China’s agriculture was the first sector to benefit from the economic reforms initiated by Deng Xiaoping (邓小平). Grain production has been increasing. However, agriculture in China is confronted with challenges such as the low output and low income. The Chinese government has placed much emphasis on agriculture in its long term economic plan and under the ninth Five-Year Plan, China will collaborate with the European Union (EU). This plan is called the ‘Sino-European Collaboration in Agriculture’ (SECA). The project will start this year and includes the following:

1. Formulation of agricultural policies to help China overcome problems in agriculture.
2. Introduction of new agricultural techniques through exchange and joint venture between enterprises in EU and China.
3. Providing assistance for newly-emerging farming organizations.

The EU and China will work out the strategies together. What is more important is that both parties are willing to establish a long-term collaboration, undertake policy research and policy formulation. In addition, the EU can share its rich experiences with China.

The new plan will utilize the resources managed by the China-EU Center for Agricultural Technology. The center has the following facilities — meeting rooms, audio-visual equipment, language training and interpretation services, and an agriculture database. The operational budget for the center is provided by the Chinese Ministry of Agriculture. The EU will provide additional financial support (by the end of August 1997), besides providing technical assistance, training and equipment.

### Dairy Industry

The dairy industry has been the focus of both China and the EU in the past 12 years. Under the first phase, ten regions will be selected, and the potential milk production bases will be promoted into modern enterprises. Early this year, the second and final phase of the dairy project was started, with the EU providing ECU30 million (US$33 million). The staff involved will benefit from a special training program. The EU will provide subsidies to China to purchase modern equipment and improve quality control. Under the second phase, the special ‘Enterprises, Equipment and Technology Promotion Office’ will be set up in China and Europe. The office with assistance from European enterprises will provide Internet service for the Chinese dairy companies.

Under the third phase, the farmers will form an organization to provide good service, jointly purchase products, control the milk quality and consult on milk prices. In 1985, the dairy project subsidized six cities in China, which helped reduce malnutrition. In 1988, the project was extended to a national level covering 26 cities. The aim of the project is to increase fresh milk production to meet demand, especially in cities. The project has helped to increase milk production and has also helped farmers to increase their profit. At the same time, the farmers have also learnt to combine cattle raising with other farm activities.

### Buffalo Rearing in South China

The buffalo is an important agricultural animal in Yunnan Province (雲南省), Guangxi Autonomous Region (廣西壯族自治區) and Guangdong Province (廣東省). Last year China and the EU agreed to initiate a six-year project to improve buffalo rearing methods. This project also included studies on buffalo genes. In Guanxi, the Nanning buffalo farm will become a case study. In Dehong County (德宏縣) of Yunnan Province (雲南省), poor farmers rear buffalo for income. In Guangdong Province, buffalo milk products have become a new source of income for farmers.
Hong Kong Focuses on Biotechnology

(by Dr. Walter K. K. Ho, Department of Biochemistry, Chinese University of Hong Kong)

1997 is an important year for Hong Kong. It is a period of transition, when sovereignty is returned to China after 150 years of British rule. Other than political considerations, Hong Kong is also going through a profound transformation in its economic structure. Traditional manufacturing, such as textiles and electronics, has given way to more service-oriented industries, such as banking, insurance and real estate. Buildings in Kwun Tong (觀塘) and Kwai Chung (葵涌) (two traditional industrial areas in Hong Kong) are now half-empty.

Factories, which used to occupy these industrial areas in the past, have moved their operations to north of the border in China, where the cost of land and labor is a fraction of that in Hong Kong. Thirteen years ago manufacturing accounted for 24% of Hong Kong’s GDP. In 1994, this value declined to less than 10%. Replacing manufacturing, the service-oriented industries have become the number one revenue generating sector in Hong Kong’s economy.

With a constant erosion of its traditional industries, Hong Kong naturally, like other countries in Asia, looks forward to developing a technology-oriented industrial base. Since the early 1980s, the Hong Kong Government has commissioned a number of studies to evaluate the feasibility of having a biotechnology industry in Hong Kong. While no concrete motion has been taken, these studies have stimulated the community’s interest in the subject. This is particularly true with the local universities, as a number of new teaching and research programs in biotechnology and molecular biology have been initiated since the mid-1980s. In contrast, the response from business on biotechnology has been lukewarm at best. The major problems frequently cited by investors are: 1) they are not familiar with biotechnology; 2) they do not see a market for it; and 3) the business is too risky and takes too long to generate cash flow. For most of the 1980s and early 1990s, biotechnology remained basically an academic endeavor in Hong Kong.

