

WAGNER NATURAL AREA NEWSLETTER

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Newsletter of the Wagner Natural Area Society, Management Committee
and Volunteer Stewards of Wagner Natural Area, Parkland County, Alberta



Second time lucky! Wagner Natural Area Society won a prestigious **Emerald Award** in the **Community Group category** at the 11th Annual Emerald Foundation Awards in Edmonton this year! Shown at the ceremony June 12th with the award are President **Irl Miller**, Past-President **Pat Clayton** and director **Beth Jenkins**.

See *The Grapevine* on page 3 for more details.

Photo: Pat Miller

The Great Wagner Natural Area Murder Mystery!

J. Derek Johnson, Northern Forestry Centre

During the summer of 2000, Pat Clayton, then President of Wagner Natural Area Society, brought to my attention some dying white spruce trees (*Picea glauca* (Moench) Voss) at the northeast corner of the Atim field along the old 118th Ave. access road into the natural area. The symptoms observed included downwardly curved branch tips with twisted young needles, rusty discoloration of both younger and older needles, with the older needles falling off the branches, and swollen nodes below the current year's growth. One tree was dead and two others had lost a considerable number of needles. A fourth tree appeared to be relatively undamaged. Pat initially wondered if the cause of the tree's demise was a change in water level as a result of a breakage in the beaver dam on Atim Creek. I did a survey of the beaver dam and downstream area and could find no break in the dam or any indication of increased water flows over the dam that might explain how the trees died. A closer inspection of the affected trees did not reveal any obvious feeding on the needles by insects, or any holes at the base of the tree where carpenter ants, bark beetles, or

other insects may have entered, or woodpecker holes dug while the birds were looking for insects, or bracket fungi that may have caused the trees to rot.

Foliage samples were taken from the dying trees and circulated among various "experts" at the federal government's Northern Forestry Centre. The entomologists agreed that it was not insect damage, and the forest pathologist did not know of any fungus or disease that would cause the damage observed. One person suggested that drought might be the reason the trees were dying, but if so, why were only the white spruce trees affected and not also the nearby balsam poplar (*Populus balsamifera* L.) and tamarack (*Larix laricina* (Du Roi) K. Koch) trees?

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“Murder Mystery”, continued from page 1

Another person questioned whether it might be salt damage, but salt is generally not applied on gravel roads in the County of Parkland. The staff in the analytical services lab at the Forestry Centre lab were of the opinion that the damage was of chemical origin, likely a herbicide, and likely deposited directly on the foliage rather than absorbed through the soil. Yet, if it was herbicide damage, why were only the white spruce trees affected and not the neighboring balsam poplar and tamarack trees? In general, conifers are less susceptible to herbicide damage than are broadleaf deciduous species, so why were none of the balsam poplar showing any effects? Was it the fact that both balsam poplar and tamarack are deciduous: shedding their leaves saved them from exhibiting symptoms?

To complicate matters, during the winter of 2000-01 more than a dozen additional dead and dying spruce trees were observed along about a 500 m stretch of the access road. Only trees within about 5 m of the edge of the road were dying. Those farther back seemed to be unaffected. Increment cores, taken at stump height (30 cm) from four affected trees of varying ages, were sound to the centre (Table 1). An obvious cause of the trees’ decline was elusive. However, a closer inspection along the entire stretch of the access road revealed that many of the low (< 2 m tall) willow (*Salix* spp.) shrubs along the road were dead, with the leaves still attached to the stems. This strongly pointed in the direction of herbicide spraying to control shrub encroachment along the road, but Parkland County claims that that section of road was not sprayed with herbicide during the summer of 2000. Could it be that these trees were sprayed in the summer of 1999 and it took until the summer of 2000 before any effects became visible?

In April 2001, additional foliage samples were collected for analysis from affected spruce trees and willow shrubs along the access road, as well as surface soil samples from beneath dead spruce trees.

Update - October 2002: The collected samples are still waiting to be analyzed. Manpower and equipment are currently unavailable. The Wagner Society is investigating other options for getting the samples analyzed. The foliage samples are the most likely ones to contain answers to our questions. The trees that were sampled in 2001 are now either dead or very close to it, and some of them now show the feeding activities of birds chipping off pieces of bark in search of insects beneath.

Table 1. Mensuration data for dying white spruce trees cored in the Wagner Natural Area.

