When the Biozentrum opened its doors in 1971, it was not just its way of doing research that distinguished it from every other academic institution: Its approach to teaching was also defined by an innovative and at the time unique concept designed to equip the next generation of scientists with the necessary tools for the research of tomorrow. Predicting the needs of these young students twenty years into the future, at the peak of their research careers, was no easy task in view of the dizzying rate of progress and new discoveries in the field of molecular biology. “In the face of this dilemma, I believe it is very important not to overburden people with large amounts of technical knowledge that needs to be learned by rote,” writes Professor Werner Arber in a paper published in 1978 (1). “What they will need, aside from basic scientific training with as broad a scope as possible, is the ability to work independently and the flexibility to familiarize themselves with new methods and topics. Moreover, they need to be original and creative.”

These precepts were implemented by the first professors at the Biozentrum under the coordination of Professor Eduard Kellenberger and Professor Werner Arber with the innovative “Biology II” curriculum. A two-year undergraduate course equipped the students with foundational knowledge in the classical disciplines of the natural sciences. The introduction of “block courses” in the third year was a highly innovative step at the time. In these six-week practical courses in various research disciplines such as biochemistry or microbiology, students acquired the tools for scientific work in the lab, from the planning and practical execution of experiments to the interpretation of results. Theoretical knowledge was imparted at lectures and seminars integrated in the block courses. “We were forty students and worked in the lab from morning till night. It was an intense and exciting time, during which we really bonded as a group,” recalls Biozentrum alumnus Björn Grünenfelder.
The block courses became a big hit, and were widely emulated. The in-depth experience of different research fields and close contact with the tutors during the block courses were immensely helpful to students when it came to finding an interesting topic or a suitable research group for their diploma thesis in the fourth year of the program. The final year was all about research: For the first time, students conducted research independently on a project of their own, supervised by the group leader.

The recipe stood the test of time. Teaching in “Biology II” began in 1972, and four years later the first two students successfully completed their final exams. Half a century later, more than 1,000 students have graduated with a Diploma or Master's degree at the Biozentrum. In spite of the academic reform and transition to the Bologna system in the early 2000s, which brought numerous changes, the spirit, practical focus and outstanding quality of the Biozentrum study program remained unchanged. It provides students with a solid foundation for the next step in their academic career – a doctorate. And because learning does not come to an end with graduation, the Biozentrum supports its PhD students with training, participation in congresses and extensive networking opportunities in preparation for their future career. To date, over 1,400 young scientists have earned their doctorate at the Biozentrum.

“I remain in awe at how comprehensively the Biozentrum faculty trained me in so many disciplines of modern biology, and I credit my time as a graduate student in Andreas Engel’s group for giving me such an exceptional start to my scientific career. The time my father Dieter, my brother Andreas and I all pursued our research at the Biozentrum at the same time will always be especially dear to me.”

– Prof. Thomas Walz, The Rockefeller University, New York, USA

“Currently, I am the chief operating officer of a biotech company and mother to two grown-up sons. My solid scientific education at the Biozentrum, which I completed with a PhD under Prof. Walter Gehring, has been fundamental to every step of my professional career. It gave me a unique perspective and has invariably served me well as a foundation for important decisions.”

– Dr. Juliane Bernholz, Chief Operating Officer at AM Pharma, Utrecht, Netherlands

“In the 1980s, the Biozentrum was the most international place in Basel and a gateway to the world. I vividly remember the block courses during which the people who taught us were walking back and forth between our baby experiments on the second floor and their pro work upstairs. Discovery was in the air, it could be felt even in the staircase”.

– Marcel Weber, Professor of Philosophy of Science at the University of Geneva, Switzerland

“During my time as a PhD student in Walter Gehring’s lab, I very much appreciated working closely together with highly qualified researchers and becoming acquainted with experimental work in one of the most fascinating fields of study – EvoDevo. It was an intense time that left a profound and lasting mark on how I think, and taught me an explorative approach that I try to pass on to my pupils.”

– Dr. Sacha Glardon, secondary school biology and chemistry teacher, Gymnasium Bäumihof, Basel, Switzerland

“I came to Basel as a Swiss expat at the age of 19. The country was foreign to me, and without the Biozentrum I would hardly have stayed in Switzerland. The international atmosphere at the Biozentrum made me feel at home. The first-class education and the research stays at Woods Hole and The Rockefeller University, made possible by the professors, proved immensely valuable to my subsequent work as a journalist.”

– Dr. Theres Lüthi, science journalist, NZZ am Sonntag, Switzerland

A springboard for top researchers

Over the last 50 years, the Biozentrum has been a springboard for countless scientists who went on to enjoy stellar careers in research. In this article, we present four alumnae who have had a lasting impact on their respective fields as professors at distinguished institutions.

Catapulted into research
Susan Gasser’s search for a summer job in 1979 took her to the Biozentrum and the office of Professor Jeff Schatz, who promptly hired the young American with a bachelor’s degree as a doctoral researcher. For Gasser, the lab and its dozen international postdocs was “the launch pad for my career.” She looks back on a heady time when research was always at the center of everything.