The opening of China has made Hong Kong into one of the busiest financial centers in the world. It has opened up many trade and business opportunities and with its close link to China, Hong Kong all of a sudden found herself to have a huge market on her backdoor. The population in Guangdong Province (廣東省) alone is more than ten times that of Hong Kong. With this change in economic perspective, the outlook for developing a biotechnology industry in Hong Kong becomes much brighter. Hong Kong can now look forward to becoming a biotechnology business center for China by providing the needed expertise in finance and management as well as in product development and marketing. In contrast to the apathy of the 1980s and early 1990s, now there is a genuine feeling amongst the business and academic communities in Hong Kong that biotechnology is really going to take off and can become a hi-tech industry in the SAR (Special Administrative Region) in the 21st century.

Fig. 1
An exhibition of high technology projects funded by ITDC held at the Hong Kong Convention Center in January 1997. Over 100 000 people viewed the exhibits.
Since the late 1980s, Hong Kong has invested significantly in order to build up an infrastructure for biotechnology. There are altogether seven universities in Hong Kong and six of them have one or more undergraduate degree programs related to biotechnology. The three major universities, viz., the Chinese University, the University of Hong Kong and the University of Science and Technology of Hong Kong, all offer postgraduate programs in the life and medical sciences leading to either a master or a Ph.D. degree. In response to Hong Kong’s need for trained professionals in the environmental and food industries, the Chinese University and the University of Hong Kong have recently introduced two new degree programs in these areas. In addition to manpower training, Hong Kong has significantly increased its budget for research in the universities over the past seven years. In 1991, the amount of grants disbursed by the Research Grant Council (RGC) was US$12.8 million and by 1995, this amount was tripled to US$35.4 million. Thirty percent of this amount was granted to projects in the biomedical area. The overall grant success rate in the biomedical area was about 40% in 1997, reflecting the competitiveness in securing a grant.

A major effort made by the Hong Kong Government in 1992 to promote technology development was the formation of the Industrial Technology Development Council (ITDC). Under the ITDC, there are six technology committees and their role is to advise the Government on matters pertaining to the development of that particular technology. These six technologies are: plastic, metal, textile, electronics, information technology and biotechnology. In contrast to other technologies, biotechnology occupies a unique position as its industrial base in Hong Kong is the least established. The role of the Biotechnology Committee in this context has more to do with advising the Government on how to develop such an industry rather than improving an existing one.

In order to stimulate technology development in Hong Kong, the ITDC offers three types of funding schemes to promote applied research and development. The Industrial Support Fund (ISF) supports industrial projects which are beneficial to the industrial and technological development of Hong Kong. The Applied Research and Development Scheme (R&D Scheme) aims to promote applied R&D activities in Hong Kong by providing funding support as a catalyst for a specific commercial project. The Cooperative Applied Research and Development Scheme (CARDS) provides funding for applied research and product development that utilize the technological research expertise of Hong Kong and China. The combined level of funding in these schemes is roughly US$50 million per year. Since its inception, the ITDC funding has supported over 100 projects in the biotechnology area totaling around US$35 million. Some of the major projects supported included: the setting up of quality control centers for Chinese medicinal materials, a vaccine and biopharmaceutical pilot plant to GMP standard, research and development of various diagnostic tests, fermentation and enzyme technology in food processing, vaccine development, drug delivery systems, genomic projects and bioinformatics. It is the view of the Biotechnology Committee that projects funded under the ITDC schemes should be highly applied with potentials in helping the industry as a whole. The more upstream and academically oriented projects are funded by RGC.
Another development which signifies Hong Kong’s commitment to biotechnology is the formation of two biotechnology research institutions from funds provided by the Hong Kong Jockey Club in 1988. The Hong Kong Institute of Biotechnology (HKIB) was set up on the campus of the Chinese University, and its role is to provide support for commercialization. The other was the Biotechnology Research Institute (BRI) which is a virtual research institution set up in the University of Science and Technology. Its role is to support upstream research in biotechnology. The building occupied by the HKIB was completed in 1992 with a total floor area of 75,000 sq. ft. Other than its in-house R&D activities, HKIB also provides an incubator facility to private companies for development of specific products. The major project undertaken by HKIB at the moment is to set up a US standard GMP facility for the production of biopharmaceuticals and vaccines. The first product targeted is an anti-malaria vaccine developed by the US National Institutes of Health. Other key projects under development are the formation of a biotechnology information office and a GMP support and training center for traditional Chinese medicine and pharmaceutical manufacturers.

