tidepool

January 2023

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Eric Ignatz

Associate Editor:
Dr. Matthew Rise

Photography:
Dr. Matthew Rise

Department of Ocean Sciences /
Ocean Sciences Centre Newsletter

Dr. Matthew Rise

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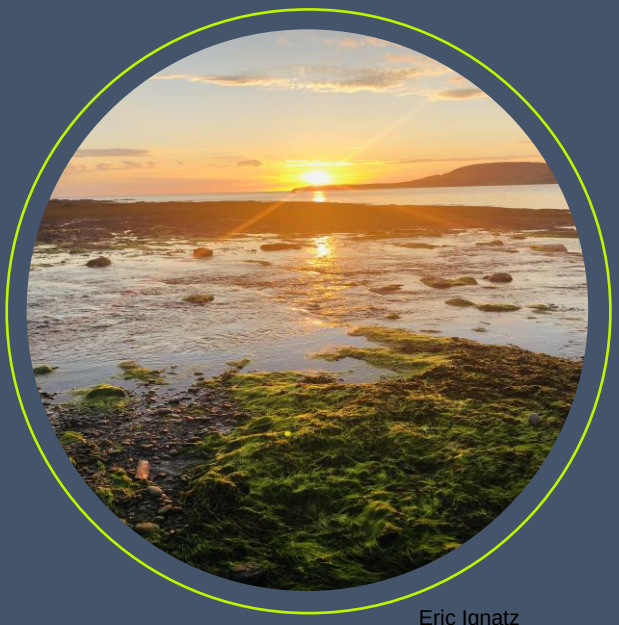
Thanks for Reading!

Thank you for reading the next edition of *tidepool*! With the continued support from members within the department, the current newsletter contains all sorts of exciting updates from our community.

As always, our goal is to increase transparency, communication and help to build a stronger sense of community at the Department of Ocean Sciences/ Ocean Sciences Centre (OSC).

If there are any recommendations for future issues of *tidepool* or you would like to become involved on the editorial team, please email Eric at ehignatz@mun.ca!



Eric Ignatz

Faculty Spotlight: Dr. Annie Mercier

About the Mercier Lab

Our research examines the interactions between animals that live on the seabed and environmental factors at various scales, typically combining field samplings and experimental trials with cellular and biochemical analyses. We therefore touch on various fields, such as chemical ecology, ecotoxicology, evolutionary biology, taxonomy, immunobiology and trophic ecology. The focus of the fundamental research is on life-history strategies that have evolved in extreme or climate-change-sensitive environments such as the deep sea, as well as subarctic and Arctic regions. More applied research segments centre on the impact of ocean acidification, pollution and other stressors on marine organisms, and on helping to develop sustainable fisheries and aquaculture practices (with a particular interest in sea cucumbers).

Word cloud showing research interests in the Mercier Lab.

Overall, our work is broad in scope, spanning across diverse taxa, depths, geographic areas and levels of biological organization. Research is often curiosity driven and leads to unexpected discoveries. Breakthroughs in biology, ecology, evolution and conservation made over the years (which have received media coverage), include:

