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# JPRS Report

# Science & Technology

## China

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## CHINA

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### Problems in the Development of High-Technology Industries

*90CF0230a Beijing ZHONGGUO KEJI LUNTAN [FORUM ON SCIENCE AND TECHNOLOGY IN CHINA] in Chinese No 6, 18 Nov 89 pp 2-6, 14*

[Article by Li Xu'e [2621 4872 6754]: "Some Problems in the Development of China's High-Technology Industry"]

[Text] Based on the party's request at its 13th congress that "attention be paid to developing emerging high-technology industries," and in accordance with the relevant dispositions made by the State Council, during the second half of last year [1988] the State Science and Technology Commission began to implement the Torch Plan, which aims at promoting the establishment and development of high-technology and new-technology industries. The Torch Plan is an important component of China's development in high technology and new technology, and the organizational measures involved in it are sure to promote the readjustment of China's industrial structure and the development of the national economy. Below we present some opinions on certain problems in the development of China's high-technology and new-technology industries and on the implementation of the Torch Plan.

1. Since the 1970's, the vigorous development of such areas as electronics, information, biology, new materials and new energy sources has given rise to such new industries as integrated electromechanical devices [i.e., "mechatronics"], optoelectronics, office automation, medical electronics, new energy sources, new materials and modern biological products. These emerging industries, based on high technology and new technology, are more technology-intensive and funds- intensive than traditional industries and their products have a greater added value. The development of these emerging industries has promoted the modernization of the traditional industries, has brought about their structural improvement, produced changes in employment and in operations management, and has intensified international market competition. As a result, certain developed countries and even certain developing nations and areas have rushed to be first in these fields, so that the competition in high-technology and new-technology industries has become a current trend of world economic development.

The current international economic situation, and particularly the economic environment of the Asian-Pacific region, indicates that the developed countries and certain emerging industrialized countries and areas are readjusting their industrial structure in order to increase their economic strength and international competitiveness and are shifting the traditional industries to the developing countries in order to gather their strength for an acceleration of their externally oriented economies and their high-technology and new technology industries. In the new international economic situation, China can benefit from the developed countries' adjustment of their industrial structure by developing externally oriented labor-intensive industries. But although in labor-intensive industries China has the advantage of cheap labor, we lack clear advantages in such other factors critical to product competitiveness as product quality, modern management, and after-sale service, the added value produced by these industries is small, and the competition among the undeveloped countries is fierce. Consequently, faced with the danger that the economic power gap between China and the developed countries and emerging industrialized countries and regions may widen, in addition to vigorously developing externally oriented labor-intensive industries, we must also act in accordance with the dispositions of the party Central Committee by energetically improving the quality and grade of labor-intensive products and vigorously developing high- and new technology industries, and we must seize the opportunity to guide our industrial structure to highest levels in order to improve China's capabilities and position in future international competition. This is a glorious and arduous task conferred on us by history.

China has the main prerequisites for vigorously developing high- technology and new technology industries. As a result of 40 years' construction, we have taken the first steps in establishing an industrial system that has a full complement of sectors and whose organization is becoming increasingly rational. In addition, China has scientific and technological manpower that is the envy of many developing countries, with experience of the arduous founding period, with a bold innovation spirit and rich practical experience, and with technological capabilities representing the world state of the art in certain fields and in certain projects. China has abundant technological results and product development capabilities, as well as good foundations in certain high-technology fields, some of which have begun to develop into industries. China has pursued a policy of externally oriented development and has vigorously promoted foreign trade, the utilization of foreign capital, and technology importation, which has created a good environment for joint efforts by the science and technology sphere and the industry, trade and finance spheres to open up new industries and has promoted the development of an externally oriented economy. The reform of the economic system and the science and technology system has evoked even greater motivation and creativity on the part of scientific and technical personnel and has liberated productive forces, providing favorable conditions for China's development of high technology and new technology.

2. The vigorous development of high-technology and new-technology industries is a necessary step and is a further reason why we should get an early start in investigating questions of development strategy. I shall present three ideas in connection with development strategy.

The first deals with selection of the focal points of development.

China has been conducting research in high technology and new technology for several decades. As basic research and applied basic research, it necessarily covers a somewhat broader area and accumulates a considerable backlog of results. But the development of industries is different: it requires large investments, and as a consequence there is a need for central focuses and for systematic organization. Which of the new industries that are developing rapidly abroad, such as microelectronics technology, communications technology, new materials, new energy sources and the like, should be the focus in China and which should be secondary areas of development? Some say that microelectronics and communications technology is the most important, pointing out that in the last 20 years these technologies have permeated every branch of industry and are developing rapidly, with high output value and rapid innovation, and have brought about a veritable revolution. Others say that bioengineering is the most important and that it will open up an entire new world. These new technologies and new industries are indeed important. But for a developing country like China, the focus should be on technologies and production activitiesthat can develop as industries and can solve pressing problems in the development of other sectors of the economy. The question of what the country needs most and what will most readily obtain support from all sides is a problem of both strategy and tactics.

The new technologies and emerging industries that have these characteristics and functions are: new energy sources, new materials, communications, and bioengineering. The energy and transport industries are bottlenecks in the economy's development. The application and industrialization of new energy sources, energy-saving technologies, and communications technology and the use of new technology to modernize traditional industries in these fields are the things that China should now focus on developing. China's development of new materials was brought about by the development of the military industrial departments. We are not so far behind the rest of the world in this field as in the communications industry: it is a field in which we are at an advantage. The vigorous international development of bioengineering technology has come relatively late, and China has an excellent foundation in this field as well; in addition, its development requires relatively small investments and it has applications in a wide variety of industries. For a country with a population of 1.1 billion, the use of bioengineering technology to solve problems of food and medical care would be splendid. In summary, new energy sources, new materials, communications technology and bioengineering are industries that the country urgently needs to develop, in which it has a solid foundation, and which require small investments but produce large benefits; they thus are the industries that China should focus on developing.

The second question is that of a quick return versus long-term calculations.

The choice of key areas solves only the problem of the lateral strategy, i.e., the choice between fields. But what should be China's vertical strategy, i.e., in terms of the connection between basic research, applied research and development research? Aiming at a quick return and putting the main effort into development research while neglecting basic research is of course unacceptable. but in the development of industries, China has tended to gravitate toward products that involve clear objectives and that would offer quick results. Japan during the 1960's and 1970's adopted a policy of taking what was available; then, after short-term benefits had materialized and funds accumulation had reached a certain level, it began to focus on long-term development. Experience with this type of approach to the development of industry is worth considering.

The third question is self-reliance versus importation of technology.

We have experience with self-reliance, vigorous cooperation, and the development of national-defense high technology, which are grounds for self-congratulation. Without a basis in self-reliance, the effective assimilation of imported technology is impossible and there cannot be any true high-technology industry. Some point out that the coastal regions have imported many high-technology industries; but in my view, these are only "high-benefit" industries, because the technology is all embodied in the equipment, and all that is left for the workers to do is operate it; the only advantage is that the benefits are slightly greater than in ordinary labor-intensive industries. In an environment of opening up to the outside world, the importation and assimilation of other countries' advanced technology and equipment is a key move in developing China's high-technology industries.

3. Which should China rely on when developing high-technology and new- technology industries: the main force, or fresh troops?

First, we must rely on the capabilities of existing large and medium- sized enterprises. Construction and accumulation based on several decades of state investment have given these enterprises a solid foundation. They comprise the country's main productive factors and are the mainstay of China's foreign-exchange-earning exports and the main source of tax revenues. In addition, as the economic system is reformed and as the operations contracting system is promoted, their operations systems are being improved, and it is quite possible that while developing and modernizing the traditional types of production, they may also function as the main force in developing high-technology industries. For example, Shanghai decided to organize a systematic plan involving 14 key industry projects with the aim of forming several path- breaking emerging industries over a 3- to 5-year period and establishing several large enterprise groups with international influence in order to produce well-known, fast-selling commodities that would be competitive on international markets. This policy was based on Shanghai's advantages not only in science and technology, but above all in its numerous large and middle-sized enterprises. Another example includes the emergence of the Xiongmao ["Panda"]

Electronics Group, comprising 126 units in 19 provinces and municipalities, with the Nanjing Radio Plant as its nucleus, and the Wanbao Electrical Equipment Group, centered on the Wanbao Electrical Equipment Industrial Company and the Guangzhou Municipal Appliance Company. The latter group now has 20 enterprises and several banks as stockholders. Both of these organizations are indicative of the excellent prospects for relying on domestic markets to produce significant economies of scale and well-known products and ultimately to move onto world markets. Some academies and bases of the military industrial departments are themselves high-technology industry groups, and some have immense capabilities for developing high-technology products, so that they are naturally a mainstay of China's development of high-technology industries.

Second, we must place our hopes in China's science and technology sphere. The central ministries and commissions have more than a thousand research institutes, with 300,000 scientific and technical personnel, and these, together with the advanced schools of science and engineering and the province and municipality research organizations, make up a vast contingent. All that is needed is to create certain conditions and to let them go to work, either developing high-technology products or starting science and technology enterprises and joining together with large and medium-sized enterprises and rural enterprises: they will then be able to become a significant new force in developing high-technology and new-technology industries and will have a major guiding and disseminating role.

In recent years, as high-technology and new-technology industries have expanded, China's privately run science and technology industries have developed to a considerable degree. There are already more than 11,000 organizations of this type, employing more than 300,000 persons, including well over 100,000 scientific and technical personnel. The privately run scientific and technological organizations find their own funding, take charge of their own operations, and take the responsibility for profit and loss; they have flexible organization, are skilled in management and administration, and have become a force to be reckoned with in China's development of high-technology and new- technology industries. They will continue to make a contribution to the establishment and development of high-technology and new-technology industries in China.

4. The Torch Plan, whose implementation was begun last year [1988] by the State Science and Technology Commission, is an important componentof the overall plan for promoting China's high-technology and new- technology development. The purposes of the Torch Plan are as follows.

