Abstractions

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FIRST AUTHOR

The very nature of the 'superheavy' elements makes their chemical properties hard to characterize. So when Robert Eichler of the Paul Scherrer Institute in Villigen, Switzerland, and his collaborators in Russia and Poland set about examining element 112 they needed a lot of patience. This element does not occur naturally on Earth, and the team had to wait several days to get just one atom of it from a nuclear fusion reaction. Some theorists had predicted that element 112 would behave like a noble metal, others that it would be more like a noble gas. On page 72, Eichler and his colleagues offer evidence for the former. Eichler, who grew up in Russia during the cold war and studied in Germany, tells *Nature* about how culture influenced his chemistry.

What are the main differences between Russia, Germany and Switzerland in terms of how research is conducted?

My team has fruitful collaborations with more than ten different countries. In our field, the challenges of the work overcome any small differences in mentality or regional habits of the individual researchers.

Is it a coincidence that you are now working with the Russian Flerov Laboratory?

My father, also a nuclear chemist, worked at the Flerov Laboratory in the 1970s and 1980s. During that time, I spent six years at a Russian school in Dubna. There I learnt Russian and found out a great deal about the country's mentality, which is very helpful for my current work. Nevertheless, it was a fortunate coincidence that superheavy elements were discovered in Dubna at a time when I was available to help study them chemically.

Is it helpful to share comparable political backgrounds with your collaborators?

In our home countries, we are all in similar positions politically — we fight for financial support from our governments and from other funds in order to gain high-quality results. In this respect, every scientific community in the world speaks the same language.

When will element 112 get a proper name?

The claims for the naming of element 112 have been sent to IUPAC. The final decision should be on its way.

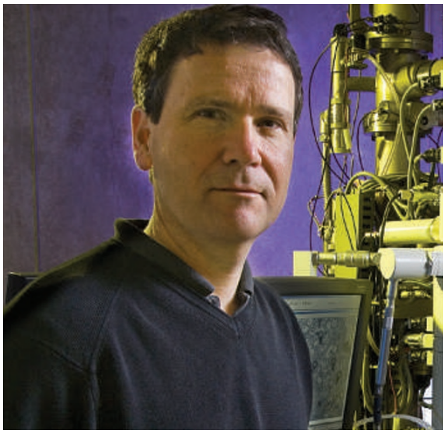
You have already helped characterize the artificial element bohrium. What attracts you to these superheavy elements?

Working with single atoms, we provide the experimental proof for the models that predict the elements' chemical properties. This is science and technology at its outer limits. I am working with my best friends in a highly professional team. ■

MAKING THE PAPER

Chris Kintner

How going with the flow helps to dictate biological patterning.



The thin, tail-like projections known as cilia that extend from certain types of cell are found in a wide variety of organisms. The single-celled *Paramecium*, for example, uses cilia to propel itself through water. In humans, cilia in the lining of the trachea sweep mucus and dirt out of the lungs, and in the fallopian tubes they move the ovum from the ovary to the uterus. But in all instances the cilia always point in a specific direction relative to the organ they serve.

Chris Kintner, a molecular neurobiologist at the Salk Institute for Biological Sciences in La Jolla, California, and his team reveal on page 97 how they believe this 'pattern' is established.

"This question came out of the blue for us," says Kintner. About two years ago, his group was investigating the development of ciliated cells in the skin of the African clawed frog *Xenopus laevis*, a favourite model organism among developmental biologists. They noticed something strange about *Xenopus* embryos growing in culture. The embryos tended to float at the bottom of the dish because the cilia on the skin cells produced a flow oriented along the embryonic axis from head to tail.

Intrigued by the observation, Kintner and his postdoc Brian Mitchell searched the literature for other examples of ciliary flow in a particular direction along the axis of an organ — and they found plenty of them. "It was remarkable to me that so many people had reported the phenomenon in different systems but so little was known about how cilia become directed," Kintner says.

Inspired by classic studies done in the 1940s and 1950s, the team removed patches of skin from *Xenopus* embryos as they developed, to check the cilia's orientation. Recruiting the help of Richard Jacobs, an electron microscopist also at the Salk, the researchers took a close-up look at the basal foot, the structure from which a cilium grows. "The basal foot acted as a little compass to reveal cilium polarity," says Kintner.

They found that when cilia first form on cells in *Xenopus* skin, they all point towards the tail. But this initial patterning is not very precise. The cilia become better organized and established as more cilia begin beating in the same direction. Kintner suspected that the flow created by the beating cilia had something to do with the refinement step.

To test this idea, the team exposed *Xenopus* skin to flow from different directions. "We tried to do all kinds of crazy things to create flow," says Kintner. In the end, he sought the help of Shu Chien, a bioengineer at the nearby University of California, San Diego, who had developed a system of flow chambers that could replicate physiological flow. Using Chien's system, Kintner's group showed that imposing flow in a different direction from that of the cilia caused them to reorient themselves.

Based on these results, Kintner proposed a model in which the initial patterning step in *Xenopus* gives cilia a posterior 'bias', allowing ciliated cells to produce flow in one direction. This flow, in turn, acts as a positive feedback loop: as cilia produce flow, they sense it and modulate their orientation to optimize it. Kintner says the work has given the team a starting point for investigating the molecular mechanisms involved in these pathways. ■

KEY NARRATIVE

It's one thing to review a book about events in your scientific field; it's quite another to find yourself a character in the story.

Per Ahlberg, a palaeontologist at Uppsala University in Sweden, says he experienced "a dislocating feeling" while reviewing *Swimming in Stone: The Amazing Gogo Fossils of the Kimberley* by John Long (reviewed on page 37). Ahlberg found that he had a "walk-on part" in the story about the finding, excavation and analysis of a treasure trove of fish fossils in an Australian barrier reef that is now above ground. Ahlberg's feeling of displacement increased when he came across "a rather unflattering photo of me with Mike Coates in the field".

Perhaps because of his proximity to the story, Ahlberg enjoyed the review process. "The pleasure of reviewing a book like this one is that not only is the subject familiar to me, but I've been to the locality and I know many of the people who featured in it."

Although he didn't gain any fresh scientific insight from his close reading of the book, he appreciated the author's efforts to present a scientific narrative to a broad audience. Despite some minor quibbles about details, Ahlberg was able to give the book his seal of approval. "I didn't have to throw the thing at the wall in frustration," he smiles. ■