelson and Karen Dillman in spruce forests of southeast and south-central Alaska where they collected epiphytic macro-lichens. She's working to combine these data with those collected by FIA and Tongass and Chugach National Forests to develop

pollution and climate models. Lots of crazy cyano-lichens and Pacific coast rainforest fun! In the fall, she headed out to the Prineville BLM district to survey 1-acre soil-crust plots for the ISSSSP with Jesse Miller. Soil crust identification has been a humbling adventure that would be nearly impossible without Bruce's patience! This spring, she'll head back out to sagebrush-country in search of habitats with especially neat crusts. Tag-alongs and ideas for target species are welcome (if interested, contact via the following)…

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From Roger Rosentreter:

Roger has hosted Jesse Miller to work writing up the results of several lichenologists' work over the last 30 years on the TNC, Lawrence Grasslands of eastern Oregon. Jesse will present his summary work at the NWSA meeting in Washington State this March. Roger is working with Boise State University staff on cheatgrass germination and interaction with mosses and litter. He is also working with Bruce McCune to database all his herbarium collections. It is going slow! Roger also submitted a report by Ann DeBolt – a study on biological soil crust in Eastern Oregon for the BLM – it may be viewed under the Contributed Articles section of this newsletter.

From Katie Glew:

Katherine has been focusing on lichen education during the past year. A lichen evening was offered through the Center of Urban Horticulture (CUH) at the University of Washington in March 2009. She taught an introductory lichen weekend workshop at the North Cascades Institute in April 2009. In July, a presentation at the Nisqually Wildlife Refuge was given. Currently Katherine is teaching a lichen workshop for the Washington Native Plant Society (WNPS), Central Puget Sound chapter. She will also be leading a WNPS lichen field trip in May, with Dan Paquette along the Trail to Twin Falls for the Botany Study Weekend. In June CUH has asked Katherine to teach a follow-up to the class offered last year. This one is entitled – "Lichens: a Closer Look". The Tuesday evening Seattle Lichen Guild continues, with some change in participants and additional topics of lichen photography, poetry, and discussions about articles in the New Yorker magazine.

Katherine Glew – kglew@u.washington.edu

Postcard from Austria – from Toby Spribille (tspribi@gwdg.de)

Two-thousand-and-nine was another action-packed and exhilarating year for me. I was fortunate enough to get to see all four major sectors of the boreal forest within a single field season – northern Europe, northern Far East, and the eastern and western North American boreal. This was all in the name of a population genetics study I am doing on *Mycoblastus sanguinarius* across its range, though of course all this travelling gave me a chance to collect a lot of other things too, make a lot of observations, and accrue a fair number of frequent flyer miles! The fruits of all this work are now filling my living room and stacked in the hallway outside my door in many, many flats and cardboard boxes. The most memorable and trippy of the four trips was doubtless the trip to the Russian Far East with Christian Printzen, Birgit Kanz, Lidia Yakovchenko and Lena Malashkina in July-August. Here are couple pics that capture the flavor a little:

Counterclockwise from top left: 1) 'The Sermon on the Mount': as disciples begin to arrive from surrounding villages, lichen bags in tote, Christian tells the Parable of the

Misidentified Ascus Type, which ends badly (the mountain is Arbat and the town in background is De Kastri); 2) around the same time, a meeting of the Axis/Ascus of Evil on another mountain. These were actually tick- and bug-proof suits we had to wear, called 'encephalitkas', a cutesified reference to the possibility of contracting encephalitis from the local ticks (the graininess in the photo comes from biting insects); L-R Lidia, Toby and Birgit, as if one could tell; 3) water pump broken! We got a new water pump after waiting some days for it to arrive, but minus a seal – we had to fashion the seal out of a cardboard box; 4) our driver Andrey fills up on gas while Lena tends to our open flame cook stove. Nothing happened. (all photos by Christian Printzen)

In other news…
Late last year Sergio Pérez-Ortega and I published the latest blurb in a series on new species from northwest North America, *Lepraria torii*, named in honor of Tor Tønsberg and his hard work over the years on Pacific Northwest *Lepraria*. You can download it at http://www.geobotanik.org/spribille/publications_en.html
The species is actually one of the easier-to-recognize PNW Leprarias – it has a thick cottony thallus and is Pd+ orange-red. It seems to have a preference for old-growth forests, so keep an eye out for it! It still has yet to be found in Oregon and Idaho. Several new contributions on the theme "Pacific Northwest crustose lichen flora" will be posted over the coming weeks and months at this address, so check it out.

WORKSHOP ANNOUNCEMENT(s)
Thanks to the hard organizational work of Celia Miller, will be giving a workshop under the banner 'Lichens of Alaska' on August 13-15 at the University of Alaska, Fairbanks as part of their Summer Sessions Program. The main emphasis of the workshop will be macrolichen identification for field biologists, spanning the gamut from morphology to chemistry. However, we also want to do a demonstration of identifying major substances using thin layer chromatography (TLC), and will have scopes set up to go into crust lichen basics. Registration is open now at can be done online at http://www.uaf.edu/summer/ - set the query browser to "Summer 2010" and search for "Lichens". I will also be giving a similar course in Sitka in mid-September, more exact dates to be announced!

INVITATION TO GRAZ!
The Graz lichenologists are a friendly bunch and have gone out of their way to make me feel at home in their little lichenological paradise. Consequently, despite the seeming distance from home, I get to work on PNW/B.C./Alaska lichens much of the time, and this includes continuing work on the **NW CRUSTOSE LICHEN FLORA PROJECT** announced a few years ago with Curtis Björk, Ernie Brodo, Trevor Goward and Tor Tønsberg, as well as various other side projects. The interconnectedness via e-mail and Skype helps shorten the perceived distance, though I do sorely miss being able to walk out the back door and into the Salish Mountains like back home in Fortine. That said, I'd like to extend an open invitation to any NW Lichenologist members travelling in Europe to stop by in Graz, visit our incredible herbarium and join us for one of the countless tea rounds or in the pub for some beer rounds and talk serious lichen. You can reach me by e-mail or on skype at toby.spribille.

REQUEST FOR MATERIAL

One of the projects I am working on with Sergio Pérez-Ortega is a population genetics study of *Kaernefeltia*, discussed elsewhere in this newsletter. As part of this study, we would *greatly appreciate* freshly collected material, preferably 20 individuals collected according to a little protocol, of *Kaernefeltia californica*. Please contact me or Sergio, sperezortega@ccma.csic.es for more details.

I would also like to solicit interesting or unidentifiable material of *Pertusaria* over the coming months – Curtis Björk and I are pursuing a clean-up of this genus and working keys for the flora project and so this would be a good time to get a handle on unaccounted-for weirdnesses.

Take care and stay in touch – Toby

Lichen Apparel and Publications

Letharia columbiana apparel

Mar 2010 Shirt Order NW Lichenologists: Please put the number desired in a GREY box

This is a pre-order form. Once the shirts are printed, I will contact you for payment.
Shipping will be $4/shirt up to 4 shirts. Above 4, I will let you know.
Shipping will be $3 per hat (up to 2, then as above) or $0 if with a shirt order.

Your email:
Your address:

please send this order form to Daphne Stone at: stone_daphne@hotmail.com

products are 100% cotton unless noted otherwise

	Unisex sizes					
style	**S**	**M**	**L**	**XL**	**XXL**	**XXXL**
T shirt $20						
black						
blue						
mock turtleneck $25						
men's black						
pullover hooded sweatshirt $35						
black						
zip front hooded sweatshirt $35						
(design on back)						
unisex black						

Ladies sizes and style	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**XXXL**
Ladies are somewhat smaller than unisex size!							
Scoop neck T							
ladies black $20							
ladies blue-60 cot/40modal $25							
long sleeve T $25							
(women's)							
black							

turtleneck $25
ladies black mostly cotton

[redacted]

Letharia design embroidered

cap (adjustable) $18
black
medium to light blue

one sizs fits most

Monographs in North American Lichenology

A new series sponsored by NW Lichenologists

Northwest Lichenologists aim to produce a series of reasonably-priced, peer-reviewed, paperback academic books on lichens, with a focus on topics of regional interest, such as generic monographs, annotated state lists, ecological works, local floras, and symposium proceedings. Our purpose is to provide an outlet for very long papers and books of wide interest but that are too long for regular scientific journals. Volumes will be produced sporadically. We expect 0-2 volumes per year. Works on any aspect of lichenology will be considered.

Vol.1
McCune, B. and R. Rosentreter. 2007. Biotic Soil Crust Lichens of the Columbia Basin. Monographs in North American Lichenology 1: 1-105. Pbk. $30. Fully illustrated in color. [See sample pages.] ISBN-10: 0-9790737-0-7 ISBN-13: 978-0-9790737-0-0

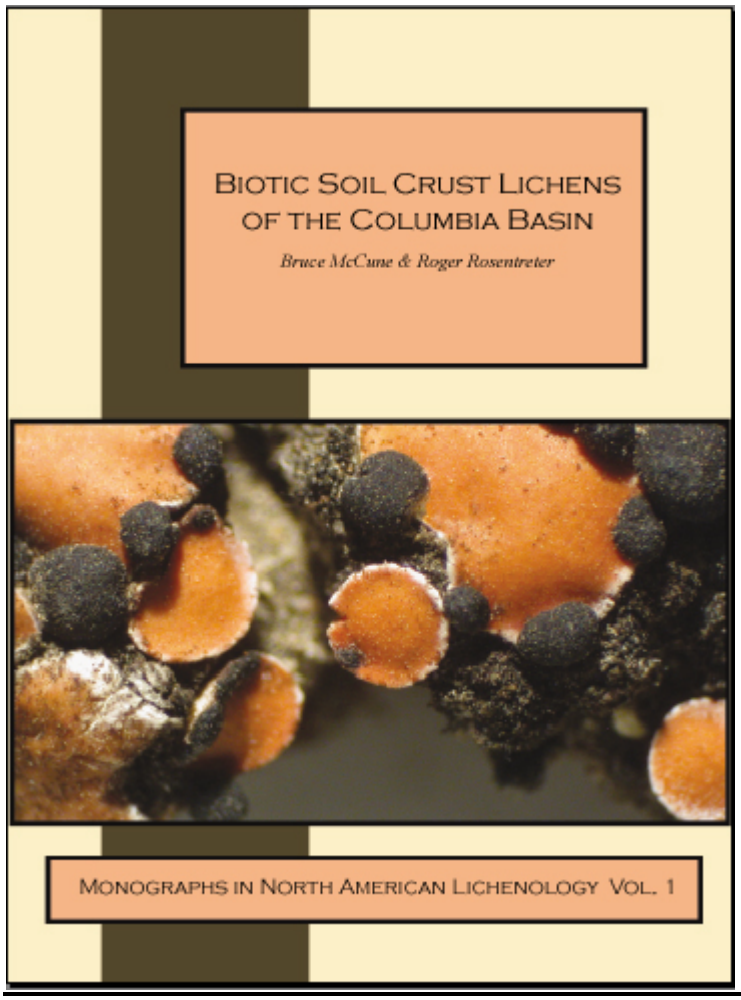
ORDER FORM AS PDF
ORDER FORM (HTML)

Why write a book for identifying soil crust lichens? We have three reasons: (1) they are ecologically important, (2) they can be difficult to identify with existing sources, or they are omitted altogether, and (3) they should be more widely recognized for what they are.

Macrolichens are much better known in North America than crustose lichens, but most of the lichens found in biotic crusts are crustose lichens. Keys and line drawings for macrolichens from the Pacific Northwest and northern Rocky Mountains are provided by Goward et al (1994), McCune and Goward (1995), and Goward (1999). Brodo et al. (2001) and McCune and Geiser (1997) provided color photos for selected species. Despite these resources, almost none of the lichen species growing in biotic crusts in the Pacific Northwest have been illustrated with color photos in sufficient magnification and detail for confident identification. We hope that this book will help to relieve that problem.

Lichens in soil crusts are often difficult to identify. Currently available books for identifying lichens do not illustrate the critical features needed for identification. We try

to fill this need by providing photographs of all of the species at the necessary scale – ranging from what you can see with a hand lens to what you can see through a compound microscope. Wherever possible, we emphasize macroscopic features, but in many cases microscopic characters make the task much easier and help to confirm the identification. This book is aimed at both technical and naturalist audiences. We hope that the use of color photographs will help someone without much experience, while we strive to provide the technical details needed for more certain identification.



Bruce and Linda's new 2nd edition of *Macrolichens of the Pacific Northwest* is now available!

This revised and expanded edition includes 116 new species and 176 additional illustrations and incorporates an understanding of macrolichens that has advanced tremendously in the past decade.

Macrolichens of the Pacific Northwest includes keys to 113 genera and 586 species of Oregon and Washington macrolichens—all the macrolichens known or expected to occur

in the two states. The keys also provide reasonable coverage for lichens of Idaho and Montana, inland to the Continental Divide. Color photographs and detailed descriptions are provided for 246 species, emphasizing lichens prevalent in forested ecosystems.

Online order form: https://www.uapress.arizona.edu/scripts/secure/orderosu.pl

New Species, Interesting Finds, and Other Noteworthy Observations

Where in the World is the Lipstick Lichen?
By John Villella and Scot Loring

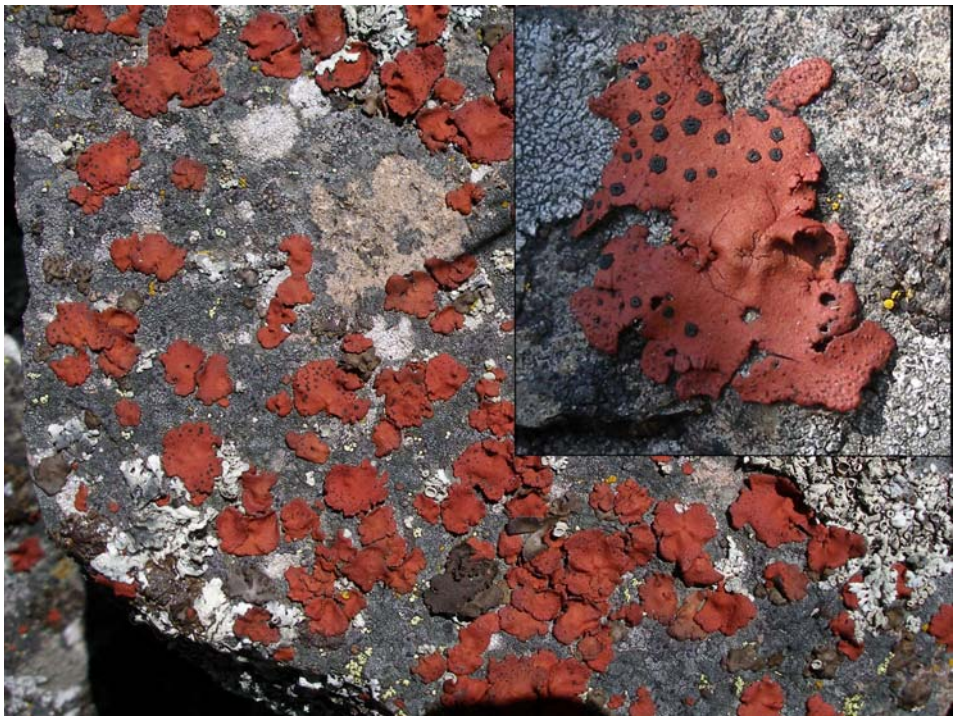
The brilliant red "lipstick lichen" *Umbilicaria phaea* var. *coccinea* was described based on material from northern California by Llano in 1950 in his important monograph on western hemisphere *Umbilicaria*. Since then it has turned out to be an uncommon variety of *U. phaea* always growing in proximity of the typical *var. phaea*. The currently known sites are restricted to two main vicinities, one centered around the type locality in northern California and the other a small disjunct population in eastern Washington. In Macrolichens of the Pacific Northwest (2nd ed), McCune and Geiser describe it as a northwest endemic and Peterson pointed out that in the Pacific Northwest this is the closest thing to a watershed endemic lichen taxa, with all the known California localities restricted to the Klamath River watershed. The two Oregon specimens in the OSU herbarium are also from the Klamath River watershed.

The amazing coloration is due to anthraquinone derivatives, which are also present in vascular plants and certain insects. Synthetic versions are used in a wide variety of industrial uses including production of dyes, hydrogen peroxide, and gasoline. Medicinally, they are used in laxatives and in the treatment of malaria and certain cancers. They are also used as a bird repellant and perhaps help serve lichens as protection against herbivory/mycophagy.

Botanical field surveys in the Klamath River watershed portion of the Cascade Siskiyou National Monument (CSNM – now Soda Mountain Wilderness) in Jackson County, Southwestern Oregon, in 2007 found it to be locally common there. Larger, denser populations could be seen from a considerable distance, due to rocks appearing to have an overall red hue. There are also known populations nearby to the east in Klamath County, also within the same watershed. Based on available habitat notes taken from the CSNM and Sampson Creek populations, the substrate in these areas is andesite and conglomerate outcrops, the conglomerates often with a minor calcareous component. Andesite is very common in southern Oregon and nearby areas. It is similar to basalt (but with more silicon) and rhyolite (but with more feldspar). The habitats are generally exposed and with a south-facing aspect on average. There are an additional two very small populations (several thalli each) three miles east of Emigrant Lake near Ashland in the Rogue River watershed, approximately seven miles north of the northern-most aforementioned Klamath River watershed locations. These two populations appeared to be unhealthy at the time of discovery and have not been re-documented since first observed in 2002.

This taxa is currently being considered for listing in Oregon by the Oregon Natural Heritage Information Center (ORNHIC). In the case that this species receives listing, it will likely be ORNHIC3 status (rare, uncommon, or threatened, but not immediately

imperiled), a common rank of species entering the list. It was first listed in 1983 by ORNHIC (then ONHP) but was removed in 2001 as it was thought to be too common at the time. A student at UW is currently studying this variety, an action that often helps in considering a taxa candidate for listing. The newly revised ORNHIC list will be released soon. We are currently working on drafting a conservation sponsorship for this lichen for the California Lichen Society, and would appreciate any knowledge that could be shared by members of Northwest Lichenologists. Although this lichen is conspicuous and not likely to have been missed in explored locales, the vast, relatively less explored expanses of Eastern Oregon and Washington may yet hide sites.



Umbilicaria phaea var. *coccinea.* Cascade-Siskiyou National Monument, 2007

The Genus *Sclerophora* in Oregon
By Scot Loring

Sclerophora is a genus of pin lichens usually found in temperate climates. They consist of apothecia born at the tips of stalks growing from a basal crust. The apothecia are head-like and have a mazaediate spore mass that is generally pinkish to salmon in coloration. The stalks are not lichenized, usually appear pale externally, are somewhat translucent internally, and grow to approximately 1.5mm long. The crust is lichenized, immersed in the substrate, generally not easily detected, and has *Trentepohlia* as the algal symbiont. In our species, whitish to yellow pruina is often present on the capitula. Spores are globose and often feature reticulate, ridged, and/or warty ornamentation.

One may confuse *Sclerophora* with certain *Chaenotheca* species, especially *C. brachypoda*, which I have observed growing intermixed with *S. peronella*. In Oregon, I usually can differentiate the two genera macroscopically in the field by the appearance of the spore mass – I have yet to see a *Chaenotheca* with such pink/salmon coloration. The two genera also can be differentiated by microscopic characters such as:
-symbionts (most of our *Chaenotheca* species have *Stichococcus*)
-spores (*Sclerophora* has hyaline, non-septate spores whereas *Chaenotheca* have pigmented spores that usually have different ornamentation and can be septate

Two species have been found in Oregon, where *S. peronella* is known from approximately fifteen sites, mostly in the northwest part of the state, although I have also recently found several populations in both Douglas and Jackson Counties. I found *S. amabilis* near the town of Winston in Douglas County two years ago, the first site documented for Oregon. I have since found two other sites, including one in Jackson County.

