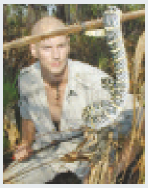
Abstractions



FIRST AUTHOR
Venom has long fascinated Bryan Fry. Based at the Australian Venom Research Unit of the University of Melbourne, Fry is interested in the protein composition of venoms and how they are generated and secreted. Together, these factors can inform evolutionary comparisons between different kinds of snakes and lizards. They can also show how ecology affects evolution, as animals in different areas develop different kinds of venom, for example.

But to compare venoms, Fry first had to collect them, which meant tackling creatures such as Fea's viper, the eastern bearded dragon and the spiny-tailed monitor. Running proteomic and genomic analyses on the venom samples changed Fry's understanding of what it means to be venomous, and also helped clear up some controversies about evolutionary relationships between snakes and lizards.

In your paper, you mention a need to rethink the very concept of 'non-venomous'. Why and how?
Some of the lizards we previously thought were non-venomous turned out to have venom. But there are degrees of venomousness. The bearded dragon, for example, has the ancestral condition of small, thin glands that don't secrete large amounts of venom. The monitor lizards have developed their glands into something truly special — a much more advanced system. So I consider the bearded dragon to be 'incipiently venomous', in other words it's there but not to a high level of development, whereas I consider monitor lizards to be 'truly venomous'. What must be stressed is that this is venom from the point of view of prey capture. The human danger level is trivial — these animals should not be considered from a practical perspective as venomous in the same manner as a cobra.

Why the interest in venom delivery?
I like venomous animals.

Who collected the specimens? Any interesting incidents?
I collected the venomous animals. Always an interesting experience.

You interviewed people who had been bitten by three rather nasty creatures. How did this help your study?
Human victims are always rather helpful. Unlike a lab animal, they can tell you exactly how horrible they feel.

Do you intend to continue with snakes and reptiles, or switch to a more benign species?
I'll continue to work with venomous animals as this is my passion. I am lucky enough to do for a career what I love. ■

MAKING THE PAPER

Tim Palmer

How climate data are helping to predict malaria outbreaks in Africa.

A group of physical scientists based in Reading, UK, recently made the relatively unusual move from climate prediction to epidemiology. Tim Palmer and his team at the European Centre for Medium-Range Weather Forecasts had developed and tested a mathematical model of short-term climate variability. The result was a package that could predict regional climate patterns, such as rainfall and drought, about six months in advance. But having created the model, researchers wanted to do more, and they began looking for applications.

"We wanted to go beyond the theoretical physical sciences and see how we could use this system for the practical benefit of people," says Palmer.

The ideal opportunity presented itself when Palmer went to a London seminar on malaria, which was held by scientists from the Liverpool School of Tropical Medicine. One talk in particular stood out: a data analysis of malaria statistics. "These epidemics were very much linked to climate — especially the amount of rainfall in the previous year," Palmer says.

The Liverpool group had robust data on malaria in Botswana, which seemed to mesh well with the Reading team's model, so the two decided to collaborate.

The fruits of this collaboration appear on page 576 of this issue, but getting to this point saw the partners wrestle with a significant language barrier. "In the early days, we would use different jargon," Palmer says. "The problem was that words we both used sometimes had different meanings." For example, the physical scientists used the word 'model' to mean a mathematical simulation. For the epidemiologists, the same word sometimes meant a simple correlation or a statistical relationship between two things.

Once the groups had cleared up their misunderstandings, they were faced with the task of reconciling two types of data. The physical scientists had global data based on grid points a few hundred kilometres apart, whereas the malaria data was more localized, often gleaned from individual communities within one of the global grid points. The teams used software and statistics to make the data match, then ran simulations based on climate information from the past 20 years to see how well the new system predicted malaria outbreaks. "It seemed to perform very well, very skilfully," says Palmer.

In Botswana, the rainy season — and so the malaria season — begins in December. But health officials usually have to wait until February before they can make an accurate assessment of the scale of any malaria outbreak. With the new model, they should be able to tell six months in advance which areas will be hit hardest. This will give them time to take preventative action, such as spraying stagnant water, distributing mosquito nets and stockpiling antimalarial drugs.

Palmer and his team now want to use a similar approach for other diseases that have some correlation with climate — such as cholera in Bangladesh and meningitis in sub-Saharan Africa. "The interesting thing for me is that predicting these diseases can be linked directly to a physical climate problem," Palmer says. ■

QUANTIFIED **BELGIUM**

A numerical perspective on *Nature* authors.
At the Catholic University of Leuven in Belgium, Dirk De Vos is one of seven permanent researchers at the Centre for Surface Chemistry and Catalysis. He supervises a number of students, and firmly believes in nurturing their talent. De Vos says he is no fan of regimented progress reports; instead he tries to have informal catch-ups with his charges a few times every week. The best discussions, he says, are often those that arise while examining real data with the group.

De Vos also encourages his students to keep time free for thinking, reading and being creative, as well as for collaborating with other groups in and beyond Belgium. Such collaborations recently led his team to use a fluorescence microscope to count, one by one, the product molecules that form at the surface of a solid catalyst (see page 572).

3 *Nature* papers published in 2006 have contributing authors working in Belgium (total papers published to date = 91).

22 submissions have been made to *Nature* in the past year from the Catholic University of Leuven.

3,200 publications from the Catholic University of Leuven appear in peer-reviewed journals every year.

US$266.7 million was spent by the Catholic University of Leuven on research in 2004.

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