

Algae

Since I work at a university, specializing in the algae taxonomy, I often get inquiries from people outside the university. Most of those inquiries can easily be associated with social contribution works by scientific professionals, such as checking narration texts for TV footages to make sure that there are no scientific mistakes in them, or they want me to specify the type of algae, which is unwantedly growing in a culture pond, and teach them how to cope with the situation. Having said that, I sometimes get consulted by people in the literature and art fields about such matters, they want to interview me in order to model a taxonomist character in a novel or they want me to specify the type of seaweeds, which are drawn on Émile Gallé's flower bases that would get exhibited in an art museum. When the university office contacted me this time, asking if it was okay to connect me to an artist, who wanted to know about *Cyanidium caldarium*, at first, I thought that it would also be one of those trivial inquiries. *Cyanidium caldarium* is a species of unicellular red algae, which grows in the high temperature and highly acidic conditions of hot springs. Although it is a type of algae that all phycologists would have heard the name of, there are not many taxonomists who actually work with them. If anything, biologists other than taxonomists might often work with them for the purpose of researching photosynthetic functions, because *Cyanidium caldarium* grows in extreme condition and there is not a concern about other lifeforms coming in and propagating during cultivation and it is relatively easy to take care of them even for "amateurs". My specialized field is the biogeography

and phylogenetic taxonomy of seaweeds, which are multicellular organisms. Among them, one group of red algae is my life work and I consider myself as a red algae specialist. However, there are numerous differences between unicellular and multicellular algae, in reality, the majority of taxonomists only specialize in either one of them. I also only had textbook knowledge about *Cyanidium caldarium*, thus, at the beginning, I accepted the request, thinking that I could perhaps help by referring Nagasaka to some researcher who would be better-suited for her inquiry.

However, when I actually listened to Nagasaka's proposal, it had more things in common with my research topics than I expected and I was fascinated by her idea. In 2005, I participated in the ecological survey of the Shiretoko Peninsula, as the person in charge of seaweeds, when the Shiretoko Peninsula was in the process of gaining World Natural Heritage site status. I have been regularly conducting field surveys to monitor the area since it gained its status, thus, the Shiretoko Peninsula has been a very familiar field for me for about fifteen years. Also, if the sudden change of the earth's environment, which was caused by oxygenic photosynthesis of the ancient algae, had not occurred, the evolution of lifeforms would have taken a completely different direction and, of course, we humans would not have come into being. Moreover, byproducts produced by life activities of those algae are the resources buried underground, such as iron, oil, and cement, which support our present civilization. These are the topics students in my class get fascinated by every year. I felt I would really like to cooperate with Nagasaka's work and I immediately started looking through papers written about the cultivation of *Cyanidium caldarium* and ordered necessary reagents and instruments for the cultivation. About one month later at the end of March, I received the *Cyanidium caldarium*, which Nagasaka had collected at the Kamuy-Wakka

Waterfalls, and I started the cultivation. After some trial and error, the *Cyanidium caldarium* kept growing nicely in an Erlenmeyer flask, which was kept in a constant-temperature incubator set at 45 degree Celsius, for Nagasaka's exhibition in the autumn. However, in the early September when it was getting closer to her exhibition, a large earthquake struck Hokkaido. Many of the algae strains I was cultivating in my laboratory died because their petri dishes were directly damaged by the tremors and their incubators stopped operating for three days due to the power cut. But, to my surprise, the *Cyanidium caldarium*, which I worried the most about being hurt by the power cut because they need the high temperature to live, survived through the event and fulfilled its duty as one of the elements in Nagasaka's work.

As Nagasaka is already aware, Stromatolite, which is one of the constituting elements of her work, is a rock produced by cyanobacteria, which is a prokaryote. Cyanobacteria is not necessarily close to *Cyanidium caldarium*, which is a eukaryote, in their taxonomic relationship. Nevertheless, everybody would feel the conceptual commonality the two share: they are the creatures that continuously live in harsh environments, which let us imagine the ancient earth where dynamic volcanic activities were taking place. Also, the origin of chloroplast goes back to cyanobacteria and all oxygenic photosynthesis organisms including *Cyanidium caldarium* have inherited their ability to perform oxygenic photosynthesis from cyanobacteria. From this perspective "things originated from cyanobacteria", they also have common features. I imagine that it is part of the work's intentions to create effects by overlaying these various meanings. Now that I think about it, I feel that it was my foolish act to have specified the seaweeds drawn on Gallé's flower bases by their tiny features, and as a result, to have narrowed down

the works' intentions.