	Tree #1	Tree #2	Tree #3	Tree #4
DBH (cm)	20.5	24.0	31.2	44.0
Height (m)	12.0	17.0	14.0	17.5
Age (yrs)	32	44	60	70



(Above) the author taking a core from one of the dead/dying white spruce trees along the access road to the parking lot at Wagner in the spring of 2001. A core (below) through to the centre of the trunk allows the age of the tree (number of rings) to be determined and provides a measure of its health.



If you wish to report any situation or occurrence in Wagner Natural Area and cannot reach a committee member, or the matter is of an urgent nature, please phone the toll-free Alberta government number: 1-800-427-3582.



The Wagner Grapevine



Bouquets

Thanks to our summer student **David Marцениuk** who carried out a number of site management tasks this summer, including clearing brush from trails, laying fresh gravel on the Marl Pond Trail, and putting a fresh coat of stain on the picnic shelter. David also helped locate and mark a number of permanent sample plots first established when Geowest did our biophysical inventory in 2000.

A big bouquet to the **ENERPRO Midstream** company for their donation of \$1000 to pay for trail upgrading, including the aforementioned gravel.

Bouquet for the hardest working steward of the committee goes to **Irl Miller** who spent 60-plus hours of volunteer time during the summer on Wagner business.

All of us, however, have had recognition for our efforts in the form of gifts of fleece jackets and T-shirts courtesy of the **Volunteer Stewards Program, Alberta Community Development, Parks & Parkland Services**. Much appreciated – they will be well worn!

Bouquets to those people who wrote letters of support for our nomination for an Emerald Award (see below).

Postscript: At least a word of thanks to Dick Clayton and Andy Hendry who worked hard on our fall clean-up September 29th while the rest of us lollygagged in the picnic shelter enjoying a pot-luck barbecue!

Wagner - Emerald Award Winner!

Wagner volunteer stewards won the award in the Community Group category given by the Alberta Emerald Foundation for Environmental Excellence June 12th in Edmonton! Beth wrote up the application that got us nominated, assisted by Irl who also did much rounding up of the necessary audiovisual material. Other finalists in this category were the Peigan First Nations Dance Group and the Castle Crown Wilderness Association. This was our second attempt: in 1991, the year of the first Emerald awards, we were a finalist in the Not-for-Profit category.

20th Anniversary of the Wagner Committee!

Our Wagner Management Committee was founded in December 1982, pre-dating the creation of the provincial government's Volunteer Stewards Program by some five years. Pat Clayton is a founder member of the Society and is still active, and several others of us were present at the inaugural meetings. We shall be celebrating our

anniversary at our Annual Members' Night on November 28th at the Unitarian Church, 12530-110 Avenue, Edmonton, and our members are cordially invited to join us. See page 9 for further information.

Big Lake Natural Area Management Plan

As stewards of a neighbouring natural area, Wagner executive has a natural interest in the Big Lake Natural Area Management Plan, of which the Phase I report was published this spring. Archie Landals of Alberta Community Development Parks and Protected Areas Division is coordinating the project in consultation with the four adjacent jurisdictions of Parkland County, Sturgeon County and the Cities of Edmonton and St. Albert. AMEC Earth and Environmental Ltd is the consultant for the study. The objective, as stated in their blue brochure, is "To prepare a publicly-accepted plan that, when adopted and implemented by the adjacent municipalities, preserves the long-term ecological integrity of the Big Lake Natural Area. The plan will provide guidelines for appropriate and controlled development and use of the BLNA so that further impacts are reduced or eliminated." The organizers were seeking public input during August and September, particularly on a vision for the future of the area in question (a much larger area than the currently designated Natural Area) but information on the plan is still available by visiting the project website at www.amecedmonton.com or by contacting Archie Landals at (780) 427-9470.

WaterforLife: Alberta's Strategy on Water Management

The outcome of the survey entitled "Water for Life," discussed in last issue's editorial, is now available on the Alberta Government's website: [//www.waterforlife.gov.ab.ca/html/results.html](http://www.waterforlife.gov.ab.ca/html/results.html). It is well worth a browse. As well as a synopsis of the comments from the public workshops, it includes also a Summary of the Minister's Forum on Water, a 2-day meeting held in June, 2002. The Equus Consulting Group should be commended on how they conducted this province-wide survey and compiled the results, as should the Alberta government for their efforts to educate the public as well as ask for their input in this survey. One major finding is that there is a need to gain much more information about water resources and to augment the staff dealing with water at Alberta Environment. ... Well, the government has asked, and heard, but will it listen? How will it act? Following up on this will be nothing if not interesting in the months and years to come!

