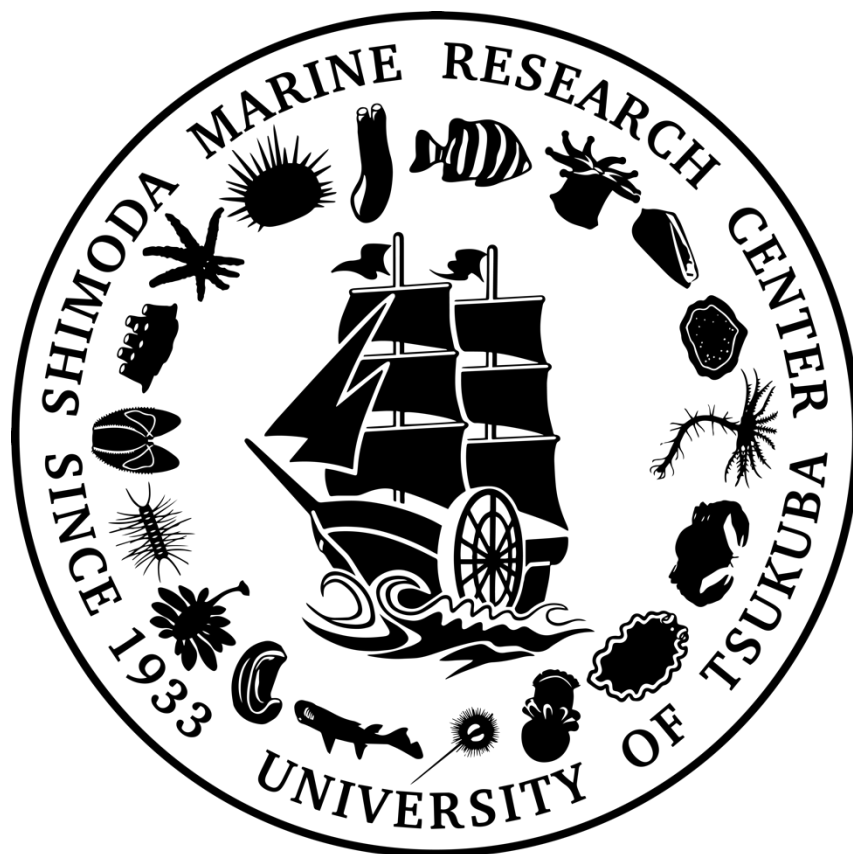


**University of Tsukuba
Shimoda Marine Research Center
Annual Report**

2022



March 2023

Overview of our activities

It has been three years since the emergence of the new coronavirus, and I feel that 2022 has been a year in which activities to restore normalcy have been promoted, albeit gradually. In relation to our activities, we can see from the list of achievements that the weight of activities such as conferences is shifting from online-based to on-site format, and that for the first time in a long time, there are more opportunities to meet researchers in person, listen to their presentations, and discuss them in person. On the other hand, as if aiming for such events, major peaks of infection come several times a year, and each time they are accompanied by a sense of anxiety.

The military invasion of Ukraine by Russia that began at the end of FY2021 had such a strong impact on me that words cannot describe it. The situation that I had thought "no way, no way" became a reality, and I was greatly shaken every time I saw the situation reported in the media day after day. I have learned about past wars and conflicts from various perspectives and the global framework for countering them in my educational program, but I was reminded once again that peace is not permanent and that tireless efforts are needed to maintain it. As of this writing, we are still no closer to an end. Conflicts are also occurring in other parts of the world. I cannot help but hope that these problems will be resolved as soon as possible, and that conflict will be eliminated from the world.

Yasunori Sasakura, Director, Shimoda Marine Research Center

Summary

Overview of the Center

The University of Tsukuba's Shimoda Marine Research Center is a research and education facility for marine biology surrounded by the rich marine environment of the southern Izu Peninsula. The ocean is the source of life on earth and has given birth to biological diversity. The 21st century is the era of life science and the environment. The Shimoda Marine Research Center conducts research and education in basic and advanced sciences related to marine life in order to deepen our understanding of the basic principles of life and the interactions between organisms.

The center has 10 faculty members who conduct research on marine organisms from various perspectives ranging from molecular to ecological, including molecular biology, cell biology, physiology, developmental biology, taxonomy, animal behavior, and ecology. In addition, many researchers from universities and research institutes in Japan and abroad visit and develop collaborative research projects. Marine biology is important not only for those who wish to pursue biology, but also for the development of human resources in a wide range of fields. At the center, students from the University of Tsukuba's Biology Department and Life and Earth Sciences Research Group, as well as other universities in Japan and abroad, participate in fieldcourses on a variety of marine-related topics.

Location and Environmental Conditions

The center is located at the end of Oura Bay, a branch of Shimoda Bay, to the south of Shimoda City center. The bay is immediately surrounded by the Kuroshio Current, but within the bay there is a small portion of an inner bay environment. Because of its location at the interface between the temperate and subtropical zones, kelp forests, which represent the temperate zone, coexist with reef-building corals that inhabit the tropics. In the future, this ecosystem is expected to change drastically due to climate change and other factors.

Marine organisms used at the center include: the tunicates *Ciona intestinalis* and *Styela* sp., the

solitary ascidian *Herdmania momus*, the urchins *Hemicentrotus pulcherrimus*, *Temnopleurus reevesii*, *Heliocidaris crassispina*, *Pseudocentrotus depressus*, and *Diadema setosum*, Comatulida crinoids, nudibranchs, Placazoa, *Xenoturbella* sp., Acoelomorpha, Brachiopoda, flatworms, the comb jelly *Bolinopsis mikado*, corals, the flatfish *Pseudopleuronectes yokohamae*, sole, and *Paralichthys olivaceus*, the wrasse *Thalassoma cupido*, the spiny lobster *Panulirus japonicus*, the conch *Strombus luhuanus*, the kelp *Ecklonia cava*, the brown algae *Mutimo cylindricus*, *Sargassum fusiforme*, and *Petalonia binghamiae*.

Facilities and Equipment

The center contains three research and experimental buildings, a fieldcourse building with aquarium and breeding facilities, a workshop, and an accommodation building. The center is equipped with a range of instruments and equipment for diving and sampling for field research and experiments, various water tanks for conducting indoor experiments, filtered seawater facilities, and equipment for research in molecular biology, biochemistry, and cell biology. Other facilities include a recombinant DNA laboratory, a laboratory for breeding laboratory animals (mice), a transgenic animal breeding room, a seminar room, and a library. Seawater is constantly pumped into tanks from a depth of 3 m to supply the breeding facilities and laboratories. Vessels are available for biological surveys and collections using a range of methods, including dredges, trawls, and plankton nets. Shikine-jima Station, a research facility for the Ocean Acidification Project, is located on Shikine-jima Island (Nii-jima, Tokyo), about 45 km southeast of the Center, where many researchers from Japan and abroad stay to conduct research and analysis.

Diving Equipment and Facilities

Wetsuits, diving cylinders, masks, snorkels, gloves, boots, and fins

Biological Sampling Equipment

Plankton net, Neuston net, Ekman barge and Smith McIntyre sediment grabs, dredges, sled net, trawl net, and Niskin bottles.

Research Equipment

Mass spectrometer TOF-MS, elemental analysis-isotope ratio mass spectrometer, light sheet microscope, super resolution microscope LatticeSIM, DNA sequencer, PCR equipment (including quantitative PCR), microplate reader, various optical microscopes, confocal laser microscope, electron microscope (TEM, SEM), soft x-ray imaging systems, calcium imaging systems, high-speed video cameras, HPLC, CTD sensors, and ultra-low temperature chambers.

Accommodation

For interns, resident graduate students, and visitors, there are two accommodation buildings, the two-story W building and the three-story E building, which can accommodate a total of 85 people. A cafeteria, bathrooms, and lounge are provided, and on weekdays three meals are served (upon request).