First, it relies primarily on the science and technology sphere, making thorough use of its strong points to develop high-technology products and create scientific and technological (i.e., high-technology) enterprises oriented toward both internal and external markets that will help to promote the economic development of the coastal region. In addition, to implement the Torch Plan, it is also necessary to organize the scientific sphere and to coordinate it with the main force, so that it will develop high-technology products for large and medium-sized enterprises and will furnish technological support and accessory products.

Second, in implementing the Torch Plan, developing high-technology and new-technology industries and pursuing increasingly thorough reform of the science and technology system must be organically integrated with promoting the reorientation and restructuring of the major academies and institutes. In other words, the Torch Plan is intended to make the major academies and institutes provide loans to developing plants and enterprise groups. This type of function cannot be evaluated in terms of the direct output value of the Torch Plan projects. As a result, the Torch Plan is not simply a technological or economic plan: it is also a spot-experiment plan for promoting reform and opening up.

Third, the Torch Plan builds bridges and paves the way for the development of commodities from the intermediate and final results of national high-technology research and development plans, national and local scientific and technical key-product breakthrough plans, innovation on imported technology, and inventions and patents and helps to unearth China's untapped potential created by many years' investment and to convert it to immense productive capacities and real wealth. In addition, the Torch Plan must bring about integration with traditional industries; this will make its advance broader and more extensive, so that the benefits that it produces will by no means be confined to its own direct output value. This is the disseminating or guiding effect of the Torch Plan. The Torch Plan not only can make high technology radiate outward, but also can lead traditional industries forward.

Fourth, the Torch Plan can be integrated with the modernization of money-losing or low-benefit enterprises. In other words, when the major academies and institutes develop their own industries, they must incorporate the money-losing or low-benefit industries in various ways. Integrating the high-technology results of the academies and institutes with the production factors of the older enterprises will generate new productive forces that will enable the older enterprises to display new vitality.

Fifth, the Torch Plan must be integrated with technology importation and assimilation. This point is particularly important in the coastal regions, which must use the implementation of the Torch Plan to alter the current problem of production of low-grade goods.

Sixth, the Torch Plan should provide guidance and support to scientific and technical personnel and research organizations eager to operate high-technology enterprises and should nurture an abundance of superior enterprises and highly capable people who understand high technology and are capable of management and operations, so that they can meet the needs of externally oriented economic development. It is particularly important to train a younger generation of successors for the high- technology industries.

The Torch Plan's objectives for the next few years are as follows.

1. Nurture and set up 1,000 to 2,000 high-technology and new-technology enterprises and promote their integration with large and medium-sized enterprises and rural enterprises.

2. Develop about 2,000 high- and new-technology products, with more than 70 percent going into production of significant scale, and with more than 30 percent used to earn foreign exchange.

3. Establish several science and technology enterprise-startup service centers in the coastal opening-up regions and in major cities of the interior to provide comprehensive services for the creation of high- technology and new-technology enterprises and to support their first steps and further development.

4. Involve 100,000 scientific and technological personnel in the Torch Plan, working to develop high- and new-technology products and create high- and new-technology enterprises.

5. Train 20,000 management, administration and international marketing personnel for high-technology and new-technology enterprises.

6. Operate effectively the high-technology and new-technology industry experimental development zones already authorized by the State Council in Beijing and elsewhere: on this basis, the coastal opening-up zones and major cities of the interior with high concentrations of skilled personnel can then establish their own experimental zones as their conditions permit and can create an environment that supports the maturation of high-technology and new-technology industries.

7. Establish Torch Plan high-technology industry development centers. Strive to raise 300 to 500 million yuan to fund the development of high- and new-technology products.

For more than a year, the Torch Plan has received approval and support from department heads at all levels throughout the country and from scientific, enterprise and financial circles. The provinces, municipalities and departments have submitted 1500 Torch Plan projects. In 1988, following evaluations, the State Science and Technology Commission's Torch Plan Office designated 30 national-level Torch Plan projects. This year, in order to strengthen its management of the projects, the State Science and Technology Commission established a Torch Plan high-technology industry development center, organized experts to evaluate 1500 projects, and designated 234 national-level Torch Plan projects for 1989. For the 2 years, a total of 272 projects were designated as the first group of State Science and Technology Commission Torch Plan projects.

This first group of projects was limited to five major fields, namely, new materials, bioengineering, electronics and information science, integrated electromechanical devices, and new energy sources and high-efficiency and energy-conserving technologies. Their technological results have matured, they are ready for large- or small-batch production, they have good market potential and offer good economic benefits, and some of them can be exported to earn foreign exchange, while others can save foreign exchange by replacing imports. About one- fifth of these projects have gone into production, and their profitability rate is above 25 percent. They are suited to economies of scale, and when the projects are completed the annual increase in output value will be about 5 million yuan. It is predicted that the implementation of these projects and of the local Torch Plan projects will have a major influence on the percentage of high-technology and new-technology industries in the national economy and will furtherimprove China's production structure.

5. In the course of China's development of high technology and new technology, and particularly during the implementation of the Torch Plan, the problem of orientation must be studied continuously. Below we present some opinions regarding current problems that are causing concern.

a. The position of the Torch Plan. This is a major problem that was investigated before the Torch Plan was unveiled. What is the relationship of the Torch Plan to several existing major state plans? We believe that the mainstay of the development of high-technology and new-technology industries is the large and medium-sized enterprises and that the scientific and technological sphere represents fresh forces. The focus of the Torch Plan is on supporting fresh forces. As a result, in national terms, the Torch Plan is not necessarily the main component of the high-technology and new-technology industry plan. But this principle varies from place to place and does not apply everywhere. In some places, although the Torch Plan is important, it actually is not the greatest part of the high-technology and new-technology industry. In Shanghai, for example, the Torch Plan covers only a small part of the high-technology and new-technology industries. This is because Shanghai's science and technology and its industry are highly developed. But in certain localities, such as Guilin and Changsha, the Torch Plan may be the main component of the high-technology and new-technology industries.

b. The focus of the Torch Plan is on supporting the academies, institutes and schools in developing high-technology and new-technology products and establishing high- and new-technology enterprises, but it varies from place to place and should not be limited to this function. In supporting advanced schools, research academies and institutes, it is particularly important that the local science and technology committees of the localities not change their attitude toward the centrally subordinate academies, institutes and schools; they should not exclude these organizations, but should continue lending to them. The Torch Plan is intentionally implemented through the localities and not through the departments, because the intent is to compel the local science and technology committees to get involved with the academies, schools and research institutes of the central system. Development of local Torch Plans that are divorced from the major academies and institutes should not be practiced on a large scale.

c. Selection of models in the development zones. Each development zone has its own characteristic development model. For example, the impetus for Beijing's development zone essentially came from privately run science and technology enterprises. Subsequently, many major academies and institutes started science and technology organizations; thus, the development zones now are basically centered on the scientific world. The case of the Shanghai development zone is quite different. As a part of Shanghai's economic and technological development zone, it has three main components: the first is the "three-capital" enterprises that are engaged in high technology; the second is high-technology enterprises run by the enterprise sphere; and the third is the future scientific and technical enterprises to be run by the science and technology sphere. The Shanghai development zone is characterized by dispersed operations and centralized management. Thus it is evident that the models differ from one place to the next. At present the most important thing is to develop the zones in accordance with local conditions, advantages and financial capabilities: artificial uniformity should not be imposed.

d. Topic selection. Because the industries developed by the Torch Plan are high- and new-technology industries, topic selection should focusstrictly on technologies that are new or high or both. This is a matter to which attention should be given when selecting topics and in operating high- and new-technology enterprises. As regards the selection of topic fields, we emphasize five, but each locality should proceed in terms of its own advantages: there should be no attempt to place equal emphasis on all five categories and to try to do everything. Effort should be concentrated and there should be a main emphasis.

e. The problem of "imminent-production" projects and "not-yet-in- production" projects. The ultimate development focus of the Torch Plan should be "not-yet-in-production" projects, extending them into significant economies of scale. This involves the problem of venture capital. What is the venture capital mechanism? There are two aspects: the first is that the object of investment is "not-yet-in-production" projects or, in the customary phase, the process of transferring prototypes from the laboratory to the plant. These "not-yet-in-production" projects must be evaluated as being able to produce vigorous progeny. Originally there was no system for making investment decisions in this area: investments through the laboratory prototype stage were allocated by the state, and once a plant had its first production, the funds could be borrowed, but in the period between these stages investors could not be found. This middle stage is consequently the focus of Torch Plan support. The investments in this stage are called venture investments. The second aspect is the continuing investment system: in other words, a venture investment may succeed or fail, but the investments in projects that fail are compensated by continuing investments in the ones that succeed. Thus, venture investment should not be considered just in terms of a single project, but in terms of a group of 10 projects. In addition, the process should not be considered solely in terms of a single stage: the venture investment stage and the subsequent "insurance" investment stage should be considered together. This requires not only that the venture investor invest during the venture stage, but that he guarantee a continuation of investment during the insurance stage: this is why it is called the continuing investment system. We are preparing to establish preparatory Torch Plan projects. This year we will start by paying out several tens of millions of yuan; we will find localities where such projects can run on an experimental basis by one or two companies under the science and technology committee. We hope that all the localities will engage in trial implementation of local-level preparatory Torch Plan projects in this spirit. If they do not engage in preparatory projects, regular Torch Plan projects will gradually run out, or at least they will no longer be high-technology projects and high-benefit projects, and their Torch Plan characteristics will have been lost. Therefore, we should of course engage in projects that will produce benefits immediately, but the ultimate objective of the Torch Plan is to engage in preparatory projects, i.e., "not-yet-in-production" projects. The venture investment mechanism will be used.

Implementing the Torch Plan and developing high-technology and new- technology industries is an entirely new task that history has bestowed upon us. We must be able to light the torch of high technology and new technology, raise it high and draw the entire country to it.