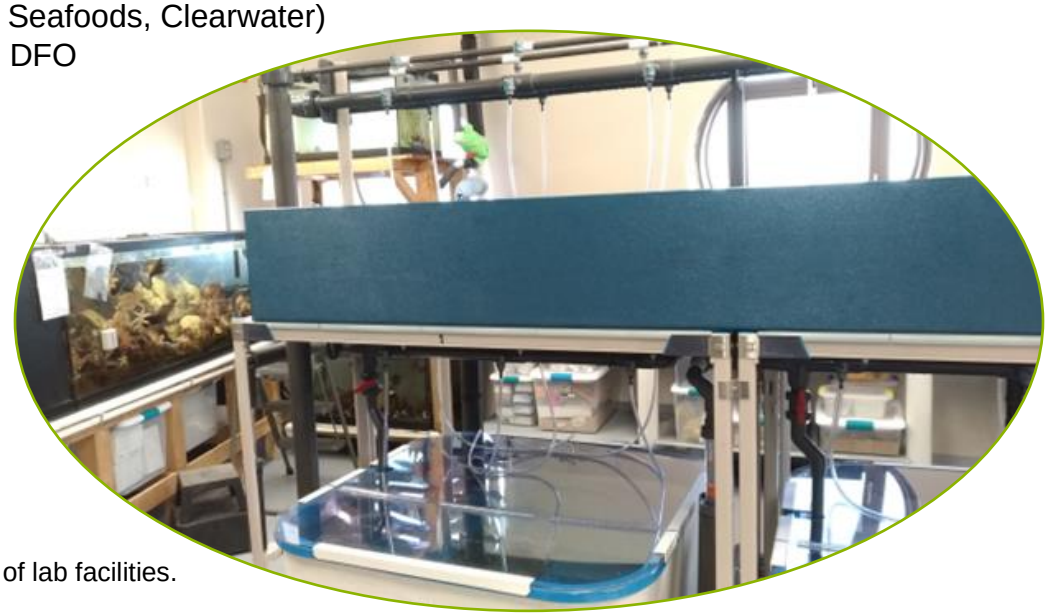
1. first evidence of lunar rhythms in the reproduction of deep-water taxa;
2. first direct evidence of allogeneic fusion (chimerism) in a unitary organism and in deuterostomes;
3. first demonstration of a functional relationship between fish larvae and deep-sea corals;
4. first demonstration of active buoyancy adjustment leading to rapid dispersal in so-called sedentary animals;
5. first evidence of anticipatory immune and hormonal responses to predation risk in an echinoderm.

Some lab members over the years.

Our main partners at present

- Government of Nunavut and Polar Knowledge Canada
- Communities and HTAs in Nunavut, with a focus on Sanikiluaq
- Mitacs and World Wildlife Fund Canada
- Industry (Quin-Sea Fisheries / Royal Greenland, Fogo Island Coop, Ocean Choice International, Green Seafoods, Clearwater)
- NSERC, CCFI, OFI, DFO

-Dr. Annie Mercier



Portion of lab facilities.

Sample publications

Mercier A., Ammendolia J., A. Brown, J.-F. Hamel 2022. Vertical migrations in the ocean and the deep source-sink hypotheses: insights from pressure tolerance investigations. *Oceanography and Marine Biology - An Annual Review*, 60, 591-624 [open access].

Jobson S., J.-F. Hamel & A. Mercier 2022. Rainbow bodies: revisiting the diversity of coelomocyte aggregates and their synthesis in echinoderms. *Fish and Shellfish Immunology*, 122: 352-365.

Hamel J.-F., S. Jobson, G. Caulier & A. Mercier 2021. Evidence of anticipatory immune and hormonal responses to predation risk in an echinoderm. *Scientific Reports*, 11: 10691 [open access].

Gianasi B.L., J.-F. Hamel, E.M. Montgomery, J. Sun & A. Mercier 2021. Current knowledge on the biology, ecology, and commercial exploitation of the sea cucumber *Cucumaria frondosa*. *Reviews in Fisheries Science and Aquaculture*, 29(4): 582-653.

Hamel J.-F., J. Sun, B.L Gianasi, E.M. Montgomery, E.L. Kenchington, B. Burel, S. Rowe, P.D. Winger & A. Mercier 2019. Active buoyancy adjustment increases dispersal potential in benthic marine animals. *Journal of Animal Ecology*, 88(6): 820-832 [open access; issue cover].

Sun J., J.-F. Hamel, B.L. Gianasi & A. Mercier 2019. Age determination in echinoderms: first evidence of annual growth rings in holothuroids. *Proceedings of the Royal Society B*, 286: 20190858.

Parzanini C., C.C. Parrish, J.-F. Hamel & A. Mercier 2019. Reviews and syntheses: Insights into deep-sea food webs and global environmental gradients revealed by stable isotope (δ15N, δ13C) and fatty acid trophic biomarkers. *Biogeosciences*, 16: 2837-2856.

Osse M., J.-F. Hamel & A. Mercier 2018. Markers of oil exposure in cold-water benthic environments: Insights and challenges from a study with echinoderms. *Ecotoxicology and Environmental Safety*, 156: 56-66.

