

Xth SCAR International Biology Symposium on “Antarctic Biology in the 21st Century—Advances in and beyond IPY—”: A brief overview

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Abstract

The Xth SCAR International Biology Symposium was held under the theme of “Antarctic Biology in the 21st Century—Advances in and beyond IPY—” at the Conference Hall, Hokkaido University, between July 26 and 31, 2009. A total of 113 oral presentations and 122 poster presentations were given under six sub-themes. This special issue was edited by six guest editors under the Editor-in-Chief of “Polar Science”, in accordance with the editorial system of “Polar Science” and contains one overview paper and five review papers and 18 research papers.

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1. Background to the “Xth SCAR International Biology Symposium”

The SCAR International Biology Symposium has been held approximately every four years since 1962, soon after the International Geophysical Year (1957–58). The first symposium was held under the auspices of the then new SCAR (Scientific Committee on Antarctic Research), and its Working Group on

Biology was responsible for the organization of the symposium. The role and task of the Working Group on Biology have now developed into that of the SSG-LS of SCAR (Standing Scientific Group, Life Sciences, see www.scar.org) and the symposium is now well established and continues to be an important discussion and presentation forum among Antarctic biologists.

In July 2006, at the XXIXth SCAR meeting in Hobart, Australia, the SSG-LS decided that the venue for the Xth SCAR International Biology Symposium would be in Japan. Two years later in July 2008, at the XXXth SCAR meeting in St. Petersburg, Russia, the SSG-LS selected the main theme for the Xth symposium as “*Antarctic Biology in the 21st Century – Advances in and beyond IPY—*”. This differs from the

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main themes of the previous nine symposia, which were selected to reflect the major areas of scientific interest at the time and reflecting the major SCAR Programmes in biology, and in particular was not targeted to any particular scientific discipline. Nevertheless, SCAR's single current biological research programme, "Evolution and Biodiversity in the Antarctic" (EBA), was to play a leading role in the structure of and presentations in the symposium. The Xth symposium was identified as a timely opportunity to focus on the early outcomes of the "IPY 2007–2008" (International Polar Year, March 2007–March 2009). The IPY 2007–2008 is organized by ICSU/SCAR (International Council for Science) and WMO (World Meteorological Organization), marking 50 years since the IGY (International Geophysical Year 1957–1958).

2. Previous symposia and their publications

All SCAR Biology Symposia have led to the publication of a symposium volume of contributions presented at the meeting. Information on the previous nine symposia is summarized below;

Ist Symposium on "Antarctic Biology", Paris in 1962

"*Biologie Antarctique*"; ed. By R. Carrick, M. Holdgate and J. Prevost, published by Hermann in 1964. A total of 56 papers under 13 sessions, each session also including discussion pages.

IIInd Symposium on "Antarctic Ecology", Cambridge in 1968

"*Antarctic Ecology*"; ed. by M.W. Holdgate, published by Academic Press in 1970

Vol. 1: Part I to Part IX, 57 papers, each part also containing introduction and discussion pages.

Vol. 2: Part X to Part XIV, 24 papers, each part also containing introduction and discussion pages.

IIIrd Symposium on "Adaptations within Antarctic Ecosystems", Washington, D.C. in 1974

"*Adaptations within Antarctic Ecosystems — Proceedings of the third SCAR Symposium on Antarctic Biology*"; ed. By G.A. Llano, published by Gulf Publishing Company in 1977. A total of 73 papers under eight parts, each part including discussion pages, plus preface and introductory pages

IVth Symposium on "Antarctic Nutrient Cycles and Food Webs", Wilderness in 1983

"*Antarctic Nutrient Cycles and Food Web*"; ed. By W.R. Siegfried, P.R. Condy and R.M. Laws, published by Springer-Verlag in 1985. A total of 92 papers under four parts, plus summary and conclusion pages.

Vth Symposium on "Ecological Change and the Conservation of Antarctic Ecosystems", Hobart in 1988

"*Antarctic Ecosystems — Ecological Change and Conservation*"; ed. by K.R. Kerry and G. Hempel, published by Springer-Verlag in 1990. A total of 45 papers under five chapters plus one review paper.

VIth Symposium on "Antarctic Communities — Species, Structure and Survival—", Venice in 1994

"*Antarctic Communities — Species, Structure and Survival—*" ed. By B. Battaglia, J. Valencia and D.W.H. Walton, published by Cambridge University Press in 1997. A total of papers, 63 papers under five chapters, with each chapter having introductory pages.

