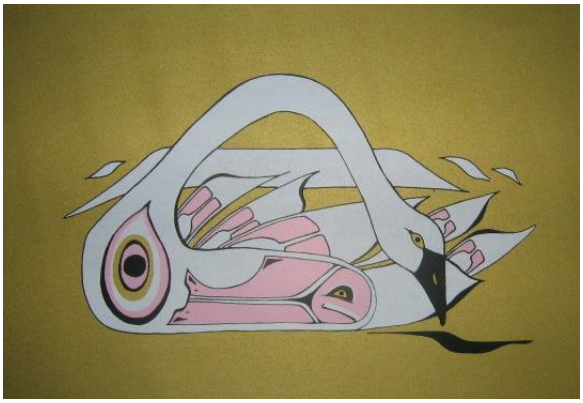
Comox Valley Naturalists Society

March 2022 Newsletter



What Darwin's Missing Microscope Saw and Could Not See

By Loys Maingon

One of the items that made the news in mid-December was the discovery and auction at Sotheby's of Charles Darwin's first microscope.[1] The story that comes with this discovery should interest not only fans of Darwin, but all naturalists.

The find revolutionizes our understanding of Darwin the naturalist and what we know of his use of microscopes. Until this discovery it was generally accepted that Darwin was gifted his first microscope by a mathematician friend, John Maurice Herbert, while he was a student at Christ's College, Cambridge, in 1831.[2] In fact, before he went on to Cambridge to graduate in "Natural Theology," Darwin followed in his father's footsteps to study medicine in Edinburgh from 1825 to 1827. It seems that Darwin had very little inclination for medicine and even less for mathematics, and therefore was headed for a career in the Church of England. Upon graduating and stepping on the Beagle December 27th 1831, he escaped that fate largely thanks to his first microscope.

As is common to this day in most medical faculties, Darwin would have been required to have a medical microscope. It was a portable microscope (Figure 1) in a case 3 inches by 4 inches and 2 inches high.

Figure 1. Darwin's first microscope. Photo: Public domain[3]

This microscope was cutting-edge technology for its time. It cost 11 pounds and 16 shillings which is conservatively about $1,100 in today's money, and was most likely a gift from his father. While at Edinburgh, in an effort to dodge math and medicine lectures as best he could, Darwin joined the local naturalist society, The Plinian Society. He used his medical microscope to write his first scientific paper on single-celled and micro-invertebrates that he collected from the banks of Edinburgh's estuary, the Firth of Forth.

Although this microscope did the job, unlike the one given to him by Herbert, which is the one he took on The Beagle, it was not specifically designed to study protists and other aquatic organisms. Nonetheless, for historians that early work done on a "medical microscope" holds

the key to questions on the unity of life that underlie Darwin's later work. These questions are encapsulated in the famous closing sentence of ***On the Origin of Species***: "From so simple a beginning endless forms most beautiful have been, and are being, evolved."

The world of single-celled, and micro-invertebrates remains to this day poorly known with an estimated 88% of species still uncatalogued and unknown, and largely ignored because of the limitations of light microscopy. This is the realm of single-celled and microscopic multi-celled organisms that share photosynthetic abilities. It challenges the assumptions inherent in the facile division made between "plants" and "animals" at a macroscopic scale. This was re-classified several times, and always unsatisfactorily, as "Kingdom Chromista" by the late Thomas Cavalier-Smith (1942-2021) who held the Chair of Botany at UBC from 1989-2000 before moving back to Oxford. In that sense, Darwin's inquiries into the origins and evolution of species began with a kingdom conveniently largely ignored by mankind which stood on its head everything that theology taught. It is the shape-shifting world of parasites, algae and fungi rolled into one, essential to life as we know it, and which makes a mockery of mankind's self-importance. And yet, Darwin obviously marveled at its beauty.

Members of the Kingdom Chromista are all around us, usually invisible to the naked eye and sometimes transiently present wherever there is water in damp and wet environments. Chromistas all share in having photosynthetic organelles containing chlorophyll c. They originate from a red algal ancestor; even its non-photosynthetic members can be shown to originate from ancestors that performed photosynthesis. As with many freshwater algae, their life cycle forms shift with season, temperature and environmental chemistry.