Wetland Series

Part 3: Chemical and physical characteristics of wetlands – a tale of gradients

by Markus N. Thormann, PhD, University of Alberta

Introduction

A more thorough understanding of peatlands can be obtained by examining the original defining criteria of these ecosystems. Originally, Tuomikoski (1942) and DuRietz (1949) classified peatlands according to the number of moss “indicator species”. These are species that can be found consistently in the same type of peatland. They determined that bogs and poor fens have a low number, while rich fens have a larger number of characteristic bryophyte species (more on this in the next installment of this series).

Sjörs (1950, 1952) overlaid a chemical gradient onto the vegetation gradient, focusing on pH (a measure of acidity or hydrogen ion concentration) and electrical conductivity (a measure of the concentration of positively charged ions or cations) of the surface water. Along this vegetation–chemical gradient, bogs are highly acidic and are dominated by oligotrophic species of *Sphagnum*, poor fens are less acidic and are dominated by mesotrophic species of *Sphagnum*, and rich fens are slightly acidic to alkaline and are dominated largely by brown mosses. Over the years, this increasing gradient of pH and conductivity along the bog–poor fen–rich fen gradient has been erroneously applied to include other surface water nutrients, such as nitrate, ammonium, and phosphorus, when indeed all peatlands have similar concentrations of these nutrients in their surface water (Vitt 1994). In contrast, non-peat forming wetlands are eutrophic, i.e., they have higher surface water concentrations of nitrate, ammonium, and phosphorus than oligotrophic and mesotrophic bogs and fens.

Most of the data I present in this installment originated from research done in western continental Canadian wetlands (Alberta, Saskatchewan, and Manitoba). Also, there are few data on the surface- or ground-water chemistry of swamps in Canada, in part due to their transitional nature in the landscape and scarcity compared to the other wetland classes, bogs, fens, and marshes, hence the emphasis on the last three.

Chemical characteristics

Acidity-alkalinity variables: Along the bog–poor fen–rich fen peatland gradient, all alkalinity-related variables increase. The pH of bogs is highly acidic, with average values between 3.4 and 4.2. Poor fens have a higher pH with values between 4.3 and 5.4. Rich fens are even less acidic and often even alkaline, with pH values ranging from 5.9 to often 8.4. Marshes and swamps have similar pHs to rich fens, ranging from 6 to 8 in most instances. Since pH is measured on a log-scale, a peatland with a pH of 4 is 10x more acidic than a peatland with a pH of 5 and 100x more acidic than a peatland with a pH of 6. Thus, bogs with a pH

below 4 are up to 1000x more acidic than rich fens with a pH around 7.

Similar to pH, alkalinity (a measure of CaCO₃ [calcium carbonate] concentrations) and electrical conductivity (total cation concentration) increase along the bog–poor fen–rich fen gradient. Values range from 0 to >200 mg/L CaCO₃ alkalinity and 30 to >600 µS/cm conductivity along the bog–fen–marsh wetland gradient (Table).

In continental areas, rich fens, marshes, and swamps are associated with alkaline waters rich in bicarbonate ions, while poor fens and bogs are associated with waters having very little to no alkalinity, and hence a low pH (Vitt and Chee 1990). This chemical partitioning is directly related to the presence of *Sphagnum* spp. in low alkalinity and low pH poor fens and bogs and the presence of brown mosses in rich fens, marshes, and swamps with higher alkalinity, conductivity and pH (marshes and swamps generally have few mosses). This leads to a bimodal distribution of wetlands along the acidity-alkalinity gradient (Gorham et al. 1984). Bogs and poor fens form one mode between pH 3.5 and 5.0, while rich fens, marshes, and swamps form the second mode between pH 5.6 and 8.5. The area between the two modes (pH 5.1 to 5.6) is the region where alkalinity approaches zero and lower pH wetlands are dominated by species of *Sphagnum*. Wetland succession was addressed in the previous installment of this series. Briefly, studies have shown succession of marshes to rich fens to poor fens to bogs occurs with the peatland existing for long time periods in the rich fen stage, often for thousands of years (e.g., Kuhry et al. 1993). However, succession from rich fen to poor fen is dramatically accelerated once *Sphagnum* spp. become established and may take only a few hundred years. Thus, peatlands with a pH between 5.1 and 5.6 are relatively rare.

