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Results of a freshwater bryozoan survey in the Pacific Northwestern United States

Terrence Marsh
Department of Biology, North Central College, Naperville, IL 60540-4690, USA
Timothy S. Wood
Department of Biological Sciences, Wright State University, Dayton, OH 45435, USA

ABSTRACT: This study represents the first known attempt to gather region-wide information on bryozoans in the Pacific Northwestern United States. For four weeks in July and August 1998, we traveled through Oregon and Washington as well as part of adjacent Idaho collecting colonies and sieving shoreline debris for statoblasts. We narcotized live colonies and then preserved them in 70% ethanol. We stored statoblasts, dried, in sealed plastic bags. Many of the species we encountered are common in eastern North America. Here we report finding *Fredericella sultana* and *Plumatella mukaii* in North America for the first time. We did not expect the widespread occurrence of *Stephanella hina*, a species well known in western Asia and previously known from only a few populations in New England and Virginia. We also found a species closely resembling *Plumatella fungosa*, but with unusually large tubercles over all of the floatoblast.

1 INTRODUCTION

The first freshwater bryozoologist to survey a large area of North America was Bushnell (1965a, b, c) with his study in Michigan. Subsequent surveys have been conducted in Massachusetts (Smith 1989), Ohio (Wood 1989), eastern Canada (Ricciardi & Reiswig 1994), and Illinois (Marsh & Wood, in prep.). Documentation of species known to occur outside the northeastern quadrant of North America has only been made when researchers reported findings of one or more species in relatively few localities (Wood 2001a).

To begin to address this lack of information on the freshwater Bryozoa of other parts of North America, we undertook a survey of the Pacific Northwest, especially the states of Oregon and Washington. The Pacific Northwest is generally understood to include part or all of adjacent Idaho, although we did not include a significant portion of this state in our survey due to time constraints. We reasoned that an initial survey would reveal whether a more extensive survey would be warranted, e.g., if we discovered new species or species not known to occur in North America.

2 METHODS

We did most of the sampling during a one-month trip to the Pacific Northwest in the summer 1998. In the early spring prior to the trip one of us (Marsh) had spent a week sampling primarily lakes and reservoirs in southeastern Oregon. At that time of year few colonies were growing so almost all of the material collected was sieve samples containing statoblasts. On the summer trip we tried to collect from different areas of the states of Oregon and Washington. We sampled lentic and lotic sites in each state along a meandering east-west route as well as sites along a meandering north-south route from southern Oregon to northern Washington. We chose sites based on their accessibility from highways, the type of habitat, and physiographic location (Fig. 1).

We collected bryozoan material in two ways: by direct sampling of colonies and by examining sediment for statoblasts. We normally collected colonies by wading in water less than 1 m deep and looking at the undersides of submerged logs, rocks, or aquatic plants. Occasionally one of us would dive to 2-3 m to collect rocks and examine the undersides. When we found colonies we would cut or chip them from the substrate to which they were attached to include the attaching structures of the colony with the collected material. Sampling in this manner typically required 30-90 minutes per site to examine all of the substrates that were available and accessible. We stored specimens in 1-litre polyethylene bottles until the end of the day, when we narcotized them with menthol flakes then preserved them in 70% ethyl alcohol (Wood 2001a).

Our second method of collecting involved collecting shoreline debris or a thin layer of upper bottom sediment from lentic sites and sieving these ma-

