

available at [www.sciencedirect.com](http://www.sciencedirect.com)[www.elsevier.com/locate/molonc](http://www.elsevier.com/locate/molonc)

## News & Views

# Putting Europe on the scientific map

Janet Fricker

The pursuit of excellence has been a dominant theme in the career of Fotis Kafatos, a distinguished malaria researcher, who is now taking his high standards forward in providing support for the very brightest young scientists in Europe, as part of his presidency of The European Research Council.

“It’s vitally important for Europe to cooperate in developing top quality science, and retaining scientists because this will provide the solutions, whether we are talking about infectious disease, conquering cancer or even climate change,” says Kafatos, who also holds the chair of Insect Immunogenetics at Imperial College (London, UK).

The European Research Council (ERC) – an independent agency funding cutting-edge research across Europe, in all disciplines from the biological and physical sciences to engineering and the humanities – was formally launched in February 2007 within the scope of the European Treaty, as a component of the European Union’s (EU) 7th Framework Programme. Stimulus for the organisation came from recognition that European research has long struggled with funding issues, with many of the most talented researchers lost to the slow trickle across the Atlantic, with competition now growing from China and Singapore. Between 1980 and 2003, the US had 154 Nobel laureates in medicine, physics and chemistry, compared with just 68 in Europe.

In an attempt to reverse this trend the ERC has now awarded grants to European scientists in more than 150 institutions in 24 countries. “In the first call (for grants in 2007) we were on the runway. We were testing our engines, as we were about to take off. We did take off in the second year and now we are quite confident that we can ramp up to the larger budget and operate on the appropriate scale,” says Kafatos.

### 1. The art of mentoring

In any conversation with Kafatos, the art of mentoring is a recurrent theme. As a Greek he likes the idea that the term

originates from mythology – Mentor was tutor to Ulysses’ son Telemachus. Kafatos is convinced that he would never have acquired the scientific knowledge he has today without the generous support of mentors. “You give and you receive, it’s an exchange not with one person but with a community,” he says, adding that it has been his intention at the ERC is to place human relations at the heart of the training of the next generation of scientists.

Born in occupied Crete in 1940, Kafatos attributes his early fascination for biology to a teacher who inspired him as a teenager with the theory of evolution, as well as the structure of DNA, which had just been published by Watson and Crick in 1953. “He taught me how to appreciate the sheer beauty of science that I see as a fundamental element of human culture.”

At Cornell, where Kafatos won an undergraduate scholarship to study biology in 1959, his interests were further nurtured by Thomas Eisner, an “inspiring professor”, who quickly spotted his talent and allowed him to be fast tracked to the graduate class and undertake original research exploring whether the defensive secretions of insects were antimicrobial. “Every thing was even more fascinating than I’d imagined – at Cornell I felt like a fish in water,” he remembers.

A PhD at Harvard followed, where he studied enzymatic mechanisms for the escape of certain moths from their cocoons. His work was funded by both a prestigious Harvard scholarship and a Schlumberger scholarship targeting Greek students.

Quickly Kafatos came to appreciate that real advances could only be made through interdisciplinary approaches – his PhD introduced him to concepts of biochemistry, molecular biology and developmental biology. In 1969, at the age of just 29, he was appointed a full professor of biology at Harvard. Here Kafatos was an early leader in bringing molecular approaches to the study of development, and one of the inventors of cDNA cloning, a technique that has been critical to modern biology. He pioneered analyses of the molecular



evolution of gene families, including the first demonstration of conserved developmental regulatory elements between the silkworm and the fruit fly.

In 1972, wanting to give something back to the country of his birth, Kafatos began dividing his time between his tenured post at Harvard and Greece, where he played a pivotal role in the establishment of the Faculty of Biology in the University of Athens, the Faculty of Biology in the University of Crete and the Institute of Molecular Biology and Biotechnology in Heraklion. Today Kafatos is largely credited with introducing modern biology practices to Greece.

Commuting between Greece and the US was a major challenge for his young family. “But my two daughters really benefited from growing up in two cultures and my wife Sarah, an American by birth, became so fluent in Greek that she even published a book in the language,” he says proudly.

In 1993 he gave up his nomadic existence when appointed Director-general of the prestigious European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. “EMBL was a fantastic institution and in my time there I like to think that I made it even better. From the outset I made it clear that everyone would be recruited solely on the basis of excellence, and I tried to make it fully inclusive by being open to people from less developed parts of Europe,” he says, adding that the current thinking at the ERC has its origins in this approach.

Under his leadership three new laboratory units were established – the European Bioinformatics Institute in Hinxton, the Mouse Biology Programme in Monterotondo, and the developmental Biology Unit in Heidelberg. He also substantially expanded PhD training and introduced an institutional partnership scheme that engaged EMBL with locally funded initiatives that promoted molecular life sciences in Europe.

## 2. Molecular approaches to tackling malaria

Undoubtedly a major attraction of the EMBL appointment was that he was allowed time to schedule his own research. By now the focus had shifted to the eradication of malaria. “Having originally come from a very poor country I had a strong inclination to use my knowledge of biology to help people from developing countries,” says Kafatos, who himself survived malaria as a child. His work focused on unravelling the immune system of *Anopheles* mosquitoes, and understanding

the complex process by which they transmit malaria parasites to humans.