## Overall Goals, Detailed Organizational Structure

*90CF0230b Beijing ZHONGGUO KEJI LUNTAN [FORUM ON SCIENCE AND TECHNOLOGY IN CHINA] in Chinese No 6, 18 Nov 89 pp 7-10*

[Article: "A Guide to the Torch Plan"]

[Text]

### 1. General Objectives

The Torch Plan, a guidance plan for developing China's high-technology and new-technology industries, has the following general objectives.

a. Creating a social environment that favors the rapid development of high-technology and new-technology industries. We must make reform more thorough, boldly conduct spot experiments in reform and opening to the outside world, establish supplementary policies and regulations, open up a variety of channels for raising funds, establish many types of support and service systems, promote the pioneering, nuts-and-bolts, go-getting entrepreneurial spirit, and shape public opinion.

b. We must get research academies and institutes, advanced academies and schools, involved in opening hundreds of science and technology enterprises of various types every year and induce them to set up a variety of horizontal ties with large and medium-sized enterprises and rural enterprises. We must make thorough use of the existing foundations and conditions to form a large group of high-technology and new-technology enterprises. In addition, we must encourage and promote the transfer of personnel and technology and see to it that results in high technology and new technology are used on a large scale in traditional industries in order to raise the technological level of the traditional industries and expand their ability to earn foreign exchange.

c. Taking as our point of departure the research results of state science and technology development plans, national and local science and technology breakthrough efforts, industry research and development activities, key basic applications research, and assimilation of and innovation on new technology together with inventions and patents, every year we must bring forth hundreds of high-technology and new-technology products and get them onto international markets or have them replace imported products.

d. While implementing the Torch Plan, we must nurture and train numerous superior scientific and technological entrepreneurs and highly capable personnel who understand technology, are good managers, have operational skills and are well versed in international trade, in order to meet the needs of an extremely oriented economy.

**2. Program and Policy**

The program and policy of the Torch Plan are as follows.

a. Orientation to domestic and foreign markets, treating products as the consistent focus, reliance on high technology and new technology, with significant economies of scale as the objective; continuous improvement of product competitiveness; and major increases both in the percentage of high-technology and new-technology enterprises in the overall industrial structure and in the contribution of their output value to gross national product by the end of the century or the beginning of the next century. The export of these industries' products should achieve a market share equivalent to that of comparable products of the moderately developed countries in the early 1980's.

b. Selection of the most promising fields for development. Microelectronics and computers, information and communications, bioengineering, new materials, integrated electromechanical devices, lasers, and new energy sources and high-efficiency, energy-conserving technologies are the main areas of development.

c. Establishment of appropriate operations systems for commodity production and market competition, so that these industries can make their own policy decisions and engage in flexible operations, with distribution tied to benefits, encouraging people to make the fullest use of their abilities; implementation of two-way selection and provision for Chinese-foreign joint ventures and joint operations.

d. Joint development and comprehensive technology-industry-trade integration. Research units and advanced academies and schools must attach due importance to establishing science and technology-style enterprises but also must accord due importance to forming integrated high-technology and new-technology organizations with large and medium- sized enterprises and rural enterprises of various kinds and at various levels.

e. Development of a variety of fund-raising channels, including government guidance funds, finance organization credit funds, stocks, bonds and the like. Banks are requested to establish special science and technology loan categories, to arrange appropriate sustained funding levels and to offer preferential conditions. In areas where conditions permit, science and technology investment organizations may be established and the attracting of foreign capital may be encouraged.

f. Newly created high-technology and new-technology enterprises may be under universal popular ownership or collective ownership or privately operated; they may also be Chinese-foreign joint capital or cooperative enterprises or solely-foreign-owned enterprises. The principal operations personnel and the main scientific and technological contingent of the enterprise may invest in them through science and technology shares, and joint stock operations are permitted.

g. High-technology and new-technology enterprises are encouraged to recruit all types of personnel that are needed, including returned foreign students and foreign-born experts, and may engage them to provide services from abroad for domestic high-technology and new-technology enterprises. The procedures for recruiting all types of personnel and the procedures for relevant personnel involved in science and technology management activities to leave the country are simplified, and the rights of review are transferred downward to the lower levels.

h. Experimental new-technology industry development zones approved by the State Council may practice various preferential policies in accordance with the methods adopted by Beijing for the Zhongguancun experimental development zone. Development zones approved by local governments may engage in locally designated preferential policies within the limits of their jurisdiction. In the case of organizations that do not enjoy the relevant preferential policies of experimental new-technology industry development zones, the high-technology and new- technology products that they produce may be selected on a competitive basis for tax decreases or exemptions.

### 3. Targets

The 3-year targets (1988-1990) for the Torch Plan are as follows.

a. Nurture and establish about 2,000 high-technology and new-technology enterprises and encourage them to integrate with large and medium-sized enterprises and rural enterprises.

b. Develop about 2,000 high-technology and new-technology products, with more than 70 percent going into large-scale production and with more than 30 percent earning foreign exchange.

c. Establish about 30 science and technology enterprise-startup service centers in coastal opening-up zones and central cities of the interior in order to provide comprehensive services for the creation of high- technology and new-technology enterprises.

d. Effectively run the key high-technology and new-technology development zones in Beijing and elsewhere approved by the State Council: on this basis, coastal opening-up zones and major cities of the interior with concentrations of capable personnel can establish their own experimental zones suited to their own conditions in order to create an appropriate environment for supporting the maturation of high technologies and new technologies and the relevant industries.

e. Involve more than 100,000 scientific and technical personnel in the Torch Plan, develop high-technology and new-technology products, and set up high-technology and new-technology enterprises.

f. Train about 20,000 operations and management personnel and persons who will be active on international markets for the high-technology enterprises.

g. In order to develop high-technology and new-technology products, strive to annually raise at least several hundred million yuan in funds, primarily project loans from banks.

### 4. Measures

In order to promote the organizational implementation of the Torch Plan, the following types of work must be done effectively.

a. Drafting development programs

Devote attention to correct handling of the relationships between current and long-term, focal and general, research and development, and imported technology and domestic science and technology breakthrough efforts; clarify the development statuses of the industries in the various fields and make long-term evaluations; investigate the translation of high technology into commerce and the mechanisms of transfer of high technology within high-technology research, and investigate paths of entry to international markets; and make suggestions regarding the main development orientations, funding allocations, organizational management and policy measures for China's high-technology industry as related to their influence on China's economic and social development. In the new situation of reform, opening up and invigoration, the high-technology and new-technology industry plans of the various localities must be consistent with the new operating mechanism, conducive to the development of an externally oriented economy, and suited to the actual local conditions, and must emphasize the key points and define limited objectives.

b. Create an excellent policy environment and support and services system

In order to benefit the implementation of Torch Plan organizational measures, the State Science and Technology Commission, the other ministries and commissions, the regions and the central cities all must define their respective policies on an ongoing basis. The objective is to create a social environment that supports the development of high- technology and new-technology industries. But care must be taken not to entrust the development of high-technology and new-technology industries exclusively to "preferential" policies. An even greater effort must be made to modernize ideas, to increase operating effectiveness, to improve service facilities, to create a "soft environment" suitable to the development of high-technology and new-technology industries, and to establish a support system that includes information, funding, finance and accounting, sales, legislative matters, consultation and training. An effort should be made to achieve results within 2 to 3 years.

c. Establish science and technology startup service centers

We must focus on learning from the successful experience of the "incubators," or the small science and technology companies in Europe and the United States. In addition, we must draw on the preliminary practical experience of various localities of China, such as the Donghu zone in Wuhan, and set up trial service organizations of this type in coastal cities and large and medium-sized cities of the interior that are in a position to do so; and we must use program and policy guidance to provide comprehensive services, to help in obtaining funding, to support the first steps of science and technology enterprises, to support the startup of enterprises by science and technology organizations, advanced academies and schools, and scientific and technological personnel, and to support the formation of significant economies of scale and aid the entry of high-technology and new- technology products onto the market. The startup service centers may be the organizations that exercise enterprise management, or they may be enterprises; they may be newly established or may be created out of existing similar organizations such as technology consulting service companies by reorganizing them and supplementing their functions. Universities and research academies and institutes that are in a position to do so should also make active use of their own advantages and put these centers into vigorous operation.

d. Establish high-technology and new-technology industry development zones

Experience indicates that establishing experimental development zones is helpful in promoting the integration of industry, research, and teaching, in accelerating the development of high-technology and new- technology enterprises, and in stimulating the remaking of traditional industries and promoting local economic prosperity. As a consequence, the state is vigorously pursuing spot-experiment activities in several experimental zones, such as the Zhongguancun zone in Beijing. Provinces and municipalities that are in a position to do so may also carry on their own spot experiments. The establishment of high-technology and new-technology industry development zones must be based on existing local advantages, rely on the scientific and technological personnel and advanced facilities of existing plants, institutes and advanced academies and schools, and start with high-technology and new-technology projects that have market development potential. In the zones that have already been planned, the progression should be from small to large, and efforts to do everything at once should be avoided.

e. Make vigorous efforts to foster and establish science and technology enterprises and promote the development of high-technology and new-technology products

Science and technology enterprises are new-style enterprises headed by scientists and engineers, with scientific and technical personnel as their mainstay, which make use of the advantages of science and technology for continuous development of new products and improvement of product quality, and which provide superior-quality services and integrate technology, industry and trade. But if enterprises of this type are limited to a small range of activities, it is hard to benefit from their advantages in brainpower. Only if the science and technology enterprises can stimulate the development of many large externally oriented rural enterprises and medium and small-sized enterprises and can integrate science and technology enterprises with such enterprises will they be able to create an atmosphere of vigorous development. The organizational measures of the Torch Plan will provide the organizational guidance and the necessary support for individuals and groups interested in developing high-technology and new-technologyproducts and strengthening the high-technology enterprises.

High-technology products are the spearhead promoting the development of high-technology enterprises, and the suitable choice of products in the initial stage of startup is usually critical to the success or failure of the enterprise. As a result, when developing high-technology products, emphasis should be laid on market surveys, and products with commercial development potential and suited to local conditions should be chosen.

f. Fund raising and rational utilization of funds

High-technology industries can produce high benefits, but they also entail rather large expenditures: they are a high-investment industry. Science and technology enterprises should therefore have a variety of funding channels in order to be able to develop and succeed quickly.

