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The proteome isn't genome II

The Human Genome Organisation was both a cheer-leader and a coordinator for genomics. But proteomics is a different beast, and the fledgling Human Proteome Organisation will struggle to find a similar role.

The Human Genome Project (HGP) had one clear goal: producing a complete DNA sequence for each of our chromosomes. This has already been attained in draft form, and a final sequence is due by 2003.

Some credit for these achievements goes to the Human Genome Organisation (HUGO), which fostered the exchange of data and materials, and helped to coordinate the activities of national genome initiatives. Although questions have been raised about its effectiveness in recent years, HUGO raised the profile of genomics and helped shape policy, including the HGP's 1996 decision that sequence data should be placed in public databases within 24 hours of collection. When HUGO was created in 1989, money was scarce and industry sceptical. The scattered community of gene mappers needed a voice.

But the HGP is also a means to an end — that being a deeper understanding of fundamental biology and disease mechanisms. This is where proteomics — the large-scale identification of proteins — is starting to come into play. And where in 1989 there was HUGO, now there is a fledgling Human Proteome Organisation, or HUPO.

HUPO will struggle to emulate its predecessor, however, because human proteomics is not a single project with one endpoint that lends itself to HUGO-style coordination. Traditionally, a proteome has been defined as the complete set of proteins that is produced by the genome during the lifetime of an organism. That is a lot of proteins — as many as half a million. And in biological terms, what really matters are the snapshots of proteins produced at a particular time, under particular conditions, by particular types of cells. Defined in this way, the human proteome is almost infinitely dynamic.

There is also little need for HUPO to copy HUGO's early cheerleading role. Relatively speaking, money abounds. Countries that missed making a major mark in genomics — such as South Korea — are determined to make up for it by giving support to proteomics. Investment in the private sector is also energetic.

The early involvement of industry will also reduce the scope for HUPO to assume a coordinating role. After it entered the DNA sequencing fray in 1998, Celera Genomics of Rockville, Maryland, showed no inclination to be coordinated by HUGO, and rejected the HGP's policies on data access. Celera is again among the major players in proteomics, and there is no reason to assume that its competitors will be any more willing to take directions from HUPO.

Celera and companies such as Oxford GlycoSciences and Large Scale Biology, which operates a proteomics subsidiary in Germantown, Maryland, aim to compare healthy and diseased tissues, studying tens of thousands of proteins. They hope to exploit observed differences in the number and levels of expressed proteins to develop diagnostic tests and to discover new drug targets. Many academic groups are also exploring similar avenues.

Other companies and academic groups intend to study protein–protein interactions, while yet others are determining protein structures on a large scale. Purists might argue that these projects stretch the definition of proteomics too far — but even if they are excluded, proteomics will still require a wide variety of technologies, including gel electrophoresis, to separate proteins, and mass spectrometry, to characterize them. But tackling the full range of human proteins will require techniques still under development, many of them proprietary.

HUPO's future was debated last week at meetings in York, England, and McLean, Virginia, but no clear answers emerged. Perhaps the best HUPO can do is to become a clearing-house for information on a diverse and fast-moving field, and the technologies that underpin it — a modest role, certainly, but a perfectly respectable one. ■

An absence of angst

German science seems surprisingly comfortable with the concept of a research prize sponsored by a tobacco giant.

Soul-searching is something of a national pastime in Germany — this is, after all, the culture that invented angst. It is surprising, therefore, that the German arm of the tobacco giant Philip Morris's philanthropic foundation has been awarding annual research prizes for nearly two decades without attracting any significant controversy. All the more so when you consider the furore that has erupted in Britain over instances in which academic institutions have accepted money from the tobacco industry.

Since 1983, around 100 researchers in Germany, Austria and Switzerland have received the Philip Morris prize. It is a prestigious award, given only to scientists of the highest calibre, and can be awarded in all areas of science, except medicine. This year's winners, announced last week, each take home around US$100,000.

Tobacco firms may attract widespread opprobrium, but it can be argued that in this regard they stand out from other companies only by degree. Some high-minded individuals, concerned about drugs pricing policy in the developing world, might refuse to accept an award from a pharmaceuticals giant; many environmentalists, meanwhile, would draw the line at accepting a prize from a notoriously polluting chemicals firm.

But over the past few years, it has become clear that there is a special irony to a company such as Philip Morris presenting a prize for outstanding science. A detailed report published last year by the World Health Organization (see *Nature* **406,** 547; 2000) revealed how Philip Morris and other tobacco firms tried to undermine science-based assessments of the health risks posed by tobacco.

It could be argued that Philip Morris should be encouraged to reward excellence in research, rather than trying to manipulate science to its own ends. But against that view must be balanced the knowledge that accepting a prize from Philip Morris provides favourable publicity for a company that appears in the past to have stooped to such tactics. It is a dilemma that merits some good German soul-searching. ■