50th Anniversary of the
SWISS SOCIETY OF PHARMACOLOGY AND TOXICOLOGY

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Initials at the beginning of a paragraph indicate contributions made by one or more of the above authors. The text has been edited for reasons of style.
Foreword

This brochure describes the key aspects of the Swiss Society of Pharmacology and Toxicology (SSPT) during its fifty years of activity. While the Society has undergone many changes over the years, its main focus remains two-fold; that of promoting the contributions of pharmacology and toxicology in research as well as in teaching and, occasionally - perhaps too rarely - providing advice on drugs and chemicals to governmental agencies and to pharmaceutical and other industries. Our members come from academia as well as from industry.

The Council has appropriately chosen professor Urs Rüegg to be the historian of the Society. In many ways, he represents the typical modern pharmacologist, since he trained as a chemist, and then completed a doctoral thesis in molecular biology, worked as a post-doctoral fellow on cell biology, followed by 3 years of receptor research at Geneva University and 12 years as researcher and team leader in the pharmaceutical industry in Basel. Thus, he learned pharmacology by doing it. In 1992, he became a full Professor of Pharmacology at the Lausanne School of Pharmacy, and in 2004 moved to the University of Geneva from where he retired in 2012. During his Presidency of the SSPT from 1995 to 2000 he was untiring in his efforts to support the Society. By organizing annual meetings, some of them with other national Societies, he increased membership numbers and stimulated greater awareness of the fields of both pharmacology and toxicology. In 1999 he initiated and chaired the committee responsible for evaluating the contribution of, and proposing future scenarios for toxicology in Switzerland.

I hope the reader of this brochure will enjoy looking back over the history of our Society. In the future, the Society must continue to play a central role in forming pharmacologists and toxicologists able to interpret the multi-level reactions that occur when chemicals interact with biological systems. At the same time, the Society must encourage the development and study of pharmacology and toxicology as they are vital elements in transmitting knowledge to students and stimulating their curiosity in medical faculties and pharmacy schools.

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Introduction

In general and in a quantitative manner, pharmacologists and toxicologists investigate the mechanism of action and effects of bioactive compounds on biological systems. Pharmacologists aim to exploit the beneficial properties of these interactions by identifying their potential use as therapeutics, while toxicologists characterize the compound-associated hazards for humans and animals, as well as for the environment. Clinical pharmacologists and toxicologists concentrate on the beneficial and adverse effects of drugs and poisons.

Switzerland is one of the world's leading nations in research and development of pharmaceuticals. In 2014, Novartis and Hoffmann-La Roche were among the four largest companies in the world, while Actelion, founded 20 years ago, has become the largest European biotech company. Other fine chemicals are produced by Clariant, Ciba-Specialty (renamed BASF Schweiz AG) and Syngenta; Nestlé is a major manufacturer of nutritional products.

Such a degree of economic success and international competitiveness is the result of higher education and accumulated know-how, including the areas of pharmacological research, pharmaceutical development, safety evaluation and risk assessment. Scientists with profound and wide-ranging expertise are educated in academic institutions that include five medical faculties and nine faculties of science in Swiss universities as well as the Zurich- and Lausanne-based Federal Institutes of Technology, the ETH-Z & the EPF-L.

Worldwide, Higher Learning Institutions are evaluated annually by different ranking procedures that assess scientific output and the student's perception of the quality of teaching. In a recent article in The Economist that was cited by the Swiss weekly journal L'Hébdo (2 April 2015), the Shanghai ranking was used to classify countries not...
only by their absolute positions, but also by positions of scientific standing relative to each country's population. On that basis, Switzerland was in first position before Sweden, the Netherlands, Australia, the USA, and the UK, followed by Canada and France. The ETH-Z & EPF-L, as well as the Universities of Zurich, Geneva, and Basel were included in this classification (plus - of course - the population of about 8 million).

At this point, should I continue boasting about Swiss institutions? Let's look at some of the scientific output. In a paper entitled 'The Scientific Wealth of Nations', the British journalist Robert May looked at the Science Citation Index and assessed publications over a 14-year period (from 1981 to 1994) totaling 72 million citations (Science 275, 793-796; 1997). He then listed the countries with respect to numbers of papers and citations. Not surprisingly, the USA was first, totaling about 30% of papers and almost 50% of citations. However, when the citations were ranked relative to the number of national inhabitants, and the different scientific disciplines were listed, it turned out that Switzerland was first in immunology, molecular biology, physics and - importantly – pharmacology. It was second in astrophysics, biochemistry, chemistry and microbiology, as shown in Table 1 below.

### Table 1. Comparative citations as expressed by the RCA and a measure of quality (RCI). The top three countries are ranked by their share of the world's citations and their RCI in each field.

<table>
<thead>
<tr>
<th>Field</th>
<th>RCA</th>
<th>RCI</th>
<th>By total citations</th>
<th>By RCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astrophysics</td>
<td>1.06</td>
<td>1.13</td>
<td>US, UK, DE</td>
<td>US, CH, NL</td>
</tr>
<tr>
<td>Biology &amp; Biochemistry</td>
<td>0.96</td>
<td>1.05</td>
<td>US, UK, JP</td>
<td>US, CH, SW</td>
</tr>
<tr>
<td>Chemistry</td>
<td>0.87</td>
<td>1.22</td>
<td>US, JP, DE</td>
<td>US, CH, IL</td>
</tr>
<tr>
<td>Clinical medicine</td>
<td>1.22</td>
<td>1.10</td>
<td>US, UK, CA</td>
<td>US, CA, UK</td>
</tr>
<tr>
<td>Computer science</td>
<td>0.65</td>
<td>0.69</td>
<td>US, UK, CA</td>
<td>IS, US, CH</td>
</tr>
<tr>
<td>Immunology</td>
<td>0.96</td>
<td>0.96</td>
<td>US, UK, FR</td>
<td>CH, US, BE</td>
</tr>
<tr>
<td>Microbiology</td>
<td>1.09</td>
<td>1.02</td>
<td>US, UK, DE</td>
<td>US, CH, UK</td>
</tr>
<tr>
<td>Molecular Biol. &amp; Genetics</td>
<td>1.03</td>
<td>1.05</td>
<td>US, UK, DE</td>
<td>CH, US, DE</td>
</tr>
<tr>
<td>Neuroscience</td>
<td>1.12</td>
<td>1.13</td>
<td>US, UK, CA</td>
<td>SW, US, CH</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>1.27</td>
<td>1.37</td>
<td>US, UK, JP</td>
<td>CH, NZ, UK</td>
</tr>
<tr>
<td>Physics</td>
<td>0.67</td>
<td>1.09</td>
<td>US, DE, JP</td>
<td>CH, DE, US</td>
</tr>
</tbody>
</table>

Similar principles were applied and published by D.A. King (“The scientific impact of nations.” Nature 430, 311-316; 2004). Again, Switzerland was first in citation rate per inhabitant (see Table 2 in King).

What could be the reason for this success? Probably, it is due to the fact that Switzerland invests generously into research and teaching, and that the main criteria in choosing projects are quality and innovative potential; these are key factors, as one never knows in advance what kind of research orientation will lead to a major scientific breakthrough. In addition, our system is based on a relatively non-elitist hierarchical pyramid. As a matter of fact, it quite often happens that one meets Ministers or even the President of Switzerland on public transportation, such as trains or trams. The access to these people is relatively easy. Even in the Swiss army, ranks are often less important than expertise. So much for the chauvinistic part of this text.
Development of the SSPT from 1965 to 2015

In view of the major role played by pharmaceuticals, and therefore by pharmacology and toxicology, it is astonishing that the Society was only founded in 1965. Professor Marcel Bickel mentioned this in his report on the occasion of the 25th anniversary in 1990. He saw this in a historical context, when pharmacology used to be merely an appendix of physiology within academic institutions, just as biochemistry used to be an appendix of chemistry. Furthermore, his report described the early history of the society, noting its growing membership, council composition and contacts with other societies. In the following, this period is briefly summarized, based in part on the text written by professor Bickel.