Montgomery E.M., J.-F. Hamel & A. Mercier 2017. Patterns and drivers of egg pigment intensity and colour diversity in the ocean: a meta-analysis of phylum Echinodermata. *Advances in Marine Biology*, 76: 41-104 [issue cover].

Verkaik K., J.-F. Hamel & A. Mercier 2016. Carry-over effects of ocean acidification in a cold-water lecithotrophic holothuroid. *Marine Ecology Progress Series*, 557: 189-206.

Mercier A., M.A. Sewell & J.-F. Hamel 2013. Pelagic propagule duration and developmental mode: reassessment of a fading link. *Global Ecology and Biogeography*, 22(5): 517-530 [issue cover].

Baillon S., J.-F. Hamel, V.E. Wareham & A. Mercier 2012. Deep cold-water corals as nurseries for fish larvae. *Frontiers in Ecology and the Environment*, 10(7): 351-356 [issue cover].

Mercier A., Z. Sun & J.-F. Hamel 2011**.** Internal brooding favours pre-metamorphic chimerism in a non-colonial cnidarian, the sea anemone *Urticina felina*. *Proceedings of the Royal Society B,* 278: 3517-3522.

Dr. Matthew Rise

A Word from the Department Head

We have some new sections in this edition of *tidepool*. “Sea Stars” profiles an OSC alumnus, with the inaugural Sea Star being Dr. Stefanie Colombo. The interview with Stefanie on page 14 of *tidepool* includes information about her research, along with some sound advice: “Be open to opportunities and stay true to yourself and what you’re passionate about”. I love that quote.

As you can see on pages 17-19, some people at the OSC are passionate about art. From the beginning, we wanted ocean-related art to be part of *tidepool*. While the arts (e.g., painting, drawing, photography, film, music, etc.) can be enriching, satisfying activities that improve our quality of life, they also might help ocean scientists to solve some of the “wicked problems” that we collectively face. In Jung et al. (2022), wicked problems are defined as “intractable and messy situations with high stakeholder divergence”. I encourage you to read this article (see reference below). Jung et al. (2022) discuss how transdisciplinary insights can arise from collaborations involving ocean scientists with artists, helping to bring public sectors (e.g., education, government) into the “wicked problem space” to focus on intractable and messy problems like marine plastic pollution. For some examples of marine science-art collaborations, see: https://www.whoi.edu/oceanus/feature/ocean-science-art-collaborations/

Humanity is facing wicked problems such as declining ocean health (e.g., see: https://www.rockefellerfoundation.org/blog/ocean-health-wicked-problem/). Fortunately, we have wicked (slang definition, i.e., “extremely”) talented scientists addressing these problems. In addition to scientists, though, we need the diverse expertise of everyone in our community (e.g., see “OSC Facilities Q & A” on page 15) to create and sustain a vibrant research environment where complex problems such as the impacts of climate change on marine organisms (e.g., Mercier and Gamperl labs) and the biological carbon pump (e.g., Passow lab) can be effectively studied. I think that transdisciplinary collaborations (e.g., with artists) may help us to devise novel potential solutions to these wicked problems.

-Dr. Matt Rise

Jung J, Gupa D, Hash C, Thoms J, Owens D, Threlfall J, and Juniper SK. 2022. Doubling Down on Wicked Problems: Ocean ArtScience Collaborations for a Sustainable Future. *Frontiers in Marine Science* 9, article 873990. https://doi.org/10.3389/fmars.2022.873990

Spotted Wolffish: Refining and Validating Best Practices for Juvenile Production Technologies and Initiating an Aquatic Health Surveillance Program

The Canadian Centre for Fisheries Innovation (CCFI), led by managing director Mr. Keith Hutchings, has partnered with Amar Seafoods Ltd and Memorial University's Department of Ocean Sciences to move forward on a project focusing on "Spotted Wolffish" (*Anarhichas minor*).

The project will focus on "**Refining and Validating Best Practices for Juvenile Production Technologies and Initiating an Aquatic Animal Health Surveillance Program**".

This project is in alignment with the Department of Fisheries, Forestry and Agriculture (FFA) provincial aquaculture "***Multi Species Strategy***" as well as in alignment with Amar Seafoods Ltd. priorities. This work will allow us to increase our knowledge and production for wolffish and make significant advances towards this species reaching its commercialization goals through land-based technology.