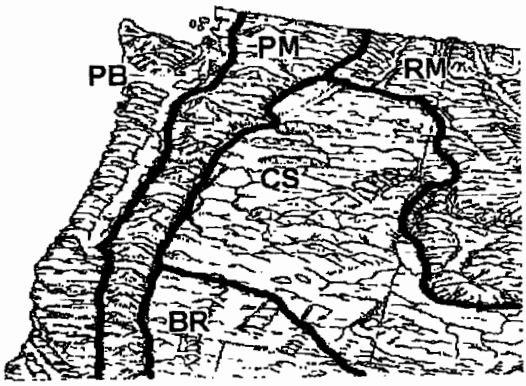

Figure 1. Physiographic regions of the Pacific Northwestern US (from Hunt 1974). BR = Basin & Range, CS = Columbia-Sanke River Plateau, PB = Pacific Border, PM = Pacific Mountain System, and RM = Rocky Mountains

terials for statoblasts. We used a three-screen method (Jones, et al. 2000) to separate statoblasts from as much of the mineral and other organic material as possible. The uppermost screen (mesh opening of 1 mm) held the sample and prevented material larger than any statoblast from being included with the statoblasts. The middle screen (mesh opening of 500 μm) caught larger statoblasts (e.g. those of *Pectinatella magnifica*), and the bottom screen (mesh opening of 150 μm) caught the smaller statoblasts (e.g. those of *Plumatella* spp.) Subsequent separation of the mineral fraction on the latter two screens resulted in a prepared sample consisting of statoblasts and a much smaller amount of mineral and other organic material. We dried the prepared sample on a paper coffee filter and stored each sample, labeled, in a self-sealing plastic bag. Sometimes we handpicked large statoblasts out of the screens and preserved and labeled them.

For species identifiable only by scanning electron microscopy we isolated statoblasts in deionized water and removed the adhering membrane, if necessary. Statoblasts were then freeze dried, mounted on aluminum stubs, and sputtered with gold palladium alloy for examination with a Philips 500 scanning electron microscope.

3 RESULTS

Figures 2 and 3 show the locations of the collecting sites in Oregon and Washington/Idaho respectively. Table 1 shows all of the bryozoan species that we found at the collecting localities. Some of our identifications are only to the genus level pending further study by us or because the material did not include statoblasts that are necessary for species determination.

For analysis we divided the Pacific Northwest into "desert" and "mountain" regions where "desert" includes all lentic sites in Hunt's (1974) Columbia-Snake River Plateau and Basin and Range physiographic provinces and "mountain" includes his Pacific Border, Pacific Mountain System and Rocky Mountains physiographic provinces (Fig. 1). Table 2 shows the pH and conductivity of lentic collection sites in the desert region of the Pacific Northwest and the bryozoan species we found at those sites.

We included Omak Lake, a site in Hunt's mountain region, in this group. While Omak Lake is several kilometers north of Hunt's Columbia River boundary for the desert region, it is an internally draining lake of high conductivity that is more typical of the desert region. The vegetation surrounding Omak Lake includes sagebrush (*Artemisia* sp.) and related desert plants. Three of the seven distinguished bryozoan species on this list are unique to the desert region in our survey. Using Microsoft Excel's t-test on the means with unequal variances we compared the pH and conductivity values between desert and mountain sites (Table 3) and found highly significant differences in both pH ($p < 0.008$) and conductivity ($p < 0.002$).

Cristatella mucedo. Colonies and/or floatoblasts occurred in 14 mountain localities, all lentic. Colonies

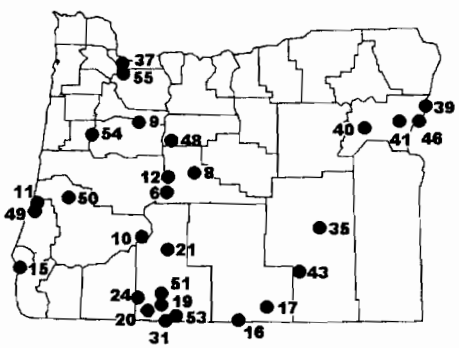

Figure 2. Collecting sites in Oregon.

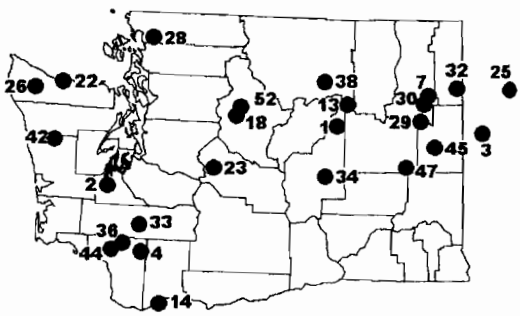

Figure 3. Collecting sites in Washington & adjacent Idaho.