These two species can be differentiated by the presence of a collar-like excipulum in *S. amabilis* (examine multiple pins), a feature absent in *S. peronella*. Literature differs on spore widths, but all agree that *S. amabilis* has larger spores than *S. peronella*, the size break being around 5 microns.

I have found *S. peronella* growing on bark (and one population on rotting wood) of multiple hardwood tree species including *Alnus rubra, Acer macrophyllum, Quercus garryana, Q. kelloggii, Q. chrysolepis*, and *Fraxinus latifolia. S. amabilis* I have found on bark of *Q. garryana* and *A. rubra*. These populations were observed in a variety of habitats from dry oak woodlands to old-growth forest and riparian areas. Slope position is extremely variable, sites existing from lowland valleys and riverbanks through mid-slopes up to high ridgelines.

Both of these species are currently under consideration for listing in Oregon by the Oregon Natural Heritage Information Center (ORNHIC). In the likely case that these species receives listing, they will probably be given ORNHIC3 status (rare, uncommon, or threatened, but not immediately imperiled), a common rank of species entering the list. The newly revised list will be published soon. I have made *numerous* pin collections

over the years from a variety of substrates in many habitats. Hopefully I will someday have time to examine more of them and report more interesting finds.

Miscellaneous

Lichen Blitz

Are you interested in hosting a NW Lichenologists lichen-blitz?

Once or twice a year NWL members come together for a multi-day fieldtrip to a lichen-rich area in the Pacific Northwest of North America. The purpose is to get to know each other, and learn from each other while doing what we love to do: "lichenize." These gatherings bring together much expertise and typically a species list results from our collaborative efforts.

If you manage a natural area, and are interested in hosting a lichen-blitz, please contact us. We are a low-maintenance group that usually camps or bunkhouses in remote locations. Formal permission to collect lichens is naturally needed. NWL will periodically review its blitz requests and optional associated donation, and schedule a foray to the most interesting area.

Donations will be used to support the educational, nonprofit purposes of NW Lichenologists.

Contact the secretary of NW Lichenologists

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100 Favorite Lichens

Dear fellow lichenologists,

We want to thank those who submitted names of lichens for nomination for our project of 100 favorite lichen species. 90 colleagues from all over the world submitted a whopping total of 725 names! Since all lichens are beautiful, probably over 15,000 names could have been submitted, but the 725 made our task to narrow down the list a little (but only a little) easier. We finally boiled down the list to 300 names, using criteria such as not more

that one species per genus (except for large, morphologically variable genera), the number of nominations per species, and the reason for nomination. In some cases this did not quite work out; for example, it was impossible to decide between *Ochrolechia oregonensis* and *O. parella*, so we left them both in. Also, the criterion of one species per genus has been interpreted loosely in cases where the genera are delimited artificially and contain more than one natural group (e.g. *Lobaria-Lobariella*, *Ocellularia*). In some cases, we have used revised generic classification that is about to be published (e.g. *Allographa*, *Glossodium*, *Phytoconis*). However, it is not really about the genera but the species!

We would also like to thank those that have provided photographs and those who maintain websites with lichen image galleries, which provided an endless source of delight. Our particular thanks go to Richard Droker, Peter Nelson, Serge Poumarat and Jean-Louis Jalla, Matthias Schultz, Stephen Sharnoff, Alan Silverside, Laurens Sparrius and André Aptroot and colleagues (Tropical Lichen Pictures), Leif and Anita Stridvall, Mike Sutcliffe and colleagues (British Lichens), Einar Timdal and colleagues (Botanical Museum Oslo Photo Gallery), Timothy Wheeler, Paul Whelan, and Volkmar Wirth, from whom we got multiple images to select from. In many cases it was difficult to decide which photo to use for the nominated species, and here we have tried to include as many different photographers as possible why maintaining a high level of aesthetics. This project made us realize that there are many outstanding lichen photographers out there, some well-known and some certainly unknown to most of us. To widen the participation of lichen photographers, for the selected 100 favorite species we will use up to three different pictures for the species pages.

So, to make a long story short, the moment has come for all of you to vote, and here is how it works:

At the following link you should be able to download three files (we did not send these by email since one has 8MB and surely would rebounce from many email addresses because of size limitations):

http://www.4shared.com/dir/32418479/cbb7c3ad/100_Favorite_Lichens.html

-100_favorite_lichens.pdf
-100_favorite_lichens_remarks.pdf
-100_favorite_lichens_vote.xls

The file "**100_favorite_lichens.pdf**" contains the images, names, and photographers of the 300 species nominated for voting. The file "**100_favorite_lichens_remarks.pdf**" contains the classification of each species as well as brief remarks of what you see on the picture or why a species was nominated. Finally, the file "**100_favorite_lichens_vote.xls**" is the voting file. It is an Excel spreadsheet that hopefully all of you can open.

Each of you has **50 votes**, that is you can select 50 out of the 300 nominated species. Once you have selected your 50 species, use the Excel file and enter the value "**1**" into the box just left of the corresponding species name. The first cell in that column is a check box that will sum the number of selected species and indicate "**50**" once you have entered "**1**" for all of your selected 50 species. The voting process should be simple and straightforward and should allow you to vote for a broad range of species to fit everyones varied taste. We will then simply add all votes for each species and the one with the highest number of votes will win. Please let us know if you have any questions.
The deadline for voting is March 15th, which will give you about 2 weeks for what is probably the most difficult task of your entire lichenological life. By March 15th, you should sent back your Excel file with your 50 votes to:
rlucking@fieldmuseum.org

****Please note that the deadline has been extended until March 28, 2010 so that votes may be cast by any Northwest Lichenologists that have not yet had the opportunity to do so****

Last but not least, we used the nomination process to determine which are the most favorite lichen genera, based on the number of nominated species and total nominations. The result is:

1. Cladonia (by far!)
2. Usnea
3. Ramalina
4. Caloplaca
5. Peltigera
6. Lecanora
7. Pseudocyphellaria
8. Leptogium
9. Teloschistes
10. Heterodermia
11. Parmotrema
12. Lobaria
13. Sticta
14. Coenogonium
15. Physcia
16. Niebla

So, at this point we can only wish you a lot of fun with the voting process and enjoy the compilation of unique lichen species that for the first time have all been brought together in such a context. We hope that all of you vote to make this project a success! Please also forward this email to colleagues you think might have not received it through our channels.

Robert & Thorsten

Robert Lücking, PhD
Collections Manager and Adjunct Curator
Department of Botany
The Field Museum
1400 South Lake Shore Drive
Chicago, IL 60605-2496, USA

Biological Soil Crust Survey - Rome Cliffs Area, T31S, R41E, Sec. 32, Malheur County, Oregon

Prepared for the
Bureau of Land Management
Oregon State Office
January 28, 2010

Ann DeBolt
2105 Manitou Avenue
Boise, ID 83706

Introduction

The Rome Cliffs Area and associated zeolite deposits are located in the vicinity of Rome, Oregon, approximately 130 km (as the crow flies) southwest of the town of Vale. Neogene and Quaternary volcanic and sedimentary rocks are the primary outcroppings in this area (Sheppard 1987). The zeolites and associated minerals occur in a sequence of alluvial and lacustrine volcaniclastic rocks known informally as the Rome beds (Sheppard 1987). The beds are nearly 100 m thick and consist of an alluvial and lacustrine sequence of conglomerate, mudstone, sandstone, tuff, and minor limestone and chert (Sheppard 1987). The rocks of the Rome beds are primarily volcanic except for minor limestone, chert, and mudstone. It is largely because of this area's unique and varied geology and soils that botanists have been interested in its flora for many years, as the soils support at least six, and possibly more, edaphic endemic and other uncommon vascular plant species.

Although relatively distant from large population centers, the unique geology and accessibility of this area (near a major highway, moderate topography, 2-track roads traverse the site) lends itself to the potential for unmanageable off-road vehicle activity. It is important to determine resource values under current conditions, since it is expected that planning documents will be needed for this area in the not too distant future.

As mentioned above, vascular plant surveys have turned up several uncommon taxa in the Rome area, specifically at Sec. 32, Township 31S, Range 41E. According to local botanists, additional inventories are still needed in this area (Don Mansfield, College of Idaho, personal communication, 2009). For the lower plants, including lichens and bryophytes, surveys in this or other regions of eastern Oregon have been limited. In 1984, Mayfield and Kjelmyr identified 14 bryophyte and 7 lichen taxa from the Boardman Research Natural Area in north-central Oregon. While investigating biological soil crust composition in relation to soil chemistry, climate, and livestock grazing, Ponzetti and McCune (2001) identified 48 taxa or morphological groups at nine shrub-steppe sites in central and eastern Oregon. None of these sites were extensively surveyed, but transect sampling was intensive and to the species level whenever possible. Of the nine sites, the closest one to Rome is nearly 180 km to the west. DeBolt (2008) identified 47 biological soil crust taxa during an inventory of the Birch Creek area, 50 km northeast of Rome. Prior to the 2008 inventory, systematic surveys for these organisms in this part of the state are not believed to exist.

Biological soil crusts are a close association between soil particles and cyanobacteria, microfungi, algae, lichens, and bryophytes (mosses, liverworts) which live within or on top of the uppermost millimeters of soil (Belnap et al. 2001). They are found in all dryland regions of the world and in all vegetation types within these lands, including the arid and semi-arid regions of North America (Rosentreter and Belnap 2001). Also known as cryptobiotic crusts, biotic crusts, microbiotic crusts, and cryptogamic crusts, biological soil crusts are often overlooked due to their tendency to blend in with the soil; thus, they are seldom collected. Due to the small size and fragility of the specimens, they can be difficult to return to the lab intact and suitable for species determination. However, the ecological importance of these organisms in nutrient

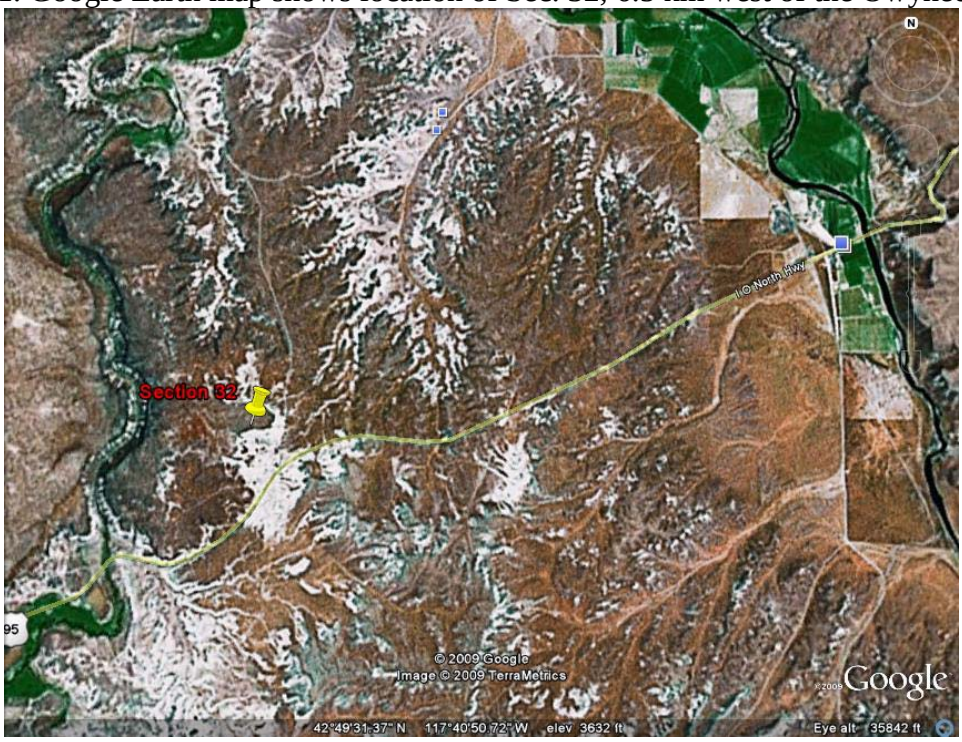
cycling, moisture storage, and soil stabilization has been well documented (Belnap et al. 2001, Hilty et al. 2004, Ponzetti et al. 2007, Rosentreter et al. 2007, Serpe et al. 2007), and will not be discussed further in this report.

At the request of the Bureau of Land Management, this project was divided into two parts. Part 1 included the field inventory of Sec. 32 west of Rome, Oregon to: (1) identify which soil-occurring lichen and bryophyte taxa are present in this unique area; (2) prepare a herbarium reference collection of all species observed, including duplicates whenever possible; and (3) determine if taxa differ by habitat and soil type. Part 1 has been completed and delivered to the BLM. Part 2 consists of the preparation and printing of this report, which consolidates and summarizes all field findings and photographs. It is hoped that these products will be useful to the Bureau during the preparation of future planning documents, and in furtherance of our knowledge of an important but poorly known component of the ecosystem.

Methods

Soil-occurring lichens and bryophytes were collected in June 2009 at the Sec. 32 portion of the Rome (sometimes referred to as the Rome Cliffs) area. This area is located at T31S, R41E, 85 km SW of Jordan Valley, OR, and about 225 km southwest of Boise, Idaho (actual highway km). The area is accessed via Highway #95. More specifically, after crossing the Owyhee River at Rome, OR, continue 6.5 additional kilometers before turning north onto a wide dirt road (Fig. 1). This dirt road slices through the eastern portion of Section 32, from north to south, providing excellent access to the study area.

Figure 1. Google Earth map shows location of Sec. 32, 6.5 km west of the Owyhee River.



To be as objective as possible in assessing biological soil crust diversity at the study site, Forest Health Monitoring sampling protocols were loosely followed. A minimum of 30 minutes and a maximum of 2 hours were spent examining plots with a 35 m radius within a given habitat or vegetation type (McCune et al. 1997). As best as could be determined (biological soil crusts are difficult to field identify), each different species encountered within a site was carefully collected and numbered. Only soil-occurring species were sampled (wood- and rock-occurring species were collected very sparingly). Each sample was gently wrapped in tissue and placed in a small paper bag. Small bags were then grouped into one large paper bag or box per plot once sampling was completed. Other data recorded at each site included the GPS coordinates, elevation, aspect, slope, and associated vascular plant species. Soil samples were taken for subsequent texture and pH testing.

This relatively small area (640 acres) of limited topographic relief is fairly homogeneous in terms of vascular plant diversity, yet at least six uncommon to rare plant species are known to occur here or in adjacent sections, most likely due to unique edaphic factors. These species and their state and Bureau global rarity status are as follows:

- *Astragalus alvordensis* M.E. Jones (Alvord milk-vetch); G4, S4, List 4
- *Chaenactis cusickii* A. Gray (Cusick's chaenactis); G3, S3, List 4
- *Chaetadelpha wheeleri* A. Gray ex S. Watson (Wheeler's skeleton-weed); G4, S2, List 2, Bureau Sensitive
- *Eatonella nivea* (D.C. Eaton) A. Gray (White eatonella); this former Bureau sensitive plant species occurs in an adjacent section of land
- *Lomatium foeniculaceum* (Nutt.) J.M. Coult. & Rose ssp. *fimbriatum* W.L. Theobald) (Fringed desert-parsley); G5T2T4, S1, List 2, Bureau Sensitive
- *Lomatium ravenii* Mathias & Constance (Raven's lomatium); G4, S1, List 2, Bureau Sensitive

Only four representative vegetation types were selected for sampling, although further exploration of the site would probably increase this sample size. The four sites are described as follows, with dominants listed in order of prevalence (from most dominant to less dominant):

Plot 1: alkaline, clay-silt soil of swale area (pH 8) with no detectable aspect, dominated by *Atriplex nuttallii* S. Watson, *Grayia spinosa* (Hook.) Moq., *Elymus elymoides* (Raf.) Swezey, *Poa secunda* J. Presl.; where burned on south edge of plot, dominated by *Halogeton glomeratus* (M. Bieb.) C.A. Mey. and *Lepidium perfoliatum* L., with few biological soil crusts.

Plot 2: clay soil (pH 7), from flat to 35% slope with a northerly aspect; mostly barren of vasculars but when present, dominated by *Atriplex confertifolia* (Torr. & Frém.) S. Watson, *Elymus elymoides, Poa secunda, Tetradymia spinosa* Hook. & Arn., *Atriplex argentea* Nutt., and *Guiterrezia sarothrae* (Pursh) Britton & Rusby.

Plot 3: fine, sandy-silt soil (pH 7) with cobble surface, flat to slight SW aspect on top of ridge; dominated by *Tetradymia glabrata, Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young, *Elymus elymoides, Phlox* sp., and *Bromus tectorum* L.

Plot 4: sandy-silt soil (pH 7) of flat area that partially burned a few years ago; dominated by *Bromus tectorum, Halogeton glomeratus, Elymus elymoides, Atriplex confertifolia, Ceratocephala testiculata* (Crantz) Roth (= *Ranunculus testiculatus*), *Sphaeralcea munroana* (Douglas) Spach, and *Salsola tragus* L.

Biological soil crust specimens were returned to the lab and curated using standard bryological and lichenological techniques (Brodo et al. 2001, McCune and Rosentreter 2007). Species were identified using the floras listed in the "References" section, primarily McCune and Rosentreter (2007) and Rosentreter et al. (2007). Soil pH and texture were analyzed in the lab using standard techniques.

Results and Discussion

Among the 94 herbarium specimens prepared for Part 1 of this project (see Appendix A. Collection Notebook), **forty-two lichen, bryophyte, and cyanobacteria taxa were identified**, along with one unknown fungus on a rabbit pellet. Among the 42 taxa, there are 34 lichens (32 on soil, 1 on wood, 1 on pebbles), 6 bryophytes (mosses and liverworts – all on soil), and 2 cyanobacteria (on soil) (Table 1, Fig. 2). The total number of taxa will increase slightly once species are determined by experts, as several collections were identified only to genus (see Appendix A).

Interesting records from the Rome area include the lichen *Lecidea laboriosa* Müll. Arg. This is apparently the first report of this species for Oregon, although its verification is still pending. *Lecidea laboriosa* is typically found on calcareous rock and sandy soil in the southwest U.S., plus a few sites on the Snake River Plain in Idaho (McCune and Rosentreter 2007). It was collected in Plots #1 (#2381) and #2 (#2424), both slightly more diverse than the two other study plots (Table 2, Fig. 2).

