Editorial

Dear Biozentrum Alumni,

Communicating comes naturally to both of them, whether in imparting knowledge or in promoting dialogue between cultures. In this issue we present the Biozentrum Alumni Anja Renold, Deputy Principal of the Gymnasium Bäumlihof in Basel, who has been teaching with enthusiasm for the past 15 years, and Mathis Brauchbar, who, as a co-founder and a partner of the communications agency “advocacy AG”, brings diverse interest groups to the negotiation table.

A rather unusual Alumni duo has found its way into this issue and, contrary to what one may suspect, this is not a “like father, like son” story: Robert Kübler, the Biozentrum’s oldest student ever began, at 64 years of age, to follow in his son’s footsteps, who had previously studied at the Biozentrum a good ten years earlier. And while the new emeritus, Prof. Heinrich Reichert, is enjoying diving into the ocean’s depths, the newly appointed Professor Jan Pieter Abrahams is drawn to the mountains. Marko Loparic, Marija Plodinec and Prof. Rod Lim are also faced with some mountains to climb with their recently founded company Nuomedis – some of these are already conquered.

We wish you enjoyable and interesting reading.

Prof. emeritus Hans-Peter Hauri, President of the Biozentrum Alumni Board
Prof. Erich Nigg, Director of the Biozentrum and Member of the Alumni Board
Learning – teaching – sparking enthusiasm.

She definitely didn’t want to become a teacher. Yet she is one. For 15 years, Anja Renold has been teaching at the Gymnasium Bäumlihof in Basel. Since 2008, she is also the Deputy Principal. A perfect mixture for this bundle of energy: She can get things moving and combine her passion for strategies and management with her love of teaching and inspiring interest. An impressive workload but sitting around at home is not her thing.

**ALUMNInews** You first studied molecular biology and then added botany and zoology. Why?

**Anja Renold** Originally, I studied medicine but soon discovered that the causes and research interested me more than the symptoms. So, I changed to molecular biology. But later, when I decided despite my former prejudices to become a teacher, I was faced with the problem that the Biology II course at that time was not recognized for teaching. That’s why I enrolled for postgraduate studies in botany and zoology.

**AN** A research assistant in Boston, then a PhD at the Biozentrum. Did you originally plan a research career?

**AR** My studies and my husband’s PhD both finished at the same time. We thought that this would be a good time to go abroad. Boston is a paradise for molecular biologists and I soon found a quite challenging position at Massachusetts General Hospital. Despite this, I was “only” an academic laboratory assistant and I realized that I didn’t want to end up as a boss’ right hand but to have my own projects. Hence the dissertation. There were, however, two reasons why a career in research didn’t come into question: Firstly, I am not a “lone warrior”, for although there is a lot of team work involved in research, one still has to put one’s own interests first. And secondly, I really enjoyed teaching in the Block Course very much. So, I told myself that I should perhaps consider becoming a teacher after all.

**AN** After three years as Deputy Principal you still took on a school principal training course. How did this additional knowledge help you?

**AR** An important aspect was the management function, as teachers tend to rule over their own little kingdoms. Furthermore, it dealt with how to bring together the many players – the teachers, students, parents, the authorities, the canton and the federal government – or how to get a relatively slow-moving system into action. Communication and crisis management were also important topics, as well as quality management and finances, as a “Gymnasium” is usually semi-autonomous. We also looked at legal issues, as we are constantly confronted by these. For example we are currently dealing with the question: For how long can a teacher confiscate a student’s mobile phone?

**AN** And what are your tasks as the Deputy Principal?

**AR** This is handled differently in each school. We function...
here very well as a team. A large part of my duties lie in the administrative area. I organize entrance exams, plan the yearly calendar and am responsible for the student holiday and absence requests, the talent support program as well as for communication. In addition I hold annual reviews with some 30 teachers each year. This management tool is very important to us and has enabled us to achieve much in the last eight years. I also look after two class levels and have regular contact with the home class teachers. And finally, we intervene in crisis situations to support the teachers.

**AN** What do you enjoy the most?

**AR** On the one hand, I like solving problems. On the other, I enjoy getting things moving. When I started as Deputy Principal, the education system survey dealing with the interface between school and the university was published. We came to the conclusion that we wanted to initiate some changes. We started out quite small implementing the project GBplus in a single class. It basically threw all the conventional teaching structures overboard. We split the year into six phases, so that the students only had to concentrate on five subjects at a time instead of thirteen. We also divided each phase into a learning and an exam phase. Can you imagine trying to give an exciting biology lesson while half the class is learning French vocabulary for the test in the next lesson. This is frustrating and doesn’t benefit anyone. At the beginning there was much criticism from the staff, particularly because the pace that we had set proved quite ambitious. But today everyone is on board and half the classes are taught using this system.

