

Date and time: Monday December 1 2014 2:00 - 3:40 pm

Weather: Pr 0 mm; RH 54%; BP 103.4 kPa; NW 15 kmh; sun/cloud; T 1° C

Activity: We tour the Greenway Pollution Control Centre.

Gary Burrows, Operations Supervisor for Wastewater Treatment Operations at London's Greenway Pollution Control Center, met me in front of the PCC main building. The purpose of my visit was simply to develop an overview of exactly how London treats its sewage and what impacts this might have on our beloved Thames, the same river that rolls past Newport Forest, some 113 km downstream from Greenway (56 km as the crow flies).



The image above shows three large circular “final settling tanks”, along with seven rectangular ones, all of them appearing dark. The primary settling tanks show up as rectangular shapes with white borders on the southern side. Remaining rectangular tanks are for aeration of the activated sludge. Various storage tanks flank the sludge disposal building in the northwest corner of the facility.

We went into a conference room dominated by a projected computer screen that showed a flow chart of the entire London sewage (“wastewater” from now on) treatment system, a network of drains, pipes, flow meters, valves, holding tanks, 36 pumping stations and five satellite treatment plants. Burrows showed how a simple

keystroke could turn a distant pump on or off or monitor the condition of wastewater there. Apart from the need to pump wastewater at various points, the entire system runs on gravity. Indeed, wastewater from north of the Thames flows through an underground channel below the river, ending up some 15 m below street level at Greenway. Giant pumps bring it up for treatment. However it arrives, the wastewater is neither brownish or fecal. Instead it is grey, with a faintly musty odor. The “greywater” goes through a number of treatment stages:

1. Screens and settling tanks remove larger particulates that include industrial effluent and household waste. I was surprised, when Burrows ran a rake through one of the holding bins to show me a typical sample, how many coats of corn kernels there were. These indigestible cellulosic remnants of corn end up in this bin. Besides toilet tissue, other items caught in the screens have included the occasional dead rat, dentures, jewelry, underwear, childrens toys, handi-wipes, and a list that would take up the rest of this Bulletin. While such solids go to landfill, chemicals that remove phosphorus compounds are added to the water at this stage.
2. Bacteria in the activated sludge phase consume most of the organic matter, converting ammonia to nitrates (*Nitrobacter* spp.) in the process. Giant air pumps send constant streams of bubbles through the many aeration tanks to keep the aerobic bacteria well-oxygenated and active. In the final stage of clarification, dead bacteria settle to the bottom sludge.
3. Large centrifuge machines whine away in a nearby building, concentrating the sludge into a thick deposit which then goes to an incinerator where it is first de-watered, then consumed in a high temperature fire.
4. From the final settling ponds, water goes to a disinfection chamber where UV units kill bacteria (during the warm seasons only). Finally, the water flows out into the river. In both the final settling tanks and in the river itself, flocks of ducks paddle happily about in the slightly warmer water.

As I stared in awe into the heart of the incinerator through a narrow viewing port, I couldn't help wondering whether the sludge couldn't be used for fertilizer. As Burrows explained it, the sludge might be good for that purpose, but economic (trucking) and legal (liability) issues currently stand in the way. Finally, it was time to leave. I said goodbye to the Mallards paddling happily about in the warmish settling tanks, then went down to the river to view the upwelling water from the plant. Goodbye to the ducks there, as well.

Back in my minilab at home, I took a quick look at the activated sludge sample. I found a great many of the bacterivore *Coleps* sp., as well as a Water Bear (see below) and a new “lifer”, *Epistylis* sp. a colonial bacterivore commonly found on the shells of turtles and the scales of fish, but free-living as well. I’d love to add it to our ATBI list, but I did not get the sample from the river.

The Greenway PCC website: <<http://www.london.ca/residents/Sewers-Flooding/Sewage-Treatment/Pages/Wastewater-Treatment.aspx>>

New Species:

‘Black Hoodlets’	<i>Exidia [truncata]</i>	FCB GT Nv23/14
Jellyroll Fungus	<i>Exidia crenata</i>	FCB Nv23/14
‘Pixie Parasols’	<i>Mycena meliigena</i>	GF GT Nv23/14
‘Tree Pennies’	<i>Aleurodiscus oakesii</i>	GF/Nk GT Nv23/14

Note: These fungi were observed by Greg Thorn and his grad student during the visit recounted in the next section:

Readers Write:

What’s in a name?

Gary Burrows, a Supervisor at Greenway: “Part of the Wastewater Industry is getting the information out there that wastewater is really caused by humans and our profession helps to turn it back into acceptable levels to return to the environment and protect public health. Because the system is underground and not seen doesn't help and the fact it's "waste"water (a dirty name), people shy away from it. It's just not as "sexy" as water. We see that happening in the States now as wastewater plants are [changing] to ‘Water Resource and Recovery Facilities’.”

