Biotechnology patents

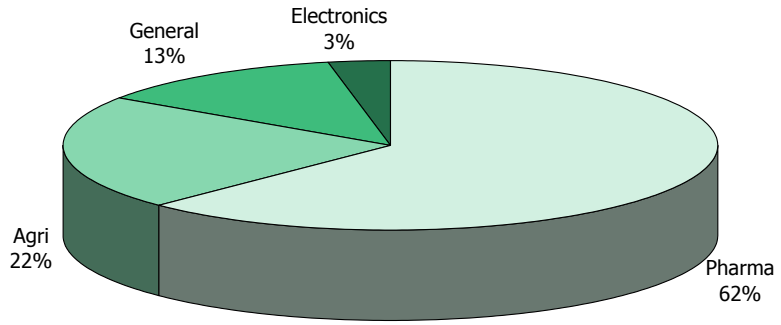
State of development in China **22-Oct-02**

Chinese biotech patents in the US

Patents issued

- 32 US patents have been issued to Chinese organisations. (See appendix for full listing)
- Of these, the vast majority have been for pharmaceutical applications, followed by agricultural.

US biotechnology patents awarded to Chinese inventors, by application area



Source: US Patent and Trademark Office
Note: Total number of patents awarded to date is 32

- Within the bio-pharma area, 20% of US patents awarded to Chinese inventors are related to hepatitis treatment, 15% to each of diabetes and antibiotics, and 10% each to cancer and HIV.
- Surmising that the statistics for HIV, hepatitis and antibiotics are all in fact driven by the need to treat AIDS, we can see that almost half of all US bio-pharmaceutical patents awarded to Chinese companies have been AIDS-related.

Patent applications pending

- There are seven outstanding applications for patents made in 2002. (See appendix for full listing)
- Five of these are in the electronics or bio-chip area; two are disease treatments. None are in the bio-agricultural area.
- This pattern ties in with the rise in electronics and IT related R&D and invention currently under way in China, and shows a marked shift away from the previous dominance of bio-pharmaceutical applications.

Biotech developments in China

General patent trends

- Applications related to electronic data processing took the lead for the first time in 2001, of which 57% were from Chinese organisations and 43% from foreign companies. [State Intellectual Property Office of the People's Republic of China (SIPO)]
- Applications related to compounds for medical, dental, and cosmetic purposes, which had ranked first for the past ten years, slipped to second place. 70% of these were from Chinese organisations. [SIPO]

Pharma industry patent situation

- Patent protection effectively began only with the 1993 revision of China's patent law. [World Markets Research Centre]
- The process of patent registration is slow, taking on average 18 months to two years. Drugs patented before 1994 still do not receive the patent protection they should. [World Markets Research Centre]

Biotechnology background

- Biotherapeutics (mainly drugs created using genetic engineering) and agricultural biotechnology (mainly transgenic animals and plants) are presently most active in the field of modern biotechnology. [SIPO]
- With the publishing of the human genome draft, gene sequencing and the search for functional genes has become a major activity for government and corporations. Treatments for serious diseases such as cardiovascular disease, cancer and AIDS are top priority. [SIPO]
- In the agricultural biotechnology arena, completion of the sequencing of genomes for some important crops is imminent. In the next several years the focal point of the research will be to seek genes which may be used to resist plant disease and pests, and to increase yield and stress resistance. [SIPO]

Biotechnology patents

- China has only 65 drugs with self-owned intellectual property rights, 2.6% of new drugs approved. [China Daily]
- In 2000, two-thirds of new drugs with independent intellectual property rights in China were developed by foreign-funded companies. [China Daily]
- The ratio of foreign to domestic biotechnology patent applications in China was about 4:1 before 1999, but it has rapidly increased to nearly 1:1 in 2002. [1] This suggests that Chinese biotech companies are progressing relatively faster than foreign players in China. [SIPO]
- Due to both low capacity among Chinese biotech companies to develop novel genetic drugs, and lack of funding (relative to major global biotech players), domestic Chinese applications for biotech patents are likely to be mainly in the areas of "improvement or combinatory invention" as opposed to new genes themselves. [SIPO]

Bio-pharmaceutical developments

- A total of 18 bio-pharmaceutical products have been commercialised, including recombinant medicines and vaccines. 30 more are on the stage of clinical trials. [United Nations Commission on Science and Technology for Development]