**AN** Does your job as Deputy Principal absorb you completely or do you still teach as well?

**AR** I do still teach. The amount changes from year to year and I sometimes am a little annoyed that I don’t do more of it. I love teaching and I really enjoy working with young people. I always have. While I studied, for instance, I trained the junior synchronized swimming national team. The interaction with young people, their questions, the chance to show them something of all the exciting things that the world has to offer and if possible to wake their interest are all things I find great. And biology is a great subject in this respect.

**AN** How much molecular biology appears in these classes?

**AR** A large amount in my classes (she laughs). Of course, there are other teachers who are more at home with plants and animals and not so comfortable with molecular biology topics but about half of our biology teachers come from the Biozentrum. So, generally one semester of the three year biology curriculum is reserved for molecular biology.

**AN** It is often said that women are not as interested in science. Is this what you also observe?

**AR** In the sciences, this depends greatly on the subject. Males and females are equally interested in biology. Generally, more men tend towards mathematics and physics. And young women are not reluctant if they are shown the whole spectrum of possibilities within the sciences and the doors that these can open.

**AN** How to interest more students in STEM subjects is often discussed. What is the problem?

**AR** Honestly? I think our school system simply doesn’t give these subjects the importance they would need to get. The curriculum has a very strong emphasis on languages and the students don’t have enough contact with the scientific subjects. Yet, in my opinion, interest in the STEM subjects (science, technology, engineering, and mathematics) must be sparked long before the “Gymnasium”. At that level it is already too late. I am convinced that this should be happening already during their primary school years.

**AN** You are a co-founder of the BioValley College Network. Its goal is doing just this, to strengthen the sciences at school. What does this network do and how did this come about?

**AR** We, five teachers, almost all from the Biozentrum, were asked in 2003 by Novartis whether we would like to take part in an exchange with Boston. The goal was to strengthen molecular biology in the school curriculum. When we returned, we didn’t want to lose the momentum that we had brought back with us, so we founded the tri-national BioValley College Network. We started out quite small but currently around 550 students participate at College Day, where students meet experts at the university. The continuing education course offered for teachers, the Life Sciences Symposium, is also very popular attracting 150 to 200 teachers from around Switzerland, Germany and France. Furthermore we provide learning opportunities in the form of a sabbatical of a two to six month return to research which is financed by Actelion. And lastly, we have established two school labs.

**AN** Your day has also only 24 hours. How do you manage all of this?

**AR** I don’t really know. With much talent for improvisation (she laughs). Actually now that my children are nine and fourteen years old, it is much easier. I also have a very understanding boss and a husband who gives me much support and I extremely enjoy doing all of this. I receive much in return. In the meantime I have also learnt to say no now and again. And I simply couldn’t sit at home. Six months of maternity leave already felt like a very long time to me.

**AN** What advice do you give your students for the future?

**AR** That you never know in which direction the road will lead and so it is best to go through life with a great deal of openness. I also find it important to persevere, even if now and again things are not so great or exciting. I also had my crises while working on my dissertation but even in these situations you can learn something that can help you later.
Bridging cultural gaps

Mediating between cultures is not only a personal passion of Mathis Brauchbar but also a main feature of his profession. As a co-founder and partner at the communications agency “advocacy AG” he gathers people with diverse interests around the negotiating table. That a huge divergence in culture can exist, even in one and the same place, was something that Mathis Brauchbar experienced already as a student. After studying philosophy in an “old-school-style”, a completely new and different culture awaited him at the Biozentrum.

ALUMNInews You are one of five owners of the communications agency “advocacy”. What are your responsibilities?

Mathis Brauchbar “advocacy” is actually more focused on dealing with issues and topics than a communications agency. We have become specialized in various fields such as research, education, health, life sciences, as well as social security and spatial planning. My field of responsibility lies at the interface between issues related to healthcare and research. Among my clients are the Swiss National Science Foundation (SNSF), the Swiss Cancer Research Foundation and the Federal Office of Public Health. The day-to-day work consists of advising our clients on issues relating to public affairs, developing communication strategies or providing support in repositioning and in change management. I’m frequently underway. On two to three days of the week I make site visits to our clients in Geneva, Lausanne or wherever they are located. The remainder of the week, I am either in our office in Zurich or Basel and work there together with the teams on current projects.

AN What was one of the most interesting projects you worked on?

MB For me, the most interesting projects are those where you bring various stakeholders to the table or when it is required to merge diverse cultures in communication. Certainly, one of the most exciting and challenging projects was the Novartis-EXPO Pavilion “Biopolis” in 2002. Novartis, as sponsor, and the EXPO organization had completely different ideas. Especially between the cultures of the management driven pharmaceutical industry and the cultural industry there was much divergence in their approach and their way of thinking. In such a situation our role is that of a mediator, who does translational work. I often have projects with a potential for conflict. Guiding such projects and jointly creating something meaningful is something I enjoy very much. Currently, for instance, I am involved in the SNSF National Research Programme 67, which deals with the end of life and includes difficult and controversial issues such as euthanasia, palliative care and the living will.

AN What do you remember most about studying at the Biozentrum?