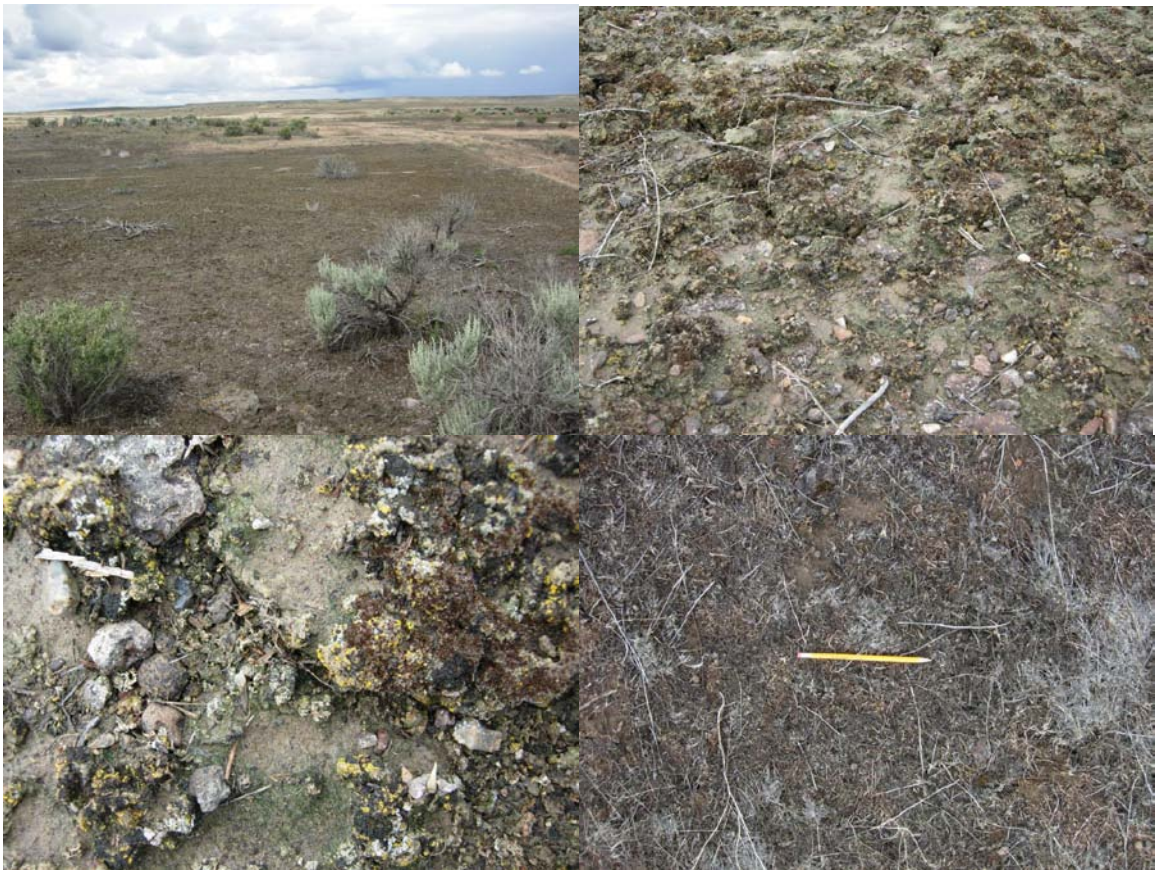
Another possible first report for Oregon is *Heteroplacidium congestum* (Breuss & McCune) Breuss (formerly *Catapyrenium congestum* Breuss & McCune). This brown-colored lichen is uncommon in *Artemisia* and *Atriplex* steppe, often on saline soils (McCune and Rosentreter 2007). It is known from southern Idaho, Utah, and Colorado. *Heteroplacidium congestum* was collected once in Plot #1 (#2395) and several times in Plot #3 (#2424), where it occurred quite abundantly. These two specimens are also pending verification from experts in Europe.

Of the four study plots, Plot #2 supported the most unique taxa, with nine lichen and one cyanobacteria not found elsewhere (Table 2, Fig. 3). Biological soil crust taxa found only in this plot include the lichens *Aspicilia contorta* (Hoffm.) Kremp., *Acarospora fuscata* (Schrad.) Arnold, *A. glaucocarpa* (Ach.) Körber, *Lecanora garovaglii* (Körber) Zahlbr., *L. laatokkaensis* (Räsänen) Poelt, *Megaspora verrucosa* (Ach.) Hafellner & V. Wirth, *Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt, *Staurothele areolata* (Ach.) Lettau, an unknown yellow crustose species, and the cyanobacteria *Nostoc.* This site is characterized by clay soil with a northerly aspect, the greatest slope ranges, from flat to 35%, and it is the most visually distinctive, with multi-colored soils of extensive microtopography and very sparse vascular plant cover (see photos below). *Tetradymia spinosa, Atriplex argentea,* and *Guiterrezia sarothrae* were vascular plant dominants recorded only in Plot #2.

Plot #2 photos illustrate its topographic relief, soil color variation, and sparse vascular plant cover.

The saxicolous lichen, *Rhizoplaca melanophthalma,* was collected on both rock and soil in Plot #2. While the soil-occurring growth form has been observed elsewhere, it is relatively uncommon. Some lichenologists consider the two growth forms as separate subspecies. In Plot #2, *R. melanophthalma* on soil was nearly fruticose, giving it an even more atypical appearance. Other normally saxicolous species growing on the clay soil in this plot included *Acarospora glaucocarpa, A. fuscata, Aspicilia desertorum* (Krempelh.) Mereschk., *Lecanora garovaglii, L. laatokkaensis, Protoparmelia badia* (Hoffm.) Hafellner, and *Staurothele areolata*. Unfortunately, Plot #2, with its combination of sparse vascular plants and relatively steep hillside topography, may be one of the more inviting areas to off-highway vehicle users. Its unique soil crust flora would certainly be impacted by this type of use.

Generally speaking, Plot #1 was not nearly as visually distinctive as Plot #2, though the biological soil crust cover was extensive, except where burned. Four taxa were unique to this plot – two lichens, including one species yet to be determined plus *Placidium rufescens* (Ach.) Breuss, and two bryophytes - *Crossidium aberrans* Holz. & E.B. Bartram and *Grimmia alpestris* (Weber & Mohr) Schleicher (also see Table 2). Plot #1 was the most alkaline, with a pH of 8 (all others were pH 7), clay-silt soil, and the only area occupied by *Atriplex nuttallii*.



Plot #1 photos illustrate the high biological soil crust cover of what superficially looks like barren ground within this swale zone. In the bottom right photo, biological soil crusts are reduced by fire and the increased litter of exotic annuals.

Megaspora verrucosa, a rather widespread species in the western U.S., grows from desert to alpine regions, typically on organic matter over the soil. It is most often found in calcareous habitats. In the Rome area, *Megaspora verrucosa* was collected only in Plot #2. Lichens on soil are good indicators of soil pH, or free calcium carbonates (McCune and Rosentreter 2007). Other Rome area taxa indicative of calcareous soils include *Acarospora glaucocarpa*, *Aspicilia hispida* Mereschk., *Caloplaca tominii Savicz*, *Collema tenax* (Sw.) Ach., *Psora cerebriformis* W.A. Weber, *P. decipiens* (Hedwig) Hoffm., and *P. tuckermanii* R. Anderson ex Timdal, or at least 19% of this area's soil crust flora (Table 3).

Table 3. Calcareous indicator species by plot.

Plot #1	**Plot #2**	**Plot #3**	**Plot #4**
Aspicilia hispida *Caloplaca tominii* *Collema tenax* *Psora decipiens* *Psora tuckermanii*	*Acarospora glaucocarpa* *Caloplaca tominii* *Collema tenax* *Megaspora verrucosa*	*Caloplaca tominii* *Collema tenax* *Psora cerebriformis*	*Caloplaca tominii* *Collema tenax* *Psora decipiens* *Psora tuckermanii*

Biological soil crust taxa unique to Plot #3 include the three lichens, *Candelariella rosulans* (Müll. Arg.) Zahlbr, *Placidium lachneum* (Ach.) Breuss, and *Psora cerebriformis* (Table 2, Fig. 3). Of these, *P. lachneum* probably has the most limited distribution. Plot #3's flat ridgetop area with fine, sandy-silt soil and a cobble surface was dominated by vascular plants including *Tetradymia glabrata, Artemisia tridentata* ssp. *wyomingensis, Elymus elymoides,* and an unidentified *Phlox*. *Tetradymia glabrata* and *Phlox* sp. were not detected in other plots. A total of twenty biological soil crust taxa were collected in Plot #3 (15 lichens, 3 bryophytes, 2 cyanobacteria) (Table 1, Fig. 2). Among the four study plots, this vegetation type is probably the most common in southeast Oregon.

Plot #3 photos illustrate the cobble soil surface, which supported 20 biological soil crust taxa.

No taxa were unique to Plot #4 (Table 2, Fig. 3). This site partially burned several years ago and is currently dominated by exotics including *Bromus tectorum, Halogeton glomeratus, Ceratocephala testiculata* (*Ranunculus testiculatus*), with scattered remnant native perennials such as *Elymus elymoides, Atriplex confertifolia,* and *Sphaeralcea munroana*. In spite of habitat degradation, it is still somewhat remarkable that **14 biological soil crust taxa were collected in this disturbed plot**, including three of the six bryophytes (Table 1). Remnant biological soil crust taxa are often indicators of low intensity burns (Rosentreter 2001). Slickspots, of which there are several within this plot, also serve as refugia from fire for biological soil crust taxa

Plot #4 photos illustrate dominance by exotic annuals after the area partially burned several years ago. Native perennials and biological soil crust taxa continue to persist, suggesting a low intensity burn. Slickspot areas also serve as refugia from fire for biological soil crust taxa.

Taxa collected in the general area of Sec. 32 but not from a specific study plot were *Thelomma occidentale* (Herre) Tibell and *Aspicilia desertorum* f. *contorta*. Both were on non-soil substrates. *Thelomma occidentale* was growing on pieces of old wooden fenceposts, while the *contorta* form of *A. desertorum* encompassed many of the small pebbles. While neither species was on soil, it helps demonstrate substrate specificity of many lichen and bryophyte taxa.

Bryophyte (both moss and liverwort) diversity in the Rome area was 50% lower than Birch Creek, where twelve bryophyte species were observed (DeBolt 2008) (Fig. 4). Birch Creek bryophyte taxa missing from the Rome area included *Brachythecium collinum* (Schleich. ex Müll. Hal.) Schimp., *Cephaloziella byssacea* (Roth) Warnst., *Ceratodon purpureus* (Hedw.) Brid., *Coscinodon calyptratus* (Hook.) C.E.O. Jensen ex Kindb., and *Homalothecium aeneum* (Mitt.) E. Lawton. This is likely because of the more open and gentle topography of Rome (specifically Sec. 32) versus the canyon environment of Birch Creek, with its tremendous topographic diversity and abundance of shaded, sheltered sites.

Additional soil-occurring species would probably be found if more time were spent in the Rome area, as its unique microhabitats and soil outcrops appear endless. However, the information gained during this project, in combination with the 2008 Birch Creek inventory, begin to give us a snapshot of biological soil crust diversity in southeast Oregon.

Conclusion

During the 2009 survey of biological soil crust diversity in the Rome, Oregon area, at least 42 taxa were identified from a 640 acre parcel of public land (T31S, R41E, Sec. 32). Among the 42 taxa, 34 lichens, 6 bryophytes, and 2 cyanobacteria were collected. Two species (*Lecidea laboriosa, Heroplacidium congestum*) are believed to be

new records for Oregon. Verification of both taxa is still pending, as is the identification of several other specimens.

The soil types and dominant vegetation differed considerably among the four study plots, reflected to some extent by the biological soil crust flora. Plots supported between 14 and 25 taxa. Of the 25 taxa collected in Plot #2, ten were unique to this site. This plot is possibly the most vulnerable to off-highway activity, as it has relatively steep slopes largely devoid of shrubs, and would appeal to those wishing to "hill climb" with recreational vehicles. This study helps illustrate that while some may see this landscape as barren, its diversity is remarkable if time is taken to look more closely.

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Appendices, Tables, Figures, and Attachments

1. **Appendix A.**
   This portion of the document is the collection notebook for Part 1 of the study. It includes label and species data for each site. DeBolt collection numbers range from 2380 to 2485. **It is also included in the body of this document.**

2. **Table 1.** Alphabetical list of taxa collected in the Rome Area.
   This is an Excel spreadsheet. It is an alphabetical list of the species with their respective collection number(s), the number of specimens for each collection, life form (ie. bryophyte or lichen), and notes. **This table is in a separate electronic file.**

3. **Table 2.** Alphabetical list of taxa by collection site in the Rome Area.
   This is an Excel spreadsheet. It is an alphabetical list of species by ecological site. **This table is in a separate electronic file.**

4. **Table 3.** Calcareous indicator species by plot. **This is a Word table within the body of this document.**

5. **Figure 1.** Google Earth map shows location of Sec. 32, 6.5 km west of the Owyhee River. **It is within the body of this Word document.**

6. **Figure 2.** Total number of biological soil crust taxa collected in each of the four plots. This is an Excel graph of the number of taxa found in the different plots. **It is in a separate electronic file.**

7. **Figure 3.** The number of biological soil crust taxa unique to each of the four plots. This is an Excel graph. **It is in a separate electronic file.**

8. **Figure 4.** Pie charts illustrate the number of taxa per life form at Rome (2009) and Birch Creek (2008). This includes two separate pie charts. **It is in a separate electronic file.**

9. **Digital Photographs.** All photos have been copied onto a separate CD.

10. **PDF file.** All files (report plus tables and figures) are incorporated into one document.

APPENDIX A.

Collection Notebook, Rome Cliffs Area, T31S, R41E, Sec. 32, Malheur County, Oregon

PLOT #1:
Alkaline, clay-silt soil of swale area (pH 8) with no detectable aspect. Approx. 6.5 km SW of Rome, OR and the Owyhee River, and 85 km SW of Jordan Valley, OR. *Atriplex nuttallii, Grayia spinosa, Elymus elymoides, Poa secunda* site. Where burned, largely dominated by *Halogeton glomeratus* and *Lepidium perfoliatum*.
N 42° 494' W 117° 424' 1122 m (3679 feet elevation) 14 June 2009

2380 *Psora decipiens* (Hedwig) Hoffm.
2381 *Lecidea laboriosa* Müll. Arg. (new for Oregon)
2382 *Collema tenax* (Sw.) Ach. (fertile)
2383 *Candelariella aggregata* M. Westb. (K- ; on organic matter)
2384 *Placidium rufescens* (Ach.) Breuss
2385 *Psora tuckermanii* R. Anderson ex Timdal
2386 *Placidium rufescens* (Ach.) Breuss
2387 *Placidium lacinulatum* (Ach.) Breuss (fertile)
2388 *Crossidium aberrans* Holz. & E.B. Bartram
2389 *Syntrichia caninervis* Mitten
2390 *Pterygoneurum ovatum* (Hedw.) Dix
2391 *Thrombium epigaeum* (Pers.) Wallr. (1 spec. kept for BSU)
2392 *Aspicilia* sp. (K-) (1 spec. kept for further evaluation)
2393 *Collema tenax* (Sw.) Ach. (on soil)
2394 *Endocarpon pusillum* Hedw. (on organic matter)
2395 *Heteroplacidium congestum* (Breuss & McCune) Breuss
(Syn.: *Catapyrenium congestum*) **(1 spec. sent to Othmar Breuss for verification)**
2396 *Syntrichia ruralis* (Hedw.) Web. & Mohr
2397 *Collema tenax* (Sw.) Ach. (young thalli)
2398 *Caloplaca tominii* Savicz (K+ red)
2399 *Aspicilia desertorum* (Krempelh.) Mereschk. form *terrestris* (K-)
2400 *Grimmia alpestris* (Weber & Mohr) Schleicher (on soil over rock)
2401 *Aspicilia hispida* Mereschk. (on soil)
2402 *Microcoleous* sp. (cyanobacteria)
2403 ? (black crust that turns green when wet) (1 spec. kept for further eval.)
2405 xxxxx
2406 xxxxx

xxxxx = blank numbers

PLOT #2:

Clay soil (pH 7). N aspect, from flat to 35% slope. Approx. 6.5 km SW of Rome, OR and the Owyhee River, and 85 km SW of Jordan Valley, OR. Associated vegetation: *Atriplex confertifolia, Elymus elymoides, Poa secunda, Tetradymia spinosa,* annual *Atriplex,* and *Guiterrezia sarothrae*.

N 42° 492' W 117° 421' 1131 m (3709 feet elevation) 14 June 2009

2407 *Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt (on soil)
(several specimens kept for BSU since this is unusual; will probably send some off)
2408 *Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt (on rock)
2409 *Lecanora garovaglii* (Körber) Zahlbr. (on rock; K-, KC-) Ver. B. McCune
2410 *Staurothele aerolata* (Ach.) Lettau
2411 xxxxx
2412 *Lecanora garovaglii* (Körber) Zahlbr. (on rock) (1 spec. kept for BSU)
2413 *Aspicilia aspera* (Mereschk.) Tomin. (very adnate) (1 spec. kept for BSU)
2414 *Collema tenax* (Sw.) Ach.
2415 *Protoparmelia badia* (Hoffm.) Hafellner (blk apothecia, olive green thallus, disc/thallus K-) (1 spec. kept for BSU)
2416 *Aspicilia desertorum* (Krempelh.) Mereschk. (on rock)
2417 ? (yellow crustose lichen; mixed with *Aspicilia desertorum* and *Staurothele*); (**spec. sent to B. McCune for further evaluation**)
2418 *Staurothele areolata* (Ach.) Lettau
2419 *Bryum argenteum* Hedw. (synonym: *Bryum lanatum)* (very small with long awns)
2420 Fungi on rabbit pellets (1 spec. kept for further evaluation)
2421 *Aspicilia desertorum* (Krempelh.) Mereschk. form *terrestris*
2422 *Synthrichia ruralis* (Hedw.) Web. & Mohr
2423 *Endocarpon pusillum* Hedwig
2424 *Lecidea laboriosa* Müll. Arg. (on soil, K-, spores simple, 8/asci, hyline) (new for Oregon; 1 spec. kept for BSU)
2425 *Caloplaca tominii* Savicz
2426 *Aspicilia* sp. (small apothecia) (1 spec. kept for further evaluation)
2427 *Acarospora fuscata*-like (on pebbles) (1 spec. kept for further evaluation)
2428 *Bryum argenteum* Hedw. (synonym: *Bryum lanatum)*
2429 *Nostoc* sp. (mixed with moss)
2430 *Acarospora fuscata*-like (but on soil) (1 spec. kept for further evaluation)
2431 *Placidium* sp. (small thallus; **1 spec. sent to Othmar Breuss**)
2432 *Microcoleous* sp. (cyanobacteria)
2433 *Megaspora verrucosa* (Ach.) Hafellner & V. Wirth
2434 *Syntrichia caninervis* Mitten **(1 spec. sent to John Badina)**
2435 *Acarospora glaucocarpa* (Ach.) Körber (det. by B. McCune, 7/09)
2436 *Aspicilia contorta* (Hoffm.) Kremp. (on pebbles)
#2435 and #2436 are together in the same packet
2437 *Lecanora laatokkaensis* (Räsänen) Poelt (small thalli on rock)
2438 xxxxx
2439 xxxxx
2440 xxxxx

PLOT #3:

Fine, sandy-silt soil (pH 7) with cobble on surface. Slight SW aspect on top of hills. Approx. 6.5 km SW of Rome, OR and the Owyhee River, and 85 km SW of Jordan Valley, OR. Associated vegetation: *Tetradymia glabrata, Artemisia tridentata* ssp. *wyomingensis, Elymus elymoides, Phlox* sp., and *Bromus tectorum*.
N 42° 491' W 117° 424' 1146 m (3756 feet elevation) 15 June 2009

2441 *Thrombium epigaeum* (Pers.) Wallr.
2442 *Aspicilia aspera* (Mereschk.) Tomin. (poor specimen)
(1 spec. kept for further evaluation)
2443 *Collema tenax* (Sw.) Ach.
2444 *Candelariella aggregata* M. Westb.
2445 *Syntrichia ruralis* (Hedw.) Web. & Mohr
2446 *Placidium* sp. **(1 spec. sent to Othmar Breuss)**
2447 *Caloplaca tominii* Savicz (K+ red)
2448 *Aspicilia desertorum* (Krempelh.) Mereschk. form *terrestris*
2449 *Microcoleous* sp. (cyanobacteria)
2450 *Heteroplacidium congestum* (Breuss & McCune) Breuss
(1 spec. sent to Othmar Breuss)
2451 *Syntrichia caninervis* Mitten
2452 *Aspicilia desertorum* (Krempelh.) Mereschk. (on pebbles)
2453 *Endocarpon pusillum* Hedwig
2454 *Placidium lachneum* (Ach.) Breuss
2455 *Placidium lacinulatum* (Ach.) Breuss
2456 *Psora cerebriformis* W.A. Weber
2457 *Bryum argenteum* Hedw. (synonym: *Bryum lanatum)*
2458 *Candelariella rosulans* (Müll. Arg.) Zahlbr. (K-)
2459 *Psora montana* Timdal
2460 *Aspicilia* sp. (on organic matter)
2461 xxxxx
2462 xxxxx
2463 xxxxx

