Picture of the issue

Revealing Symmetry

Photo: Werner E. G. Müller, University of Mainz

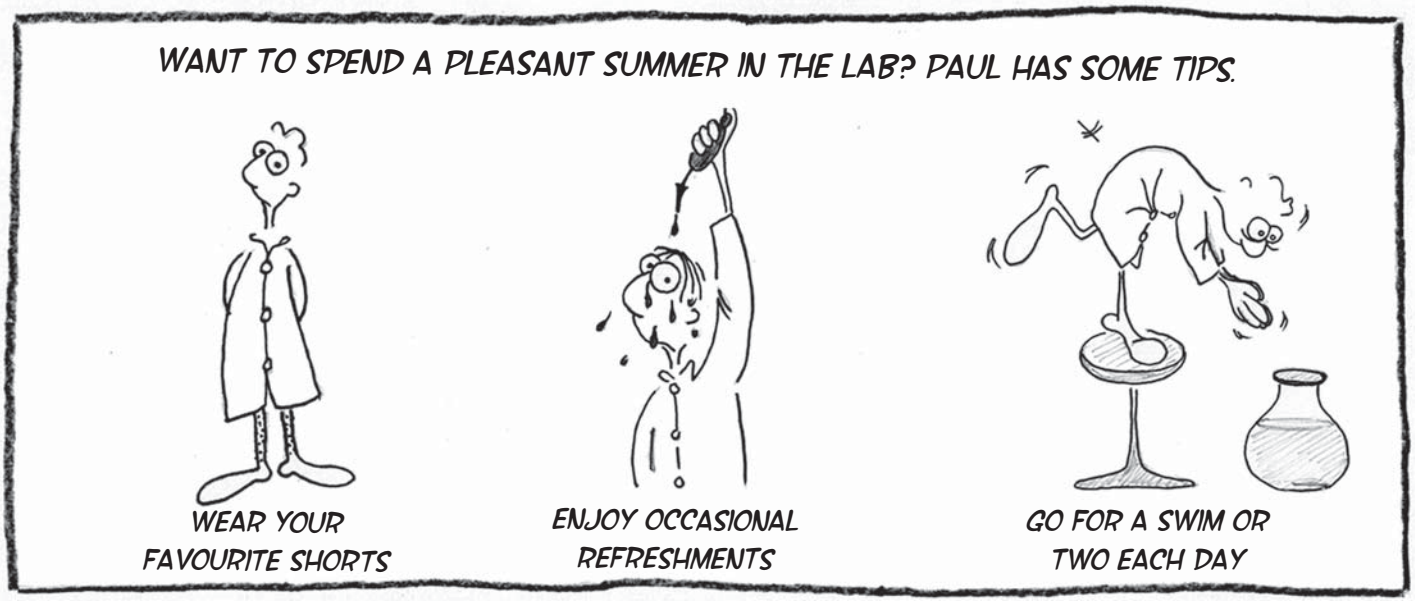
On first sight, this cross-section of the giant basal spicule (GBS) of the glass sponge *Monorhaphis chuni* looks like a true masterpiece of symmetry. The GBS anchors the three-metre tall sponge in the deep sea floor and is constructed from lamellae made of inorganic silica (glass), the structural protein silicatein and collagen. In analogy to the annual rings of a tree, the number of lamellae increases over time. Even though it is not known how much time it takes for a single ring to grow, the chemical composition of this *M. chuni* revealed that it was born 11,000 years ago, making it probably the oldest living animal.

What's more, recently, Klaus Peter Jochum from the Max Planck Institute for Chemistry in Mainz, Germany and colleagues showed that the lamellae can also be used as a paleothermometer, giving hints about temperature changes in the deep sea over the course of the last 11,000 years. The scientists found some irregularities pointing to several increases in temperature, occurring 9,500–3,100 years Before Present (BP). At that time, temperatures rose from 2°C up to 6°C or even 10°C. According to Jochum *et al.*, these short-time climate changes were unknown up until now and are expected to be due to volcanic outbursts (*Chem Geol*, 300:143-51).

Stefanie Haas

PAUL THE POSTDOC

BY RAFAEL FLORÉS



Recently Awarded

▶ Royal compliments and €1 million from the Grete Lundbeck European Brain Research Foundation are what awaits **Karen Steel** (Wellcome Trust Sanger Institute, Hinxton, UK) and **Christine Petit** (Institut Pasteur, Paris, France) on May 9th in Copenhagen, Denmark. The two neuroscientists won the 2012 **Brain Prize** for unravelling the "genetic regulation of the development and functioning of the ear, and for elucidating the causes of many of the hundreds of inherited forms of deafness".