Memorial University of Newfoundland has long been an active proponent of Aquaculture Research & Development. Faculty, students and support staff at the Department of Ocean Sciences and the Dr. Joe Brown Aquatic Research Building (JBARB) will be key players in the execution of this industrial led project.

Currently, there are no commercial spotted wolffish hatchery(s) in Newfoundland / Canada and therefore the JBARB will be playing a major role in this new and exciting semi commercial multi-year project.

The JBARB provides facilities designed to support research, training, pre-commercial production, and small-scale commercial trials, on alternative species for marine aquaculture.

This **new and exciting project** will compliment ongoing research and development activities at the OSC, which are already providing information/data that are essential for the viability and continued growth of our multi species (lumpfish, spotted wolffish, American oysters, marine plants, sea urchins) aquaculture industry.

We believe, collectively, that funding projects such as this one will help to solidify "**new local investment**", helping to solidify Atlantic Canada and neighboring Quebec as world leaders in aquaculture innovation and safe farming practices. Also, at the same time maintaining the prosperity that we see as a direct result of the marine finfish and shellfish farming operations.

Spotted wolffish, a cold water, demersal fish, native to the north Atlantic Ocean has emerged as a promising candidate for cold-water aquaculture and is looked upon with considerable interest in Norway and Canada.

Since the earlier 2000's, Norway has been the only country with a "commercial" aquaculture production of spotted wolffish. Amar Seafoods Ltd. is committed and have been active in both Canada and Norway over the past number of years.

The market value of the product is well proven, and the very favorable production characteristics are well documented. Furthermore, spotted wolffish possess characteristics important for the establishment of an exclusive niche product, including a limited geographic area suitable for culture, together with a unique, high-quality product.

Spotted wolffish have numerous attributes that make them a desirable species to culture including, but not limited to:

- having a high market value;
- desired by consumers and chefs;
- not supplied by U.S. or Canadian wild fisheries;
- an established broodstock available in neighboring Quebec, Prince Edward Island and now starting in Newfoundland and Labrador;
- well-developed hatchlings that do not require live feed;
- high rearing density tolerance;
- and low disease susceptibility.

This particular project is supported in principle by representatives from the Department of Fisheries, Forestry and Agriculture- Government of Newfoundland and Labrador, Department of Fisheries and Oceans (Canada), Newfoundland Aquaculture Industry Association (NAIA), Memorial University of Newfoundland and Amar Seafoods Ltd.

Memorial and the province has a
"Team of Highly Qualified Staff, Students and Researchers"
for projects such as this.
We are blessed with talent, passion and facilities at Memorial.

Specifically, this project will address:

- Establishment of a "Broodstock Program in NL".
- Refinement and validation of Standard Operating Procedures (SOPs) / best practices for "Semi Commercial Scale Juvenile Production Technologies".
- Initiate an "Aquatic Animal Health Surveillance Program".
- Technology and Knowledge Transfer.
- Creation of Private Sector Jobs for local residents.

Amar has taken a regional commercial collaboration approach and Memorial University's Department of Ocean Sciences is glad to be a partner. The Ocean Sciences Centre staff works closely with its industry partners, as demonstrated through current and past projects that have been undertaken here at Memorial University of Newfoundland.

Danny Boyce
Facility and Business Manager
Dr. Joe Brown Aquatic Research Building

Proponents: Mr. Danny Boyce **Department of Ocean Sciences**
Dr. Javier Santander **Department of Ocean Sciences**
Capt. Knut Trellevik. **President Amar Seafoods Ltd.**
Mr. Bjorn Apeland **CEO Amar Group**

OceanUS Announcements

OceanUS is back for another semester! We currently have an Ocean Sciences team for MUN's Relay for Life event, this is an annual fundraiser MUN has for the Canadian Cancer Society. Anyone is welcome to join our team! The event is on March 4th from 7 PM - 7 AM. The link to register or donate is: https://support.cancer.ca/site/TR/RelayForLife/RFLY_NW_even_?team_id=496424&pg=team&fr_id=28684. We'd love to have you.