PLOT #4:

Sandy-silt soil (pH 7). Flat area that partially burned at least a few years ago. Approx. 6.5 km SW of Rome, OR and the Owyhee River, and 85 km SW of Jordan Valley, OR. Associated vegetation: *Bromus tectorum, Halogeton glomeratus, Elymus elymoides, Atriplex confertifolia, Sphaeralcea munroana, Ranunculus testiculatus, Salsola* sp.
N 42° 492' W 117° 423' 1128 m (3699 feet elevation) 15 June 2009

2464 *Aspicilia desertorum* (Krempelh.) Mereschk. (on pebbles)
2465 *Collema tenax* (Sw.) Ach.
2466 *Pterygoneurum ovatum* (Hedw.) Dix.
2467 *Placidium lacinulatum* (Ach.) Breuss
2468 *Psora tuckermanii* R. Anderson ex Timdal
2469 *Psora decipiens* (Hedwig) Hoffm.
2470 *Bryum argenteum* Hedw. (synonym: *Bryum lanatum)*
2471 *Syntrichia ruralis* (Hedw.) Web. & Mohr
2472 *Aspicilia desertorum* (Krempelh.) Mereschk. form *terrestris*
(1 spec. kept for further evaluation)
2473 *Protoparmelia badia* (Hoffm.) Hafellner (on soil, but usually on rock)
2474 *Psora montana* Timdal
2475 *Microcoleous* sp. (cyanobacteria)
2476 *Caloplaca tominii* Savicz
2477 *Candelariella aggregata* M. Westb.
2478 xxxx
2479 xxxx

COLLECTIONS FROM GENERAL AREA BUT NOT FROM A SPECIFIC PLOT

On various substrates. Approx. 6.5 km SW of Rome, OR and the Owyhee River, and 85 km SW of Jordan Valley, OR. Associated vegetation: *Bromus tectorum, Halogeton glomeratus, Elymus elymoides, Atriplex confertifolia, Sphaeralcea munroana, Salsola* sp.
N 42° 493' W 117° 42' 1120 m (3675 feet elevation) 15 June 2009

2480 *Aspicilia desertorum* (Kremp.) Mereschk. form *contorta* (in edit)
(completely encompassing small pebbles) **(1 spec. kept to send to Bjorn Owe-Larsson)**
2481 *Aspicilia hispida* Mereschk. (on soil)
2482 *Thelomma occidentale* (Herre) Tibell (on wood)
2483 *Microcoleous* sp. (cyanobacteria; within the soil)
2484 *Psora tuckermanii* R. Anderson ex Timdal (on soil)
2485 *Aspicilia desertorum* (Kremp.) Mereschk. (on rock)
(small apothecia, more adnate, whiter thallus) **(1 spec. sent to Bjorn Owe-Larsson)**

Table 1. Alphabetical List of Taxa Collected in the Rome Area, Sec. 32 (T31S, R41E)

Species	Collection Number	Number of Specimens for Each Collection Number	Lichen (L), Bryophyte (B), Other	Notes
Aspicilia aspera (Mereschk.) Tomin	2413, 2442	4; 2	L	1 spec. each of #2413, #2442 to BSU
Aspicilia contorta (Hoffm.) Kremp.	2436	1	L	in same packet as #2435 - *Acarospora glaucocarpa*
Aspicilia desertorum (Krempelh.) Mereschk.	2416, 2452, 2464, 2485	1; 2; 2; 1	L	#2485 to B. Owe-Larsson for verification
Aspicilia desertorum (Kremp.) Mereschk. f. *contorta*	2480	4	L	in edit; encompasses small pebbles; 1 spec. to B. Owe-Larsson for verification
Aspicilia desertorum (Krempelh.) Mereschk. f. *terrestris*	2399, 2421, 2448, 2472	4; 2; 3; 5	L	1 spec. #2472 to BSU
Acarospora fuscata (Schrad.) Arnold (?)	2427, 2430	1; 1	L	both specimens kept in Boise for further evaluation
Acarospora glaucocarpa (Ach.) Körber	2435	1	L	det. by B. McCune; in same packet as #2436 - *Aspicilia contorta*
Aspicilia hispida Mereschk.	2401, 2481	1; 1	L	
Aspicilia sp.	2392, 2426, 2460	3; 1; 1	L	1 spec. each of #2392, 2426 kept in Boise for further evaluation
Bryum argenteum Hedw.	2419, 2428, 2457, 2470	1; 1; 2; 1	B	syn: *B. lanatum*
Caloplaca tominii Savicz	2398, 2425, 2447, 2476	4; 3; 2; 1	L	
Candelariella aggregata M. Westb.	2383, 2444, 2477	4; 1; 2	L	
Candelariella rosulans (Müll. Arg.) Zahlbr	2458	1	L	
Collema tenax (Sw.) Ach.	2382, 2393, 2397, 2414, 2443, 2465	2; 2; 1; 3; 5; 5	L	
Crossidium aberrans Holz. & E.B. Bartram	2388	2	B	
Endocarpon pusillum Hedw.	2394, 2423, 2453	1; 3; 3	L	
Grimmia alpestris (Weber & Mohr) Schleicher	2400	2	B	
Heteroplacidium congestum (Breuss & McCune) Breuss	2395, 2450	3; 5	L	1 spec. each of #2395, #2450 to O. Breuss for verification
Lecanora garovaglii (Körber) Zahlbr.	2409, 2412	1; 5	L	1 spec. #2412 to BSU
Lecanora laatokkaensis (Räsänen) Poelt	2437	1	L	
Lecidea laboriosa Müll. Arg.	2381, 2424	1; 1	L	new for OR; 1 spec. #2424 to BSU
Megaspora verrucosa (Ach.) Hafellner & V. Wirth	2433	2	L	
Microcoleous sp.	2402, 2432, 2449, 2475, 2483	3; 2; 3; 1; 4	O	cyanobacteria
Nostoc sp.	2429	1	O	cyanobacteria
Placidium lachneum (Ach.) Breuss	2454	2	L	
Placidium lacinulatum (Ach.) Breuss	2387, 2455, 2467	2; 3; 5	L	

Table 1. Alphabetical List of Taxa Collected in the Rome Area, Sec. 32 (T31S, R41E)

Species	Collection Number	Number of Specimens for Each Collection Number	Lichen (L), Bryophyte (B), Other	Notes
Placidium rufescens (Ach.) Breuss	2384, 2386	2; 2	L	
Placidium sp.	2431, 2446	3; 1	L	1 spec. of #2431, #2446 to O. Breuss for determination
Protoparmelia badia (Hoffm.) Hafellner	2415, 2473	2; 1	L	1 spec. #2415 to BSU
Psora cerebriformis W.A. Weber	2456	1	L	
Psora decipiens (Hedwig) Hoffm.	2380, 2469	1; 1	L	
Psora montana Timdal	2459, 2474	2; 3	L	
Psora tuckermanii R. Anderson ex Timdal	2385, 2468, 2484	2; 2; 2	L	
Pterygoneurum ovatum (Hedw.) Dix	2390, 2466	3; 1	B	
Rhizoplaca melanophthalma (DC.) Leuckert & Poelt	2407, 2408	9; 1	L	#2407on soil, an uncommon substrate; 5 spec. retained in Boise for further evaluation; #2408 is on rock
Staurothele areolata (Ach.) Lettau	2410, 2418	1; 1	L	
Syntrichia caninervis Mitten	2389, 2434, 2451	3; 3; 2	B	1 spec. of #2434 to J. Badina for verification
Syntrichia ruralis (Hedw.) Web. & Mohr	2396, 2422, 2445, 2471	2; 1; 3; 2	B	
Thelomma occidentale (Herre) Tibell	2482	1	L	on wood
Thrombium epigaeum (Pers.) Wallr.	2391, 2441	2; 2	L	1 spec. #2391 to BSU
Unknown; black crust turns green when wet	2403	1	L?	spec. retained in Boise for further evaluation
Unknown; yellow crustose lichen	2417	1	L	spec. sent to B. McCune for further evaluation
Unknown; fungus on rabbit pellets	2420	1	O	spec. retained in Boise for further evaluation
* specimens given to BSU are housed in the Biology Department Herbarium				

Table 2. Alphabetical List of Taxa by Collection Site, Rome Area, Malheur County, OR (T31S, R41E, Sec. 32)

An "x" indicates which species were collected at each site. Highlighted cells indicate species unique to a given plot.

Species	Collection Number	Plot 1 - alkaline, clay-silt soil of swale area; *Atriplex nuttallii, Grayia spinosa, Elymus elymoides, Poa secunda*	Plot 2 - clay soil from flat to 35% slope with northerly aspect; *Atriplex confertifolia, Elymus elymoides, Poa secunda, Tetradymia spinosa,* annual *Atriplex, Guiterrezia sarothrae*	Plot 3 - fine, sandy-silt soil with cobble surface and slight SW aspect on top of hills; *Tetradymia glabrata, Artemisia tridentata* ssp. *wyomingensis, Elymus elymoides* , *Phlox* sp., and *Bromus tectorum*	Plot 4 - sandy-silt soil of flat area, partially burned a few years ago; *Bromus tectorum, Halogeton glomeratus, Elymus elymoides, Atriplex confertifolia, Ranunculus testiculatus, Sphaeralcea munroana,* and *Salsola* sp.	From general area; not within a particular plot
Aspicilia aspera (Mereschk.) Tomin	2413, 2442		x	x		
Aspicilia contorta (Hoffm.) Kremp.	2436		x			
Aspicilia desertorum (Krempelh.) Mereschk.	2416, 2452, 2464, 2485		x	x	x	x
Aspicilia desertorum (Kremp.) Mereschk. f. *contorta*	2480					x
Aspicilia desertorum (Krempelh.) Mereschk. f. *terrestris*	2399, 2421, 2448, 2472	x	x	x	x	
Acarospora fuscata (Schrad.) Arnold (?)	2427, 2430		x			
Acarospora glaucocarpa (Ach.) Körber	2435		x			
Aspicilia hispida Mereschk.	2401, 2481	x				x
Aspicilia sp.	2392, 2426, 2460	x	x	x		
Bryum argenteum Hedw.	2419, 2428, 2457, 2470		x	x	x	
Caloplaca tominii Savicz	2398, 2425, 2447, 2476	x	x	x	x	
Candelariella aggregata M. Westb.	2383, 2444, 2477	x		x	x	
Candelariella rosulans (Müll. Arg.) Zahlbr	2458			x		
Collema tenax (Sw.) Ach.	2382, 2393, 2397, 2414, 2443, 2465	x	x	x	x	
Crossidium aberrans Holz. & E.B. Bartram	2388	x				
Endocarpon pusillum Hedw.	2394, 2423, 2453	x	x	x		
Grimmia alpestris (Weber & Mohr) Schleicher	2400	x				
Heteroplacidium congestum (Breuss & McCune) Breuss	2395, 2450	x		x		
Lecanora garovaglii (Körber) Zahlbr.	2409, 2412		x			
Lecanora laatokkaensis (Räsänen) Poelt	2437		x			
Lecidea laboriosa Müll. Arg.	2381, 2424	x	x			

Table 2. Alphabetical List of Taxa by Collection Site, Rome Area, Malheur County, OR (T31S, R41E, Sec. 32)

An "x" indicates which species were collected at each site. Highlighted cells indicate species unique to a given plot.

Species	Collection Number	Plot 1 - alkaline, clay-silt soil of swale area; *Atriplex nuttallii, Grayia spinosa, Elymus elymoides, Poa secunda*	Plot 2 - clay soil from flat to 35% slope with northerly aspect; *Atriplex confertifolia, Elymus elymoides, Poa secunda, Tetradymia spinosa,* annual *Atriplex, Guiterrezia sarothrae*	Plot 3 - fine, sandy-silt soil with cobble surface and slight SW aspect on top of hills; *Tetradymia glabrata, Artemisia tridentata* ssp. *wyomingensis, Elymus elymoides* , *Phlox* sp., and *Bromus tectorum*	Plot 4 - sandy-silt soil of flat area, partially burned a few years ago; *Bromus tectorum, Halogeton glomeratus, Elymus elymoides, Atriplex confertifolia, Ranunculus testiculatus, Sphaeralcea munroana,* and *Salsola* sp.	From general area; not within a particular plot
Megaspora verrucosa (Ach.) Hafellner & V. Wirth	2433		x			
Microcoleous sp.	2402, 2432, 2449, 2475, 2483	x	x	x	x	x
Nostoc sp.	2429		x			
Placidium lachneum (Ach.) Breuss	2454			x		
Placidium lacinulatum (Ach.) Breuss	2387, 2455, 2467	x		x	x	
Placidium rufescens (Ach.) Breuss	2384, 2386	x				
Placidium sp.	2431, 2446		x	x		
Protoparmelia badia (Hoffm.) Hafellner	2415, 2473		x		x	
Psora cerebriformis W.A. Weber	2456			x		
Psora decipiens (Hedwig) Hoffm.	2380, 2469	x			x	
Psora montana Timdal	2459, 2474			x	x	
Psora tuckermanii R. Anderson ex Timdal	2385, 2468, 2484	x			x	x
Pterygoneurum ovatum (Hedw.) Dix	2390, 2466	x			x	
Rhizoplaca melanophthalma (DC.) Leuckert & Poelt	2407, 2408		x			
Staurothele areolata (Ach.) Lettau	2410, 2418		x			
Syntrichia caninervis Mitten	2389, 2434, 2451	x	x	x		
Syntrichia ruralis (Hedw.) Web. & Mohr	2396, 2422, 2445, 2471	x	x	x	x	
Thelomma occidentale (Herre) Tibell	2482					x
Thrombium epigaeum (Pers.) Wallr.	2391, 2441	x		x		
Unknown; black crust turns green when wet	2403	x				
Unknown; yellow crustose lichen	2417		x			
Unknown; fungus on rabbit pellets	2420		x			
TOTALS		**21**	**25**	**20**	**14**	**6**

Figure 2. Total number of biological soil crust taxa collected in each of the four plots.

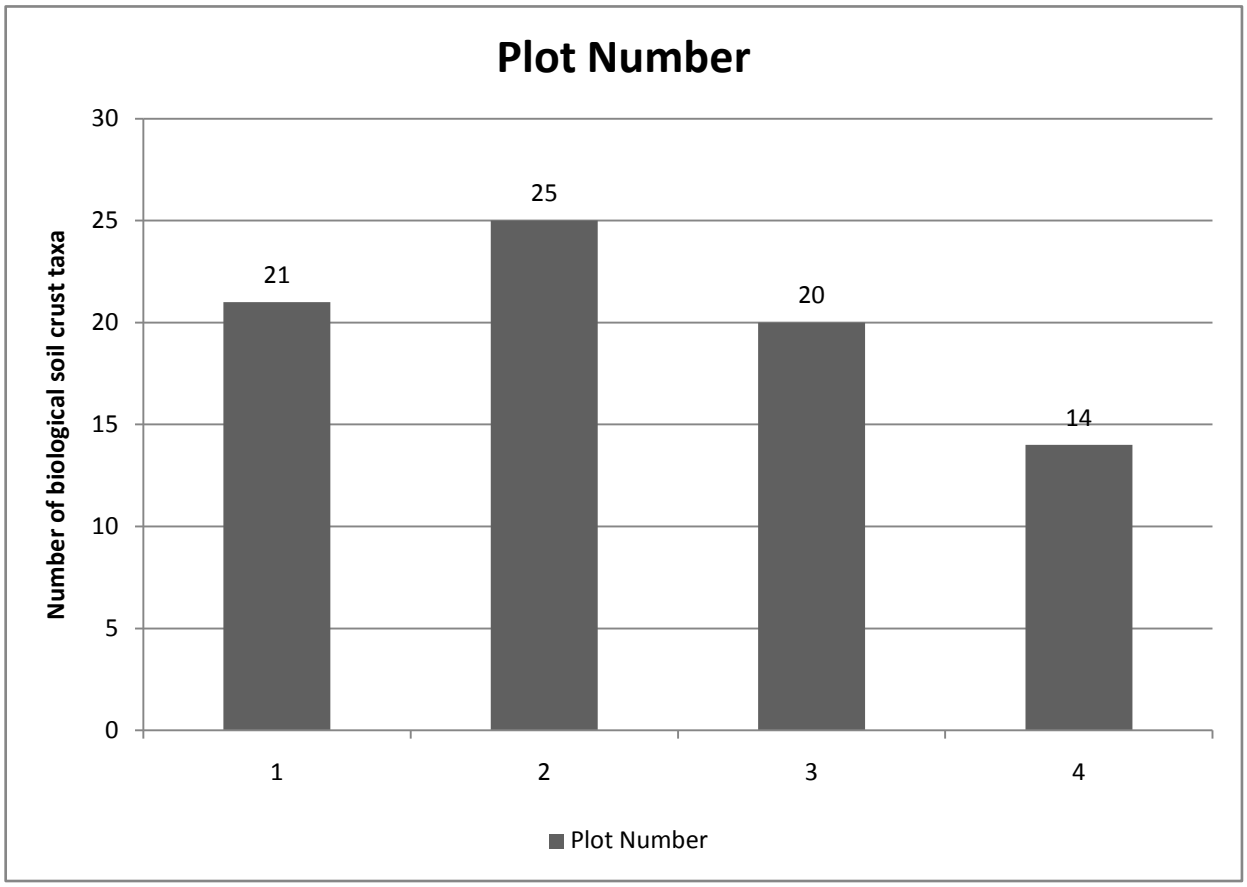


Figure 3. The number of biological soil crust taxa unique to each of the four plots.

