SHANGHAI
2003

Guest Editor

Li YiPing, Ph.D.
Professor; Chairman, Chinese National Human Genome Center at Shanghai, and
Chairman, Shanghai Center of Research & Development of New Drugs, Shanghai, PRC

Associate Guest Editors

Wang Jingbo
Institute of Science & Technical Information of Shanghai, Shanghai, PRC

Shi Qianghua
Deputy Director, Shanghai Academy of Medical Scientific Research Management, Shanghai, PRC

Gan Rongxing, MD
Vice President, Shanghai Institutes for Biological Sciences,
The Chinese Academy of Sciences, Shanghai, PRC

Wang Jun, Ph.D.
Professor, Biochemistry Department, The Chinese University of Hong Kong, Hong Kong, PRC

Special thanks to

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Dong Shupei
Deputy Secretary-General, Shanghai Academy of Biological Engineering, Shanghai, PRC

Wong Wai Mei
Biochemistry Department, The Chinese University of Hong Kong, Hong Kong, PRC

Zhang Qin
Shanghai Institutes for Biological Sciences, The Chinese Academy of Sciences, Shanghai, PRC
An Overview of Biotechnology in Shanghai

by
Professor Li, Yi-Ping
Professor, Chairman, Chinese National Human Genome Center at Shanghai, Shanghai Center of Research & Development of New Drugs.

Shanghai, one of the largest harbor cities in the world, is China’s largest economic center and its most important industrial, scientific and technological center. In recent years, Shanghai has evolved into the world’s most dynamic area of economic growth and metropolitan development. Entering the 21st century Shanghai is continuing its march to become an international center of commerce, finance, trade and shipping. This is perfectly illustrated as Shanghai prepares to stage itself for the international audiences in World Expo 2010.

Shanghai’s high tech industry as well as its system of scientific and technological innovation has realized rapid and tangible progress during the period from 1995 to 2001. In 2001, up to 51 percent of economic growth in Shanghai was powered by advancements in science and technology. High-tech industries contributed 21.8 percent of total industrial output and their products accounted for 19.6 percent of total exports, compared to the corresponding figures of 37.7 percent, 13.9 percent and 5.6 percent for 1995. Biotech has emerged as one of the most active sectors during this period and is playing a major role in Shanghai’s technological renaissance.

With a long history of first rate basic research as its solid foundation, and as the results of the government’s strong commitment and continuing efforts to nurture its scientists, Shanghai has witnessed many scientific and technological breakthroughs in recent years. The process of commercialization of the achievements is accelerating, with the consequent rapid increase in the number of biotech companies in Shanghai. Zhangjiang Hi-Tech Park, for example, has successfully attracted most of the biotech enterprises and R&D centers in Shanghai, and is on its way to becoming a Chinese “Biopharmaceutical Valley”. A multiple capital market of government, industry, civil and foreign capital is maturing. A technology intermediary agency system including the Shanghai New High Technology Service Center, Technology Stock Exchange, and Intellectual Property Service Center is shaping up. A biotechnology industry chain covering R&D, commercialization, investment, manufacturing, marketing and service of the biotechnology is taking shape.

1. The Past

The history of Shanghai’s biotechnology industry dates back to the 1950s and 1960s. However, it did not receive a great deal of attention until the 1980s as China began to implement the Policy of Reform and Opening-up. As a result of these reforms, the industry has been enjoying a period of rapid growth during the early 1990s. This parallels the rapid advancement of science and technology in Shanghai and China and easier access to abundant capital and human resources. The rapid growth also comes as a result of the local government’s strong commitment to the development of information technology, biotechnology and new materials industry.

In 1993, the modern biotechnology and pharmaceutical sectors were earmarked as one of the key areas of development by the city government. To facilitate this, the Coordinating Commission of Shanghai Biotechnological & Pharmaceutical Industry was formed, headed by the city leaders. The Biotechnology and Pharmaceutical Industry Office was also formed at the same time to coordinate the overall development of the related industries. In 1995, the Shanghai Science and Technology Congress reiterated modern biotechnology as a key research and development area. In August 1996, the Ministry of Science and Technology of the PRC, the Ministry of Health of the PRC, the State Drug Administration and the Shanghai Municipal Government collectively sponsored the formation of the State Biotechnology & Pharmaceutical Industry Base (Shanghai), signaling a new era of rapid growth for Shanghai’s biotech industry.
2. The Present

The Shanghai biotechnology industry is still in its infancy. It lags behind the more advanced countries such as the United States, especially in the fields of agriculture and environmental protection. However, the gap is closing up rapidly, and steady growth has been achieved in the recent ten years, in terms of annual production, product varieties and technology levels (recombinant DNA technology, genetic engineering and so on).

Industry Scale

The gross output for the biotechnology and pharmaceutical industry in Shanghai has increased five-fold from 1993 to 2001, with the average annual growth rate being 26 percent, well above the growth rate for the city’s industries in general.

