Polyozellus Multiplex - An Example of Our Mycological Ignorance

by Andrus Voitk

Figure 1 *- Polyozellus multiplex, Stanleyville Trail, Gros Morne National Park, September, 2000. The same trees are still there but this gorgeous ectomycorrhizal mushroom has not been seen in that location since. I am now aware of three places where this mushroom has been found to fruit. In 1-5 follow-up years it has not been found to fruit in any of these places again.*

Polyozellus multiplex, the blue (or black) chanterelle, shown in Figure 1, grows as a large cluster of black or very dark bluish-purple fan-shaped leaves, arising out of a wide, common stalk. The sporulating surface, on the outside of each fan, is made up of folds, somewhat resembling thick, forked, decurrent gills. The spore print is white, giving mature specimens a dull bluish-gray appearance on the outside, contrasting with the shinier blackish purple on the inside of each leaf.

Classical morphological taxonomy considered Polyozellus to be a relative of the chantarelle with its fold-like gills, along with the genus Gomphus, whose sporulating surface is virtually identical to that of P. multiplex. Recent DNA studies have left Gomphus as a distant relative of the chanterelle but placed P. multiplex with earth fans, Class Telephorales, Family Telephuraceae. It doesn't seem to fit readily with either and no doubt the future has more family unrest in store for poor P. multiplex.

Among interesting properties of this good edible* is its ability to slow certain cell replication. Animal experiments suggest P. multiplex may, among other things, prevent stomach cancer (1). These and other similar considerations are tangential to the present thrust. However, the reader interested in such topics is referred to a review article by Lull and coworkers, summarizing present knowledge about anti-inflammatory and immunomodulating properties of fungal metabolites (2). For the curious, this article has a very extensive list of references.

P. multiplex is reported from the Far East and North America. On our continent it is more common on the west coast and in the Rockies, but extends across the continent, all the way to Newfoundland. It is considered uncommon or rare throughout its range, including Newfoundland. This rarity is often a stimulus for enlightened people, who value biodiversity, to protect a species against inadvertent loss. The simplest form of legislated protection is prohibition of interference with the species. Thus, to protect P. multiplex, it would be natural to legislate against the picking, kicking, eating or otherwise interfering with the mushroom, if encountered. Had we such a law, it would be awkward for me to admit in a footnote to having eaten it or for FORAY NEWFOUNDLAND & LABRADOR to admit having picked and archived a voucher specimen of it on its 2005 Gros Morne foray.

The wisdom of such legislation is obvious in other fields of natural science. Quite clearly, significant threat to the survival of the piping plover would ensue, were we to eat the birds or their eggs. However, P. multiplex is not a piping plover. We have no idea what picking the fruiting body of this fungus does to its survival. In fact, extrapolating the findings of Pilz and coworkers** on the Oregon Mycological Society's Cantharellus Project might suggest the very opposite (3). In this experiment, equivalent plots of Cantharellus formosus (a supposed relative of P. multiplex, at least according to the old taxonomy) were either systematically harvested or left untouched. Both biomass and abundance was greater on the plots subjected to regular harvesting. These findings are not isolated and the publication cites several other reports with similar results.

Can we extrapolate these findings to P. multiplex? We don't know. If we do decide that harvesting is a better way to protect our rare mushroom, how should we harvest it? There is a large body of opinion that mushrooms should be cut, not plucked, to avoid injury to the underlying mycelial organism. In the experiment cited, plots designated for harvesting were divided between cut and pluck methods. Surprise! Over time (13 years at last report) those plots harvested by cutting fared the worst in terms of biomass and abundance.

Our ignorance runs even deeper. Will the observed advantage persist over the long term? We don't know. We don't know if the observed local advantage of harvesting (by plucking) is advantageous or detrimental to the species over a larger area. Does the disruption of plucking disseminate many more spores to potentially seed other suitable habitats or does it effectively remove the spores from such distribution? We don't know. Result: we lack solid evidence to either permit or prohibit picking of this rare mushroom.