Professor Peter Waser from the University of Zurich put together a preliminary council of the SSPT at an assembly in November 1964. Table 2 at the end of this text shows its composition at that time and up to 2014. The first members' meeting was held in Basel in May 1965 with about 30 members and, at that point, the Society took off.

The aim of the Society, as defined in the by-laws was to defend and integrate the interests of pharmacology and toxicology in education and research in Switzerland, and to make contacts with other societies abroad having similar interests. The annual meetings were held in turn in one of the cities having an academic pharmacological or toxicological institution. At first, communication depended on talks; later on, the predominant medium became posters and this is still the case.

Soon after its foundation, the SSPT became a member of the International Union of Basic and Clinical Pharmacology (IUPHAR; www.iuphar.org). Several SSPT council members have served as IUPHAR officers, namely Peter G. Waser (treasurer 1972-78, president 1978-81), Gerhard Zbinden (councilor 1975-78, treasurer 1981-84), Alfred Pletscher (treasurer 1984-87, vice-president 1987-90) and Urs Rüegg (treasurer 2006-2014). As can be seen, IUPHAR likes Swiss treasurers.

Apart from its connection with IUPHAR, the SSPT collaborated with other National Societies, namely the German, French, British, US-American and Canadian ones. The main activity was to hold joint meetings either in Switzerland or in one of the partner countries. A memorable event was the joint Canadian-Swiss Pharmacological Society meeting held in Zermatt in 1999, which brought together many colleagues in pharmacology from the two nations. The SSPT was instrumental in setting up the Austrian Pharmacological Society in 1997-98, whose founding council members came mostly from the University of Graz.

Regarding other contacts, the SSPT was rather critical about the creation of the Federation of European Pharmacological Societies in 1990 (EPHAR) and was reluctant in joining it. Toxicologists have been in close contact with the International Society of Toxicology (IUTOX) and EUROTOX.

In 1969, the SSPT became one of the founding members of the Union of Swiss Societies of Experimental Biology (USSBE, USGEB). In 2013, the USSBE/USGEB was designated LS2, which stands for “Life Sciences Switzerland”, see: www.naturalsciences.ch/organisations/ls2/home. Also in 1969, the SSPT became a member of the Swiss Academy of Sciences (SCNAT).

In 2005, the council decided to split the SSPT into three societies: One for experimental pharmacology, one for clinical pharmacology, and one for toxicology. These societies have their own by-laws and councils but are each constituents of the SSPT, whose president rotates bi-annually between the 3 constituent societies (www.swisspharmtox.ch). The division into separate societies not only led to an
increase in total membership but, more importantly, also gave the newly formed societies more independence and flexibility with regard to national and international contacts. Both the clinical pharmacologists and the toxicologists have been very successful in increasing awareness and interest in their domains by creating educational programs and holding meetings, often in conjunction with Swiss internal medicine meetings or together with other toxicological societies. In 2006, the Swiss Society of Pharmaceutical Medicine (SGPM) also joined the SSPT (Table 2).

**Educational Activities**

Within the universities and, especially in the pharmacy schools, Continuing Education programs were established and are ongoing. This was initiated in the early 1990s in Lausanne by Urs Rüegg and later expanded to Geneva and Basel. Whole day courses or 2-hour evening lectures are held at the universities. Participants are mainly pharmacists and the maximum attendance ever reached was close to 200 for evening sessions. At the University of Basel, Karl Hofbauer introduced such a program in 2001 that was very successful. A year later, together with Stephan Krähenbühl, he also initiated biannual seminars in pharmacology for pharmacists and physicians called “Pharmathemen”. Since 2007, these seminars have been organized by Jürgen Drewe and Christoph Meier. The Swiss Society for Clinical Pharmacology and Toxicology organizes annual one-day courses entitled “Progress in Pharmacology” sponsored by Pfizer (and therefore called “Pfizer Meetings”). These have taken place since 2004 under the auspices of the SSPT and are organized by Uwe Simon and Leonardo Scapozza.

Successful collaboration regarding education in the domain of pharmacological safety was initiated by Friedlieb Pfannkuch. Today, the annual course is a well-established part of the Modular Training Program in Toxicology of the “Deutsche Gesellschaft für Pharmakologie und Toxikologie” and provides an overview of the relevant aspects of physiology, as well as standard tests designed to investigate the effects of drugs on these systems.

**Sponsoring and prizes**

The SSPT provides financial support for young scientists wishing to attend scientific meetings or to undertake short stays in laboratories for technology-transfer, i.e. to familiarize themselves with other techniques.

The Bürgi prize is allocated annually to young scientists for the best publication. The prize is named after Emil Bürgi, who was director of the Pharmacological Institute in Bern from 1906-1942. Uwe Simon heads the nomination Committee.

In 1996, Urs Rüegg introduced the Novartis award for the best talks or posters by young scientists. The award is given annually to three recipients. This tradition continues with the NIBR (Novartis Institutes of Biomedical Research) prize.

On several occasions, the SSPT has attempted to set up a formal teaching structure for pharmacologists, as is the case in the UK and the USA. However, enthusiasm faded, mostly due to lack of interest among the students.

Furthermore, the SSPT has attempted to assist search committees for the nomination of future pharmacologists in the universities. Letters were sent to chairpersons of the committees; these had some effect, but SSPT council members were never invited to be part of search committees.

Since the 1970s, examinations at the five medical faculties have been coordinated regarding time, place and content in order to ensure standardization of requirements. Senior teaching staff members of the five medical faculties meet on a yearly basis to produce a questionnaire with multiple-choice questions. This has
resulted not only in achieving greater examination standardization, but has also led to the attainment of comparable teaching standards, which was not the case before. Finally, this brings representatives from the five medical faculties into closer contact.

**Toxicology**

The Swiss Society of Toxicology (SST; www.swisstox.ch) celebrates its 10th anniversary this year.

**WL & BS/** Although the ultimate closure of the Institute of Toxicology of the ETH-Z and the University of Zürich in Schwerzenbach only took place in 2001, the SSPT started analyzing the situation in 1999. Urs Rüegg, Beat Schmid, Christian Hodel and Peter Meier-Abt prepared a report in 2000 on the state of toxicology in Switzerland on behalf of the Academies and the Swiss Science Council. In this report, a detailed analysis described the current state of toxicology and the role of toxicologists in academia and industry. The conclusions were that most researchers in this field work in industry, that this field annually required 2-4 experts, and that academia should provide the framework for training these specialists. It also proposed that a network should be created that provides the structural basis and the educators. Ways to strengthen academic toxicology were further analyzed during 2000-2004 by the steering committee “SwissTOX” of the Swiss Academy of Medical Sciences that was composed of Walter Lichtensteiger, Urs Rüegg & Beat Schmid and members from academia, the Swiss Office of Health and Environment, and industry.

The center for “Xenobiotic and Environmental Risk Research” (XERR) was established in Zurich in 1999 under the leadership of Walter Lichtensteiger. This center had 30 collaborating research groups from all fields of chemical risk research, including experimental and clinical environmental hygiene and risk assessment, occupational medicine, forensic medicine, radiobiology and biotechnology (for more information, see: www.unizh.envtox/netmem.htm).