Few organisms illustrate the complexities and contradictions of the Kingdom Chromista that confronted young Darwin better than *Ophrydium versatile*. Although this is technically classed by zoologists as a sessile ciliate, it is often better described in texts dealing with algae. Like lichens this protozoan meets its energy needs by hosting algae which excrete mono- and di-saccharides that the non-photosynthetic zooid, known as a "peritrich" absorbs. In dark and low-temperature and low-nutrient environments (winter and fall) the peritrich lives individually in pond bottoms by actively scavenging bacteria, microalgae and small crustaceans. A couple of photos taken February 15, 2022 in a pond after snow melt at Buttle Lake can illustrate this part of the cycle. Figure 2 shows the peritrich swimming and opening its mouth. Figure 3 shows the peritrich with its mouth open and its corolla of reduced cilia engulfing.

Figure 2. Peritrich swimming (stoma upper left).
Photo: Loys Maingon

Figure 3. Sessile peritrich with stoma open (bottom).

As temperatures warm with increased sunlight, the peritrichs aggregate into colonies and live

photosynthetically much like an algal ball. Figure 4 is a photo of *Ophrydium versatile* taken in August in a vernal pond near Rossiter Lake. The theory, at least until recently, has been that the zooids are host to the green algae *Chlorella* or *Zoochlorella*. In the warmer sunnier seasons, until temperatures drop and passive solar energy is no longer sufficient, the algae's photosynthate keep the zooids alive.

Figure 4. *Ophrydium* versatile colonies in a pond by Rossiter Lake. ***Photo: Loys Maingon***

The *Ophrydium* colonies are fragile gelatinous assemblages that can be fragmented easily. As with lichens, fragmentation can be a source of reproduction and dispersion. Fragments caught in a duck's plumage or on a mink's fur coat can transplant not only an *Ophrydium* zooid, but an entire pond ecosystem in one shot. The reason for this lies in more recent insights into *Ophrydium*, and into the nature of the "species" concept. Although the general description of *Ophrydium versatile* as a species is correct, it has been challenged in two places thanks to advances in microbiology.

First, it has been found that, as with lichens, the algae in *Ophrydium* are not just *Chlorella*, they can also be members of the Trebouxophyceae, which are also the main photobionts in lichens. So, there is a lot of variation within the species, which challenges the very individualistic concept of "species" itself.

Second, that the *Ophrydium* genus represents a simple, fairly passive symbiosis was the theory until the late (and very great) Lynn Margulis (1938-2011), who authored the endosymbiotic theory of evolution in 1966, and went on to write ***The Symbiotic Planet*** (1998), analyzed and compared the composition of *Ophrydium* versatile samples from British Columbia and Massachusetts. Rather than look at the peritrich itself as the species unit, B. Duval and Lynn Margulis looked at the composition of the gel matrix. They found that not only were the algae completely different species, but the saccharide gel matrix wasn't just the peritrich's secretion, it was home to euglenoids, helizoans, diatoms (*Nitzschia*, *Navicula*, *Gyrosigma*, *Cymbella*), filamentous and coccoid cyanobacteria, bacilliform bacteria, methanogenic bacteria, spirochaetes, fungal organisms, ciliates, rotifers, nematodes and copepods. In other words, the *Ophrydium versatile* colony hosted an entire ecosystem representative of their entire environment. Like lichens they were enclosed ecosystems unto themselves. In Margulis's assessment individual *Ophrydium* is really a kind of super-cell:

> "…the algae of *Ophrydium* are trapped into the service of the jelly ball community. Each 'individual organism' in this 'species' is really a group, a membrane bound packet of microbes that looks and acts as a single individual."[4]

So, what's in it for the *Ophrydium* zooid and its algal partner? The colony gel matrix assures the survival of representatives of the pond ecosystem, through the hot, low-oxygen and drought periods of the pond ecosystem. The zooids are both autotrophic (produce their own energy) and heterotrophic (capture and consume their prey's energy). The zooids don't just carry around their autotrophic solar energy and carbohydrate source, they also capture and "cultivate" their heterotrophic "farm."