For that matter, we don't even know if this is a rare species. After three years of forays in Gros Morne Park, one specimen was finally collected in 2005. The same area was forayed each year. While a specimen may have been overlooked previously, personal experience suggests not. Maria and I found two clusters on the Stanleyville trail of Gros Morne Park in 2000. We know it is a mycorrhizal mushroom, having a symbiotic relationship with trees, so it should remain in the same place as long as the trees are there. Well, we have not found it there since, despite several visits to the exact spot at the right time each year and despite including that trail on the forays three years running. The mushroom, its fruiting body, is rare, yes. But for all we know, the organism may be one of the most common ones in our woods. Perhaps it just doesn't fruit too often?

As people have begun to understand ecosystems better, protection of species has become protection of habitats. For mycorrhizal mushrooms it would be logical to start with protecting the trees with which it is associated. Which trees? Well, we don't really know. On the Pacific coast it is almost exclusively associated with old growth conifers, primarily hemlock and Douglas fir. Neither grows in Newfoundland, where it is found in second growth balsam fir forests. Can it adapt? Are there other trees with which it would do equally well? We don't know. As for balsam fir, we have plenty of them. We can't very well protect them all in hopes some may be associated with P. multiplex. Are there other factors? We don't know. As a result, we don't know which balsam firs to protect.

What about protecting the area where it fruits? After all, we try to bring back the piping plover by making several sandy beaches off limits to pets, humans and vehicular traffic during breeding season. At the chance of sounding repetitious, P. multiplex is not a piping plover. This seemingly logical and appealing approach may be a Trojan horse. There is in the natural sciences a teleologically accepted concept of distress fruiting. The idea is that an organism under stress may fruit profusely in a last ditch effort to propagate the species. Therefore, if we select an area for protection where P. multiplex has been seen to fruit copiously, might this be an area where for reasons unbeknownst to us the last remaining P. multiplex is dying out, desperately trying to produce some fruiting bodies before its demise? We don't know. What if the fungus is thriving comfortably everywhere else with no need for excessive fruiting? What if we assign all these areas for development as parking lots and uranium mines. lulled into a false sense of security that we have successfully protected the one area where this handsome mushroom is known to fruit?

What if? We don't know. We are not necessarily stupid but we sure are ignorant. It is comforting to know that in Polyozellus multiplex we have one small way to measure this ignorance, lest we, for a brief moment, lose sight of it.

References

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Pilz D., L. Norvell, E. Danell, and R. Molina. 2003. *Ecology and management of commercially harvested chanterelle mushrooms*. United States Department of Agriculture, Portland.

Polyozellus multiplex

Footnotes

*My wife would not eat it, saying it tasted like tar and old tires. I suspect her vivid imagination was influenced by its black colour, not the taste. Having no experience with the taste of tar and old tires myself, I cannot comment further on her observation, except to say I did find it quite tasty. Realizing its rarity in Newfoundland, I would not pick or eat it now, even though I have no proof this is good for it – it may be the opposite (see text).

** One of them is Lorelei Norvell, one of our expert faculty at FORAY NEWFOUNDLAND & LABRADOR in 2004. She discussed part of this

The Stanley Park Heronry - A Vancouver Surprise!

by Elizabeth Zedel.

Great Blue Heron (Ardea herodias) - Seen in the trees of Stanley Park, Vancouver, B.C.

This summer I was walking in Vancouver, British Columbia with my 2 daughters from our downtown hotel room to Stanley Park with boarders the west end of the city. As we were walking I noticed the smell of guano and fish and suddenly a lot of bird noise. It got louder and louder and then as I looked up I saw tens of VERY large nests high in the trees above me. What we had stumbled on was the Stanley Park Heronry.

It was very loud as the chicks were beginning to hatch, and the trees were alive with these large birds.

There were information signs about the Heronry as well as warnings not to parked your car under the trees as it could get hit with bird poop. The noise was terrific. We have a link to a clip of the noise and our experience on our website for you to look at. Go to www.nhs.nf.ca and follow the link to the Stanley Park Heronry video.

The information below is provided to us by the Stanley Park Ecology Society and more information is available on the web at: http://www.vcn.bc.ca/spes/urbanwildlife/heronry.php Congratulations to this group for helping these great birds co-habit in Vancouver. If you are ever in Vancouver between February and September check out the Herons of Stanley Park.

Great Blue Heron Calendar - An exibit that explains the year of the heron in StanleyPark.