Table 1. Bryozoan species of the Pacific Northwestern US.

NO	ST	COUNTY	BODYWATER	TAX1	TAX2	TAX3	TAX4	TAX5	TAX6
1	WA	Grant	Banks Lake	*H.pun.*	*P.art.*	*P.mag.*	*P.nit.*		
2	WA	Thurston	Black Lake	*C.muc.*	*P.mag.*	*Plum.*	*S.hin.*		
3	ID	Kootenai	Coeur d'Alene Lake	*H.pun.*	*P.mag.*	*Plum.*	*S.hin.*		
4	WA	Cowlitz	Coldwater Lake	*Plum.*	*S.hin.*				
5	OR	Lane	Cottage Grove Lake	*C.muc.*	*H.pun.*	*L.car.*	*P.mag.*	*Plum.*	
6	OR	Deschutes	Crane Prairie Reservoir at dam	*C.muc.*	*P.muk.*	*S.hin.*			
7	WA	Stevens	Deer Lake	*C.muc.*	*P.mag.*	*P.muk.*	*P.nit.*	*P.vai.*	*S.hin.*
8	OR	Deschutes	Deschutes River	*F.ind.*					
9	OR	Linn	Detroit Lake	*C.muc.*	*P.ema.*	*Plum.*			
10	OR	Douglas	Diamond Lake	*P.nit.*					
11	OR	Coos	Eel Lake	*P.art.*	*P.mag.*	*P.rug.*	*S.hin.*		
12	OR	Deschutes	Elk Lake	*P.fru.*	*P.rug.*	*S.hin.*			
13	WA	Okanogan	Franklin D. Roosevelt Lake	*C.muc.*	*H.pun.*				
14	WA	Skamania	Franz Lake	*P.mag.*	*P.muk.*	*P.sim.*	*S.hin.*		
15	OR	Curry	Garrison Lake	*F.sul.*	*Plum.*				
16	OR	Lake	Goose Lake	*P.fun.*					
17	OR	Lake	Greaser Reservoir	*P.nod.*					
18	WA	Chelan	Hidden Lake Outlet	*C.muc.*					
19	OR	Klamath	irrigation canal off Klamath River	*L.car.*	*P.ema.*	*Plum.*			
20	OR	Klamath	John Boyle Reservoir	*L.car.*	*P.mag.*	*P.sim.*	*S.hin.*		
21	OR	Klamath	Klamath Marsh	*Plum.*					
22	WA	Clallum	Lake Crescent	*C.muc.*	*P.mag.*	*Plum.*			
23	WA	Kittitas	Lake Easton	*C.muc.*	*P.rug.*	*S.hin.*			
24	OR	Klamath	Lake of the Woods	*F.ind.*	*P.rug.*				
25	ID	Bonner	Lake Pend Oreille	*C.muc.*	*H.pun.*	*P.mag.*	*P.ema.*		
26	WA	Clallum	Lake Pleasant	*C.muc.*	*F.ind.*	*P.art.*	*P.mag.*	*Plum.*	*S.hin.*
27	WA	King	Lake Washington	*C.muc.*	*P.mag.*	*Prug.*	*S.hin.*		
28	WA	Whatcom	Lake Whatcom	*C.muc.*	*Fred.*	*P.mag.*	*Plum.*	*S.hin.*	
29	WA	Stevens	Long Lake	H.pun.	*P.mag.*	*P.ret.*	*S.hin.*		
30	WA	Stevens	Loon Lake	*P. nit.*	*Plum.*				
31	CA	Siskiyou	Lower Klamath Lake	*Plum.*					
32	WA	Pend Oreille	Marshall Lake	*Fred.*	*S.hin.*				
33	WA	Lewis	Mayfield Lake	*C.muc.*	*Fred.*	*P.mag.*	*P.cas.*	*Plum.*	
34	WA	Grant	Moses Lake	*P.ret.*					
35	OR	Harney	Mud Lake	*Plum.*					
36	WA	Cowlitz	N. Fork Toutle River	*Fred.*	*P.ema.*				
37	OR	Multnomah	Oaks Bottom slough	*P.mag.*	*Pvai.*	*Plum.*			
38	WA	Okanogan	Omak Lake	*P.sim.*					
39	OR	Baker	Snake River-Oxbow Reservoir	*Plum.*					
40	OR	Baker	Phillips Lake	*P.ema.*	*P.rug.*				
41	OR	Baker	Powder River	*Plum.*					
42	WA	Grays Harbor	Quinault Lake	*F.ind.*	*P.mag.*	*Plum.*			
43	OR	Harney	Rock Creek Reservoir	*Plum.*					
44	WA	Cowlitz	Silver Lake	*P.mag.*	*Plum.*	*S.hin.*			
45	WA	Spokane	Silver Lake	*P.nit.*	*P.rug.*				
46	OR	Baker	Snake River below Brownlee Dam	*P.art.*	*Plum.*				
47	WA	Lincoln	Sprague Lake	*P.art.*	*P.nit.*				
48	OR	Jefferson	Suttle Lake	*C.muc.*	*P.nit.*	*S.hin.*			
49	OR	Coos	Tenmile Lake	*P.art.*	*P.mag.*	*Plum.*	*S.hin.*		
50	OR	Douglas	Umpqua River	*Fred.*	*P.rug.*				
51	OR	Klamath	Upper Klamath Lake	*Plum.*					
52	WA	Chelan	Wenatchee Lake	*S.hin.*					
53	CA	Siskiyou	White Lake	*Plum.*					
54	OR	Benton	Willamette River	*P.muk.*					
55	OR	Clackamas	Willamette River below locks	*F.bro.*	*P.mag.*	*P.ema.*			

