

FINAL WORD

by Mark F. Cantley and Ken Sargeant

THE FATE OF THE OLD WORLD'S NEW BIOTECHNOLOGY

Managing bio-systems" is a smooth phrase to summarize the entropy-reducing activities which on this planet range across 20 orders of magnitude; from enzymes catalyzing their chosen substrates, to governments seeking to catalyze the energies of their citizenry. Biotechnology broadens the mind. Natural ecosystems run more smoothly than government plans and strategies, if you don't mind the waste and casual slaughter of natural selection; but it is natural selection that has favored the emergence of the Lamarckian abilities which characterize human culture including individual and societal learning. What could be more Lamarckian than the accumulation and almost instantaneous diffusion (subject to our patent department's consent) of knowhow in biotechnology today?

Governments would like to promote and accelerate these learning processes, and "strategy" is a fashionable term. While many argue that in biotechnology as elsewhere, least government is best, there seem to be some scale problems in space, time, and money where some public coordination is essential. As a global example of biotechnology, consider the elimination of smallpox; as an example of investment surely too long-term, uncertain and unprofitable on economic criteria, take the education (or indeed the creation) of children; as an expenditure too vast and profitless to be privately funded, consider the surveying, cataloging, and conservation of species, at global or ecosystem scale, or (on the shelves) of organized and data-banked culture collections. Yet these three examples all call forth sufficient political content to ensure their pursuit, albeit with some excesses on the second and inadequacies on the third; and demand some degree of organized government for their success.

The role of government is a perennial subject for debate in that complex metasystem, the European Community, which has recently been meditating on its role in the governance or stimulation of biotechnology. A futures think-tank, mooted in 1974 as an adjunct to joint European R&D policy, led after four years of slow debate and decision to the program called FAST: Forecasting and Assessment in Science and Technology. This is a five-year pilot program with a four million-dollar budget which is mandated to act as a "neo-cortex" for the Community's executive, the Commission; it was formed to advise on R&D priorities and to enhance the coherence of long-term science and technology policy. Not limited to left-brain analyses, FAST had to consider technical, structural, and social change. So in devoting one-third of its effort to "Bio-Society" studies (the other two-thirds were devoted to "Work and Employment" and "The Information Socie-

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ty"), it embraced not only the life sciences and biotechnology, but their broader social impacts. Bravo.

What has this effort generated? Paper, certainly. But from the 400-page FAST report, some central simplicities emerge under the bold banner, "A Community Strategy for Biotechnology in Europe." Diagnosis: the old world is being "outsent" by the new, "outplanned" by the rising sun, and "fragmented" by national rivalry, into competing and sub-critical efforts, in which companies and countries seek alliances outside Europe to strengthen their positions within it.

The prescription is a strategy based on four functions, seen as fitting the Community role:

- Monitoring: regular strategic review of strengths, weaknesses, opportunities, and threats;
- Concentration: to help the 10-member states get their act together where necessary;
- Contextual measures: to create a setting supportive and encouraging for biotechnology; from patent law to the price of glucose;
- Joint R&D: in response to jointly identified needs.

Realistically, FAST recognises that any such strategy must operate with the member countries and companies; the Community must "lead from behind" with the consent of its members. Unsurprisingly, the strategy focuses on basic capability development, and the implications of biotechnology for three "strategic domains": land use (a hot issue in view of the Community's expensive agricultural policy), Third World impacts (few countries of the old world are without their colonial legacy), and health care.

Can one be more charitable about the FAST strategy for Community biotechnology? Following a score of national reports, is there anything new to say or do, or must the tide of bio-bumf now start to ebb? Time will tell. Certainly the Commission intends to develop a European strategic program in biotechnology, as was announced by President Gaston Thorn to the European Parliament in February.

Some elements of the strategy proposed by FAST are obvious, and some may be right. We are all engaged in a messy, long-term learning process, in which fortunes financial and political may be made and lost. "Contextual measures" make a potentially powerful concept: the infrastructure of information systems, culture collections, legal and regulatory frameworks, popular education and culture oriented towards critical rationality in the assessment of available innovations; and a gradual and continual redevelopment of land, labor, and capital to even greater achievement of real value, however defined.

One of the central challenges of biotechnology is organizational: it is a boundary-crossing, multi-disciplinary, statistician's nightmare, forever evading the point of the semantic lepidopterist's institutional pin. It challenges the organization of our universities, our government departments, our economic statistics, and our minds. One of the issues tackled in the FAST report is to identify the

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COMMENTARY Continued from page 494 have never been developed or made available on a wide scale. For example, with the sole exception of yellow fever, no vaccines are in general use against any of the arboviruses. Technical difficulties plus a lack of adequate financial incentives have discouraged or defeated efforts in the development of this and many other types of vaccines. Today, the picture begins to look very different. Gene splicing could revolutionize our control of infectious diseases. And the greatest opportunities of all are undoubtedly in the Third World.

FINAL WORD Continued from page 526 appropriate scale: Who does what? How does the messy learning process advance, as know-how threatens to outrun "know-why"?

The answers are familiar, tedious, but recurrent: the need for transfers—of ideas and people, between institutions, between countries, between disciplines, and between sectors—to promote learning and understanding. Links are required between the developed world and the developing ones, demanding the institutional and infrastructural build-up to enhance the capacity to absorb, to adapt, and to implement: the global networks such as MIRCENs (Microbial Resource Centres: training and diffusion centers funded by UNESCO and other U.N. agencies) and CGIAR (Consultative Group for International Agricultural Research) are commended as models by FAST.

The FAST report has a lot of good ideas; the perceptions on the necessity of developing the bio-informatics infrastructure are particularly sound. The open question remains: can the old world really overcome its historical fragmentation, its cherished cultural diversity mapping into vested interests defended by administrative irrationality, to maintain or to win parity with the U.S. and Japan?

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