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Introduction

Lord May of Oxford

(Ernst Mayr Lecture on 29th October 2002)

If someone held a gun to my head and threatened to discharge it if I did not name, within a second's time, one of the most eminent and ingenious, productive and influential biologists of our days, I would immediately say: "Bob May". Having saved my life by this indisputable statement, I now face the much more difficult, if not impossible task to adequately capture the essence of an extraordinary person such as Lord May of Oxford.

To make it clear at the outset, Robert May has a seat in the House of Lords, for reasons that will become apparent in a moment, but I do not think that he would consider himself a member of the stiff-upper-lip society. In fact, he is not English, he is Australian with all the virtues of being outspoken, clear-cut and articulate.

The first thing that the gunman demanded of me was the name of one of the world's most eminent and ingenious biologists. Certainly, ingenuity is one of Robert May's most striking hallmarks. Starting out at Sydney University in chemical engineering, he received his Ph.D. in theoretical physics – and superconductivity in particular – and then left for Harvard, where he spent two years as Gordon MacKay Lecturer in applied mathematics. He returned to Sydney University to become appointed, at age 33, to the first "Personal Chair" created at Sydney University for "individuals of great distinction, for whom no vacant Chair on Establishment exists". It was already at this time, in the early 1970s, when he was Professor of Theoretical Physics, that Robert May's ingenuity and sagacity came to the fore in a most dramatic and influential way: Robert May turned to biology. What other theoretical physicists like Schrödinger and Delbrück had done to molecular biology, namely, being successful visionaries in a newly emerging field of the biological sciences, Robert May did to ecology.

Armed with his extraordinary mathematical skills, and a clear grasp of the essential, he set the whole ecology scene alive by bringing one big question back to centre stage: Does complexity promote stability? Are ecosystems more stable, when they contain more species and connections? In other words, does a richer ecology mean

a more stable one? By asking and rephrasing this question he entered what for many decades had been the holy grail of community ecology – Elton's and Hutchinson's complexity-promotes-stability argument – and stood it on its head.

With this blow against the general wisdom, Robert May refocused the ecological agenda of that time. He did so by introducing analytical approaches and mathematical tools long familiar in the physical sciences to the study of biological populations. Furthermore, he treated such populations as non-linear dynamical systems and by this foreshadowed the "deterministic chaos" view of the world that later was to spread across all sciences.

In 1973, shortly after he had laid out these ideas in a brilliant monograph entitled "Stability and Complexity in Model Ecosystems", Robert May moved from Sydney to Princeton and from a Professorship in Theoretical Physics to a Professorship in Biology. He once confessed that the ecology course he taught just after he had arrived at Princeton was the first biology course he had attended since the age of 12!

By now an amazing transformation had been completed. To put it in humble entomological parlance, it was as if a young caterpillar feeding on engineering stuff had gone into a dramatic pupal remodelling stage in theoretical physics and applied mathematics and had finally hatched as a brilliant butterfly in the biological sciences, a new species, in fact a type specimen. With the emergence of this "imago", to use the proper biological term, the whole field of community ecology, which at this time had lost most of its lustre, was immediately rejuvenated.

After 15 years at Princeton, Robert May moved to Britain to become a Royal Society Research Professor jointly at Oxford University and Imperial College London. I wonder whether in those days he agreed with his compatriot Patrick White, winner of a Nobel Prize for Literature, who once described the London intellectuals as "the most sterile of beings". Be this as it may, here in Britain he opened up yet another field of theoretical ecology. He introduced what could be called the population dynamics of the immune system. Out of this adventure came "Virus Dynamics", a book jointly written with Martin Nowak. Whereas molecular biologists are interested in how individual viruses interact with individual cells of the immune system, Robert May's complementary quest is for the interaction between entire populations of viruses such as HIV and entire populations of immune cells. In this context he addresses questions such as why is there such a long and variable delay between HIV infections and the outbreak of AIDS.

