IUPS—a Family of Physiologists

University of Konstanz
Department of Biology c/o Hofer
Germany

First Vice President
Irene Schulz-Hofer

family
[1]a group of people living under one roof and usually under one head
[2] a group of persons of common ancestry
[3]a group of people united by certain convictions or a common affiliation

Merriam-Webster Dictionary

The International Union of Physiological Sciences, or IUPS, is an organization that unites physiologists from all parts in the world. But is it a family of physiologists? We usually picture a "familiy" as members of a social group consisting of parents and their offsprings, or, in the wider sense, descendents from a common ancestor. A familiy typically demonstrates a strong feeling of unity, harmony and solidarity between its members, who share common goals and values and have long-term commitments to one another. In general members of a family are also expected to stand up for each other. Generally, the unifying objectives of a family are to increase wealth, recognition and influence. In some old families with long tradition members bear a familiy coat of arms as a symbol of their bond (see the signet of IUPS on top). In a family, children commonly receive special attention as they require a notion of being protected and should receive care, help, good education, and the mediation of ethical principles in order to be well prepared to live in a community and to maintain their standing as dignified and respected citizens in their personal future, which also constitutes the future of the family. Many of these definitions also apply to IUPS, although we are scattered across all corners of the globe and do not even (necessarily) speak the same language. Scientifically, we usually communicate in English but communication is more than verbal, it also entails the interaction of physiologists from different background in respect of their scientific knowledge, new insights and further approaches to the understanding of life. Scientific interaction between physiologists from all countries is facilitated by meetings and International Congresses and by publication in scientific journals (see also "Physiology", the journal of IUPS published in cooperation with the American Physiological Society at http://physiologyonline.physiology.org/).

Some eighty thousand years are supposed to have existed between paleolithic and neolithic man. Yet in all that time he only learned to grind his flint stones instead of chipping them...Ten years now go further than a thousand then, not so much on account of our finer intellects as because the light we have shows us the

way to more.

Arthur Conan Doyle

The history of IUPS dates back to 1889 when the first International Congress of Physiological Sciences was organized in Basel/Switzerland. Subsequently, such congresses were held every 3 years. In 1953 the International Union of Physiological Sciences, IUPS, was launched in Montreal/Canada with founding societies from 17 countries. The number of member societies continually increased and they now number 52. In addition, IUPS has associate-, supporting-, affiliate-, regional- and special members (see www.iups.org). IUPS itself is one of the Scientific Union Members of the International Council of Sciences (ICSU) and is corporate member of the International Council for the Organization of Medical Sciences (CIOMS) and of the International Council of Laboratory Animal Sciences (ICLAS) thus forming a family cluster of organizations with similar aims and objectives.

One objective of IUPS is to encourage the advancement of the physiological sciences by increasing the understanding of the function of cells, tissues, organs, and organ systems of humans and animals. Another objective is to provide a forum for physiologists from around the world that transcends their national or political backgrounds in order to facilitate the dissemination of knowledge in the field of physioloy by the promotion of International Congresses of Physiological Sciences. A third goal is to contribute to and to support the development of physiological sciences in developing countries.

The test of a man or woman's breeding is how they behave in a quarrel. Anybody can behave well when things are going smoothly.

George Bernard Shaw

Since the first International Congress in Basel, changes have taken place in the scientific world and challenged the objectives and very concept of the IUPS family in several ways. One problem was the intrusion of political and national concerns. After World War I, the 10th International Congress of Physiologists was held in Paris in 1920. The Paris Congress did not allow Germans and scientists from some other nationalities to participate. Three years later, the Edinburgh Congress in 1923 rectified this situation and began to re-establish the universality of physiological sciences and of its congresses. However, Edinburgh was, in turn, largely boycotted by the French. Finally, the International Council of Science (ICSU, which comes from the original name "International Council of Scientific Unions") was established in 1931. It arose primarily out of the chaos in the academic world after World War I, which had adversely affected IUPS congresses for some years. The ICSU Statutes established the principle of the Universality of Sciences and defended the uninhibited mobility of scientists in connection with international scientific activities without any discrimination in respect of their citizenship, religion, political views, ethnic origin, skin color, language, age or sex (see www.icsu.org). IUPS as Member of ICSU strongly supports these principles. In 2002 the Council of IUPS reapproved this statement and rejected the call for an academic boycott of Israel by a group of European academics. The memorandum was signed by the President at that time, Allen W. Cowley, jr. and the Secretary General, Ole H. Petersen, in the name of IUPS ensuring that all its activities will remain open to full participation of scholars of all backgrounds and nationalities.