The low pH of poor fens and bogs is maintained by a combination of inorganic cation exchange and organic acids produced by the decomposition of humic acids (Hemond 1980, Clymo 1984, Gorham et al. 1987). The inorganic cation exchange process ‘removes’ cations, including sodium (Na⁺) and calcium (Ca²⁺), from surface and pore water and binds them to uronic acid molecules on the surfaces of *Sphagnum* cell walls. In return, hydrogen ions (H⁺) are released from the *Sphagnum* cell walls, which acidifies the surrounding habitat. The resulting acidity is partly responsible for lower decomposition and nutrient-cycling rates in bogs and poor fens, thereby contributing to the generally nutrient-poor status of those peatlands.

In association with alkalinity, ion concentrations generally increase along the bog–fen–marsh–swamp wetland gradient

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as well (Table). Because *Sphagnum* spp. bind cations (see above), cation concentrations in bogs and poor fens, those peatlands with a dominant *Sphagnum* moss stratum, are significantly lower than those in rich fens (Table). Furthermore, cation concentrations are significantly higher in marshes and swamps than in fens due to increased water flow, which imports cations into these wetlands. Of these cations, potassium (K^+) occurs in the lowest concentrations (0.7 to 2.2 mg/L; Table) and often is the third-most limiting elemental nutrient after N and P in wetlands.

In contrast, concentrations of sulphur, aluminum, and iron are higher in bogs and poor fens compared to rich fens (see Vitt 1994), marshes and swamps (data not shown). These elements occur in higher concentrations in low pH ecosystems due to their increased solubility.

Nitrogen and phosphorus: Work in Canadian peatlands has shown that bogs and fens have similar concentrations of most nitrogen (N) and phosphorus (P) variables in their surface waters (ammonium [NH_4^+]: 44 vs. 35 $\mu\text{g/L}$; nitrate [NO_3^-]: 19 vs. 16 $\mu\text{g/L}$; total dissolved nitrogen [TDN]: 1153 vs. 1183 $\mu\text{g/L}$; soluble reactive phosphorus [SRP]: 15 vs. 20 $\mu\text{g/L}$; total phosphorus [TP]: 83 vs. 156 $\mu\text{g/L}$; Table). These wetland classes are considered oligotrophic or mesotrophic (low to medium concentrations of nutrients) and are significantly nutrient-poorer than marshes and swamps, which are eutrophic (nutrient-rich). Vitt et al. (1995) showed that many surface water chemistry variables vary considerably on a daily, seasonal and annual basis and at different depths within the same peatland. Hence the large ranges for most of the chemical variables summarized in the Table.

It is counterintuitive that bogs and fens have similar concentrations of nutrients, since bogs are ombrotrophic (receiving water nutrients only from precipitation) and fens are minerotrophic (receive water and nutrients from precipitation and ground- and surface-water flow) (refer to Part 2 of this series for further details). It is possible that nutrient cycling processes are much tighter in bogs than in fens. Hence, bogs may "lose" less of their nutrients due to water flow off the often domed surface of the peatland. In contrast, fens, with a closer connection to surface- and ground-water flow, may lose some of their nutrients due to water flow and hence retain less of their nutrients.

Marshes are significantly richer in N and P than either fens or bogs (NH_4^+ : 366 vs. 38 $\mu\text{g/L}$; TDN: 2135 vs. 1176 $\mu\text{g/L}$; SRP: 99 vs. 19 $\mu\text{g/L}$; TP: 373 vs. 138 $\mu\text{g/L}$; Table). This is a combination of the result of increased supplies of nutrients from ground- and surface-water and higher decomposition rates of plant remains (Thormann and Bayley 1997b, Thormann et al. 2001). Increased decomposition rates liberate more nutrients from dead and decaying plants, thereby making them available for future plant growth.