▶ **Jonathan Jones** of the Sainsbury Laboratory in Norwich, UK, has been named winner of the 2012 **E. C. Stakman Award**, presented by the University of Minnesota. Like the patron of the prize, Elvin Charles Stakman, Jones, too has made numerous and essential contributions to plant pathology. In particular, he studies disease resistance. One current project intends to shed light on the interaction between *Arabidopsis* and its parasite, the *Arabidopsis* downy mildew.

▶ Honour to whom honour is due. In mid-April, the Belgian Inbev-Baillet Latour Foundation awarded their 2012 **Latour Health Prize** to **Gero Miesenböck** from the University of Oxford. Often outshined by Stanford University's Karl Deisseroth, Miesenböck is deemed to be the actual founder of the widely popular optogenetics technique, in which genetically modified neurons can be stimulated by light (see interview with him in *LT* 5-11). The prize doesn't only come with fame and glory but also €250,000.

▶ Another award goes to the Wellcome Trust Sanger Institute. Recently, **Elizabeth Murchison** received the **Eppendorf Award for Young European Investigators** for pinpointing the causes and evolution of one of the most mysterious and rare cancers – the clonally transmissible cancer. This type of cancer has so far only been observed in dogs and, most dramatically, in Tasmanian devils whose very existence is threatened by this condition. -KG-

Synthetic biology moratorium

Prevent Disasters?

Moratoriums seem to be very *en vogue* at the moment. First it was nuclear power in Germany, then research on a mutated bird flu virus, now, over a hundred civil society groups are calling for a moratorium on synthetic biology. In a report released on March 13th, watchdog and environmental organisations including *Friends of the Earth* and *GeneWatch UK*, stressed that "technical ability to synthesize DNA and create synthetic organisms far outpaces our understanding of how these novel products may work". Because of this fast technological evolution, "standard forms of risk assessment and cost-benefit analyses relied on by current bio-

Photo: Fotolia/sumnersgraphicsinc

'Synthetic' doesn't have to stand for 'evil' all the time. Synthetic fibres are well-suited for sporting activities and make a slim waist...

technology regulatory approaches are inadequate" and new "national and international oversight and security mechanisms" must be developed.

Already in 2010, civil society groups suggested a halt to research on synthetic biology, after Craig Venter famously created his *Synthia* cell. But back then, the US bioethics commission of the US government said that there is no need to flash into action as the discipline is still in its infancy. Now, two years later, synthetic biology has grown up, marched out of the lab and into the commercial production of chemicals, medicines and biofuels. In a comment in *Nature*, Genya Dana and colleagues from the US Woodrow Wilson International Center for Scholars tally that the global market for synthetic biology in 2010 was $1.1 billion.

Dana *et al.* agree with the civil society groups that in contrast to traditionally genetically modified organisms, synthetic microbes are "more difficult to regulate, manage and monitor". They add, "Once released, synthetic organisms cannot be retrieved. It is imperative that funding and research communities take action to prevent future ecological disasters."

However, Joyce Tait and David Castle from the ESRC Innogen Centre for Social and Economic Research on Innovation in Genomics at the University of Edinburgh believe, "Contrary to the opinion of Genya Dana and colleagues, the greater sophistication of modified microbes created by synthetic biology could make them less, not more, difficult to regulate, manage and monitor than their naturally occurring counterparts." Additionally, Tait and Castle express concerns that "Adverse public opinion could hinder the development of synthetic biology's potential." If this is to be prevented, "Media must refrain from hyping the benefits or risks of the technology (in order to) ensure that synthetic biology can be developed safely under a regulatory system that is based on the probability of occurrence of hazardous events, rather than on imagined possibilities."

New open access journal

eLife Comes to Life

"This will be a game changer," Randy Schekman, editor in chief of *eLife*, the new open access journal supported by the Wellcome Trust, the Max Planck Society and the Howard Hughes Medical Institute, boldly states in a video posted to the journal's newly launched website *www.elifesciences.org*. The announcement of *eLife* in June last year caused a major media stir, by November the editorial board was firmly in place and, according to the website, "soon" *eLife* "will open for manuscript submissions". Impatient scientists who want to be among the first to have their paper published by *eLife* are invited to join a mailing list. However, the official launch is not scheduled until the end of 2012.

What is it that makes *eLife* different and everyone involved so excited? It's a journal the current publishing scene has been missing all the time. "There are no life science general journals targeted at the very high end and run by scientists," Schekman points out. However, simply giving the science community a new home for their papers is not the main goal of eLife. Ac- ▶▶

cording to managing executive editor Mark Patterson, *eLife* wants to inspire a broader change in the system. "One of the central ideas", he explains, "is to use digital media to the maximum extent and to really make research communication as effective as possible." All this, "for the benefit of science", of course. What's more, *eLife* also wants to promote a "swift, constructive, and fair editorial process".