List of Buildings and Facilities

Shimoda Marine Research Center Building (Total 3,931m²)

Research Building 1	3-story reinforced concrete building (10 laboratories, 9 experimental rooms, 2 observation and measurement rooms, 2 electron microscope rooms, 1 specimen room, 1 library, 1 seminar room, 1 low-temperature room, 3 dark rooms, 1 printing room, and 5 other rooms).
Research Building 2	2-story reinforced concrete building (3 laboratories, 5 experimental rooms, 1 lecture room, 1 archive storage room, 1 analysis room, 1 dark room)
Research Building 3	2-story reinforced concrete building (4 laboratories, 1 experimental room, 1 collaborative analysis room, 1 collaborative research space, 1 conference/seminar room, 1 measuring equipment room, and 3 other rooms)
Fieldcourse Building	1-story reinforced concrete building (1 large fieldcourse room, 1 indoor mesocosm facility, and 1 indoor breeding room)
Workshop	1-story reinforced concrete building (1 workshop, 1 storage room, 1 workroom, and 1 shower room)
Accommodation	3-story reinforced concrete building (24 Western-style rooms, 3 Japanese-Style rooms, 1 cafeteria, 2 bathrooms, and 1 lounge)
Vessels	Tsukuba II (19t, 612 HP×2, 40-person capacity) Karetta (0.5t, 9.9 HP, 6-person capacity) SMRC (Inflatable boat, 8 HP, 4-person capacity) Oberia (Rowing boat, 2-person capacity)
Seawater facilities	Fresh seawater is constantly pumped from a depth of 3 m to a 56-ton tank located approximately 13 m above sea level, and is supplied non-stop to the indoor and outdoor breeding facilities and laboratories in each research building.

Shikine-jima Station Building (total 149.6m²)

Experimental facilities	1-story building of wood and stone, with a galvanized steel sheet roof. Building The facilities are equipped with a fridge, freezer, drying oven, a microscope, a workbench, a sink, and various other laboratory equipment.
Accommodation	Wooden one-story building with galvanized steel plate roof (2 Western-style rooms, 2 Japanese-style rooms, 1 dining room, and 1 bathroom).
Vessels	Akane (0.5t, 20hp, 7-person capacity).

Staff Members in the Center

Faculty	Director, Professor	笹倉 靖徳 Yasunori SASAKURA	Developmental Genetics
	Professor	稲葉 一男 Kazuo INABA	Cell Biology
	Professor	Jason HALL-SPENCER	Environmental Ecology
	Associate Professor	谷口 俊介 Shunsuke YAGUCHI	Developmental Biology
	Associate Professor	中野 裕昭 Hiroaki NAKANO	Evolutionary embryology
	Assistant Professor	柴 小菊 Kogiku SHIBA	Cell Biology
	Assistant Professor	和田 茂樹 Shigeki WADA	Marine Ecology
	Assistant Professor	Sylvain AGOSTINI	Marine Biology
	Assistant Professor	Ben HARVEY	Environmental Ecology
	Assistant Professor	Lucia PORZIO	Environmental Ecology
Technician		柴田 大輔 Daisuke SHIBATA	
		大植 学 Manabu OOUE	
		小高 友実 Tomomi KODAKA	
		高野 治朗 Jiro TAKANO	
		中村 千華 Chika NAKAMURA	
Researcher		谷口 順子 Junko YAGUCHI	
		北之坊 誠也 Seiya KITANOBO	
		Davide SPATAFORA	

		柴田 あいか Aika SHIBATA	
Part-time	Researcher	笹倉 暁子	
		鈴木 智佳	
Administration	Head	羽子田 誠	
Administration	Administrative assistant	土屋 理恵	
		土屋 富士子	
Part-time	Administrative assistant	George NORTHEN	
Part-time	Cleaning Staff	山田 順子	
		田中 文子	
		秋山 佳子	
		渡邊 恵	
Part-time	Research Technician	佐藤 壽彦	
		大畑 雅江	
		田子内 加代	
		田中 佐貴子	
		金守 美里	
		浅野 美世	
		中尾 菜穂	
		中野 亜子	
		森下 秀子	
		加納 穂澄	
		北之坊 仁美	
		木村 智美	
		古屋 こさと	
		武富 晋一郎	
		土屋 絵里	
JSPS	Postdoctoral Fellow	寺内 菜々	
		香川 理	

Enrolled between 2022.4.1-2023.3.31

Research Activities

1) Research Introduction

Marine Molecular Biology Division

Genetics (Sasakura)

Ascidians are closest living relatives of vertebrates. *Ciona intestinalis* is the model ascidian because of its well-annotated genome information and established methodologies for manipulating genes. Using *Ciona*, our group studies genetic mechanisms underlying development of ascidians. Particularly, we are interested in the mechanisms of metamorphosis, in which *Ciona* dramatically converts its body structure from swimming tadpole larva into sessile, vase-like adult. We developed the methods to modify genomes of *Ciona* by means of transgenic and genome editing technologies. The transgenic and mutant lines established by the methods are useful tools to observe cellular and molecular phenomena during development. We are engaged in the National BioResource Project of *Ciona*, which is purposed to collect, store and provide these useful lines to researchers all over the world. A constructs for providing them to researchers upon request.

Research Themes:

- Developmental genetics of ascidians
- Neurodevelopmental and physiological studies on ascidian metamorphosis mechanisms

Cell Biology (Inaba · Shiba)

Cilia and flagella are important cellular organelles for locomotion and fluid flow in body. The structure of cilia and flagella is well conserved in the process of evolution. We study the structure, function and evolution of cilia and flagella by using marine organisms such as ascidian, sea urchin, fish, and comb jelly. Our research topics cover a wide range of subjects, including fertilization, morphogenesis, locomotion, evolution and ecology of marine unicellular and multicellular organisms.

Research Themes:

- Studies on the structure, function and evolution of eukaryotic flagella and cilia
- Research on sperm motility regulation and adaptation to the fertilization environment
- Genomics and proteomics in marine invertebrates

Developmental Biology (Yaguchi)

The main research goal of our laboratory is understanding the molecular mechanisms of body axis formation and neurogenesis in sea urchin embryos/larvae. We also focus on the function of nervous system in sea urchin larvae.

Research Themes:

- Analysis of the mechanisms of body-axis formation and neurogenesis in early embryos
- Analysis of neural function during early development
- Analysis of the effects of external environmental stimuli such as light and temperature on development

Evolutionary Embryology (Nakano)

There are many extant animals, such as xenacoelomorphs and placozoans, that are evolutionarily important but have not been extensively studied. In our group, we perform morphological, ecological, and developmental research on these 'non-model organisms' with the aim of gaining new insights on the origins, evolution, and diversity of bilaterians and metazoans.

Research Themes:

- Studies on evolution and diversity of metazoans using flatworms, xenacoelomorphs and placozoans
- Zoological and natural history research on marine invertebrates
- Evolutionary and phylogenetic studies of body color diversity in sea slugs
- Evolutionary developmental studies on brachiopods, including analysis of their shell proteins

Marine Ecology Division

Environmental Ecology (Hall-Spencer and Porzio)

As well as warming the oceans, CO₂ released due to human activities is also causing ocean acidification, which alters the fundamental chemical balance of surface waters (e.g. reducing the amount of carbonate). Our laboratory uses natural analogues of ocean acidification (CO₂ seep) in Japan and Europe alongside manipulative experiments to understand the eco-physiological processes involved in the response of winner and loser species to ocean acidification and warming in Japan and on coastal ecosystems worldwide. We mostly focus on marine macrophytes as they are key organisms for the structure and functioning of coastal ecosystems. The aim will be to improve the knowledge on the impacts of combined ocean acidification and global warming on the fate of their distribution and the associated ecosystem services.

Research Themes:

- Diversity of macrophytes in coastal systems
- Community structure and functioning under ocean acidification
- Eco-physiological and biological response of macroalgae to global warming and acidification

Environmental Ecology (Harvey)

We seek to understand how changes in environmental conditions (focussing on ocean acidification, ocean warming, and marine heatwaves) will change our oceans. Our research is multidisciplinary, combining field-based (subtidal and intertidal surveys and experiments), aquarium-based manipulative experiments, and desk-based (environmental modelling, statistical modelling, meta-analyses) approaches. Our research covers a wide range of subjects within the context of climate change, including species ecophysiology, biomineralisation, population genetics, biodiversity and community meta-barcoding, community-level structuring processes and interactions, regime shifts and stability, and ecosystem functioning, goods and services. Taken together, this will allow us to better understand the impacts of global climate change on coastal ecosystems worldwide.

Research Themes:

- Role of ocean acidification and warming on biodiversity, community structuring, and stability
- Impacts of ocean acidification and warming on calcification, physiology, and functioning
- Impacts of marine heatwaves on biogeographic distribution, range shifts, and aquaculture

Material Cycling (Wada)

Marine organisms and their ambient environments have various interactions. Analysis of the interactions will allow us to understand the principle of mechanisms of marine ecosystems. In addition, we can contribute to predict the progress of global climate change such as ocean acidification.

