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## The role of IUPS in encouraging quality education in physiology

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Across the world, research in physiology is ongoing, supported by the International Union of Physiological Sciences (IUPS). It is a core basic science that reaches from molecules to cells, organs and systems and communities. The new knowledge is disseminated widely through journals, meetings, and the four-yearly IUPS congresses. The IUPS is committed to ensuring that its members are provided not only with opportunities to access developments in science but also to learn about new and effective methods of teaching and learning physiology. At the most recent congress of the International Council of Scientific Unions meeting in Suzhou, China in 2005, representatives from other scientific unions expressed considerable interest in the educational work of IUPS.

Since the 1970s, there has been a growing commitment by IUPS to assist physiology teachers, particularly in colleges and universities, to stimulate their interest, and to enhance their understanding of relevant educational processes. The Education Committee supports them through workshops, meetings, and access to teaching materials. Participants in these activities have come from a wide range of countries. During the past decade an IUPS teaching listserv moderated by

Adrianta Surjadhana (Indonesia) has provided continuous communication and support among colleagues around the world.

Perhaps the earliest education-related workshop supported by IUPS occurred in 1977 in New Delhi, India. The aim of this two-week event was to define educational objectives for physiology programs in the context of medicine. Ainslie Iggo (UK) and Ann Sefton (Australia) contributed to the design beforehand and participated actively. Stimulating discussions developed as the participants focused on applying the most recent scientific and educational evidence in a context of local needs.

Since then, members of the Committee have collaborated internationally to design and lead workshops, present symposia and posters, and give plenary lectures at national and regional physiological society meetings. These have been offered consistently at meetings of the American and the Federation of Asian and Oceanian Physiological Societies. In addition, during the past three decades Education Committee members have organized educational events in this partial list of countries: Africa (Kenya, Morocco, South Africa, Sudan); Asia (India, Japan, Java, Paki-

stan) ; The Americas (Brazil, Canada, Chile, Costa Rica, Grenada, Jamaica) ; Europe (Czech Republic, Great Britain, Hungary, The Netherlands, Norway).

Since 1986 IUPS “satellite” teaching workshops have been a feature of all but one congress (Vancouver), and planning for 2009 in Kobe is now well in hand. It is gratifying that some of the participants in the first workshop 23 years ago will be attending the upcoming one in Japan. All these workshops have adopted “best practice” in ensuring that participants have opportunities to contribute to programming that effectively meets their needs.

The first workshop, led by Ann Sefton (Australia), was held in Australia prior to the 1986 Sydney congress at Jenolan Caves House. Participants came from across the world, including five Chinese physiologists, the first for many years to attend an IUPS event. At that time early literature was developing to enhance the quality and effectiveness of post-high school education in universities and colleges. The focus was beginning to shift from “teaching as telling” to engaging students’ interest and stimulating active learning focused on understanding rather than memorization. This workshop was notable in offering many participants their first view of the educational use of computers for practical classroom experiments and exercises. Joel Michael and the late Alan Rovick (both USA) demonstrated their potential for encouraging and supporting learning. For those present it was a revelation! Other highlights included opportunities for informal discussion with colleagues from many countries, the chance to share common problems and experiences, and the unique venue. The site included heritage-listed limestone caves in the mountains west of Sydney, and the participants enjoyed a

tour of one cave system.

The subsequent workshop in 1989 was held in Kuopio, Finland, prior to the Helsinki congress. Keith Cooper (Canada) chaired the Education Commission and the local organiser was Osmo Hanninen. Issues of concern discussed by participants included active learning for understanding ; physiology teaching in non-medical contexts ; possibilities for international cooperation ; training and careers of postgraduate, postdoctoral and infrastructural personnel ; the role of practical classes in physiology. Many of the themes considered at that time recur in later workshops, as infrastructure improved and high-quality educational research was providing new ways of thinking about teaching and learning.

Following the Kuopio workshop, Education Commission members under the leadership of Keith Cooper (Canada) produced a book of practical experiments that could be carried out with minimal equipment. It proved to be popular and useful, particularly in parts of the world with limited infrastructure and physiology teachers who were untrained and unsupported in their educational roles. The Education Committee is currently completing work on a revised, web-based version titled *Physiology for the 21<sup>st</sup> Century : A sourcebook of effective and economical experiments*, a collection of inexpensive, low-tech, inquiry-focused lab and classroom activities. The project involves physiologists from every continent, and is being led by Dee Silverthorn (USA) and supported with funding from IUPS and the U.S. National Science Foundation.

The next workshop was held in Inverness in 1993, in association with the Glasgow congress, again led by Keith Cooper. Somewhat to the surprise of those attending, Princess Anne paid a for-

mal visit to the workshop, joining in group discussions, talking to participants and studying the posters with interest. Working groups discussed ways to encourage “active learning”, approaches for students in non-medical programs, and international cooperation. The suggestion was first made here to regionalise IUPS’s educational effort, targeting Africa, Asia-Pacific, Central and South America, and Eastern Europe. In implementing that recommendation, responses to date in the different regions have varied considerably but the endeavour has overall been a success.

In 1997, after the St. Petersburg congress, another workshop was held at Repino, Russia, led by George Somjen (USA). In their strongly-positive evaluation of the workshop, participants particularly praised the level of interest and stimulation, the opportunity to share experiences with people from around the world with similar concerns and ideas, the organization, and the venue’s atmosphere. Small groups worked on the practical and ethical issues of student animal experimentation; computer-based, problem-based, community-based, and active learning; and theories of learning. Hands-on computer experience was offered and widely taken up.

Lincoln, New Zealand, was the site of the following workshop prior to the Christchurch congress in 2001. Integrating clinical and basic sciences, the developing importance of information technologies, and problem-based learning were among the topics actively debated. Ann Sefton (Australia) and Penny Hansen (Canada) led the meeting. There were opportunities to explore the new and more sophisticated technologies, and

there was a lively and informative session on students’ learning styles.

The meeting associated with the most recent congress in 2005 was held in Pali Mountain, California, USA. The workshop was planned and led collaboratively by a core group of Education Committee members. Participants formed working groups that continued and extended previous workshop topics. At this time the Education Committee was reformulated with 22 members representing six continents.

The latter three meetings were fully reported in *Advances in Physiol. Educ.*: Sefton A, Somjen G, Hansen P (1997) Workshop on Teaching, International Union of Physiology Sciences, Repino, Russia, S21–30; Sefton, A Jervie and Hansen P (2002) International Union of Physiological Sciences Teaching Workshop, August 21–24, 2001, Lincoln University, Lincoln, New Zealand, **26**: 59–65; Hansen P and Sefton A Jervie (2005) International Union of Physiological Sciences Teaching Workshop, 2005, **29**: 216–226—all available on-line at <http://advan.physiology.org>.

This brief history of successful international workshops and meetings on physiology education indicates the importance IUPS puts on developing excellence in teaching and learning, as well as in research. There is now a robust international network of physiologists who strive to review the quality of education that they offer, to develop and validate new methods of teaching and learning, and to share experiences with colleagues from across the world.