MB What I liked about the Biozentrum in the 1980’s, was its open and international culture. I had previously studied philosophy at a time when everything was still very old-school
the professor was “god”; the structures rigid and students meek. The change to the Biozentrum was almost a culture shock. The culture I found there was much more my style. I clearly remember my first day. I asked someone who was passing, where the introductory lecture was to be held. And his casual reply made me realize: OK, here you can do away with formalities and you speak English. When the professor entered the lecture hall, it was Howard Riezmann, I recognized him immediately as the person I had just stopped in the hallway. Nevertheless, you could also sense that renowned scientists such as Walter Gehring, Gottfried Schatz and Werner Arber were working here and that the Biozentrum was recognized as one of the leading institutes in Europe. This was a great motivator and also made me quite proud to be studying here.

AN Why did you change from philosophy to biology?
MB In the 1980’s, biomedical ethics evolved as new genetic possibilities became available. I wanted to pursue bioethics already then. So after two years of philosophy, I studied Biology II, not to become a research scientist but to gain some expert knowledge in this field. While still a student, I started writing about bioethics topics for the student newspapers. Later I became a freelance writer for the “Basler Zeitung” and the “Tages Anzeiger”: And so one thing led to another. It was relatively easy to find work as there were very few science journalists with a background in molecular biology. Finally, in 1989, my editor from the “Tages Anzeiger”, who had just opened a journalist agency, asked me if I would like to join. I started with him on the very day I submitted my diploma thesis.

AN Have you been involved in any projects for the Biozentrum?
MB Yes, together with Joachim Seelig I created a portrait of the Biozentrum for a jubilee event. I have also on occasion worked with Werner Arber, for instance when the OECD asked him to prepare a report about the future of biotechnology in the 21st century. But returning to the Biozentrum in a completely different role, back to the institute that reconnects me with all the joys and disappointments of my student days, leaves a weird feeling.

AN Speaking of joys, do you have any anecdote that still makes you smile today?
MB There was an amusing situation when Walter Gehring told us, right at the start, that he only takes the very best students for their diploma work in his group and that it didn’t look good in our class (he laughs). Oh well, we thought, at least we know where we stand. Consequently, no one applied to him and he then had to send Markus Affolter, who was then a scientific assistant, to see whether any student would like to do their diploma with Walter Gehring. However, by this time, we had all found a lab.

AN Back to your job again. What has changed in the communication landscape in the past 25 years?
MB The changes have not fundamentally affected us as an agency, as our core business is consulting. What has changed massively in the last years is the use of digital media. In this field, it is mandatory to keep up-to-date. So, although we may have large digital projects, which we do not have the competence to implement, we do need to have a clear picture of exactly what the end result will be. As consultants, our goal is to present our customers with a wide range of possibilities, including novel ideas. Thirty years ago, a brochure was the first class product. This now belongs more or less to the past. Today we employ integrated approaches. Another thing that has changed, not only for us in communications, is the pace of work. Project management using digital channels, communication via email and being reachable around the clock makes everything faster and more compact. Today, feedback is required from many people with the result that more adjustments and fine tuning become necessary. This also affects the costs. Earlier, the layout and printing of a brochure was a large expense. Today this only costs about half as much. Yet sometimes nothing is printed at all, everything is published online. This means whole production steps have been simply dropped out. On the other hand, the costs for our services are more likely to rise.

AN Does being self employed, still allow you to have a private life?
MB Oh, I really hope so! (he laughs) Being self-employed in the way I am, it is not easy to draw the line between work and leisure. I think as an employee working in an office, this border is much clearer. I also work from home, particularly because of my family. And when I read books, they often interest me in a professional context. In this sense, work, hobbies and the family are very closely interwoven in my life.

Like son, like father!

Robert Kübler and Eric Kübler are father and son. Both studied at the Biozentrum. It is not unusual when children choose to study what a parent had once learnt. In this case, however, it was the opposite: The son studied biology first and then his father. This made Robert Kübler not only the oldest student ever studying at the Biozentrum but also older than all of his lecturers...

ALUMNInews The first question one asks an alumnus is: What did you do after graduating? In this case the first question is clearly: What did you do prior to studying?

Robert Kübler I was previously employed in the investment banking and financial sector. From 1976 until my retirement in 1999, I worked as the Financial Director of the Basel Trading Company.

AN To then study molecular biology doesn’t seem to be an obvious choice?

RK I think it is relevant to know that at school, I loved science, particularly chemistry, and planned to study this subject. But shortly before my final exams, when a friend of the family advised me to study at the “École des Hautes Etudes Commerciales,” the same business school in Paris as his son, I surprisingly let myself be swayed. Even to this day, I don’t know why he could convince me.

AN You enrolled to study biology when you were 64. Why?