Research Themes:

- Assessment of Blue Carbon in Seagrass beds
- Impacts of ocean acidification on coastal ecosystems
- Analysis of marine snow dynamics

Marine Complex Biology Division

Environmental Ecophysiology (Agostini)

We study the ecophysiology of marine organisms with a special focus on corals and the impact of anthropogenic stressors on their community. Ocean warming is driving the degradation of coral reefs in the tropic and could allow the increase of coral abundance in warm-temperate areas. However, ocean warming comes in combination with ocean acidification which is limiting the growth of corals on a global scale. There are many dangers beyond climate change and ocean acidification. Due to the lack of data on microplastic pollution, which has been attracting attention in recent years, it is not yet possible to assess what kind of impact it has on marine ecosystems and corals. We also study the impact of other anthropogenic stressors on marine ecosystems in general and thrive to understand the ecology and future trajectories of these ecosystems through the study of the physiology and ecology combining field and laboratory studies. To increase awareness of the different environmental problems that threatens marine ecosystems we also conduct various social outreach activities.

Research Themes:

- The effects of anthropogenic stressors on marine ecosystems
- Eco-physiology of scleractinian corals and marine organisms
- Tropicalization of marine ecosystems under ocean acidification and warming
- Evaluation of the impact of microplastic pollution

2) Research Supervision of Students at the Center

University of Tsukuba, Life and Environmental Sciences, Biology

- | | |
|-------------------------------------|---|
| Undergraduate, 4 th Year | マガキガイ体内受精における異型精子の役割に関する研究 |
| Undergraduate, 4 th Year | 海洋酸性化と異なる光強度がサンゴ暖温帯サンゴのエンタクミドリイシに与える影響
Effects of ocean acidification under different light availability on the warm temperate coral <i>Acropora solitaryensis</i> |

University of Tsukuba, Faculty of Science and Technology, School of Science and Technology, Information and Life Sciences, Life and Earth Sciences, Biology Degree Program

- | | |
|-------------------------------|--|
| Research Student | ホヤの変態制御機構に関する研究 |
| Research Student | ウニ幼生における神経形成の分子メカニズム解析 |
| Masters, 1 st Year | カブトクラゲ櫛板の隔小板関連タンパク質の探索 |
| Masters, 1 st Year | ホヤの変態制御機構に関する研究 |
| Masters, 1 st Year | 海藻藻場の溶存態有機物の生産 |
| Masters, 1 st Year | 日本の沿岸におけるマイクロプラスチックの分布およびフラックス
Distribution and fluxes of microplastics in Japanese coastal areas |
| Masters, 2 nd Year | ウニ胚原腸形成を司る新規メカニズムの解析 |
| Masters, 2 nd Year | 海藻由来有機物の微生物分解の指標探索 |
| Masters, 2 nd Year | 熱ストレス下における造礁サンゴの日周期的な光合成活性と防御機能としての光阻害 Diurnal photosynthetic activities and the protective role of photoinhibition in hermatypic corals under heat stress |
| Masters, 2 nd Year | 潮間帯に生息するクモハゼは海洋酸性化に対して耐性を示すが、間接効果による負の影響を受ける The intertidal goby <i>Bathygobius fuscus</i> show some tolerance to ocean acidification but is still affected through indirect effects |

Masters, 2 nd Year	<p>群体の形態に基づくハマサンゴ属、ハナヤサイサンゴ属およびアナサンゴモドキ属における遺伝的系統の推定</p> <p>Predicting genetic lineages of the reef-building corals <i>Porites</i> spp., <i>Pocillopora</i> spp. and <i>Millepora</i> spp. based on colony morphology</p>
PhD, 2 nd Year	マリンスノーの強度と生物ポンプの解析
PhD, 2 nd Year	ウミウシの体色多様性進化と系統学的研究
PhD, 2 nd Year	<p>海洋温暖化・酸性化がサンゴ・藻類の相互作用に及ぼす影響</p> <p>Coral-algae interactions under ocean acidification and warming</p>

3) Publications

Marine Molecular Biology Division

Genetics

Khalturin K, Shunatova N, Shchenkov S, Sasakura Y, Kawamitsu M, Satoh N. Polyzoa is back: The effect of complete gene sets on the placement of Ectoprocta and Entoprocta. **Science Advances**, 8(26):eabo4400. July 2022.

Sakamoto A, Hozumi A, Shiraishi A, Satake H, Horie T, Sasakura Y. The TRP channel PKD2 is involved in sensing the mechanical stimulus of adhesion for initiating metamorphosis in the chordate *Ciona*. **Development, Growth & Differentiation**. 64(7):395–408. September 2022.

Sasakura Y, Horie T. Improved Genome Editing in the Ascidian *Ciona* with CRISPR/Cas9 and TALEN. In: Hatada I, editor. **Genome Editing in Animals**. New York, NY: Springer US. p. 375–88. (Methods in Molecular Biology; vol. 2637). February 2023.

Yamagishi M, Huang T, Hozumi A, Onuma TA, Sasakura Y, Ogasawara M. Differentiation of endostyle cells by Nkx2-1 and FoxE in the ascidian *Ciona intestinalis* type A: insights into shared gene regulation in glandular- and thyroid-equivalent elements of the chordate endostyle. **Cell and Tissue Research** 390:189–205. September 2022.

Yamakawa S, Hayashi Y, Kako K, Sasakura Y, Morino Y, Wada H. Mechanism underlying retinoic acid-dependent metamorphosis in the starfish. **Developmental Biology**. 492:119–25. December 2022.

Cell Biology

Hayakawa E, Guzman C, Horiguchi O, Kawano C, Shiraishi A, Mohri K, et al. Mass spectrometry of short peptides reveals common features of metazoan peptidergic neurons. **Nature Ecology & Evolution**. 6(10):1438–48. August 2022.

Ito T, Morita M, Okuno S, Inaba K, Shiba K, Munehara H, et al. Fertilization modes and the evolution of sperm characteristics in marine fishes: Paired comparisons of externally and internally fertilizing species. **Ecology and Evolution**. 12(12): e9562. December 2022.

Jokura K, Sato Y, Shiba K, Inaba K. Two distinct compartments of a ctenophore comb plate provide structural and functional integrity for the motility of giant multicilia. **Current Biology**. 32(23): 5144-5152. October 2022.

Sensui N, Itoh Y, Okura N, Shiba K, Baba SA, Inaba K, et al. Spawning-induced pH increase activates sperm attraction and fertilization abilities in eggs of the Ascidian, *Phallusia philippinensis* and *Ciona*

- intestinalis*. **International Journal of Molecular Sciences**. 24(3):2666. January 2023.
- Shiba K, Baba SA, Fujiwara E, Inaba K. Calaxin is required for asymmetric bend initiation and propagation in sperm flagella. **Frontiers in Cell and Developmental Biology**. 11:1136404. March 2023.
- Shibata D, Morita M, Sato Y, Shiba K, Kitanobo S, Yokoya R, et al. Axonemal growth and alignment during paraspermatogenesis in the marine gastropod *Strombus luhuanus*. **Frontiers in Cell and Developmental Biology**. 10:905748. June 2022.
- Sugiura K, Shiba K, Inaba K, Matsumoto M. Morphological differences in tardigrade spermatozoa induce variation in gamete motility. **BMC Zoology**. 7(1):8. December 2022.
- Hazraty-Kari S, Tavakoli-Kolour P, Kitanobo S, Nakamura T, Morita M. Adaptations by the coral *Acropora tenuis* confer resilience to future thermal stress. *Communications Biology* 14, 5(1):1371. December 2022.
- Ito S, Yamazaki D, Kameda Y, Kagawa O, Ye B, Saito T, Kimura K, Chiba S, Hirano T. Taxonomic insights and evolutionary history in East Asian terrestrial slugs of the genus *Meghimatium*. *Molecular Phylogenetics and Evolution*. 2023 May 1, 182:107730.
- Chiba M, Hirano T, Yamazaki D, Ye B, Ito S, Kagawa O, Endo K, Nishida S, Hara S, Aratake K, Chiba S. The mutual history of Schlegel's Japanese gecko (Reptilia: Squamata: Gekkonidae) and humans inscribed in genes and ancient literature. *PNAS Nexus*. 2022 Nov, 1, (5):pgac245.
- Kudo K, Kagawa O, Ito S, Wada S, Nishi H, Shariar SM, Yamazaki D, Hirano T, Chiba S. Species identification and invasion pathways of an introduced snail *Macrochlamys* sp. Japan. *BiolInvasions Records*. 2022 Sep (4): 839–854

Developmental Biology

- Kinjo S, Kiyomoto M, Suzuki H, Yamamoto T, Ikeo K & Yaguchi S. TrBase: A genome and transcriptome database of *Temnopleurus reevesii*. **Development, Growth & Differentiation**.64(4):210-218. May 2022.