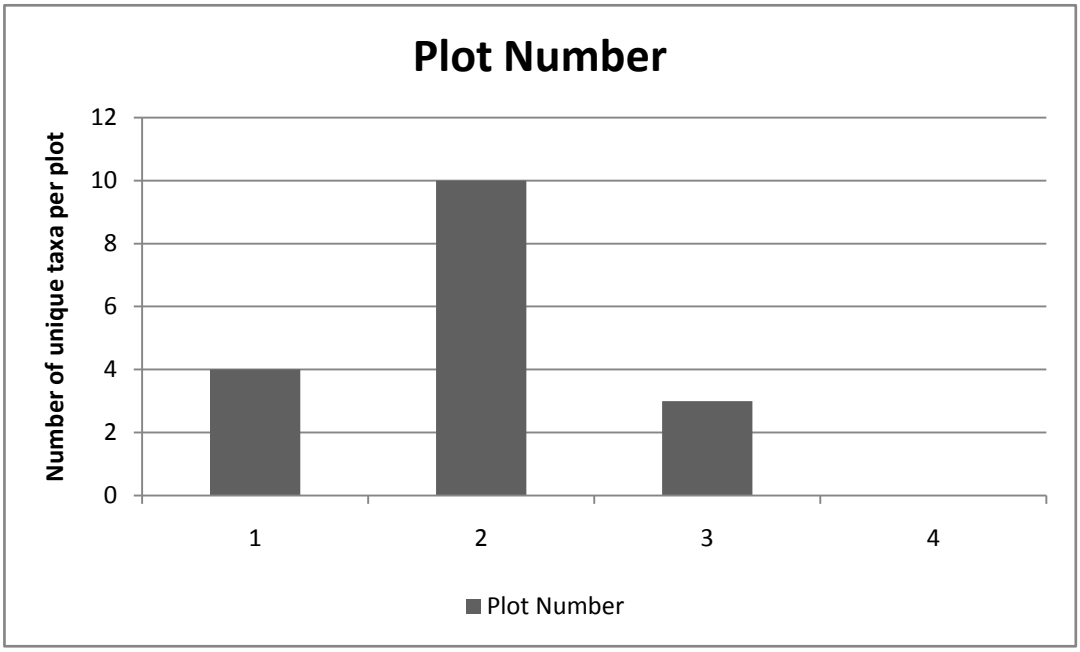
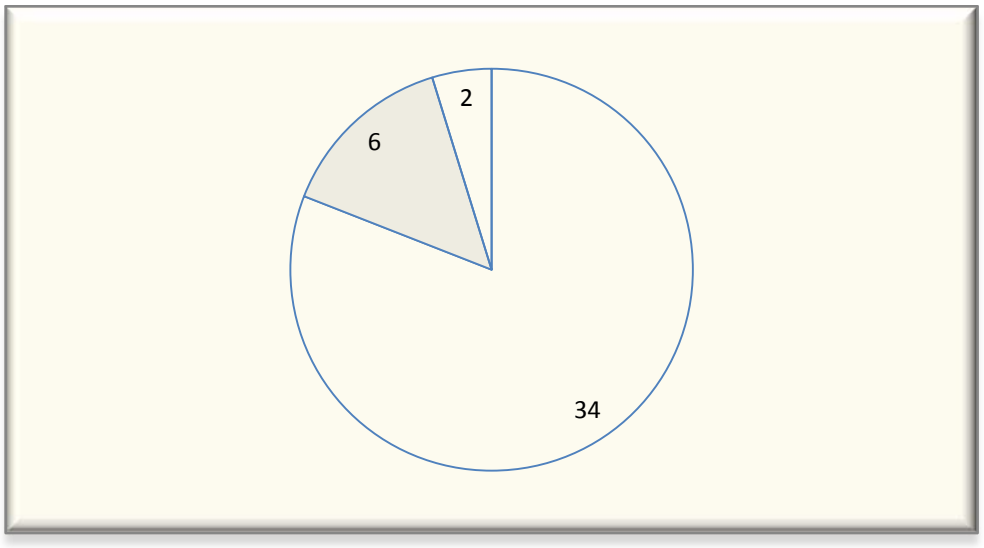


Figure 4. Pie charts illustrate the number of taxa per life form at Rome (2009) and Birch Creek (DeBolt 2008)

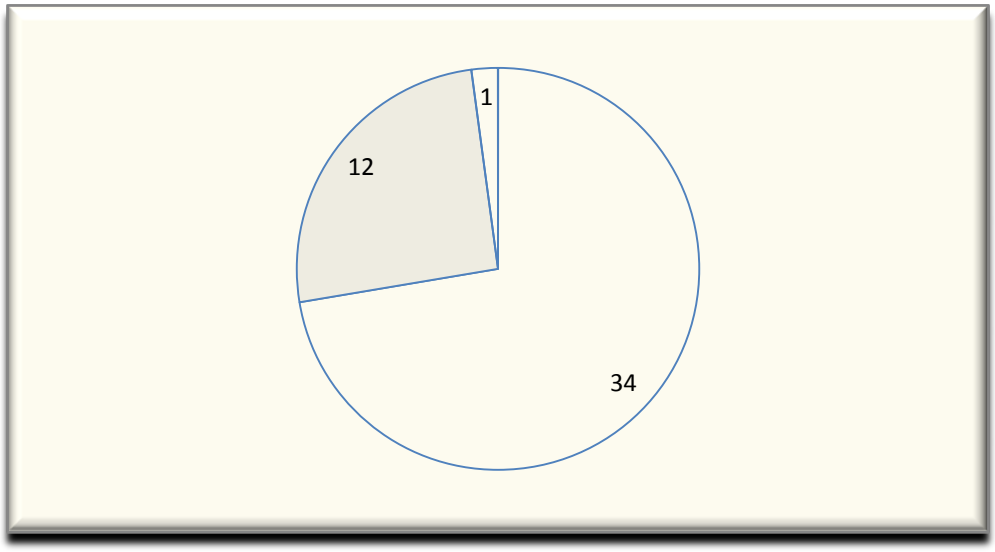
2009 Rome Area

Lichens	Bryophytes	Cyanobacteria
34	6	2
81%	14%	5%



2008 Birch Creek Area

Lichens	Bryophytes	Cyanobacteria
34	12	1
72%	26%	2%



Dear colleagues and friends,

The following is a pdf file with our first results of the *Kaernefeltia* study. It corresponds to the slides of a presentation I gave during the last Iberian Cryptogamic Meeting in Portugal (Sept. 2009). Inside you can find a summary of our very first results about the disjunct lichen *Kaernefeltia merrrilli*. As you can see, for the moment, our best hits are: 1) we identified 4 groups of populations, 2) genetic distance of the Iberian specimens of *K. merrillii* regarding those from North America is small and it can suggests long distance dispersal (although other possibilities are not easy to discard for the moment), 3) the only sequence of *K. californica* included in the study 100% matched with the sequence of two specimens of *K. merrillii*. This raises many questions about *K. californica*.

The study goes slowly but continues. Unfortunately both Toby and me we have other projects and we don't have so much time to focus on *Kaernefeltia* (and neither money, these kind of molecular studies are really expensive). Anyway, the study continues, and perhaps I've found a way to get more money to amplify more markers and more specimens. So, now we are interested in filling the gaps in *K. merrillii* distribution in N. America and in adding specimens of *K. californica* to our dataset. Whatever collection that falls in these last two queries will be more than welcome ;-)

All the best,
Sergio

Phylogeography of the disjunct lichen *Kaernefeltia merrillii* (Du Rietz) A. Thell & Goward (Parmeliaceae, Ascomycota)

Sergio Pérez-Ortega*, Beatriz Roca*, Toby Spribille & Ana Crespo***

* Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense, E-28040 Madrid, Spain

** Institut für Pflanzenwissenschaften
Karl-Franzens-Universität Graz, Holteigasse 6, A-8010, Graz, Austria

UNIVERSIDAD COMPLUTENSE MADRID

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Phylogeography of the disjunct lichen *Kaernefeltia merrillii*

Sergio Pérez-Ortega

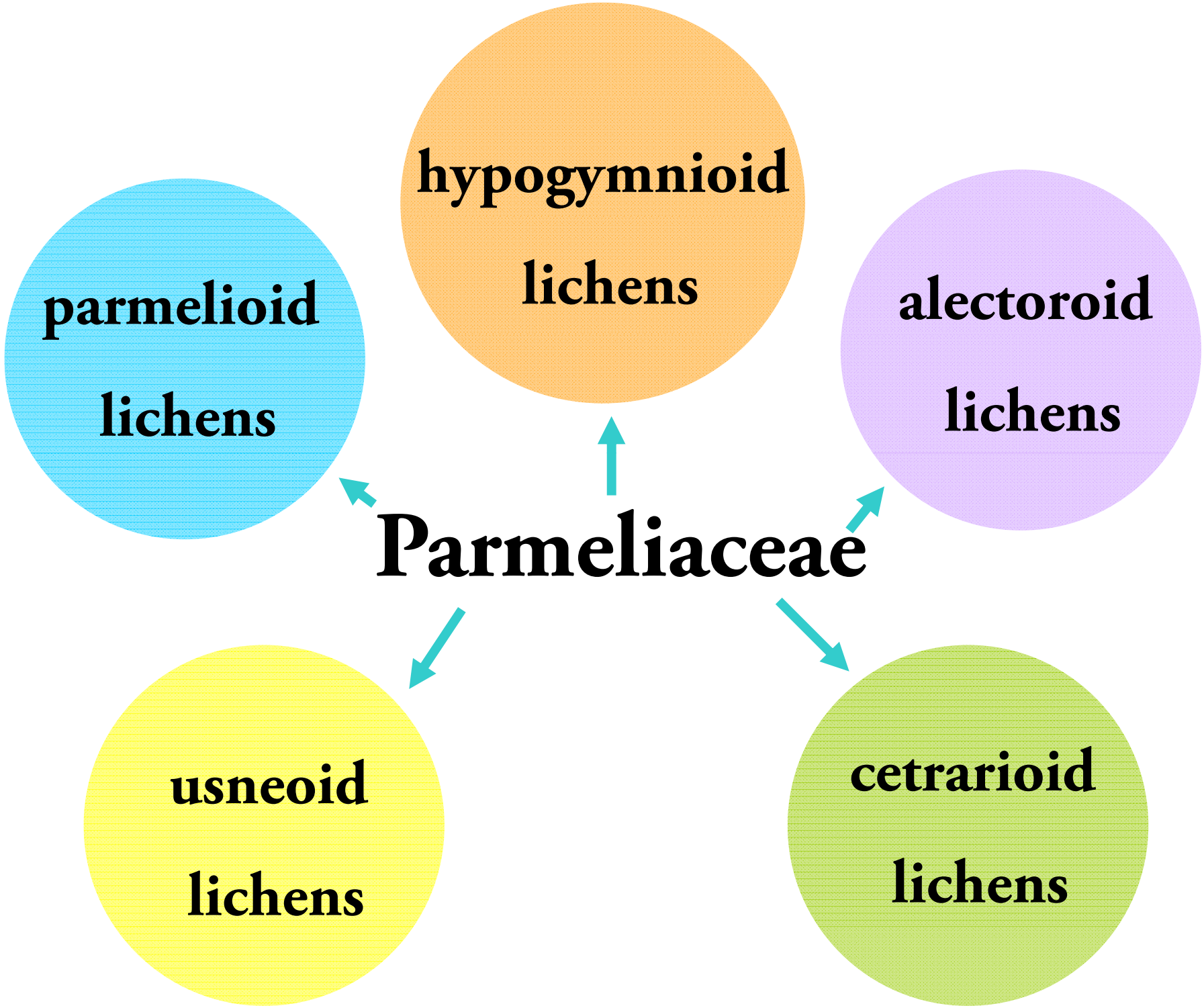
Toby Spribille

Beatriz Roca

Ana Crespo

Parmeliaceae

c. 2200 especies

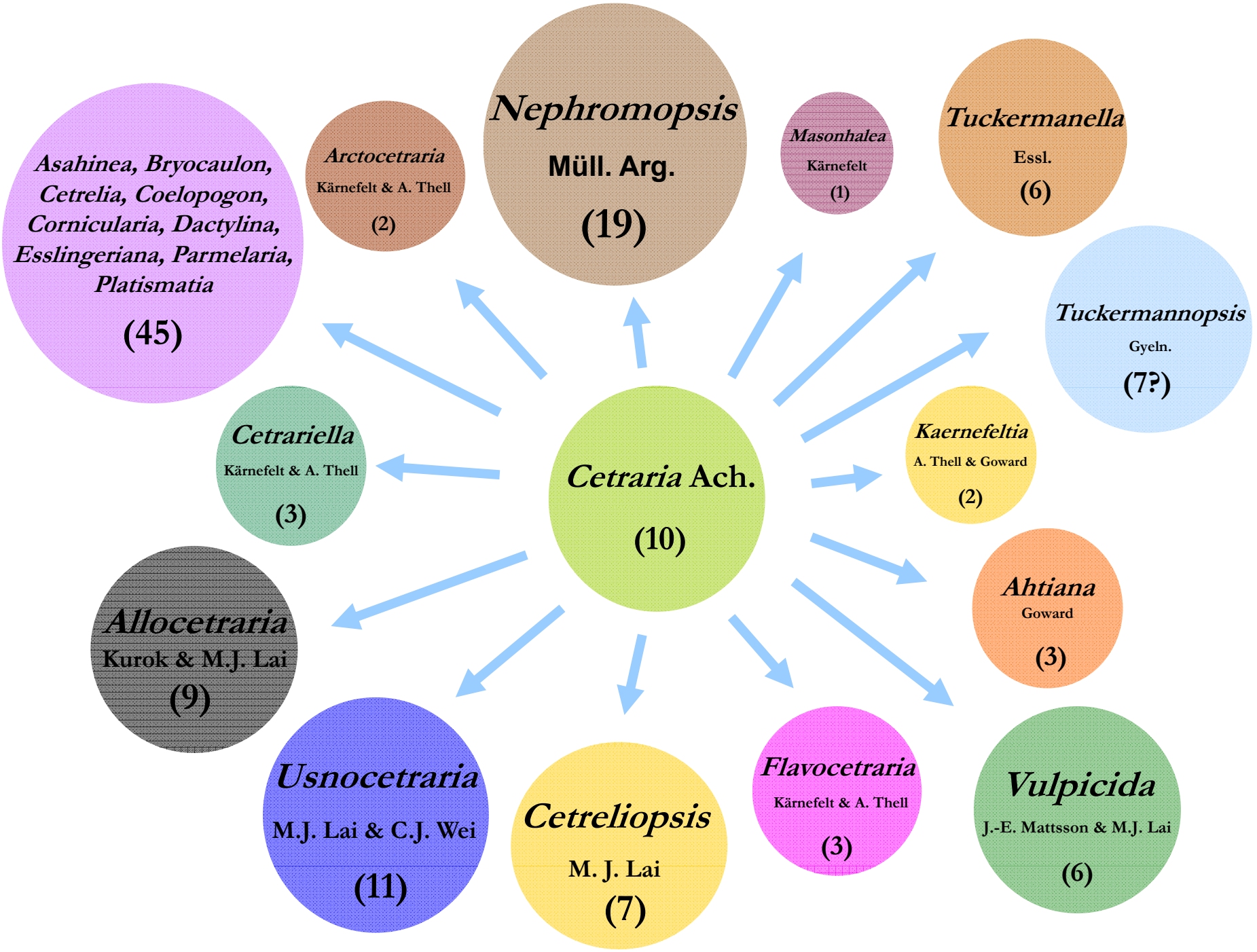

Parmeliaceae
parmelioid lichens
hypogymnioid lichens
alectoroid lichens
usneoid lichens
cetrarioid lichens

Cetraria

sensu Acharius

c. 135 especies

Nowadays, cetrarioid lichens… (c. 90 species in 14 genera)