VIIth Symposium on "Antarctic Ecosystems, model for wider ecological understanding", Christchurch in 1998.

"*Antarctic Ecosystems: Models for Wider Ecological Understanding*"; ed. By W. Davison, C. Howard-Williams and P. Broady, published by New Zealand Natural Science in 2000. A total of 45 papers under five chapters, each chapter having introductory pages.

VIIIth Symposium on "Antarctic Biology in a Global Context", Amsterdam 2001

"*Antarctic Biology in a Global Context*"; ed. By A.H.L. Huiskes, W.W.C. Gieskes, J. Rozema, R.M.L. Schorono, A.M. van der Vies, and W.J. Wolff, published by Backhuys Publishers in 2003. A total of 50 papers under seven chapters, plus introduction.

IXth Symposium on "Evolution and Biodiversity in Antarctica", Curitiba 2005

In *Antarctic Science*, vol. 19, issue 2, p. 145–281, 2007. A total of 16 papers.

3. Objectives of the Xth symposium

The Xth Symposium main theme covers new findings across Antarctic Biology gathered during the IPY period. In the context of the IPY, and differing therefore from previous symposia, issues such as bi-polar aspects and outreach programmes were included. The Local and International Steering Committees selected six sub-themes for the Xth Symposium, and brief synopses of these are presented below. The sub-themes in part were linked with the structure of SCAR's current Scientific Research Programme in Life Sciences, EBA: Evolution and Biodiversity in the Antarctic (www.eba.aq) in order to showcase EBA results. The symposium was open to all Antarctic scientists in the Life Sciences.

Sub-theme 1. Antarctic evolutionary history

Lead Convener: Dominic A. Hodgson and co-conveners: Katrin Linse, Brigitte Ebbe

Evolutionary history is key to understanding the origins and diversity of Antarctic organisms and their adaptation to the polar environment. Understanding Antarctic evolutionary history also contributes to predicting the directions and magnitudes of the future changes in Antarctic ecosystems. This sub-theme was expected to include, for instance, studies on the history of Antarctic organisms on geological timescales in relation to past climate changes, phylogeography, or adaptive radiation, and on shorter Quaternary timescales in relation to climate and ecological changes. This sub-session was associated with EBA-WP (Work Package) 1.

Sub-theme 2. Adaptation to extreme environments

Lead Convener: Guido di Prisco and co-conveners: Takeshi Naganuma, Nobuyuki Miyazaki

Adaptation to the extreme environment is central to understanding how Antarctic organisms can survive and sustain their life cycle under harsh conditions. Under sub-theme 2, recent findings on adaptation of Antarctic organisms were invited for presentation, ranging across biological disciplines from the genomic and proteomic, through biochemical and physiological adaptation, to life history and ecology. This session was associated with EBA-WP2.

Sub-theme 3. Marine biodiversity and processes

Lead Convener: Graham Hosie and co-conveners: Lucia Campos, Kunio Takahashi

In order to understand and gauge the impact of climate change on the Antarctic marine ecosystem, we need a good understanding of the current and past biodiversity of the region. The Census of Antarctic Marine Life (www.caml.aq) is a major biodiversity IPY project with the main objective of establishing that benchmark in all realms from pelagic to benthos. This sub-theme included results from CAML and other biodiversity studies, including comparative Arctic studies, obtained using both traditional and modern methods, such as molecular and video image analysis. Papers were encouraged ranging across single species to community or synthesis studies. This session was associated with the marine components of EBA-WP3 and 4.

Sub-theme 4. Patterns and diversity in the terrestrial system

Lead Convener: Satoshi Imura and co-conveners: Mark Stevens, Bart Van de Vijver

The Antarctic terrestrial biome is believed to be one of the simplest systems in the world. Studies on spatial and

temporal variations in diversity in this region provide an important opportunity to increase understanding of the functioning of biological systems across the planet. This sub-theme included species, population and ecosystem level studies on diversity, reproduction and population dynamics. Little known areas (e.g., inland nunataks, subglacial lakes) were also a target of this sub-theme, to clarify the patterns of diversity and biotic composition of unexplored but important areas. This session was associated with the terrestrial component of EBA-WP3 and 4.