Evolutionary Embryology

- Kushida Y, Imahara Y, Wee HB, Fernandez-Silva I, Fromont J, Gomez O, et al. Exploring the trends of adaptation and evolution of sclerites with regards to habitat depth in sea pens. **PeerJ**. 10:e13929. September 2022.
- Nakano H, Nakano A, Maeno A, Thorndyke MC. Induced spawning with gamete release from body ruptures during reproduction of *Xenoturbella bocki*. *Communications Biology*. 6(1):172. February 2023.

Nakano H. Dawn of Placozoan Phylogenetic Taxonomy. In: 100th Anniversary Publication Committee, Seto Marine Biological Laboratory, Kyoto University, editors. **Marine Invertebrate Biodiversity**. Kyoto: Kyoto University Academic Press; 2022. p. 28–38.

Marine Ecology Division

Environmental Ecology

- Heitzman JM, Caputo N, Yang SY, Harvey BP, Agostini S. Recurrent disease outbreak in a warm temperate marginal coral community. **Marine Pollution Bulletin**. 182:113954. September 2022.
- Hudson CJ, Agostini S, Wada S, Hall-Spencer JM, Connell SD, Harvey BP. Ocean acidification increases the impact of typhoons on algal communities. **Science of The Total Environment**. 865:161269. March 2023.
- Kerfahi D, Harvey BP, Kim H, Yang Y, Adams JM, Hall-Spencer JM. Whole community and functional gene changes of biofilms on marine plastic debris in response to ocean acidification. **Microbial Ecology**. 85(4):1202–14. April 2022.
- Seto M, Harvey BP, Wada S, Agostini S. Potential ecosystem regime shift resulting from elevated CO₂ and inhibition of macroalgal recruitment by turf algae. **Theoretical Ecology**. 16:1–12. January 2023.

Materials Cycling

- Hudson CJ, Agostini S, Wada S, Hall-Spencer JM, Connell SD, Harvey BP. Ocean acidification increases the impact of typhoons on algal communities. **Science of The Total Environment**. 865:161269. March 2023.
- Seto M, Harvey BP, Wada S, Agostini S. Potential ecosystem regime shift resulting from elevated CO₂ and inhibition of macroalgal recruitment by turf algae. **Theoretical Ecology**. 16:1–12. January 2023.
- Wada S, Satoh Y, Hama T. Massive loss and microbial decomposition in reproductive biomass of *Zostera marina*. **Estuarine, Coastal and Shelf Science**. 275:107986. September 2022.

Marine Complex Biology Division

Environmental Ecophysiology

- Heitzman JM, Caputo N, Yang SY, Harvey BP, Agostini S. Recurrent disease outbreak in a warm temperate marginal coral community. **Marine Pollution Bulletin**. 182:113954. September 2022.
- Hudson CJ, Agostini S, Wada S, Hall-Spencer JM, Connell SD, Harvey BP. Ocean acidification increases the impact of typhoons on algal communities. **Science of The Total Environment**. 865:161269. March 2023.
- Seto M, Harvey BP, Wada S, Agostini S. Potential ecosystem regime shift resulting from elevated CO₂ and inhibition of macroalgal recruitment by turf algae. **Theoretical Ecology**. 16:1–12. January 2023.

Technical Staff

高野治朗, Agostini S, Ramtahal J, 濱野章一, 桂川英徳, 鷺尾正彦, 阿部広和, 小木曾正造, 渡部雪菜
下谷豊和, パトゥイエ 由美子, Tara-JAMBIO マイクロプラスチック共同調査(東日本・北陸編), *臨
海・臨湖*, 39: 1-6. November 2022.

Shibata D, Morita M, Sato Y, Shiba K, Kitanobo S, Yokoya R, et al. Axonemal growth and alignment
during paraspermatogenesis in the marine gastropod *Strombus luhuanus*. **Frontiers in Cell and
Developmental Biology**. 10:905748. June 2022.

4) Conference Presentations and Invited Lectures

Marine Molecular Biology Division

Genetics

【International Conference】 ○Yasunori Sasakura, Akiko Hozumi, Arata Onodera, Nozomu M.

Totsuka, Honoo Satake, Kohji Hotta, Takeo Horie, G-protein signaling relay promotes Ciona metamorphosis. 11th Tunicate Meeting, Konan University, Kobe, Hyogo, 2022.07.13

【International Conference】 ○Gabriel Krasovec, Akiko Hozumi, Tomoyuki Yoshida, Takayuki Obita,

Mayuko Hamada, Akira Shiraishi, Honoo Satake, Takeo Horie, Hisashi Mori, Yasunori Sasakura, D-serine controls epidermal vesicle release via NMDA receptor allowing tissue migration during the metamorphosis of Ciona. 11th Tunicate Meeting, Konan University, Kobe, Hyogo, 2022.07.13

【Oral Presentation】 小野寺新、保住暁子、戸塚望、佐竹炎、濱田麻友子、堀江健生、堀田耕司、

○笹倉靖徳, ホヤの固着依存的な変態開始を司る G タンパク質シグナル経路, 第 45 回日本分子生物学会, 幕張メッセ, 千葉県千葉市, 2022.12.1

【Poster Presentation】 ○小野寺新、保住暁子、戸塚望、佐竹炎、濱田麻友子、堀江健生、堀田耕

司、笹倉靖徳, ホヤの固着依存的な変態開始を司る G タンパク質シグナル経路, 第 45 回日本分子生物学会, 幕張メッセ, 千葉県千葉市, 2022.12.1

【Poster Presentation】 ○笹倉靖徳、佐藤ゆたか、吉田学, NBRP カタユウレイボヤ, 第 45 回日本

分子生物学会, 幕張メッセ, 千葉県千葉市, 2022.11.30-12.2

Cell Biology

【Invited Lecture】 柴小菊, 精子走化性における遊泳方向制御機構の解析, 日本顕微鏡学会第78回学

術講演会シンポジウム「受精・生殖研究の最前線」, ビッグパレットふくしま, 福島県郡山市, 2022.5.13

【Oral Presentation】 ○柴小菊, 稲葉一男, 3D 遊泳トラッキングシステムによるホヤ精子走化性の

解析, 日本動物学会第93回早稲田大会2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

【Oral Presentation】 柴田 大輔, 守田 昌哉, 佐藤 友, 柴 小菊, 北之坊 誠也, 横屋 稜, ○稲葉

一男, マガキガイ異型精子形成における軸系の形成と配向, 日本動物学会第93回早稲田大会
2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

【Oral Presentation】○岩本 裕之, 城倉 圭, 大岩 和弘, 稲葉 一男, クシクラゲ櫛板の X 線回折像
から繊毛軸系の 3 次元構造を復元する, 日本動物学会第 93 回早稲田大会 2022, 早稲田大学,
東京都早稲田, 2022. 9.8-10

【Oral Presentation】○北之坊 誠也, 古川 真央, 大木 駿, Sanaz Hazraty-Kari, Parviz Tavakoli-Kolour,
Tanya Singh, 守田 昌哉, 交雑するミドリイシ属サンゴ属の 系統解析と遺伝子浸透について,
日本動物学会第 93 回早稲田大会 2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

【Poster Presentation】Kogiku Shiba, Kazuo Inaba, ピエゾ駆動対物レンズを用いたホヤ精子遊泳の
3 次元解析, 3D analysis of ascidian sperm swimming using a piezoelectric Z-scanner
attached to a microscope objective, 第 60 回日本生物物理学会年会, 北海道函館市, 2022.9.28-
30

【Poster Presentation】Hiroyuki Iwamoto, Kei Jokura, Kazuhiro Oiwa, Kazuo Inaba, 真核生物鞭毛・
繊毛軸系構造の X 線回折トモグラフィー: クシクラゲ櫛板の利用, X-ray diffraction-based
computed tomography of axonemal structure of eukaryotic flagella/cilia: Use of Ctenophore
comb plates, 第 60 回日本生物物理学会年会, 北海道函館市, 2022.9.28-30

