Research Center for Marine Biology,
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Research Center for Marine Biology,

Graduate School of Life Sciences, Tohoku University

History

Joint Usage/Education Center

1924	The Marine Biological Station of Asamushi, Faculty of Science, Tohoku Imperial University was established accompanied with an aquarium.
1984	The aquarium was closed.
1986–87	The station's facilities were renovated.
2004	Tohoku University was corporatized. The station was renamed Research Center for Marine Biology.
2005	The center was reassigned to Graduate School of Life Sciences.
2011–2016	The center was certified as MEXT Joint Usage/Education Center for Promoting Marine Biology Education in Tohoku.
2016–2021	The center was certified as MEXT Joint Usage/Education Center for Promoting Multidimensional Global Education.
2021–	The center was certified as MEXT Joint Usage/Education Center for Developing Future-generation Marine Human Resources.

Influenced by both warm and cold currents, the environment around the center is rich in flora and fauna. Taking advantage of this blessed environment, the center has been carrying out high quality research on the life history, development, and evolution of diverse marine life. Based on the achieved state-of-art knowledge, the center has been engaging in marine biology education for students worldwide.

The center's educational activities since 1924 are highly regarded and from 2011, the center is certified as one of the Joint Usage/Education Centers for Marine Biology by MEXT. Through this educational project, the center accepts collaborations for research and education from universities and institutions, designs Mutsu Bay-unique marine biology education programs, nurtures global human resources by providing students with opportunities to learn from and learn together with people from different nations, and promotes science education in Tohoku district cooperating with universities/faculties of education.

In addition to these activities, the center aims to design new educational programs using marine life that would influence various fields not limited to biology and promote collaborations with those fields and marine biology. The center also places emphasis on training the next generation of professional marine biologists through international research projects.

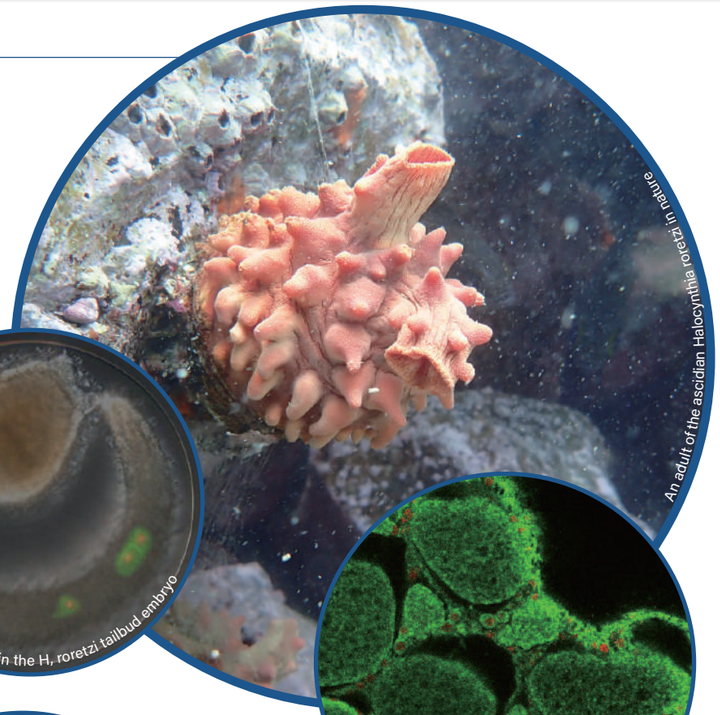
Research

The founding director Prof. Shinkishi Hatai always said to his students, "It is very interesting. Go ahead and try it." In such an inspiring atmosphere, successive members of the center have engaged in a wide spectrum of research from microscopic to macroscopic scales. This atmosphere and effort have been producing new insights into marine biology that lead the field and sophisticate the center's educational activities.

Gaku Kumano (Director & Professor)

Developmental Biology

During animal development, single-celled fertilized eggs develop into complex adult forms through generation of varieties of cell types and tissues, which eventually turn into shapes for their specific functions. We are interested in understanding these developmental processes and their evolutionary aspects. Specifically, we are interested in germline development, mechanisms for which are known to be diversified among different animals despite the fact that germline development itself is commonly essential, and tissue morphogenesis, which create such diversified body shapes among different marine organisms. For the last decade, we have been using marine animals found around Asamushi, such as ascidians, larvaceans, and jellyfish to elucidate mechanisms of these two developmental processes.