Everybody likes to go their own way—to choose their own time and manner of devotion.

Jane Austen

A second challenge to IUPS as an organization representing the whole family of physiologists was the diversification in scientific areas. The emergence of the term "Biochemistry" from a field formerly called "Physiological Chemistry" may serve as an early example. Physiological sciences were divided into separate organ- or organelle-oriented disciplines that were frequently reported on in organ- and organelle-oriented journals. These specialized groups of physiologists quite often come from wealthy countries and are capable of organizing their own meetings, the size of which is comparable to that of international congresses. Consequently, the organization of such groups inherently call into question the need for international congresses in general physiology. We have to realize, however, that many physiologists require the support of large international forums because they come from underdeveloped or developing countries or countries facing political upheaval and where wars, political oppression and poverty exist. IUPS is dedicated to helping the physiologists in these countries in their efforts to advance science. IUPS has decided that International Congresses must be continued but it also continues to recognize the Physiological Sciences' need for small highly specialized areas.

In order to address the need for both universal congresses and specialization, IUPS decided in 2001 to reorganize and to reform their 30 commissions into a more compact and efficient group composed of only eight commissions dealing with "locomotion", "circulation, respiration", "endocrine reproduction development", "neurobiology", "secretion and absorption", "molecular and cellular physiology", "comparative physiology: evolution, adaptation and environment", "genomics and biodiversity". Each commission comprises between two and five sections (see www.iups.org). In addition there is an "Ethics Committee" as well as two committees to address issues relating to "Education" and "Physiome" These committees have special responsibilities for designing and implementing future programs. The teaching committee co-chaired by Ann Sefton and Penny Hansen develops programs to communicate concepts of modern education in workshops across the world, with a special focus on developing countries where access to physiological research is often limited. They also focus on ways for students to develop their own experimental design and to solve physiological questions even with the simplest equipment or none at all. The Ethics Committee acts as the "con-*science*" of IUPS. It drafts ethical standards not only in respect of experiments involving live animals, but also in respect of the freedoms, rights and responsibilities of scientists.

Science cannot resolve moral conflicts, but it can help to more accurately frame the debates about those conflicts.

Heinz Pagels

Ethical codes and standards may be diverse, even within a family but even more between scientists and people acting outside the scientific world. In the last 30 to 40 years, strong anti-vivisectionist movements have hindered research involving live animals. At most universities physiology is no longer taught in practical courses in which live animals are used. Methods such as cultured cells have been applied as an alternative to study physiological phenomena and to simulate processes in whole organs, but they can hardly replace a beating heart or a breathing lung. A climate of fear has led to delays or even suspension in the establishment of animal research centers. In 2001 the IUPS Congress in Christchurch was faced to demonstrations of anti-vivisectionists who disturbed the conference. This, however, is

just one example of the many commonly known demonstrations of the sort. In "The ethics of life" (1997), edited by D. Noble and J. D. Vincent, and based on a sympsosium organized by IUPS and UNESCO in Paris, fundamental questions are addressed relating to physiological research, its higher ethical justifications and its limitations. IUPS is aware of the ethical dilemmas to study life on live animals. At the international level, Ethical Guidelines for Biomedical Research have been established and published by the Council for International Organization of Medical Sciences (CIOMS) to which also IUPS adheres. However, no progress in the understanding of how organisms function can be made without experiments involving live animals. It goes without saying that these esperiments should be conducted using the highest scientific standards and with respect for life.