Although a clearly defined biotechnology industry does not exist in Hong Kong, nevertheless a number of industries in the private sector may contribute to the formation of such an industry in the future. They include traditional Chinese medicine manufacturing, generic drug packaging, food and fishery. At the moment, companies in these sectors are facing difficulties in a saturated local market, competition from China, tightening of government regulation, satisfying international export requirements, low return on investment and high costs. To resolve these problems, most industrialists realize that Hong Kong has to upgrade its biomanufacturing standard and capability so as to stay abreast of their competitors. This change in attitude has stimulated collaboration between the academic and commercial community, and the funding provided by the TDC has been instrumental in catalyzing these exchanges.

Compared with Korea, Singapore and Taiwan, Hong Kong is a relative latecomer to biotechnology. In hindsight, this was a blessing, because if Hong Kong were to have gone fully into biotechnology in the late 1980s, the time might not have been opportune. At the moment, there is a genuine need for Hong Kong to upgrade the technology of its industry, and the economic basis for forming a biotechnology industry is much more stronger. This is particularly in view of the huge domestic market in China and the large pool of technical expertise available from there. These points are echoed in the ‘Made by Hong Kong’ study carried out by a panel of experts from MIT. In this study, various options for developing biotechnology in Hong Kong were discussed. It was recommended that top priority should be given to the development of traditional Chinese medicine because Hong Kong holds the unique position of being able to merge eastern medicine with acceptable western practices. This was regarded as a niche which Hong Kong can out-perform other countries. The MIT study did not recommend Hong Kong to go into biopharmaceuticals, based on the fact that worldwide competition may be fierce.

Which direction Hong Kong should take to develop biotechnology is still uncertain. However, there is no doubt that the time is right for Hong Kong to go into biotechnology. The return of Hong Kong to China has opened up many opportunities. The infrastructure that Hong Kong has built is now ready to serve. As the Chairman of the Biotechnology Committee, Mr. Lo Yuk Lam, remarked to the Director General of Industry, "Yes, we are almost there!"

**In contrast to the apathy of the 1980s and early 1990s, now there is a genuine feeling amongst the business and academic communities in Hong Kong that biotechnology is really going to take off and can become a hi-tech industry in the SAR (Special Administrative Region) in the 21st century.**
China’s Health Minister, Chen Minzhang, reported on the current status of epidemic diseases in China on World Health Day. There is a sharp increase in the number of cases of infectious diseases such as the plague, Tuberculosis and HIV/AIDS. These diseases tend to be concentrated within certain areas.

Mr. Chen disclosed that while incidence and mortality rates for infectious diseases are on the whole lower compared to 1995, the morbidity rate of the plague in south-west China has risen by eight times — with the highest rate of incidence in six years. The number of cholera cases has been decreasing for the past few years, but the disease has not been eradicated from most rural areas. On the other hand, an increasing incidence of TB has been noted, the number of cases currently standing at six million. New infectious diseases such as HIV and AIDS are also spreading rapidly. Incidence of HIV/AIDS has been reported in 29 provinces and cities — an increase of 69% from 1995. Likewise, the morbidity rate for Syphilis has risen to above 20%.

Many reasons have been cited for the rise in the incidence of infectious diseases. The most important reason has been attributed to China’s changing social structure. For example, the rise in AIDS is partly attributable to an increase in prostitution and in the practice of casual sex. The spread of contagious diseases may also be due to the dynamic nature of the population in the country, and the infiltration of fake medicine and quack doctors into the marketplace.

To remedy the health crisis in China, Mr. Chen emphasized the importance of stepping up the regional surveillance systems of all health departments, and providing capital and policy guidelines and measures to prevent and contain major epidemics. The Ministry will also look into improving the surveillance methods for monitoring both local and foreign diseases.

Also speaking at World Health Day, Professor Zhuang Hui from Beijing Medical University provided an update on the status of Hepatitis B in China. He revealed that at present there are 690 million Chinese already infected with HBV, and another 120 million carriers of the virus. A recent Hepatitis treatment cost survey was conducted by the Shanghai Municipal Government on outpatients and hospitalized patients. The results of the survey showed that direct economic losses due to the disease was estimated at 30 – 50 billion yuan (US$3.6 – 6.03 billion).

The Health Department of Guangdong Province made a special appeal to the province to undertake a positive approach in the prevention of epidemic diseases. Guangdong is expected to be increasingly vulnerable to infectious diseases as its population becomes more dynamic. As an example, TB has become one of the major killer diseases in the province, with an annual mortality rate of 15 000. Since 1986, a total of 220 people have been infected by the HIV virus, and 19 have contracted AIDS.