C.muc. = Cristatella mucedo; F.bro = Fredericella browni; F.ind. = Fredericella indica; Fred. = Fredericella unidentified; *F.sul = Fredericella sultana; H.pun. = Hyalinella punctata; L.car. = Lophopodella carteri; P.art. = Paludicella articulata; P.mag. = Pectinatella magnifica; P.cas. = Plumatella casmiana; P.ema. = Plumatella emarginata; P.fun. = Plumatella fungosa; P.fru. = Plumatella fruticosa; Plum. = Plumatella* unidentified; *P.muk. = Plumatella mukaii; P.nit. = Plumatella nitens; P.nod. = Plumatella nodulosa; P.ret. = Plumatella reticulata; P.rug. = Plumatella rugosa; P.sim. = Plumatella semilirepens; P.vai. = Plumatella vaihiriae; S.hin. = Stephanella hina.*

Table 2. Bryozoan species found in lentic sites in "desert" regions of the Pacific Northwestern US.

Site	State	County	Body of water	Taxon	pH	Conductivity
16	OR	Lake	Goose Lake	*P.fun.*	9.1	1230
17	OR	Lake	Greaser Res.	*P.nod.*	8.4	280
31	CA	Siskiyou	Lower Klamath Lake	*Plum.*	8.0	810
34	WA	Grant	Moses Lake	*P.ret.*	9.8	340
35	OR	Harney	Mud Lake	*Plum.*	9.0	1740
38	WA	Okanogan	Omak Lake	*P.sim.*	9.8	1610
40	OR	Baker	Phillips Lake	*P.ema.* *P.rug.*	9.3	80
43	OR	Harney	Rock Creek Res.	*Plum.*	8.6	150
45	WA	Spokane	Silver Lake	*P.ema.* *P.rug.*	9.2	680
47	WA	Lincoln	Sprague Lake	*P.art.* *P.nit.*	9.7	380
53	CA	Siskiyou	White Lake	*Plum.*	8.9	1450

P.art. = Paludicella articulata; P.ema. = Plumatella emarginata; P.fun. = Plumatella fungosa; Plum. = Plumatella unidentified; *P.nit. = Plumatella nitens; P.nod. = Plumatella nodulosa; P.ret. = Plumatella reticulata; P.rug. = Plumatella rugosa; P.sim. = Plumatella semilirepens.*

Table 3. The pH and conductivity in "desert" vs. "mountain" lentic sites in the Pacific Northwestern US.