Physical characteristics

Water table: In bogs, water tables are generally between 30 and 150 cm below the moss surface; however, there may

still be depressions (hollows) in the undulating moss surface where water pools for parts of the year. Bogs in eastern Canada often have pools of several m^2 in area in concentric rings around the centre of the bog, which is extremely rare or altogether absent in bogs in western Canada. Water reaches the growing moss layer due to the wick-like properties of mosses that allow water from deeper peat layers to reach growing moss plants at the peatland surface. Also, mosses are excellent water-storage plants and intercept and retain much of the water (and nutrients) from precipitation.

The position of the water table in fens varies depending on the type of fen, but it is generally fairly stable throughout the year. Generally, the water table is close to the moss surface but it may vary from being up to 10 cm above the moss surface to several cm below the moss surface. Often, water tables are above the moss surface early in the year due to increasing run-off from melting snow and ice. Water tables drop to below the moss surface during summer and fall. Floating fens, those fens that develop as floating mats around lakes and sloughs, have the most stable water table position. The mat of mosses and vascular plants rises and sinks with the water table of the associated body of water, creating a very stable environment for the establishment and survival of wetland plants. The vegetation of fens is closely related to the position of the water table. In general, graminoids and mosses dominate in wetter fens, where the water table is above the moss surface. In contrast, shrubs and even trees dominate in drier fens, where the water table is below the moss surface or where mosses create a microtopography with small mounds (hummocks) and well-aerated peat horizons (National Wetlands Working Group 1997).

Marshes and swamps are characterized by often highly fluctuating water tables, due to tides, flooding, groundwater recharge, or seepage losses. Even small precipitation events can cause significant water table fluctuations, often measuring up to 30 cm in a short period of time (Thormann and Bayley 1997a). These water table rises occur rapidly and persist for extended periods before the water table levels off again. These rapid and significant water table fluctuations hinder the establishment of some plant species, most notably bryophytes, which generally require stable water tables to be successful. Moreover, marshes and swamps may be dry for extended periods during the year or for several years as they undergo cyclical periods of dryness and wetness (National Wetlands Working Group 1997). I have worked in a marsh in central Alberta where the water table was 40 cm above the soil surface one year and 10 cm below the soil surface the next. This indicates how fast the hydrology of some wetlands can change. In swamps, the water table is most often below the surface. However, some swamps, for example, the Florida Everglades or the swamps in the southeastern U.S.A., are inundated for long periods and plants adapted to those

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conditions by developing specialized oxygen-transporting tissues, including pneumatophores (“air roots”) which allow transport of oxygen into permanently or seasonally flooded roots).

Peat depth: Peat depths vary among different wetland classes and range from several meters to no peat at all. In Canada, for a wetland to be considered a peatland, it must have at least 40 cm of peat (30 cm in the U.S.A.). In general, bogs have the greatest peat depths, ranging from 3 to 5 m with some bogs having even up to 10 m of peat (National Wetlands Working Group 1997). Most of this peat consists of *Sphagnum* spp. remains; however, as previously discussed, many bogs started out as marshes or fens and the deeper peat layers may consist of sedge and graminoid remains. Fens generally accumulate less peat than bogs (Thormann et al. 1999), averaging 1 to 5 m. Although marshes and swamps can be peat-accumulating wetlands, and hence peatlands, there is much uncertainty and these two wetland classes are often characterized as non peat-accumulating wetlands with less than 40 cm of peat. If peat accumulates, and there is some evidence that it does in southern boreal marshes (Thormann and Bayley 1997a), in marshes it is rich in herbaceous plant remains, while swamp peat consists primarily of woody remains (National Wetlands Working Group 1997). Moreover, the marshes and swamps of the Florida Everglades and many marshes along the Baltic Sea coast in Europe accumulate significant quantities of peat and must be considered peatlands.

In western continental Canada (Alberta, Saskatchewan and Manitoba), peatlands with the greatest peat depths occur in eastern Manitoba, western Saskatchewan, and western Alberta, with depths frequently exceeding 5 m (Vitt et al. 2000). On average, western continental peatlands have between 2 and 3 m of peat, making them significant carbon stores (Vitt et al. 2000).

Conclusions

Bogs and fens differ significantly in all alkalinity-related variables and ion concentrations; however, they have similar N and P surface water concentrations. This variation can be explained by differences in their hydrology and vegetation composition. In contrast, marshes and swamps are eutrophic wetlands characterized by highly fluctuating water tables. Bogs and poor fens can easily be classified using a pH and/or conductivity-meter without extensive plant identification skills; however, some fens and marshes are very similar vegetationally and chemically and they are often difficult to classify as one or the other. This particularly applies to marshes that are in transition to rich fens. Here, water chemistry and plant community data have to be combined for a proper classification. In the next installment of this series, I will address plant community differences among the different wetland classes.