The classification of "algae" itself also has a similar aspect of conceptual commonality. In the contemporary taxonomy, groups of organisms, which have common ancestors, are only recognized as being in the same taxonomic groups. Since the Ancient Greek civilization, it has been thought that organisms that can move on their own are animals and the rest of organisms are plants. However, the development of electron microscopes and the genetic analysis technologies in recent years have broken the mold. It has turned out that fungi, which had been grouped as a part of lower plants that do not flower, are closer to animals than to plants that flower. Also, it has been proven that three groups of seaweeds; green algae, brown algae, and red algae, whose only differences were thought to be their colors, are further away from each other in their lineages than the difference between fungi and animals. When it comes to unicellular algae, they are divided into much more, independent lineages than seaweeds. That is to say, organisms that are under the classification of algae are a highly miscellaneous mixture phylogenetically. Nevertheless, from their common characteristics of having relatively simple constitutions, growing in water, and performing oxygenic photosynthesis, these organisms are still classified as algae today, besides the taxonomic unit's perspective.

As a matter of fact, to my regret, I could not see Nagasaka's work in person in Fall 2018 due to my schedule, despite the exhibition being held in Sapporo, where I am based. This time, I am in charge of making the summer exhibition, featuring algae, at the Hokkaido University Museum. While it is part of the aim in the exhibition to convey the academic values of each specimen in the collection, the exhibition also aims to convey their artistic appeals, such as different forms of algae, which Gallé paid close attention to, or the physi-

cality of old specimen labels, which evoke the feelings of history in us. By having Nagasaka's work, which will be re-configured to fit into the exhibition, in the middle of the exhibition space, I hope to sensuously convey the profoundness of algae to the audiences and make an intriguing exhibition by the synergetic effect created by art and science.

Tsuyoshi Abe

服部 浩之

インディペンデント・キュレーター

1978年生まれ。早稲田大学大学院修了（建築学）。青森公立大学国際芸術センター青森[ACAC]学芸員を経て、2017年より秋田公立美術大学大学院准教授。アジア圏を中心に、展覧会やプロジェクト、リサーチ活動を展開。近年は、「十和田奥入瀬芸術祭-SURVIVE：この惑星の、時間旅行へ」（十和田市現代美術館、奥入瀬エリア | 2013年）、「Media/Art Kitchen」（ジャカルタ、クアラルンプール、マニラ、バンコク、青森 | 2013年-2014年）、「あいちトリエンナーレ2016—虹のキャラバンサライ」（愛知県美術館ほか | 2016年）、「ESCAPE from the SEA」（マレーシア国立美術館、Art Printing Works | 2017年）、「近くへの遠回り」（ウィフレド・ラム現代美術センター | 2018年）などの企画に関わる。第58回ヴェネツィア・ビエンナーレ国際美術展日本館展示「Cosmo-Eggs | 宇宙の卵」（2019年）キュレーター。

山本 順司

地球科学・教育学・博物館学

1973年滋賀県生まれ。2001年東京大学大学院修了（博士[理学]）。地球を時空的に解剖することを旨とした「四次元地球プロジェクト」を推進。
2003年京都大学大学院理学研究科助教に着任。宇宙と地球の接点である太陽系の形成過程を探るため「石の中の銀河プロジェクト」を推進。地球深部に眠っている地球形成初期からの残存物質の探索に没頭。
2011年の東日本大震災を機に教育普及活動の重要性を痛感し、教育学や博物館学を志向。
2012年北海道大学総合博物館准教授に着任。「地球体感教材開発プロジェクト」を開始。開発した教材を次々に科学イベントや授業に投入し、その効能を教育系学会誌や博物館学系学会誌で公表することで、科学リテラシーの底上げに力を尽くしている。
2015年から社会と学術界が交わる場を作ることを目指し、大学博物館を知的ハブとする「知の交差点プロジェクト」を開始。
誰もが意識せずに立ち寄れる究極のユニバーサルミュージアムを作ることを目指して活動中。北海道大学准教授。