The past and the present are within the field of my inquiry, but what a man may do in the future is a hard question to answer.

Arthur Conan Doyle

What will the future of physiology hold? Physiologists try to understand how cells, organs and whole organisms function and how they interact with each other. The discovery of new methods continuously improved scientists' ability to study living systems in more detail, from the entire body, to organs, to cells, to proteins and, finally, to genes. The human genome has now been mapped, but most of the questions how cells, organs and whole organisms function and how they interact with each other have not yet been answered. We know that proteins are translated from genes (whose composition we know), but we are not yet able to identify and classify all proteins nor do we know the function of most of them. In order to specifically address these issues, the IUPS Council has established two new committees the "Long Range Planning Committee" (2005) which is chaired by Denis Noble (see http://www.iups.org/Sections/Communications/FinalLRPCReport.pdf) and the Committee on the Physiome and Bioengineering, which is co-chaired by Peter Hunter and Aleksander Popel. The Long Range Planning Committee submitted a report to the Council at their meeting in 2007. The report is still open for discussion and recommandations from member societies, and it will be the topic of further disussion at the next Council meeting and subsequently presented to the General Assembly for approval at the next IUPS Congress in Kyoto in 2009. The report recommends a re-orientation of priorities in physiological sciences to meet the challenge of "Systems Biology". Physiology is described in the report as the fundamental science which provides the basis for all other life sciences including medicine. The report therefore places physiology as the key discipline among biological sciences and postulates that physiologists have a special responsibility for future advances in the post-genomic era since physiological interpretation of genomic data requires insight into higher functional levels. The purpose of the recently-established IUPS "Physiome" project is to develop databases and computational models (e.g. in respect of microcirculation, the musculo-skeletal system of the heart, lungs etc.) which facilitate the understanding of the integrative function of cells, organs and organisms (see also Physiome Project http://www.physiome.org).

…. *if you have big ideas you have to use big words to express them, haven't you?*

Lucy Maud Montgomery

The Long Range Planning Committee recommended to encourage physiologists to approach

the topic of "Systems Biology". This term refers to the integration of the lower level functions with those of the higher levels similar to the approach of physiological genomics to integrative physiology in the "Physiome Project". IUPS and member societies should find ways to establish productive interactions with other disciplines, this includes- *inter alia*- such areas as structural biology, biophysics and clinical medicine. To most scientists working in experimental life sciences the question how life functions at higher levels is crucial. In the beginning of the 20th century until the middle of the 20th century, physiology was mainly organ physiology and *in vivo* animal research. This research was mainly descriptive, as researchers lacked the methods and tools to study mechanisms at cellular levels, such as secretion or absorption of ions and solutes. With the application of micropuncture-, microperfusion-electrophysiological- and imaging methods, it was possible to study ion channels and-transporters on the cellular and even on the molecular level. The Long Range Planning Committee suggests that the time has come to advance functional genomic research to organs in respect of the fields of health and disease.

I find the great thing in this world is not so much where we stand, as in what direction we are moving

Oliver Wendell Holmes

As in real families, the support and encouragement of young scientists should be one of the primary duty of a scientific family. Developing the technologies and programs to solve the problems of the future will be the task of the forthcoming generation of physiologists. We should not wonder if their solutions will be somewhat different from our present ideas and expectations. The upcoming 36th Congress of International Unions from July 27 to August 1, 2009 in Kyoto/Japan with the title : "Function of Life : Elements and Integration" (see also http://www.iups2009.com) will present an excellent opportunity to review the recent advances and developments in physiology and to examine possible avenues for the future of physiology. It will also provide an opportunity to meet the next generation in our discipline. Young scientists are encouraged to participate and will be supported by travel grants. We look forward to IUPS' next "family reunion" and hope that many of its family members will find their way "home" to the IUPS Congress 2009 in Kyoto/Japan.