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Installments I and II of this series can be found in Wagner newsletters of October 2001 and April 2002.

The author can be reached by phone at (780) 492-4615 or by e-mail at mthorman@ualberta.ca

Table: Averages (ranges) of surface water chemistry variables of the dominant wetland classes in continental western Canada. Data compiled from Vitt and Chee (1990), Vitt et al. (1995), Thormann and Bayley (1997a), Szumigalski and Bayley (1997), and Thormann et al. (2001).

Chemistry variables	Bogs	Fens			Marshes
		Poor fens	Moderate-rich fens	Extreme-rich fens	
pH	3.85 (3.39 - 4.22)	5.00 (4.28 - 5.44)	6.42 (5.93 - 8.10)	7.26 (6.82 - 8.35)	7.40 (6.60 - 8.40)
Alkalinity (mg/L CaCO ₃)	0 ---	16 (14 - 19)	77 (13 - 136)	87 (85 - 89)	222 (75 - 380)
Conductivity (µ Siemens/cm)	30 (0 - 66)	34 (15 - 60)	103 (26 - 231)	223 (180 - 259)	607 (293 - 1186)
Ammonium (NH ₄ ⁺ , µg/L)	44 (1 - 202)	36 (3 - 62)	37 (2 - 470)	33 (1 - 79)	366 (2 - 3516)
Nitrate (NO ₃ ⁻ , µg/L)	19 (2 - 47)	17 (2 - 40)	13 (2 - 44)	18 (3 - 36)	16 (2 - 233)
Total dissolved nitrogen (TDN, µg/L)	1153 (629 - 2304)	965 (846 - 1084)	1101 (613 - 1837)	1483 (1178 - 1788)	2135 (405 - 6251)
Soluble reactive phosphorus (SRP, µg/L)	15 (1 - 75)	25 (2 - 112)	12 (1 - 147)	24 (2 - 112)	99 (2 - 867)
Total phosphorus (TP, µg/L)	83 (21 - 153)	192 (44 - 392)	241 (13 - 529)	35 (8 - 112)	373 (79 - 1864)
Calcium (Ca ²⁺ , mg/L)	3.5 (0 - 20.0)	5.0 (1.4 - 11.7)	15.9 (7.2 - 51.0)	42.3 (22.4 - 114.5)	51 (30 - 66)
Magnesium (Mg ²⁺ , mg/L)	1.1 (0 - 8.0)	2.6 (0.4 - 8.0)	5.7 (2.3 - 26.0)	12.9 (0.3 - 39.9)	13 (1 - 22)
Potassium (K ⁺ , mg/L)	0.7 (0.3 - 1.4)	0.8 (0.2 - 3.1)	1.0 (0.1 - 1.7)	2.2 (1.1 - 4.5)	No data

Wagner Wildlife Watch # 2:
The Wheel Animals
by Cliff Adams

We see a drop of rain on a leaf or a miniature pool of water no more than a few centimeters in diameter on the ground and we think nothing of it. There are, after all, larger worlds to visit and to wonder about. Nevertheless, this one time, somehow, the small world of a few drops of water caught my interest as I walked along the pathway in Wagner Natural Area.

After a rain, the forest holds its moisture for a while, in puddles, in the damp soil, in the wet mosses and leaf litter. It is no different in Wagner Natural Area except that the water lingers a bit longer. I found a small world near a mat of feather moss and collected a few millilitres in a small vial. My newly collected small world was a bit of sediment, a few fragments of moss leaflet and water tinged greenish brown—and it was home to a group of creatures called the wheel animals.

The wheel animals (more properly called rotifers) are small worm-like creatures no longer than a fifth of a millimetre. Nearly transparent, the ones I had captured squirmed and stretched and contracted again in a drop of water on my microscope slide as if they were trying for the most comfortable position possible. And then the most amazing thing happened. Suddenly two wheels emerge from the head of the creature and start to spin. Although I know it is an optical illusion, the wheels really do seem to rotate like two microscopic brushes. I watch the wheels spinning and debris is swept in a continuous current toward a mouth located between the wheels. The rotifer has started to feed.