Of course, Margulis herself may have been a victim of "social appearances." As with lichens and all successful

marriages, it is never really clear who is dominant. The zooid which provides shelter and micronutrients is as much a captive working for the algae as the algae is of the zooid. The colony stage of the species *Ophrydium* isn't just an individual, it is a Noah's ark of species for colonization from extreme environments in a time of extreme climates. In this respect, that would be consistent with the interpretation of Margulis and Mark McMenamin that *Ophrydium* is representative of the soft-bodied eukaryotic organisms characteristic of the Ediacaran age that evolved 635 million years ago after the deglaciation of the Cryogenian period.[5] To go down to a pond as snow retreats to find *Ophrydium* peritrichs, or to wade on a hot summer day to gaze at a colony, is to recapitulate evolution through the geological ages.

When we consider the limitations of Darwin's first microscope, we can only marvel at the perceptiveness and skill of Victorian zoologists to discover geological ages in the evolution of individual species. Figures 2 and 3 above are about 1200x magnification on a standard light microscope enhanced with illumination and photographic zoom. Even with these modern advances which push the limits of light microscopy one can barely identify a single-celled organism to species. Darwin's first two microscopes were limited to about 200x magnification under ambient light directed by a mirror. It took incredible perceptive skills to identify individual species and record their features in ink drawings and watercolours. Many of these skills have now been lost in our economically and technologically spoiled society, but they can still be found in the work of third-world researchers. The skills involve using glimpsed intuitions into the structure of organisms and reconstruction from memory. While these intuition and memory can be mainly correct, they can also result in misinterpretation. Viewing depends on honed skills of interpretation and memory that have greatly faded in the digital age.

Darwin's first microscope provided him with insight into the early life forms of this planet. His genius was to use his interpretation of the phenomena of the unity of Chromista life forms to build on and interpret the evolution of macroscopic life. His handicap was his cultural baggage that constrained his perception. He was a Victorian member of a culture of romantic individuality and therefore saw mainly the individual struggle for existence. As understanding and technology progressed, researchers like Lynn Margulis, Thomas Cavalier-Smith and James Lovelock increasingly built a symbiotic picture of life which is not really a contradiction of Darwin, but a furtherance of his original insights from that first microscope.

[Click the shortened link, or copy the full URL to your browser.]

1. https://tinyurl.com/mr2zud9w (https://www.theguardian.com/science/video/2021/dec/16/darwins-lost-microscope-the-auction-of-a-history-making-box-of-brass-video)

2. https://tinyurl.com/2wa5zued (https://www.whipplemuseum.cam.ac.uk/explore-whipple-collections/microscopes/charles-darwins-microscopes); https://www.darwinproject.ac.uk/john-maurice-herbert

3. https://tinyurl.com/bdhrfvs9 (https://kottke.org/21/12/charles-darwins-first-microscope)

4. Lynn Margulis (1998) *Symbiotic Planet (A New Look at Evolution*. Basic Books, p.11.

5. Mark McMenamin (2000) *The Garden of Ediacara*. Columbia University Press.

Board of Directors for 2022

At CVN's online Annual General Meeting on February 13, the following directors were elected by acclamation:

- Vice President: David Innes
- Treasurer: Isabella Erni
- BC Nature Director: Sharon Niscak
- Wetlands Restoration: Karen Cummins
- Projects: Loys Maingon
- Director-at-Large: John Neilson

We are grateful for the continued service of these directors, all of whom have served in past years and agreed to stand for re-election this year.

Note, however, that we continue to have two important vacancies on the Board: **President** and **Secretary**. We encourage any member who has an interest in serving on the Board in either of these roles to contact David Innes at cvncoordinator@gmail.com.

Update on the Vanier Garry Oak Restoration Proposal

By Jim Boulter

In March of 2021, the Board of CVN approved a proposal for a pilot project for the restoration of a rare wetland Garry oak grove in the City of Courtenay's Vanier Park. CVN has been interested in this grove since at least the 1990s, but until the City bought the property from the school district in 2015 or so, little could be done to preserve the oaks.

A CVN delegation presented the 36-page proposal, which included a stewardship component, to the City in July of 2021 and this was subsequently turned over to the City Parks Department for their review and recommendations. The stewardship component of the proposal was put on the back burner pending a decision by Courtenay.

In the meantime, the Vanier Garry oak team has not stood by idly, but designed and conducted a survey of the portion of the Park with the highest density of oaks. The survey included mapping and identifying the oaks in an area of about 0.5 Ha, as well as assessing their general health, and noting items of concern. The survey was conducted during October and November of 2021, and included grand firs, Douglas firs and notes about the general ecosystem present. This survey was presented to the CVN Board in February and approved.