He helped coordinate the *Anopheles* genome sequencing project and led its subsequent utilisation in functional genomic analyses, focusing on the molecular physiology of infection and the mosquito’s innate immune responses to the parasite.

The project led to the discovery of genes that act as antagonists, suppressing parasite transmission, and those that act as agonists promoting it. The team found that when antagonists are inactivated, parasite numbers increase substantially; whereas when agonists are inactivated, parasite numbers drop dramatically. Now continuing his work at Imperial, Kafatos is looking to develop transgenic and chemical methods to block the progression of the parasite in the mosquito.

“If, on the basis of a number of genetic factors – but which are also linked to environmental parameters – we can understand why certain *Anopheles* carry malaria and others do not, we will perhaps then possess the long-awaited weapon with which to control and potentially eradicate this disease,” he says.

Possible future directions, he adds, include producing transgenic mosquitoes that would be inherently incapable of passing along the disease, or “smart sprays” which would affect the insects’ immune system, making them inhospitable to parasites. But he thinks it unlikely that such strategies will emerge in less than a decade. And when they do, he concedes, there will be many ethical issues to consider, that will require consultation with both scientists and the broader society.

After serving two and half terms at EMBL, Kafatos was recruited to Imperial College, London, with the intention of concentrating solely on his research. Before taking up this “retirement” appointment he “haggled” for guarantees not to be involved in teaching or administration. To his regret he now no longer undertakes bench work. “It’s not the best use of my time, and since I no longer do it on a daily basis I’m not very adept. I haven’t been allowed to pick up a pipette in the last few years,” he laughs.

But administration again reared its head in the form of a “once in a life time” offer to head up in the European Research Council. Kafatos recognises that his ability to combine research with the ERC presidency has been enabled by forming a joint group co supervised by his former EMBL staff scientist, Giorgos Christophides.

## 3. Supporting excellence

The origins of the European Research Council came from the Initiative for Science in Europe, a scientific lobbying organisations formed in October 2004 to bring together organisations such as the European Life Sciences Forum (ELSF), the European Molecular Biology Organisation (EMBO), the Federation of European Biochemical Societies (FEBS), the European Molecular Biology Laboratory (EMBL), the European Physical Society (EPS), the European Science Foundation (ESF), the European Southern Observatory (ESO), the European University Association (EUA), EuroScience, the Federation of European Biochemical Societies and other representatives from scientific disciplines ranging from mathematics and chemistry to the social sciences and humanities. “This was a group

of similarly minded political leaders pushing for greater investment in Science in Europe. We quickly realised that it is only by supporting science on a European basis rather than a country wide basis that you open your pool wide enough to attract the very best people,” he says.

The ERC is governed by the Scientific Council, a committee of 22 eminent European scientists who are responsible for determining strategy and dedicated to seeking out excellence, irrespective of nationality, gender or location. The Scientific Council has responsibility for a budget that is guaranteed at €7.51 billion for 2007–2013, the duration of the EC’s 7th Framework Programme. The budget, which is supported by the EC and associated countries, provided €300 million in 2007, with increases of €250 million each year, reaching just under €1.8 billion for 2013. For administrative purposes ERC is divided into three domains – life sciences, medicine and social sciences, with allotted funds for each.

In the first year, the Council decided to give priority to young scientists, addressing the needs of “highly promising” scientists, three to eight years after completing their doctorates. “Though I say it myself this was a brilliant choice. All too many countries focus on people already established in their fields to the detriment of the young. We wanted to enable people starting out on their careers to become independent investigators. From my own career perspective I understood how important it was to be independent, because it is only then that you start to develop original ideas,” he says.

Individual support is generous – up to €2 million over five years – the last thing the ERC wants is for its carefully selected proteges to waste time by having to constantly seek out additional money to fund research. Not surprisingly, competition has been fierce. In the first round, 9167 proposals were

received (demonstrating clearly the unmet need), with the panels selecting the 559 most promising candidates to submit a full proposal, with 299 candidates finally selected for funding. The ERC does not pre-select areas, but challenges applicants to identify and pursue their own projects.

One positive outcome of the initiative has been that the national research councils or ministries of France, Switzerland, Italy, Sweden, Cyprus, Austria and Belgium volunteered to fund the top runners up.

In 2008 the second ERC Advanced Grants programme was launched, targeting advanced independent principle investigators who could demonstrate significant research achievements in the last 10 years, with grants up to €3.5 million over five years. Altogether 2167 applications were received, with 275 securing funding – a success rate of 12.7%.

Now with the ERC fully underway, Kafatos and his team, are in the process of making refinements, including trying to reduce the number of bureaucratic hoops that applicants have to jump through. The ERC has attempted to lower submissions to more manageable levels by narrowing the time window of eligibility and encouraging researchers to exercise greater self-evaluation.

There is no question that in the current global economic climate the ERC stands alone in pursuing a long-term counter-cyclical strategy for research and innovation in Europe.

“Undoubtedly the scientific community in Europe has been bolstered by the existence of the ERC. But it’s far too early to show any statistics about the reversal of a European brain drain. We think it will be another generation before the benefits of our work really start to show through,” says Kafatos.