Passionate about microscopy and technology

Markus Dürrenberger receives honorary membership of the SNI

At this year's Annual Event, Dr. Markus Dürrenberger received honorary SNI membership in recognition of his extraordinary commitment to microscopy and for setting up the Nano Imaging Lab. Dürrenberger is not only an expert in all kinds of microscopes, but also an enthusiastic teacher and an outstanding technician who has brought numerous inventions to the market, as we learn in our interview.

Biology was the right choice

When Markus Dürrenberger's father urged him to study molecular biology at the Biozentrum in Basel, over 40 years ago, the conversation opener at the Dürrenberger household presumably went something like this: "Molecular biology or you can fund yourself!" After completing his Matura (high-school diploma), Dürrenberger had initially started a degree in power engineering but quickly realized that it wasn't the right course for him. It was then that his father was able to help, with his strong sense of where his son's strengths and preferences lay. Even as a child, Markus was always outside playing with his magnifying glass, and at school he was fascinated with natural cycles, microscopes and the life that could be found within a water droplet.

"Luckily, I wasn't given much choice in the matter," laughs Markus. "But then I thoroughly enjoyed studying biology." A particular fascination with viruses led him to research the development cycle of the Escherichia virus T4, a bacteriophage that infects the intestinal bacterium *Escherichia coli* both for his diploma thesis and later doctoral dissertation. As these viruses are only visible under an electron microscope, Markus developed a passion for these complex instruments, which allow detailed imaging of even the smallest and finest structures.

Successful plastic development

In those days, when it came to embedding the infected bacterial cells for examination using electron microscopy, what Markus lacked was an ideal type of plastic that would polymerize and therefore harden in the examination conditions of -100°C under exposure to UV light, allowing him to prepare sections. As part of his work in Professor Eduard Kellenberger's group at the Biozentrum, Markus therefore developed a biocompatible plastic – which was subsequently commercialized by the company Lowi (Germany) under the brand name Lowicryl.

At this year's Annual Event, Markus Dürrenberger (left) was awarded honorary SNI membership by SNI Director Martino Poggio.

"That was a stroke of luck, because we received 5% of Lowicryl's turnover toward our research for a period of 20 years," says Markus Dürrenberger. "Later, at the Maurice E. Müller Institute, we added bone meal to the plastic to develop a bone cement that's still used in implants today. This cement is also found in plastic dental fillings, as we used it to develop various fillings in collaboration with the dental institute later in my career."

Career moves before coming to Basel

These developments took place while Markus was working as a research assistant and head of the Center for Microscopy (ZMB) at the Maurice E. Müller Institute, which was based at the Biozentrum of the University of Basel.

Prior to that, he had already gained some experience in the USA and at the University of Zurich: In 1988, imme-

Further information:

Nano Imaging Lab
https://nanoscience.unibas.ch/en/services/nano-imaging-lab/

Markus Dürrenberger is not only an expert in all kinds of microscopes, but also an enthusiastic teacher and an outstanding technician.

diately after completing his doctoral dissertation, Markus spent a year at the Scripps Research Institute in La Jolla (California, USA) in order to share his experience in the field of plastics processing in microscopy. "I didn't particularly like it there, mostly because of the working environment and conditions, and I quickly applied to the University of Zurich with a view to creating a service department for electron microscopy," Dürrenberger recalls.

Then, after four successful years in Zurich, Professor Ueli Aebi brought Markus Dürrenberger back to Basel in 1993, offering him a position at the Maurice E. Müller Institute in order to set up the Center for Microscopy (ZMB) as a service platform for biological research and analyses. "It was a great time," Markus recalls. "We had just about every kind of microscope that existed back then. The highlight was the world's fastest confocal microscope, operating at 240 frames a second."

Part of the SNI team since 2016

Due to restructuring measures, the ZMB was dissolved in 2016. Markus and part of his team were incorporated into the Swiss Nanoscience Institute (SNI) in the form of the Nano Imaging Lab, where they would devote more of their time to questions relating to materials science.

Since then, the NI Lab has become an important pillar of the SNI. Thanks to the outstanding work of the whole team within the SNI network and beyond, it is now a sought-after partner for all questions relating to imaging and analysis.

Markus worked hard from the outset to renew the NI Lab's infrastructure, making sure it was fit for the future by the time of his retirement in 2023 and providing his successor, Dr. Marcus Wyss, with ideal conditions as he took up his new role. "When I retired in 2023, all of the instruments were under 10 years old. Thanks to an excellent new transmission electron microscope, the NI Lab can fully meet the needs of materials science," he says.

An enthusiastic tinkerer and teacher

In the interview, it quickly becomes clear how passionate Markus is about microscopy and how fascinated he was with the technical aspects of his work. Throughout his career, he was never content simply to apply existing equipment or methods – as soon as he had mastered a machine's operation, he would set about modifying, improving and expanding it.

For example, cooling systems that he developed for the microscopes were subsequently adopted by the manufacturers – and there are also preparation machines that are based

on his previous work and innovations. Moreover, he personally built 100 units of a "glow discharger" – a device that uses plasma to make surfaces hydrophilic – and distributed them to colleagues around the world. "I always loved overcoming a technical challenge to make our work easier – and, of course, I always enjoyed excellent support from the mechanical and electrical workshop," says Markus.

Another of Markus's passions is teaching. Generations of medical and biology students have completed his three-week microscopy block course and still remember it fondly today. In 2022, he found himself on the operating table at the University Hospital Basel following an accident in the mountains. The operating surgeon smiled at him and said, "I know you," explaining that he had taken the microscopy block course with him many years ago and still had vivid and positive memories of it.

Still not bored

Even though he is now retired and those tasks fall to someone else, Markus nevertheless remains very active. For the SNI, he does some work with Museum Burghalde in Lenzburg on an hourly basis in order to integrate aspects of the nanosciences into the permanent exhibition. In addition, Markus continues to play an active role in the pension fund of Basel-Stadt and is running as a candidate for its board of directors.

He also has a family as well as various hobbies. His four adult sons and partner of many years, Dominique, are delighted that he can now spend more time with them – in the mountains, for example, or at sea to dive. After all, water – either as snow or in liquid form – is another of his passions, and he was once Swiss champion of the 100 m breaststroke. And anyone who knows anything about Markus Dürrenberger knows that his motorcycle is never in one place for long.

"We would like to thank Markus for his dedication over the years and congratulate him on his honorary membership. We are delighted that he will maintain his links with the SNI network as a member."