

The smallest cancer patient ever

A team of scientists from Kiel University has discovered the mechanics of tumour growth. By caring for the tiny and ancient animal Hydra, former Humboldt fellow Alexander Klimovich is looking for ways of dealing with cancer.



Dr Alexander Klimovich has to take extra care of his scientific objects: Hydra suffering from cancer. With their help he aims to understand the mechanics of the disease. Photo: Ann-Christine Wimber

Hydra is probably the smallest cancer patient in the world. The tiny fresh-water animal measures about two millimetres in length and features long tentacles on its upper end as well as a sucking cup-like foot. At Kiel University it is cared for and pampered by Dr Alexander Klimovich, former Humboldt fellow and now assistant to Professor Thomas Bosch at the Zoological Institute. The young scientist from Russia takes care of the animals in order to learn more about the origin and formation of tumours. Hydra is the ideal model object – in perfect lab conditions it seems to neither age nor die. And it is quite successful in surviving: It has been on earth for 500 million years. “Compared to a healthy Hydra, the animals carrying tumours are gravely sick, and need intensive care to keep them alive”, Klimovich declares. The room in which the Hydra population is kept is cold. Klimovich has to wear a sweater – warm drinks are not allowed, they might spill and spoil the scientific surroundings. Hydra lives in a special test tube, inactive until some food passes by. Then they grab the tiny krill which Klimovich feeds them with a pipette, swimming among them. The cancer patients need to be fed more often than the healthy population. Also, Klimovich needs to check regularly if the water temperature is just right. It is not allowed to be too warm or too cold. This extra care is essential, as the patients present a milestone in cancer research: “For the last 50 years there have been intensive debates as to whether animals other than humans can naturally develop tumours. With time tumours were observed in monkeys, dogs, birds, but they remained still unreported in other invertebrate,

simpler animals”, the scientist from St. Petersburg explains. Hydra is a very good test object. The animals have a unique way of reproducing: They produce “buds” that then detach themselves from their parental (mother) organism and grow to be adults and “bud”-bearers themselves. Therefore, an abnormality gets passed on to the next generation; all members of one “family” growing from the single sick animal showed the same tumorous growth. While investigating tumour-bearing Hydras and the regulation of their tissue growth, Klimovich and his colleagues discovered a large quantity of accumulated stem cells. “When undertaking more detailed molecular analyses of the tumour, we found a gene that becomes dramatically active in tumour tissue. The defective cells seem not to have the regular programmed cell death. Therefore, they are not eliminated, but just pile up”, the 29-year old researcher explains. “Similar events occur in certain cancers in humans”. The findings are a breakthrough, insofar as scientists now know that cancer is not a development of modern times. It is as ancient as multicellular life itself. “We have learned about the universal, fundamental mechanics that cause cancer”, Klimovich states. He and his fellow scientists will now try to find the cause for the tumour cell hyperactivity. “Since we will never root out this disease, we have to find a way of preventing the hyperactivity in certain cells being triggered, or of shutting it down.” That still has a long way to go. But understanding the mechanics of tumour formation is a first step.

Ann-Christin Wimber

Preserver of languages

Humboldt fellow Netra Prasad Paudyal from Nepal analyses the endangered languages of his home country. This work is not only interesting for researchers; it could help to preserve languages for future generations.

It takes Netra P. Paudyal days to get to his objects of research. He has to take a plane to Kathmandu, an eight-hour long bus-ride into the mountains and needs to walk for another eight hours. His destination is a secluded village in the Nepalese mountains on the banks of the Madi and Narayani rivers. Here, a few speakers of Darai still exist.



Dr Netra P. Paudyal is an expert in General Linguistics. Photo: Ann-Christine Wimber

Paudyal is a linguist, based at Kiel University and funded by a Humboldt fellowship. “Not only the long travel time needed to reach the speakers of Darai is complicated”, the 38-year old scientist declares. “Humboldt regulations state that I am only allowed to leave Germany for two weeks!” That is simply not enough time for collecting research material. Paudyal’s main field of research is General Linguistics; he compares the Darai language to other common languages. The Darai and their ancestral language are somewhat of an enigma. They speak an Indo-Aryan language

belonging to the Indo-European family, which is unusual, given their rather Tibeto-Burman appearance. Paudyal has a field assistant situated in Kathmandu who takes trips to the village and records the data. Also, he still has reserve-data he collected while writing his Master’s thesis at Tribhuvan University, Nepal. But it is not sufficient for the current research purpose – analysing the unusual. “Darai is different from the other Indo-Aryan languages”, Paudyal explains. While analysing the languages structure, he found that the verb changes according to the subject and the object. The sentence structure – subject, object, verb – stays the same. But the reflection of the verb varies, taking subject and object into consideration. This is called a three-argument verb.

