Abstractions

SENIOR AUTHOR

Fish oil has a reputation as 'brain food', but whether this is justified and, if so, how the oil works, is unclear. Working with his colleague Frédéric Darios, Bazbek Davletov at the MRC Laboratory of Molecular Biology in Cambridge, UK, was studying protein–protein interactions involved in neuronal growth. The pair thought that omega-3 and omega-6 fatty acids might be involved in the process. They found that one protein, syntaxin 3, was necessary for cell-membrane growth and that the omega fatty acids stimulate this protein. Davletov spoke to *Nature* about their results, which appear on page 813.

Why look at membrane growth?

The cell membrane defines the boundary of a single unit of life: the cell. For cells to grow, for example during axonal growth in the brain, the membrane must expand.

And why omega-6 and omega-3?

Omega-6 and omega-3 fatty acids were implicated in the growth of neuronal membranes during brain development, but no one knew why these acids were specifically important for neuronal growth.

Any surprises?

We were astonished to find that syntaxin can engage its protein partners only in the presence of omega-3 and omega-6 fatty acids. So we should not overlook the importance of signalling pathways in regulating protein–protein interactions. For example, many protein-interaction networks are currently built without taking into account small metabolic molecules, which are dynamically regulated inside the cell. I think we will achieve a fuller knowledge of the cell when we merge the recent advances in proteomics with our knowledge of metabolic signalling pathways.

Does the study have dietary implications?

Fish and plants are rich in omega-3 fatty acids whereas animal meat is the main source for omega-6. The human brain is highly enriched in omega-3, so omega-3 consumption is beneficial during brain development in early childhood. Identifying the link between omega-3 and syntaxin should allow us to find new consumable substances that could be beneficial for neuronal growth.

Why do we need to know more about how omega-3 and omega-6 work?

They are widely marketed in shops and on the television, so we need to know how they act in our bodies. Knowing about syntaxin 3 might help us find drugs that enhance neuronal growth or to identify other metabolic pathways that regulate brain development. ■

MAKING THE PAPER

Trevor Ireland

Moon dust offers a fresh perspective on the origins of the Solar System.

Trevor Ireland (right) with co-worker Peter Holden.

Studying the Sun by peering closely at microscopic metal grains collected from the Moon may seem to be an odd approach. But just such an experiment has allowed Trevor Ireland and his colleagues at the Australian National University in Canberra to get results that run counter to theories of how our Solar System formed.

The Sun holds precious clues to the origins of our Galaxy. Its surface is made up of the same mixture of gases and dust from which the Solar System grew about 4.6 billion years ago. As it is not possible to study a chunk of the Sun, researchers have opted for the next best thing: the solar wind. This steady stream of particles shoots out from the Sun at more than a million kilometres per hour.

Like many researchers in his field, Ireland wants to analyse the composition of this wind. In particular, he is keen to assess the relative abundance of the various isotopes of oxygen, as that could shed light on the mechanism behind the formation of the Solar System. In samples from primitive meteorites, for example, which are thought to be descendants of the Sun's gases, there is about 5% more of the oxygen-16 isotope compared with samples from planetary rocks. So by looking at isotopic ratios in the solar wind, it should be possible to see whether the Sun is more like a meteorite or a planet.

Ireland will soon get his chance: from December 2001 to April 2004, NASA's Genesis spacecraft collected samples of this wind, which are now available for analysis. Ireland's team is currently building the necessary instruments to analyse these samples. In the meantime, the group did a trial run of the experiment by looking for traces of the wind on the Moon's surface. In late 2003, Ireland asked NASA for some of the dust collected by Neil Armstrong from the Moon's surface.

"We thought it was a one-off simple experiment just to see whether we could look at the isotope composition," says Ireland. "At the time, I could think of many reasons why it would not work."

For one thing it, was not clear that he could find anything to analyse that would be sufficiently free from contaminating oxygen from other sources. He chose to home in on tiny metal spheres whose cores, he reasoned, should be free of oxygen unless they had been bombarded by the fast-travelling solar wind. Isolating 30-micrometre balls (100 times smaller than a pin head) from Moon dust proved to be the most painstaking part of the experiment, says Ireland.

In the end, he found a handful of particles that seemed to fit the bill, and studied them using a powerful mass spectrometer called SHRIMP, which used a focused caesium beam to erode the surface of the metal balls. The results, published on page 776 of this issue, were completely unexpected: the values for oxygen isotopes did not agree with either meteoritic or planetary composition.

"We are confident of our results, but they do not fit with the current model of how the Solar System formed," says Ireland. "It is not clear what the causal link between the Sun and the planets is." Ireland expects that the finding will be met with some scepticism — at least, he smiles, until it is reproduced using the samples from Genesis. ■

QUANTIFIED SOUTH AFRICA

A numerical perspective on *Nature* authors.

Nigel Bennett at the University of Pretoria, South Africa, is part of an international collaboration that has been working hard to put Damaraland mole-rats (*Cryptomys damarensis*) on the map. Bennett takes his group on regular field trips all over the country to study these creatures. Field trips are a great environment for discussing ideas and getting to know your animal, says Bennett. His group works well as a team, he adds — always willing to help each other and often combining efforts to write up multidisciplinary papers. On page 795, the group shows that, within colonies of mole-rats, there is a small set of workers who are not as diligent as the rest. Rather than searching for food, these slacker animals laze about, eat more than their share of the colony's food — and simply get fat.

13 submissions to *Nature* have come from South Africa since January 2006 (<1% total submissions).

14 students and postdocs work in Nigel Bennett's group.

15 authors working in South Africa have published original research in *Nature* in the past year.

75% of papers published in *Nature* that have contributing authors from South Africa have been in the biological sciences.