



Angela Fortune and Thierry Chopin participated in the session “Land-based aquaculture & marine and freshwater IMTA” at the **Aquaculture Canada 2016** conference in St. John’s, Newfoundland, September 18-21.

Angela presented her paper “Thinking outside the box: investigating cage design for sea cucumber grown in suspension in an IMTA system”. Interesting idea: containing sea cucumber does not mean you have to close the box, and that’s better for them to get their food from the fish co-products.



Thierry presented two papers:

- “Integrated Multi-Trophic Aquaculture (IMTA): the concept, its many variations, who it is for and what will be needed to see it emerge in the Western World”;
- “Faced with decreasing salmon production and pending climate changes, the only hope for aquaculture development in Atlantic Canada is diversification within an integrated coastal area management strategy”.

The second paper got the attention of **Samantha Andrews**, journalist for *The Fish Site* who, on September 27, published the article “[Diversification necessary for Canadian aquaculture development to be successful](#)”.

Angela, Thierry, **Troy Lyons** and **Jon Grant** got “screeched-in”! They became members of the Royal Order of Screechers and performed all the duties of becoming an Honorary Newfoundlander.





They spoke like a Newfoundlander, they ate like a Newfoundlander, they drank like a Newfoundlander and they kissed the almighty Cod!

It's a sign of the times! Thierry was "screeched-in" in St. John's, in July 2005, but, because there were not any cod around, he had to kiss a rubber puffin's rear end. Now that cod is coming back, he had to do the real thing!



To know more about the Newfoundland Screech rum and the "screech-in" ceremony click [here](#)

Thierry Chopin was the plenary speaker of the conference "Les rendez-vous de Concarneau 2016: where industry meets science" in Concarneau, Brittany, France, on September 29-30, during the European Biotech Week.

Around 70 researchers (from France, Germany, Italy, Portugal, Norway, Denmark, Finland and Canada) met at the **Laboratoire de Biologie Marine**, the **oldest marine biology station in the world**, founded in 1859 by **Jacques Marie Cyprien Victor Coste**.

This resulted in two newspaper articles: one in *Le Télégramme* on October 1, and one in *Ouest France* (the most read francophone newspaper in the world) on October 3.



Thierry Chopin in the office/library of Professor Victor Coste at the Laboratoire de Biologie Marine of Concarneau (photo credit: Renée-Laure Euzen).



Read the articles:

[“Station marine. Deux jours de colloque”](#) in *Le Télégramme*, on October 1, 2016.

[“L'aquaculture de demain, enjeu planétaire”](#), by Renée-Laure Euzen, in *Ouest France*, on October 3, 2016.



Another article appeared in the *Telegraph Journal* in New Brunswick, Canada, on October 3, based on an interview given by Thierry Chopin just before he left for France.

So, some **truly transatlantic media coverage** of an important global challenge: **the need to evolve practices if we want aquaculture to become one of the most efficient food production systems of the future.**

Read the article:

[“Is seaweed the next superfood? Marine biology professor says seaweed boom is already here”](#), by Sarah Petz, in the *Telegraph Journal*, on October 3, 2016.

In its October 2016 issue, **Eurofish Magazine** reported on the 5 day course **“Marine Algae Culture: Techniques, Uses and Development Perspectives”** that took place last June, at the **Universidad de Las Palmas de Gran Canaria (ULPGC)**, under the auspices of the **Mediterranean Agronomic Institute of Zaragoza (IAMZ)**. **Thierry Chopin** was one of the instructors (see the *CIMTAN Snippets* issue of June 2016).

The IAMZ in Zaragoza, Spain, is part of a four-member network of organizations in Mediterranean countries that work on education, research, technical assistance and policy



development in the region. In collaboration with other institutions, it organizes courses in fisheries and aquaculture, among other subjects. The courses are characterized by a combination of classroom lectures and field activities, with close interaction between students and instructors. The goal of these courses is to provide the students with content, but also to encourage them to cooperate and build networks that they can use in the future.

Read the article:

[“Zaragoza Institute offers intensive courses in fisheries and aquaculture – State-of-the-art content and international contacts”](#)

Watch the video:

<https://www.youtube.com/watch?v=ij-Kg-HxjxM>

Thierry Chopin taught the **seaweed component** of the **UNB Saint John Marine Semester 2016** at the **Huntsman Marine Science Centre** in **St. Andrews**, New Brunswick, October 17-21 and October 31. Here is a diary of the activities.

October 17 - Day 1

In the morning, we talked about the course, its organization and its contents. That was followed by a general introductory lecture on algae and seaweeds.

In the afternoon, we had a lab, during which we extracted carrageenans, which are sugars from some red seaweeds, like Irish moss (*Chondrus crispus*), with gelling or thickening properties. We used the good old Breton and Acadian recipe to prepare “blanc mange” or seaweed pudding.