The emergence of the field of endocrine disruptors led the Swiss National Science Foundation to implement the National Research Program 50 (NRP50) with a budget of CHF 15 million from 2002-2007. This program was extremely successful and led to many applications, especially regarding the safety of cosmetics, sunscreens, drugs and food. A new platform called Pan-Swiss focuses interest on xenobiotics via their webpage: http://panswiss.org/.

In 2000, in order to encourage more national involvement, Margret Schlumpf contacted Ruth Gonseth, a dermatologist and member of the National Parliament. She submitted a motion to the National Council, and her successor, Maya Graf, followed up in 2002 (“Unabhängige Toxikologie-Forschung in der Schweiz”; “Toxicologie: Pour une recherche indépendante en Suisse”), requesting information from the government on how independent teaching and research concerning toxicology and training of toxicologists should be ensured in the future. Based on proposals made by a governmental committee, that included Walter Lichtensteiger as representative of SwissTOX, the Swiss Federal Council decided in 2007 to create two toxicology centers, one for ecotoxicology and one for human toxicology.

The Swiss Centre for Applied Ecotoxicology was opened in 2008 with laboratories at the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) in Dübendorf, and at the Swiss Federal Institute of Technology in Lausanne (EPF-L). It has a federal mandate to strengthen independent research and to advise and train in the field of ecotoxicology. The Ecotox Center, headed by Inge Werner, is involved in numerous application-oriented scientific projects on ecotoxicological risk assessment and the development and optimization of test methods, mostly in collaboration with
partners from relevant authorities, Cantonal bodies and industry (see www.oekotoxzentrum.ch).

Following an application by Denis Hochstrasser, University of Geneva, and Stephan Krähenbühl, University of Basel, the Swiss Centre for Applied Human Toxicology (SCAHT) was founded in November 2009. It was established by an agreement between the Swiss Federal government, Swissmedic, and the Universities of Basel and Geneva. Martin Wilks is the director. Partly in collaboration with the XERR, the SCAHT has successfully implemented its education and training programs that are designed to meet the diverse needs of academia, regulatory agencies and industry. The Center contributes to graduate and postgraduate education as well as continuous professional development by transmitting knowledge, skills and practical experience, leading to recognized qualifications (see www.scaht.org).

During the period between 2001 (closure of the Institute of Toxicology in Schwerzenbach) and the inauguration of the two Swiss centres for eco- and human toxicology in 2008/2009, the SSPT and the SST, supported by organizations such as the XERR, undertook to fill the gap left by the missing structures.

As a consequence of the renewed interest in toxicology, the University of Zurich created a professorship of human toxicology for Michael Arand, successor of Walter Lichtensteiger, and of forensic pharmacology/toxicology for Thomas Krämer at the Institute of Forensic Medicine. Hanspeter Naegeli represents veterinary toxicology. At the ETH Zurich, Konrad Hungerbühler represents safety and environmental technology, while Rik Eggen from the EAWAG works on ecotoxicology, and Shana J. Sturla focuses on food and nutrition toxicology. The University of Basel created a professorship of molecular and systems toxicology; Alex Odermatt was chosen for that position. Stephan Krähenbühl of the Department of Biomedicine in Basel is also an active contributor to toxicology. At the University of Berne, Helmut Segner represents ecotoxicology.

The SST organizes annual meetings, with increasing numbers of participants. In addition, about 30 colloquia on toxicology have been organized at Basel University.

**Swiss Register of Toxicology**

**BS&WL/** The Swiss Register of Toxicology was created in 1995. Christian Hodel (1936-2003) always stressed the importance of academic teaching to graduate and postgraduate trainees in toxicology in Switzerland. His influence, combined with his multiple links with the European Register, made him an important driving force behind this successful project. About 135 experts have been registered so far.

As similar criteria for admission to the Swiss Register were used as those established by EUROTOX, it has been recognized by EUROTOX, and toxicologists registered in Switzerland are permitted to use the title “European Registered Toxicologist”.

**Tox Info Suisse**

**HK/** In 1966, the Swiss Association of Pharmacists (now Pharmasuisse) founded the Swiss Toxicological Information Center (STIC). In 2015, the foundation changed its name to Tox Info Suisse. Besides its tasks as a national poison center, the "Tox Zentrum" has developed research activities in the fields of epidemiology, clinical effects and dose-effect relationships in acute human poisoning under the leadership of Franz Borbély, Josef Velvart, Peter Meier-Abt and Hugo Kupferschmidt.
Scientific Achievements of Members of the SSPT

Below are listed a few of the accomplishments by pharmacologists in Switzerland that I consider to be important milestones. Of course, this is highly personal and subjective.

1. **Walther Wilbrandt**, Director of the Bern Institute of Pharmacology from 1944 until 1972, worked on digitalis and described the cardiac “Na-Ca antagonism” regulating contraction in frog muscle. The mechanism, however, remained unclear until the discovery by **Harald Reuter** in 1968 of the Na/Ca-exchanger as the main outward transporter of calcium ions in cardiac cells. This followed on from his discovery in 1964 of the voltage-gated (L-type) calcium inward current and its enhancement by adrenaline in cardiac cells. **Mordecai Blaustein**, now at the University of Maryland in Baltimore, co-discovered this exchanger in squid axons. He spent a brief sabbatical in Bern with Harald Reuter. Together, they characterized this exchanger that is essential for the proper functioning of a variety of cells, in vascular smooth muscle. By using ouabain as an inhibitor, some of the functions of another Na-transporter, the Na/K-ATPase, had been discovered already in 1953 by **Hans-Jürg Schatzmann** in Bern, who also discovered the Ca-ATPase in erythrocytes.

2. The dihydropyridine calcium channel blocker, isradapine (PN200-110), discovered and developed at Sandoz (since 1997 part of Novartis) in Basel, was instrumental for the molecular and pharmacological characterization of the voltage-gated L-type channel. Michel Lazdunski’s group at the University of Nice in France carried out the initial work and much of the pharmacology was accomplished at the University of Bern, again in Harald Reuter’s lab.

3. The discovery of the benzodiazepine receptor by **Hanns Möhler** at Roche in 1977 was a milestone in CNS pharmacology. It was the key to linking benzodiazepine actions to GABA_A receptor modulation. Of note, **Leo Sternbach** at Roche in Nutley, New Jersey, discovered the benzodiazepines serendipitously in the 1950’s. Diazepam, midazolam, flunitrazepam are just a few examples of compounds that made this company a very wealthy leader in the world of “Pharma”. Without knowing much about the targets, Roche assigned different therapeutic profiles to these compounds: Minor tranquilizers, sedatives, or anti-epileptics. Besides these agonists, a pure antagonist, flumazenil, was discovered in Hans Möhler’s laboratory and is used as an antidote to the agonists, e.g. to wake up sedated patients after anesthesia.

4. The immunosuppressive drug cyclosporin A was discovered by **Hartmann Stähelin** and **Jean Borel** at Sandoz; this drug revolutionized treatment of patients who had undergone transplantation surgery or suffered from certain autoimmune diseases. Mihatsch’s team at Basel University investigated its major side effect, nephrotoxicity.

5. The similarly acting compound, rapamycin, became the tool used to identify an important kinase, TOR, which stands for “Target Of Rapamycin”. **Mike Hall** at the Biocenter in Basel and **Rao Movva** at Sandoz carried out this research jointly.