Based on the experience of the Spark Plan, the Torch Plan should also implement the principle of matched funding. The main funding sources are bank loans and investments from various sources, including private funds and foreign capital. The central ministries and commissions and the local governments should also provide a certain amount of funding as guidance funds, and they should offer a variety of types of support, compensated and uncompensated (e.g., appropriations, loans, subsidies, deducted interest, deferred interest, and investments), for different types of activities and projects.

g. Strengthen the training of various types of personnel

The key to developing high-technology and new-technology enterprises is able personnel. A group of new-style entrepreneurs well versed in the international markets, who are simultaneously scientific and technical personnel and entrepreneurs is needed. In a certain sense, enlisting and relying on a strong scientific entrepreneurial cadre of this kind is the main requirement if high-technology products are to be able to enter international markets and maintain their competitiveness. As a consequence, training is an important component of the Torch Plan. The principles of training are: separation of subjects, training geared to needs, training with a practical orientation, and emphasis on real results. The primary persons to be trained are: relevant personnel of the province, municipality and autonomous-region science and technology committees and those in charge of high-technology and new-technology offices in the ministries and commissions; the relevant personnel of experimental industry zones and science and technology startup service centers; and the relevant personnel of high-technology and new- technology management, plant directors, and appropriate operating personnel, along with other scientific and technical personnel prepared to involve themselves with high-technology and new-technology industry. The subject matter of the training includes science and technology enterprise operations and management, policy, regulations, international trade, and international commercial law.

**5. To gain a systematic, concise understanding of the general objectives, basic program, tasks, subject matter, measures and support conditions, and the main aspects of Torch Plan implementation, the reader should consult the table of Torch Plan objectives, system and management reproduced below.**

**[Table] Torch Plan Objectives, System and Management**

A. Overall objectives: To take advantage of scientific and technological advantages, promote the conversion of high-technology and new-technology research into commodities, to promote the development ofhigh-technology and new-technology industries, and to achieve a large increase in the share of high and new-technology industries in all industry and in the contribution of high- and new-technology products to gross national product and to total export value by the end of this century or the beginning of the next.

B. Basic Guidelines

B1. Persist in walking on two legs

1.1. Place hopes in fresh forces

—Scientific research units

—Advanced academies and schools

—Newly created science and technology enterprises

1.2. Rely on the main force

—Large and medium-sized enterprises

—Military-industrial enterprises

—Enterprise groups

1.3. Thoroughly motivate both groups to unite suitably and to stimulate and supplement each other

B2. Persist in opening to the outside world

2.1. Pursue international cooperation and joint-venture operations

2.2. Develop international markets

B3. Persist in converting science and technology results into commodities and industries

3.1 Breakthrough research project results and intermediate results

3.2. Technology importation and assimilation results

3.3. Inventions and patents

B4. Continue painstaking guidance, identify advantages, make breakthroughs in key areas, gradually expand typical avenues of approach

4.1. No precipitate crash programs

4.2. Concentrates on effective development of typical products and typical projects

C. Tasks and Subject Matter: Establish a large group of high- and new-technology enterprises and develop a large group of high- and new- technology products.

C1. Strengthen macroscopic guidance, create an environment favorable to the development of high- and new-technology industries

1.1 Draft guidelines and policies

1.2. Develop funding channels

1.3. Furnish support services

1.4. Pursue market research

1.5. Strive to obtain support from the society

C2. Select optimum fields of development

2.1. Electronics and communications

2.2. New materials

2.3. Integrated electromechanical devices

2.4. Biotechnology

2.5. New energy sources and high-efficiency and energy-conserving technologies

C3. Make reform more thorough, support research units and personnel

3.1. Set up science and technology enterprises that integrate technology, industry and trade

3.2. Gradually form science and technology enterprise groups with competitive capabilities

C4. Effectively operate high- and new-technology development zones

C5. Effectively operate science and technology industry startup service centers

C6. Promote international cooperation and joint-venture operations of all types

C7. Nurture personnel suited to an externally oriented economy

D. Facilities and Supporting Conditions

D1. Organizational management

1.1 Responsibilities of Torch Plan office personnel: guidelines, policies, regulations, environment and oversight

1.2 Responsibilities of Torch Plan high-technology startup service centers: projects, funding, information markets

—Establish high-technology enterprise startup service centers

—Set up high- and new-technology industry development zones

—Nurture and establish high-technology industries

—Effectively run new-technology product development

D2. Training of personnel

2.1. Principles

—Separation of subjects, training geared to needs, teaching oriented to applications, emphasis on real results

2.2. Subjects

—Relevant science and technology committee personnel at all levels

—Personnel of various categories at high- and new-technology enterprises

—Relevant personnel in experimental zones and startup service centers

2.3. Funding

—State Science and Technology Commission assistance

—Local matching

D3. Fund raising

3.1. Multichannel fund raising

—Bank loans

—Assistance from government at various levels

—Investments by relevant companies

—Foreign funding

D4. Policy

4.1. Already drafted

—Provisional Regulations Regarding Conditions and Standards for Recognizing High-Technology and New-Technology Enterprises

—Provisional Measures for Simplifying Procedures for Departure From the Country by Certain Personnel of High- and New-Technology Enterprises

—Decisions Regarding Further Mobilization and Organization of the Science and Technology Sphere for Strategic Service to the Economic Development of the Coastal Region

4.2. Still to be drafted

—Techniques for Reviewing and Managing Applications for Tax Exemption for High- and New-Technology Products

4.3 Local policies and regulations

4.4. Efforts at all levels on the "soft environment" and "suitable climate"

E. Key implementation points for 1988-1990

E1. Nurture and establish 1,000 to 2,000 high- and new-technology enterprises

E2. Develop 2,000 high- and high-technology products

E3. Establish several dozen science and technology industry startup service centers

E4. Involve 100,000 scientific and technical personnel in the Torch Plan

E5. Train 20,000 operations, management and international market personnel

E6. Effectively operate several high- and new-technology development zones

E7. Annually raise 300 to 500 million yuan in funds to support new- product development

## Early Progress in Implementation

*90CF0230c Beijing ZHONGGUO KEJI LUNTAN [FORUM ON SCIENCE AND TECHNOLOGY IN CHINA] in Chinese No 6, 18 Nov 89 pp 11-14*

[Article by Zhang Bingfu [1728 4426 4395] and Tang Juan [0781 3197]:"An Excellent Start in Implementing the Torch Plan"]

[Text] The Torch Plan is a plan promulgated by the State Council in August 1988 and organized and implemented by the State Science and Technology Commission for the purpose of promoting the conversion of China's high-technology and new-technology research results into commodities and promoting the development of high-technology and new- technology industries.

In the past year, with vigorous organizational efforts and promotion by the State Science and Technology Commission and the local governments at all levels, and with the energetic cooperation and support of the relevant departments and commissions and of the banking and taxation departments, the Torch Plan has made an excellent beginning and various types of activities have gotten under way. In accordance with its implementation outline, the following main types of activities have been carried on.

### I. Organization of the Implementation of Torch Plan Projects at the National Level

In accordance with the requirement, stated in the Torch Plan outline, that "in the 3-year period from 1988 to 1990 about 2,000 high-technology and new-technology products must be developed, more than 70 percent of them going into production on a significant scale and at least 30 percent earning foreign exchange," in 1988 the State Science and Technology Commission selected 272 of the more than 1500 Torch Plan projects submitted to it by organizations in all areas and in all departments as preliminary 1988-1989 Torch Plan projects. These projects belong to the five high-technology and new-technology key development fields, i.e., new materials, integrated electromechanical devices, electronics and communications, biotechnology, and new energy sources and high-efficiency and energy-conserving technologies. The standard for selecting these projects was that they be technologically advanced and technologically mature and that the conditions exist for organizing batch production; that they have good market prospects; that they produce high economic benefits, with an expenditure-to-output ratio of about 1:5 and with a profits tax of more than 25 percent; and that the time to get the products into production be short, generally not exceeding 3 years.

In order to implement this group of national-level projects, the State Science and Technology Commission arranged bank loans and in some cases arranged deducted or deferred interest, depending on the characteristics of the project. While implementing the national-level Torch Plan, the regions and departments also organized a set of local Torch Plan projects and borrowed certain amounts of funds to provide support for these projects.

Currently, the State Science and Technology Commission is vigorously opening up domestic and foreign funding channels and is striving to obtain even greater support for the Torch Plan from various spheres of the society.

**II. Establishment of Experimental New-Technology Industry Development Zones and Science and Technology Startup Service Centers as Important Future Bases for Implementing the Torch Plan**

A. Since the State Council approved the Beijing Experimental New- Technology Development Zone in May 1988, the cities of Wuhan, Nanjing, Shanghai, Guangzhou, Shenyang, Xi'an, Lanzhou, Chongqing and Guilin have authorized the establishment of more than 20 new-technology industry development zones in accordance with their own conditions and needs andin keeping with the spirit of the Torch Plan. These development zones can be assigned to four different models:

(1) Designated territory, centralized management, centralized operations: e.g., the Beijing and Shenyang development zones. The characteristics of this model are that it makes thorough use of the existing base and of certain local advantages and takes the approach of integrating technology and marketing, with self-financed development and accumulation, so that a particular atmosphere develops quickly. (2) No designated territory, startup on existing sites, centralized management, dispersed operations: e.g., the Changsha and Harbin development zones. The characteristics of this model are that it is open in all directions, operations are simple and thrifty, and there is no emphasis on designating specific premises, concentrating instead on the projects and the high-technology industries themselves. The initial focus is on accumulating funds, developing markets and obtaining experience, followed by gradual concentration, resulting in the development of small areas with different characteristics. (3) Opening up of new geographic areas, long-term programs, short-term arrangements, unified construction, centralized management, open-type operations, rolling development: e.g., the Nanjing development zone. Its characteristics are that project development and development of the zone proceed simultaneously, so that the development zones are built up tract by tract as the previous ones succeed, achieving rolling development and rapid development into industries. (4) Contained within economic development zones, construction concurrent with that of the economic development zones: e.g., the Shanghai and Qingdao development zones. The characteristics of this model are that it can make use of the superior conditions and social facilities of the earlier economic development zones.