We prepared the academic (“authorized”) recipe with sugar and vanilla extract, but, I do not know how, some Baileys Irish Cream found its way into some of the wells of the muffin pan...! It was delicious, according to my unbiased students!

We definitely had a very strong gel of kappa-carrageenans when using female gametophytes of *Chondrus crispus*: the puddings did not fall from the upside down pan!



October 18 - Day 2

Beautiful day outside! So, we went to the shore in the morning to get familiarized with these seaweeds in the field and we identified them in the lab in the afternoon by making an algarium.





October 19 - Day 3

After the day before looking at seaweeds from a semi-exposed habitat (the Bay of Fundy is never completely exposed), we looked at seaweeds from two sheltered habitats: less species diversity, but we saw the elusive colonial cyanobacterium *Rivularia atra* among goosetongue greens (*Plantago maritima*), and the invasive green alga *Codium fragile* (oyster thief).

The latter part of the afternoon was dedicated to class-room lectures.



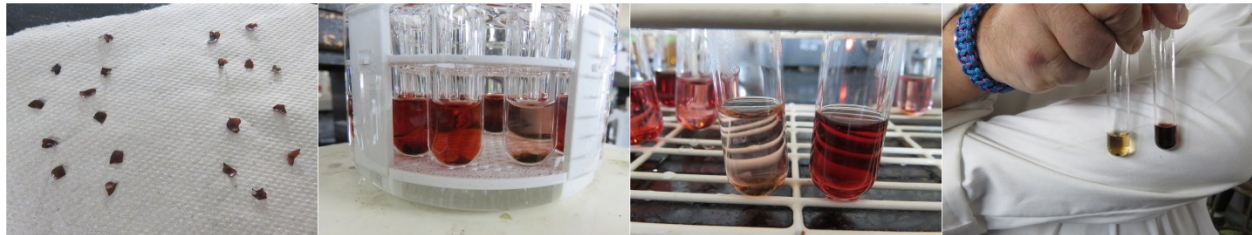
October 20 - Day 4

Lectures in the morning; lab in the afternoon.

In natural populations, most individuals of the commercially valuable red seaweed Irish moss (*Chondrus crispus*) are in the vegetative state and it is impossible to identify gametophytes from sporophytes. That is a problem when you want to study population composition and evolution. Luckily, these two generations produce different sugars in their cell wall: the gametophytes produce kappa-carrageenans, a gelling agent with which one can make jello; the sporophytes produce lambda-carrageenans, a thickening agent with which one can make ketchup.



These sugars will react differently to a chemical reagent, the resorcinol-acetal reagent. After placing a little piece of Irish moss in a test tube, the reagent will turn red, after 60 seconds at 80-90 °C in a water bath, if the sample comes from a gametophyte; it will remain colourless, or slightly pink, if it comes from a sporophyte.



So, this rapid chemical test, based on the chemistry of sugars with huge applications in the food industry, can help you characterize a population pretty quickly. Thierry Chopin has been analyzing the Irish moss population at Letite, New Brunswick, with the help of the successive students of the Marine Semester, since 1994. He will publish the results in 2019, when he will have a unique 25 year time series, because, guess what, this population is not behaving like what is described in the textbooks, with these wonderful and perfect life cycles. Seaweeds do a lot of “funny things”, as you can read on his website (<http://www2.unb.ca/chopinlab/S...S...S/index.html>)!

October 21 - Day 5

Rainy day... great to be inside! We spent the morning working in groups to be sure that they are on the right track for their presentations on October 31. Sweating over exam booklets in the afternoon.



October 31 - Day 6

Final day of the seaweed component of the Marine Semester.

Halloween day, but we are serious... the students are giving their 25 minutes presentations: molecular data and species concepts in algae; genetics of seaweeds; forms and functions in seaweeds; seaweeds and biofuels: myths and reality; seaweeds, climate changes and ocean acidification. Only two costumes: my teaching assistant, Krystal, is Dubble Bubble and Alexis is Harley Quinn (Daddy's Little Monster)!



West and east coast CIMTAN teams conduct public opinion surveys on aquaculture and IMTA

As the CIMTAN initiative comes to a close, one of the last research studies was undertaken over last summer to explore current public opinion and knowledge of aquaculture in Canada. **Mark Flaherty**, of the University of Victoria organized a public survey to explore consumer preferences and perceptions of finfish, shellfish, seaweeds, and the IMTA approach to aquaculture. He was specifically interested in differences between the east and west coast of Canada, and survey teams traveled throughout small coastal communities (populations of less than 5,000) in the Maritimes provinces (New Brunswick, Nova Scotia and Prince Edward Island) and on Vancouver Island (British Columbia).