RK When my son took the biology course in 1984, he was still living at home and I noticed what he was learning about: Amino acids! He explained to me what they are and this instantly reawakened my interest in chemistry. I told him, that should the opportunity ever arise to learn this too, I would grab it immediately. The opportunity presented itself fifteen years later and on October 18th, 1999, I attended my first BIO II lecture at Uni Basel.

AN How did you react when your father told you that he had decided to study the same biology course that you had previously taken? Did you think that he could make it or were you skeptical?

Eric Kübler I thought it was a good decision – needing some courage but interesting. And of course I believed in his abilities...

RK In this regard I have to interrupt you. You certainly didn’t say it directly, it isn’t your style, but what you really wanted to say was: “You’re crazy” (he laughs). And this was quite close to the truth.

EK I guess I knew what the course was like and the difficulties it entailed. But my experience had taught me that you get used to this and then it comes together.

AN Did you give your father a hand with the course?

EK No, I didn’t have to. Besides, at that time I was working in Göttingen as a scientific research assistant and usually only heard about how my father was managing his studies. And I think he managed this very well without me.


Eric Kübler, born in 1964, Swiss, studied molecular biology at the Biozentrum and completed his doctorate under Prof. Howard Riezman. He researched at the Whitehead Institute in Cambridge, USA, and the University of Göttingen. At the biotechnology firm Prionics AG he was involved in the development of new BSE tests. Since 2004, he conducts research and teaches at the School of Life Sciences at the University of Applied Sciences and Arts Northwestern Switzerland, in Muttenz. He lives in Basel with his wife and four children.
**AN** Where there also moments where you regretted your decision to go back to uni?

**RK** Oh yes, definitely. During the second semester, while doing the practical work in inorganic chemistry. I really reached my limit and almost threw in the course. I didn’t go back to uni for the next two to three days and had decided to quit. Then I had a good cry on my son’s shoulder, so to speak. He listened patiently to me and actually didn’t say much but afterwards I felt better again and continued studying.

**EK** Honestly, I can’t remember that discussion at all. But each student hits this point at some time and I never doubted that my father would manage it. He was so enthusiastic...

**RK** I would even venture to say, that it was only enthusiasm that finally got me through the course.

**AN** You were not only the Biozentrum’s oldest student but were also older than all your lecturers. Did you reap some benefits from this?

**RK** I wouldn’t say that I had an advantage. Perhaps the professors were a little more lenient. Professor Hans-Peter Hauri asked me early after registration whether I would not prefer to attend lectures as an “auditor” rather than as a student. I explained to him that I didn’t only want to listen but also to study and learn. I could only gain from this.

**AN** How was it to be among all those young blooded students at your age?

**RK** I enjoyed the atmosphere among the young students very much. I felt that they accepted me as a fellow student very quickly, perhaps because I never tried to pretend to be young. My behavior was certainly very different to theirs. For example, I dressed for exams as formally as the examiners. And now and again, this sometimes created an unusual situation.

**AN** What kind of situation are you thinking of?

**RK** Before one of the first lectures, for instance, I was standing on the stairs at the side of the lecture hall. A student came to ask me about the structure of the course. I told him, “Sorry, I don’t know either, I am also new.” He was completely confused and asked me, “Aren’t you the professor?...”

**AN** Well, your son is a professor. You teach at the Institute of Chemistry and Bioanalytics at the School of Life Sciences of the University of Applied Sciences and Arts Northwestern Switzerland, in Muttenz. Do older students also attend your lessons?

**EK** Yes now and again, but not very often, although I have never had a student of my father’s age. It is not unusual to have students between thirty and forty who want to further educate themselves. Unfortunately, some of them don’t persevere for very long. I think they often imagine it will be easier than it is.

**RK** That was also my experience.

**EK** And like with all students, I try to encourage them to stay with it. In your case, it worked, too.

**AN** What did you do after graduating?

**RK** My goal right from the start was to be educated, not trained. To be honest, I did nothing after graduating and gave myself time to recover. In retrospect, the studies were much more arduous than I would have thought possible. To start a new career at almost seventy soon proved to be an illusion. And it was not an option to continue with research at the Biozentrum. When I carried out my diploma work with Professor Kiefhaber, I promised that I wouldn’t stay longer (he laughs).

**AN** Could you imagine beginning to study again after retirement, just like your father?

**EK** By all means. My son is presently studying informatics and – can you believe it – this field interests me very much. Who knows, perhaps I will follow in my son’s footsteps and study something in this area. You see, it is never too late.

**AN** And then history repeats itself...

**EK** Yes, that would indeed be the case. Yet whether I would completely immerse myself in studying a new field, like my father did, I really can’t say. » Home
Eureka! That’s it!

Why is a frog cold and a rat warm? That is what the boy, barely 10 years old, wanted to find out. All he needed was two tins, a glass jar, a frog and a rat. And suddenly he had the answer – eureka! This all happened more than half a century ago. The boy grew up to be a professor and recently an emeritus, who has never lost his thirst for knowledge. In ALUMNInews, Heinrich Reichert looks back on his life in research.