We're planning lots of fun events for the upcoming months so stay tuned and keep up with our socials! OceanUS can be found on Facebook (OCEANUS – Ocean Sciences Undergraduate Society), Instagram (@mun_oceanus) and email (oceanus@mun.ca).

- OceanUS 2022-2023 Executive Team

2022-2023 Executive Team:
President: Jill Carter
Vice President: Alessia King
Secretary: Theresa Allingham
Treasurer: Jacob Mercer
Social Rep: Mary Londero
4th Year Rep: Isaiah Power Smith
3rd Year Rep: Jenna Keveryga
2nd Year Rep: Marcella Whelan

OSGSA News

The Ocean Sciences Graduate Student Association (OSGSA) is an organization that aims to improve graduate student life at the OSC by providing both academic and social support!

Over past few months, we have had a busy social schedule! Graduate students within our department have been able to attend Screech-in ceremonies, trivia nights, Halloween costume contests, holiday parties and a maker's swap. We hope to keep the fun going this semester!

Also, a huge thank you goes out to Donna Inkpen and everyone who contributed to or purchased tickets for our gift basket giveaway in December!

Be sure to follow us on social media to keep up to date on our future events!

-OSGSA 2022/2023 Executive Team

2022/2023 Executive Team:
Chairperson: Eric Ignatz
Treasurer: Verena Kalter
Seminar Series Coordinators: Natalie Perrin, Coral San Roman, Joanna Dicks
Graduate Development Coordinator: Eleanor Barry
Graduate Studies Representative: Colleen McBride
Sustainability Coordinator: Olivia Dillon
Graduate Student Food Coordinator: Sara Jobson
Graduate Student Union Representative: Mary Clinton
Social Events Coordinator – Grace Walls
Communications Coordinator – Rahana Ebrahim

MUN Ocean Sciences Graduate Student Association
@munosgsa
@munosgsa
osgsa@mun.ca

Welcome to New Arrivals

Visiting Researchers

Dr. Fei Gao, Ph.D. in Marine Biology, is an Associate Professor at the *Ocean College*, *Hainan University*. She is engaged in the research of physiological ecology and molecular ecology of marine macrobenthos, mainly including the classification, ethology, ecological function, and integrated-culture of tropical sea cucumbers. She is the member of Echinoderms Branch of the Chinese Society of Oceanology and Limnology. Her research is funded by National Natural Science Foundation of China and the National Key R&D Program of China.

PROFESSIONAL EXPERIENCE
01/2017-present: Associate Professor, Hainan University
01/2015-12/2016: Associate Researcher, Yellow Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences (YSFRI, CAFS)
01/2011-12/2014: Assistant Researcher, Yellow Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences (YSFRI, CAFS)
09/2008-10/2010: Post-Doc, Yellow Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences (YSFRI, CAFS)

Dr. Qiang Xu, Ph.D. in Marine Biology, is a professor at the *Ocean College*, *Hainan University*, and is the PI of the Marine Ranching Group of the State Key Laboratory of Marine Resources Utilization in the South China Sea, Haikou, China. He is the member of the Advisory Committee of Experts on the Construction of Marine Ranching within the Ministry of Agriculture and Rural Affairs and executive member of Echinoderms Branch of the Chinese Society of Oceanology and Limnology.

His research field is bioresource conservation and marine ranching in tropical sea areas, and his interests include ecosystem ecology of tropical sea ranching areas, population ecology of sea cucumbers, stock enhancement facilities and techniques for benthic animals, and quantitative evaluation of restoration effects of bioresources. He is funded by several national programs including the National Key R&D Program of China, the National Natural Science Foundation of China and the Key R&D Program of Hainan, China.

He teaches an undergraduate course in “Essentials of Oceanography”, and a graduate course in “Advances in Fishery Facilities and Equipment”.

Drs. Gao & Xu will be working in Dr. Annie Mercier’s lab. Among other things, they plan to conduct collaborative work on the nutritional physiology and digestive processes of holothuroids (sea cucumbers), and on the response of holothuroids (and other echinoderms) to environmental stressors.