Erin Latham

The survey teams were **Kurt Simmons** and **Breanna Moore** in the east, and **Nick Sherrington** and **Erin Latham** in the west. Kurt is a CIMTAN MSc student who researches the quantification of water clearance, ingestion, and egestion rates of orange-footed sea cucumbers. This was done to assess the performance of sea cucumbers as a potential benthic organic extractive species in IMTA systems. Breanna is a high school teacher specializing in at-risk youth in Charlotte County, New Brunswick. Nick is a former CIMTAN MSc student who researched the cultivation of the green alga *Ulva* as part of an IMTA system, but took a break from his permaculture research and business development to do the surveys. Erin is a CIMTAN PhD candidate who is close to completing her PhD studies working with First Nations and understanding their specific interests in the management and development of aquaculture, including the role of IMTA in future community development.



Impressions from the field:

Nick and Erin: “Being very familiar with coastal communities on Vancouver Island, we had some idea of peoples’ perceptions about aquaculture, but, admittedly, we did not know how people would respond when asked to participate in a survey. Luckily, people were very interested in the topic. We talked to folks who had spent their lives in these communities, many of them having stayed despite the down-turn in traditional resource industries and despite their kids having left home. Many people, young and old, have become small business owners. When we first asked about aquaculture, sometimes it took a bit of conversation to warm people up to talking about their opinions, but once we mentioned fish, shellfish and seaweeds, they realized that they had a lot to say. For some, the term ‘aquaculture’ was unfamiliar but the terms ‘salmon farming’ or ‘oyster farming’ triggered a response. We realized that even with all the careful and deliberate planning of survey design, it was impossible to know exactly how people might respond and interpret our intentions.”



Nick Sherrington



Kurt Simmons

Kurt and Breanna: “We had a similar experience to Erin and Nick on the east coast. We requested interviews at random, and individuals ranged from casual passerby’s with little knowledge of aquaculture, to fishermen who typically have moderate exposure to aquaculture, and then to industry and community decision-makers. Not to mention two mayors, who were keen to give their input! Despite initial hesitancy, people were often all-too-happy to share their thoughts and opinions... including their stories, family histories, and just whatever else came to mind (as Maritimers, this is all too familiar)! Kurt found it interesting that aquaculture was often not an issue many people spent time thinking about, particularly those outside of Charlotte County, New Brunswick, the location where the majority of aquaculture activity occurs on the east coast. He suspected a relation between how much a person is familiar with aquaculture and what their opinion of it is. The diversity of opinion was, however, surprisingly rich across coastal communities in New Brunswick, Nova Scotia and Prince Edward Island.”

Both teams were interested in the public response to IMTA. They showed pictures of the IMTA model to people during the survey, and then asked questions about their initial thoughts. The response was generally positive, and most saw IMTA as an improvement to the current industry practices. However, with cautious optimism, many people also felt they needed more qualified information on IMTA before endorsing it further. For example, they had interesting responses to the question “Would you be willing to pay more for IMTA products?”. A few people were quick to say “IMTA should be cheaper!”, identifying that since IMTA appears to be a more efficient system with more products to sell, therefore more profits and a cheaper product to produce, it should transfer to the consumer via cost savings. In another example, some respondents saw the future industrialization and commercialization of IMTA



as a problem, and wished instead to see the whole aquaculture industry, including IMTA, become smaller-scale and locally owned. After encountering a lot of opposition to finfish aquaculture, and sometimes aquaculture in general, on the west coast of Canada, Nick thought that, by just provoking an 'aquaculture conversation' and asking people questions that caused them to think about the industry more holistically, it seemed to encourage a more positive outlook to its future goals of development.

As scientists encounter the boundaries of technical research and development, public opinion surveys provide a valuable tool to assess the palpability of such technologies in the current social political climate. These surveys from the west and east coasts of Canada demonstrate significant differences not only in opinions and awareness of aquaculture, but a difference in population demographics that may be strongly correlated to people's opinions and experiences of aquaculture. For CIMTAN, these surveys situate the rural context for new IMTA development, and they suggest that IMTA may offer a new direction in response to society's appetite for change in the industry. The survey teams found that talking to people about seafood and fisheries and aquaculture, the IMTA conversation flowed naturally.



Breanna Moore

After having talked to almost 700 people collectively from across small communities on the east and west coasts of Canada, our perception is that IMTA is very adaptable to different people's ideas and values and to how they define sustainable seafood production. These surveys collected a tremendous amount of information that should soon lead to a comprehensive publication.

Citation of the week in *Le Télégramme* (French newspaper) on Monday, October 3, 2016:
"Il faut rire avant d'être heureux, de peur de mourir sans avoir ri" ("We must laugh before being happy, for fear of dying without having laughed").



Jean de La Bruyère (1645-1696)
French philosopher and moralist