【Oral Presentation】○柴 小菊, 稲葉 一男, ピエゾ駆動対物レンズを用いたホヤ精子鞭毛運動の 3
次元解析, 第 12 回繊毛研究会, 名古屋市立大学, 愛知県名古屋市, 2022.10.30-11.1

【Poster Presentation】○北之坊誠也, 古川真央, 大木駿, 戸篠祥, Sanaz Hazraty-Kari, Parviz
Tavakoli-Kolour, Tanya Singh, 守田昌哉, 同所的に生息するミドリイシ属サンゴ交雑検出の試
み - Gras-di®解析を用いて -, "An attempt to detect sympatric Acropora coral hybridization
using Gras-di analysis, 日本サンゴ礁学会第 25 回石垣大会, 石垣市市民会館中ホール, 沖縄県
石垣市, 2022.11.11-13

【Oral Presentation】○稲葉一男、城倉圭、佐藤友、小坂実央、柴小菊、クシクラゲ櫛板内で軸系集
合体が波打つための分子基盤, 2023 年生体運動研究合同班会議, 東京大学本郷キャンパス小
柴ホール, 東京都文京区, 2023.1.6-8

【Oral Presentation】○柴田あいか、野間泉、松川将之、高橋文雄、笠原賢洋、共生藻によるミドリ
ゾウリムシ光運動反応制御, 2023 年生体運動研究合同班会議, 東京大学本郷キャンパス小柴
ホール, 東京都文京区, 2023.1.6-8

【Oral Presentation】 ○岩本裕之、稲葉一男、大岩和弘、クシクラゲ櫛板の繊毛打に伴う軸糸構造変化を高速 X 線回折測定で見る, 2023 年生体運動研究合同班会議, 東京大学本郷キャンパス小柴ホール, 東京都文京区, 2023.1.6-8

【International Conference/Oral Presentation】 Kazuo Inaba, Osamu Kutomi, Sayaka Yamaguchi, Seiya Kitanobo, Kogiku Shiba, Katsutoshi Mizuno, Calaxin-mediated regulation of ciliary motility, Cold Spring Harbor Asia Conference on Cilia & Centrosomes, Awaji Yumebutai Conference Center, Awaji, Hyogo, Japan, Feb 28 - Mar 03, 2023

【Invited Lecture】 柴小菊, 海産生物を用いた鞭毛繊毛運動マシナリーの解明, 第一回ジオラマ行動力学・散乱透視学合同シンポジウム「ジオラマ透視学」, 基礎生物学研究所地下1階バイトレミーティングルーム, 愛知県岡崎市, 2023.3.22-23

Developmental Biology

【Invited Lecture】 Shunsuke Yaguchi. Planktonic sea urchin larvae change their swimming direction in response to strong photoirradiation. Developmental Biology of the Sea Urchin XXVI. オンライン 2022.4.5-9

【Invited Lecture】 谷口俊介. WestPac-SUGDB: A genome and transcriptome database of Western Pacific sea urchins. シンポジウム「海産無脊椎動物」日本動物学会大93回大会、早稲田大学、東京 2022. 9.8-10

【Invited Lecture】 Shunsuke Yaguchi. Light regulates larval behaviors of sea urchins. LBDV Special seminar. LBDV, Villefranche-sur-mer, France. 2022.11.10

【Invited Lecture】 Shunsuke Yaguchi. Light regulates larval behaviors of sea urchins. Special seminar. University of Nice, Nice, France. 2022.11.9

Evolutionary Embryology

【Poster Presentation】 ○林牧子、前野哲輝、中野裕昭, イロウミウシ科ウミウシから得られた寄生性扁形動物の一種の分類学的検討, 第91回日本寄生虫学会大会, とちぎプラザ, 北海道帯広市, 2022.5.28-29

【Oral Presentation】 浅井仁、宮澤秀幸、梁瀬隆二、稲葉一男、○中野裕昭, 背面突起を有する無腸動物の一種の分類学的検討, 日本動物学会第93回早稲田大会 2022, 早稲田大学, 東京都早稲

田, 2022. 9.8-10

【Invited Lecture】 中野裕昭, 知られずに生きている海の動物たちの研究, 日本動物学会第 93 回早稲田大会 2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

【Invited Lecture】 ◦埴宗継、中野裕昭, 平板動物のキメラ形成を介した性成熟と多様性の獲得の可能性, 日本動物学会第 93 回早稲田大会 2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

Marine Ecology Division

Environmental Ecology

【Invited Lecture】 Ben P. Harvey. “Rise of the turfs: the simplification of marine ecosystems under ocean acidification”. Newcastle University, UK, 2022.4.26.

【International Conference】 ○Ben P. Harvey, Ro Allen, Sylvain Agostini, Linn J. Hoffmann, Koetsu Kon, Tina C. Summerfield, Shigeki Wada & Jason M. Hall-Spencer ““Feedback mechanisms stabilize degraded turf algal systems at a CO₂ seep site” Oral presentation at the 5th International Symposium on The Ocean In A High CO₂ World, Lima, Peru, 2022.9.15.

【International Conference】 ○Ben Harvey, Sean Connell, Sylvain Agostini, Fabio Badalamenti, Marco Milazzo, Jason Hall-Spencer, Ivan Nagelkerken, Shigeki Wada, Bayden Russell “Functional decline of sea urchins due to ocean acidification can mediate changes in biogenic habitat” Oral presentation at the 23rd International Temperate Reef Symposium, Hobart, Tasmania, Australia, 2023.1.9.

【International Conference】 ○Callum Hudson, Sylvain Agostini, Shigeki Wada, Jason Hall-Spencer, Sean Connell, Ben P. Harvey “Ocean acidification increases the impact of typhoons on algal communities” Oral presentation at the 23rd International Temperate Reef Symposium, Hobart, Tasmania, Australia, 2023.1.10.

Materials Cycling

【Invited Lecture】 和田茂樹, 二酸化炭素の増えた未来の海で生態系の変化を探る, 第7回地中海底工学フォーラム・ZERO, 東京大学生産技術研究所, 東京都目黒区, 2022.4.22

【Invited Lecture】 和田茂樹, 自然の高CO₂海域を利用した付着生物群集・生態系の将来予測, 日本付着生物学会50周年シンポジウム, 東京大学生産技術研究所大気海洋研究所講堂, 千葉県柏

市, 2022.10.6-7

【International Conference】 Shigeki Wada, Yuhi Sato, Selective aggregation with bubbles on sea surface, ISBEC 2023, University of Tsukuba, Tsukuba, Ibaraki, 2023.3.8-9

【Invited Lecture】 和田茂樹, 未来の海を使って生態系の将来を探る, 海洋生物シンポジウム2023, 東京海洋大学白鷹館, 東京都目黒区, 2022.4.22

Marine Complex Biology Division

Environmental Ecophysiology

【Oral Presentation】 ○Guinther Mitusashi, Yuko F. Kitano, Hume Benjamin C. C, Armstrong, Eric, Barbara Porro, Emilie Boissin, Julie Poulain, et al. “Prediction of Genetic Lineages Using Coral Colony Morphology.” Oral presented at the 日本地球惑星科学連合 2022 年大会, online, May 27, 2022.

【International Conference】 ○Guinther Mitusashi, Yuko F. Kitano, Hume Benjamin C. C, Armstrong, Eric, Barbara Porro, Emilie Boissin, Julie Poulain, et al.. “Skeleton Morphometric Analysis of Reef-Building Corals for Taxonomic Identification and Genotype Prediction.” Oral presented at the 15th International Coral Reef Symposium, online, July 3, 2022.

【Oral Presentation】 ○Ramtahal, Jonathan, Kugako Sugimoto, Tara Jambio Consortium, Yumiko Patouillet, and Sylvain Agostini. “TARA-JAMBIO Joint Microplastic Survey: Distribution, Flux and Plastisphere of Microplastics in Japanese Coastal Areas.” Oral presented at the Japan Geoscience Union Meeting 2022, Makuhari Messe, Chiba, Japan, May 22, 2022.

<https://confit.atlas.jp/guide/event/jpgu2022/subject/MIS19-05/advanced>.

