lack of regulation and oversight governing such work. At a time when advances in chemistry and biochemistry are opening up new possibilities thanks to the expansion of the genetic code, another form of common code seems necessary: A code of conduct arising from the crosstalk between scientists, national and international authorities, backed by a broad engagement of citizens on the potential benefits and pitfalls of these developments.

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doi:10.1038/sj.embor.7400131

Push for innovation

The fate of basic research in Europe has arrived on the radar screen of politicians

The large investments of time and effort seem to be paying off. After nearly two years of lobbying, meetings and position papers, the scientific community in Europe is on the verge of achieving a major goal: convincing the political powers of the need to establish a European Research Council (ERC). Largely thanks to the ERC Expert Group, set up in 2002 by the Danish Minister for Science and Technology to explore options for the creation of an ERC, politicians finally seem to be warming to this idea. "Scientific organizations have achieved a change in the political scene in research funding," José Mariano Gago (Fig 1), President of the Laboratory for Experimental Particle Physics and Instrumentation in Lisbon, Portugal, and Portugal's former Minister of Science and Technology, said at a meeting in Brussels in late February, organized by the Initiative for Science in Europe (ISE) group. "[The scientists'] demands are accepted, at least in words, by policy makers," he added.

...the EC and other political bodies now openly concede that Europe is increasingly losing out in the global market of science and technology

In a number of recent documents published by the European Commission (EC), several countries' leaders and ministers for science and research have reiterated the growing importance of basic research for the future economic and social well-being of Europe. More importantly, the EC and other political bodies now openly concede that Europe is increasingly losing out in the global market of science and technology, particularly in comparison with the USA. Indeed, the major demands of the scientific community have now finally arrived on the radar screen of politicians: first and foremost is the need to establish an ERC with additional money from the EU's budget to fund basic research at the European level. What started as a small group of mainly life scientists pushing for change has grown into a larger

Fig 1 | José Mariano Gago: "We must go out and campaign for scientific debates not only at the European level but also in our own countries."

movement across all sciences and countries. This was further highlighted by an open letter, signed by 45 Nobel Laureates from Europe, to the European Commissioner for Research Philippe Busquin in support of the creation of an ERC.

The main reason for a European fund for basic research is the fragmentation of science policy across the European landscape—as more than 90% of research funding is distributed by national research councils and funds, both competition and cooperation at an international level are impeded. "We have a fragmentation of efforts with dispersion of funding which often results in sub-optimal funding," said Pierre Papon from the École Supérieure de Physique et Chimie in Paris, France. Furthermore, Europe as a whole invests less in research and development in terms of a percentage of its gross domestic product compared with the USA (Gannon, 2003). "Europe needs more scientists but public funding per researcher is about half that of the USA," Gago said, which translates into lower salaries, bleaker career prospects and further contributes to the 'brain drain' of European scientists to the USA. And although some of the richer EU countries are doing fairly well, "in some countries the idea of science for the public good is absent," he noted. This has repercussions for Europe's scientific productivity, particularly when measured in terms of Nobel Prizes and the publication of highly cited

EXTRACT FROM THE SYMPOSIUM CONSENSUS "EUROPE'S SEARCH FOR EXCELLENCE IN BASIC RESEARCH", DUBLIN CASTLE, IRELAND, 16-17 FEBRUARY 2004

- There is a need to create a more attractive basic research environment [...] where excellent researchers are recognized and can excel, thereby strengthening Europe's performance in basic research
- ... it was also agreed that national initiatives on their own would not be sufficient, and therefore a European initiative is required. The objectives of this European initiative would be to promote excellence in basic research by promoting international competition among individual research teams. The sole criterion should be excellence, identified by international peer review
- It was also agreed that there is a need to provide specific funding for basic research of high quality, in the next Framework Programme (7th)...
- In this context, the Symposium welcomed the Commission's proposal for significant increase in EU research funding including for basic research
- ... This initiative, which must have the complete trust and confidence of the scientific community, should involve a new facility characterized by minimum bureaucracy, involve the scientific and engineering communities, both enterprise and academia, in its strategy and overall management. It should award grants on a competitive basis

