

The Bio-imaging Data Analysis Training Course 2021

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The 9th Bio-imaging Data Analysis Training Course was jointly held by the Exploratory Research Center on Life and Living Systems (ExCELLS), JSPS KAKENHI Platforms for Advanced Bioimaging Support (ABiS) and NIBB. This course was designed for biologists who are relatively new to analyzing datum obtained through advanced microscopy. Therefore, the focus of the training was related to learning about image processing and analytical techniques through solving simple problems with image analysis, and understanding appropriate methods and necessary preparation when consulting experts in technically advanced problems concerning imaging. 134 people applied for the course, which had an announced capacity of 16 participants. Given the high demand for courses on these subjects, we accepted 33 participants.

This course's lectures were conducted with the aim of guiding participants towards an awareness of the series of steps essential for fundamental image processing and analysis while also obtaining images for eventual use (workflows). In addition to this, participants independently worked on practical image analysis exercises using ImageJ; a typical open-source software package for biological image processing and analysis. Lectures were also given on how the programming of simple “macro language”, which uses the aforementioned workflows in ImageJ, allows for automation; a necessity for the large capacity and high-dimensional throughput of microscopic imaging which has more become common over recent years.

Upon the course's conclusion, each student offered commentary about and discussed the methods taught by providing examples of images gleaned from their own research.

Unfortunately, although this year's course was held online due to issues associated with COVID-19, we utilized technological innovations within the lectures and exercises, such as a chat service to support individual participants, so as to allow them to feel as if the course was being held as an in-person event.

Every year following the course's completion, participants often report feeling pretty tired, but satisfied. In a similar vein, we believe that this course is beneficial to its participants thanks to the associated increase in their familiarity with image analysis techniques. Thus, we expect that this course will increase opportunities for joint research relating to biological image analysis moving forward.

(Kagayaki Kato)

Advanced Bioimaging Support (ABiS)

The demand for bioimaging has increased in recent years in the field of life science. However, due to advances in imaging technologies, such as the diversification and specialization of imaging equipment, increasingly complex operations, increased equipment and running costs, as well as the growing need for image data analysis, individual research institutes and universities are increasingly encountering difficulties related to the introduction, maintenance, and operation of imaging equipment.

ABiS was launched as one of the designated "Platforms for Advanced Technologies and Research Resources" during fiscal year (FY) 2016 under the new framework of the Grant-in-Aid for Scientific Research on Innovative Areas (Leader: Prof. Masanobu KANO, NIPS/The University of Tokyo). This program aims to contribute to the further development of academic research in Japan through the provision of cutting-edge equipment and methodologies to individual KAKENHI (Grants-in-Aid for Scientific Research) research projects by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) under the Grant-in-Aid for Scientific Research on Innovative Areas (FY2016-FY2021).

Cooperating with domestic partner organizations that own and operate multiple types of advanced specialized imaging equipment, ABiS provides cutting-edge instruments for light microscopy, electron microscopy, magnetic resonance imaging, and other methods through its network. It aims to provide comprehensive support for advanced imaging in the field of life science. NIBB, together with NIPS, contributes as a core institute in the ABiS network. Among the various support activities that ABiS performs, NIBB is tasked with the following:

- Light microscopy
 - 4D microscopy administered by Prof. Toshihiko FUJIMORI
 - IR-LEGO microscopy administered by Assoc. Prof. Yasuhiro KAMEI
 - DSLM administered by Assoc. Prof. Shigenori NONAKA
- Imaging analysis
 - Development of image processing/analysis algorithms for biological data administered by Prof. Naoto UENO, Assist. Prof. Kagayaki KATO and Assist. Prof. Yusaku OHTA.
- Training
 - Training for image analysis administered by Prof. Naoto UENO and Assist. Prof. Hiroshi KOYAMA.

To organize and coordinate ABiS activities, two secretariat offices were established at NIBB (Assoc. Prof. Shoji MANO) and NIPS, respectively, under the control of the general support group (Individuals in charge at NIBB; Director-general Prof. Kiyokazu AGATA, Prof. Naoto UENO, Prof. Shinji TAKADA, Assoc. Prof. Shoji MANO). General support provided includes budget planning and management of ABiS activities. In particular, we promote ABiS activities via its associated website and other media, so that

KAKENHI researchers make full use of the ABiS platform to accelerate their research projects. In addition, we organize technology training sessions, workshops, and symposia to disseminate advanced imaging technologies and share information about them. We also coordinate with the other three platforms (Platform of Supporting Cohort Study and Biospecimen Analysis, Platform of Advanced Animal Model Support, and Platform for Advanced Genome Science) to provide both multidisciplinary and international support.

Euro-Bioimaging (EuBI) is the largest and most well-established imaging network in Europe, and has been expanding globally to form the Global Bioimaging (GBI) network which boasts participants from areas such as India, Australia, Singapore, the Republic of South Africa, Canada, Mexico, USA, and some Latin American countries. In 2018, ABiS joined the GBI project representing the Japanese bioimaging community. It is hoped that through GBI, ABiS will be able to raise the quality of present support to that of the currently accepted international benchmarks, and that further observations, data analyses and research methods will be able to be better shared globally. Furthermore, it is also hoped that this collaboration will lead to set up a better environment for bioimaging research in Japan. This will be achieved not only by providing international training courses for young researchers and the staff of imaging facilities, but also through discussions about the implementation of career paths; a common problem in this field.

Since the ABiS project that spanned 6 years was finished at the end of this fiscal year, we self-evaluated the past ABiS activities and forecast the future demands, and applied for the Grant-in-Aid for Transformative Research Areas, Platforms for Advanced Technologies and Research Resources (FY2022) as the next ABiS project. In February 2022, our past activities were highly evaluated by the committee and plans for the next project have been approved for the second phase of the ABiS project (FY2022-FY2027). As in the past, the ABiS will continue to support light microscopy, electron microscopy, magnetic resonance imaging, and image analysis as the core institute together with the Institute for Physiological Sciences.

ABiS Symposium "Image Data Analysis to Open Up A New Era for Life Science"

March 1 (Tue) 2022

The ABiS symposium "Imaging Data Analysis to Open Up A New Era for Life Science" was held this year as an online event. The following 8 researchers, experts in image data analysis and database construction, gave lectures.

- Naomi KAMASAWA (The Max Planck Florida Institute for Neuroscience Imaging Center)
- Nobuhiko OHNO (Jichi Medical University/ National Institute for Physiological Sciences)
- Tatsumi HIRATA (National Institute of Genetics)
- Kazuo IABA (Tsukuba University)
- Naohiro OKADA (The University of Tokyo)
- Saori TANAKA (Brain Information Communication Research Laboratory Group)
- Shu-ichi ONAMI (RIKEN Center for Biosystems Dynamics Research)
- Yoshitaka KIMORI (Fukui University of Technology)

There were 168 participants, and a lively question and answer session was held for each presentation. A participant survey and other information about this symposium is available on the website. (<https://www.nibb.ac.jp/abis/ev20220301/>)