Japanese biotechnology

Companies eye export markets

Tokyo

JAPAN's biotechnology companies are bursting with confidence. The days when they were eagerly seeking licensing arrangements with their US and European counterparts are over. Instead, the stage may be set for international competition that will intensify in the next decade. Those seem the main conclusions to be drawn from a newly published survey of the industry.

The survey, which drew replies from 260 biotechnology companies, was carried out by the industrial newspaper *Nikkei* and its companion magazine, *Nikkei Biotech*. Almost all areas were covered, from companies manufacturing cleanrooms to those producing interferons. Expenditure on research and development appears to be doubling yearly: in 1984 it rose 28.2 per cent from the previous year, this year a 51.5 per cent rise is anticipated. Average research and development expenditure now runs at 295 million yen per company, but that disguises considerable variation.

The biotech giants, such as Ajinomoto, Toray Industries and Tanabe Seiyaku, have declared research budgets of over Y1,000 million (US 4.6 million) a year. And other leaders, like Meiji Seika, did not give details of their expenditure. Nearly half the companies revealed that they were planning to build new research facilities, or to expand existing ones, in the near future.

The expansion is perhaps a reflection of the optimistic view of the future market for products related to biotechnology that is now emerging: from the present Y50,000 million a year market a 170-fold increase to Y8.3 thousand thousand million by the year 2000 was predicted by the companies surveyed.

But perhaps the most striking result of the survey is the way the gap between the United States and Japan is perceived to have shrunk. Just a couple of years ago, when *Nature* published a survey on Science in Japan, there was still considerable uncertainty over the role of biotechnology in Japan and concern over the huge lead held by the United States. The gap has not vanished in the most advanced fields. In genetic engineering, only a few companies — including Kyowa Hakko, Ajinomoto and Toray — are prepared to say they now stand shoulder-to-shoulder with US companies. None thinks it is ahead. But in cell fusion, mass cell culture and immobilized enzyme technology, which are the techniques of mass production, a handful of companies, including Meiji Seika, Sumitomo Seiyaku and Toray, now see themselves as in the lead. And in more conventional fermentation technologies, just over 10 per cent of companies saw themselves ahead of their Western counterparts, and nearly 15 per cent at the same level.

The biggest remaining problems for the industry are seen to be in basic research and in the failure to obtain effective industry/university/government cooperation. These problems have been aired many times, but there are still no effective policies to deal with them. Research in biotechnology is largely funded by the companies themselves and government support of basic research remains modest. Indeed lack of support for basic research may itself become an international issue.

A great many of Japan's biotechnology researchers have trained in the United States (158 are enrolled on the National Institutes of Health visiting programme, but only six from the United Kingdom) and many are recruited direct from US universities where they are completing postdoctoral studies. Although a US Embassy spokesman says that there is no possibility that the noble tradition of allowing other countries free access to US basic research facilities will be curtailed, complaints have already been voiced in Congress. The future may see pressure for Japan to contribute as much to the world's pool of basic research as it takes out.

Whether or not that happens, there is no doubt that there is going to be fierce competition between the United States and Japan in the next decade. And just as in the field of electronics, Japanese companies that enter the international market will have first to face fierce internal competition. It is a notable feature of the Japanese scene that many companies follow similar lines of research; one year interferon is in vogue, another year, tumour necrosis factor. Numerous companies are moving into monoclonal antibody production and the manufacture of diagnostic kits too. The companies that emerge as winners will be very tough international competitors. Biotechnology companies elsewhere should take note. **Alun Anderson**

French agricultural research

New look at research council

Paris

A FRENCH dinosaur is stirring. The Institut National de la Recherche Agronomique (INRA), the national agricultural research council, which some critics say has been an agent of conservatism rather than change in French agriculture, is embracing biotechnology.

Jacques Poly, INRA director-general, has appointed Pierre Douzou, director of the national biotechnology programme, as president of INRA's scientific council. Moreover, Guy Paillotin from the Ecole Polytechnique has joined INRA as director of research, while half of all directors of INRA's laboratories have been changed in the past two years. Poly says "everything is possible now".

Not that he, or Douzou or Paillotin, has much complaint about INRA's existing research. "I'm a fan of INRA", says Douzou. INRA has world-class animal reproductive biology at Versailles, can possibly claim a world lead in classical plant embryology and has a number of major research centres as at Toulouse and Grignon, where it has set up a major effort in modern fermentation technology. But, says Poly, INRA may have been too close to the farmers, responding to their immediate needs. Now INRA must break new ground, taking account of the impact of the new biology on agriculture.

Although the shift will not be easy, "unlike your troubles in Britain", says Poly, it will not be hampered by lack of funds. INRA has not been particularly favoured under the present government, but spending will rise by 10 per cent next year. The revitalization of French agriculture through research has clearly become a political priority. Another sign is that, in Douzou's biotechnology programme, which was reconstituted during the summer, the new "board of directors" contains only three representatives of chemical and pharmaceutical companies, but seven from the agro-food sector.

French politicians seem to have recognized that the agricultural and food industries are vast, and its second export earner. (Wine alone was worth FF18,000 million last year.) Yet these industries are threatened with fundamental change, in part because of possible adjustments to the European Community's Common Agricultrual Policy (CAP) and partly from new technology in food and farming. To avoid what Douzou calls "the desertification of rural France", research, and INRA, come to the fore.

But Poly, Douzou and Paillotin recognize that INRA has been too isolated from the universities and from other research councils and that this must change. Already significant numbers of senior scientists from universities and other research councils are moving to INRA, says Poly, as a consequence of the rapid advances in molecular biology and the recent change in intellectual atmosphere in France, towards practical application.

Another key factor is the source of INRA's funds, says Poly. Since the present administration came to power in 1981, INRA has depended on the revamped and powerful ministry of research, and not on the ministry of agriculture as previously. And now the benefits are beginning to show. "It has made a big difference", says Poly.

Robert Walgate