Site	Statistic	pH	Conductivity (µS)
desert	average	9.1	795
	standard deviation	0.6	613
mountain	average	8.5	63
	standard deviation	0.5	38
desert vs mountain	t-test	$p < 0.008$	$p < 0.002$

of this species were abundant on the undersides of logs several hundred meters above the dam in Crane Prairie Reservoir in Oregon. They were also abundant on the undersides of rocks in the small outlet stream from Hidden Lake, Washington. There was no current in Crane Prairie Reservoir, whereas the current was moderate in the small outlet stream from Hidden Lake.

Fredericella browni colonies occurred on the undersides of logs below the locks (and falls) on the Willamette River at West Linn, Oregon. Here it occurred with *P. magnifica.* There was no current at this site.

Fredericella indica. We found colonies of this species in four localities, all in mountain sites. Water flow at these sites varied from none to sluggish.

Fredericella sultana. We collected colonies of this species in Garrison Lake in southwestern Oregon. This freshwater lake is just inland of the Pacific Ocean at Port Orford. This species was abundant on sticks in a slow moving channel under the Arizona Street bridge that divides the lake into two parts. We also found colonies of an unidentified *Plumatella* at this site.

We made several other collections of *Fredericella* sp., all in lentic or lotic mountain sites. Because these colonies lacked statoblasts, we could not identify them to species.

Hyalinella punctata. We found colonies in two localities, one mountain and the other bordering the desert region. In Franklin D. Roosevelt Lake, an impoundment of the Columbia River formed by the Grand Coulee Dam, we found the colonies on sticks we collected from a couple of meters below the surface. In Lake Pend Oreille we collected colonies from concrete riprap and a branch at the lake edge. We also sieved statoblasts at four mountain lakes and a lake that is fed by Franklin D. Roosevelt Lake.

Lophopodella carteri. We found evidence of this species in only three mountain localities, all in western Oregon. None of our collections included colonies, only floatoblasts.

Paludicella articulata. We collected colonies of this ctenostome species in both still and flowing water throughout the Pacific Northwest. Colony growth was luxuriant in Tenmile Lake.

Pectinatella magnifica. We collected colonies or statoblasts of this species in 18 localities in this survey, none of which were lentic desert localities. Banks Lake is a reservoir that receives and returns water to the Columbia River for electricity generation. We collected only statoblasts in Quinault Lake, Lake Crescent, and Lake Washington, all in western Washington; Deer Lake in northeastern Washington; and Lake Pend Oreille in northern Idaho. Sallie Jones, a biologist at the Bonneville Lock and Dam, (pers. comm.) documented the occurrence of colonies of this species passing through the Bonneville Dam facility on the Columbia River (Multnomah County, Oregon, and Skamania Co., Washington) in the fall seasons for several years prior to our survey. She also documented this species in Drano Lake, an impoundment created by fill for a railroad bed along the Washington side of the Columbia River several km upstream of Bonneville Dam.

Plumatella casmiana. We encountered colonies only in Mayfield Lake in Washington. They were abundant on logs in 1-2 m deep water underneath a bridge at the upper end of the lake.

