Abstractions


BROAD INST.

FIRST AUTHOR

These days, sequencing a genome requires almost as much managerial acumen as it does scientific skill. Many projects now work on multiple genomes because researchers want to answer deep biological and evolutionary questions straight away. But this can involve a large number of groups and so entails a lot of careful coordination.

James Galagan, associate director of microbial genome analysis and annotation at the Broad Institute in Cambridge, Massachusetts, understands this balancing act all too well. He is first author on a paper that examines the sequence of the fungus *Aspergillus nidulans* (see page 1105), and was a contributing author to papers that reveal the sequence of two related organisms: *A. fumigatus* (see page 1151) and *A. oryzae* (see page 1157). *Nature* asked him about the art of both genomic science and management.

Three genomes must have required a huge effort. How many groups pitched in?

Really there were three major communities involved — one for each fungi. But each community spanned multiple institutions and countries. The medical community oversaw *A. fumigatus* because it's a pathogen. The biotech community was interested in *A. oryzae* because it is used to make sake and soy sauce — it's almost the national fungus of Japan. And *A. nidulans* is more of a 'model organism', so it attracted people who were interested in basic biology.

How difficult was it to manage this work?

I was the contact person for organizing the comparative analysis, and so I worked with a large subset of each group. First, we decided what we could learn from the sequences alone. Then we used a series of conference calls to organize things. It's always hard to find a time when everyone can phone in when the groups are in Japan, the United States and Europe. The last stage was about looking for the key finding — the surprise — because a lot of the results were expected.

What was the benefit of doing three related genomes more or less at once?

It allowed us to look at genome evolution. When you compare how genomes have changed, the information is in front of you. You also have the power to identify parts that have been conserved.

Has the bar been raised with each published sequence?

The bar is much higher than it was several years ago. It's no longer enough to sequence a genome, catalogue the genes and come up with diagrams of signalling and so forth. We're expecting to get much more. We're expecting to find things that change how people look at the organism. ■

MAKING THE PAPER

Paul Knauth

An alternative perspective on the data collected by Mars Rover Opportunity.

When it comes to testing a controversial hypothesis, Paul Knauth opts for the "lions' den" approach, presenting his ideas at meetings and conferences. But by any standards, the talk he gave at a meeting about Mars in October 2004 was more than a little provocative. Knauth, a geologist at Arizona State University in Tempe, presented evidence suggesting that the large depression seen by the Mars Rover Opportunity was not evidence for a now-vanished body of water on the red planet.

Together with fellow Arizona geologist Donald Burt, Knauth thought that rather than the remains of an evaporated lake, the depression might be the result of a 'base surge' — a ground-hugging cloud of gas and ash — caused by either a volcanic explosion or an impact from a meteor.

So when the question-and-answer session at the Mars meeting began, Knauth took the plunge. "I stood up and gave an alternative view — it was one of the most stressful talks I ever did," he says. "Of course a lot of people jumped up, very unhappy about it."

But afterwards, several people not associated with the Rover project came up to him and said "right on", he remembers. That motivated Knauth and Burt to call in Ken Wohletz, an expert in base surges based at Los Alamos National Laboratory in New Mexico. Together the three worked out the hypothesis that appears on page 1123 of this issue.

The trio concentrated on minerals such as the sulphate deposits detected in the depression on Mars. The Rover team explains these deposits in terms of an acidic lake evaporating to leave the mineral. But the three geoscientists felt that other minerals present in the Mars basin did not square with this explanation.

They also noted that the Rover team talked about acidic weather on Mars — another factor that seemed wrong to Knauth. "If it were true, there would be clay minerals all over Mars," he says. Acid rain occurs when sulphur dioxide is emitted into the atmosphere, perhaps from a volcano, and mixes with water vapour. When the rain falls on basalt it creates sulphate deposits. But clay is a by-product of the process, and Opportunity has so far produced no evidence of this.

Instead of a dried lake, Knauth and his colleagues think that the depression is more like a desert — although that doesn't mean that they say there is no sign of water on Mars. Small amounts of water would have been needed to redistribute the chemistry after the base surge and to help create the small iron-rich spherules that litter the site.

Field trips to the sites of base surges on Earth convinced Knauth and his colleagues that their hypothesis had merit. They were amazed by the geological similarities between the sites and the martian landscape. "We felt like we were walking around on Mars," Knauth says of one place in New Mexico.

Knauth knows that he, Burt and Wohletz are "outsiders" in the Mars field, but he feels that they can play an important role in the scientific dialogue. Several Mars researchers have welcomed their input, even though they disagree with the hypothesis. Part of the reason the Rover team put its data and images online is so that other scientists could weigh in and discuss the findings — whether to agree or disagree. "And here we come," says Knauth. ■

QUANTIFIED **2005 SUBMISSIONS**

A numerical perspective on *Nature* authors.

Analysing data based solely on the corresponding author's affiliation can introduce some bias, as the co-author with the strongest English skills is often called on to be the corresponding author. With this caveat, we take a look at frequent submitters to *Nature* from universities, institutes and companies over the past year.

Most institutes (64%) accounted for just one submission, and 12% of institutes submitted five or more papers. A few universities — such as Stanford, the University of California, Berkeley, the University of Cambridge, UK, and Tokyo University — each submitted more than 50 manuscripts. And these same institutes stand out in the published record. The average accept rate for institutes in the 'top ten' was 14% (discounting withdrawn and pending manuscripts).

88 countries submitted manuscripts to *Nature* during 2005.

38% of all submissions to *Nature* this year came from the United States.

3,187 universities, institutes and companies submitted manuscripts to *Nature* during 2005.

106 is the highest number of submissions made to *Nature* this year from a single university — from the Massachusetts Institute of Technology.