My name is **Cassandra Gardner**, and I will be joining the Department of Ocean Sciences as the Facility Manager at the CDRF. I am originally from Thunder Bay, ON, where I attended Lakehead University and obtained an Honours Bachelor of Science in Applied Biomolecular Science. I moved here to St. John's, NL to attend Memorial University, where I obtained a Master of Science in Medicine – Cancer & Development, under the supervision of Dr. Hélène Paradis and Dr. Bob Gendron. Since then, I have been working as a Research Assistant in the laboratory of Dr. Rod Russell in the Faculty of Medicine's Division of Biomedical Sciences. My husband and I, along with our husky mix, Birchy, currently live in Torbay. In my spare time, I enjoy outdoor adventures, gardening, and baking. I am excited to be working at the Ocean Sciences Centre come February, and getting to know you all!

Sea Stars

*Sea Stars is *tidepool*'s new section that will feature interviews with OSC alumni*

Name: Stefanie Colombo

Program Completed at the OSC: PhD (Biology)

Supervisor(s): Dr. Chris Parrish (with support from Dr. Matt Rise as a supervisory committee member)

Graduation Date: May 2014

Current Occupation: Associate Professor and Canada Research Chair (Tier II) in Aquaculture Nutrition at Dalhousie University (Department of Animal Science and Aquaculture)

Description of Occupation:

My research program focuses on discovering innovative ways to improve nutrition in aquaculture and support the production of healthier, sustainably farmed seafood. I train graduate students and undergraduate BSc students. I currently teach two undergraduate courses, Fish Nutrition and Research Methods for Honours Students. I also work on committees at Dal and outside of Dal, for example, I am the Chair of the Animal Care and Use Committee at Dalhousie Agriculture Campus, and I am the Science Advisor for the Aquaculture Association of Nova Scotia.

What skills did you learn at the OSC that enabled you to find success in your career?

Besides learning skills directly required for my thesis (e.g., lab work in Chris' lab, fish feeding and sampling, etc.), some of the key skills I learned at OSC were: getting/being organized, effective written and speaking communication, collaborating with different people, working as a team, writing reports and meeting deadlines, learning from others how to manage large projects (i.e. Chris, Matt, Genome Atlantic).

What advice would you have for current students studying at the OSC?

Don't be afraid of new challenges because when things get tough, it's an opportunity to grow. Be open to opportunities and stay true to yourself and what you're passionate about. Try to enjoy your time at OSC while you're balancing your workload – get out for a hike in the summer, enjoy the seals, whales, icebergs, etc. Try to get involved in organizations/societies outside of OSC – I was glad to be involved with the Aquaculture Association of Canada, it helps to make connections and your contribution makes a difference.

What is your favourite memory of the OSC?

I have many great memories of my time at OSC. Taking a break to watch the whales and the seals, going for a hike at lunch time, sampling days at JBARB, having group meetings with Chris' lab, Matt's lab and our collaborators. I genuinely loved my time at OSC.

OSC Facilities Q & A

This email exchange demonstrates the amazing expertise needed to run our marine lab!

Question from Matt Rise:

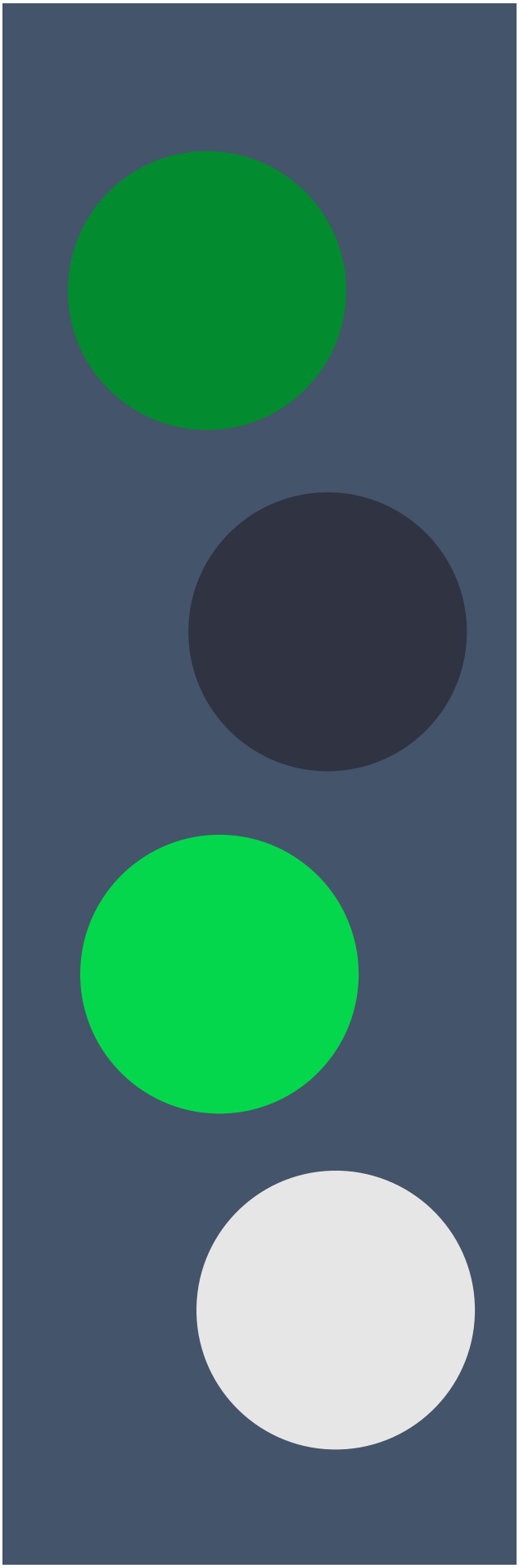
“I was at the OSC last night (January 23) when we lost power. My office computer and lights went off for several seconds. It was not the usual “blip”. Are the power failures changing at the OSC (e.g., longer in duration than previously)?”

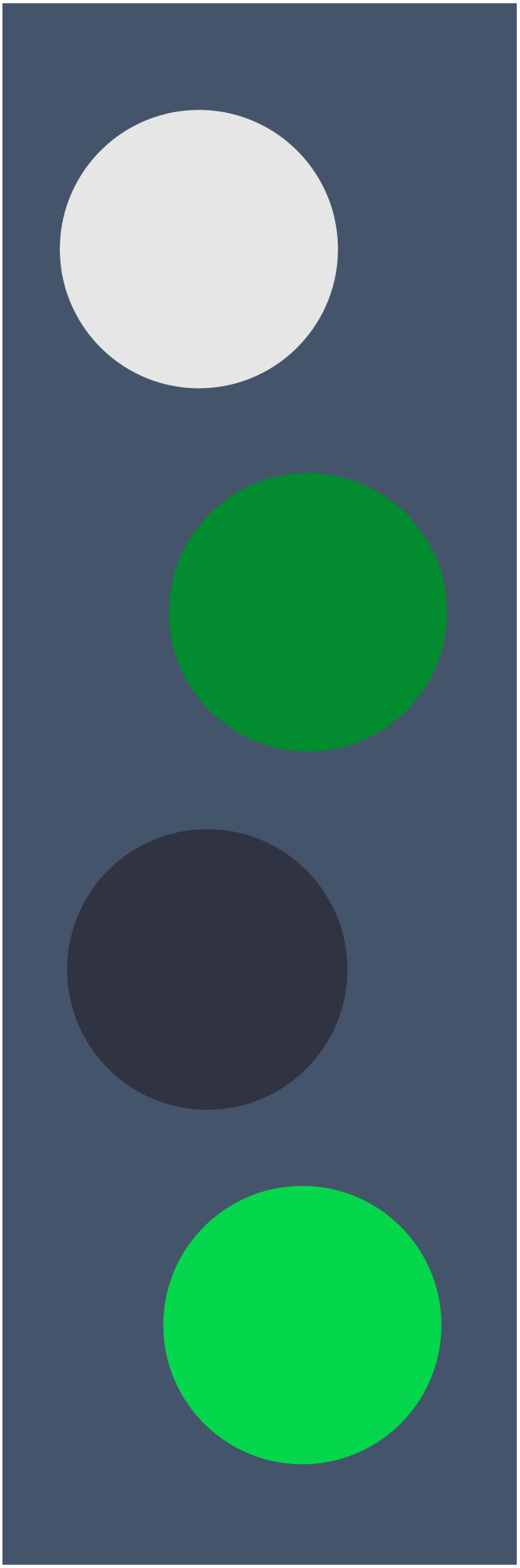
Answer from Greg Tremblett:

“There are two ways that our emergency generator can switch from normal power to emergency power.