Plumatella emarginata colonies occurred in four localities in our survey; we found statoblasts in two additional localities. Colonies were common in all four sites growing on logs and/or rocks. At two of

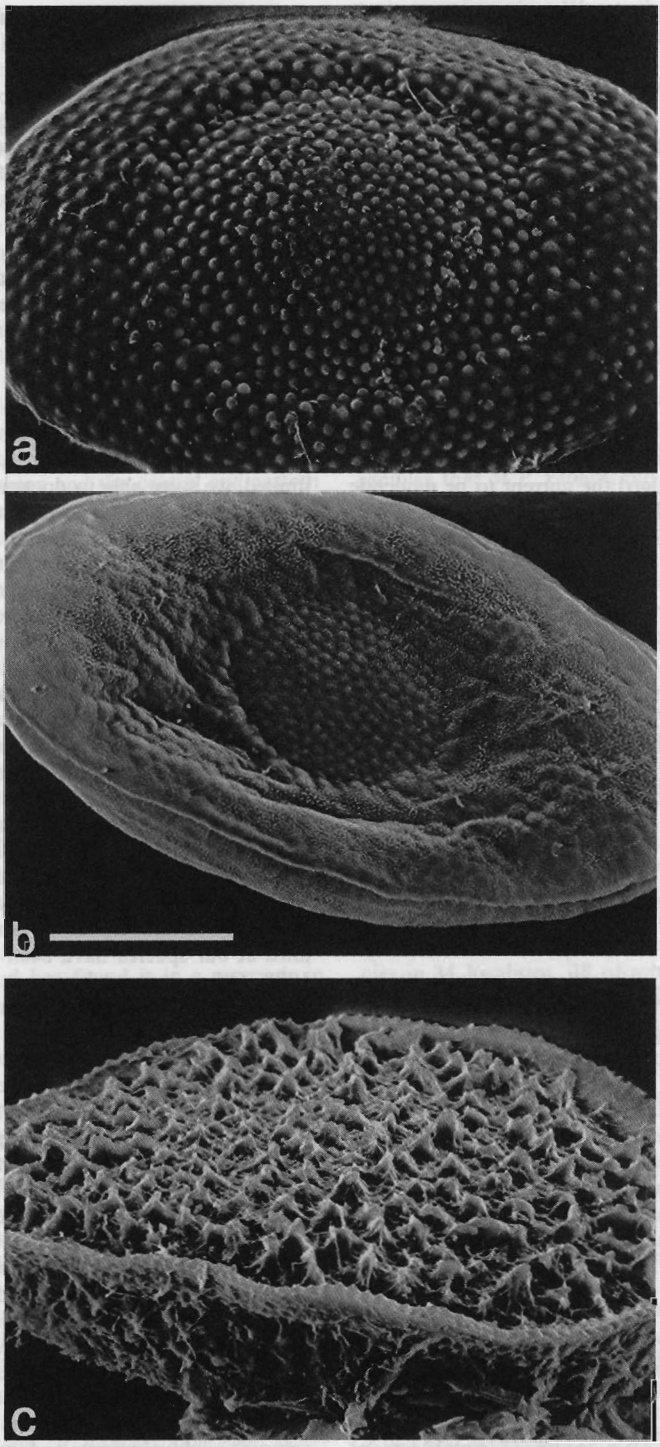

Figure 4. Selected statoblasts encountered in this study. a) Floatoblast of *Plumatella fungosa* from Greaser Lake showing unusually strong tuberculation. b) Floatoblast of *Plumatella mukaii* from Crane Prairie Reservoir showing the wrinkled surface membrane characteristic of this species. c) Sessoblast of *Stephanella hina* from Eel Lake showing sharp, conical projections characteristic of this species. Scale bar = 0.1 mm.

the sites the current was judged to be "moderate" or "swift," vs. the other two sites where the water was still.

Plumatella fungosa. We sieved floatoblasts of this species from Goose Lake, a desert locality in southern Oregon (Fig. 4a). Access to the lake was gained in Goose Lake Recreation Area at Pine Creek, Oregon.

Plumatella fruticosa colonies occurred in Elk Lake in the central Oregon Cascade Mountains. At this lake we found the colonies growing on logs with *P. rugosa* in a protected bay at the southern end of the lake.