6. Another major discovery involving a protein kinase, which also took place at the Novartis Company in Basel, is imatinib (Glivec®, Gleevec®). This drug blocks the activity of the tyrosine kinase BCR-Abl that displays constitutive activity and therefore causes a number of cancers, most notably chronic myelogenous leukemia (CML). The introduction of imatinib in 2001 led to an increase in the 5-year survival rate of CML patients from about 30 to 90%. Due to mutations of the BCR-Abl kinase, some patients develop tolerance to imatinib. Therefore, a number of analogs have been prepared and these are used to treat imatinib-resistant CML as well as other types of tumors.
Fifty years of research and teaching in pharmacology & toxicology

The following section describes the past 50 years of development of the institutions performing research and teaching in pharmacology & toxicology.

Basel

Basel is a world center of drug discovery and development. The two giants, Novartis and Hoffmann-La Roche, are among the four biggest pharmaceutical companies worldwide, while Actelion is the largest European biotech company. In addition, numerous smaller pharma and biotech companies, e.g. BasileaPharm and Santhera, are active in the Basel area. Over the years, these companies have provided the medical profession with a large number of drugs and also, more recently, with accompanying diagnostic tests. To name just a few of the drugs, these are the ergot alkaloids, including ergotamine and LSD, the 5-HT₃-antagonist tropisetron, cyclosporin A, the calcium antagonist isradipine and the endothelin receptor blocker bosentan, discovered at Roche and developed by Actelion. The tricyclic anti-depressants were discovered at the Geigy Company, which later became Ciba-Geigy and, after merging with Sandoz in 1997, part of Novartis. Clozapine, an important neuroleptic drug, had been developed at Sandoz. At Roche, tremendous growth of the company followed the discovery of benzodiazepines at their Nutley, New Jersey site, as many of them became important sedative, hypnotic and antiepileptic drugs. Also at Roche, the antibiotic, trimethoprim/sulfamethoxazole (co-trimoxazole; Bactrim®), was discovered. All of these drugs became generics a long time ago. The fusion of Genentech with Roche provided a range of products produced by biotechnology, including monoclonal antibodies that are used mainly in cancer therapy. Regarding cancer, probably the most efficacious anti-cancer drug is the kinase inhibitor imatinib, discovered at Novartis, see above. Many other drugs were discovered, developed and put on the market by the Basel-based pharmaceutical industry.

UAM/ Teaching pharmacology in Basel at the academic level also has a long history. Initially, at the beginning of the 20th century, professors of internal medicine began to teach courses in pharmacology for medical students. The first official professorship or chair in pharmacology was created in 1949 and Karl Bucher was the first full professor of pharmacology. In 1972, the “Anstalt für Pharmakologie”, as it was called, moved from the Kantonsspital Basel to the newly founded “Biozentrum”, together with 5 newly created departments of the Faculty of Science. At the Biozentrum, Hans Thönen and Franz Grün joined Karl Bucher as new professors of pharmacology. Hans Thönen led a highly productive team in the field of neurotrophic factors and their effects on neuroplasticity. In 1977, he became director of the Max Planck Institute of Psychiatry in Munich and leader of its Division of Neurochemistry. Kay Brune, then a junior faculty member, made important discoveries on non-steroidal anti-inflammatory drugs, and later moved to Erlangen, Germany. Franz Oesch also led a junior group in the field of chemical carcinogenicity and later became Professor of Pharmacology and Toxicology at the University of Mainz.

After Thönen’s move to Munich and Bucher’s retirement, Urs A. Meyer and John G. Nicholls were recruited in 1983 to head the pharmacology department. Urs Meyer had previously held the post of Assistant Professor of Pharmacology and Medicine at the University of California in San Francisco, and from 1974 until his appointment in Basel, he was Associate Professor of Clinical Pharmacology and Head of the Division of Clinical Pharmacology at the University of Zurich Medical School and the Zurich University Hospital. John Nicholls came from the Department of Neurobiology at Stanford University and continued his work on the development and regeneration of
the nervous system. Since 1998, he has been working at the International School for Advanced Studies (SISSA) in Trieste.

**Urs Meyer's** interests focused on the mechanisms of interindividual variation in drug response. During his tenure, he and his team discovered the molecular mechanisms of several genetic polymorphisms of drug disposition, as well as nuclear receptor-mediated mechanisms in the regulation of drug metabolizing enzymes and drug transporters. Another discovery was the mechanism of drug sensitivity of the metabolic disease hepatic porphyria for which his team developed the first mouse model. Urs Meyer's laboratory was at the cutting edge of the new fields of pharmacogenomics and personalized medicine.

Urs Meyer remains one of the most cited pharmacologists in the world.

The appointment of **John Nicholls** also signaled the start of a strong move of the Biozentrum into the field of neurosciences. The department was renamed Pharmacology/Neurobiology. Several junior groups in the field of neurosciences joined during the next years, e.g. in 1992 **Markus Rüegg** (molecular mechanisms of synapse development and neuromuscular diseases, now Professor of Neurobiology at the Biozentrum), **Thomas Meier** (treatment of neuromuscular diseases, now CEO of Santhera), **Andreas Lüthi** (neurophysiology of emotions, now group leader at the Friedrich Miescher Institute in Basel), and **Anita Lüthi** (cellular mechanisms of sleep regulation, now Associate Professor in the Department of Fundamental Neurosciences at the University of Lausanne). A later appointment in the field of neuroscience and pharmacology was **Kaspar Vogt** as Assistant Professor in 2006. He had previously worked as National Science Foundation-professor at the Institute of Pharmacology and Toxicology at the University of Zurich. His specialty was the neurophysiology of interneurons in the brain. In 2014, Kaspar Vogt was appointed to the International Institute for Integrative Sleep Medicine at the University of Tsukuba in Japan.

In 1992, **Josef Pfeilschifter** was recruited as Professor of Pharmacology and Toxicology, among other reasons, to strengthen the teaching of pharmacology. He had previously worked in research at Ciba-Geigy and was already well known for his contributions to the field of inflammation and the role of inflammation in a number of diseases. In 1996, he was recruited as professor and director of the Institute of Pharmacology and Toxicology at the University of Frankfurt, where he later became Dean of the Medical Faculty.

Three endowed professorships were created. The Novartis Foundation sponsored two 5-year professorships within the “Pharmazentrum2, next door to the Biozentrum. **Karl Hofbauer**, who previously headed the cardiovascular research of Novartis, was appointed Professor of Applied Pharmacology at the Pharmazentrum in 2000 and remained until his retirement in 2011. Since 2007, **Alex Odermatt** has been the Professor of Molecular and Systems Toxicology, associated with the Department of Pharmaceutical Sciences. Once the five-year sponsorship period had elapsed, both positions were taken over by the University. Finally the Eckenstein-Geigy Foundation sponsored a chair in pediatric pharmacology. In 2014, **Johannes N. van den Anker**, previously head of the Division of Pediatric Pharmacology at the Children’s National Medical Center in Washington, D.C., took up that position at the children’s hospital of the “two Basel’s”, Basel-Stadt and Baselland.

There have been major changes in the research orientation of the Biozentrum, so that the teams are now grouped into five areas of investigation: Growth and Development,
Infection Biology, Neurobiology, Structural Biology & Biophysics, and Computational & Systems Biology. There is no research group dedicated uniquely to pharmacological research and teaching. Only Christoph Handschin, the successor of Urs Meyer, working in the field of adaptation of skeletal muscle, has an official appointment as Professor of Pharmacology in the Medical Faculty where he is responsible for teaching pharmacology to medical students at the bachelor level. Disease-relevant aspects related to muscle pathologies are investigated by Christoph Handschin within a broad consortium including Markus Rüegg, Michael Sinnreich and the Musculoskeletal Disease Group of NIBR headed by David Glass.