Description from The Audubon Society Field Guide to Nroth American Birds " 42-52 inches tall. A large blue gray heron. Back and wings blue-gray; underparts whitish with black streaking on belly, head white with black stripe ending in black plumes behind eye; back-and-white foreneck and chest end in gray plumes in the breeding adult. Juveniles lack plumes and are more brownish. '

Stanley Park Monitoring Report for 2005

Prepared by the Stanley Park Ecology Society

The 2005 heronry in 100 words

The Stanley Park Heronry became a cause celebre this year, attracting thousands of admiring Vancouver residents and becoming a recognized destination for tourists, biologists, photographers, and reporters alike. In 2005 there were 176 active Great Blue Heron nests, double the 2004 count and eight times the number in 2003. Nests were established in 25 trees. At least 247 juvenile herons successfully left their nests. As nest numbers fluctuate from year to year, the activity of the 2006 heronry can't be predicted. Next year may be the one that sees a decline in the number of heron nests in Stanley Park.

And a few more details

Despite being classified provincially as a "species at risk", the Great Blue Herons in Stanley Park continued to evolve as a symbol of Vancouver's diverse urban wildlife in 2005, growing in both number and the amount of attention they generated. The location of the heronry is in itself a perfect symbol of the City of Vancouver - situated on the border of forested park, busy coastline, and vibrant, extremely dense human development. The Stanley Park heronry is not only one of the best examples of urban wildlife in Vancouver or North America - it is among the best in the world. In 2005, their fifth year at this location, the herons returned to the trees near the Park Board offices on Beach Avenue in record numbers, to establish one of the largest heronries ever recorded in Vancouver. The heronry was frequently featured on local and national radio, television and print articles.

The herons were both watchers and the watched. They looked down from their nests on Vancouver residents playing tennis, out for a stroll, or on their way to work, while thousands of visitors and residents alike looked up in awe and sometimes surprise at the noisy, nesting birds. A few West End residents even have a "bird's eye view" from their apartment windows, and can observe the nesting activities of a species at risk from the comfort of their patio or kitchen table.

Beach Avenue Heronry Trends

Year	Trees	Nests	Fledges
2001	**3**	**6**	**?**
2002	**7**	**18**	**15**
2003	**5**	**21**	**31**
2004	**10**	**70**	**151**
2005	**25**	**176**	**247**

Great Blue Herons have a long history of nesting in Stanley Park, with written records of a heronry at Brockton Point going back to 1921, and continuing through the 1960s to 1990s at the site of the former Stanley Park Zoo. What started as a trickle in 2001 has in the last two years become a torrent, with the herons arriving at the park site en masse in both 2004 and 2005. Prior to 2004, records indicate an average of 20-30 active nests per year with 1979 standing out as a record-setting year with 38 successful nests and 91 fledges (chicks successfully leaving the nest). These numbers are dwarfed by the counts of the last two years. The sudden growth in 2004 can perhaps be attributed to the abandonment of two Lower Mainland heronries, one in Vancouver and the other in Point Roberts. It is likely that the further growth in 2005 is the result of the same abandonment, with additional herons from the former nesting sites attracted to the apparently prime location of Stanley Park. Offspring from previous years may also be contributing to the population boom. The history and rapid growth of the heronry are illustrated in the accompanying graph and table.

Observations of note in 2005

Courting herons were first observed on January 27, 2005. The last of the approximately 250 juvenile herons to leave the heronry were observed there in the second week of September 2005.

The herons nested in 25 trees in 2005; 15 of these had not previously had nests. The herons selected 17 Bigleaf Maples and four Red Oak and Western Red Cedar trees to build nests in. The highest number of nests in one tree was 30. Five trees had a single nest, and 13 trees had three or fewer nests.

Adult herons were spotted hunting for fish, crabs, and small marine life around the Park's coastline, False Creek, and Burrard Inlet. It is also possible that they ventured to the North Arm of the Fraser River and the shorelines of islets and beyond for additional food sources for their young.

