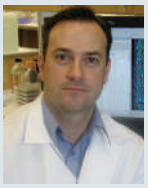
Abstractions



FIRST AUTHOR

The paper on page 315 marks the end of an era in human genetics. It presents the annotated sequence of chromosome 1, the final human chromosome to be 'completed' by the Human Genome Project. Although, as with all human chromosomes, some gaps in information remain, the paper means that virtually the whole human genome has now been sequenced and annotated. Simon Gregory, a molecular geneticist at Duke University in Durham, North Carolina, spoke to *Nature* about the latest paper and what the future might hold for human genetics.

How has the annotation of human chromosomes altered over the years?

There are a lot more data to draw from. For chromosome 1, we were able to overlay the additional data sets on top of the sequenced DNA. There are now much richer sets of data and better resources to work with, so the final product is more valuable to researchers.

Has our understanding of DNA changed?

The interesting thing will be finding out what the non-coding regions do. In the early days, these were dismissed as 'junk DNA', but I think we're learning that genes might be the horses and that regions of non-coding DNA are the jockeys.

What have you learned from being part of such a large project for so long?

I've been working on chromosome 1 for nine or ten years. It's been a fantastic project to be involved with — working with people from multiple cultures and continents. And it has established the ethos for publishing results in the public domain, which has had a knock-on effect for other projects.

How does your move from the Sanger Institute to Duke University mark your place in the Human Genome Project?

Careers have been put on hold for this once-in-a-lifetime opportunity. When you finish the annotation, you hand it over to the scientific community, to groups who learn how these genes play a role in biology and disease. I came to Duke because I want to work on diseases; I want to be a user of the sequence rather than a generator.

Is it odd not working in the genome project?

The Human Genome Project was fantastic, but it was operated in a rarefied atmosphere. There wasn't competition for grants in the traditional sense, as the roles of the sequencing centres were established early on. The only competition was of the fierce but friendly type to see who could get the most done. Outside the project, it's the real world. There's much more competition. You've got to face the real world yourself. ■

MAKING THE PAPER

Alexander Hutko

How to get a picture of what is happening near Earth's core.

Investigating the various geophysical events that occur deep inside our planet is no easy task. Researchers are particularly interested in what is happening some 3,000 kilometres below the surface, but getting a clear picture of these processes requires more than a little ingenuity.

Alexander Hutko and his colleagues at the University of California, Santa Cruz, solved the problem by tracking the energy waves triggered by earthquakes. The results, detailed on page 333, offer a three-dimensional picture of events occurring near Earth's core.

Earth is divided broadly into three components: the crust, mantle and core. The crust and the upper part of the mantle together make up a region known as the lithosphere: broadly speaking the part of Earth that forms the tectonic plates. These plates 'float' on the rest of the mantle, which allows them some degree of movement — earthquakes occur when these plates grind against one another.

Hutko and his team were interested in what happens to slabs of the lithosphere that are driven deeper into the Earth when the tectonic plates bump into one another. To find out, the researchers began by analysing how seismic waves bounce off different layers and structures inside the planet.

"A simple way to think about this is as if you were standing on a shore and someone on the opposite side throws a stone, and you observe the waves to determine where the stone landed," says Hutko.

The team homed in on a region in the Pacific Ocean off the west coast of Central America, situated between an earthquake-prone area of South America and a dense network of recording stations in the western United States. The earthquake data, which had been collected since 1991, were analysed using techniques developed by the oil-exploration industry about two decades ago to get detailed pictures of structures just below Earth's surface. "We have only recently had enough data to achieve this kind of resolution," says Hutko.

Hutko and his team fed the data into a computer program that "spits out a bunch of numbers", he explains. From these numbers, they were able to create two-dimensional images corresponding to slices of the deep Earth. By putting several slices next to one another, the team built up a three-dimensional picture. "It is amazing to go from simple records of the ground moving side-to-side to getting snapshots of the middle of the Earth," Hutko says.

The team found that slabs of Earth's lithosphere, once part of the ocean floor, had sunk all the way down to the boundary between the core and the mantle. "Others had suspected that the base of the mantle was a graveyard of slabs, but no one knew how deep they went," notes Hutko.

He now plans to travel to Japan to collect and analyse data beneath the western Pacific Ocean. "It is an exciting prospect as this region has one of the densest high-quality networks of recording stations in the world. The sheer volume of data is amazing," he says. ■

QUANTIFIED **SPAIN**

A numerical perspective on Nature authors.

At Merck's research lab in Madrid, Spain, Ángela Basilio belongs to a group of scientists who spend their time screening samples from natural products. They are on the lookout for molecules that have biological activity and so could be used to develop new drugs. Although the research is more strictly defined than it would be in an academic setting — following the interests and priorities of the company — Basilio says that the group has freedom to explore. The financial resources make the research more secure, she adds, and the company has tremendously diverse expertise, making multidisciplinary projects easier to tackle. One such project led to the discovery of platensimycin, a new antibiotic that is described by Basilio and her colleagues on page 358.

32 researchers working in Spain have contributed to *Nature* papers this year (<2% of all authors).

86% of 2006 *Nature* papers with contributing authors from Spain are related to biological sciences.

10 papers submitted to *Nature* in the past year came from Merck.

250,000 extracts from natural products and synthetic compounds had to be tested by Merck in Spain before it found platensimycin.

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