Plumatella mukaii. We collected colonies in two lotic, mountain localities, both in western Oregon. At these localities we judged the current to be moderate and swift, respectively. We sieved statoblasts in two lentic, mountain localities, both in Washington (Fig. 4b).

Plumatella nitens. We collected colonies in four localities, all lentic. We collected statoblasts at three more lentic localities. The first three localities where we collected colonies are mountain sites while the fourth, Sprague Lake, is a desert lake which had been badly fouled by fishermen leaving remains of their catches in the water. Silver Lake, where we collected statoblasts, is also a desert locality.

Plumatella nodulosa. We isolated statoblasts of this species from a sieve sample of lakeshore debris that we collected at Greaser Lake, a desert lake in south central Oregon.

Plumatella reticulata. We collected colonies at two lentic localities. At Moses Lake, a desert lake, the colonies were growing on rocks, while at Long Lake, a mountain lake, the colonies were growing on logs.

Plumatella rugosa. Colonies occurred in four mountain localities in our survey; we found statoblasts at an additional four localities – two mountain and two desert localities. This species was abundant only at Eel Lake, where the colonies were small (1-2 cm in diameter). There was adequate substrate to support colony growth at all four of the colony sites except Elk Lake.

Plumatella similirepens. We found colonies or statoblasts in two mountain and one desert lentic localities.

Plumatella vaihiriae. We recovered statoblasts of this species in two mountain lentic localities.

Stephanella hina. Casual sampling by one of us (Marsh) in 1998 had revealed the presence of *S. hina* in Silver Lake in western Washington. Heretofore the species had been known only from New England (Smith 1988) and Virginia (Wood unpubl.) since its original description from Japan (Oka 1908). On every subsequent visit to Silver Lake we have found statoblasts of this species but have yet to find the translucent colonies. The sites where we collected this species were all mountain lentic sites with little or no current. Despite intensive searching, we encountered colonies of *Stephanella* only at Marshall Lake in northeastern Washington (Fig. 4c).

4 DISCUSSION

While our collections in the Pacific Northwest were limited, we were able to document a number of species in this under-studied region. Even the large and unique *Pectinatella magnifica* had not previously been noted in the literature, although colleagues familiar with the region had reported its occurrence to us. Previously published records of this species in North America note only that it has been found as far west as Texas.

The number of bryozoan species appearing in this survey (20) is comparable with the diversity reported in other regional or state surveys. Bushnell (1965a, b, c) reported 13 species in Michigan, compared to 14 in Massachusetts (Smith 1989), 14 in eastern Canada (Ricciardi & Reiswig 1994), and 13 in Ohio (Wood 1989). The high diversity we found in Washington and Oregon reflects both the relatively large area of the region and recent advances in the taxonomy of this bryozoan group. More than one third of our species have been described only since 1988. Other surveys have not included sieving for statoblasts. In this survey four species were found only as statoblasts.

Freshwater bryozoans are likely disseminated over long distances on the feathers and in the guts of migratory waterfowl (Bushnell 1973). Thus it is reasonable that all but two of the species we found have been reported elsewhere in North America. *Fredericella sultana*, however, has not previously been recorded in North America but is common in Europe. *Plumatella mukaii* is know in this hemisphere from Chile (Orellana-Liebbe 1999) but otherwise has been reported only from a variety of localities in eastern Asia and India (Wood 2001c). We predict that future surveys will reveal additional North American localities where these species occur. Waterfowl that migrate to Arctic nesting grounds could bring statoblasts to local water bodies where colonies could germinate and grow. Statoblasts produced by the colonies in these arctic bodies of water could be subsequently dispersed into other parts of

the continent by birds using various migratory routes.

This same dispersal mechanism could account for the distribution of *P. nodulosa*. Greaser Lake in Oregon, the only site where this species was found, is frequented by migratory waterfowl. In mid-March, for example, we noted Canada geese and other unidentified waterfowl on the lake and killdeers along the shoreline. Thus we are not surprised that this species also occurs at several other sites in northeastern North America (Wood 2001b).