Windstorm at Newport Forest

Greg Thorn, UWO Mycologist : “Dana Kavanagh and I made a brief visit to Newport Forest today [Monday Nov 23] to look for more lichens for her 4th year thesis. We left London West at about 10:45 in light rain, which became more and more heavy as we went further down Hwy 2. Just past Melbourne the rain was heavy enough to consider pulling off the road, but there was little traffic so I just slowed down and carried on. When we got to the gate it seemed prudent to eat our lunches in the car before going out in the rain, and when we finished our last bites,

the rain had stopped! A blue arch in the west broadened and turned into a full blue sky for almost 2 hours. We sampled elms (American and Slippery, mostly dead) along the creek west of the entrance meadow, then crossed to the Copse and went downhill toward Fleming Creek and downstream towards the camper, sampling ashes (also mostly dead), sugar maples, and occasional elms. While we were down there, at about 2 pm, the winds picked up from moderate to gale force, with gusts I would estimate to 100 km/h. Dead branches started flying by, and several crashes were heard across Fleming Creek. We climbed back out of the woods and were nearly blown away when we came into the open. We settled in at the Nook to sort some collections from a fallen ash that we had made hastily before our retreat. While there, we also sampled the old sugar maple there that has the feeders on it. I went down to the creek and saw a big ash on the far side go down in the wind, landing with quite a splash as it fell across the creek . . . We left at 3:00 and drove home past many a house missing roof shingles, and occasional trees fallen on front lawn or roadsides.”

Luminescent mushrooms

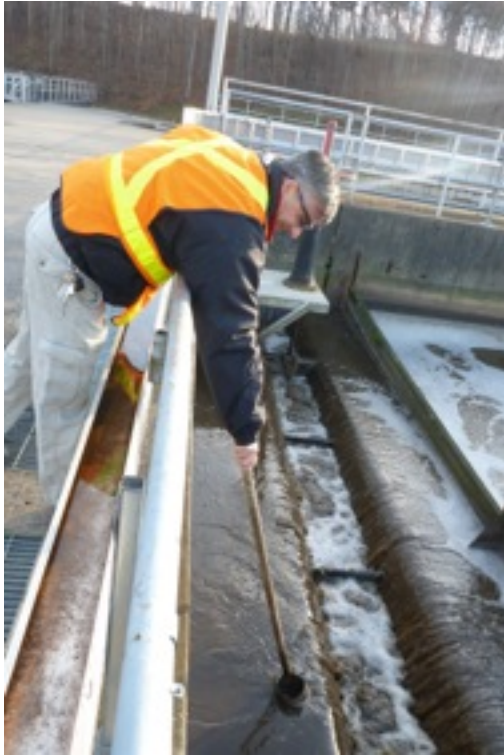
Bruce Parker, a Newport Forest Steward: “Thanks for mentioning *P styptics*. [a luminescent fungus] We found one on a park campsite in Killarney [many] years ago. We were so impressed we invited nearby campers to view it. It was this 'shroom which sparked my interest in fungi.”

Susan Price, nature lover: “I just read . . . your bulletin. I was interested in the fungus that glows in the dark. A number of years ago I had a glow-in-the-dark experience. I was camping at Point Pelee National Park in May. I got out of my tent in the middle of the night. I didn't want to walk all the way to the washrooms . . . when I got back in the tent I noticed there was a small glowing in [a] dark spot on my hand. The next day I spoke to a staff person at the Information Centre about this unusual sight. He was puzzled and thought it might have been a firefly larva but it was just a spot on my hand and then it faded. Now I wonder if it could have been fungus instead.” [Thorn says “Not.”]

Cougar on the loose?

Naturalist Ken Magee relays this notice from Clinton, Ontario: “There has been a sighting of a cougar in the Maitland Woods. The town has been informed and the bylaw officer will be notified. Please avoid this area!”

IMAGES:



Gary Burrows takes a sample of activated sludge for me from one of the aeration tanks. (It's not "sludgy", but mostly water at this stage.) I think of activated sludge as a microbial heaven with lots of organic munchies for the bacteria and lots of bacteria for predacious protists to consume. Except for the many lucky ones that get recycled a few end up in large centrifuges that concentrate the sludge before it moves on to microbial hell in the form of a giant incinerator, as seen through the narrow porthole above.



This may be a “water bear” for some people . . .



. . . but this is a “water bear” for us — as portrayed in this electron micrograph. Some species of tardigrade, as they are technically known, live on land in moist habitats, while others are aquatic. Note the simple claws and a circular prostomatic “mouth”. Tardigrades are tiny invertebrates with four pairs of legs in a phylum all of their own.

Video of an aquatic tardigrade rather like the one we found in the sludge sample: <<https://www.youtube.com/watch?v=D6Eac3UKEII>>