Everything seems 'ready for take off', the only question is whether scientists will grant everyone access to their work. Maybe one or another just needs a little shove? In a recent *The Guardian* article, Sir Mark Walport, director of the Wellcome Trust, considered sanctioning researchers who refuse to make their work freely available. One way would be to retain future funding until earlier research supported by the Wellcome Trust can be accessed publicly. "We have to maximise the public benefit of the research that we publish and we only do that by distribution," Walport said.

In related news, also *EMBO Molecular Medicine* went open access in March. Editor in chief Stefanie Dimmeler told *Laborjournal*, "For us it's most important that through this open access model also physicians who are not working at universities and interested laymen can read our articles. Through open access we achieve a wider distribution of our journal and thus, can promote new developments in medicine more effectively."

Whether a change in the game or simply a broader reach, scientific publishing has entered a new era.

Health surveillance at 2012 Olympics

Protect the Crowd

Citius, altius, fortius – faster, higher, stronger! In just a few weeks, the Olympic spirit will spread across London and the whole world. However, when thousands of people flock together maybe more will be spread than just good spirit?

"There is ample documentation that mass gatherings can amplify and spread infectious diseases. Respiratory infections, including influenza, have been frequently associated with mass gatherings. Such infections can be transmitted during the mass gathering, during transit to and from the event, and in participants' home communities upon their return," states a WHO report on the pandemic (H1N1) 2009 influenza. Therefore, at the 22nd European Congress of Clinical Microbiology and Infectious Diseases, held in the British capital at the beginning of April, an entire symposium day was dedicated to mass gathering health.

The congress press release illustrates, "When some three million visitors converge on London in late July, they'll bring with them organisms from every corner of the globe." Avoiding disease outbreaks or being prepared is the key for 'healthy' games (at least among the visitors). This can be, amongst others, accomplished with *Bio.Diaspora*, something like an advance warning system that employs the global airline transportation network to "anticipate how infectious diseases are likely to spread around the world". But that's not enough yet.

In January *The Lancet Infectious Diseases* published a six-article series on mass gathering health, which highlights the importance of this new branch of research. "Mass gathering health is something different from the public health arena in general. It (also) includes much more than just infectious diseases," said John McConnell, editor of the journal, referring to non-communicating diseases like burns, heat or crush injuries. "We hope that this series will be among the foundations, on which the emerging speciality is built," McConnell added.

Music and germs for the masses

In Saudi Arabia, host to one of the largest mass gathering events, the Hajj, this discipline is already officially recognised. After completing a 50-week programme, the successful candidate can call him/herself a certified mass gathering medic.

Thus, with experts' knowledge ready to hand, athletes and visitors can focus on spreading fun and cheer at the Olympics. And London director of the UK Health Protection Agency, Brian McCloskey, confirms, "We've got all we need in place. Come and enjoy it!"

Cash injection for Swedish SciLifeLab

More Money

Recently, the Swedish life science research initiative, The Science for Life Laboratory (SciLifeLab), came into a little money. To be a bit more precise, €26 million from the private Knut and Alice Wallenberg Foundation plus between five and ten million more per year for the next five years, courtesy of the pharmaceutical company AstraZeneca – truly, a "historic investment" as the press release states.

The SciLifeLab, formed two years ago, is a collaboration between four Swedish universities: Uppsala University, Stockholm University, Karolinska Institutet and the Royal Institute of Technology (KTH). Already back in 2010, the initiative couldn't exactly complain about a lack of funding. The Swedish government generously provided a start-up aid of €60 million.

So, for what is all the money needed? Jan Björklund, Swedish minister for education, aims to "gather the sharpest brains and lay the foundation for new and major breakthroughs".

SciLifeLab's major research interest is the investigation of the molecular basis for human diseases including cancer, cardiovascular diseases and autoimmune disorders via genomics, proteomics, functional biology and bioimaging approaches.

Regarding proteomics, the SciLifeLab has already joined a "sharp brain club". The groups of Mathias Uhlén (high throughput proteomics and functional genomics) and Emma Lundberg (cell profiling) of the KTH participate in the EU-funded PROSPECTS (Proteomics in Space and Time) project alongside highly-decorated scientists like Matthias Mann and Franz-Ulrich Hartl (MPI Biochemistry, Germany), Ruedi Abersold (ETH Zürich) as well as Carol V. Robinson (University of Oxford). The project was set up in 2008 to "develop novel technology and applications for the functional analysis of proteins".

Besides support for research projects, shares of the multi-million cash injection will also flow into territorial expansion and recruitment. It is planned that the 300 current SciLifeLab staff members will welcome 700 colleagues in the near future.