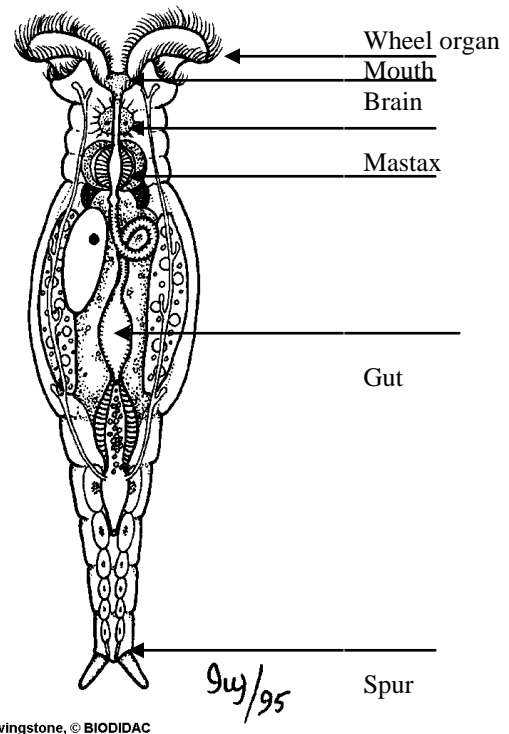
I try to watch the cilia, the hair-like bristles that form the wheels, (called trophi - singular: trophus) as they lash back and forth (for that's what cilia do) to see how the currents are formed. In perfect synchrony, the cilia of each trophus create the swirling current that brings bacteria, plant debris and other tiny particles of food to the animal. A small diatom is caught in the rush of water past the mouth but is rejected and floats gently away again. Within the body of the rotifer an organ, looking for all the world like a beating heart, pulsates and I see the food passing down the gullet enter this organ (the mastax) where the food is chewed. The photomicrographs below, although not my own, capture the characteristics of the rotifers nicely.

The rotifers are a strange group, however. The bdelloid (pronounced 'dell-oid') rotifers are one grouping of the Phylum Rotifera and they are all females. Each female produces eggs (perhaps a dozen or so at a time) by the process of parthenogenesis (that is, sexual reproduction without benefit of males). If conditions are too dry to permit liquid water, the rotifers dry out and form small cysts, no larger and no less arid than a dust mote, to await the next wet spell.



Image Sources:

1. <http://www.biosci.ohiou.edu/introbioslab/Bios173/images>
2. <http://www.jg.btinternet.co.uk/moss.html>



Livingstone, © BIODIDAC

Image Source : <http://biodidac.bio.uottawa.ca/>

These benign microscopic creatures are a part of the legacy of the Wagner Natural Area and deserve our respect, our wonder and our admiration no less than the orchids, the squirrels, the wild flowers and the warblers.

Wagner Natural Area Society

Annual Members' Night & 20th Anniversary Celebration

Thursday, November 28, 2002

Unitarian Church of Edmonton, 12530 – 110 Avenue, Edmonton
Auditorium

Doors open at 7:00 p.m. Program begins at 7:30 p.m.

“The Volunteer Steward Program”

Peter Lee (formerly with the Alberta government parks program): - “Looking Back —The Beginnings”

John Kristensen (ADM, Parks & Parkland Services, Community Development): “Looking Forward — Present and Future”

Reception

with tea, punch and cake

Please join us in celebrating our anniversary!

Admission free. Members, guests and visitors welcome!

Membership in Wagner Natural Area Society

The membership year runs from January 1 to December 31. Please consider renewing promptly if you haven't already done so to support the Society and Wagner Natural Area. Fill out this form and mail it with a cheque payable to Wagner Natural Area Society. As a member you will receive two newsletters per year and an invitation to the Annual Members' Night in October/November. Field trips and other activities are organized from time to time for the benefit of members. Donations are tax-deductible. For more information, contact the Membership Secretary at 481-1525.

Please include me as a member of the Wagner Natural Area Society!

- Family/Organization \$12 Individual \$10
 Student/Senior \$8

In addition to my membership fee, I enclose a gift to support the activities of Wagner Natural Area Society for _____.

Name: _____

Address: _____

Telephone: _____ Date: _____

Mail to: c/o Membership Secretary, Wagner Natural Area Society, 26519 Highway 16, Spruce Grove, Alberta T7Z 3L4