The imaginary gunman's second behest was to name a highly productive biologist. Indeed, Robert May's scientific output is prolific, not to say breathtaking: hundreds of papers in top scientific journals including a continuous flow of landmark articles in "Nature" and "Science" and, in addition, one book after another: "Stability and Complexity in Model Ecosystems" (Princeton University Press, 1973), "Theoretical Ecology: Principles and Applications" (Blackwell, 1976), "Population Biology of Infectious Diseases" (Springer, 1982), "Exploitation of Marine Ecosystems" (Springer, 1984), "Perspectives in Ecological Theory" (Princeton University Press, 1988),

"Population, Regulation and Dynamics" (Cambridge University Press, 1990), "Infectious Diseases of Humans: Transmission and Control" (Oxford University Press, 1991), "Large Scale Ecology and Conservation Biology" (Blackwell, 1994), "Extinction Rates" (Oxford University Press, 1995), "Evolution of Biological Diversity" (Oxford University Press, 1999), and finally, together with Martin Nowak, "Virus Dynamics: The Mathematical Foundations of Immunology and Virology" (Oxford University Press, 2000). In a summary, this means an inter-book-publishing-period of 2.7 years over a time span of three decades.

However, Robert May is productive not only in enriching the science community with sparkling books and papers, he is productive also in receiving awards and medals from the world's most prestigious organisations. Let me mention only a few: the McArthur Award (1984), the Crafoord Prize (1996) from the Royal Swedish Academy of Science, i.e. the equivalent of the Nobel Prize in those fields of mathematics, the geosciences and the biosciences in which no Nobel Prize is awarded, the Balzan Prize (1998), which 15 years earlier had been given to Ernst Mayr and which was presented to Robert May by the President of Italy, the Japanese Blue Planet Prize (2001), and most recently, actually only yesterday, the Order of Merit awarded to him by the Queen. Among the many honorary degrees he holds is one from Princeton University, which was awarded to him in 1996 as part of the University's 250th Anniversary Celebration along with Bill Clinton – what an honour to Clinton!

This political connotation brings me to the third request I faced in the beginning: to name the politically most influential biologist of our days. It was already at Princeton that Robert May had high administrative responsibilities by chairing, for more than 10 years, the University Research Board, but such responsibilities and political influences increased substantially during May's 5-year term as Chief Scientific Advisor to the British Government and Head of the Office of Science and Technology. There he made his mark as a strong defender of science, and as a scientist deeply involved in conservation biology – in the future of biological diversity. In the mid nineties, however, it was anything but easy to convince the Treasury that it should spend more money on research. The usual counter-argument was that scientists had not yet been efficient enough in controlling their resources. Robert May being an analytical scientist came up with some solid figures later published in "Science". In a country-by-country comparison Britain ranked low in terms of public money spent for research, but high in terms of first-rate scientific achievements. (In Germany, I should mention in parenthesis, the ranking was just the inverse.) In conclusion, Robert May's survey showed that in a value-for-money table the UK was the champion.

When it comes to championship, Robert May has a strong determination – and ability – to win: not only in science, not only in politics, but also in other games such as chess or bridge (while still in Australia he was becoming a national champion contract bridge player), or even in croquet (at Oxford, I was told, he is captain of the croquet team of his college). He is so famous for his love of games that it

might not be too much of an exaggeration to claim that his research is essentially a game to him, and that he might even revise its rules to make the game more interesting. In any way, it is his intellectual mastery of the game of science that makes him so insufferable to his opponents. His arguments are downright unbeatable, as you will see in a minute.

But before I hand over the microphone to him, let me end by telling how Ernst Mayr replied when I wrote him, as I always do, whom I was going to ask to present the next Ernst Mayr Lecture. "Yes", he wrote at age 98, "Bob May would be a good Ernst Mayr Lecturer […] Even though he is a theoretical ecologist, I have the impression that he now really thinks like a naturalist." As we all know, being dubbed a naturalist by Ernst Mayr is the accolade of success.