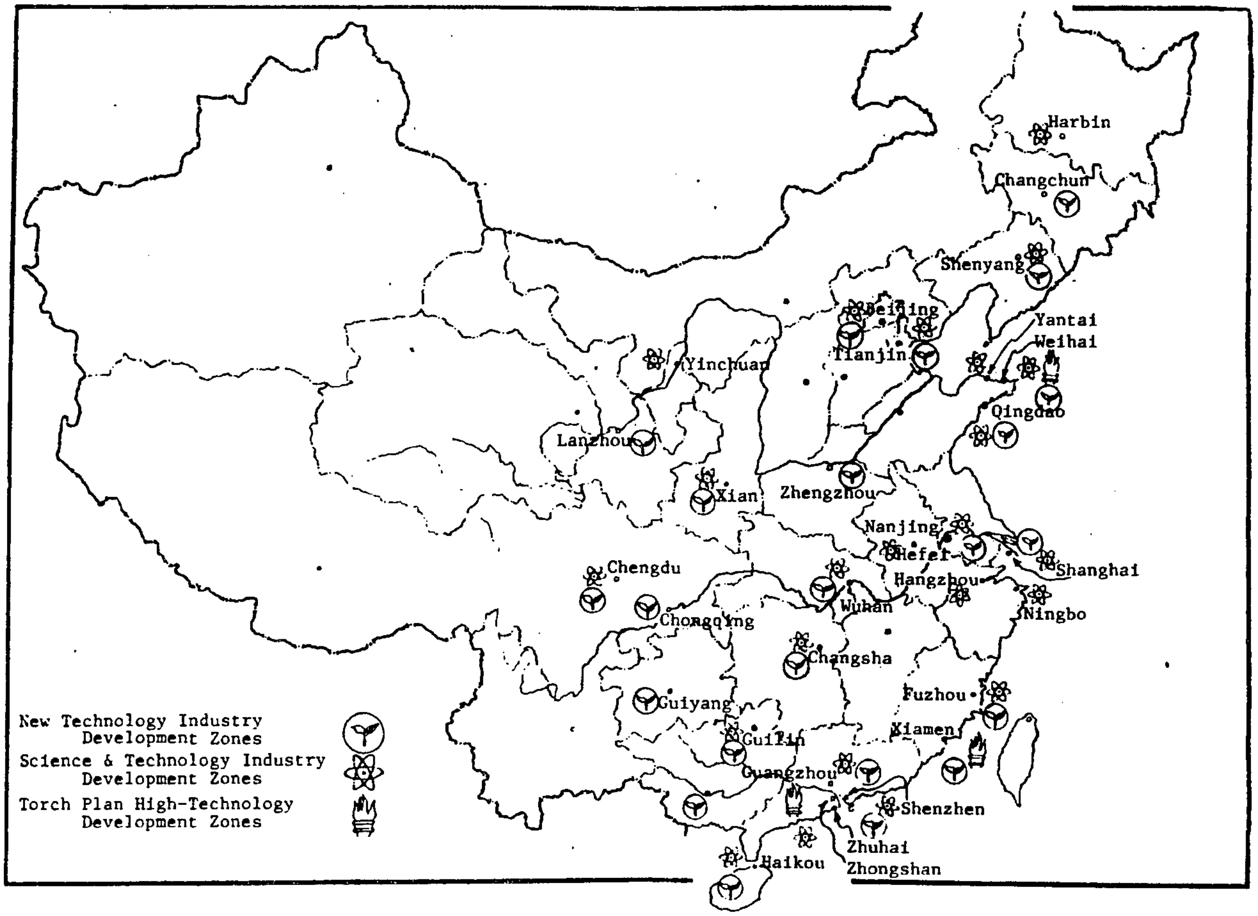
The construction of these new technology development zones follows the general guideline of making use of advantages, project startup proceeding from small scale to large scale, and gradual development, and makes thorough use of existing bases and conditions, so that they develop stably and certain amounts of economic benefits are obtained.

In the case of the Beijing New Technology Development Zone, as of June 1989, the development zone office had already approved more than 790 new-technology enterprises with a personnel of 26,000 and with 70 percent scientific and technical personnel, involving more than 1600 approved high-technology and new-technology products. In 1988 the total earnings in the zone were 1.4 billion yuan, including nearly 470 million yuan in technology earnings, with tax payments of 150 million yuan and earnings of U.S.$13 million in foreign exchange from export. The per- capita profits-tax payment was 4,000 yuan. Thus the Beijing new Technology Development Zone has become the enterprise group with the best economic and technological benefits in Beijing.

The new-technology zones that have already been established not only have generated excellent benefits, but also have done a great deal to promote system reform of the research academies and institutes, advanced academies and schools, and large and medium-sized enterprises. The long-standing problem of the divorcement of science and technology from the economy had never been effectively solved, and the research academies and institutes and advanced schools' scientific and technological results could not be converted rapidly to productive forces. The construction of the new-technology development zones has also provided new ways of promoting science and technology-oriented economic construction. The Chinese Academy of Sciences established 139 new-technology enterprises in the Beijing new-technology industry development zone, and more than 3,000 scientific and technical personnel from the academies and institutes involved themselves in thedevelopment, production and management of new technologies and new- technology products. They broke through the constraints of the old system, carried on investigations in the course of reform, and achieved good results.

B. Establishment of Science and Technology Startup Service Centers

This is a new form in China, based on European and U.S. experience with incubators of small science and technology enterprises, in which science and technology




enterprises are provided with services and are supported in their initial steps, and the science and technology organizations, advanced academies and schools, and scientific and technical personnel are supported in establishing science and technology enterprises and in developing new science and technology products into production on a significant scale and gaining access to markets. Since the Donghu New Science and Technology Startup Services Center was founded in Wuhan, more than 10 provinces and municipalities have established science and technology startup service centers.

Recent experience indicates that the development zones and startup service centers that have been established cover the entire country (see figure) and have become an important base for China's implementation of the Torch Plan.

### III. Nurturing of Capable Advanced Personnel for Implementation of the Torch Plan

The key problem in developing high-technology and new-technology industries and implementing the Torch Plan is that of capable personnel. There is an especial need for a group of new-style scientific and technical entrepreneurs who are thoroughly conversant with international markets. Only with a powerful contingent of this type is it possible to establish and develop China's high-technology and new-technology industries.

Since the Torch Plan started, governments at all levels have accorded due importance to the personnel problem. To train the required personnel, the localities have instituted various types of Torch Plan training classes at various levels, totaling more than 3,000 person- sessions.

In February 1989, the State Science and Technology Commission held the first domestic refresher courses for the management of high-technology and new-technology startup service centers, for which it obtained support from the United Nations science and technology development fund. Experts from the United States, the United Kingdom and other countries were invited to lecture on company-incubator operations and management in the U.S. and Western Europe; they taught classes on organizational management in the screening and nurturing of enterprises, on seed money and venture capital, on the establishment of the "incubator" operations support system and the like. As a result of the training, the attendees not only gained a new understanding of startup service centers and caught sight of new horizons, but also gained a further understanding of universal problems in establishing this new type of organization.

### IV. Diversified Publicity Activities, Efforts To Obtain Support for the Torch Plan From a Variety of Domestic and Foreign Spheres

During implementation of the Torch Plan, in addition to relying ongovernmental organizations at all levels, the State Science and Technology Commission also made use of various channels and methods to introduce the Torch Plan to the financial world, the science and technology world, amalgamated companies, large and medium-sized enterprises and other social spheres.

In May 1989 the State Science and Technology Commission held the first "Torch Cup" high- and new-technology product development evaluation meeting in Beijing, at which high- and new-technology products that have resulted from more than 800 projects during the last 2 years were exhibited to domestic and foreign participants from various spheres and the Torch Plan projects were described.

In July 1989, the State Science and Technology Commission held a news conference at which it announced 272 Torch Plan projects for 1988-1989. After the meeting, nearly 5,000 letters were received from China and abroad, some requesting further information on the Torch Plan and some expressing interest in particular Torch Plan projects or the hope of extensive contacts.

### V. Drafting and Improvement of the Torch Plan Management Systems

Based on the circumstances of Torch Plan implementation, the State Science and Technology Commission is now drafting a variety of management systems, which include: strengthening management structures; drafting Torch Plan key development area outlines and project guides; improving the procedures for submitting Torch Plan project applications and for their evaluation; and an overall program and supporting policies for new-technology development zones and science and technology enterprise startup service centers.

To summarize, in slightly over a year of implementation of the Torch Plan, it has already provided guidance in the development of China's high-technology and new-technology industry. The Torch Plan not only has promoted the conversion of scientific and technical results to commodities and industries, but has also promoted reform of the major academies and institutes and the integration of high- and new-technology industries with traditional industries. We are confident that within 3 to 5 years, the economic benefits created by the Torch Plan will make the Torch Plan contingent a force to be reckoned with in China's economic development.

## Completion of Training Courses

*90CF0230d Beijing ZHONGGUO KEJI LUNTAN [FORUM ON SCIENCE AND TECHNOLOGY IN CHINA] in Chinese No 6, 18 Nov 89 p 16*

[News Briefs]

[Text]

### Second Session of Torch Plan Training Classes Concludes

From 9 to 29 April 1989, the State Science and Technology Commission's Management Academy held the second set of training classes for Torch Plan administrators of province and municipality science and technology committees, and for persons in charge of development zones and startup centers; a total of 42 management personnel from the science and technology committees and development zones of 22 provinces and municipalities participated, including 23 persons (54 percent) from coastal-region development zones and the metropolitan areas of Shanghai, Tianjin, Guangzhou, Wuhan, Dalian, Qingdao, Nanjing and Xiamen.