Sub-theme 5. Environmental change and the human factor

Lead Convener: Dana Bergstrom and co-conveners: Julian Gutt, Takahiro Iida

Antarctica is often seen as a barometer of global climate and human impacts. Impacts of past, current and predicted future environmental change on ecosystem dynamics, biogeochemical cycles and their interactions are being studied through various approaches, including observations, long-term monitoring and modeling. Human impacts on Antarctic ecosystem function are being addressed within various IPY projects and under the EBA umbrella. Within this sub-theme, long-term climatic changes and other human impacts such as introductions of non-indigenous species and pollutants into Antarctica and the Southern Ocean were discussed. This session was intended to be highly interdisciplinary, including program contributions such as EBA-WP5, ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean) and ALIENS (Aliens in Antarctica).

Sub-theme 6. Outreach and education

Lead Convener: Julie Hall and co-conveners: Takashi Ishimaru, Victoria Wadley

IPY addresses the question, “Why are the polar regions and polar research important to all people on Earth?” The “Outreach and Education” sub-theme was targeted at the primary and secondary education community, young and potential future polar researchers, Arctic communities, the general public and decision-makers. This session encouraged contributions across a wide spectrum of work founded on Antarctic biological disciplines.

4. The Xth SCAR International Biology Symposium and its publication

The final program of the symposium is available at <http://biows.nipr.ac.jp/~plankton/scarbiologysymposium2009/>.

The Symposium was attended by 255 established scientists and post-graduate students from 22 countries. There were 113 oral presentations including six key note talks and 122 poster presentations. The Local Organizing Committee (LOC) and International Steering Committee (ISC) of the symposium decided to publish a special volume for the Symposium, and an agreement was developed with Elsevier for achieving this as a special issue of the journal “Polar Science”. The LOC and ISC established an editorial board to handle the submitted manuscripts for this special issue. The Guest Editors are Mitsuo Fukuchi (Japan: Chief), Dominic Hodgson (UK, [sub-theme 1](#)), Guido di Prisco (Italy, [sub-theme 2](#)), Graham Hosie (Australia, [sub-theme 3](#)), Peter Convey (UK, [sub-theme 4](#)) and Dana Bergstrom (Australia, [sub-theme 5](#)).

A total of 32 manuscripts were submitted by the symposium participants. All manuscripts have been reviewed and edited in accordance with the editorial system of *Polar Science*. Finally, a total of 24 papers are published in this special issue. Some manuscripts, requiring further revision, are not included in this issue but they may subsequently be published in the normal series of “Polar Science”.

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References

- Battaglia, B., Valencia, J., Walt, D.W.H. (Eds.), 1997. *Antarctic Communities – Species, Structure and Survival*. Cambridge University Press, p. 464.
- Carrick, R., Holdgate, M., Prevost, J. (Eds.), 1964. *Biologie Antarctique*. Hermann, p. 651.
- Davison, W., Howard-Williams, C., Broady, P. (Eds.), 2000. *Antarctic Ecosystems: Models for Wider Ecological Understanding*. New Zealand Natural Science, p. 334.
- EBA. <http://www.eba.aq/>.
- Holdgate, M.W. (Ed.), 1970. *Antarctic Ecology*, vol. 1 Part I to Part IX, vol. 2 Part X to Part XIV. Academic Press, p. 998.
- Huiskes, A.H.L., Gieskes, W.W.C., Rozema, J., Schorono, R.M.L., van der Vies, A.M., Wolff, W.J. (Eds.), 2003. *Antarctic Biology in a Global Context*. Backhuys Publishers, p. 338.
- Kerry, K.R., Hempel, G. (Eds.), 1990. *Antarctic Ecosystems – Ecological Change and Conservation*. Springer-Verlag, p. 427.
- Llno, G.A. (Ed.), 1977. *Adaptations within Antarctic Ecosystems – Proceedings of the Third SCAR Symposium on Antarctic Biology*. Gulf Publishing Company, p. 1252.
- IXth Symposium on Evolution and Biodiversity in Antarctica, Curitiba 2005 *Antarctic Science*, vol. 19, issue 2, pp. 145–281, 2007.
- Siegfried, W.R., Condy, P.R., and Laws, R.M., (editor), 1985. *“Antarctic Nutrient Cycles and Food Web”* Springer-Verlag, p. 700.