An adult of the ascidian Halocynthia roretzi in nature

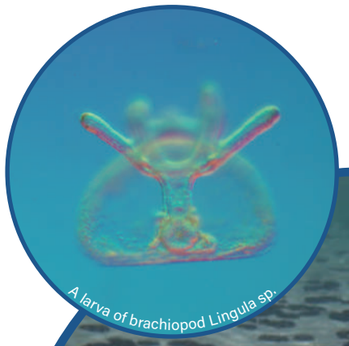
Primordial germ cells in the H. roretzi tailbud embryo

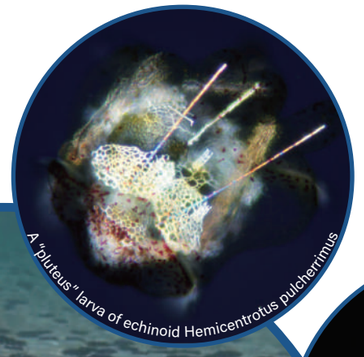
Germ cells in the jellyfish Cladonema pacificum

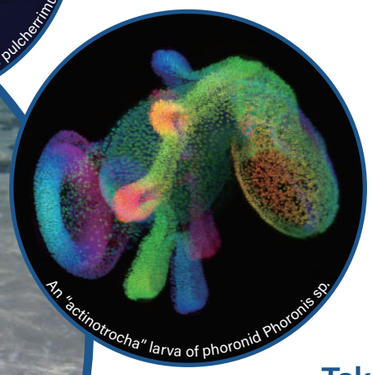
Michio Kondo (Professor; concurrent)

Theory and empirical studies about structure and function of complex ecological systems

Ecosystem is a huge, complex system, dynamics of which is driven by interactions between multiple biotic and abiotic factors. We aims to discover the common principle behind ecological phenomena by using diverse approach including eDNA monitoring, theoretical modeling and statistical analysis of ecological big data.


A larva of brachiopod Lingula sp.


A "pluteus" larva of echinoid Hemicentrotus pulcherrimus


An "actinotrocha" larva of phoronid Phoronis sp.

Sand dollars Scaphechinus mirabilis on the sandy bottom

Takuya Minokawa (Associate professor)

Evolutionary developmental biology : evolution of ontogenic mechanisms

There are many marine invertebrates that undergo "indirect development," an ontogenic process consisting of adult and larval stages. Larvae and adults are different in body sizes, structures, and lifestyles. A process called "metamorphosis" is inserted between larval and adult stages. Although metamorphosis is not well understood, it is regarded as important from the perspective of both ontogeny and phylogeny. We study larval morphogenesis, adult rudiment formation, and metamorphosis from a developmental biological perspective, aiming at a deeper understanding of "indirect development" and "metamorphosis". We focus on various marine invertebrates such as echinoderms, phoronids, and brachiopods, and study their morphological changes from larvae to adults.

Aiko Iwasaki (Assistant professor)

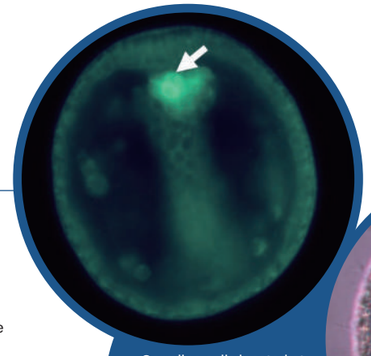
Population/community ecology: ecological impact of large infrequent disturbances

Disturbance is an event that disrupts the structure of an ecosystem, community, or population and change the availability of resources. Although small, frequent disturbances have been recognized as an important factor which determines species distributions and diversity patterns, little is known about how catastrophic disturbances which occurs once in decades or centuries such as mega-earthquakes or extreme climatic events affect the ecosystem structure. The aim of my research is to reveal the ecological role of large, infrequent disturbances by conducting field work and data analysis broadly targeting various species and disturbances. I have mainly worked on evaluating the impact of the 2011 off the Pacific coast of Tohoku Earthquake on the rocky intertidal community and the community's recovery process.

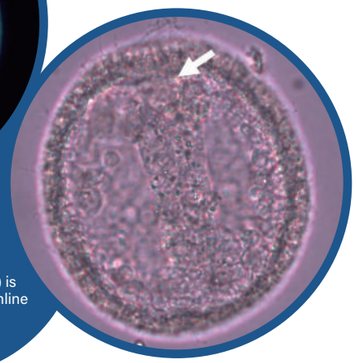
Shumpei Morita (Assistant professor)

Germ cell biology: The mechanism of germline regeneration

Sexually reproducing multicellular organisms consist of two cell lineages, germline cells and somatic cells. The germline cells are segregated from somatic cells, and eventually develop into eggs or sperm to transmit genetic information to the next generation. If the germline cells do not develop, or are removed, the animal is sterile. Loss of the germline results in sterility, but remarkably, some animals have an intrinsic ability to regenerate new germline cells from the somatic cells. The best resolution in this phenomenon is in the sea squirt, *Ciona robusta*. How does a somatic cell that is normally destined for a body part developmentally convert to become the new germline cell? Our project aim to reveal the mechanism of germline regeneration.