papers. Since the 1980s, Nobel Prizes have increasingly been awarded to researchers working in the USA, which also holds a six-fold advantage over Europe in the citation of its scientific publications. "In quantity terms we're doing fairly well," commented Bertil Andersson, Chief Executive of the European Science Foundation, but "in quality terms we're falling behind." An ERC might be a first step to overcome these problems, particularly in furthering competition at a European level and therefore setting higher quality standards that might force national governments to improve the situation locally to enable their scientists to successfully compete for ERC grants.

The realization that something has to be done in Europe to bring the continent on a par with the USA and Japan has obviously spilled over from the scientific community to

the political realm and, accordingly, recent months have seen a sudden rise in the number of calls to improve Europe's capacity for innovation. A resolution of the European Parliament in November last year called for greater support for basic research from European research policy (Resolution of the European Parliament, 2003). On 16 January, the EC released a communication that formally endorses additional support for basic research at a European level and lays out a timeline for action (European Commission, 2004a). Another communication to the Council of Europe and the European Parliament in February also stressed the importance of basic research (European Commission, 2004b). "Financial support at EU level offers a high added value in research," the communication states, and so "There is hence a strong case for a significant increase in EU research funding..." It then suggests, "To that end a European facility would be established along the lines of, for instance, the National Science Foundation in the US, for awarding grants to the highest level individual research teams in competition at European level..."

At a speech at the European Parliament on January 15, Commission President Romano Prodi also deplored the fact that approximately 400,000 European graduates work in the USA, and called for more proactive approaches to make knowledge and innovation key priorities for the EU. Similarly, a meeting of European ministers for research, funding managers and scientists from the EU member and accession states, organized by the Irish Presidency of the EU and the EC in Dublin, Ireland, in mid-February, also reiterated the "clear challenge for Europe to enhance its levels of creativity and excellence in basic research in the context of global competition." The symposium consensus goes on to make recommendations that largely follow what the scientists have been asking for and what the ERC Expert Group's report states (www.ercexpertgroup.org; see sidebar).

Last but not least, German Chancellor Gerhard Schröder, French President Jacques Chirac and British Prime Minister Tony Blair called for a more innovative Europe in an open letter to Prodi and Irish Taoiseach (Prime Minister) Bertie Ahern, who is the current President of the European Council. "Support for basic and applied research has to be strengthened. In this context, we will examine with interest the Commission's proposal for the future structure of European

research, including a possible European Research Council," the three wrote after a meeting in Berlin, Germany, on 18 February.

With so much support for basic research in Europe, the scientific community might well start putting the champagne bottles on ice. However, the wide endorsement of an ERC does not necessarily mean its immediate creation. As the debate has moved out of the academic realm into the harsh world of politics, much can still change. "We are talking about a political decision that has to be taken," Achilleas Mitsos (Fig 2), Director General of Research at the EC, reminded the scientists at the Brussels meeting. And it looks like the EC has its own ideas about how to support basic research at an EU level. Their new research policy will have five major axes, according to Mitsos, of which basic science is only one, together with policy-driven research, cooperation and coordination of existing programmes and policies, building of new research capacity through infrastructures and human potential, and public-private partnerships.

As the debate has moved out of the academic realm into the harsh world of politics, much can still change

Nevertheless, the basic research axis of EU funding would meet some of the scientific communities' demands. The EC suggests that funding basic research should be science- not policy-driven, should define excellence as the exclusive criterion for selection and should concentrate on competition rather than cooperation at the European level to increase the overall quality of research. In addition, research would become a more important element in the EU's structural funds to improve infrastructure in

Fig 2 | Achilleas Mitsos: "This is a revolution that I please want you to help us with."

Fig 3 | Mogens Flensted-Jensen: "If we don't have some kind of consensus among the scientists [...] we will have difficulties in convincing our politicians."

economically weaker countries. "This is a revolution that I please want you to help us with," Mitsos urged the scientists at the meeting, who represented all of the scientific disciplines from mathematics to the humanities.