Since 1991, Heinrich Reichert, Professor of Molecular Zoology and Neurobiology at the University of Basel, worked as a lecturer and teacher, initially at the Zoological Institute and for the last eight years at the Biozentrum. After almost forty years of research, he retired at the end of January. And the rare but intense “eureka” moments come immediately to his mind when looking back on his scientific career. He has always been driven forward by open questions and the joy he felt when he suddenly discovered the answer was motivation enough. There are several of these “eureka” moments for Heinrich Reichert. “It must have been about 1985 when we were working on the flight control system of the locust. I had just got the experiment running when a flash of inspiration came out of the blue. I ran out of the lab and straight to the head of the institute calling: ‘I know how it works!’ Suddenly, it had dawned on me how this fantastic autopilot works. Everyone was excited and I most of all.” Only a few years ago Heinrich Reichert could once again enjoy one of these special moments. He was investigating the question of how it is possible that something as complex as the brain arises from something as simple as a thousand cells. “For a long time I considered this to be a completely irresolvable problem”, he admits. “Again we found the answer to this dilemma while we were deeply involved in an experiment. The key is that the family principle underlies the whole organization. This means that one stem cell gives rise to a family of neurons. From a hundred stem cells finally a hundred families develop that are connected. All at once this system became clear to us, as we had been investigating the development and lineage. These moments, totally unexpected, were the most wonderful experiences in my research career.”

Besides using frogs and locusts as research objects, Heinrich Reichert discovered the benefit of working with flies – even twice. The first time was during his PhD thesis. Afterwards he almost gave up on them: “I thought that working with...
Drosophila was a hopeless case, much too small and quite unsuitable for neurobiological research.” At the beginning of the 1980s, when genetics began to thrive, the fly caught the interest of the neurobiologist again. “Today, we can use the fly to study things we couldn’t have dreamt of earlier,” says Heinrich Reichert. “For instance, how genes control the formation of complex neuronal circuits and regulate behavior. In those days, this was inconceivable.” Yet after forty years of research, there are still questions that remain open for the emeritus: How does the brain give rise to consciousness? How does it learn and remember? “There is still a long way to go. There will probably be no magnificent ‘double helix’ discovery, which suddenly explains everything. We will continue to move ahead in small steps as we always have,” believes Heinrich Reichert, “but when looking back, I can see the enormous progress that we have made over the past forty years.” This includes – also thanks to Reichert’s research – that a paradigm has become obsolete: That Drosophila research has no relevance for the understanding of the real brains of mammals. Today, we know that they are incredibly similar in diverse aspects. The same mechanisms, genes, types of nerve connections, neural stem cells and signaling molecules, even in regard to the circadian rhythm and diseases, they are astoundingly similar. “Male flies that are not very attractive to the females tend to become alcoholics,” relates Heinrich Reichert with a grin.

In addition to his research, Heinrich Reichert also founded the cross-border network for neurosciences “Neurex.” For over a decade, it has been a perfect example of an efficient multinational research and education program. His second hobby-horse is the marine biology excursions. He was infected by the enthusiasm of his two former colleagues, Volker Schmid and Walter Gehring. He eventually “inherited” the student courses at the marine biology stations in Banyuls-sur-

mer and Roscoff from them, continuing to run them with the same passion. “The ocean is a universe of diversity! Anyone who hasn’t experienced this has really missed out on something!” thinks Heinrich Reichert, who also enjoys to go diving privately. The new emeritus hopes that he can devote himself to the study of marine organisms for at least one or two months a year. If he manages to find time for this at all because actually everything is still continuing as it has till now. He is already booked out for months. “Just a week after becoming an emeritus, I was in Asia working on an interesting project. And in India, there may be a possibility to be involved in establishing a national marine biology institute. I am really excited about this already,” declares Heinrich Reichert laughing. “When I meet people here in the lift, they ask me: How are you? How do you feel? And I can only answer: It’s great! There is so much going on – also in the future!” » Home

Encounter with the shark Cacharinus longimanus in the Red Sea. Picture taken by Heinrich Reichert.

Biozentrum Alumni – become a member now!

The Biozentrum Alumni is a community of all those who have studied, carried out research, taught or worked in another function at the Biozentrum. Its central goal is to promote a worldwide network among them.

Biozentrum Alumni automatically also become members of AlumniBasel. They can benefit from the offers of both organisations. The annual membership fee is CHF 50. Alumni living abroad pay a reduced fee of CHF 25 as they cannot access all offered benefits.

» apply now!
The mountain calls...

...and that in every sense. Born in mountainous Norway, the passionate structural biologist is already getting a feeling for the Swiss mountains and the German language. Since the climb to the summit will have to wait, in the meanwhile, by reading Thomas Mann’s novel “The Magic Mountain”, Jan Pieter Abrahams is reaching literary heights. This is because for his recent appointment to professor at the Biozentrum and at the Paul Scherrer Institute (PSI) he wants to be well prepared – in every respect.