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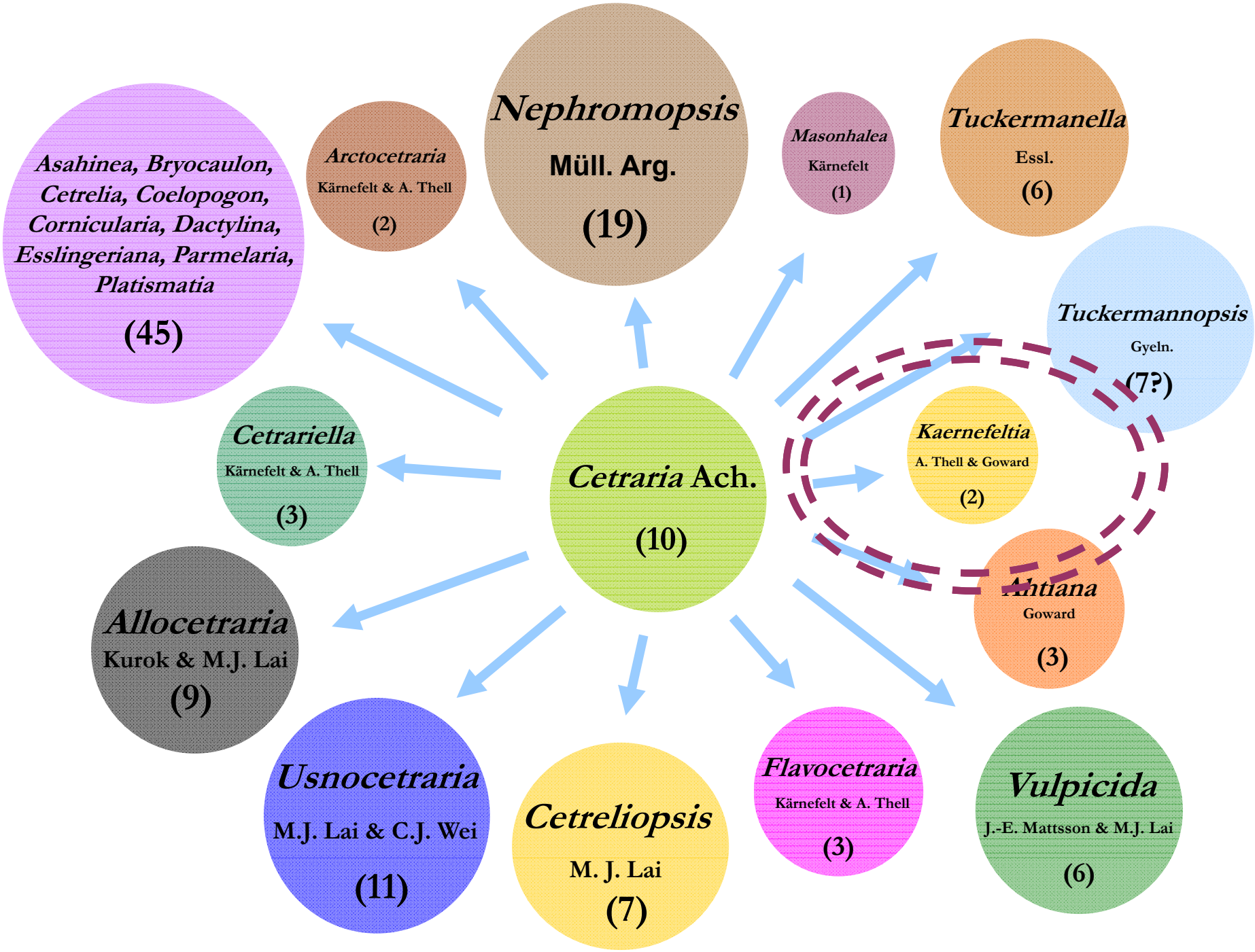
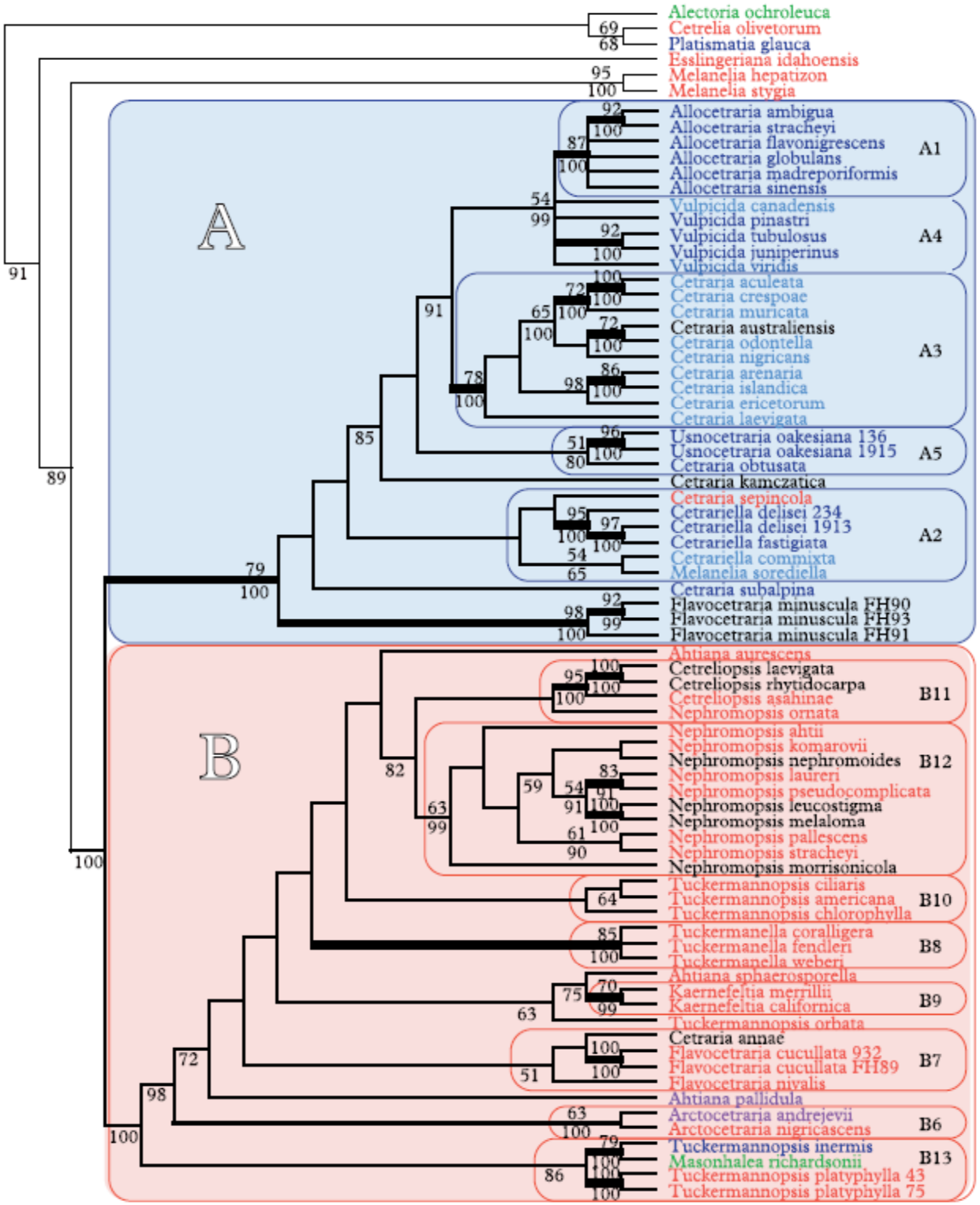
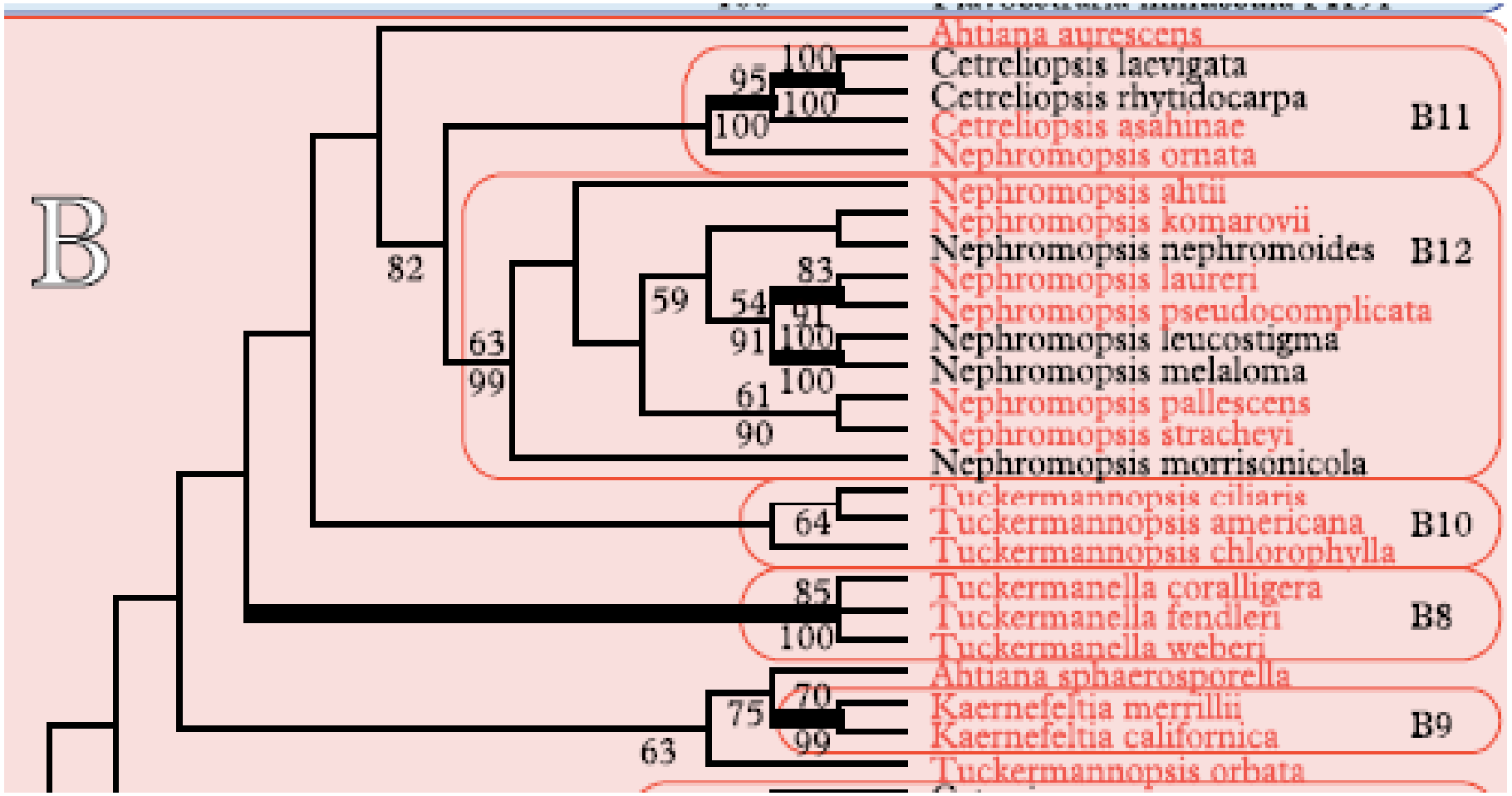




Consensus tree from 23 most parsimonious trees based on a combined dataset: ITS+β-tubulin+GPDH.

Thell et al. 2009: *Lichenologist* 41(5): 489–511

← ***Kaernefeltia***


B
Ahtiana aurescens
Cetreliopsis laevigata
Cetreliopsis rhytidocarpa
Cetreliopsis asahinae
Nephromopsis ornata
B11
Nephromopsis ahtii
Nephromopsis komarovii
Nephromopsis nephromoides
Nephromopsis laureri
Nephromopsis pseudocomplicata
Nephromopsis leucostigma
Nephromopsis melaloma
Nephromopsis pallescens
Nephromopsis stracheyi
Nephromopsis morrisonicola
B12
Tuckermannopsis ciliaris
Tuckermannopsis americana
Tuckermannopsis chlorophylla
B10
Tuckermanella coralligera
Tuckermanella fendleri
Tuckermanella weberi
B8
Ahtiana sphaerosporella
Kaernefeltia merrillii
Kaernefeltia californica
B9
Tuckermannopsis orbata
100
95
100
100
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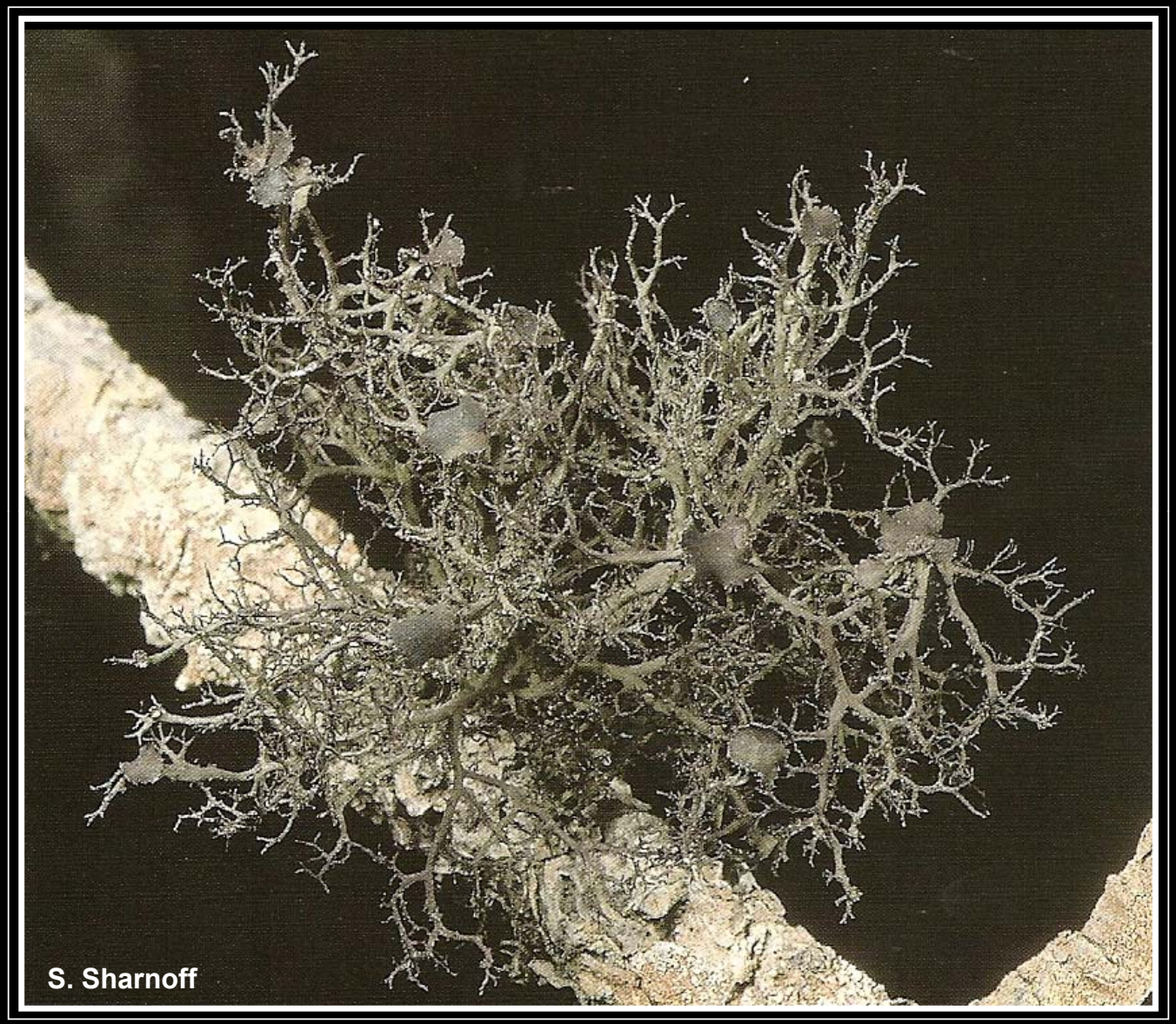
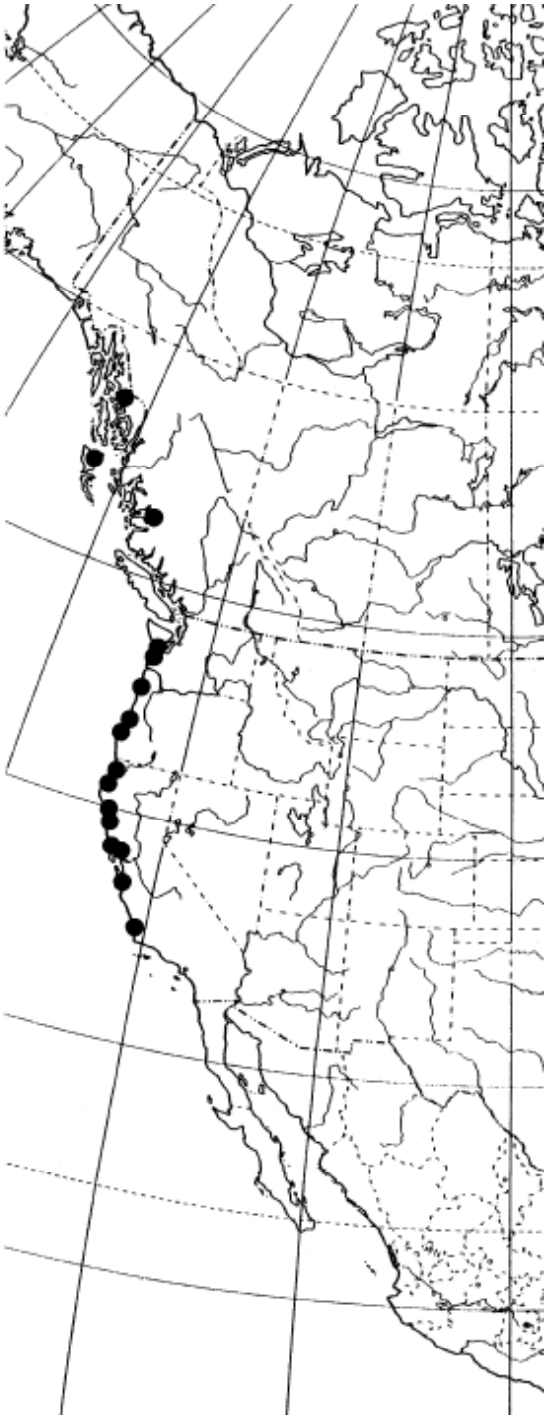
61
90
64
85
100
70
75
99
63



Kaernefeltia californica (Tuck.) A. Thell & Goward



Distribution map of *K. californica*

(Thell & Goward 1996: Bryologist 99:125-136)

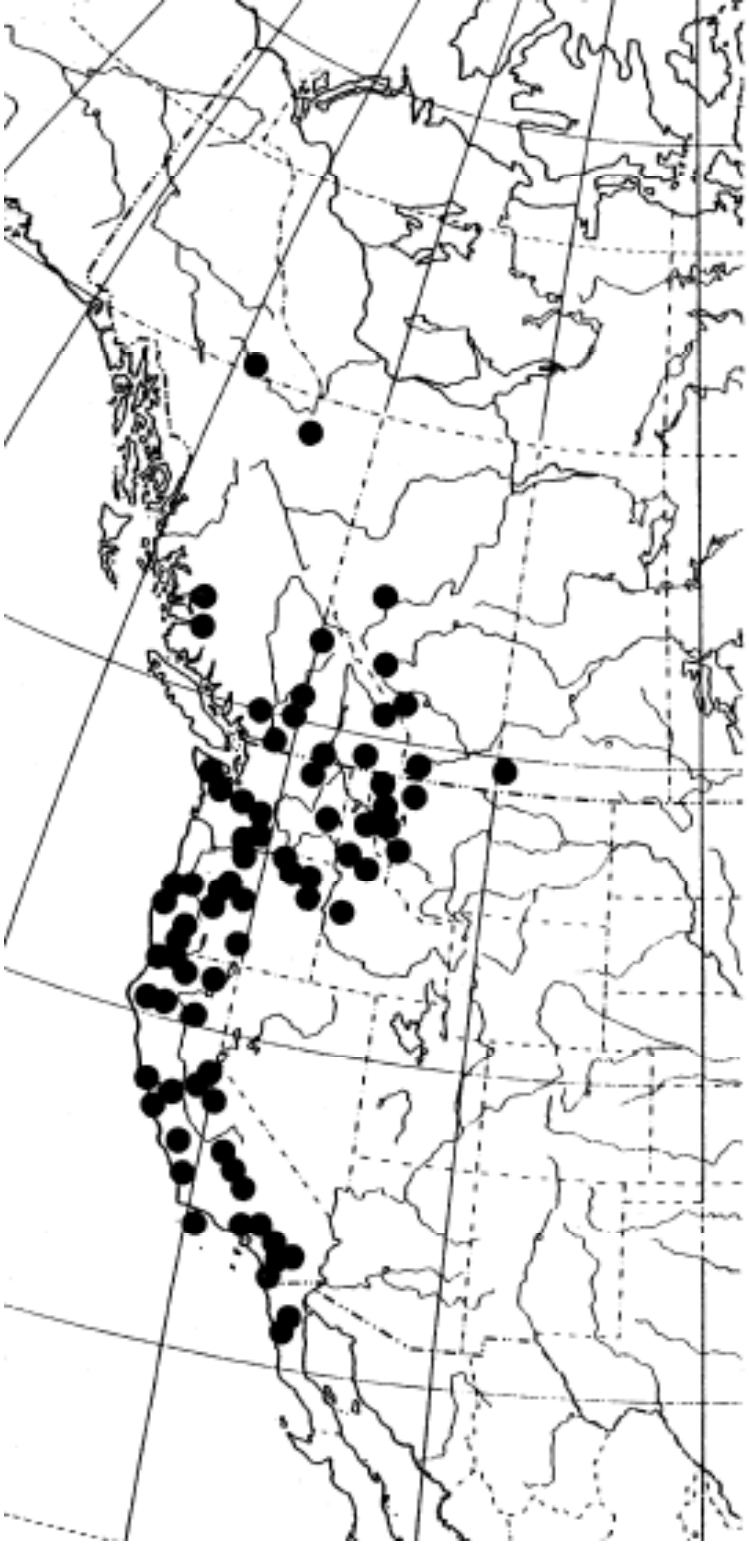
Kaernefeltia merrillii (Du Rietz) A. Thell & Goward

High morphological plasticity in *K. merrillii* !!!!!

Kaernefeltia "thellii"

A different species????

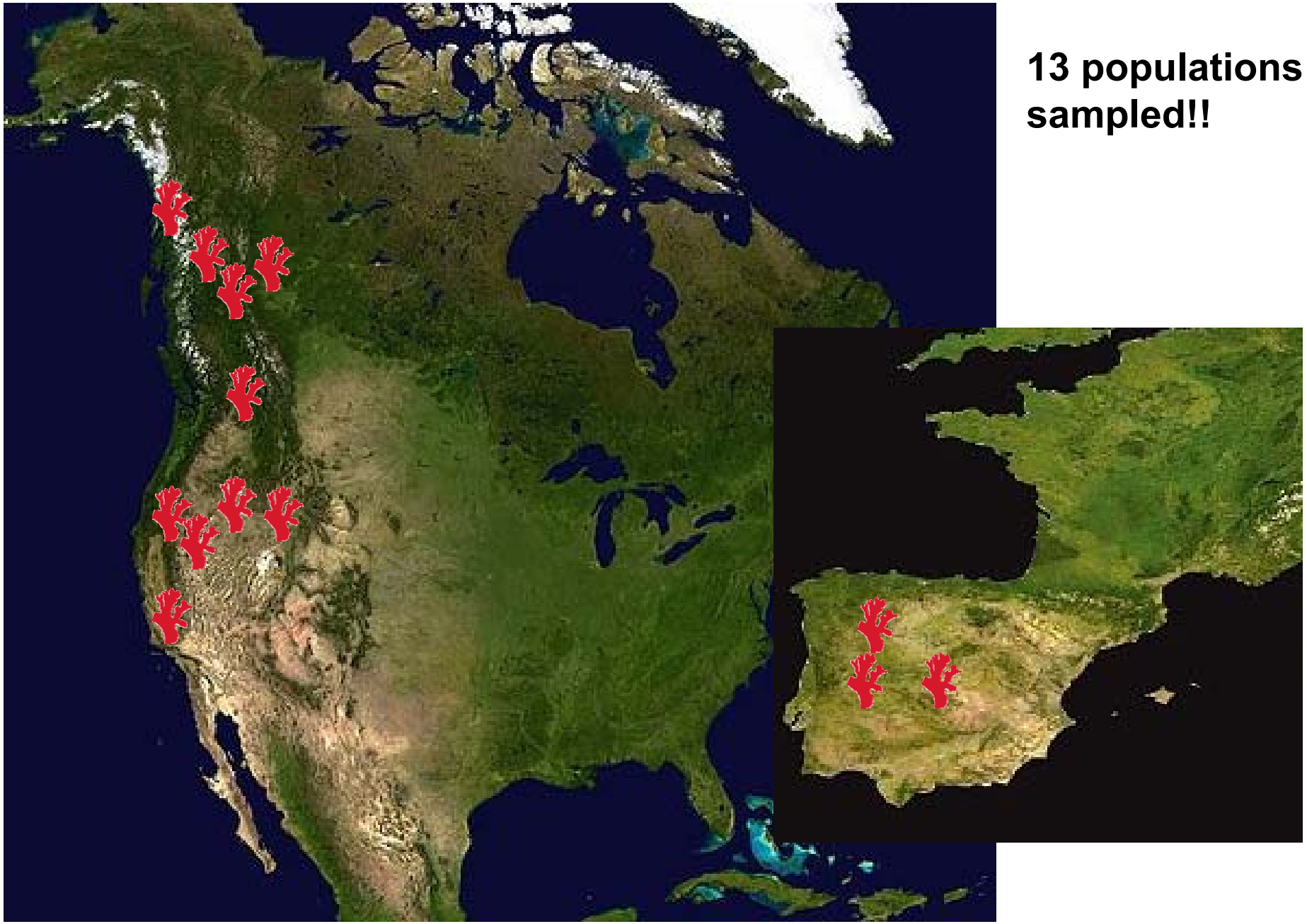
Cetraria iberica A. Crespo & Barreno



Distribution map of *K. merrillii*

(Thell & Goward 1996: Bryologist 99:125-136)

Material and methods



13 populations sampled!!