【Invited Lecture】 ○Riccardo Rodolfo-Metalpa, Verena Schoepf, Sylvain Agostini, Jean-Pierre Gattuso, Raquel Peixoto, and David Obura. “Quels moyens avons-nous pour ameliorer l’adaptation rapide et la resilience des recifs coraliens?” Oral presented at the COP27, Sharm El Sheik, Egypt, November 11, 2022.

【Invited Lecture】 ○Riccardo Rodolfo-Metalpa, Verena Schoepf, Sylvain Agostini, Jean-Pierre Gattuso, Raquel Peixoto, and David Obura. “What Tools Do We Have to Improve Rapid Adaptation and Resilience of Corals? A Global Approach with Specific Perspectives for the

Pacific Region.” Oral presented at the COP27, Sharm El Sheik, Egypt, November 10, 2022.

【Invited Lecture】 Sylvain Agostini. “Mission Tara Jambio マイクロプラスチック共同調査.” Oral presented at the 令和3年度海洋プラスチックごみ学術シンポジウム, online, March 11, 2022. http://www.env.go.jp/water/post_125.html.

【Invited Lecture】 Sylvain Agostini. “Tara Jambio Microplastic Joint Survey: Science, Art and Education.” Oral presented at the GEA International Conference 2022, Tokyo, Japan, October 27, 2022. <https://www.gea.or.jp/en/2022/gea22.html>.

【International Conference】 ○Sylvain Agostini, Ben P. Harvey, Shigeki Wada, Koetsu Kon, Joshua M. Heitzman, Nicolas Floc’h, Marco Milazzo, et al. “What We Learn from the Shikine CO₂ Seep on the Effects of High CO₂ on Hermatypic Corals.” Oral presented at the 5th International Symposium on The Ocean in A High CO₂ World, Lima, Peru, September 15, 2022.

【Oral Presentation】 ○Joshua M. Heitzman, Hirata, A., Mitushasi, Guinther, and Agostini, Sylvain. “Coral-Algae Interactions under Ocean Acidification.” Oral presented at the 25th Japanese Coral Reef Symposium, Ishigaki, Japan, November 12, 2022.

【Oral Presentation】 ○Joshua M. Heitzman, Hirata, A., Mitushasi, Guinther, and Agostini, Sylvain. “Coral-Algae Interactions under Ocean Acidification.” Oral presented at the 5th International Symposium on The Ocean in A High CO₂ World, Lima, Peru, September 15, 2022.

Technical Staff

【Oral Presentation】 ○柴田 大輔, 大畑 雅江, 小高 友実, 中村 千華, 加納 穂澄, 北之坊 仁美, 小坂 実央, 柴 小菊, 稲葉 一男, カブトクラゲの実験動物化に向けた継代飼育系の確立, 日本動物学会第93回早稲田大会2022, 早稲田大学, 東京都早稲田, 2022. 9.8-10

【Oral Presentation】 ○高野治朗, Tara-JAMBIO マイクロプラスチック共同調査, 臨海・臨湖実験所・センター技術職員研修会議, 東京大学大学院理学系研究科附属臨海実験所, 神奈川県三崎, 2022.11.9-11

【Oral Presentation】 ○高野治朗, 特殊任務への挑戦④～マイクロプラスチック調査編～, 第5回筑波大学技術職員交流会, 筑波大学(ハイブリッド), 茨城県つくば市, 2022.3.8

5) Press Releases

<https://www.tsukuba.ac.jp/journal/biology-environment/20220524140000.html> (Yaguchi)

<https://www.atpress.ne.jp/news/349679> TARA JAMBIO ART PROJECT 展 (Agostini)

<https://www.atpress.ne.jp/news/329344> アーティスト日比野克彦の作品を中心としたTARA展 (Agostini)

<https://www.atpress.ne.jp/news/307631> 科学×アート×教育で海を守る活動に追い風を！ アニエスパーがサポートする タラ オセアン ジャパン 2022年春夏の取り組み (Agostini)

<https://www.atpress.ne.jp/news/307101> タラ オセアン Tara JAMBIO Microplastics Project 同調査にかかる資金調達プロジェクトを500万円を目標に挑戦中 (Agostini)

6) Awards and Prizes

北之坊誠也,日本サンゴ礁学会第 25 回石垣大会, 優秀発表賞, 石垣市市民会館中ホール, 沖縄県石垣市, 2022.11.11-13

7) Newspaper articles and TV coverage

Inaba, 「繊毛から眺める海の生き物」Ebuheb (エブオブ) Vol.86, pp2-5 (2023)

Inaba, SciTech Dairy, Dec 5, 2022, <https://scitechdaily.com/mystery-behind-comb-jellys-mesmerizing-movement-solved/>

Inaba, EurekAlert, NEWS RELEASE 26-OCT-2022, <https://www.eurekalert.org/news-releases/969941>

Inaba, テレビ放映 NHK ヒューマニエンス 「ミクロの毛”細胞を指揮する司令塔」2022年11月1日放送

Inaba, 筑波大学ポッドキャスト No.021 クラゲだってがんばってます！まっすぐ泳ぐための「クシ」の秘密, 2022年11月11日

Yaguchi, 筑波大学ポッドキャスト No. 003 食べるだけじゃないんです！知られざるウニの世界へようこそ, 2022年5月24日

Nakano, 福井新聞『背中に角 無腸類の新種 「オニムチョウウズムシ」』2022.4.19

Nakano, 毎日新聞「日本沿岸で発見、新種生物も紹介 白浜・京大水族館／和歌山」2023.2.1

Nakano, 紀伊民報「海洋生物を究める 白浜京大水族館で企画展」2023.3.14

Wada, 日経新聞、海の酸性化、生物むしばむ サンゴや貝に打撃、2022年6月18日

Wada、山陽新聞、里海からの警告 第2部 異変 ⑩酸性化の脅威、2023年3月18日

Wada、テレビ放映、NHK、NHKスペシャル、海の異変 しよびよる酸性化の脅威、2022年7月17日

Wada、テレビ放映、NHK、サイエンスゼロ、生き物のからだが溶ける！？”海洋酸性化”の脅威、2022年8月14日

Wada、テレビ放映、NHK、コズミックフロント、海洋酸性化 静かに迫る危機、2023年3月2日

Shibata、テレビ放映 NHK ダーウィンが来た「カラフルでミラクル★海の大スター！ヒトデ」、2022年8月7日放送

Agostini、共同通信 特集記事「海中の森が消えた、静岡・伊豆 海藻食べ尽くすブダイやアイゴ」、2022年10月18日

Agostini、静岡新聞 特集記事「藻場の消失 漁業に打撃」、2022年11月1日

8) International Collaborative Research

USA・University of Connecticut Health, Dr. Stephen M. King,

「繊毛鞭毛タンパク質の構造、機能に関する研究」 (Inaba)

Czech Republic・University of South Bohemia, Dr. Otomar Linhart,

「チョウザメ精子のタンパク質の解析」 (Inaba)

Mexico・National Autonomous University of Mexico(UNAM)Dr. 西垣卓也,

「後生動物における精子鞭毛運動制御の共通性と多様性」 (Inaba・Shiba)

USA・Howard Hughes Medical Institute Janelia Research Campus, Dr. Teng-Leong Chew,

「ハプト藻運動装置の微細構造に関する研究」 (Inaba)

Switzerland・Paul Scherrer Institute, Dr. Takashi Ishikawa,

「軸糸ダイニンの分子構造に関する研究」 (Inaba)

Australia・Deakin University, Dr. Alecia Bellgrove,

「褐藻配偶子の運動に関する研究」 (Inaba・Shiba)

USA・Arizona State University, Dr. Hu Ke, 「サンゴと褐虫藻の共生関係に関する研究」 (Inaba)

USA・University of California, Santa Barbara, Dr. William Smith, France・Montpellier Cell Biology Research Center, Dr. Patrick Lemaire, 「ホヤの神経機能に関する研究」 (Sasakura)

Ireland・Galway University, Dr. Gabriel Krasovec,

「ホヤの変態と D-セリンに関する研究」 (**Sasakura**)

USA ・ Swarthmore University, Dr. Bradley Davidson, Dr. Hannah Gruner, Dr. CJ Pickett,

「ホヤの変態と成体組織構築に関する研究」 (**Sasakura**)

USA ・ Brown University, Dr. Gary M. Wessel, 「棘皮動物におけるゲノム編集に関する研究」 (**Yaguchi**)