阿部 剛史

藻類学

1968年東京都生まれ（幼時に埼玉県に転居）。1998年北海道大学大学院修了（博士[理学]）。紅藻ソゾ属を材料に、従来の分類学的手法に加え、培養株を用いた交雑実験と化学分類を併用し、日本近海における種内分化過程を推定。
1998年北海道大学大学院理学研究科助手に着任。北海道大学総合博物館の設立に関わる。
1999年北海道大学総合博物館の発足に伴い、同、博物館情報メディア研究系助手に移籍。
2000年日本藻類学会論文賞受賞。
2006年ほぼ40年ぶりとなる知床沿岸の海藻相調査に参加、以後、知床世界自然遺産浅海域生物相モニタリング調査に海藻担当として参画。
2012年夏季企画展示「藻類が人類の未来を救う」担当。
2012年北海道大学総合博物館資料基礎研究系講師に昇任。
2013年タイ国立科学博物館出張展示「Algae for Humankind」担当。
2019年北海道大学総合博物館資料基礎研究系准教授に昇任。

Hiroyuki Hattori

Independent Curator

Born in 1978. Hiroyuki Hattori graduated from Waseda University with a Master's in Architecture. Through working as curator at Aomori Contemporary Art Centre [ACAC], he has been working as associate professor for the Graduate School of Transdisciplinary Arts at Akita University of Art since 2017. He has been developing various activities, including exhibitions, projects, and research, mainly in Asia. Recent projects he was involved in curating include: *Towada Oirase Art Festival–SURVIVE: Time Hoppers on the Earth* (Towada Art Center and Oirase Area, 2013), *Media/Art Kitchen* (Jakarta, Kuala Lumpur, Manila, Bangkok, and Aomori, 2013-2014), *Aichi Triennale 2016–Homo Faber: A Rainbow Caravan* (Aichi Arts Center and other locations, 2016), *ESCAPE from the SEA* (National Art Gallery, Malaysia and Art Printing Works [APW], 2017), and *Going Away Closer* (Centro de Arte Contemporáneo Wifredo Lam, 2018). He was also curator of *Cosmo-Eggs* in the Japan Pavilion at the 58th International Art Exhibition–La Biennale di Venezia in 2019.

Junji Yamamoto

Earth Science, Education, and Museology

Born in Shiga Prefecture in 1973. Junji Yamamoto completed his graduate studies at Tokyo University with a Doctorate in Science in 2001. He promoted the "Four-dimensional Exploration of the Earth" project, aiming to dissect the earth spatiotemporally. In 2003, he became assistant professor at Graduate School of Science, Kyoto University. He promoted the "Galaxy in a Stone" project to search for the formative process of the solar system, where the universe and the earth come in contact. He devoted himself to search residual materials from the early stage of the earth's formation, which are buried deep within the earth. Upon experiencing the Aftermath of the 2011 Tohoku Earthquake and Tsunami, he keenly felt the importance of educational activities and aspired to education and museology. In 2012, he became associate professor at the Hokkaido University Museum. He started the "Sensory Tool for the Earth" project. Since then, he has been committing to improve scientific literacy through introducing the teaching aids he developed in science events and lectures and publishing their effects on educational and museological academic journals. Since 2015, aiming to create a place where society and academia intersect, he has been doing the "Intellectual-Hub" project to turn university museums into intellectual hubs. He is currently an associate professor at Hokkaido University and working with the goal to create an ultimate universal museum, where everyone can casually visit.

Tsuyoshi Abe

Phycology

Born in Tokyo Prefecture in 1968 and moved to Saitama Prefecture during his childhood. Tsuyoshi Abe completed his graduate studies at Hokkaido University with a Doctorate in Science in 1998. Using the red algal genus *Laurencia* as his research specimen, he theorized their differentiation process in the seas near Japan by applying the conventional taxonomical methodologies as well as the cross experiment and chemotaxonomy by using cultivated strains. In 1998, he became an instructor at Graduate School of Science, Hokkaido University. He was involved in the foundation of the Hokkaido University Museum. In 1999, following the inauguration of the museum, he transferred his position to be instructor in the Section of Informatics and Media Studies. In 2000, he received the Best Paper Award of the Japanese Society of Phycology. In 2006, he joined the first algae survey of the coast of the Shiretoko Peninsula after almost forty years, and, since then, he has been participating in the shallow sea biological monitoring survey of the Shiretoko World Natural Heritage site, as the person in charge of seaweeds. In 2012, he took charge of making a summer exhibition *Algae Save the Future of Humankind* at the museum. In 2012, he became a lecturer in the Section of Fundamental Studies. In 2013, he took charge of loaning the exhibition *Algae for Humankind* to the National Science Museum, Thailand [NSM]. Since 2019, he has been an associate professor in the Section of Fundamental Studies at the Hokkaido University Museum.