In keeping with the spirit of Vice-Chairman Li Xu'e's comments on the summary report on last year's Torch Plan training session held by the management institute, and at the request of last year's students, this year's training course offered nine classes in three areas (general overview of the Torch Plan, management of the externally orientedeconomy, and technical and economic analysis of high- and new-technology projects), together with three special-topic seminars (Duan Ruichun [3008 3843 2504] on problems regarding rights to scientific and technical results; Shi Dinghuan's [4258 1353 3883] general overview of the Torch Plan; and Dr Raval of the Indian Academy of Entrepreneur Development on successful enterprise experience and the essence of the entrepreneur). Many students commented favorably, noting that the course work was effectively organized, abundant material was covered, and the special-topic seminars presented information. During the classes, the students also made a visit to the Wuhan startup center.

### Second Session of Classes on Management of High-Technology and New- Technology Industries Concludes

This July and August [1989], at the request of the State Science and Technology Commission, the China Science and Technology Management Training Center in Dalian held a second series of training courses on management of high-technology industries. Chinese instructors lectured for the first 3 weeks and U.S. instructors in the final 5 weeks. The lectures by the Chinese instructors offered preparation for understanding the subsequent presentations by the U.S. instructors, which focused on the development of the high-technology industry, international technology markets, joint-capital enterprises, technology overview and strategy, and international economic methods. The U.S. instructors discussed theory, presented case studies, and led discussions of the case materials. The students were satisfied with the content of the courses, particularly with a small-group simulation of the operation of Chinese-foreign joint-venture companies; they felt that the discussions of ways of solving problems arising in the course of operations were useful.

## First Facility for Genetically Engineered Interferon in Operation

*90CF0124A Changchun JILIN RIBAO in Chinese 19 Oct 89 p 1*

[Article by Xiao Ying [5135 3841]: "Good News from Changchun About the Beginnings of a High-Tech Biological Product: Our Nation's First Gene-Engineering Interferon Base in Operation"]

[Text] 18 Oct—As one of the target areas of industrial research earmarked in the Seventh 5-Year Plan, the nation's first genetically-engineered-interferon base has been established in the Biological Materials Production Institute at the Changchun Health Department. This signifies that China's high-tech biological materials production has progressed to a new level.

Today marks the opening ceremony of the Biological Materials Production Institute at the Changchun Health Department as it goes into production. He Chukang [0149 4554 1660] and Liu Xilin [0491 1585 2651] were among the Provincial and Changchun Municipal leadership who participated in the ribbon-cutting ceremony.

Interferon is a type of anti-virus and anti-tumor agent and immuno-modulator. It is effective against many kinds of viral diseases. However, the amount of natural interferon production is very low, and the price is very high. Since the beginning of the eighties, other countries have adopted gene engineering technology in its industrial production. In 1987, the Biological Materials Production Institute at the Changchun Health Department became the major institute to take on the industrial research of gene-engineered interferon. This institute operates in close cooperation with other units such as the Virology Institute of the Academy of Preventive Medicine. The scientists and technicians worked day and night to establish a central testing site of sound design and advanced artistry. All the goals were reached one year prior to its anticipated completion. The gene-engineered interferon strain produced is stable, of relatively high quantity, and the quality meets the specifications of our nation. The product has become the first high-tech medical product that has received permission to be produced industrially.

The completion of this industrial research helps our nation not only in providing effective antidotes to prevent some common diseases, but also in supplying large amounts of experience in the large-scale production of the high-tech polypeptide medicine. This signifies that our nation has entered the rank of countries that produce gene-engineered polypeptide medicine.

## Zero-Magnetism Space Laboratory Built in Beijing

*90CF0124B Beijing GUANGMING RIBAO in Chinese 29 Sep 89 p 2*

[Article by Jin [6855]: "Nation's First Zero-Magnetism Space Laboratory Built; Will be Open to the Entire Country"]

[Text] China's first zero-magnetism space laboratory that meets advanced standards of the eighties was recently completed in Beijing and is now in operation. This facility was built by researchers from the Geophysical Research Institute of the State Seismological Bureau in collaboration with the Iron and Steel Research Institute of the Ministry of Metallurgical Industry. After 8 years of effort, they successfully produced a very significant piece of scientific research. The completion of this laboratory is not only very important to the observation of geomagnetism as it relates to seismological networks and in simulation tests in geophysics, but it also has broad applications in research areas such as high-energy physics, space physics, medicine, space flight, and biology, especially human biology (such as human idiosyncrasies). Officials from the State Seismological Bureau said that the laboratory will be open to the entire nation to facilitate interdisciplinary research in science.

## Nation's Largest Rice Research Institute Founded in Hangzhou

*90CF0124C Beijing GUANGMING RIBAO in Chinese 10 Oct 89 p 1*

[Article by Ye Hui [0673 6540]: "The Largest Rice Research Institute Since the Founding of This Nation Has Been Established in Hangzhou"]

[Text] Hangzhou, 9 October—The largest agricultural research facility since the founding of the nation—the China Rice Research Institute—was opened today. Vice Premier Tian Jiyun [3944 4764 0061] sent a letter of congratulations on behalf of the State Council. Minister of Agriculture He Kang [0149 1660], Zhejiang Province General Secretary Li Zemin [2621 3419 3046], and Director of the International Rice Institute Dr Lan Pei [5695 1014] cut ribbons during the opening ceremony.

At the opening ceremony, He Kang said the Chinese government puts great emphasis on scientific and technological research on rice. In June 1981, the State Council authorized the establishment of the Rice Research Institute. The institute designed its construction and at the same time conducted research. There have already been some results, and some personnel were also trained.

He said that Chinese rice occupies a very important position in the world. The area under cultivation is second in the world, while the yield is the world's largest, with unit production 65 percent higher than the world's average. China's cultivated land is 7 percent of the world's, and that land feeds 22 percent of the world's population. In the last forty years, grain production in China has made great advances, with the national per capita grain consumption having grown from 97.5 kilograms in 1949 to 367 kilograms in 1988. Of this, rice comprises 43 percent of the total grain production.

Representatives from the United States, Japan, the FRG, Australia, Thailand, the Philippines and South Korea attended today's opening ceremony.

The first director of the China Rice Research Institute, Professor Zhu Zuxiang, described the stages of the development of the institute and thanked representatives of the institute's long-standing benefactors. These included lenders and donors, namely, the World Bank and the UN Development & Planning Administration, as well as organizations that provided various assistance to the institute (the International Rice Research Institute, the UN's FAO, and the Rockefeller Foundation).

Dr. Lan Pei of the International Rice Research Institute presented a plaque to the China Rice Research Institute. He said that the China Rice Research Institute is a milestone in establishing guaranteed grain supplies for the Chinese people. He hopes that the Chinese and the International Rice Research Institute will work collaboratively, and together advance research into and the technology of rice.

During the ceremony, He Kang announced the decision of the Ministry of Agriculture to designate Xiong Zhenmin to be the third chief of the China Rice Research Institute. He also mentioned that the Ministry of Agriculture and the State Science & Technology Commission have decided to establish a China Rice Research Institute Foundation in order to support China's scientific research in rice.

After the opening ceremony there will be a three-day international conference on grain crops. Among the topics discussed will be the feeding of 7 billion people, and the requirements of science and technology in rice research in the year 2000.

## Twenty-Three of 64 Key National Laboratories Established

*90CF0124D Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 12 Sep 89 p 1*

[Article by Jiang Zaizhong; [1203 0961 1813]: "China Establishes 23 National Laboratories; These Laboratories Have Accomplished More Than 200 High-Level Scientific Research Results"]

[Text] Beijing, 11 Sep (XINHUA)—Our nation has invested 430 million yuan to establish 64 key national laboratories. At present 23 are established and open to the outside world. The other laboratories will be open [to the outside world] as they are completed.

The key national laboratories that have been established have already become an important force in advances in science and technology in our nation. More than 200 high-level scientific research results have been obtained in these key national laboratories. For example, the key national Surface-Physics Laboratory at the Chinese Academy of Sciences [CAS] has reached international research standards in the research and preparation of items such as superconducting thin films. The key national Crystal Materials Laboratory at Shandong University has made important gains in the research and exploration of non-linear optical materials, self-[frequency-]multiplying laser crystal materials and other new materials. The key national laboratories have also produced 300 Ph.D.'s and about 2000 with master's degrees. These achievements in basic research have important implications for China's development of high-tech science and applied science.

The State Planning Commission has planned the implementation of the key national research laboratory program since 1984. The aim was to improve our nation's facilities for basic research, to support workers in science and technology, to explore and experience at the forefront of international science and technology, ultimately benefiting our nation's economic development. According to sources, during the Eighth 5-Year Plan, the State Planning Commission will continue to implement the key national research laboratory program, and establish a number of other key national research laboratories.

## PLA Academy of Military Medical Sciences Profiled

*90CF0124E Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 27 Sep 89 p 2*

[Article by Zhang Lei [1728 4320]: "In the Flash of a Finger: The Rapid Advance of the Academy of Military Medical Sciences"]

[Text] In 1951, the Central Military Commission issued a directive establishing an army with medical scientists as its core: the Academy of Military Medical Sciences. At a later date, a foreign military medical delegation visited the academy, and was deeply surprised by a sizable and quality academy of military medical sciences. They were particularly impressed by the foresight of China's military leadership in establishing the Academy of Military Medical Sciences in the first years of the republic.

In 1985, at the National Conference on Science and Technology, a representative of the Academy of Military Medical Sciences, the renowned physiologist Professor Zhu Renbao [2612 1103 5508] proceeded to the podium, and raised the first and only national science and technology special award cup in China's world of medicine!

This served as praise for thirty years of quiet contribution and hard work by several thousands of science and technical workers. It also signaled a deep understanding. The colleagues in the audience listened silently to their little-known stories.