After completing a doctoral thesis in record time, she was free to choose her next position. She climbed the career ladder at the Swiss Institute for Experimental Cancer Research and the University of Geneva, becoming an established group leader and a professor in 1991. She claims to have been “at least 80 percent” inspired by the example of Jeff Schatz and his informal, American-influenced leadership style. It was also during this time that she settled on her research field: Using microscopic analysis, she explored how chromosomes are packed in the cell nucleus and how this controls DNA transcription.

Then, in 2005 – on the advice of Jeff Schatz – Professor Susan Gasser seized the opportunity of a lifetime. She returned to Basel to take up a position as director of the Friedrich Miescher Institute, cementing its status as a world-leading institute for biomedical research until her retirement in 2020. Does the multiple award-winning researcher and mother of one son see herself as a role model for young scientists? “I have tried to set a good example. My own experience has enabled me to offer encouragement to many talented women at difficult moments in their career.”

The last postdoc
Growing up in rural Wisconsin (USA), Professor Carla Koehler originally wanted to be a vet, before she discovered a passion for biochemical research – and in particular for mitochondria, the tiny power stations that supply our cells with energy.

“At the time, hardly anyone was working on the phenomenon of mitochondrial protein import in the US, so I had to go to Europe,” she remembers. This is how she ended up at the Biozentrum in 1995 as a postdoc under Professor Jeff Schatz. The move paid off: In her time there, she discovered a previously unknown mechanism responsible for transporting proteins through mitochondrial membranes. Meanwhile, she also found time to explore Alsace, the Jura and the Black Forest with her road cycling group.

Toward the end of her stay, Jeff Schatz began making preparations for retirement. The resulting downsizing of the research group meant more resources for Carla Koehler – but also greater responsibility, for example in the form of student supervision. During this time, her path often crossed with Schatz’s at the weekend, as she worked on her experiments and he cleared his office.

“I thought he was bothered by my loud music, but in fact he wanted my Bob Dylan CD,” she recounts, remembering one such meeting.

In 1999, she returned to the University of California, Los Angeles (UCLA), as a tenure track professor with a wealth of experience and promising projects in her bags. She has found new cycling routes in the hills of Los Angeles, but remains as devoted as ever to mitochondrial research.
A chance liaison with structural biology

An adventurous spirit – and love for her future husband – were what enticed Professor Karolin Luger across the border to Switzerland after studying biochemistry in Innsbruck. It was therefore largely a matter of chance that she ended up as a doctoral researcher at the Biozentrum under Professor Kaspar Kirschner in 1986 – a happy coincidence, as the young researcher from a family of engineers in the Austrian state of Vorarlberg turned out to be a born structural biologist: “The structures inside cells are like machines that you can take apart and put back together in your head.”

What she remembers most from her time at the Biozentrum is the freedom she enjoyed in her research project and the “highly creative and enthusiastic” supervision she received from Kaspar Kirschner. An equally fond memory is the relaxed social interaction among the various research groups: “We would often spend a couple of hours standing on the steps of the open staircase discussing something.”

After completing her doctorate (and after a gap year spent kayaking in the United States), in 1990 Karolin Luger transferred to ETH Zurich, where she used X-ray crystallography to painstakingly figure out how DNA molecules, measuring meters in length, are packed into nucleosomes in the cell nucleus – a sensational scientific breakthrough at the time. In 1999 she continued her research on nucleosomes at Colorado State University in the US, where she established the department of structural biology from the ground up. Today, Karolin Luger is a professor at the University of Colorado Boulder, where a prestigious grant allows her to do research as freely and creatively as she did at the Biozentrum 35 years ago.

A puzzle with hundreds of pieces

Berlin or Basel? This is the question Professor Angela Krämer found herself pondering in 1987. In the end, she decided against a junior professorship at the MPI in Berlin to follow her mentor, Professor Walter Keller, from Heidelberg to Switzerland. Keller had taken note of the talented biochemist during her doctorate, poaching her from a colleague shortly after she returned from a research trip to the US.

What drew Angela Krämer to the Biozentrum was the opportunity to establish her own research group and study the mechanism known as RNA splicing, whereby unnecessary parts of precursor messenger RNA are excised and the remaining fragments rejoined back together in a process analogous to film editing. Angela Krämer laughs at the memory: “We were so naive back then; we thought we were looking for three or four proteins. In fact, as we realized over the years, it was a massive complex.” As a fledgling group leader, she benefitted greatly from the constant exchange with Keller’s group, with which she shared a lab. In 1989, a junior research grant from the Swiss National Science Foundation helped Angela Krämer to finally strike out on her own.

In 1992, she accepted an invitation to the University of Geneva, where she continued to piece together the many fragments of the spliceosome: “This was the perfect task for me. I have always had enough imagination to wrap my head around the most intricate details.” Angela Krämer has been retired for seven years now, and is happy that her findings have contributed to the development of gene therapy for hereditary diseases.