There were eight documented bald eagle attacks on the heronry in 2005, three of which resulted in abandoned heron nests and a total of four dead heron chicks. Each of the eight attacks occurred on nests in the same tree (see map on page 6). The attacks are thought to have been carried out by the same pair of adult bald eagles, who themselves have a nest on the other side of Lost Lagoon. While observing the heronry from an apartment rooftop, Stanley Park Ecology Society monitors observed an eagle on four occasions leaving its nest on Cathedral Trail, attacking the heronry, and then returning to its nest. Additional attacks were observed from the ground. One eagle attack on the heronry was reported in 2003 and no attacks were reported in 2004.

There are six active bald eagle nests in close range to the Stanley Park Heronry, four in Stanley Park, one in Vanier Park and the other near Jericho Park (see www.stanleyparkecology.ca for Nesting Bald Eagle in The City of Vancouver reports for 2004 and 2005). One theory suggests that herons deliberately establish their nesting sites in the vicinity of nesting bald eagles because the adult bald eagles will chase "foreign" juvenile bald eagles away from the area. An interesting inter-species relationship also occurs between the eagles, herons, and northwestern crows that also nest in the trees around the heronry. Flocks of crows were repeatedly observed mobbing any bald eagles that approached the crows' (and therefore the herons') nests, harassing the eagles until they left the area.

36 dead heron chicks were collected from underneath the heronry in 2005, having either fallen or been pushed from their nests by their siblings. An additional seven chicks were transferred to wildlife rehabilitators after surviving falls from the nests. The juvenile herons that survived and fledged dispersed to local feeding grounds such as Lost Lagoon, Beaver Lake, the Stanley Park shoreline, Coal Harbour, False Creek, and the coastline from Jericho to Wreck Beach. Other herons likely moved to Ambleside Beach, the West Vancouver coastline, the inner area of Burrard Inlet, the Fraser River, Iona Beach and some of the islets and islands off the mainland.

The herons are likely to return in late January or early February 2006 to begin the nesting process all over again. The females will select a mate, then together they'll either refurbish an existing nest or build a new one, lay and incubate eggs, and begin the arduous hunting and feeding process as their young grow and fledge.

2006 will be an interesting year for the Stanley Park Heronry. As the surviving fledglings from the 2004 season reach breeding age, they may return to their Stanley Park birthplace to nest. While the survival rate of juvenile herons is low, about 20-30 percent, a substantial increase in the number of nests in 2006 may suggest that the Lower Mainland has sufficient food sources to enable a higher proportion of juvenile heron chicks to survive their first year. It may also suggest that urban herons have adapted to city life so well that their survival rates are higher than those outside of urban areas.

While the Great Blue Heron is known as a species that is easily disturbed by human activity, the urban herons of Stanley Park seem tolerant of the noise and bustle of the city. There were no records of herons abandoning their nests due to human activity, traffic, or organized events in and around Stanley Park. The herons did not abandon their nests in response to frequent fire engine or police car sirens either. The herons were monitored during the Celebration of Light Fireworks display, and while they were

startled by the explosions, no herons were observed to abandon their nests due to the fireworks in either 2004 or 2005. It did not appear that heron chick mortality was higher on nights with fireworks than nights without them. While the fireworks did cause the herons some disruption, there was no evidence to suggest this disturbance was anything more than a temporary one.

Three pairs of herons that nested near Jericho Beach in 2004 did not return there to nest in 2005. One of those nests failed in 2004 after being blown from a tree in a wind storm.

Stanley Park Ecology Society heron monitors volunteered more than 200 hours of their time monitoring the heronry in Stanley Park in 2005.

Heronries don't last forever. Permanent abandonment is the final part of a heronry's cycle and may occur as a gradual decline or as a sudden absence after many years of successful habitation. The most common reasons for abandonment include repeated predation of the nests, loss of habitat due to guanotrophy (destruction of the nesting site due to bird feces), or human disturbance. The Stanley Park Ecology Society is committed to educating the public to ensure that human impacts are minimized and the heronry can be enjoyed for many years to come.

Recommendations

Adopt the guidelines and recommendations outlined in the forthcoming Stanley Park Heronry Management Plan

Data in this report was collected by Dalyce Epp, Maria Morlin and Robert Boelens. For further details orquestions please contact Robert Boelens at coyotes@stanleyparkecology.ca or 604 681 9453

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