The Division of Clinical Pharmacology was established as the first Institution of Clinical Pharmacology in continental Europe in 1963 by Luzius Dettli, an expert in renal physiology, who was also one of the chief physicians in Internal Medicine. Luzius Dettli was followed by Ferenc Follath, who later moved to the University Hospital of Zurich as head of Internal Medicine. Thomas Lüscher, currently head of Cardiology at the University Hospital of Zurich, took over from him.

Due to the presence of the pharmaceutical industry, Basel possesses considerable expertise in toxicology. Competent, but rather scattered toxicological activities and services are also available at the University, within the Department of Neurobiology, at the Biocenter, the Department of Pharmacy, the Division of Clinical Pharmacology, the Department of Research and the Institute of Social and Preventive Medicine.

Berne

Berne has a tradition in pharmacology, going back to the 1940s (see above - ‘Discovery of the sodium-calcium exchanger’). In the 1960s, two eminent scientists were engaged, professors Marcel Bickel and Harald Reuter (see pictures below).

The latter (shown on the right of M. Bickel) was Director of the institute up to 1998 and Dean of the Medical Faculty from 1983-1985. Working together with Hartmut Porzig, the emphasis was on membrane transporters, mostly on those involving calcium. Other important members of the institute included Ueli Honegger and Erwin Siegel.

HUS/ After the retirement of these scientists in the early 2000s, Hans-Uwe Simon took over and brought immunopharmacology to Berne making it an international center for this specialty, thus attracting many other scientists working in related areas. These include Andrea Huwiler ( sphingolipids), Shida Yousefi (innate immunity), Uwe Zangemeister-Wittke (tumor pharmacology), Stephan von Gunten (glycobiology) and Thomas Kaufmann (apoptosis). Today, the institute is a center for translational
medicine, covering topics pertaining to both basic and clinical sciences, including investigator-driven clinical trials. In April 2015, the institute has moved to the University Hospital (Inselspital), and join the Center of Laboratory Medicine to create a platform for the promotion of research in translational medicine.

(Some members of) The Bernese Institute celebrate its 50th anniversary with guests in May 2012.

From left to right: Robert Friis, Dagmar Simon, Albrecht Wendel (Constance), Julijana Kristl (Zagreb), Uwe Zangemeister-Wittke, Stephan von Gunten, two others, Hartmut Porzig, Karl Aktories (Freiburg, Germany), Harald Reuter, Urs Ruegg (Geneva), Thomas Brunner (Constance) and Hans-Uwe Simon

The Institute for Clinical Pharmacology, initially directed by Rudolf Preisig, and subsequently by the Co-Directors Jürg Reichen and Bernhard Lauterburg, shared responsibility for different aspects of pharmacology in Bern. After the retirement of the latter in 2010, the Institute was closed. At the beginning of 2013, it was re-established as a Division of the Clinics of Nephrology, Hypertension and Clinical Pharmacology and is currently headed ad interim by Stephan Krähenbühl. A list of candidates for the future Director has been drawn up and the successful applicant is expected to be appointed at the beginning of 2016.

**RF, HR&HA/ The creation of a Department of Clinical Research, Harald Reuter's idea, was implemented in 1994, with Jürg Reichen and Robert Friis as the first Co-Directors. The Department was intended to serve as a home base for individual scientists who were to be responsible for bringing and expanding broad technical capabilities to the Faculty, notably Molecular Biology (Rolf Jäggi), confocal and fluorescence imaging, and additional techniques in biochemistry (Andrew Ziemiecki and Anne Catherine Andres). The specific mandate of the Department of Clinical Research was to host major equipment, maintain it, and to provide training for personnel from other institutes, especially from the clinical departments of the Inselspital, and to improve the opportunities for competitive research. Over succeeding years, Martin Fey, André Häberli, and the present Director, Hugues Abriel further expanded the department and established it as a central facility for the support of research and career development of younger staff, specifically focusing on researchers from the Inselspital. The most recent developments in the Department of Clinical Research are the creation of the “clean mouse facility”, where germ-free mice are bred, the genomics and proteomics facilities, as well as a bioinformatics support unit (www.dkf.unibe.ch).

**Lausanne**

**JD/ The University of Lausanne was established in 1890, succeeding the former Academy, founded in 1537. The Faculty of Medicine dates back further, namely to 1856 and pharmacologists were among the first to be appointed.**

**Louis Bourget** (1856-1913) was Professor of Pharmacology at this Faculty and the School of Pharmacy from 1890 up until 1899. **Siegfried Rabow** (1848-1931) was Professor of Therapeutics and Materia Medica from 1899-1902. He was also Director
of the Psychiatric Hospital of Cery near Lausanne. **Casimir Strzyzowski** (1868-1962) followed him as Director of the Laboratory of Therapeutics, later renamed Laboratory of Pharmacology, until 1936. His successor was **Victor Demole** (1887-1974), who was Associate Professor of Pharmacology and Prescription Drugs between 1936 and 1957. He was also scientific director of Hoffmann-La Roche between 1924 and 1947. **Michel Dolivo** (1921- ) was Associate Professor of Pharmacology from 1958 to 1962, then Full Professor of Physiology. He created the Institute of Pharmacology in 1962. **Georges Peters** (1920-2006) came to Lausanne in 1963 to strengthen the Institute in both pharmacology and toxicology. He was Associate Professor from 1963 to 1967 and Full Professor of Pharmacology and Toxicology until his retirement in 1990. Georges Peters was not only an emphatic teacher and researcher but also an outspoken politician in the Canton of Vaud. For example, on the occasion of a debate on radio in the mid sixties, the moderator asked G. Peters if he wished to offer some advice to his fellow doctors. His answer was: "Gentlemen, dear colleagues, you use too many drugs of which you know neither the primary nor the secondary effects." The Society of Medicine of the Canton was indignant and charged its Council to investigate the matter. However, **Jean-Louis Schelling**, who chaired this council, ensured that the matter ended peacefully.

Following Peters' retirement in 1990, **Bernard Rossier** took over. He and his team, which included **Kathi Geering, Jean-Daniel Horisberger, Laurent Schild** and others, worked on membrane electrolyte transport, mostly on the Na/K-ATPase and the epithelial sodium channel, whose structure was elucidated and characterized in a functional context at that institute.

This was a period of renal physiology and pharmacology with a research focus on other transporters by **Françoise Roch-Ramel**. Sadly, both she and Kathi Geering passed away early in the 21st century.

In 1992, **Susanna Cotecchia**, who came from Bob Lefkowitz’s laboratory at Duke University and worked on adrenoreceptor structure and function, joined the Institute as full professor. In 2002, she became co-director of it (with Jean-Daniel Horisberger who later passed away), then Vice-Dean. **Olivier Staub** is well known for his research on biochemical aspects of ubiquitylation with respect to Na⁺ homeostasis, and **Edith Hummler** for her expertise in rodent genetics. Current junior faculty members are **Marie-Christine Broillet** (cyclic nucleotide-gated ion channels), **Stephan Kellenberger** (acid-sensing ion channel function), **Dimitry Firsov** (renal circadian clocks), **Olivier Bonny** (calcium homeostasis), **Dario Diviani** (A-kinase anchoring proteins), and **Vladimir Katanaev** (Wnt signaling in development and cancer).