“My focus is to collect the entire language sample so scientists can use it in the future”, Paudyal explains. Usually, linguists visit their objects of research and only record small samples of data, namely the kind they need for their research. The father-of-two sees himself as a preserver. His data could be used to help create schoolbooks. Linguistics is a very logical science: Paudyal and his assistant encourage a group of speakers to talk about their everyday life. This is recorded on tape and camera. Afterwards, it is digitalized, transcribed into IPA (International Phonetic Alphabet) and translated into English and Nepali. Then, dictionaries are written and structures explained. “People in the Tanahu district, where I am currently working, often ask me why I need their language. I educate them on the fact that in the future the language might die, as have a lot of languages, and that it could get revitalized from my work”, the Humboldt fellow says. In that way, Paudyal is also an anthropologist: “I do more of

the technical, linguistic part and less anthropology – but I am interested in this field of work as well.”

The choice to become a linguist seems to have been a natural one. Nepali being his mother tongue, Paudyal learned two more languages in early childhood that were spoken in this area as well as Hindi, which was needed to go shopping in the nearby towns. In school, he learned English, and during his PhD he had to learn Chintang, which is an endangered Nepalese Language.

Paudyal will stay in Kiel until December 2015 – and might learn German on top. What will follow afterwards he does not know. “In modern studies, linguistics has become a very competitive field with very few jobs. I hope to produce something interesting and that another door might open”, states the man from Nepal. The work on the three-argument verb could be a step in this direction.

Ann-Christin Wimber

Languages of Nepal

Nepal is one of the most linguistically diverse countries in the world. A complete linguistic survey has not yet been done in Nepal but the Ethnologue (Lewis 2009) cites 126 distinct languages for Nepal, 124 of which are listed as living. Nepali is spoken as mother tongue by the majority of the total population. All other languages are spoken by a limited number of speakers in various parts of Nepal. Among them, the five Indo-Aryan languages of the central part of the country are at risk of dying out. These are Danuwar, Bote, Kumal, Majhi and Darai, which are classified as Ardhmagadhi languages within the Indo-European language family. Most speakers in these language communities have already been assimilated linguistically and culturally into the modern Nepali mainstream. acw

Studying Medical Life Sciences



From lab research to clinical application

The Master’s programme Medical Life Sciences (MedLife) at Kiel University started in 2012. This English-taught biomedical Master programme trains students for a career in translational medicine: What is researched in cutting-edge “omics” sciences such as proteomics or genomics is often ground-breaking (e.g. high-throughput genome sequencing of microbial organisms that populate our gut), but it needs to be translated into medical applications for preventing, treating or curing disease: You need to know what clinicians, biochemists and molecular biologists are talking about to find solutions for clinical problems. Many B.Sc. graduates are interested in a biomedical research career. In Medical Life Sciences they can concentrate on one focus area introducing them to Oncology, Inflammation, Longevity or Evolutionary Medicine. Students involve themselves deeply in those fields, conduct lab work in research projects and write their theses in the lab of their choice. They are also trained in project management, English scientific writing, bioinformatics and epidemiology. Biobanks are a great epidemiological tool for translating research into clinical applications, but a scientist needs to know how to handle the data, which is why it is in MedLife’s curriculum. Students are also included in scientific events such as symposia or summer

schools: “The symposium of the Cluster of Excellence Inflammation at Interfaces was a great platform to catch up on the latest findings of scientific research in the field of inflammation, establish scientific contacts and expand your professional network”, says Maren Pein, who graduated in June. The concept works well, since the first graduated students will continue in research with their PhD positions already secured.

As MedLife only takes a maximum of 25 students per year, groups are small and students are individually supervised. Currently, most students of the 2012 group are finishing their Master’s theses. Some carried out additional internships at companies or academic research labs first, to get a feeling for the career path they want to choose. It will be interesting to see where their choices will lead them.

Edna Hütten

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The author has coordinated the MedLife programme from the beginning with scientific coordinator Professor Almut Nebel. Edna Hütten sees to the daily management of the programme, provides administrative support to students and teaching staff, acts as point of contact for interested candidates and is involved in the continuous development of the programme.