Yellow border marks Vanier Park. Cross-hatch shows survey area.

In all, 65 living oaks and about the same number of other non-oak trees were mapped and had their trunk diameters, crown diameters and general health recorded. The ages of the oaks were estimated based on the diameter of the trunks with the oldest oaks around 250 years old. The majority of the oaks date from 1840 to 1940, with no juvenile trees under 70 years of age. Along with the lack of any saplings and low acorn production, we are able to confirm now that this grove is not viable without external assistance. Garry oaks cannot sprout or grow in shaded environments, and the overtopping firs are the major source of shading in this grove.

Historically, this area was part of the "upper prairie" oak groves that lined the east side of the Tsolum River prior to pre-emption in 1862, and few if any firs were present initially. The presence of Garry oaks (Quercus garryana) in the Comox Valley is no accident, but is an example of a culturally modified ecosystem, established through centuries of Indigenous cultivation of Garry oak, camas (Camassia quamash) and other food crops. An aerial photograph from 1929 shows the existence of oak groves in the same location as now, with few if any conifers present. The conifers took over when the area ceased to be farmed, with few firs over 100 years present now.

Our survey also reveals that there are pathogens in the grove, likely including laminated root rot which affects the grand firs, and Armillaria sp. affecting a few oaks.

Our survey provides recommendations to promote the oaks, including a number of ways that the canopy could be opened for the oaks, a process called "releasing". We have identified 3 Douglas firs and 18 grand firs which should be subordinated to the oaks, opening gaps in the canopy to promote new growth and improve the health of the oaks.

Oak grove looking west, with some overtopping confers visible. ***Photo: Jim Boulter***

The Survey is currently being looked at by other stakeholders, and will be given to the City Parks department, likely by the end of this month. We will be posting the Survey for wider viewing after the Parks department has received their copies.

A resource page in the CVN website has been set up, and the proposal and background material are available at: https://comoxvalleynaturalist.bc.ca/vanier-forest-garry-oaks-project/.

Leave a Legacy, Nominate a Tree

CVN's 2022 Tree of the Year Contest

By Kerri Scott

Few other communities have a living legacy like the Garry oak forest in the Comox Valley. Dispersed between Ships Point and Smith Road as well as on Denman and Hornby Islands there remain patches of a cultural ecosystem.

According to Bill Henderson, "The scattered majestic oaks still standing alone in today's fields north of the river and the few native Garry oak groves surviving amid second-growth conifer forests are all that remain of the ancient indigenous cultivation."

Sacred to the god of thunder, Garry oak trees in vast camas meadows were vital to the women who managed the meadows as a food source. Fires caused by lightning and replicated by the first nation's people before the arrival of Europeans were fundamental to the health of huge oak forests.

Garry oak (*Quercus garryana*). ***Photo: Terry Thormin***

The historical Tsolum River Valley Garry oak ecosystem includes the Vanier Forest Garry oak grove which is the only remaining grove of Garry oaks found in wetland conditions in the Comox Valley.

In 2019, one of the Garry oaks at the nearby Comox Valley Sports Centre site won the Tree of the Year award. Nominated by Annette Boulter, she said "This Garry oak has been watching over our kids for generations. Like a mother or father, this tree is a big part of life on that land." Boulter's wish, which also echoes that of Cathy Storey, whose legacy is the Comox Valley Nature Tree of the Year contest, was that trees are recognized for the vital role they play in our community.

Protected by City Bylaw, not all Garry oaks are part of this remnant grove. Some tree nominations from previous years include a Garry oak planted in 1995 at the Courtenay Airpark by Comox Valley Nature members. Also in 1937 Bill Farmere planted a Garry oak on his property. When asked how long he had lived in the Comox Valley, Farmere replied, "Walked up the tracks in '21 and decided to settle here." The tree was forty one years old when Farmere passed away at the age of 98.

Nancy Gothard, a planner and policymaker at the City of Courtenay nominated one of the Garry oaks in the St. Andrews cemetery in 2021. Gothard says, "The City wants to support the Tree of the Year this year by linking the event to the City's urban forestry page and crowdsourcing map. Folks can post and put on the map their photos of their favourite trees." Trees within

Courtenay nominated for Tree of the Year will be added by CVN to the crowd-sourced map which can be found at http://www.courtenay.ca/urbanforest.