**Toxicology** in Lausanne was part of the Institute of Pharmacology and Toxicology, which is now a department in the Faculty of Biology and Medicine. Professor **Jacques**...
Diezi is the major personality with an immense knowledge of toxicology; therefore, he is a consultant for many agencies and a prime target for journalists.

In 1994, Emanuela Felley-Bosco joined the team as a junior faculty member, investigating toxicological mechanisms, and she greatly contributed to organizing activities regarding toxicology within Switzerland.

JD/ The period of the early 1960s also saw the gradual development of clinical pharmacology in Lausanne, based on the initiative of A. Vannotti. After Antoine Borel had refused to involve himself in this project, Jean-Louis Schelling, who was about to leave the Lausanne University Hospital to open his private practice, agreed to accept the responsibility for this development. But first he undertook post-graduate studies in the laboratory of Louis Lasagna at Johns Hopkins University in Baltimore. After his return two years later - in 1966 - he became lecturer of pharmacotherapy and, after a few years, Professor of Clinical Pharmacology. He was head of clinical pharmacology until 1994, taught pharmacological concepts to prescribers, medical, as well as pharmacy students, concentrating his research on cardiovascular and metabolic investigations in patients, drug side effects and interactions. In the 1970s, he introduced the measurement of serum digoxin concentrations used for monitoring the treatment and adjusting the dosage of this somewhat hazardous drug.

TB/ After the retirement of J-L. Schelling, Jérôme Biollaz, an expert on renal pharmacology, tubular drug transport and drug interactions, took over and developed a remarkable line of clinical research on vasoactive and metabolic agents. Lausanne became a recognized center for phase 1 trials and similar studies, sponsored by either drug manufacturers or public funds. Innovative methods were introduced, such as population pharmacokinetic modeling and pharmacogenetic approaches. Pharmacovigilance tasks increased as well, with a special emphasis on teratovigilance, embodied in the Swiss Teratogen Information Service. After Jérôme Biollaz retired in 2009, Thierry Buclin became head of the department and took over the development of the Division. Laurent Décosterd, head of the Laboratory for clinical pharmacology, developed an unprecedented palette of drug measurement methods for the therapeutic monitoring of concentrations of antiretrovirals, anticancer agents, antifungals, and antibiotic and antiparasitic agents. In parallel, Chin Bin Eap, who followed Pierre Baumann as head of the Laboratory for clinical psychopharmacology, complemented this research for numerous psychotropic agents. Chantal Csajka developed a pharmacometric unit able to analyze the bulk of data produced. Developments in therapeutic monitoring of drug concentrations thus became a main research line of the Division of clinical pharmacology in Lausanne, besides classical activities such as phase 1 trials, pharmacovigilance and teratovigilance, teaching students and practitioners.

Geneva

YD/ The Chaire de Thérapeutique was created at the founding of the Faculty of Medicine in 1876. The first chairman was Jean-Louis Prevost II (1838-1927). Born in Geneva, Prevost was renowned for his discoveries at La Salpêtrière hospital in Paris in the field of neurology and neuropathology. He was the first to demonstrate that palsy in poliomyelitis arises from the destruction of motoneurons in the spinal cord. He also published fundamental papers on hemiplegia and studied the antagonism between atropine and muscarine, thus stimulating interest in cholinergic mechanisms in controlling motility and the autonomic nervous system. Among succeeding chairmen and teachers, we should mention the following: Prevost’s successor and son-in-law
Frédéric Batelli (1867-1941). Prevost and Batelli are famous for their investigations into the effects of electricity on animal hearts. They experimented the use of electrical defibrillation, a practice that was not applied to human beings until 45 years later by an American surgeon who was fascinated by their pioneer work and visited the former Ecole de Médecine in Geneva. Jacques Brun (1826-1908), the son of a wine merchant and an expert in analytical chemistry, analyzed the chemical composition of the vine. Albert Major (1853-1951), a meticulous specialist of foxglove (Digitalis) and deadly nightshade (Belladonna) in clinical practice, whose favorite expression was "indubitablement". So the students wrote:

Major indubitablement / A ses malades toujours donne,
Aytung discuté savament / Un extrait de belladonne.

Bernard Wiki (1867-1941) was an excellent teacher. The faculty inherited from him his meticulous studies of mushroom toxins and various alkaloids as well as a beautiful collection of antique Materia Medica books. Wicki's successor, Edouard Frommel (1895-1965), took over in 1937 the directorship of the "Institut universitaire de Thérapeutique de Genève" and was known for his wide-ranging culture in clinical, scientific and other fields, including theology! At the same period, Bernard Glasson and Achille Benakis established the Laboratoire du Métabolisme des Médicaments.

Ralph W. Straub (1927-1988) was a student of A. von Muralt and R. Stämpfli. In England, he worked with several Nobel Prize winners, A. F. Huxley, Paul Greengard, and also with G. Burnstock, J. M. Ritchie, W.W Douglas and others. These brilliant scientists often visited Geneva for meetings, parties or sabbaticals. Some also appreciated Geneva's proximity to the alpine ski slopes. Ralph Straub's main scientific contribution concerned the physiology, pharmacology and metabolism of unmyelinated nerve fibers. In 1988, Ralph was victim of a sudden heart infarct, a misfortune, which struck down many members of the Faculty during the last and the present century.

Yves Dunant (1937-) first practiced tropical medicine in Africa and then studied neurophysiology and pharmacology with Michel Dolivo in Lausanne and with Arnold S.V. Burgen in Cambridge, UK. Using a multidisciplinary approach, he was - and still is - working on presynaptic mechanisms in rapid synapses, particularly using the rat sympathetic ganglion and the Torpedo electric organ. Major achievements are the rapid sequestration of calcium by synaptotagmin in synaptic vesicles and the pivotal role of the mediatophore in rapid synaptic transmission (www.mediatophore.ch). Among co-workers, Ann Kato made major discoveries concerning the mechanisms
involved in amyotrophic lateral sclerosis, Dominique Muller, who tragically died in a glider accident in April 2015, was conducting brilliant investigations of the plasticity of central synapses, while Michel Schorderet was in charge of pharmacology teaching to pharmacy students in Geneva and Lausanne.

As for Jean Ferrero, the whole college of Swiss pharmacologists appreciates him for his efforts in coordinating teaching throughout the country. In the 1980s and 1990s, we had frequent, lively meetings in Bern while creating and organizing a national multiple-choice examination for medical students.

In 2004, the Geneva Medical Faculty reorganized its structure: Pharmacology is now part of the Département des neurosciences fondamentales, presently chaired by Dominique Muller, who is in charge of pharmacology teaching for medical students and dentists, while Nicolas Schaad is responsible for teaching for pharmacy students.

PD/ The domain of clinical pharmacology was initiated in 1970 by Claude V. Perrier (1932 - 1975), who unfortunately died in a boating accident five years later. The current head of the department is Pierre Dayer. Alex Muller, then head of internal medicine, referred him to train with Urs Meyer in Basel, where he spent two productive years before returning to Geneva in 1985. Probably as a result of his years in Basel, the initial topics were in pharmacogenetics and individualized medicine with a later focus on pain medicine, e.g. opiate metabolism. Many others joined the team, among them, Marie Besson, Youssef Daali, Jules Desmeules, Monica Escher Imhof, Valérie Pignet, Victoria Rollason Gumprecht, Caroline Samer and Nicole Vogt. Jules Desmeules holds a joint appointment with the “Ecole Romande de Pharmacie”. See: http://pharmacoclin.hug-ge.ch/.