France ・ Sorbonne University, Dr Jenifer Croce,

「ウニ幼生の神経形成に関する研究」 (**Yaguchi**)

Sweden ・ Royal Swedish Academy of Sciences, Dr. Michael C. Thorndyke,

「珍渦虫の発生学的研究」 (**Nakano**)

Tara Pacific Consortium, Dr. Serge Planes、 Dr. Denis Allemand、 et al. (**Agostini**)

Hong Kong SAR ・ Hong Kong University, Dr. Bayden Russell,

「Transcriptomics of sea urchins in response to warming」 (**Harvey**)

Canada ・ University of British Columbia, Dr. Chris Harley & Dr. Katie Marshall,

「Role of marine heatwaves in determining species biogeographic distribution」 (**Harvey**)

China ・ Guangdong Ocean University, Dr. 赵力强, 「Shell geochemistry of mussels」 (**Harvey**)

Korea ・ Keimyung University, Dr. Dorsaf Kerfahi,

「Role of ocean acidification on biofilm settlement dynamics on plastic substrates」 (**Harvey ・ Hall-Spencer**)

New Zealand ・ Victoria University of Wellington, Dr. Chris Cornwall,

「Role of ocean acidification on coralline algae responses」 (**Harvey ・ Porzio ・ Hall-Spencer**)

9) Joint Research with Companies

リージョナルフィッシュ株式会社 「日本市場に受け入れられやすいゲノム編集育手法の開発」
(**Yaguchi**)

10) Organized Conferences, Symposiums, and Research Meetings

井尻 貴之, 柴 小菊, 佐藤 裕公, 河野 菜摘子, 第 8 回生殖若手の会, 明治大学駿河台キャンパス (ハイブリッド), 東京都千代田区, 2022.9.10-11

Makoto Iima, Takuji Ishikawa, Kenta Ishimoto, Kenji Kikuchi, Toshiyuki Nakagaki, Yukinori Nishigami, Kogiku Shiba, One-day Workshop on Cellular-level ethological dynamics towards "proto-intelligence", Online + Maskawa Hall, Kyoto University, Kyoto, Japan, 29th October, 2022

Takehiro Kusakabe, Takahito Nishikata, Hiroki Nishida, Yasunori Sasakura, 11th International Tunicate Meeting, Okamoto Campus, Konan University, Okamoto, Kobe, Japan, 11-16th July, 2022

Educational Activities

1) Lectures and fieldcourses

University Fieldcourse

Period	University Department	Subject Area	#
2022.6.13-16	山梨大学	環境生物学実習	8
2022.7.11-15	筑波大学生物学類	動物分類学臨海実習	11
2022.7.18-22	筑波大学生物学類	動物分類学臨海実習	10
2022.8.24-26		生物公開臨海実習（海山連携）	3
2022.8.29-9.1	山梨大学	野外生物学実習	11
2022.9.5-9	筑波大学生物学類	水圏生物学臨海実習	15
2022.9.12-16	筑波大学生物学類	生殖生物学臨海実習	13
2022.9.26-30	筑波大学自然保護寄附講座 筑波大学理工情報生命学 術院生命地球環境学研究 群	海域フィールド実習 マリン生態環境科学	10
2022.10.5-7	筑波大学大学院共通	海洋生物の世界と海洋環境講座	10
2023.1.23-26	健康科学大学健康科学部 理学療法学科	海洋生物臨海実習	6
2023.2.20-23	筑波大学	地球環境学野外実験II	6
2023.3.6-10	筑波大学生物学類	水圏生物学実習	13
2023.3.20-24	筑波大学生物学類	植物分類学臨海実習	18
2023.3.27-29	筑波大学大学院共通	地球規模課題と国際社会:海洋環境変動と生命	6

Lectures and Seminars

Period	University Department	Subject Area	#
通年不定期開催 (オンライン)	筑波大学理工情報生命学 術院生命地球環境学研究 群	マリンバイオロジー特論	2
2022.11.10-11 (オンライン)	筑波大学理工情報生命学 術院生命地球環境学研究 群	マリン分子生命科学I	2
2022.8.8-10	筑波大学生物学類	生物寺子屋	5

2) Demonstrations and workshops

河津町立河津中学校 職場体験学習

下田市立下田中学校 職場体験学習

東京国際フランス学園 センター見学・仕事体験

Laurus International School of Science Plankton observation, and research experience

3) Academic Activities and Social Contributions

Zoological Science (Associate Editor) (**Inaba**)

Zoological Letters (Associate Editor) (**Inaba**)

Invertebrate Reproduction and Development (Editorial Board) (**Inaba**)

Japanese Association for Marine Biology (JAMBIO, President) (**Inaba**)

Journal of Experimental Zoology Part A (Editorial Board) (**Inaba**)

日本動物学会理事・会長 (**Inaba**)

日本動物学会理事 (**Shiba**)

日本動物学会男女共同参画委員 (**Shiba**)

Development Growth and Differentiation (Editorial Board) (**Sasakura**)

生物科学学会連合地球生物プロジェクト委員 (**Yaguchi**)

日本動物学会理事 (Yaguchi)
日本動物学会国際交流委員 (Yaguchi)
Scientific Reports (Editorial Board) (Yaguchi)
Development Growth and Differentiation (Guest Editor) (Yaguchi)
幼魚水族館バフンウニ展示 (Yaguchi・Yaguchi)
日本動物学会関東支部 支部代表委員 (Nakano)
日本動物学会関東支部 選挙管理委員 委員長 (Nakano)
日本動物学会 ZDW (ZooDiversity Web) 委員 (Nakano)
Zoological Science (Guest Associate Editor) (Nakano)
白浜水族館 企画展 (企画運営) (Nakano)
JAMBIO 沿岸生物合同調査 (担当) (Nakano)
Scientific Reports (Editorial Board) (Nakano)
理科年表 生物部 (監修) (Nakano)
Tara Ocean Japan (理事) (Agostini)
日本動物学会第 93 回早稲田大会 2022 動物学ひろば開催 (Shibata・Ooue)

4) Provision of Research Materials

田中 克彦 東海大学海洋学部海洋生物学科, バフンウニ 30 個体
埴 宗継 山梨大学大学院総合研究部医学域, アカヒトデ 10 個体、ムラサキウニ 10 個体、
ポウシュウボラ 3 個体、ナマコ 3 個体、ウミシダ 3 個体

5) Public Outreach

Open Lectures

令和 4 年度筑波大学公開講座「海洋生物学入門」(高校生対象), 2022 年 8 月 2 日-5 日, 筑波大学下田臨海実験センター.

Inaba, 「日本のマリンステーション連携-JAMBIO の設立と活動」, 国際生物科学連合 (IUBS) 第 34 回総会公開講演会・第 5 回 JAMBIO 国際シンポジウム, 2023 年 3 月 11 日, ハイブリッド開催 中央大学後楽園キャンパスおよびオンライン配信.

Inaba, 「ミクロの毛のはなし」, 下田市水産・海洋学講座, 2023年3月23日, 下田市文化会館.

Events

「海洋生物を究める！ —JAMBIO 沿岸生物合同調査の紹介—」, JAMBIO 沿岸生物合同調査の成果を展示する企画展, 2023年2月1日-2023年5月14日, 京都大学白浜水族館.

