

EDITOR'S NOTE

This is the 2018 issue of SPring-8/SACLA Research Frontiers that covers outstanding scientific outcomes of SPring-8 and SACLA in 2017 and 2018. The best scientific achievements are collected from more than 1,000 papers published using SPring-8 and SACLA each year.

There are two reviews in this issue. One is contributed by Professor Ueda and Dr. Fukazawa of Tohoku University. Professor Ueda has a long experience in synchrotron radiation science, particularly in atomic and molecular physics using soft X-rays. He has been an active user of soft X-ray beamlines at SPring-8, but since SACLA became in operation, he has been leading gas phase experiments using intense femtosecond pulses of SACLA. In such experiments, atoms are ionized by losing electrons in their inner shells, causing many interesting, previously unobserved phenomena within femtoseconds. These are experiments made possible only by using XFEL. This is a very fundamental research, but as long as we use intense X-rays as a measuring probe, it is always relevant.

The second review is contributed by Professor Hooper and Dr. Kitchen of Monash University, Australia, and Dr. Pearson of National Cerebral and Cardiovascular Center Research Institute, Osaka. Using propagation-based phase contrast imaging of newborn rabbits, the group have been working on the mechanisms of breathing immediately after birth, which led to a proposal of a new resuscitation method. They have also been developing new medical imaging techniques (see Kitchen *et al.* in this issue). This review focuses on the change of blood circulation after birth. Since oxygen, which is obtained through the placenta in utero, must be obtained in the lungs, blood circulation changes drastically after birth. However, how this is brought about has not been well understood. In recent experiments, they combined phase contrast imaging and angiography to visualize air and blood circulation simultaneously in the lungs. They discovered that the presence of gas in the lungs sends a signal to the brain to alter circulation. This finding is important for understanding various phenomena and anomalies that take place after birth in humans. Recently, Prof. Hooper was made a "Member of the Order of Australia" (AM) for his significant service to medical research in the field of fetal lung and cardiorespiratory development.

In this issue, I would like to particularly mention an article on an exotic insect found in Brazil. "Hidden morphological novelty enabling the evolution of female penis in the sex-role reversed cave insects" by Drs. Yoshizawa and Blanke is very interesting research in insect biology that sheds light on the evolution of an unusual insect. This work received an Ig Nobel Prize in 2017. Although the Ig Nobel Prize is conferred to "research that makes people LAUGH and then THINK," there is not much to laugh about in this article. High-resolution CT revealed interesting features of anatomy and gave clues towards the understanding of the curious path of evolution of the insect.

SPring-8/SACLA Research Frontiers is made of two parts. The first is scientific results (Scientific Frontiers) and the second is additional information on hard and soft infrastructures that support scientific research. Although some important numbers such as the operation time are given in the second part, other information and more complete statistical numbers on the operation of SPring-8 and SACLA are available on the website so that more updated information can be accessed (http://www.spring8.or.jp/en/about_us/spring8data/).

The full text of SPring-8/SACLA Research Frontiers is also available on the SPring-8 website (<http://www.spring8.or.jp/>). For the list of publications produced by SPring-8 users and staff, please visit the publication database at http://www.spring8.or.jp/en/science/publication_database/.

On behalf of all the editors, I would like to thank those who helped us by recommending excellent research results suitable for publication in this issue, and the users and staff of SPring-8 who contributed their reports to this issue.

Naoto Yagi

Japan Synchrotron Radiation Research Institute (JASRI)

EDITORIAL BOARD

Naoto YAGI (Editor in Chief)	SPring-8/JASRI
Shunji GOTO	SPring-8/JASRI
Yuichi INUBUSHI	SPring-8/JASRI
Shigeru KIMURA	SPring-8/JASRI
Toyohiko KINOSHITA	SPring-8/JASRI
Takashi KUMASAKA	SPring-8/JASRI
Yasuo OHISHI	SPring-8/JASRI
Norimichi SANO	SPring-8/JASRI
Yuden TERAOKA	SPring-8/QST
Tomoya URUGA	SPring-8/JASRI
Marcia M. OBUTI-DATÉ (Secretariat)	SPring-8/JASRI