-KG-

Structural biology collaboration

A Dynamic Hub

Imagine it is possible to unravel all mysteries of the cell. Imagine there is a way to zoom in and out like when using 'Google Earth', to see structures at every scale: from the membrane to the organelles; from proteins to molecules and finally, to atoms. Studying a cell at all those scales requires the possession of very expensive machinery that no single lab can afford. However, thanks to the recently launched collaborative project 'Instruct' a 'Google Cell' approach might soon be within grasp.

Instruct brings together tons of high-end equipment and scientific expertise combined at 15 so-called 'Instruct Centres'. Amongst them the Magnetic Resonance Centre CERM in Florence, Italy, the Image Processing Centre at the CNB in Madrid, Spain, the Centre for Virus Production at the Biocentrum Helsinki (Finland), the Centre for Bioinformatics at the Tel Aviv University (Israel) and the Centre for Mass Spectrometry at Bijvoet Centre Utrecht (Netherlands).

According to a press release accompanying the launch of Instruct, Dino Moras from the IGBMC-CERBM Instruct Centre in Strasbourg, France said, "Structural biology is at a critical stage where close integration with cell biology will open up new and powerful insights into treating diseases, from killer cancers to the common cold. Instruct will have a big impact on medical advances over the next decade."

Instruct sees itself as a "dynamic hub" of structural biology allowing scientists "to tailor their profile to match their interests and priorities". Besides access to a wide range of expertise and equipment, it also includes adverts for jobs, academic programmes, a calendar of events as well as discussion forums. Currently, the 'hub' counts 790 members from 25 countries. However, as the Instruct website points out, only scientists from countries who have paid the Instruct annual membership fee of €50,000 are able to submit their proposals to gain access to the cutting-edge technologies offered through the Instruct Centres. At the moment, only eight countries have done so: Czech Republic, France, Germany, Israel, Italy, The Netherlands, Portugal and the UK.

The programme also seeks to become the voice of the whole structural biology community and, through it, ensure sufficient future investment, which is especially important regarding the European Commission's next research-funding programme. But a unified voice is not only important for financial reasons. By offering workshops, conferences, PhD programmes and fellowships (gathering both industry and academia) Instruct intends to bring a new wind to structural biology. And with this strong, creative community we might be very close to unlocking even more of life's secrets.

Paola Carrillo B.

Eating Habits of Plants

Austrian researchers explain how carnivorous plants digest their prey.

Carnivorous plants, yes plants that follow a 'non-vegetarian diet', have evolved to grow in boggy and rocky habitats. Since these soils hardly provide any nourishment, the plants must find an alternative nutrient source for minerals like nitrogen, potassium, iron as well as small organic compounds. To fulfil their dietary requirements, carnivorous plants have become experts in attracting, trapping and ultimately digesting small animals such as insects.


Photo: Fotolia/Cathy Keifer

For a recent publication, scientists at the University of Vienna in Austria studied eleven species from five families of these fascinating plants to understand how they absorb the prey after digestion (*Plant J*, 2012 Mar 14, Epub ahead of print). First, the plant traps were stained with methylene blue to localise the parts responsible for nutrient uptake. In all cases, dye uptake was restricted to specific cell types called gland cells. Gland cells are involved in secretion (of mucilage, digestive enzymes) and absorption (of digested nutrients). These parts were then incubated with a sample protein that was to mimic prey proteins. Since this mimic protein was labelled with a fluorescent dye, it was possible to track its transport under a confocal microscope.

Until now, carrier proteins and channel-based uptake were thought to be the key drivers of prey absorption in carnivorous plants. In this paper, Wolfram Adlassnig and co. report a new mechanism that aids nutrient uptake, namely endocytosis. Endocytosis is a process, by which living cells actively absorb large molecules that cannot pass through the cell membrane, by engulfing them. This process is widely used, for example, by immune cells in the human body for the timely clearance of pathogens and toxins.

What the scientists saw were tiny fluorescent vesicles in the cell cytoplasm that became visible after a few hours of incubation. This is characteristic of material taken up by endocytosis. Over time, these vesicles were seen to fuse together to form larger compartments, which could aid intracellular digestion. Interestingly, this observation was restricted to seven of the eleven carnivorous plant species in this study. This means that endocytosis is not a universal phenomenon, rather a supporting route for nutrient uptake in carnivorous plants.

Following this route has many advantages. Firstly, this strategy is of obvious value in the absorption of large molecules and peptides that cannot passively diffuse through the cell membrane. Secondly, intracellular digestion would be far more efficient and complete in comparison to extracellular digestion by enzyme secretion. Thirdly, by using the intracellular route, the plant can save on other resources by secreting smaller amounts of extracellular enzymes. These enzymes would then have to degrade the prey into a form suitable for endocytosis rather than complete degradation. In the long run, the 'non-vegetarian' plant would ultimately benefit by using this combination of strategies.

Latika Bhonsle

(More research results from European labs on pp. 28-33)