Nearly 60% of the bryozoan species in this study occurred only in mountain localities in western Oregon, western Washington, and northeastern Washington, in what Hunt (1974) refers to as the Pacific Border, Pacific Mountain System, and Rocky Mountains physiographic regions (Fig. 1). The remaining species occurred in the desert regions of southeastern Washington and the central and eastern portions of Oregon: Hunt's Columbia-Snake River Plateau and the Basin and Range physiographic regions.

The species encountered the most frequently, *Stephanella hina*, occurred exclusively in the mountain regions. We found only statoblasts in all localities except Marshall Lake, Washington, where we unknowingly collected colony material. Colonies of this translucent species are very difficult to see on the typical dark substrate we examine in the field. This species has not been found as frequently in any other survey in North America. From Smith's (1988) first record of *Stephanella* in the Swift River in Massachusetts and our findings, it is tempting to describe this species as restricted to holarctic regions, as is the case for *C. mucedo* (Wood 2001a). However Smith (pers. comm.) has subsequently found this species in a second locality nearer the coast of Massachusetts and Wood has found it in a reservoir in southwestern Virginia. Both findings suggest that this species is not necessarily restricted to a more northern, cooler climate.

The three sites from which we recovered statoblasts of *L. carteri* are all in the mountain region. This species is known from scattered sites in a number of states in northeastern North America (Wood 2001a, Ricciardi & Reiswig 1994) and Panama (Marsh & Wood, unpubl.). Wood (2001a) has noted that this species has been found in a growing number of localities in North America following its introduction in the 1930s.

Lentic sites in the desert region are home for only several species of *Plumatella* and *P. articulata* based on our collections (Table 2). We found three of the nine taxa, *P. fungosa*, *P. nodulosa*, and an undescribed species of *Plumatella*, only in desert localities. Of these three taxa, *P. nodulosa* has been found elsewhere in North America (Wood, 2001b). There is a highly significant difference between the conductivity and pH in lentic sites in the desert region vs. the mountain region. We attribute this difference to the limited drainage and high rates of evaporation in lentic sites in the desert region. Our findings suggest that *Plumatella* spp. and *P. articulata* are the only species able to cope with the differences in water conductivity and pH that exist among mountain and desert localities.

We collected statoblasts of *P. similirepens* at Omak Lake in Washington, a desert region site, and Franz Lake in Washington, a mountain region site, as well as colonies in John Boyle Reservoir in Oregon, a mountain region site. Previously this species was only known from two collections in Illinois (Wood 2001b).

The undescribed plumatellids are known so far only from their floatoblasts. In one, the floatoblast annulus is paved, as in *P. emarginata*, but the ventral fenestra is entirely smooth. The other species resembles that of *P. repens*, but the annulus bears no nodules. We anticipate new collections very soon, to be followed by published descriptions of both species.

Statoblast records alone are useful for indicating the presence of colonies in the drainage area. We recognize that statoblasts do not necessarily prove the occurrence of colonies in the body of water where they are found.

No single plumatellid species occurred frequently in this survey. This may be due to the relatively few sites surveyed, compared to our three-year survey of Illinois bryozoans (Marsh & Wood, in prep.). *P. reticulata*, occurring at 22% of all Illinois sites, was found at only one mountain and one desert locality in the Pacific Northwest. We were surprised that we did not find the ctenostome, *P. articulata*, in more lotic (1) than lentic (6) sites. In our survey of Illinois (Marsh & Wood, unpubl.) we have found this species in 34 localities, 28 of which are lotic. Another ctenostome bryozoan, *Pottsiella erecta*, has been reported infrequently but consistently in surveys of northeastern North America (Smith 1989, Wood 1989, Ricciardi & Reiswig 1994, Marsh & Wood, unpubl.) but we did not find this species in this survey.

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