There are many fascinating stories associated with the trees in the Comox Valley. But none as celebrated as the historical Garry oak trees. Comox Valley Nature will be showcasing these Garry oak ecosystems in one of our upcoming tree tours.

Do you have a Garry oak that you would like to nominate and have included in the tour? Or maybe your favourite tree is a species that has never been nominated before. CVN wants to hear your story!

For more information and the easy online nomination form visit the CVN website: http://cvnature.ca/treeoftheyear/. Nominations remain open until April 1, 2022.

Airpark Restoration Report

Bill's tree

By Frank Hovenden

A Garry oak grown by Loys Maingon was planted in the Courtenay River Airpark to honour Bill Heidrick who passed away on Feb.1, 2022.

Planting "Bill's tree": Bill's wife Kathie Woodley flanked by young volunteers Megan Firth and Jack Bindernagel.
Photo: Frank Hovenden

Bill was always an active member of the communities in which he lived. In the Comox Valley he played a major role with Project Watershed but also found time for Comox Valley Nature. He was a very positive person who was quick to offer a pat on the back. In his last year, although he did not have the strength to do physical labour, he would still visit our work parties and express his appreciation while offering words of encouragement to our volunteers.

Bill, you are missed and loved by many.

Wetlands Group Spring News

By Karen Cummins

Spring is surely just around the corner and our hardy group of CVN members will soon be exploring Little River Nature Park again to catch the appearance of those early spring beauties that never fail to raise our spirits. With our field books in hand there are always plants or creatures to identify, and their ecology and connections to discuss.

The bare-stem desert-parsley plant (*Lomatium nudicaule*) pictured here is just one example. It bloomed yellow in late May on the beach plain near Little River. The young leaves of this plant, with a celery-like flavour, have been a springtime food source for the First Nations people, and different parts of the plant were used medicinally.

Bare-stem desert-parsley. ***Photo: Karen Cummins***

We are always prepared to remove the invasive exotic plants that would otherwise swamp the unique ecosystems at Little River Nature Park.

We are very pleased to be joined this year by the Youth and Ecological Restoration group. The YER vision is "to engage youth in a wider circle of community relationships in both the human and natural worlds."

Join us in this adventure into stewardship within our community: contact me at karen.cummins@shaw.ca

CVN Webinars in 2021

By David Innes

A summary of the 2020 CVN presentations was reported in the November 2020 CVN Newsletter. As noted then, CVN switched from in-person meetings at the Filberg Centre to online webinars starting in March 2020. Online webinars continued through 2020 and 2021 and into 2022 as the pandemic also continues. Again, we thank Loys Maingon who continues to help organize presentations and takes care of the technical details using the GoToWebinar platform courtesy of the Canadian Society of Environmental Biologists (CSEB). Recordings of many of these presentations are available on the CSEB website: https://cseb-scbe.org/. You can also access them through CVN's website (go to the Guest Speakers category of blog posts, or use the search box).

Researching shoreline restoration. ***Photo courtesy Jason Toft***

Our first webinar in January was by **Jason Toft** of the University of Washington School of Aquatic and Fishery Sciences. His presentation, "**Restoration Effectiveness of Living Shorelines in the Salish Sea**," showed how armoring, such as concrete barriers, has altered many intertidal beaches. In contrast, Living Shoreline techniques aim to improve shoreline conditions by recreating some of the functions of natural shorelines. Examples were presented of recent design implementations including complete removal of armoring, as well as eco-engineering approaches. Some of these include new engineering solutions to create a salmon-friendly harbour-front in Seattle. More details are available at: https://staff.washington.edu/tofty/research/

The 2021 CVN AGM took place online in February with short presentations by various CVN groups: Airpark restoration (**Frank Hovenden**), Wetland restoration and Tree of the Year (**Karen Cummins**), Botany (**Jocie Brooks**), Birding, swan ount and Christmas bird count (**Kelly Klein**), Garry oak restoration, and conservation (**Loys Maingon**). These presentations show how active CVN continues to be despite the difficulties imposed by the pandemic. More information on group activities and reports are available on the CVN website (https://comoxvalleynaturalist.bc.ca/).