Prior to being appointed to the Biozentrum und PSI, Jan Pieter Abrahams held a professorship for almost twenty years at the University of Leiden in the Netherlands. However, the natural structures of life's creation fascinated him already long before. “I love seeing important molecular structures of life that nobody has seen before, in ways that nobody has tried before,” says the biologist enthusiastically. And so he has dedicated his whole research life to making the previously hidden forms and structures of life visible. Just as a geologist examines rocks for clues about the formation of our planet, the tiny molecules and proteins hold the secrets of the origins and evolution of life. “There are very few places on earth that are as old as the structures of life that exist within ourselves: there is a place in Greenland and also one in South Africa where you can put your hand on a rock that is older than life on Earth. Everything else that we can see, from the Alps to the deep oceans, is much younger,” he explains.

"Yet the fundamental molecular shapes of life, the structures of the molecules that carry oxygen in our blood, that allow us to see and think, that generate the energy we need to live, are all as old as life itself. So, though life is always renewing itself, it is older than most things about us that we experience as permanent. The shapes of the molecules in our bodies are older than the mountains.” In order to unlock life’s little secrets, Jan Pieter Abrahams is committed to developing new and increasingly powerful methods to help make very fragile proteins visible, for instance, or to show the three-dimensional structure of protein crystals at atomic resolution.

In order to achieve this, it requires extensive expertise in diverse fields. And that is why the new professorship at the Biozentrum and the PSI has attracted the experienced structural biologist: “The combination of the fundamental biological research at Biozentrum and the world-class electron microscopy of molecular structures at C-CINA, together with the high end physics, particle optics and precision engineering at PSI makes Switzerland one of the few places in the world where I can fulfill my ambition.” And regarding his research here in Switzerland, he already has very clear-cut ideas. He wants to build a new instrument that will make it possible to visualize the molecular and atomic shapes of life by employing electron diffraction. But before this instrument will become available, Jan Pieter Abrahams will pilot its theory and practice by augmenting existing electron microscopes at the Biozentrum. “I’m most excited about the prospect of starting a new project together with enthusiastic, highly competent experts, in a new, multi-disciplinary environment.”

Jan Pieter Abrahams is very much looking forward to this next step in his life and the opportunities it offers. That he may literally have to climb some mountains only makes the challenge more interesting. “I was born in Norway and look forward to living close to the mountains again and in order to brush up my German, I have started to virtually climb the Swiss Alps in reading Thomas Mann’s novel ‘Der Zauberberg’.” Jan Pieter Abrahams has always been keen to reach new summits, whether that be in research, in terms of language or offered by a new living environment.

An inner excitement, mixed with the anticipation and concerns accompanying this new phase of life, is also shared by his family. At least his wife and one of his two daughters will accompany him as he heads towards the mountains. And a closer look at Jan Pieter Abrahams’ CV reveals that the scientist has always been slowly but steadily drawn southward, towards the heart of the continent. “In the past I lived in Norway, Denmark, Holland, Germany and England – in my heart I’m a European. And Basel is about as close to the heart of Europe as you can get.” » Home
CH-280.3.018.065-8.

No, this isn’t a secret code. It’s the Commercial Register Number of the company Nuomedis AG. Three researchers from the Biozentrum are among the founders of this start-up: Marko Loparic, Marija Plodinec and Rod Lim. They have developed an innovative technological method for the diagnosis of cancer and are on the way to bring it on the market.

They have already proven their inventive skills. Now they require a good dose of business skills. In founding their company Nuomedis AG the scientists are venturing into unknown territory – the world of industry. Since last year, their company has an entry in the Commercial Register Index under the number CH-280.3.018.065-8. But what appears to be a first step, has actually evolved from a much longer history. Setting up the company is only one important milestone along the road from an idea being born to the market launch.

It all started with a basic scientific question. What do the mechanical properties of cancer cells have to do with the invasion and metastasis? To address this question, Marko Loparic, together with Marija Plodinec and Prof. Roderick Lim first developed an early prototype of ARTIDIS to circumvent technological limitations at the time. Convinced by their proof-of-concept experiments, the trio obtained about two million Swiss francs from the Commission for Technology and Innovation (CTI) over the last four years to develop ARTIDIS with assistance and support from the company Nanosurf AG – specialists in atomic force microscopy (AFM). This support enabled their work to mature and flourish. “It was then that we established our first contacts with the University Hospital Basel and with their support received patient tissue biopsies that we examined with AFM. Successful collaboration with the Institute of Pathology in Basel enabled us to test and verify on more than 200 samples that this technique is suitable for use in cancer diagnosis,” says Marko Loparic.

ARTIDIS stands for “Automated Reliable Tissue Diagnostics”. The basic component is an AFM, which is a well-established nanotechnological tool in the basic sciences but relatively unknown in medicine. “By considering the needs of medical practitioners, we have built an AFM-based tool that has a specific application in cancer diagnostics,” explains Marko Loparic. “With ARTIDIS it becomes possible for oncologists to not only make a much faster but also a very accurate diagnosis. We only require a very small biopsy to assess whether the tissue is healthy or whether we are dealing with a benign or malignant breast tumor.”