Zurich

HM, WL & HUZ/ Pharmacology in Zurich has flourished since its beginning at the start of the last century. The period from 1963-1988 under Peter G. Waser as director was especially productive. Initially focusing on the mechanism of action of curare, his work expanded to include neuro- and psychopharmacology. Sleep research was championed by Alexander Borbély and Irene Tobler, while Walter Lichtensteiger and Margret Schlumpf developed toxicology, and Marcus Schaub pursued cardiovascular pharmacology.

The two past directors of the Pharmacology Institute of Zurich University

On the left, Peter G. Waser in the 1970s in one of the laboratories.

On the right, Hanns Möhler, who directed the Institute from 1988-2005 and also held an appointment at the ETH-Z.

The successor of Peter Waser, Hanns Möhler, was previously at Roche in Basel. He was director of the Pharmacology Institute in Zurich from 1988 to 2005 and focused on neuropharmacology. Based on his discovery of the benzodiazepine receptor, the Institute became a world leader in GABA<sub>A</sub> receptor pharmacology. Research was carried out by interdisciplinary groups, headed by Jean-Marc Fritschy, Dietmar
Benke, Bernhard Lüscher (now at Penn State University), Uwe Rudolph (now at Harvard), Detlev Boison (now in Portland) and Florence Crestani. Besides generating genetic models of anxiety disorders, the major breakthrough concerned the functional differentiation of GABA_A receptor subtypes as drug targets in vivo. These findings opened up a new CNS pharmacology with subtype-selective targets for the treatment of sleep disturbances, anxiety disorders, muscle spasms and cognitive deficits. In 1994, the Institute, comprising the groups of Borbély, Lichtensteiger, Möhler and Schaub, moved to a new building on the Irchel campus.

During the years 2004 to 2006, all professorships, except that of Jean-Marc Fritschy, had to be renewed. Since 2005, the Institute has further strengthened its focus on neuropharmacology. Hanns Ulrich Zeilhofer succeeded Hanns Möhler as head of the Institute. His research focuses on the neurobiological basis of chronic pain and on new approaches to the treatment of pain. Imaging techniques, which have become almost indispensable for pharmacological research, were integrated into the Institute through the appointment of Markus Rudin (joint appointment with ETH-Z). Both Institutions developed cutting edge imaging approaches ranging from molecular imaging of subcellular structures to large-scale brain imaging techniques. Steven Brown was recruited to succeed Alexander Borbély. He changed the direction of sleep research at the Institute to include broader and more molecularly oriented chronobiology. Human sleep research is continued in the groups led by Hans-Peter Landolt and Peter Achermann. Michael Arand is the successor of Walter Lichtensteiger and focuses on detoxifying enzymes of the epoxide hydrolase family. Following the retirement of Hanns Möhler, the ETH established its own (molecular) pharmacology professorship and recruited Ursula Quitterer, a cardiovascular pharmacologist.

PMA&GKU/ Clinical Pharmacology was founded in 1974 and from its inception was localized within the environment of the Department of Internal Medicine at the University Hospital. The first director was Urs A. Meyer, who came from the University of California, San Francisco, USA. He introduced pharmacogenetics into Switzerland and chaired Clinical Pharmacology in Zurich until his move to Basel in 1983. His successor was his former fellow Peter Meier-Abt, who had just finished his research fellowship in hepatology at the Yale School of Medicine, New Haven, USA. He performed research into bile acid and other organic solute transport processes of the liver. Together with Bruno Stieger and Bruno Hagenbuch, a number of drug transporters in the liver and bile duct were discovered and characterized. Furthermore, Clinical Toxicology was brought into closer association with Clinical Pharmacology through a partnership with the Swiss Toxicological Information Center, now called Tox Info Suisse. The success of this collaboration is reflected by the fact that Tox Info Suisse became an associated Institute of the Medical Faculty of the University of Zurich in 2012 and that Tox Info Suisse created a new Head of Research post. Clinical Pharmacology was expanded to become Clinical Pharmacology and Toxicology (CPT) with a strong focus on questions and problems concerning drug safety. In 2000, CPT was instrumental in establishing the Centre of Clinical Research at the University Hospital, of which Peter Meier-Abt became the founding director. In 2005, Peter Meier-Abt moved to the Rectorate of the University of Basel and Gerd Kullak-Ublick was recruited as his successor. He expanded liver transport research to include the genetic regulation of transporters and drug-induced liver injury. Furthermore, the structure of CPT was transformed into a clinical department; the development of clinical decision support software used to monitor drug-drug interactions and adverse drug reactions in both in- and outpatients became central areas of research.
Regarding the center for “Xenobiotic and Environmental Risk Research”, see above under Toxicology and www.unizh.ch/envtox/netmem.htm.

BS/ Gerhard Zbinden (1924-1993) was an eminent scientist and a highly respected toxicologist. After several years in reputed positions in the pharmaceutical industry, he became, in 1970, the first Professor of Experimental Pathology at the University of Zurich and in 1975 Director of the Institute of Toxicology of the ETH-Z and the University of Zurich. He was committed to making scientifically based and ethically responsible decisions for the benefit of society, animals and research. Known and respected worldwide as a leading scientist and teacher in the field of toxicology, Gerhard Zbinden’s humane and humorous character will always be remembered.

Veterinary pharmacology & toxicology is taught in Bern and Zurich. The two Veterinary Faculties merged in 2006 to form a joint Faculty called VetSuisse (www.VetSuisse.ch).

In Bern, Günter Scholtysik directed the pharmacology group from about 1988 up to the late 1990s. The emphasis of his research was on cardiac conductance systems. When a former collaborator of his, Meike Mevissen, took over, the emphasis changed to an investigation into drug and hormone metabolism, both, in vivo as well as at a mechanistic level, in various species of animals.

HPN/ In Zurich, the pharmacology & toxicology research group was led from 1988 to January 2015 by Felix Althaus, the first scholar of Urs Meyer. Felix Althaus became Director of the Institute in 1993 after the retirement of professor Eduard Jenny. His main research domain was on molecular mechanisms of DNA repair and on drugs interfering with that. He headed the expert group on endocrine disruptors from 2002 to 2007 (NRP 50; see above). One of his scholars, Hanspeter Naegeli became Professor of Toxicology and continued this line of research, applying it to investigate the molecular toxicology of carcinogens at low doses, as well as the responses of skin cells to UV radiation. In February 2015, he took over the directorship of the Institute and a “new” Urs Meyer was appointed as Professor of Pharmacology. His main research topic is the effect of various stressors on neurodevelopment.

A recent picture of the members of the Zurich-based Institute of Veterinary Pharmacology & toxicology. The Director, Hanspeter Naegeli, is the forth from the left in the rear row.
Development of pharmacology within the Swiss pharmacy schools

In 1965, there were five pharmacy schools in Switzerland. The one in Zurich was attached to the ETH, whereas the others were part of the Faculties of Science at the Universities of Bern, Basel, Lausanne and Geneva. In about 1990, the School in Bern was closed, following an evaluation. In the four remaining pharmacy schools, pharmacologists from the medical faculties taught pharmacology, but there was little or no internal research in either this area or in the life sciences in general. This was a relatively unique situation as most other European or American pharmacy schools had intramural pharmacology/toxicology departments. Perhaps for this reason, the Lausanne school decided to create its own professorship in pharmacology in the early 1990s, and Urs Rüegg was nominated. Even though it took a few years to adapt to each other, the school benefited from internal research in pharmacology and the associated teaching. In particular, most students appreciated the possibility of being exposed to themes of pharmacology and being encouraged to discuss these, as well as the introduction of practical lab courses in pharmacology, at that time a novelty in Western Switzerland. Geneva remained dependent on teaching provided by its medical faculty. Michel Schorderet coordinated this arrangement up to his retirement in 2004, after which Urs Rüegg took over.