Dr. Carrie Holt (DFO – Pacific Biological Station) gave a presentation in February, "**Genetic risks of hatchery enhancement for Pacific salmon**," a week following the AGM. In BC, hatchery production is used as a conservation tool for wild populations by DFO's Salmon Enhancement Program and can increase the availability of fish for harvest, but is a risk factor to wild genetic diversity. A proposed approach was described for classifying populations that reflects the adaptive state of the population based on proportions of natural- and hatchery-origin fish. Various approaches were described for minimizing genetic risks of enhancement to wild populations. Except for populations near extirpation, limiting hatchery size by scaling the hatchery program to natural production is an effective way to reduce these risks. More information is available on Dr. Holt's web page: https://profils-profiles.science.gc.ca/en/profile/carrie-holt

During February 22 to 26, 2021 **Loys Maingon** and **John Neilson** organized a series of five **Salish Sea Herring Spawn webinars.** A summary of these webinars was reported in the March 2021 Newsletter and recordings are available as noted above.

Eric Hertz tracks salmon data. ***Photo courtesy Eric Hertz***

Two webinars were hosted in March. **Dr. Eric Hertz** (Pacific Salmon Foundation) gave a presentation "**The Pacific Salmon Explorer: a novel tool for mobilizing data on salmon and their habitats**". Salmon are critical species in British Columbia, but understanding their status is hampered by limited access to data. The Pacific Salmon Explorer is a novel tool that democratizes salmon data, with many potential uses (www.salmonexplorer.ca). This tool provides access to the best available data for salmon conservation units (CUs) in BC. Applying a standardized assessment approach, the Pacific Salmon Foundation (PSF) evaluates the current status of salmon CUs and pressures on their habitats. The Pacific Salmon Explorer is also a living tool, and the information and analyses are updated regularly as new data become available.

Later in March, **Dr. Jasmine Janes** (VIU) and **Genevieve van der Voort** gave a presentation "**Orchid Pollinators of Strathcona Park**". Dr. Janes and her student Genevieve worked up on Forbidden Plateau in the summer collecting data about the pollinators of two species of *Platanthera* orchids in meadow areas. Many plants hybridize naturally suggesting shared pollinators. Motion detection video monitoring helped them determine potential diurnal and nocturnal pollinators of *Platanthera dilatata* and *P. stricta* in the Mt. Washington area—two species that hybridize producing *P. estesii*. However, they found little overlap in the floral visitor community associated with each species. More information is available at: https://www.jasminejanes.com/research.

Researching bear dens. ***Photo courtesy Helen Davis***

The first webinar in April was by **Helen Davis** (Artemis Wildlife) on "**Impacts of Forest Harvesting on the Supply of Bear Dens in Coastal BC**". Forest policies in BC can have negative effects on wildlife including black bear populations on Vancouver Island due to a shortage of den habitat. Biologist Helen Davis has been doing great work creating artificial habitat in North Vancouver Island. The dens are typically in or under large old-growth cedar. In the presentation she discussed the impact of BC's forest policies on wildlife—how the dwindling numbers of critical denning trees is leading to a collapse in the black bear population on Vancouver Island and what she is doing about it. More information is at: http://artemiswildlife.com/bear-dens.

The second April webinar was by **Dr. Lynne Quarmby** (SFU) "**Watermelon Snow—Science, Art and a Lone Polar Bear**". Dr. Quarmby talked about her recently published book ***Watermelon Snow***. Her voyage through the dramatic landscapes of the high Arctic convinced her of the need for action on climate change. She presented a unique human and scientific perspective on this life at a time of increasing desperation about the future. More information: https://quarmby.ca/book.

Western redcedar dieback. ***Photo: Joseph Hulbert***

Following the summer of 2021, in-person CVN meetings were still on hold and webinar presentations continued into the fall. In September, **Dr. Joey Hulbert** (Washington State University) gave a presentation "**Western Redcedar Dieback and Community Science in the Pacific Northwest**". Western redcedar is a culturally, ecologically and economically important tree to western North America, but recent increases in dieback have raised concern about its vulnerability to hotter and dryer climates. The symptoms of dieback generally include trees with thinning crowns, flagging, yellowing or browning of foliage, dying tops and mortality. Forestry specialists consider that the driver of the dieback is abiotic. Given its extent throughout the region, it is likely linked with recent drought events, but the relationship has not been empirically tested. Dr. Hulbert is also the program director for Forest Health Watch (https://foresthealth.org/) with more information on dieback and where individuals can participate in citizen science using iNaturalist to contribute to forest health research.