JAMBIO-TARA microplastics survey-related outreach

Date	Event type	Event Description	Number of Attendees
2022-04-08	Expo	Tara Jambio Microplastic Exhibition@Gallery Space of Agnes b boutique @KyotoBAL,	900
2022-04-09	Expo	Kyotographie Samuel Bollendorf and other exhibitions	15000
2022-04-10	Event	Kyotographie Talk Session	30
2022-04-22	Event	Talk after Screening MPS @uplink kyoto	15
2022-04-22	Expo	POP UP Exhibition of Tara Ocean Foundation @Kyoto Shimpukan	250
2022-04-29	Presentation	Tara Awashima Club with winner of Tara Poster Concours 2020-2021	12
2022-05-29	Presentation	Tara Crowdfunding Reward seminar @agnesb-tara ocean Office	5
2022-06-12	Presentation	Tara Presentation @CCIFJ	40
2022-07-03	Event	Beach + Movie + Discussion @ sado	21
2022-08-20	Expo	SDGs Expo Himeji	16 000
2022-08-20	Event	Panel discussion @ Himeji	80
2022-08-26	Event	Microplastic Story talk session for Crowdfunding donnator	25
2022-09-04	Event	Beach clean and Tara presentation @odawara	60
2022-09-24	Event	Tara Awashima Club with winner of Tara Poster Concours 2022	8
2022-09-29	Expo	Setouchi triennale 2022	12130
2022-10-07	Event	Tara Presentation @lycee francais international de kyoto	30
2022-10-08	Event	Crowdfunding return event at Setouchi triennale 2022	11

Date	Event type	Event Description	Number of Attendees
2022-10-22	Event	Tateyama Educational event for adult	17
2022-10-23	Event	Tateyama Educational event for kids	25
2022-11-02	Event	Shimoda Sampling with Veolia, and donateur of crowdfunding	6
2022-12-04	Event	Tara Crowdfunding Reward seminar @agnesb-tara Office and Online	4
2023-02-09	Presentation	Tara Presentation @CCIFJ	40
2023-03-25	Expo	TARA JAMBIO ART PROJECT Exhibition (as of March 31)	93

Researchers using the Center

1) Main Research Topics of those Researchers

Research Subject	PI affiliation	#	Host
ゲノム編集ホヤの作製	サントリー生命科学財団	1	Sasakura
遺伝子破壊カタユレイボヤの作製	サントリー生命科学財団	1	Sasakura
ウミホタルおよびその近縁種の採取	産業技術総合研究所	4	Sasakura
ホヤを用いた遺伝子実験	岩手大学大学院連合農学研究科	1	Sasakura
海中ロボットの動作試験	東京大学生産技術研究所	20	Sasakura
海洋測器の操作訓練	日本海洋株式会社	12	Sasakura
海水や海底の電気特性測定、および電波伝搬測定	ソニーグループ株式会社	6	Sasakura
船上および岸壁からのROV（南極ブルー）の操作訓練	国立極地研究所	2	Sasakura
海水濾過槽に生息するキヌタレガイ（二枚貝の一種）を採集	東京海洋大学	2	Sasakura
カタユレイボヤのゲノム編集に関わる実験技術を学ぶため、マイクロインジェクションなどの技術指導を受ける	岩手医科大学	2	Sasakura
ホヤ卵のゲノム編集	岩手医科大学	1	Sasakura
つくばIIによる海洋計測	海洋研究開発機構	3	Sasakura
岩礁潮間帯性ヤドカリ類の系統地理学的研究に関わる採集	京都大学	1	Sasakura
カプトクラゲを利用した共同研究	沖縄科学技術大学院大学	1	Inaba
マイクロプラスチックに関する共同研究	CNRS / Univ P et M Curie Paris6	1	Inaba
カプトクラゲの成体と幼生を使った分子生物学的実験	エクセター大学	1	Inaba
軟体動物の生殖メカニズム・戦略を調べるための実験	東北大学	1	Inaba

アユ生殖に関する共同研究	群馬県水産試験場	1	Inaba
海洋酸性化に関する共同研究打ち合わせ	Keimyung University · College of Natural Sciences		Inaba · Hall- Spencer
クシクラゲの平衡器官形成の共同研究	日本大学医学部	1	Inaba · Shiba
科学研究費助成事業 学術変革領域研究 (A)「ジオラマ環境で覚醒する原生知能を定式化する細胞行動力学」第8回 総括班会議 (領域幹事会)	北海道大学 他	9	Inaba · Shiba
ジオラマ行動力学領域内研究交流会「多様な生殖細胞の運動様式」	東北大学 他	7	Shiba
海藻 (Padina属) の採集	静岡大学	7	Shiba
科学研究費助成事業 学術変革領域研究 (A)「ジオラマ環境で覚醒する原生知能を定式化する細胞行動力学」領域内共同研究	東北大学	3	Shiba
カジカ科魚類の精巣発現タンパク質の同定	大阪公立大学	1	Shiba
新規センサーを用いた海中及びホヤ精子の観察	海洋研究開発機構	3	Shiba
イメージング技術に関する研究打ち合わせ	埼玉大学	1	Shiba
精子走化性に関する共同研究	東京大学	1	Shiba
ホヤ配偶子のサンプリング	静岡大学	1	Shiba
ヤッコカンザシの採集	筑波大学	1	Yaguchi
ウニ殻活用の共同研究打ち合わせ	JRE 洋上風力開発本部	2	Yaguchi
ウニ遺伝情報解析の共同研究	理化学研究所	1	Yaguchi
海産動物飼育の共同研究 (甲殻類幼生の飼育法とウニの飼育法の情報を組み合わせた飼育法の開発)	幼魚水族館	2	Yaguchi
棘皮動物ゲノム編集の共同研究	リージョナルフィッシュ株式会社	1	Yaguchi
顕微鏡イベントにおける撮影技術の研究	NHK	3	Yaguchi

研究材料（フタツメイソウミグモ）の採集	新潟大学	1	Nakano
研究材料（海藻）のサンプリング	東京海洋大学	5	Wada
バイプロコアラ試験およびROV試験	国立極地研究所	9	Wada
海洋酸性化に関する研究打ち合わせ	東京海洋大学	3	Wada
底生動物群集に対する海洋酸性化の影響調査	東京海洋大学	3	Agostini ・ Harvey
伊豆周辺の藻場についての情報収集とブルーカーボン についての意見交換	北海道大学	1	Wada
タイワンハウキガニおよびクラゲムシ類の採集	北里大学	2	Wada
多波長励起蛍光カメラの試験	海洋研究開発機構	2	Wada ・ Agostini
国内9湖沼の溶存有機物化学形態の分析を目的とする蛍 光性溶存有機物測定装置の利用	東京大学	4	Wada
海洋生物の採取と高分子合成	筑波大学	2	Wada
海産生物からの有用物質の採取	筑波大学	1	Wada
環境省モニタリングサイト1000（沿岸域調査）に関す る藻場調査	三重大学	7	Wada
Isotope Analysis using Mass Spectrometer	筑波大学	2	Wada
元素分析計-質量分析計の利用	筑波大学	1	Wada
観測測器（海中グライダー）の試験・操作習熟	気象研究所	4	Wada
気候変動に対する魚類の応答解析	University of Adelaide	1	Wada
ミサゴの羽サンプルについて、炭素および窒素の安定 同位体比の分析を行う(自然同位体比測定)	筑波大学	3	Wada
海水中に存在する糖鎖の測定	名古屋大学	2	Wada
海洋プラスチック採取	筑波大学	1	Wada
海洋酸性化による魚類の行動異常を解明するプロジェ クトへの参加	沖縄科学技術大学院大学	1	Agostini
Tara-Jambioにおいてマイクロプラスチック調査・啓発	Tara Ocean Japan	7	Agostini

活動を行う			
新たな材料へ海産生物の加入に関する研究	東京理科大学	2	Agostini
マイクロプラスチックサンプリング	沖縄科学技術大学院大学	1	Harvey
式根島で収集した藻類のサンプルを利用し海洋酸性化の環境への影響を評価する実験を行う	沖縄科学技術大学院大学	1	Harvey
海洋酸性化による魚類の食事生活への影響を評価する	University of Adelaide	3	Harvey
Visit to learn ocean acidification and its impact on marine organisms	Sathyabama Institute of Science and Technology, Chennai, INDIA	4	Porzio

2) Research Output from Researchers using the Center

Hayakawa E, Guzman C, Horiguchi O, Kawano C, Shiraishi A, Mohri K, et al. Mass spectrometry of short peptides reveals common features of metazoan peptidergic neurons. **Nature Ecology & Evolution**. 6(10):1438–48. August 2022.

Kushida Y, Imahara Y, Wee HB, Fernandez-Silva I, Fromont J, Gomez O, et al. Exploring the trends of adaptation and evolution of sclerites with regards to habitat depth in sea pens. **PeerJ**. 10:e13929. September 2022.

Ito T, Morita M, Okuno S, Inaba K, Shiba K, Munehara H, et al. Fertilization modes and the evolution of sperm characteristics in marine fishes: Paired comparisons of externally and internally fertilizing species. **Ecology and Evolution**. 12(12): e9562. December 2022.

Sensui N, Itoh Y, Okura N, Shiba K, Baba SA, Inaba K, et al. Spawning-induced pH increase activates sperm attraction and fertilization abilities in eggs of the Ascidian, *Phallusia philippinensis* and *Ciona intestinalis*. **International Journal of Molecular Sciences**. 24(3):2666. January 2023.

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