The reliability of the measurement is based on the unique mechanical properties of unadulterated, living tissue. ARTIDIS consists of an extremely minute probe, 4,000 times finer than a hair, which indents around 10,000 to 20,000 points across the biopsy to reveal stiffness variations in the underlying tissue. Based on these measurements, a mechanical profile is generated. In healthy tissue, the stiffness measured across the sample is homogeneous. Cancerous tissue is very heterogeneous. A very characteristic proportion of “softness” indicates the presence of malignant cells.

“We can generate such a histogram in three hours. Using conventional methods, the patient often has to wait about two to three days, sometimes even a week for a diagnosis. This period of uncertainty is very stressful for the patient,” explains Marko Loparic. “In the future, we aim to reduce this time to one hour, making it comparable to that of a blood test. This would make it possible to introduce a one-stop-session in the clinic.” This means that in one visit to the clinic, the patient undergoes an examination and then also receives the diagnosis. And should it really be cancer, the oncologist can already, at the first visit, determine the appropriate treatment strategy. This provides an enormous time saving.

Furthermore, the aggressiveness of the cancer can also be detected by ARTIDIS. “Approximately 30 percent of the patients are currently over or under treated and in many cases, it is not known whether the form of cancer is actually aggressive or not,” adds Marko Loparic, explaining the current clinical situation. “Today, there are no dependable markers to help the treating physician to find the optimal therapy.” ARTIDIS could fill this gap, so that patients could receive an individually tailored treatment faster. This not only improves the quality of life but also has a positive impact on the cost. Cancer treatments are hugely expensive: The total cost from diagnosis to therapy, in the case of breast cancer, is about 150,000 euros.

A total of five patent applications for ARTIDIS have been submitted by the project partners. They have already been granted the most comprehensive and important patent in the USA – the application of ARTIDIS in the area of cancer diagnostics. “This is of great importance in order to attract investors. That’s why we are very happy that the patent was approved in the USA and that we have the exclusive rights to its use”, says Marko Loparic, pleased about their success. Following the development of the prototype, the patent approval and the license agreement with the University of Basel, establishing Nuomedis together with employees of Nanosurf was a logical consequence. “We can only support the clinical market and carry out clinical studies if we have ISO certification,” explains Marko Loparic their approach. “In principle, we can only implement the many industrial standards as an independent company.”
Yet the highest priority remains the further development of ARTIDIS for its application in the prognosis of cancer and the diagnosis of other diseases. There are presently six demo labs throughout the world working with ARTIDIS prototypes. “Our first one was here at the Eye Clinic in Basel. The method is being applied with much success in both research and in improving surgical procedures. Further demo labs are located in Grenoble and Leipzig,” tells Marko Loparic. “We plan to set up labs in other locations so that we are well prepared for the coming phase of clinical studies.”

As a scientist in academia, Marko Loparic says, one has no idea about the whole procedures and requirements at the beginning. The team is therefore very grateful that they could rely on the experience of Robert Sum, former Chair of Nanosurf, as well as on the CTI which provided them with the services of a coach and with help in setting up the company. Since this company exists, Marko Loparic is not only a medical doctor and researcher but also the newly appointed Chief Medical Officer of Nuomedis AG. “What has definitely changed in my life now is that each day I learn something more about management and project organization. It is similar to learning a new language”, thinks Marko Loparic. “I now find myself in a very interesting position at the interface between research, clinical work and industry. All three aspects are very different from each other and this makes it very interesting for me.” Already, as a medical student, he realized that routine work was not his cup of tea. That was why he swapped daily hospital life for research. “In my opinion, I can have a greater impact as a scientist or in a company. When ARTIDIS is introduced into clinical practice, we can help millions of people.” That motivates Marko Loparic and demonstrates that despite all, he has internalized a doctor’s way of thinking. “I find what I am doing very satisfying, as I have been involved in everything from the start: In the beginning with a basic science idea, then a further development in its application and finally to take the idea out into the world.

The co-founders of Nuomedis: Rod Lim, Marija Plodinec and Marko Loparic.
Awards and honors.