- 11 gene-engineered drugs and vaccines have been commercialised; 10 more engineered drugs are in the stage of clinical tests. [Hi-Tech Research and Development program of China]
- Human blood substitutes have been put into production. [Hi-Tech Research and Development program of China]
- Gene therapy for human glioblastoma is in the first-phase clinical test. [Hi-Tech Research and Development program of China]
- Priority research includes obtaining new genes related to leukaemia, liver cancer, rhinopharyngocele, stomach cancer, neural diseases, diabetes, hypertension and the determination of the cDNA sequence. [Hi-Tech Research and Development program of China]

Bio-agricultural developments

- 4 novel insect-resistant transgenic cotton species have passed provincial-level examination. [Hi-Tech Research and Development program of China]
- Disease-resistant wheat is cultivated extensively. [Hi-Tech Research and Development program of China]
- 30 applied rice species of photoperiod-sensitive or thermo-sensitive have been put into commercial applications. [Hi-Tech Research and Development program of China]
- 20 species of high yielding, superior-quality, pest-resistant hybrid rice have been put into commercial applications. [Hi-Tech Research and Development program of China]
- By 2000, China had genetically modified 141 agricultural plants, with 45 approved for field trials and 31 for commercial use. [Hi-Tech Research and Development program of China]
- Genetically-modified plants are grown on 700,000 hectares of land, ranking China fourth in the world. [CEInet]

Appendix: Listing of patents

US patents issued to Chinese inventors

Patent no.	Description
6428818	Tea catechin formulations and processes for making same
6410265	Gene encoding a putive efflux protein for solvents/antibiotics in Pseudomonas mendocina
6403367	Integrated portable biological detection system
6355491	Individually addressable micro-electromagnetic unit array chips
6338849	Process of preparing immunoglobulin for intravenous injection by viruses double-sterilized without adding any protectant
6331565	Dicaffeoylquinic acid for treating hepatitis B and the diseases associated with retrovirus, and the new caffeoylquinic acid derivatives
6320098	Cytoplasmic-genetic male sterile soybean and method for producing hybrid soybean
6313170	L-threonate ferrous, as well as pharmaceutical composition and use for improving and treating human anemia thereof
6303302	Regulation of fungal gene expression
6294380	Liver cell clones for use in extracorporeal liver-assist device
6288033	Treatment of hepatitis B infection with thymosin alpha 1 in combination with lamivudine or in combination with lamivudine and famciclovir
6277258	Device and method for focusing solutes in an electric field gradient
6267992	Treatment of diabetic nephropathy and microalbuminuria
6235882	Gene encoding a putative efflux protein for solvents/antibiotics in pseudomonas mendocina
6225089	Gene encoding a putative efflux protein for solvents/antibiotics in pseudomonas mendocina

6197755	Compositions and methods for delivery of genetic material
6184437	Lysine rich protein from winged bean
6149915	Treatment of diabetic nephropathy and microalbuminuria
6140043	Pharmaceutical compositions for competitively inhibiting the binding of a retrovirus to the IFN-receptor and means for diagnosis of an HIV infection
6080582	Cell tests for Alzheimer's disease
5962428	Compositions and methods for delivery of genetic material
5955646	Chimeric regulatory regions and gene cassettes for expression of genes in plants
5846735	Hepatitis C virus Fc-binding function
5770788	Inducing chromosome doubling in anther culture in maize
5739118	Compositions and methods for delivery of genetic material
5585373	3-(7'-oxo-1'-aza-4'-oxabicyclo[3.2.0]-hept-3'-YL) propionic acid derivative as antitumor agent
5519010	Sulfated polysaccharide, pharmaceutically acceptable salt thereof, process for preparing same and medicament containing same as effective component
5459061	Hybridomas producing monoclonal antibodies which specifically bind to continuous epitope on the human EGF receptor and compete with EGF for binding to the EGF receptor
5312801	Somatic embryogenesis and plant regeneration of cacao
5260189	Synthetic HIV-like peptides their compositions and uses
5054831	Piercing element gripping apparatus
4935359	Fermentation process

Source: US Patent and Trademark Office

Pending US patent applications from Chinese inventors

Application no.	Description
20020151584	Antiviral compositions and methods of use
20020137059	Microdevice containing photorecognizable coding patterns and methods of using and producing the same thereof
20020123134	Active and biocompatible platforms prepared by polymerization of surface coating films
20020076825	Integrated biochip system for sample preparation and analysis
20020048765	Integrated microarray devices
20020025347	Treatment of diabetic nephropathy and microalbuminuria
20020022276	Individually addressable micro-electromagnetic unit array chips

Source: US Patent and Trademark Office
Note: 2002 applications only

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