Special weapons, meaning atomic, chemical and biological weapons, are weapons which inflict casualties on a large scale. Their destructive power is many times that of conventional weapons, and the mechanisms of destructiveness vary greatly. Research in this area has concentrated on the profile of destructiveness of these weapons and aspects of medical prevention and treatment. After the Academy's establishment in the early years of the Republic, the first obstacle was the lack of qualified personnel. Professors such as Zhu Renbao and Lin

Guogao [2651 0948 6964], numbering around 20, gave up their own familiar profession, or gave up higher positions at regional levels; some even came back to China from overseas after having overcome all obstacles in many places. They quickly joined the ranks of "three protection" research. In 1950, Professors Zhou Qianchong [0719 6692 0394] and Huang Cuifen [7806 5050 5358] returned to China in the spirit of serving their country, gave up comfortable living conditions, overcame numerous obstacles, and came back to China on a freighter. They journeyed for 56 days, finally reaching China. Soon after, they joined the Academy of Military Medical Sciences, and devoted their complete attention to military medical research.

There are very few reports worldwide on medical protection [against] special weapons. Some countries spared no effort to blockade us. In the early sixties, the U.S. Department of Defense published the "Index of Specifications and Standards," disclosing a kind of chemical ammunition. However, the chemical structure of this new chemical warfare agent was strictly classified. If the structure and functions of this chemical toxicant were not clearly understood, there would not be a 'target' for research on prevention and treatment. The Academy then organized information from four sources, namely, intelligence reports, the toxicant's synthesis, the determination of its physical and chemical properties, and its mechanism of poisoning. This information was used to provide a preliminary understanding of this U.S. chemical weapon's packaging, physical and chemical properties, toxicological effects, destructive properties, method for prevention and treatment, etc. On this basis, and after analysis and research, dozens of compounds of various types were designed and synthesized. After a large number of research experiments over a 2-year period, the structural type of this toxicant was roughly determined. Also, a typical chemical was determined as the major research object, thus providing a "target" for research on prevention and treatment. In 1972, the United States declassified and published the chemical structure of this new neurotoxicant. Its chemical structure was completely identical to that of the agent we synthesized. While information was kept strictly classified by foreign military sources, our investigation had gained time for our strategic technological research.

In the 21-year period after 1964, the year China set off its first atomic bomb, there were over a 1000 person-times involved with more than ten nuclear tests. Some comrades participated in as many as 19 nuclear tests, and worked in the field for almost 6 years.

There was an old comrade, who started epidemiological surveys soon after he started at the Academy. In several decades of work, his colleagues traveled to the corners of the world. Their 30 years of hard work bore magnificent fruit: a compilation in 31 volumes and 500,000 words entitled "Epidemiology and Medical Zoology" which encompassed information from all of China including Taiwan. This work has provided a basis for determining whether biological warfare has been launched against China and the possible effects. It also allows peacetime prevention of epidemics and development of the economy. This work thus has significant consequences for national defense construction as well as for the basic development of preventive medicine.

"Now we can proudly announce that China has a set of medical preventive measures against the terrifying special weapons such as nuclear, chemical and biological weapons."

In reviewing the several major wars in new China's recent history, the intelligence of the Academy of Military Medical Sciences shone through all of them. During the Sino-Indian border defensive war, academy personnel expeditiously designed chemically generated oxygen devices to be used on highlands. They also designed combat food, disinfectant filter bags with perchlorates, and strategies to prevent malnutrition. During the Zhenbao Island dispute, the Academy sent drinking-water-disinfectant pills, long-lasting vitamin B2, precipitants to treat turbid water, and ointment for frostbites. Combat troops in the Sino-Vietnamese border defensive were provided the following from the Academy: skin cleansing reagents, protective ear plugs, water-testing and poison-testing kits, deodorant, compound dangshen tablets, self-heating canned food, drinking-water disinfectants, precipitants to treat turbid water, amino-acid injections, long-lasting riboflavins, and cough medicine. None of these are guns and bullets, but the combat power generated by these devices in the war zone is not replaceable by any weapons.

Since the future of warfare will involve much more than the crossing of bayonets, and the forces in contention are more and more those of science and technology, experts at the Academy have long since set their objectives on medical prevention and treatment against laser injuries and microwave injuries and against the destructive force of the neutron bomb, and have oriented their efforts in new areas such as aerospace, navigation, diving, etc.

The atmosphere of change has brought an atmosphere of openness to this area restricted for so many years. Since the Third Plenary Session of the Eleventh CPC Central Committee, this "forbidden palace" of science has been open to medical workers from inside China and overseas. The Academy staff successively established scientific and technological research agreements and scholarly exchanges with dozens of countries and armies. They have invited 461 groups (totaling 924 person-times) of foreign experts to visit and lecture at the Academy. The visitors included two Nobel Prize laureates. The Academy sent hundreds of researchers overseas to study and participate in international conferences. Military medicine not only produces combat power, it also generates productivity. A number of national-inventors'-award-winning medicines (such as tertiary amine cholinesterase reactivator) can conquer deadly neurotoxicants that may be used in future chemical warfare, and have recently saved thousands of people in China from being poisoned by agricultural reagents.

These new medicines have also been utilized with advanced atomic medicine technology in curing hundreds of people contaminated by nuclear radiation. People in Tangshan will not forget that in 1976, during the great earthquake, experts from the Academy of Military Medical Sciences worked continuously for 5 days and 5 nights. They used ultra-low-volume misting techniques and new equipment in the war against mosquitoes, flies, and bacteria. Their effects upset the pattern of "great epidemic" after each great earthquake in China history. Overseas experts were very surprised at the results. Ten years later, the people's government of one of the nation's "rat-free cities," Dandong, of Liaoning Province, presented a red plaque to a microepidemiology expert at the Academy of Military Medical Sciences. He used disinfection techniques in disinfecting furs, thus making China the first fur-exporting country in the world to disinfect all its furs. Researcher Liu Yujing [0491 5148 0079] thus also became the first person from China to receive the "(Ke Er Mai) Award" from the international disinfection society.

In the last few years, they have transferred more than one hundred research items to the local level.

Gene engineering is a very significant breakthrough in medical biology in the seventies. At the end of the seventies, in an old building inside the Academy of Military Medical Sciences, Professor Huang Cuifen and researcher Ma Xiankai [7456 6343 0418] planned and established the Chinese army's first molecular genetics research institute. Researcher Ma Xiankai for the first time in China successfully used genetic engineering in converting Bacillus coli into hepatic nuclear antigen. Next came the construction of a rarely seen engineered bacteria that is 2000 more powerful than first-generation bacteria. This became a first-generation genetic engineering product in China. It received the highest national science and technology advancement award.

While nuclear energy is used to reap benefits for mankind, people have developed concerns at the same time. Nuclear accidents have pointed to the fact that nuclear energy has not been completely controlled by human beings. The experts in the field of nuclear medicine prevention and treatment actively shouldered the task of "nuclear accident emergency medical treatment procedures" as outlined in the Seventh 5-Year Plan. At present, the diagnosis of nuclear accidents, basic establishment of treatment techniques, and treatment kits specifically designed for emergency use during nuclear accidents have also been successfully developed.

In the last 38 years, the Academy of Military Medical Sciences has developed into an institution with eight research institutes, more than 2000 technicians, and 500 top researchers. There are master's degree programs in more than twenty professional disciplines, and eleven doctoral programs. Also established is the army's first post-doctorate mobile science and technology research program. Since 1980, this academy has produced 515 achievements, and received national awards for science and technology advances, national natural science awards, and national invention awards as well as awards for military science and technology advances.

To the rapidly advancing Academy of Military Medical Sciences, the nation salutes you!

## Biological Research at CAS Reviewed

*90CF0124F Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 28 Sep 89 p 2*

[Article by Wang Guihai [3769 6311 3189]: "An Enticing World"]

[Text] Biological research occupies an important position in the Chinese Academy of Sciences [CAS]. At present there are 23 special research institutes, 7 arboretums, 12 field testing stations, 9 key national laboratories that are open or still under construction, and 5 laboratories operated by the Academy. There are more than 8 thousand researchers and technicians conducting research in various subfields of different branches of science. This is an important consolidated force of biological research in China.

In the last 40 years, biological research at the Chinese Academy of Sciences has advanced fairly rapidly, producing many ingenious scientific and technological results that have international implications. For example, for the first time, bovine insulin protein and yeast alanine transfer RNA molecules that possess full bioactivity were produced entirely artificially. Research that meets international standards has included the following: structural determination of high-resolution, high-purity insulin crystals; research on the structure, functions, and reaction mechanisms of enzymes; research on high-energy-state photosynthetic phosphorylation and on the morphine analgesic mechanism; and studies of ova maturation and fertilization, and placenta induction and differentiation. In addition, important advances have been made in understanding mechanisms of gene control in nitrogen fixation, smallpox powder protein structure and mechanisms, blastulation mechanism, visual information system processing and ecological research. Since the establishment of the Academy, there have been many organised surveys of biological resources, as well as verification, editing, and compilation of large amounts of basic information and diagrams. Together with Chinese taxonomists, the Academy staff compiled the "Fauna," the "Flora," and the "Sporophyte Flora," at present totaling 112 volumes. Also established is the nation's largest animal and plant specimen and microscopic and bacterial specimen banks. The specimens total 7,000,000.

During the seventies, the Chinese Academy of Sciences developed research in biological technology fairly early. By now, there is an army of 1,100 people shouldering the nation's research and "863" duties; this army has produced more than 50 achievements during the Sixth 5-Year Plan. At present, penicillin acylase genetically engineered bacteria has been put through intermediate testing. In the gene engineering research of human growth hormones, engineered bacteria that possess high-level expression secretion have been obtained and put through intermediate testing. An ethylhepatic gene-engineered vaccine is also at the intermediate testing stage, has proved to be safe and possesses high immunological properties in human inoculation and experimental testing. In China, for the first time, anti-tobacco-mosaic-virus and anti-cucumber-mosaic-virus gene-engineered strains will go into large-scale field testing. China is first in the world to develop corn and soya bean protoplasm regeneration varieties. The annual productivity of fast-propagating banana varieties has reached 4,500,000. These accomplishments have established the basis for developing China's high-tech biology.