Germline cells located at the tip of invaginating midgut (white arrow).

Vasa protein (green) is enriched in the germline cells.



Education

The flora and fauna of Mutsu Bay is a mixture of marine organisms from the warm current (Tsushima current) and cold current (Oyashio current). Building on the unique flora and fauna, the center provides lectures and practical/field courses on various fields such as molecular cell biology, developmental biology, taxonomy, phylogeny, and ecology. Not only does the center provide courses open to Tohoku University students, the center open courses for university students across Japan and across the globe, and also hosts courses run by other universities. Further, we also host and instruct courses for elementary schools, junior high schools, and high schools. Through these activities, we aim to nuture the next generation of marine human resources.

Courses for Faculty of Science, Tohoku University

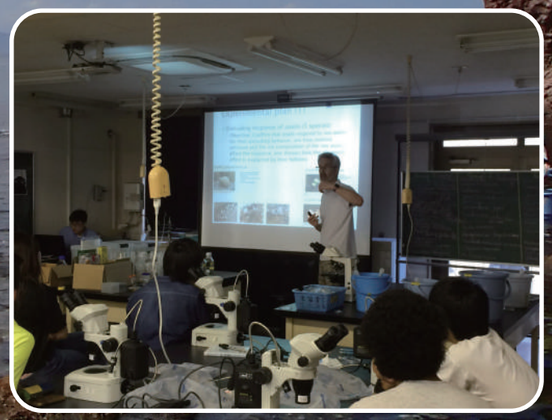
Several courses are held for students belonging to the Faculty of Science, Tohoku University to study developmental biology and ecology using marine organisms.

Open Marine Biology Courses

Courses are held in spring (developmental biology) and summer (ecology) open to university students across Japan.

Interactive Short Course in Marine Biology

This course is for Japanese and international students studying in Japan. Group work projects enhance the international exchange among participants.

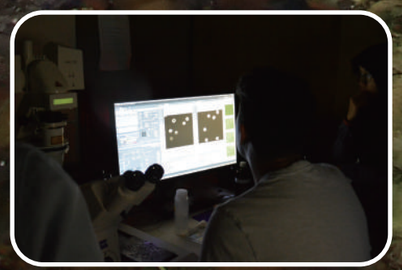


Exchange with researchers from abroad

Visiting researchers from abroad help the center's educational activities. This photo shows Professor emeritus Dr. C. Nielsen (University of Copenhagen), who visited the center to study brachiopod development, and Tohoku University students joining his research.

Shinkishi Hatai International Marine Biology Course

SHIMBC is held once in two years inviting internationally distinguished researchers from aboard as instructors (the course content depends on the instructors). This course is open to university students across the globe and previous participants came from countries in Asia (including Japan) and Europe.



Courses for external universities

The center hosts courses run by universities from Tohoku and Kanto districts.

General Education

The center instructs marine biology courses for elementary schools, junior high schools, and high schools.

User Guide

The center can be used for purposes such as

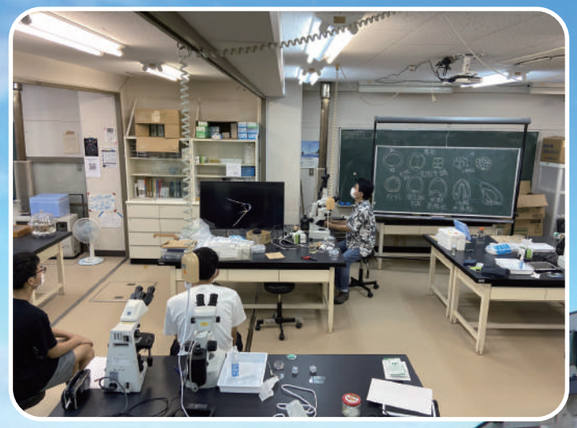
・holding and participating in marine biology courses and seminars

・research activities of students and researchers

・collecting materials for research and education

Courses and Research

The center's teaching laboratory could be used for a broad range of teaching and research. It is equipped with seawater tanks and sinks and compound microscopes and dissecting microscopes are available for each course participant.



