

UNIVERSITY OF NATAL



# Laudation

written and spoken by the University Orator

Professor C O GARDNER, BA (Hons)(Natal), MA(Oxon)

in presenting

ROBERT GRAHAM COOKS

to the Chancellor at the Graduation Ceremony

held in Pietermaritzburg on

Saturday, 17 April 1999

Mr Chancellor,

I present to you today, for the award of a very well deserved honorary degree, one of our own graduates who has become an outstanding research scientist in one of the best chemistry departments at one of the top universities in the United States. It is a wonderful moment for this University, but a sad thing about it is that the orator – who is supposed presumably to be good at articulating things – finds that he cannot give a really full account of what Graham Cooks actually *does*. The reason for this problem is of course well known: science has become so complex, so high-powered and specialised, that it is difficult for ordinary non-specialist people to know what exactly is going on.

I must however try to say something. Professor Cooks's central interest is mass spectrometry. Mass spectrometry is, to put it crudely, a way of finding out information about substances by doing certain things to them. To be a bit more precise and technical, isotopes, molecules and molecular fragments are ionized: this means that they are converted into ions (i-o-n-s) -- versions of themselves which have an electrical charge because they have had an electron or two added or taken away. Within the mass spectrometer, these ions are accelerated in an electric field and deflected by a magnetic field into a curved trajectory that gives a distinctive mass spectrum, in other words a distribution of the ions according to their mass. The curvature is greater with the lighter ions. This is the process at its most straightforward; there are many complex variations.



All this sounds impressive and (to most people) obscure; but this way of discovering the mass of ions enables researchers to find out a vast number of important facts. Mass spectrometry has been used and is being used in a wide variety of fields, including the nuclear. Graham Cooks says that what he likes about working in this whole area is that (to use his own words) "it has practical value and also interesting fundamental aspects". He describes what he does as involving a bit of chemistry, a bit of physics and a bit of electronics and data processing. One of his interests is in building mass spectrometers; some are large enough to fill a room, others are small enough to fit into a coat pocket. An achievement for which he is famous is the use of two mass spectrometers in tandem – one to separate mixtures and the other to identify individual components.

All these instruments he uses to examine the chemical compounds in complex mixtures. The samples that he has subjected to detailed analysis include blood, urine, air, drinking water, strawberry jelly, water hemlock, and so on. These examples give one a sense of the variety of the applications of mass spectrometry as practised by Professor Cooks and his research team. His interest and expertise have taken him into biological and environmental studies and also into cancer research. His varied scientific work has also been well documented: he has over 600 publications to his credit.

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The great American university with a great chemistry department that Graham Cooks is at (and he has been there for many years) is Purdue University, which is situated in West Lafayette, Indiana. It is a fine place to work at, and obviously Professor Cooks has added a

good deal of further enrichment to it; but he describes the area in which he lives as physically pretty bleak and boring. One of the things that worries him is that it is 1500 kilometers from the ocean. This is a matter of some importance to him because he grew up on the south coast of this province and used to spend a good deal of his spare time body surfing. (He says that in desperation he has even been reduced to swimming in Lake Superior in winter, all by himself, when the water temperature was about 5 degrees Celsius.)

He did his secondary schooling at Port Shepstone High School, where he was inspired by several of his teachers. He then came to the University of Natal here in Pietermaritzburg, and took the BSc, Honours, MSc and PhD degrees. A person who had a profound influence on him was Professor Frank Warren, then head of the Chemistry Department, whose commitment to research he describes as astonishing. It was towards the end of his stay here that he became interested in mass spectrometry.

He obtained a scholarship which took him to Cambridge University in England, and there he plunged fully into mass spectrometry, and attained a second doctoral degree. And from then his distinguished career took off.

As the story of his earlier body surfing and his later discontent with the Indiana countryside shows, Graham Cooks is not just a scientist. (Maybe it would be impossible for anyone, or anyone who remained sane, to be just a scientist!) He admits that literature, for example, is of great interest to him – and of course in its own way literature, like mass



spectrometry, tries to analyse some of the substances, albeit the human and psychological substances, of which life is made up. He even goes so far as to say (and I suppose this might shock some of his colleagues) that he turns to the Times Literary Supplement with more enthusiasm than to Science magazine; but he does go on to add, good-humouredly, that he does read the latter, for after all, "one has to pay one's bills"!

This range of interests, I think we may say, is not a mere sideline to Professor Cooks's main body of research concerns. It seems clear that it is his breadth and flexibility that have enabled him to spread his important work in so many different directions. A narrower person interested in mass spectrometry – and one can be sure there must be many such people -- would have concentrated on one or two small areas of possibility: Graham Cooks has moved, and in a distinguished way, over a very wide field.

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And indeed the awards that he has received emphasise his range, his versatility. His post is that of the Henry Bohn Hass Distinguished Professor of Analytical Chemistry. He has been a Fulbright Fellow at the University of Warwick in England. In 1983 he received the Purdue Cancer Research Award. The next year he received the Chemical Instrumentation Award from the Analytical Division of the American Chemical Society (the ACS). In 1985 he was the recipient of the Thomson Medal for International Service to Mass Spectrometry. He is an honorary member of the Chinese Mass Spectrometry Society. In 1990 he received the Herbert McCoy Award. In that same year and again in 1995 he received a Special Creativity Award from the National Science Foundation. In 1991 he won the Frank H Field

and Joe Franklin Award, which is the ACS Award for Mass Spectrometry, and in 1997, the Fisher Award, which is the ACS Award for Analytical Chemistry.

That list of awards is rather intimidating. Graham Cooks might even describe it as boring, like the landscape round Purdue University. But of course it's partly because of awards of that sort that people are awarded honorary degrees. They are also granted degrees, however, because they are even more varied, more unpredictable, more interesting, than the list of their awards suggests.

Mr Chancellor, I have the honour to request you to bestow the degree of Doctor of Science, *honoris causa*, on Robert Graham Cooks.

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