Material and methods

- Amplification and sequencing of the ITS region: primers **ITS1F, ITS4, ITS2KL, ITS1LM**

  (White et al. 1990: *PCR protocols*: pp 315-322; Gargas & Taylor 1992: *Mycologia* **84**: 589-592; Lohtander et al. 1998: *Bryologist* **101**: 404-411; Myllys et al. 1999: *Mol Phyl Evol* **12**: 295-309

- Phylogenetic analysis: $(MC)_3$ Bayesian Analysis implemented in MrBayes 3.1.2

  Huelsenbeck & Ronquist 2001: *Bioinformatics* **17**:754-755; Ronquist & Huelsenbeck 2003: *Bioinformatics* **19**:1572-1574.

- Haplotype network: TCS

  (Clement et al. 2000: *Molecular Ecology* **9**: 1657-1660)

- Genetic diversity measurements: DNAsp

  (Rozas & Librado 2009: *Bioinformatics* **25:** 1451-1452)

- Dendrogram of Fst distances among populations: MEGA 4

  Kumar et al. 2008: *Briefings in Bioinformatics* **9**: 299-306

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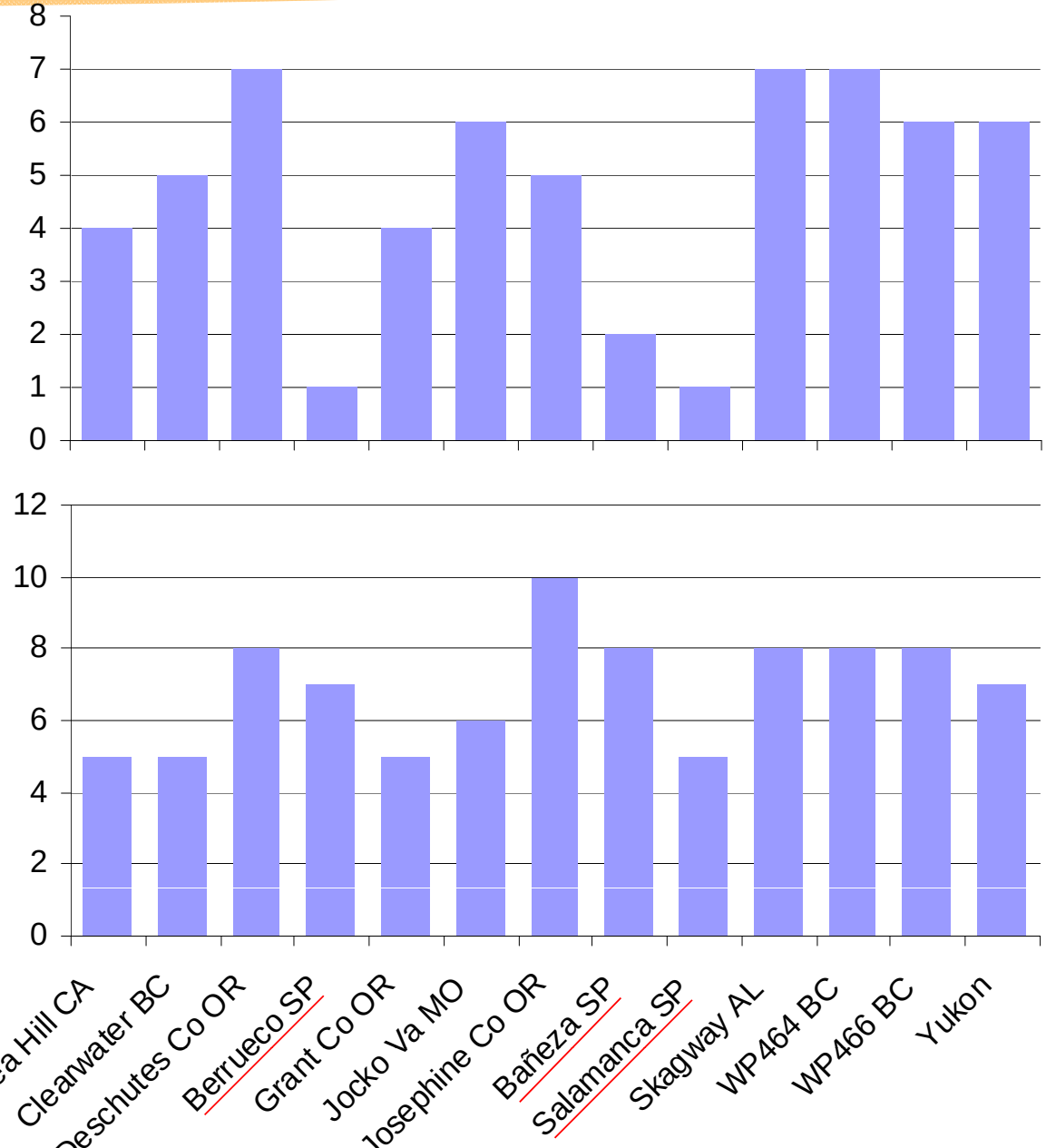
Results



Nº Haplotypes

vs

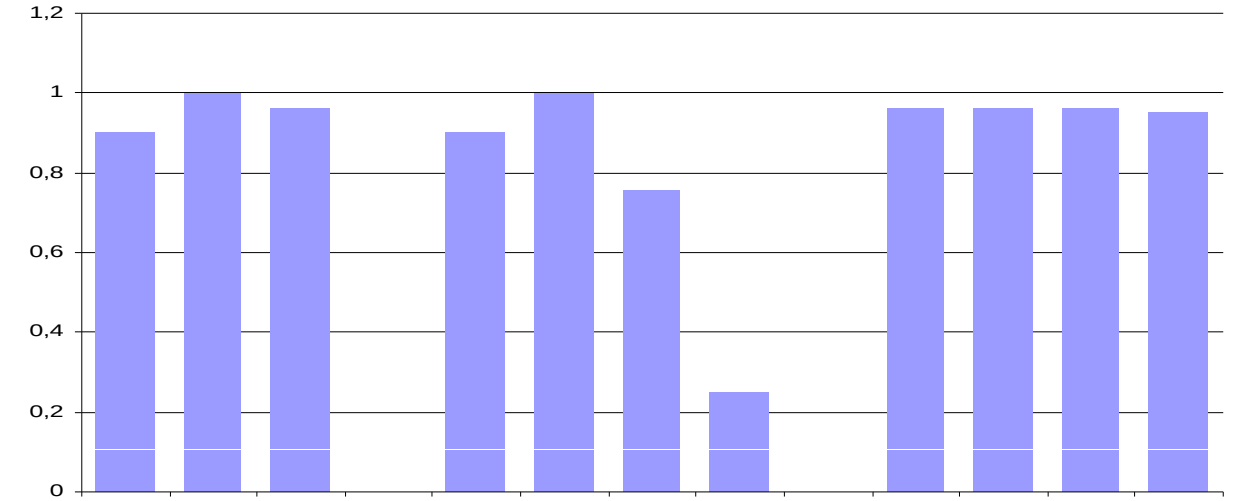
locality

Nº Specimens

vs

locality

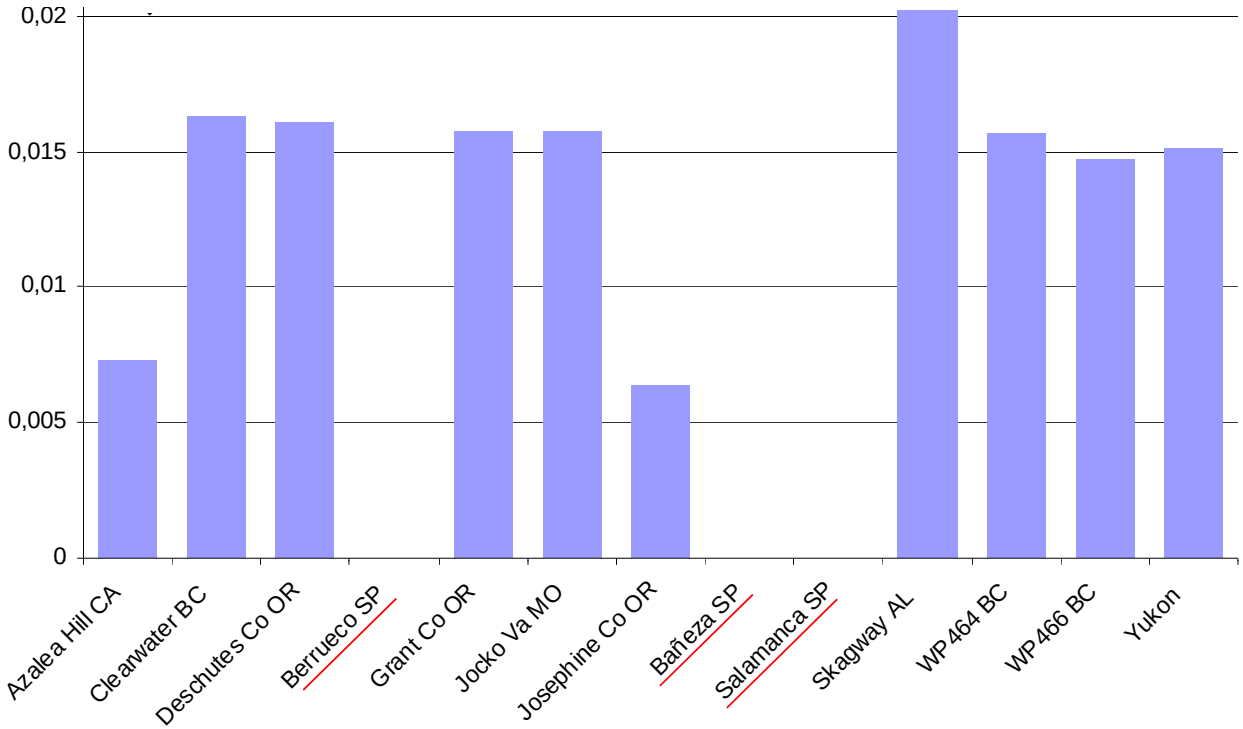
Results



Hd (haplotype diversity)

vs

locality

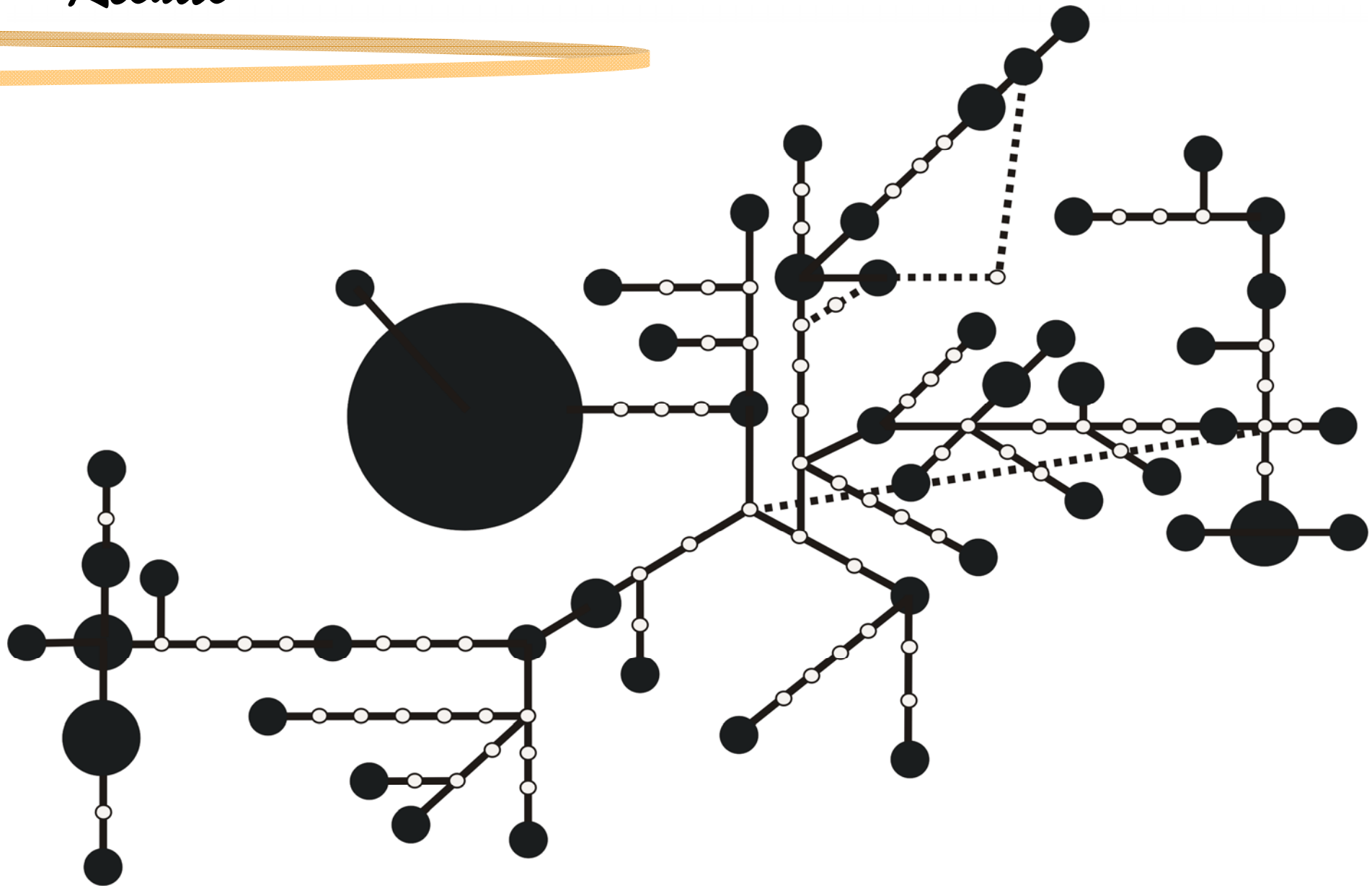


π (nucleotidic diversity)

vs

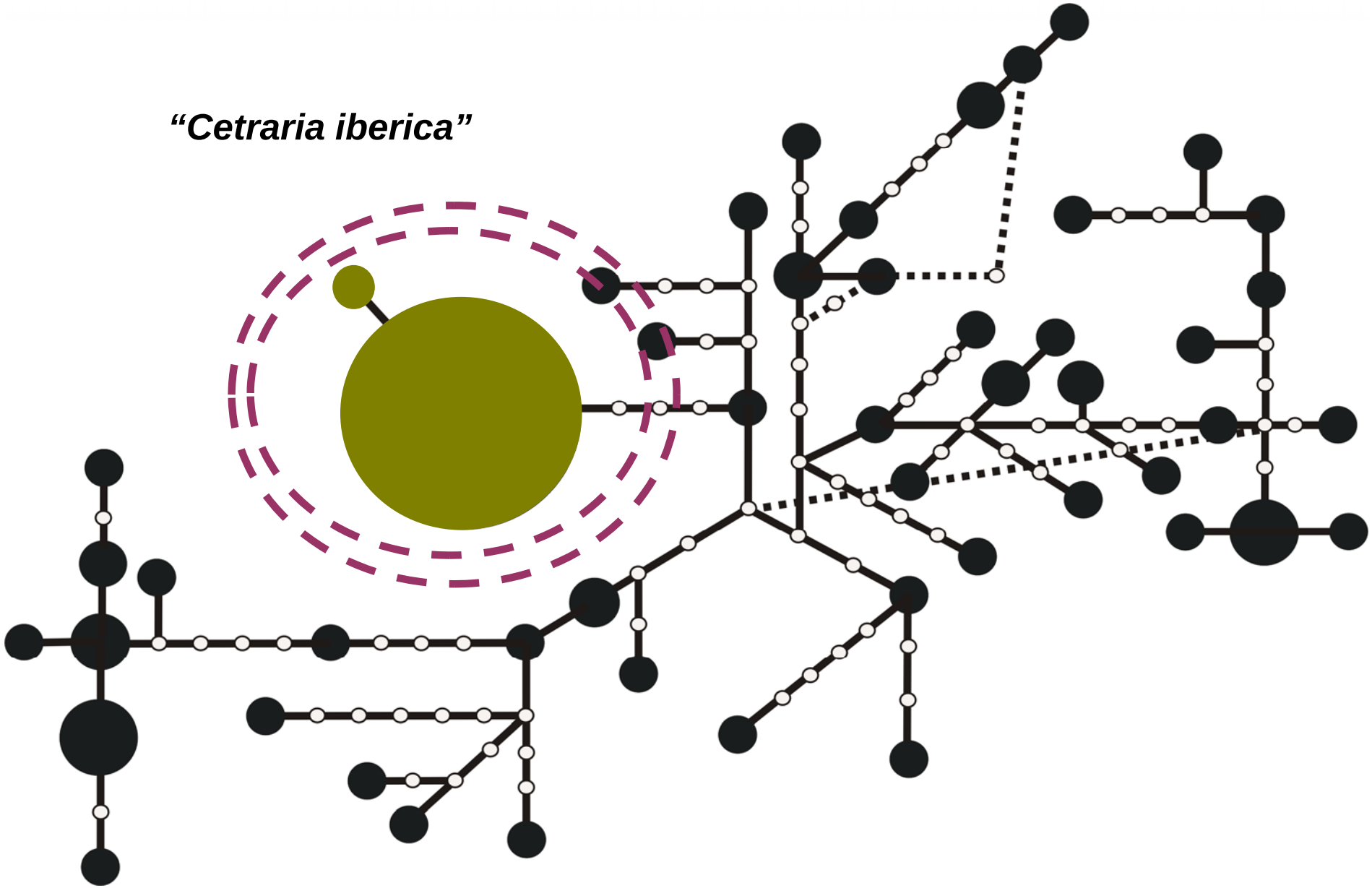
locality

Results



Statistical parsimony
ITS haplotype network

“Cetraria iberica”