R&D Expenditure

From 1993 to 2000, the R&D expenditure on the biotech industry increased 11.13 fold, much faster than the 2.33 fold increase in R&D spending in all sectors of the society. The funding allocated to basic research has also increased rapidly. The Government is committed to further boosting the level of funding for the R&D expenditure in the whole society to 2.2–2.5 percent of total GDP by the year 2005, and consequently the R&D input on the biotech is expected to increase to an even higher level.

Enterprises and Human Resources

By the end of 2001, Shanghai’s biotechnology and pharmaceutical industry employs over 70,000 staff. Among them over 10,000 were scientists and engineers, more than 50 of whom are members of either the Chinese Academy of Sciences (CAS) or the Chinese Academy of Engineering (CAE).

Shanghai is the home of approximately 280 biotechnology and pharmaceutical enterprises, of which 10 are listed in either domestic or overseas stock markets. Shanghai Pharmaceutical (Group) Company, a state-owned enterprise, is one of the most prominent pharmaceutical companies. In the past few years, the number of small- and middle-sized private biotech startups has mushroomed and is playing increasingly dynamic roles. In addition, with the excellent economical and investment environment, Shanghai has become more attractive to many multinational pharmaceutical enterprises. By the end of 2001, four of the top ten pharmaceuticals firms of the world, Roche, Bristol-Myer Squibb, Johnson & Johnson, GlaxoSmithKline, have set up subsidiary factories in Shanghai.

Hi-Tech Parks

The initiative to construct science parks was taken by the Shanghai Government in 1985. Combining the advantages of well-equipped research facilities and readily available human resources, backed by infrastructure, residential facilities, capital and policy and management, the parks offer an excellent environment for the development of new technology and related industry, the commercialization and industrialization of the technology achievements, and venture capital investment. In 2000, the seven main S&T parks in Shanghai occupy an area of over 22sq. km. It is noteworthy that the number of R&D incubators, including specialty incubators, university incubators and international incubators has grown to 24, occupying a total incubation space of almost 0.5sq. km.
Of all the parks, Shanghai Zhangjiang Hi-Tech Park (http://www.zjpark.com) is the leader in the modern biotechnology and pharmaceutical industry. The park was established in July 1992 as a national-level park designated for the development of new and high technology. In August 1999, the Shanghai Municipal Government issued the “Focus on Zhangjiang” strategic policy, which has led to the Park’s accelerated development and its expansion in size from 17sq. km. to 25sq. km.

3. Perspectives


The most important policy document for Shanghai’s science and technology development, “The Tenth Five-Year Plan (2001–2005) for Science and Technology in Shanghai”, issued by the Shanghai Municipal Government in 2001, proposes “to build a framework for an innovation system of science and technology between 2001 to 2005, to significantly improve the capability for sustainable innovation; to develop Shanghai into the nation’s base for hi-tech R&D and related industrialization; and to provide a solid technological back-up for the city’s overall competitiveness”. To achieve these strategic goals, “The Tenth Five-Year Plan (2001–2005) for Biotechnology and Pharmaceutical Industry and Its Perspective in Year 2015” specifies that: (1) Shanghai’s biotechnology and pharmaceutical industry emphasizes the development of products of modern biotechnology and medicines of natural resources; (2) the local biotech industry be encouraged to increase the use of modern biotech techniques and incorporate herbal materials in their products; (3) the government to support the expansion of biotechnological applications in agriculture, food and environmental protection; and (4) the government to develop the modern biotechnology and pharmaceutical industry as the backbone of Shanghai’s hi-tech and strategic industry.

Accordingly, the government has adopted a series of measures, such as:

- Allocate more funding for R&D, and encourage domestic and overseas companies to invest on R&D.
- Increase funding for S&T and incubation facility for the bio-pharmaceutical industry, establish funds for venture capital and assurance there of, and promote the industrialization of technology achievements.
- Strengthen protection of intellectual property rights.
- Attract management and research talents by creating conductive working environment and competitive salary.
- Establish authorized and qualified technology intermediary agencies to foster the scientific innovation in R&D, industrialization of technology achievements, new drug licensing, patent application, trademark registration, and technology trading.
- Foster closer cooperation and communications with the multinational bio-pharmaceutical firms, investment corporations, and industry and research organizations.

With the significant advancements in many key areas of basic and applied biotechnology made in the last decade and Shanghai’s well-known drug manufacturing technology, we can confidently predict that Shanghai’s biotech industry will continue its substantial and rapid growth it has enjoyed in the last decade. The future of the biotechnology industry in Shanghai is further ensured by the government’s determination to implement a number of strategic stimulatory measures, including more R&D input and infrastructural support, more proactive policy on talent recruitment, and a favorable and comprehensive support system for technology transfer and start-ups, and the city’s international reputation for its openness and its excellent investment atmosphere.

In the coming years, Shanghai will continue to open her arms and heart to those with the drive and talent to excel. It will provide a level playing field for domestic and international investors alike, working together for a brighter future of biotechnology.