The October webinar was presented by **Dr. Peter Ross** (Raincoast Conservation Foundation): "**Environmental pollution in British Columbia: A short history of chemical conquest**". Canada enjoys the longest coastline in the world. This raises fundamental questions about how best to understand, let alone protect, marine biota from the complex blend of chemicals used, lost, or disposed of, in consumer or industry activities. Considering that 80% of ocean pollutants originate from land, the generation of data that helps us track contaminants back to their source will underpin solution initiatives. The presentation gave an overview of a new community-oriented water pollution program, Healthy Waters, that will track priority pollutants from land to sea. Details and information can be found at: https://www.raincoast.org/waters/. More information on plastic pollution in BC's coastal environment can be found at http://pollutiontracker.org/.

Mussels after heatwave. ***Photo: Chris Harley***

The final webinar for fall 2021 was given in November by **Dr. Chris Harley** (UBC): "**Well that stunk: mass die-offs of BC seashore life during the 2021 heatwave**". In late June, 2021, western North America experienced an unprecedented heatwave. A new Canadian all-time high temperature record was set and hundreds of people died. Along the coast of BC, the high temperatures coincided with very low tides, and that combination was lethal for billions of barnacles, mussels, sea stars, and other sea creatures that live in the intertidal zone (see a short article on the effects of the heatwave on intertidal organisms in the November 2021 CVN Newsletter). Such intense heatwaves, once a 1-in-1000 year occurrence, are expected to become more common and more severe due to climate change. Dr. Harley and his students study how marine ecosystems are changing and why. They study the ecological impacts of gradual warming, sudden heatwaves, ocean acidification, and changes in salinity. Details of his research can be found at: https://www.zoology.ubc.ca/harleylab/

CVN continues to have an active monthly meeting program through webinars as a response to the pandemic preventing in-person meetings. Although we hope in-person meetings will resume, webinars have the advantage of inviting a greater diversity of speakers from a wider geographic range without having to worry about travel and accommodation. Webinars can also be easily shared with other Vancouver Island Nature clubs, increasing attendance. Some of our members are also thankful that they can view presentations without the need to travel, especially during the dark days of winter.

It has been suggested that when we resume in-person presentations we should also continue to offer webinar options for those who are unable to attend presentations in person. Thanks again to all our presenters, Loys for help in organizing presentations through GoToWebinar and CVN members for continued support.

Upcoming CVNS Activities

General Instructions for Field Trips

- All field trips are club events and reserved for members only, unless otherwise stated. Typically, one walk each month is open to the public.
- Meet either at the carpooling location or the trailhead 10 minutes before the specified time, unless otherwise announced. Carpooling locations are usually the former Thrifty's location in downtown Courtenay or the Courtenay Country Market on Highway 19A north of the city.
- Participants are responsible for their own safety.
- Walks typically take at least 2 hours.
- Wear clothing and footwear suitable for the conditions.
- Bring water and a snack (or lunch for longer trips).
- No dogs please.

Schedule

This information reflects planning as of our publishing date and is subject to change. For general club activities, watch for the latest information and additional details in the Board's periodic announcements and on the website.

To be notified of the activities of a particular interest group, contact the Group Leader and ask to be added to the group's contact list.

Although some interest-group field trips have resumed, no in-person general meetings or weekend walks have been scheduled at the time of publishing.

Reminder for Field Trip Leaders

All field trip participants who are not CVNS members must sign our Informed Consent and Assumption of Risk Agreement before participating.

Until further notice, all participants must continue to follow CVN's COVID-19 protocol (vaccination, agree to special waiver, distancing, etc.).

