setting up a joint working party to consider a proposal from gene sequencer John Sulston, of the MRC's Laboratory of Molecular Biology, to launch a major new genome research center in Cambridge (*Science*, 15 May, p. 958).

More complex patterns of cooperation are likely to emerge in the future. Although Wellcome's growth to MRC size will really shift the balance of spending power, the trust is not the only player overlapping MRC territory. Added together, the British medical research charities already outspend the MRC, and the trend is also for them to collaborate more closely. Last year, for example, Wellcome and the Cancer Research Campaign came together to create the $9 million Institute of Cancer and Developmental Biology in Cambridge (*Science*, 26 July 1991, p. 377).

Ogilvie won't reveal Wellcome's plans, but she points out that past growth in the trust's budget changed Wellcome's role from concentrating on a small number of "Cinderella" disciplines that had been neglected by the MRC—tropical medicine, vision research, and clinical epidemiology, for example—to encouraging scientists in almost any biomedical discipline to send in their best grant proposals. Today, researchers in front-line fields like molecular biology and neuroscience are as likely to send their proposals to Wellcome as to the MRC. At the same time, the trust has been moving toward funding progressively larger projects. Glasgow University and Imperial College, London, were among the first to benefit from this shift, winning multimillion-dollar funding for new parasitology research groups, in 1987 and 1990 respectively.

Focus on facilities. For purely administrative reasons, it may pay Wellcome to concentrate more of its budget into building world-class facilities in the hottest fields. Howard Hughes president Choppin also points out that investing in "bricks and mortar" poses fewer headaches than ramping up support for individual scientists, when a funding body is faced with rapid expansion. And support for new labs is certainly what British scientists would prefer: "What we don't want is more short-term grants—a lot of the energies of people in the research community are used up in keeping things running from one 18-month grant to the next," says John Mulvey, a former Oxford University particle physicist who now runs the lobbying group Save British Science.

The one thing that Ogilvie is prepared to commit herself on is that the trust will continue its policy of trying to give researchers some long-term job security and boosting salaries—the low level of which is often cited by British expatriate scientists as one reason they left the country. "Here we have very skillful, highly dedicated laborers...who definitely should be paid properly, and be given the right kind of working environment," says Ogilvie. For the many young British scientists who find that meeting their mortgage payments is a bigger concern than designing their next experiment, that news may be the most welcome of all.

–Peter Aldhous

BIOTECHNOLOGY

Is the United States Losing its Lead?

The United States leads the world in biotechnology research and development today, but, like Avis, Japan is trying harder—and it could surpass the United States by the end of the decade unless the United States fights back with an Avis-like strategy of its own. So warns the National Research Council (NRC)* in a report that describes the Japanese approach: learning from the leader. The result, according to the study, which was carried out by a blue-ribbon panel of university researchers, biotech executives, and industry analysts, is "a prevailing pattern of transfer of biotechnology developed in the United States to Japan during the past two decades." There's nothing particularly underhanded about the Japanese approach, though: They've simply invested in cutting-edge biotech firms and leading research universities and gleaned valuable information about how it's done on this side of the Pacific.

The NRC reached that conclusion by reviewing three dozen cases in which the Japanese invested in American biotech R&D. In fact, the most intriguing part of the report is the series of case studies in the appendix, some of which depict in detail how major Japanese firms have formed joint ventures with biotech companies and American universities. Some of the major examples are listed in the accompanying chart.

But the news isn't all grim: The U.S. government, the biotech industry, and universities can still protect the young industry's lead in the world marketplace. The report recommends that the biotech industry expand manufacturing and sales in Europe and Asia. It calls on the United States government to develop a technology strategy, including financial incentives to encourage innovation and more American investment in biotech, and to offer a "first-to-file" patent system in the United States like those already in place in Europe and Asia. That would replace the "first-to-invent" U.S. system, which is not recognized abroad, thus giving American researchers no patent protection overseas. Unless such moves, and others, are made, the report cautions, the results could be "significant and negative" by the turn of the century.

–Ann Gibbons

*"U.S.-Japan Technology Linkages in Biotechnology: Challenges for the 1990s," is available for $19 (prepaid) plus $3 shipping fee from the National Academy Press, 2101 Constitution Ave., N.W., Washington, D.C. 20418. Or call 1-800-624-6242.

SOME U.S.–JAPAN BIOTECH PARTNERSHIPS

Japanese Partner	U.S. Partner	Type of Linkage	Initial Terms of Investment
1. Kirin Brewery	Amgen	Joint Venture (1984)	Kirin paid $12 million and Amgen paid $4 million to develop and market two drugs jointly—erythropoietin (EPO) and granulocyte colony stimulating factor (G-CSF).
2. Hitachi Chemical Research	University of California, Irvine	New research facility (1988)	Hitachi built a $12 million lab for its researchers on UCI campus; in return, UC's department of biological chemistry gets one floor rent free. Hitachi also supports an endowed chair at UC.
3. Kirin Brewery	Calgene	Joint Venture (1990)	Kirin paid $2.5 million to develop and market jointly Calgene's pest-resistant potato seedlings and $1.5 million for research on potato genes.
4. Japan Research Development Corp.	Michigan State University	Collaborative research (1990)	Japan to spend $15 million over a 5-year collaboration on research on the evolution of microbes for environmental biotechnology.
5. Yamanouchi Pharmaceutical	Mt. Sinai Medical Center	Collaborative research (1991)	Collaboration to develop a transgenic mouse model exhibiting Alzheimer's disease.