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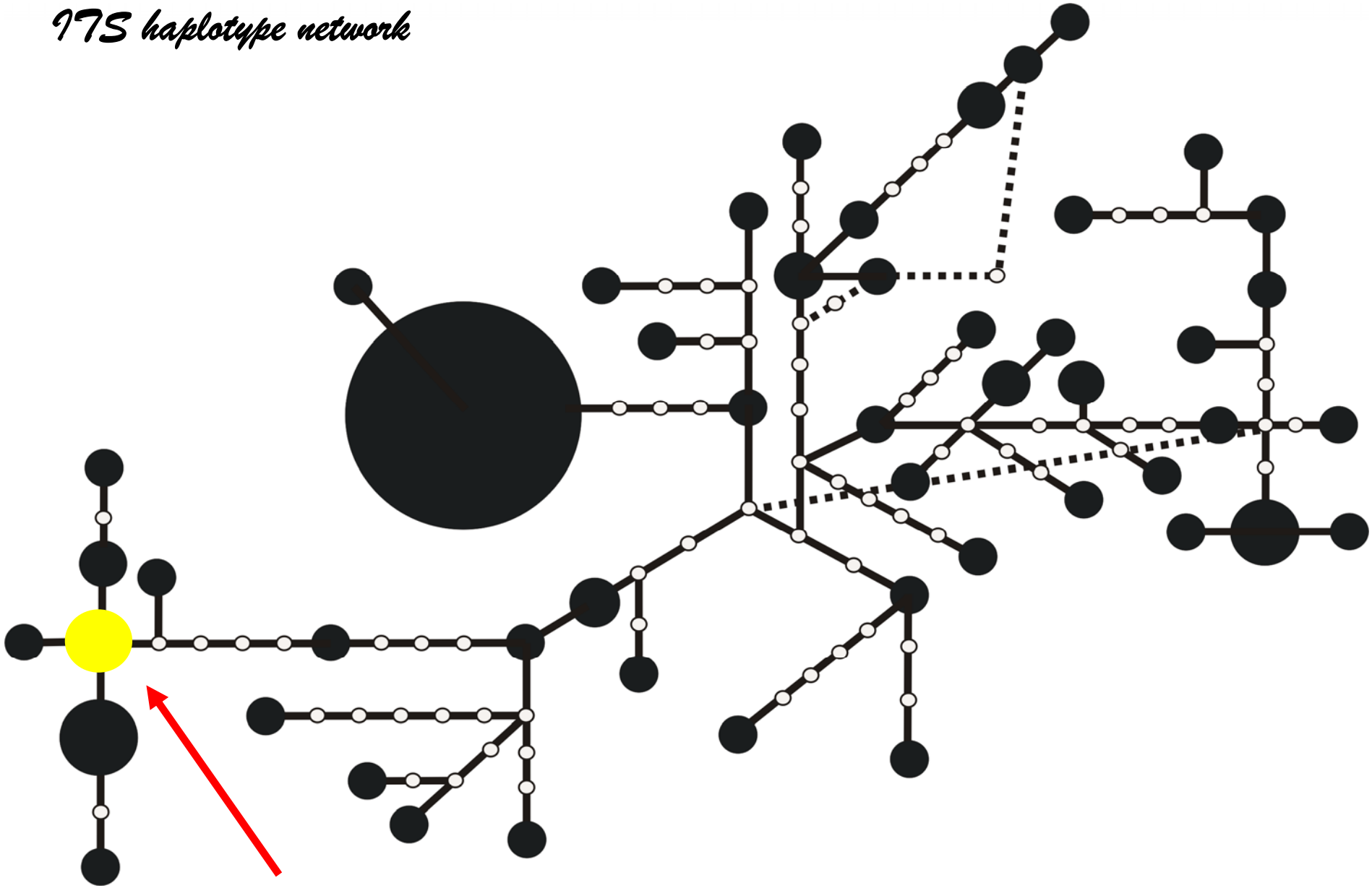
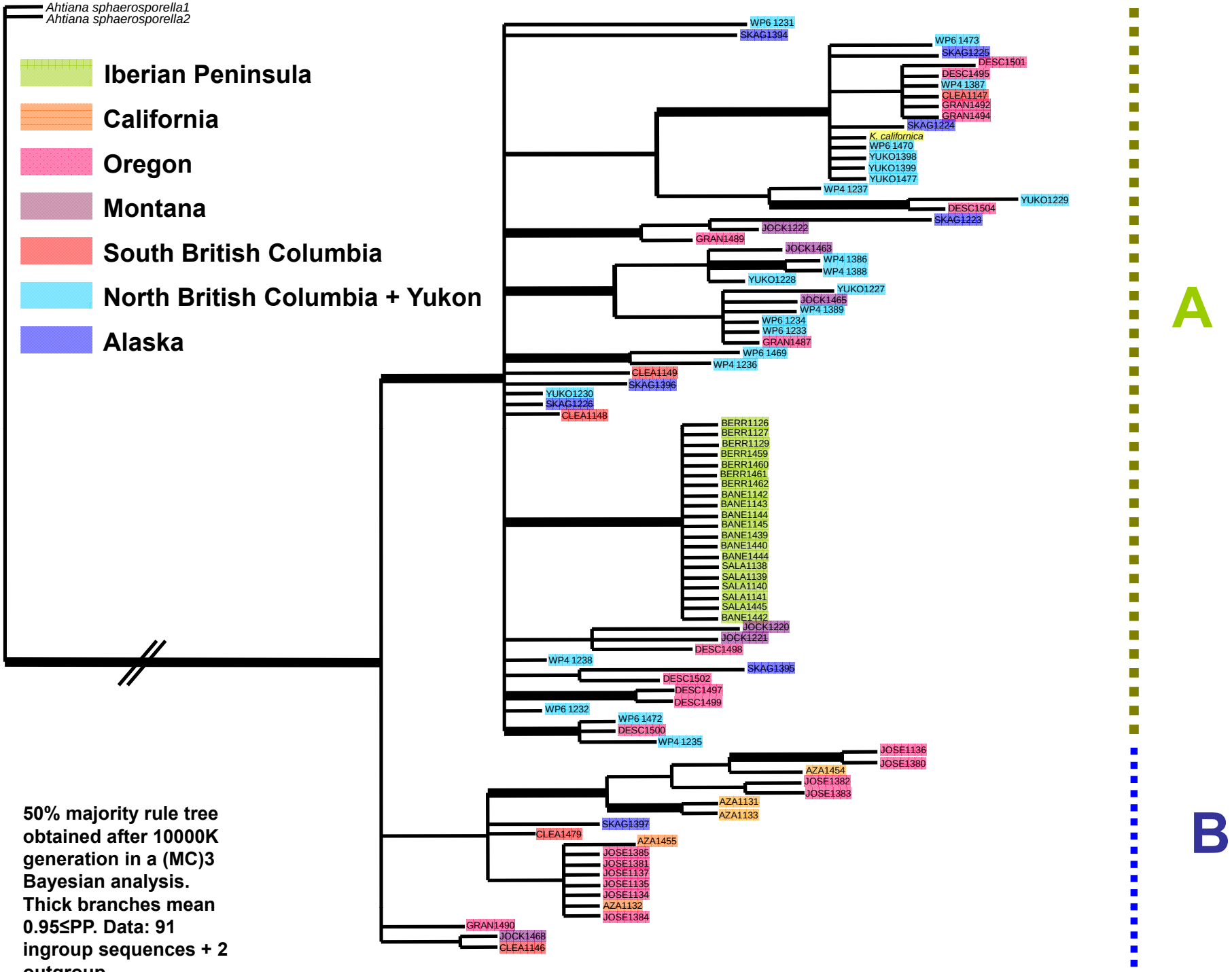


K. californica + *K. merrillii* from Yukon and Northern BC

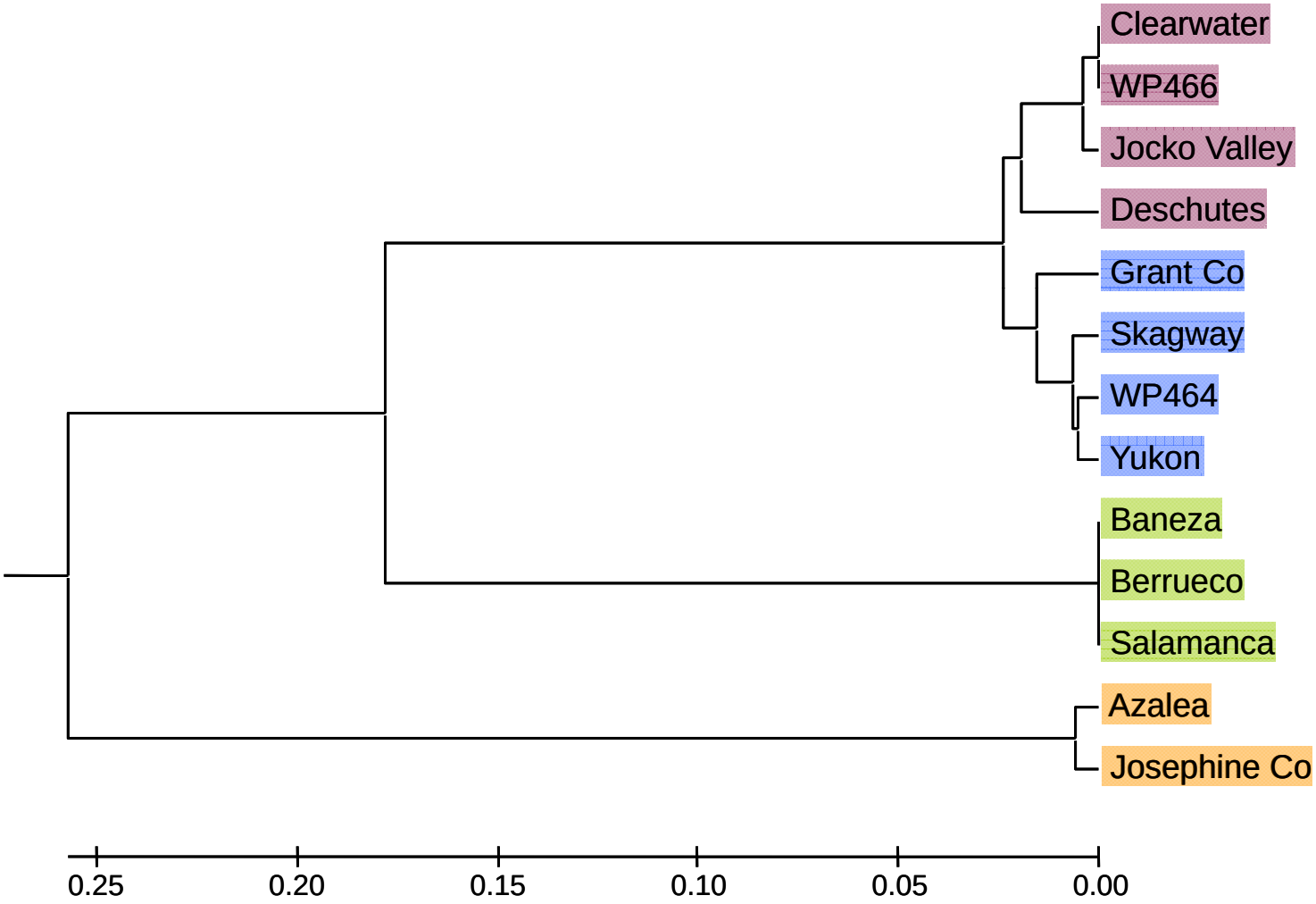
Same haplotype !!!!

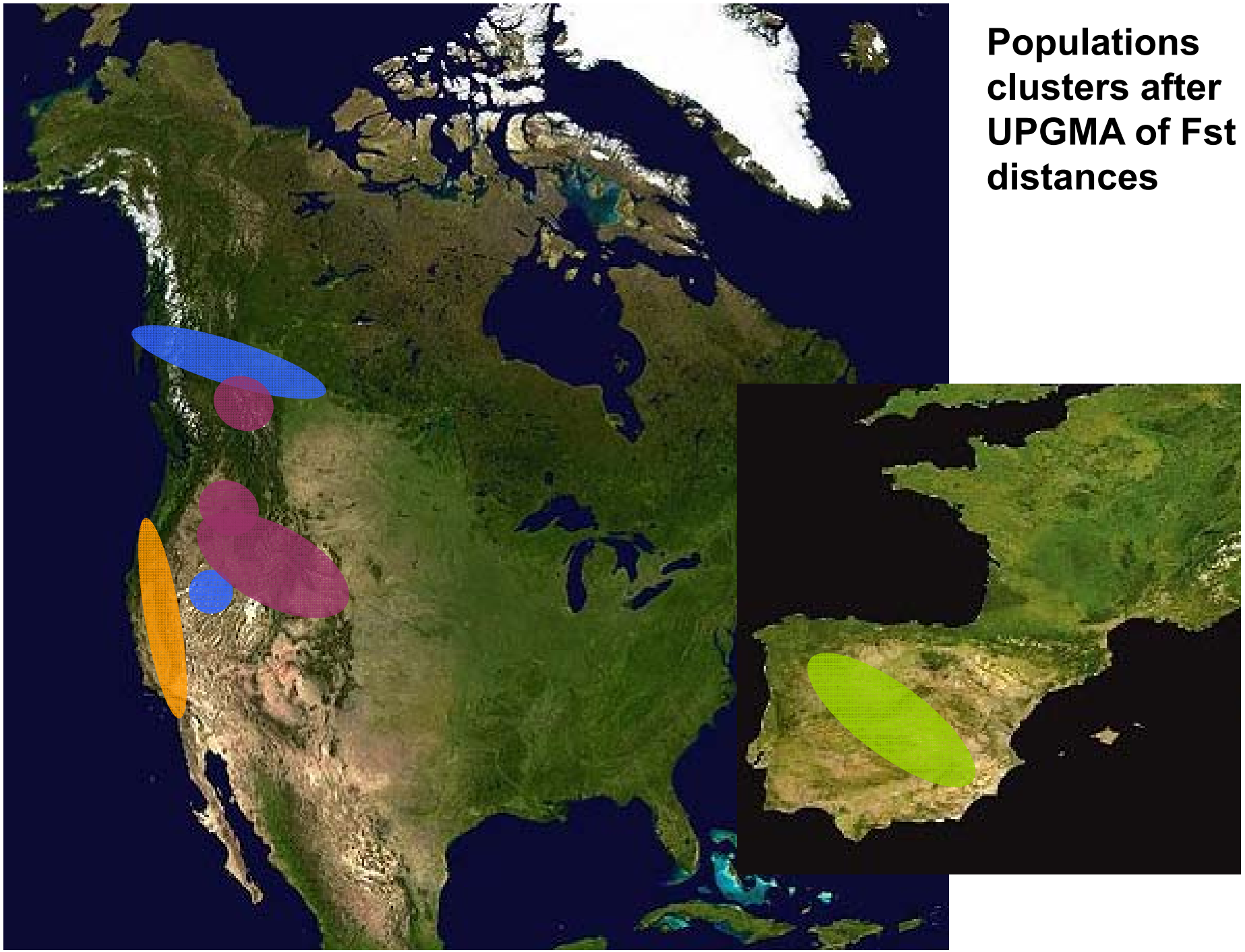


50% majority rule tree obtained after 10000K generation in a (MC)3 Bayesian analysis. Thick branches mean 0.95≤PP. Data: 91 ingroup sequences + 2 outgroup

$$F_{ST} = \frac{\Pi_{Between} - \Pi_{Within}}{\Pi_{Between}}$$

UPGMA clustering of the 13 studied populations based on Fst distances





Populations clusters after UPGMA of Fst distances

Conclusions

- Preliminary data showed a higher haplotypic and nucleotidic diversity in populations from North American than from the Iberian Peninsula

- Intercontinental genetic structure was revealed for *K. merrillii*. However, low geographic structure was detected in North American populations.

- Clustering of sampling localities revealed 4 main groups of localities: 1 in the Iberian Peninsula, and 3 in NA: 1 southern coastal group, 1 northern inland group and 1 northern inland-coastal group

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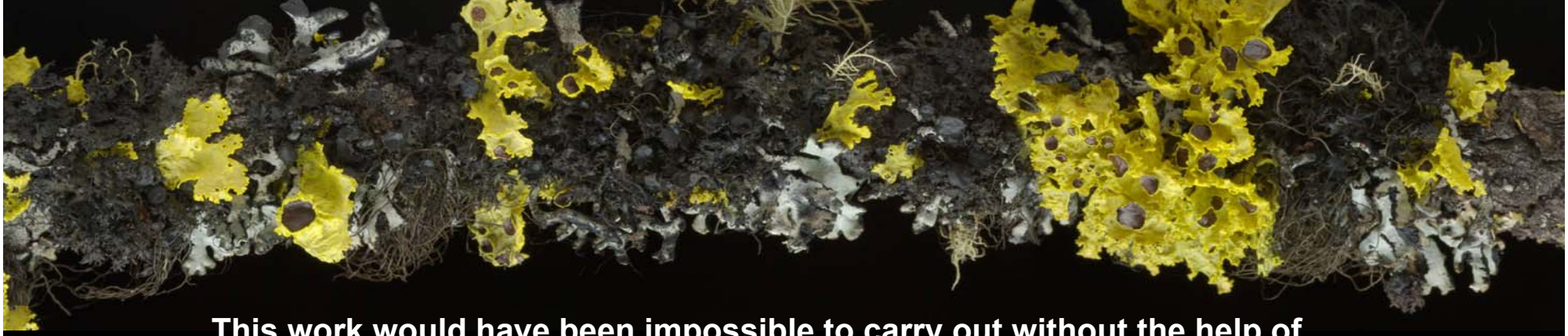

This work would have been impossible to carry out without the help of…

Curtis Bjork

(Idaho, Canada)

Trevor Goward

(British Columbia, Canada)

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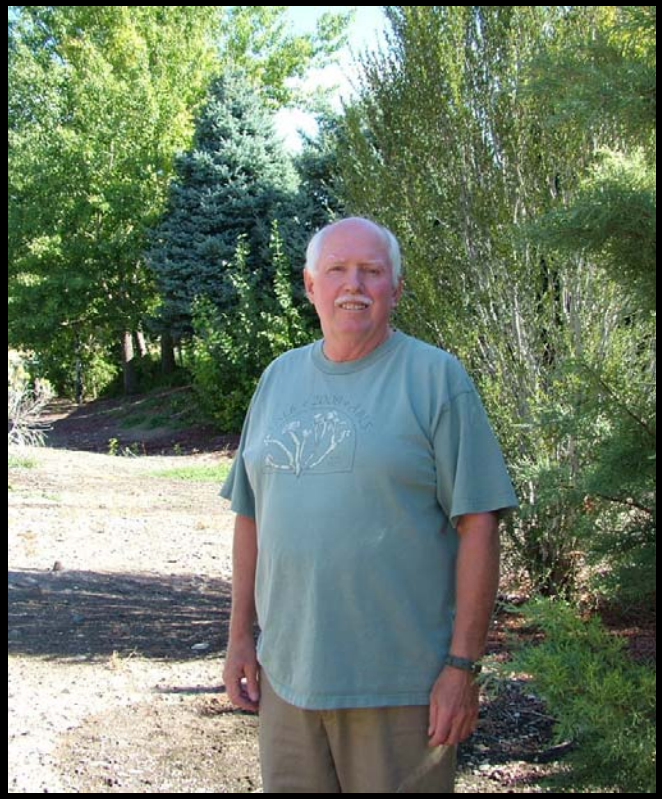

Rick Dremmer

(Oregon, U.S.A.)

Tim Wheeler

(Montana, U.S.A.)

This work would have been impossible to carry out without the help of…

Ron & Judy Robertson

(California, U.S.A)

&

Scot Loring

Muito obrigado