About the Society

Website

http://comoxvalleynaturalist.bc.ca

General Email Address

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Board of Directors

President: [vacant] (coordinator@comoxvalleynaturalist.bc.ca)
Vice-President: David Innes (cvncoordinator@gmail.com)
Secretary: [vacant] (cvnsecretary@gmail.com)
Treasurer: Isabella Erni (TreasurerCVNS@gmail.com)
BC Nature Director: Sharon Niscak
Project Director: Loys Maingon
Wetlands Restoration Director: Karen Cummins
Director-at-Large: John Neilson

Group Leaders and Other Volunteers

Membership Secretary: Dianna Colnett (cvnsmembership@gmail.com)
Birding: Kelly Kline (cvnbirds@gmail.com)
Botany: Jocie Brooks (cvnbotany@gmail.com)
Shoreline: [vacant] (cvnsshoreline@gmail.com)
Photography: Bryan Walwork
Weekend Walks: Loys Maingon
Conservation: Loys Maingon
Garry Oak Restoration: Loys Maingon
Vanier Forest Garry Oak Project: Jim Boulter
Airpark Restoration: Frank Hovenden
Environmental Heritage and Culture: Gordon Olsen (coordinator@comoxvalleynaturalist.bc.ca)
Swan Count: Ernie Stefanik, Krista Kaptein (ernie.stefanik@gmail.com)
Comox Valley Conservation Partners liaison: Kate Panayotof
Speakers Planning: David Innes
Bursary Committee: Kathleen Wilkinson (cvnbursary@gmail.com)
Tree of the Year Committee: Karen Cummins
Education and Outreach Committee: Lyndsay Fraser
Coffee Committee: Judy Chrysler, Kelly Kline
Website: David Orford (site_info@comoxvalleynaturalist.bc.ca)
Facebook: Jillian Jones (cvnaturefacebook@gmail.com)

Newsletter Advertising: Kathie Woodley
Newsletter Editor: David Orford (Advisor: Sharon Niscak) (newsletter@comoxvalleynaturalist.bc.ca)

Constitution and Bylaws

Available in PDF form on this web page:
http://comoxvalleynaturalist.bc.ca/about-us/

Membership

Includes membership in BC Nature.

Membership form (including the Informed Consent and Assumption of Risk Agreement) is available at meetings and on the website. This must be completed each year.

Fee: $30 per year per household (1 or 2 adults plus children 19 and under)

Discount of $16 if you are already a paid-up member of BC Nature (either directly or through another club).

Pay at general meetings, on the website, or mail a cheque payable to Comox Valley Nature to:
CVNS Membership Secretary
Box 3222
Courtenay BC, V9N 5N4

Membership runs for the calendar year and is considered lapsed 90 days after year end. Lapsed members are removed from the CVNS and BC Nature membership lists.

Change of address, phone number or email: Please advise the Membership Secretary.

Meetings

When in-person meetings resume, they will follow the schedules described here.

Monthly general meetings are held on the 3rd Sunday of the month at 7:00 p.m. in the Florence Filberg Centre, 411 Anderton Avenue, Courtenay.

June meeting: Potluck at a member's house.

No general meeting in July, August, or December.

Bird meetings: First Thursday of the month, 7:00 p.m. at the Filberg Centre Soroptimist Lounge, Courtenay. For information or to be included on the birding group list, send email to cvnbirds@gmail.com. Birding walks are held weekly, most on Thursday mornings, and once per month on a Sunday.

Botany meetings: Second Monday of the month at a member's home, 12:00 p.m. An email is sent prior to the meeting to confirm location and topic.

Botany walks (weather permitting) precede or follow the meeting and are also scheduled at other times. To be included on the botany group list, send email to cvnbotany@gmail.com.

Newsletter

The newsletter is published 3 times per year (March, June, and November). The full-colour version is emailed in PDF form to all members on the email list, and a few printed copies (black and white) are available at general meetings and in the CVNS outbox in the Evergreen Lounge at the Florence Filberg Centre.

The newsletter depends on your contributions. Please consider contributing an **article** or **note** on any topic of general interest to other members such as natural history, conservation activities, trips, unusual sightings, or a book review. **Photos** are also appreciated, either with a story or stand-alone. You can send your contribution by email to newsletter@comoxvalleynaturalist.bc.ca.

We would appreciate receiving articles by the first day of the publication month. All articles are subject to editing.

NatureKids

CVNS has a cooperative relationship with NatureKids Comox Valley, a separate nature club for children which is part of the NatureKids BC organization. For more information, see http://www.naturekidsbc.ca/.

Northern Flicker female cleaning her nest.
Photo: Margaret Barr