However, at a press conference in January, Busquin seemed to be back-peddalling from some of his earlier promises (Rana, 2004). Basic science could get as little as €500 million in the coming 7th Framework Programme (FP), which is some distance away from the €2 billion per year that was discussed earlier (Breithaupt, 2003), and might have to competitively share this money with applied research. Furthermore, Busquin said that he favoured the administration of the fund by the EC rather than the scientists' demand for an independent ERC. When Karin Metzloff, Executive Director of the European Plant Science Organisation, challenged Mitsos about these remarks, he remained elusive. "The words FP must not be interpreted as what we're doing today," he said. Equally, when Julio Celis, Secretary General of the Federation of European Biochemical Societies, asked him when the consultation process with the scientific community would start, as stated in the EC communication, Mitsos managed to avoid answering this question as well.

This proposed dilution of the power of an ERC is not helped by differing ideas about its scope among the scientists themselves. As some speakers at the Brussels meeting pointed out, solving the structural problems of scientific research in Europe needs much more than the creation of an ERC. Some of these solutions include the strengthening of education, helping economically weaker countries to improve the quality of their research, supporting libraries and other archives, and promoting the public acceptance of science. "We are almost at the

point where the discussion is going in circles," Mogens Flensted-Jensen (Fig 3), Vice Chairman of the ERC Expert Group, warned the scientists at the conference. "If we don't have some kind of consensus among the scientists [...] we will have difficulties in convincing our politicians." However, the consensus quickly emerged that it is not up to an ERC to address all of these problems, although it could eventually contribute. Instead, by setting quality standards at an international level, it would eventually force national governments to improve research at home. "Once you are clear in the intention and goals of setting standards [...] then the young people will recognize these standards [...] and will see that these standards are distributed throughout Europe," Helga Nowotny from the European Research Advisory Board said. Indeed, the report prepared by the ERC Expert Group strongly recommends setting up an ERC with an initially narrow scope to focus on supporting basic science through European-wide competition before eventually expanding its mission to fulfil other roles.

...solving the structural problems of scientific research in Europe needs much more than the creation of an ERC

In the end, the scientific community might have to look for other solutions for the creation of an ERC rather than relying on the EC. Rolf Linkohr, a member of the European Parliament, suggested. "If the ERC falls under the Framework Programme, you have to follow the rules of the Framework Programmes," such as accounting and deliverables, which has created misgivings among scientists who have long been complaining about the immense bureaucratic workload that comes with an EC contract. An alternative would be to create a European Research Fund for basic research,

Fig 4 | Timothy Hunt: "Policy makers are important. They can make or break science."

Linkohr pointed out, which could help to avoid the legal and regulatory limitations that apply to the Framework Programmes as it could be set up with its own legal basis tailored to its needs.

Whatever the ultimate outcome of the ERC debate—as an independent agency or as yet another part of the EC's Framework Programmes—one thing seems certain: going back to the *status quo* is no longer possible. As the fate of basic research in Europe seemingly moves up politicians' agendas, the window of opportunity for much-needed change is opening wider. Furthermore, for the first time, the European scientific community seems to be united across countries as well as disciplines and is increasingly willing to push for change. One indication is the ISE, which is setting itself up with Gago as President to monitor further progress towards the creation of an ERC and to offer advice to policy makers. Representatives from many other learned societies and academic organizations in Europe who attended the meeting in Brussels strongly expressed their interest in being involved and contributing to the creation and management of an ERC. This might imply change beyond the world of European politics. "We must go out and campaign for scientific debates not only at the European level but also in our own countries," Gago said. Indeed, European scientists, many of whom have abstained from the political debates, now seem to recognize that they must follow the lead of their American colleagues and invest more time and effort into convincing politicians about their needs. "Policy makers are important. They can make or break science," Timothy Hunt (Fig 4), a Nobel Laureate in physiology from Cancer Research UK in London, said.

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doi:10.1038/sj.embor.7400134