1. What we are all accustomed to is a brief blip. This occurs when we perform our regular testing of the emergency generator, supposedly every month, whereby the diesel engine and generator are already started up, but not supplying power to the site. The blip occurs when we switch the 4 large electrical switches from normal power to emergency power. These switches operate very fast, therefore you only notice a blip. The key difference with this is that the diesel engine and generator are running and up to speed before the site is switched to emergency power. The reverse is also a blip. When we switch from emergency power to normal power, the 4 electrical switches operate first to supply normal power to the site. Then the diesel engine and generator continue to run for 1 hour to ensure the normal power supply is stable, after which it runs for an additional 15 minutes as a cool down period.

2. The second way is what occurred last night. When normal power is lost suddenly, the diesel engine and generator automatically receives a signal to start up. It takes this engine longer to start and spool up to speed than a car or truck engine. Once it reaches operating speed, a signal is sent to the 4 large electrical switches to command them to switch to emergency power. This entire sequence takes about 10 to 15 seconds. The key difference here is that the diesel engine and emergency generator are not already running, but has to start from the stopped condition.”





Accomplishments within the Department

Awards

J. Roger Pearson Graduate Award in Ocean Education and Outreach
Sara Jobson (Supervisor – Dr. Annie Mercier)
Victoria Heath (Supervisors – Dr. Ian Fleming & Dr. Sarah Lehnert)

The Weston Family Graduate Scholarship in Marine Biology
Joanna Dicks (Supervisor – Dr. Uta Passow)

LGL Limited Scholarship in Marine Science
Isaiah Power Smith (BSc Honours - Marine Biology)

Dr. Charles and J. Yvonne (Butt) Pelley Scholarship
Nicholas Edwards (BSc - Ocean Sciences)

University Research Professor
Dr. Kurt Gamperl

Theses Defended

Judy Perry, MSc Chemistry, "Analysis of phytosterols by gas chromatography with mass spectrometry in Atlantic salmon (*Salmo salar*) fed novel lipid sources" (Supervisor – Dr. Chris Parrish)

Comprehensive Examinations Completed

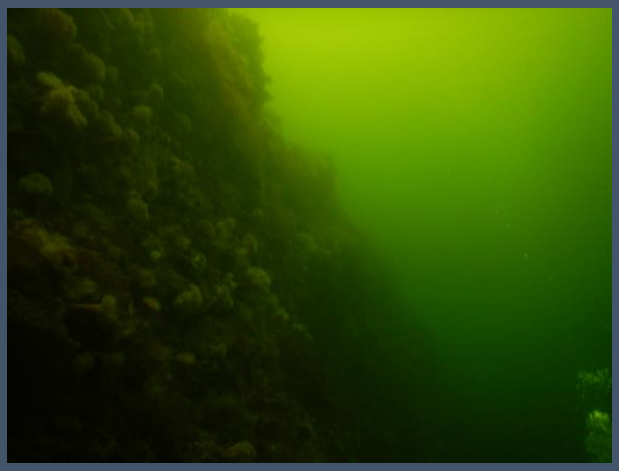
Sara Jobson, "Shake it off: Exploring drivers and outcomes of autotomy in marine animals" (Supervisor – Dr. Annie Mercier)

* If any updates / new arrivals / accomplishments were accidentally missed, please reach out to Eric (ehignatz@mun.ca) so that this information can be included in the next issue of *tidepool*!

Artwork Contest

*All members of the OSC community were asked to enter their aquatic themed artwork for a chance to win the opportunity to have it hung on the walls of the Ocean Sciences Centre. An internal panel of judges will determine our winner(s), which will be announced in the next edition of *tidepool*!*

George Bishop



Joanna Dicks

Grace Walls

Alana Barton