

Inspiring and educating young scientists is something that we cannot leave to chance, given the indisputable connection between scientific research and economic growth. In Israel, whose economy is firmly based on science and technology, this link is clear to those officials responsible for education. That is why in recent years a minor revolution has taken place in their education system, inspired by a report from a national committee, headed by Professor Haim Harari, President of the Weizmann Institute. Not surprisingly it addressed the very problems that still trouble Europe. First, the curricula were rewritten to place more emphasis on integration between the science and technology curricula. Secondly, teachers, in growing numbers, participate in continuing education through a network of regional training centres, which they attend one day a week. For this, they are rewarded with an increased salary. Teachers are important after all, as we

have yet to recognise in Europe. Finally, a core curriculum is being devised for all subjects, not just the sciences. The Israeli Ministry of Education liaises very closely with academics in universities and provides them with a budget for the development of teaching materials. However, as Benjamin Geiger, Professor at the Weizmann Institute, who was involved in the implementation of this reform, conceded, Israel is small—1.2 million children attend school—and its education system is centralised, and hence activities can be coordinated relatively easily. 'But the implementation of such a comprehensive reform is a slow and difficult endeavour,' he added, 'and it is still way too early to evaluate its success.' Since Europe is large, there is an even greater need for a similar revolution. But given that many countries do not yet have a national curriculum, the possibility of a pan-European curriculum seems a little remote at the moment.

The task of planning curricula and teaching them is not likely to become easier. An ever-increasing number of factors need to be considered. The expert panels who design curricula must include many different professionals, among them practising scientists, educators, social scientists and ethicists. The new knowledge and concepts that arise in research must be complemented by consideration of their ethical, social, environmental and economic impact. These are topics that must be tackled not only in science, but across the whole curriculum, as the Wellcome Trust recently recommended in its concepts for a national curriculum in England. What a challenge. Teachers have never been so valuable.

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DOI: 10.1093/embo-reports/kvd102

The discovery of functional genomics

EU announces new funding approach for European research

The one consistent aspect of the European Community's science funding policy to date has been that it has not had any difficulty in changing its direction or priorities with each Framework Programme. And in the wake of heavy criticism of the current 5th Framework Programme—by scientists, review panels and science lobbyists—for its heavy emphasis on applied research, the commission finally seems to be willing to revamp its funding policy. If the informally leaked details for a new experimental approach for funding and managing research projects in functional genomics—to start as early as the middle of next year, and to be absorbed into the 5th Framework Programme—are indeed true, the EC will have demonstrated an ability to react quickly to new developments as well as widespread criticism. Furthermore, if this new initiative can be regarded as a pilot project for the 6th Framework Programme, it means that the next programme, sched-

uled to start in 2003, will better reflect the wishes of European scientists than the current one does.

The new initiative will focus more directly on research in functional genomics as a component of the 5th Framework

the flexibility that is required to respond to this gap and have already pre-announced, at a number of small meetings, their intention for a new approach to support European research in the field of functional genomics.

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Programme. This area has not been emphasised in the current programme because of the extensive period of negotiation that was required to put the programme together. The EC's 5-year plan simply was not able to reflect the most recent and important developments in this field, i.e. the sequencing of the human genome, and a growing number of other species. Happily, they have shown

Previously, the standard EU response to such a dilemma would simply have been to change the wording in the working programmes slightly to make functional genomics a target for applications for research funding. However, in this case the EU is going much further, introducing a new style of selection and targeting. Although the details may change again by the time that this issue of *EMBO reports* is

published, the overall strategy and timeline seem to be set. As decided by the Programme Committee at its meeting on October 11, the commission plans to publish a 'call for expression of interest' on November 15, and will invite scientists to submit their suggestions for topics in the field of functional genomics that should be supported by the EU. Early in 2001, an evaluation panel will select approximately five of the most important topics from this set for further consideration. Then, in June 2001, a special call for full proposals for research within those five topic areas is scheduled. In this case there will be full disclosure of applicant names, in order to avoid the awkwardness of anonymity—one aspect of the current programme that has bemused many scientists. Ultimately, two or three research projects will be selected for funding in the range of 10–15 million Euro each. Successful projects will have to integrate excellence in research, training of younger scientists and networking of laboratories. The latter will be of importance in that it is a preparatory step to bringing together the most important European researchers in this field. However, and in contrast to the existing 5th Framework Programme, the greatest emphasis will be on the scientific quality of the proposed research. Because this procedure is regarded as being experimental, the initial funding period for each project will be for three years, but this may eventually be extended to five years. The overall funding of 30–35 million Euro for this special initiative will come from the 130 million Euro genome initiative—money that was already part of the budget for the Quality of Life Programme.

The main targets of criticism within the 5th Framework Programme have been its exclusive focus on research that is relevant to socio-economic goals, and its complicated regulations for applicants. Thus, the details of the new funding regulations for genomics research are signs of a remarkable change in science policy, as decisions about the projects to be funded will be based on research proposals rather than on political goals. Furthermore, by

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its very nature, the current 5th Framework Programme has favoured dispersion of funds—which has a certain political appeal. It is a brave move to transfer the emphasis to excellence and to treat the European research arena as a single entity in which the geographic locations of the collaborators on a grant application become of secondary importance. Giving larger awards to a smaller number of projects should ultimately have the consequence of creating and supporting the 'centres of excellence' that EU Commissioner Philippe Busquin described in his vision for a 'European Research identity' [EMBO reports, **1**, 96–99 (2000)]. The integrated projects will recognise the need to have a critical mass of excellent research in order to achieve advances in the area of functional genomics. However, the remaining nearly 100 million Euro will presumably be dispersed through the standard procedure, thus con-

tinuing support for a number of smaller laboratories and increasing infrastructure.

Interestingly, the commission also seems willing to move away from the requirement of a detailed, long-term work plan by which the progress of the project can be monitored. But the commission will closely monitor the progress of the projects with the assistance of a scientific advisory board. This new approach recognises that it would be an unusual research project that could accurately predict what is going to happen in the 36th month of its existence. Indeed, the effectiveness of the programme would be compromised if the applicants had detailed work plans with predictable outcomes. In fast-moving areas of open-ended research, results are often not predictable.

The EU commission has shown a commendable willingness to respond to a gap in the 5th Framework Programme. Hopefully, researchers throughout Europe who would benefit from extra funding in the area of genomics will become actively involved, to ensure that those who promoted change towards high-quality science get the necessary support for further improvements in the philosophy and practice of EU funding. If Commissioner Busquin is indeed willing to continue to listen to the scientists—and these recent developments seem to indicate that this is the case—the 6th Framework Programme will probably reflect the needs of European scientists better than the current one does.

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Preparing for the worst

The USA and Japan's preparations for a terrorist attack with chemical or biological weapons

Biological weapons are not just topics for contemporary novelists but found their way into classical literature long ago. Shakespeare has Hamlet's father's ghost describe, 'Upon my secure hour thy uncle

stole, with juice of cursed hebona in a vial, and in the porches of my ears did pour the leprous distillment.' (Act 1, Scene 5) Indeed, neither the act nor the accusation is new. Jews in Europe were

accused of poisoning wells to cause plague in the Middle Ages. Japanese planes in World War II dropped plague-infested fleas over Chinese cities and villages.