Seminars and Conferences

Equipped with a video projector and screen and also internet connection via WiFi, the center's teaching laboratory and conference room are suitable for holding seminars and conferences.

Dormitory

The center's dormitory has western-style rooms (left), Japanese-style rooms, a barrier-free room (right), a cafeteria, shower rooms, and toilets. Internet is available via WiFi.

Guesthouse for long-term visitors

For long-term stay of researchers, three rooms each with a kitchen, bath, and toilet are available.

Meals

Lunch and dinner are served upon request (reservation required).

SCUBA Diving

With prior approval from the center, visitors may conduct surveys by SCUBA diving.

Research Vessel

The center's research vessel Utou III is available for courses and research purposes such as collecting benthos (dredging) and plankton (plankton net).

Supplying Biological Materials

The center supplies biological materials such as tunicates, sea stars, and sea urchins for research and educational purposes. Every year, the center sends thousands of individuals to universities, research institutes, and high schools across Japan.

Digital Resources

The center provides online resources such as a photograph-rich database of organisms that are found around the center, the full-text of the center's bulletin issued from the 1940s to the 1990s, and a series of research articles investigating the flora and fauna of Mutsu Bay. Further, various educational videos created by the center staff are available on-site to support courses.

Asamushi Biological Archives

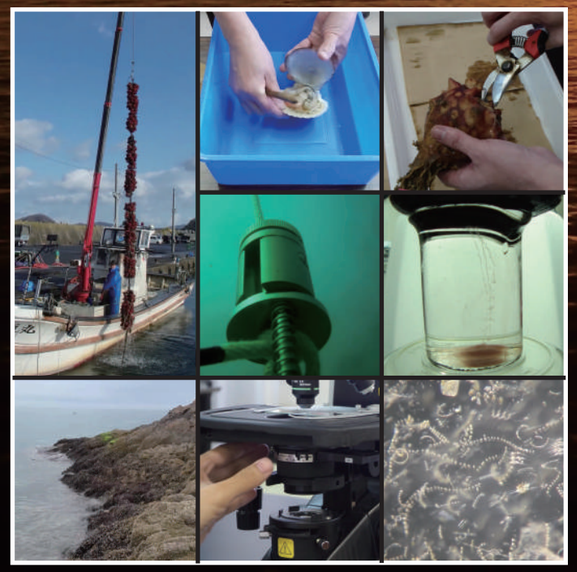
This online database provides beautiful photos of organisms found around the center. The database covers almost all animal phyla found from the marine environment and it is used during courses to aid identification of organisms. The list of species is growing every year, now surpassing 300 species.

Open Access Documents

Documents related to the center such as *The Bulletin of the Marine Biological Station of Asamushi* and a series of research articles entitled *Report of the Biological Survey of Mutsu Bay* are available from the Tohoku University Repository and the center website.

Educational Videos

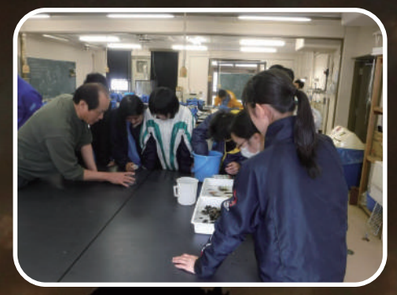
More than a dozen videos created by the center staff are available at the center to aid courses. These videos demonstrate the methods to handle animals (e.g. how to collect animals and their sperms and eggs), instruct the handling of instruments (e.g. how to use a microscope), and also support other occasions during courses at the center.



Community Involvement

As a member of the community, the center provides opportunities for people of all ages to learn about the marine life. Below are some examples of the center's previous activities.

The center staff instructed high school students as a part of the Exploring-Germination-and-Growth program for young Scientists.



The center staff instructed junior high school students.

The center cooperated with an academic society and an aquarium to provide an opportunity for junior high school and high school students to present their research.

The center cooperated with a local TV station.

The center held a lifelong learning course.

The center cooperated in an environmental conservation activity.

Access

From Asamushi-Onsen Station

20 min-walk following the map (right).

Shin-Aomori Station to Asamushi-Onsen Station

Shin-Aomori Station - (JR Ou Line; 6 min.) - Aomori Station

- (Aoimori Railway; 20 min.) - Asamushi-Onsen Station

Aomori Airport to Aomori Station

Aomori Airport - (JR Bus Tohoku; 35 min.) - Aomori Station