

SYMPOSIUM

June 14-15 2010

Scientific Committee

Jacqueline Egli, PhD Biology, Head of Teacher Education Program, ETH Zurich
Patrick Faller, Biology Teacher (Gymnasium Rychenberg) and Teacher Educator, ETH Zurich
Michael Hengartner, Professor of Molecular Biology, UZH
Peter Jann, PhD Biology, CEO of the Life Science Learning Center, ETH Zurich and UZH
Guido Rutz, Biology Teacher (Gymnasium Rychenberg), Teacher Educator, UZH
Monica Zwicky, Professor of Developmental Biology, UZH

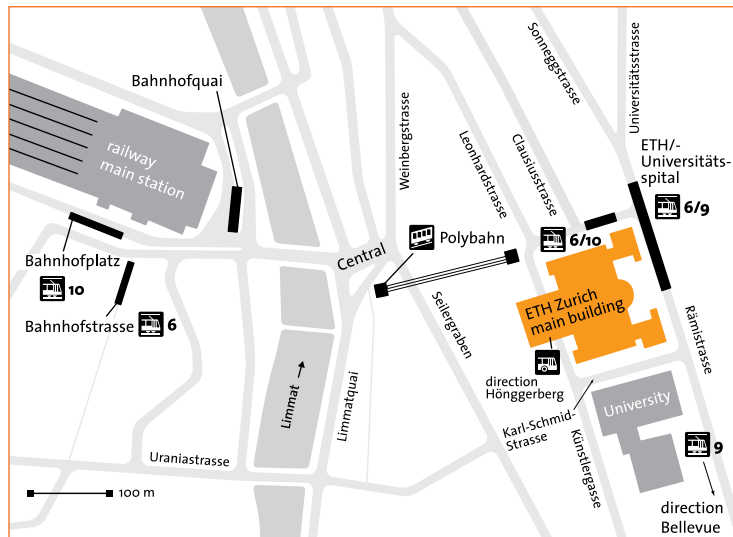
Organization: Gabrielle Schweizer, EducETH, gaschwei@ethz.ch

Updated information on the symposium including the program is available under:

www.educeth.ch/modern_biology/index_EN (English)
www.educeth.ch/modern_biology (German)

How to find the ETH Zurich

ETH Zurich, Semper Aula (G 60), main building,
Rämistrasse 101, 8092 Zurich

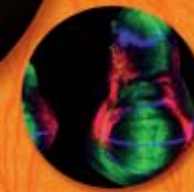


Arriving by public transport

- From the railway main station: tram no. 6 (direction Zoo) or tram no. 10 (direction Flughafen)
- From Bellevue: tram no. 9 (direction Hirzenbach)
- From Central: Polybahn



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Modern Biology Goes to School: Opportunities and Challenges

Symposium of the Competence Center
«EducETH: Learning and Instruction» in cooperation with the
Life Science Learning Center, ETH Zurich and University of Zurich

Semper Aula (G 60), main building ETH Zurich, Rämistrasse 101, Zurich, Switzerland

Chairs:

Ernst Hafen, Professor of Developmental Genetics, ETH Zurich
Elsbeth Stern, Professor of Research on Learning and Instruction, ETH Zurich

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Background

Biology is a school subject with a long tradition, and it is quite popular among students. Nevertheless, scientists are increasingly concerned about the growing gap between school curricula and the rapid scientific progress in the field. While at school biology is still largely taught as an ever-growing collection of loosely connected observations and facts, from a scientific point of view the subject is more aptly understood as a set of emerging concepts that are rooted in the process of evolution. Moreover, while chemistry, physics and mathematics are becoming an integral part of scientific biology, many students have severe difficulties with the demands of molecular biology and are unable to use mathematics as an instrument for modeling biological processes. In addition, biologists are concerned about public opinion of evolution as a contentious theory rather than understanding it as the basis for the diversity and the unity of life.

Aim of the symposium

Scientists from the fields of biology, biology education, cognitive psychology and distinguished teachers from the Zurich area will discuss frameworks for modern biology education that are applicable in schools at all grade levels, with a special emphasis on the gymnasium (secondary school). The goal is to merge and refine the work that has been done by the guest speakers and by two initiatives in Zurich: The Life Science Learning Center, which provides a platform for inquiry-based instruction in genetics and molecular biology, and the HSGYM-Biology initiative. Two major demands have been formulated for school biology:

- Evolution should no longer be dealt with as an isolated chapter in the biology curriculum, rather it should be treated as the major organizing principle of biology from the very beginning of instruction.
- Core properties of biological systems, including energy use, growth, reproduction, and homeostasis must be taught in an interdisciplinary context of mathematics, chemistry and physics.

Long term goals

Changing classroom practice is a long-term process that needs more than just suggestions. Design studies are a well-established form of cooperation between schools and universities. Teachers and scientists develop material for classroom practice based on researched scientific understanding on how students learn. This material is then systematically tested and improved in an iterative process. As more schools participate, the reforms conveyed by the material will be further disseminated. This symposium is considered as a starting point for initiating design studies with primary and secondary schools.

What the symposium will look like

During the symposium, lectures by distinguished researchers will be presented in English, while some workshops on classroom practice will be held in German.

Guest speakers and lecture titles:

Ruedi Aebersold, Professor of Molecular Systems Biology, ETH Zurich:
From Molecular Biology to Systems Biology

Christof Aegerter, Professor of Physics, University of Zurich:
Teaching Physics by Using Biological Problems

Sebastian Bonhoeffer, Professor of Theoretical Biology, ETH Zurich:
Mathematical Modeling in Organismal Biology

David Botstein, Professor of Genomics, Princeton University:
Science and Mathematics Education for 21st-Century Biologists

Erin Furtak, Professor of Biology Education, University of Colorado, Boulder:
Transforming the Teaching of Natural Selection Through a Professional Learning Community

Ute Harms, IPN, Professor of Biology Education, Leibniz Institute for Science and Mathematics Education at University of Kiel:
Challenges of a Spiral Curriculum in School Biology Today

Mike Klymkowsky, Professor of Molecular, Cellular & Developmental Biology, University of Colorado, Boulder:
Socratic and Metacognitive Approaches to the Development of Molecular Level Understanding of Biological Systems

Andrew Shtulman, Professor of Psychology, Occidental College:
Sources of Misconceptions in Understanding Evolution

William Wood, Professor of Molecular, Cellular & Developmental Biology, University of Colorado, Boulder:
Transforming the Teaching of High School Advanced Placement Biology and Introductory College Biology in the U.S

The topics of the workshops organized by teachers from the Kantonsschule Rychenberg, the Kantonsschule Wohlen, and the LSLC are dealing with biology education from an interdisciplinary perspective: 1) Air Bladder, 2) Eyes, Light, and Color, 3) Experiments and Technology in Biology, 4) Evolution as a Topic in Elementary and Early Secondary Science Classes