The schools in Zurich and Basel have had common teaching programs via video transmission of lectures into the auditoria of the partner institution. Following the retirement of Urs Meyer and John Nicholls in Basel, Stephan Krähenbühl became the main pharmacology teacher in 2000. In the same year Karl Hofbauer joined as Professor of Applied Pharmacology, and in 2007 Alex Odermatt was recruited as toxicologist.

The Zürich Institute of Pharmaceutical Sciences is part of the large Department of Chemistry and Applied Biosciences of the ETH. In its early days, members of the Department of Pharmacy taught pharmacology, since their chairs have positions at both the University and the ETH. In about 2005, Michael Detmar, an expert in angiogenesis, was recruited. In terms of research, this appointment thus provided the School with an in-house expert. Teaching is still undertaken jointly with the pharmacologists of the medical faculty; the coordinator is Hanns Ulrich Zeilhofer, who chairs the Department.

As mentioned above, the Lausanne and Geneva Pharmacy Schools relied from their beginnings on teaching by pharmacologists from their medical faculties. The Lausanne School preferred to have its students exposed to pharmacology by a pharmacist rather than a medical expert in pharmacology. For this reason, Michel Schorderet from Geneva extensively taught basic pharmacology not only to the pharmacy students in Geneva, but also to those in Lausanne up to 1992. At that time, Urs Rüegg was nominated in Lausanne. It appears to me (UR) that the introduction of in-house research on pharmacological topics was beneficial to the pharmacy school: Many pharmacy students carried out their diploma or doctoral thesis on a pharmacological topic, seminars were given and extramurally funded research projects on therapy of muscular diseases were successful.

After the fusion of the Lausanne and Geneva Pharmacy Schools to form the “Ecole Romande de Pharmacie” in 2004, Urs Rüegg was in charge of teaching and research in Geneva. After his retirement in 2012, teaching was again outsourced to practicing pharmacists. Regarding his succession, the position has been advertised and, among several applicants, a choice has been made. The chosen candidate is expected to start activities this year. Therefore, pharmacology will be once again a major area of research at the “Ecole Romande de Pharmacie” based in Geneva.
The future: challenges and opportunities

Opportunities in teaching

Higher learning institutions have two duties: Transmitting existing knowledge and creating new knowledge. Regarding the latter, I think that we, pharmacologists and toxicologists, should broaden our range of drug types. In particular, we should raise awareness of medical and governmental officials as well as of the general public that the more recent drug types, such as monoclonal antibodies and RNA-based drugs, are also pharmacological agents.

A continuing and important obligation of pharmacologists and toxicologists is to offer high quality transmission of existing knowledge that stimulates students’ interest and curiosity. Regarding methods, problem-based learning is already used at most medical faculties in Switzerland. It is certainly a useful way to transmit knowledge, because it demands active participation of the students, but it requires a lot of effort and time from the teaching staff.

An attractive alternative to that could be digital learning, a method that offers topics on-line. Much has been achieved by the Boston-based M.I.T. and Harvard University (see www.edx.edu). In fact, the M.I.T. currently has 70'000 students from 193 countries enrolled in its online courses. Since about a year ago, the EPF-L and the ETH-Z have also contributed a few courses to digital learning. Its advantages are that students can consult and download information from web pages when they have time and are motivated. And, of course, most topics offer interactive ways of learning. Only after becoming acquainted with the topic of study, do students visit the on-line digital classroom to discuss and apply the knowledge, e.g. in case studies.

So far, there is not a single topic of pharmacology or toxicology that is offered digitally on the www.edx.edu or similar site. It would make sense to do so, since over the past 50 years, pharmacology as well as toxicology has shifted from mostly “know-what” to “know-why” domains due to insights into mechanisms of drug and toxin action. Therefore, we should promote digital learning.

Participation of researchers in pharmaceutical companies

The author’s personal view is that scientists from industry are not sufficiently informed about the activities of the SSPT and many of them are even unaware of its existence. This is probably due to a rapid turnover of scientists at the pharmaceutical companies in Basel and even more so at the US East and West coasts, such as at Genentech in South San Francisco and at the Novartis Institutes of Biomedical Research (NIBR) in Cambridge, Massachusetts. It would be a good idea to make an attractive offer, e.g. by proposing specific courses and joint projects in association with “academia”.

The council of the International Union of Basic and Clinical Pharmacology (IUPHAR; www.iuphar.org) had similar ideas when it met in Basel in 2012. It suggested creating a discussion forum with and between scientists from industry. In fact, such a forum did exist at Basel University, the Basel Biology Club, but it ceased its activities about 10 years ago, whereas at Geneva University, there are still the Wednesday evening seminars for and by members of the Faculty of Science; of course, a variety of disciplines are represented, but pharmacologists can function as integrators between biology and chemistry.

Should we engage ourselves so that pharmaceutical companies keep their activities in Switzerland? Well, this sounds like a good idea. In fact, during the past ten years, Novartis has been going westwards, expanding its involvement at the site in Cambridge, Massachusetts, while closing down the Novartis Institute of Medical
Research at University College in London, headed by Humphrey Rang, the Tsukuba-based research site in Japan, the Vienna-based “Sandoz Forschungsinstitut” as well as the NIBR unit at Horsham, UK. Employees of Novartis Basel and the Basel government are worried about the possibility of further shifts of activity to the USA. A response to the question above could be that “yes, we should do that”. For example, delegates from established and credible organizations, such as the SSPT, could meet with executives of that company, listen to their viewpoints, and, depending on those, highlight the quality, the culture and the reliability of Swiss scientists. It is noteworthy in this context that almost all drugs currently sold by Novartis have been discovered in Europe, mostly in Basel, in spite of the fact that the US-based NIBR began its research activity in the early 2000s and has a budget exceeding the one in Basel.

Actelion and Roche, on the other hand, appear to be committed to maintaining their Basel headquarters. Roche has just finished a 41-floor high office tower at their site on the Rhine River. Actelion’s founders, Martine & Jean-Paul Clozel and Walter Fischli are committed to Europe, and consider that the level of chemistry here is very good.

Serono in Geneva took over the researchers and the research facilities of Glaxo-Welcome in 1997, saving more than 100 posts. This lasted until 2006 when Merck (Darmstadt, Germany) took over, creating Merck Serono. Research in Geneva has since been reduced to mostly contract research and licensing activities.

Enhance the impact of science on the political decision-making

One final point: Scientific societies of other countries have their interests supported by experts within parliaments and executive bodies. In Switzerland, there is as yet little contact of this nature, and for this reason it would be good if the SSPT, via the Academies and USGEB/LS2, could stimulate policy makers’ interest in science. This was the case when members of Zurich and Lausanne universities contacted Maya Graf, a member of parliament, in the late 1990’s: She raised awareness among her parliamentarian colleagues concerning the importance of toxicology. This led to the launch of the National Research Project on endocrine disruptors (NRP 50; 2002-2007) and later to a bid for the two toxicology networks mentioned above (see page 5, under Toxicology).

In the future, the Society must continue to encourage the development and study of pharmacology and toxicology since these fields are important elements in transmitting knowledge and stimulating curiosity among students in medical faculties and pharmacy schools. Moreover, the general public, and medical and official organizations should be made aware that the more recent drug types, in particular monoclonal antibodies and RNA-based drugs, are also pharmacological agents transmitting beneficial or undesirable effects.

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