**Petr Broz receives Career Development Award**

Prof. Petr Broz has received one of the highly regarded Career Development Awards from the Human Frontier Science Program (HFSP). He studies the defense mechanisms of the innate immune system and is interested in how invading pathogens are detected and eliminated within host cells. Recently, he has demonstrated that guanylate-binding proteins (GBPs) attach to the pathogens inside the cell, thereby triggering a signaling cascade that leads to the destruction of intracellular pathogens and to the activation of a signaling complex, the so-called inflammasome. In his project Broz will investigate how exactly GBPs recognize bacteria inside the host cell and their mode of action. Through granting a Career Development Award, the HSFP distinguishes former fellows, who have received a long-term fellowship for their postdoctoral research abroad. » More

**Prestigious research prize for Michael N. Hall**

In March 2015, the five winners of this year’s “Canada Gairdner International Award” were announced. One of the laureates is Prof. Michael N. Hall. The award recognizes his discovery of the protein kinase TOR – Target of Rapamycin – and its role as a key regulator of cell growth. The discovery of TOR was not only a major milestone in basic research but also proved to be of clinical relevance. TOR has been implicated in a wide variety of diseases such as diabetes, cancer and cardiovascular disease. With the prize from the Gairdner Foundation, Hall once again receives one of the highest acknowledgments for his excellent research. “There is no greater reward for a scientist than to have his work recognized by his peers – and this is what the Gairdner Award is,” says Hall delighted. The formal prize presentation will take place on October 29th, 2015, at a ceremony in Toronto, Canada. » More

Research.

**Small signaling molecule gives green light for cell division**

Though very tiny, the molecule is vital for the survival of almost all bacteria. This signaling messenger – called c-di-GMP – controls behavioral processes in bacteria. For instance, it ensures that bacteria join together to form biofilms, which can cause chronic infections in humans. The scientists working with Prof. Urs Jenal have now demonstrated that c-di-GMP also plays a decisive role in bacterial reproduction. They have discovered that oscillating levels of this signaling molecule drive cell cycle progression and proliferation of the model bacterium *Caulobacter crescentus*. Additionally, the varying spatial distribution of the signaling molecule in the dividing mother cell also plays an important role in the behavior of the progeny. It is the first time that the researchers have been able to establish a direct connection between the two major regulatory networks of bacterial cells, – the small messenger and important regulatory enzymes called kinases. » More

**Pruning of blood vessels: cells can fuse with themselves**

The vascular system is the supply network of the human organism and delivers oxygen and nutrients to the body. Prof. Markus Affolter’s research group has now investigated the pruning of blood vessels in the zebrafish, a process which occurs when a blood vessel is no longer required. During vascular regression, most of the cells consecutively migrate and incorporate into the neighboring functional vessels. The last single cell that remains in the pruning vessel reaches around the lumen and the membrane margins of this cell undergo fusion thus closing the vessel. This ability of the cell to self-fuse ensures a controlled closure of a regressive blood vessel thus preventing blood leakage. For the first time the
Stem cell division: two paths, one goal

Neural stem cells are the source of millions of nerve cells and other supporting cells in the brain. A specific form of cell division – also known as asymmetric cell division – ensures that both the stem cell pool is maintained and sufficient mature cells are generated. In the fruit fly Drosophila, the team of Prof. Clemens Cabernard has discovered that the brain utilizes two separate pathways to ensure correct asymmetric cell division. In dividing cells, the spindle apparatus distributes essential cell components to the two daughter cells and provides information that determines the positioning of the cleavage furrow. The scientists have now demonstrated that the interplay between two signaling pathways, the spindle dependent and independent pathway, is absolutely essential for the accurate positioning of the cleavage furrow and consequently for the proper segregation of chromosomes and cell fate determinants. The understanding of these signaling pathways is of importance, as misdistribution of chromosomes and molecules determining cell identity are often observed in cancer cells. » More

A battlefield inside the macrophage

Who is smarter, who has the most sophisticated methods at their disposal or the best hide-away? This is the decisive question – also in the fight between pathogens and host cells. Prof. Petr Broz’ team has discovered that the macrophages of the immune system defend against bacterial invaders aided by guanylate-binding proteins (GBP). They demonstrated that the GBP bind to the invading pathogen Francisella novicida and kill the bacteria within the cell. The DNA released from dying bacteria leads to activation of a signaling complex, the inflammasome, which initiates the death of the host cell. This in turn activates new immune cells, which should impede the further proliferation and the spread of the bacteria. In macrophages unable to produce GBPs, hundreds of bacteria accumulate, eventually severely affecting the surrounding, healthy tissue. Thus, these proteins are a very effective weapon in the fight against intracellular pathogens. » More

Nanosized bacterial speargun

Many types of bacteria including pathogens causing cholera or pneumonia use a bacterial “speargun” to kill host cells or surrounding competitors. This so-called type VI secretion system (T6SS) is an almost unbeatable weapon that allows bacteria to inject toxic proteins directly into target cells. Prof. Marek Basler has now resolved the structure of the T6SS sheath at the atomic level and provides new insights into the assembly of this nanomachine. The sheath is a sophisticated tube that has the amazing ability to contract in less than five milliseconds to push a toxic spear out of a cell. The scientists could show how the single subunits of the contracted sheath are connected to form a cog-wheel like ring and how these rings connect to form a very long tube. Inside the sheath the subunits are linked via a so-called handshake domain which is critical for assembly and contraction. Structural comparisons revealed that the T6SS injection systems of the cholera pathogen and bacteriophages evolved from a common ancestor. » More