For many years, the Chinese Academy of Sciences has contributed to China's economic growth and development in the areas of agricultural breeding, treatment and control of agricultural pests, medicine, and food. Regular methods have been used in combining new technologies of breeding pollen cultures and haploid bodies to obtain new and resilient varieties and lines of main agricultural products: wheat, rice, soya beans, cotton, sweet potato, corn and rape. Just within the Seventh 5-Year Plan, 18 new varieties have been developed. The total propagated area measured more than 20 million mu. Cultivated heteroplasmic silver carp, Feng carp, and the Wuchang fish and other new high-quality fresh-water varieties have been bred and produced in almost 20 provinces and cities.

At present, biology faces a period of monumental and basic theoretical consolidation, development, and breakthrough. Establishing basic research is an important responsibility. It is especially important to continue to emphasize research in molecular and cellular biology to ensure the healthy advance of the nation's biological technologies. It is important to plan to grasp subjects that are new and at the cutting-edge, such as neural biology. It is important to create conditions for the development of new technologies such as computers. At the same time, based on the nation's needs, it is especially important to greatly emphasize and increase research in ecology and biological resources since they mean so much to society and the economy. Looking to the future, the picture is exhilarating, but the path is neither level nor wide. It demands our strenuous efforts, and requires a new generation of people to reach out for and create a better future.

## Processing of, Research on Monotectic Alloys Under Space Microgravity

*40080012A Beijing KEXUE TONGBAO in Chinese Vol 34 No 22, 16-30 Nov 89 pp 1755-1756*

[Article by Jiang Wanshun [1203 8001 7311] et al. of the Lanzhou Physics Institute, Chinese Academy of Space Technology [previously translated as Research Institute of Space Technology]]

[Summary] In 1987, our group carried out China's first experiment in materials processing under space microgravity conditions aboard a satellite that was later recovered. On this occasion, we employed the on-board multiuse processing furnace in a successful remelting experiment involving three monotectic alloy samples. We obtained monotectic alloys with great uniformity in the specific-gravity dispersion distribution—uniformity impossible to obtain on Earth.

The Zn-Pb sample (3 percent by volume), in a 700°C single-phase remelt zone, was slowly cooled (2.3°C per minute). Analysis revealed the following:

1. As predicted, the sample had uniform overall distribution, without the layered appearance of samples prepared on the ground. The small number of 0.1-12-micron-diameter minority-phase Pb spheres evenly distributed throughout the Zn demonstrated that gravity-induced Stokes deposition was clearly eliminated.

2. On the sample surface, new non-gravity-caused separation was discovered in a small amount of the alloy. This can be attributed to the Ma-lan-ge-ni[phonetic]-convection-induced liquid-drop drift toward the high-temperature regions, with the drift speed (using the variables of reference [1]) given by the formula:

$$U = 2R_0 \cdot \frac{dE}{dT} \cdot \frac{\Delta T}{3\eta_e} \cdot \frac{\eta_e + \eta_i}{2\eta_e + 3\eta_i},$$

Calculations show that for a 1-micron-radius Pb drop in 550°C liquid Zn, a Ma-lan-ge-ni drift speed of 15 microns per second is generated; over the 2-hour cooling period, there is enough phase migration to produce separation. The solidifying frontier rejects the minority-phase moise areas.[2]

3. A thin uniform layer of minority-phase Pb was discovered over the entire outer surface of the sample. Based on wetting theory[2], there is a critical wetting period between the minority phase and the sample shell that causes the thin covering and can introduce phase separation. Analysis of the results has shown that we can overcome this non-gravity-induced segregation in two ways: (1) select a crucible surface for majority-phase wetting of the alloy system, and (2) select a rapid or isothermal cooling method to eliminate Ma-lan-ge-ni drift.

In the remelt of the second sample, Al-Pb, it was discovered that there may have been abnormal solvation. According to the ground phase diagram, at a temperature of 700°C, the solubility of liquid-state Pb in A1 should be 2.5 percent by weight. Analysis of the sample showed that the percentage by weight of Pb retained in the A1 exceeded that figure and reached 17 percent. This is most likely explainable by changes in the alloy phase diagram as a result of microgravity; also, there is naturally the possibility of volume convection-induced drift.

The third sample was a Pb-Zn powder alloy, sintered in a liquid state at a temperature of 700°C. Analysis revealed that it did not manifest the volume contraction phenomenon associated with the earth comparison sample; moreover, the space sample's microscopic organization was more uniform than that of the earth sample.

### References

1. Feuerbacher, B. et al., "Materials Sciences in Space," 1986, p 373.

2. Derby, B., Proc. 5th Eur. Symp. Materials Sciences Under Microgravity, 1983, p 277.

## Study of Preparation of Ce-TZP, Its Mechanical Properties

*40090007a Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE CERAMIC SOCIETY] in Chinese Vol 17 No 6, Dec 89 pp 514-521*

[English abstract of article by Yang Shigang [2799 1709 0474] and Chen Kai [7115 2818] of the Inorganic Materials Science and Engineering Department, South China University of Technology]

[Text] $CeO_2$, a low cost rare-earth oxide, has been selected as a stabilizer in the preparation of high-quality $ZrO_2$-toughened ceramics (Ce-TZP). Compared with Y-TZP, this kind of material possesses coarser crystalline grains and, correspondingly, larger critical grain sizes in the t-$ZrO_2$ $\rightarrow$ m-$ZrO_2$ transition, so when preparing high-quality Ce-$ZrO_2$ ceramics, ultrafine powder should not be used as the raw material. The addition of $Al_2O_3$ and $TiO_2$ has been found to be very effective in lowering the sintering temperature and improving the mechanical properties at room temperature. The effects of the additives are discussed. The relationship between the mechanical properties and microstructure is investigated with the aid of XRD [X-ray diffractometry], SEM [scanning electron microscopy] and EDAX [energy-dispersive analysis by X-ray]. The maximum values of $H_v$ [Vickers hardness value], $\sigma_t$ [flexural strength] and $K_{IC}$ [fracture toughness property] are approximately 9 GPa [gigapascals], 2.1 +/- 0.63 GPa and 14 +/- 1 MPa x $m^{1/2}$ [megapascals times square-root meters], respectively.

### References

1. Claussen, N., ADV CERAM, Vol 12, 1984 p 325

2. Gupta, T.K., ADV CRYOG ENG, Vol 30, 1984 p 367

3. Sato, T., Shimada, M., AMER CERAM SOC BULL, Vol 64 No 10, 1985 p 1382

4. Nakata, T., Disclosed Patent Report 60-90869, 1985

5. Garvie, R.C., Nicholson, P.S., J AMER CERAM SOC, Vol 55 No 3, 1972 p 152

6. Niihara, K., et al., J MATER SCI LETT, Vol 1, 1982 p 13

7. Duwez, P., Odell, F., J AMER CERAM SOC, Vol 33 No 9, 1950 p 274

8. Claussen, N., MATER SCI ENG, Vol 71, 1985 p 23

9. Sato, T., Shimada, M., "Ceramic Materials and Components for Engines," "Proceedings of the Second International Symposium," W. Bunk, et al., ed., 1986, pp 291-297

10. Gupta, T.K., SCI SINTER, Vol 10 No 3, 1978 p 205.

## Mechanism, Kinetics of Sintering of Hot-Pressed Silicon Nitride at Lower Temperatures

*40090007b Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE CERAMIC SOCIETY] in Chinese Vol 17 No 6, Dec 89 pp 530-536*

[English abstract of article by Yuan Lijian [5913 0500 1696] of the Department of Materials Engineering, Shanghai Jiaotong University; Yan Dongsheng [0917 2639 3932] and Mao Zhiqiong [5403 1807 8825] of Shanghai Institute of Ceramics, Chinese Academy of Sciences]

[Text] A $MgO-Al_2O_3-SiO_2$ system additive has been selected with which $Si_3N_4$ can be hot-pressed to complete densification at a temperature of 1550°C or above (approximately 10 wt percent liquid phase, under 30 MPa pressure). Since $Si_3N_4$ and carbon fiber can coexist without damage at such a low temperature, it is possible to produce a carbon fiber-reinforced $Si_3N_4$ composite, thereby improving the brittleness of $Si_3N_4$. The mechanism and kinetics of the sintering of the hot-pressed $Si_3N_4$ existing in a liquid phase at a temperature of 1450-1650°C have been studied by means of determining the linear shrinkage and the relative density of the specimens, as well as the wettability of the additive composites with $Si_3N_4$. The densification process seems to be consistent with Kingery's liquid-phase sintering model. The kinetics of solution-diffusion-reprecipitation can be represented by the equation $\Delta L/L_0 = K_1 t^{1/n}$. It is believed that the hot-pressing temperature is the dominating factor influencing the densification rate. Other processing parameters obviously affecting the densification rate are the applied pressure and the amount of liquid phase formed.

### References

1. Guo Jingkun, "Fiber-Reinforced Ceramic Composite Materials, A Research Report," Shanghai Institute of Silicates, Chinese Academy of Sciences, 1979

2. Isami, S., NEW INORGANIC MATERIALS, Vol 4 No 4, 1975 p 1

3. Bowen, L.J., et al., J AMER CERAM SOC, Vol 61 Nos 7-8, 1978 p 335

4. Hummel, F.A., et al., J AMER CERAM SOC, Vol 34 No 7, 1951 p 319

5. Huang Liping, et al., JOURNAL OF THE CHINESE CERAMIC SOCIETY, Vol 7 No 4, 1979 p 346

6. Coble, R.L., J APPL PHYS, Vol 41 No 12, 1970 p 4798

7. Kingery, W.D., et al., J AMER CERAM SOC, Vol 46 No 8, 1963 p 391

8. Kossowsky, R., J MATER SCI, Vol 9 No 12, 1974 p 2025.

## Growth of $Bi_{12}SiO_{20}$ Single-Crystal Fibers

*40090007c Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE CERAMIC SOCIETY] in Chinese Vol 17 No 6, Dec 89 pp 537-540*

[English abstract of article by Li Guangao [2621 0385 0707], et al., of the Department of Physics, Nankai University; Dong Xiaoyi [5516 1321 5030], et al., of the Institute of Modern Optics, Nankai University]

[Text] Using an independently developed resistance heating pull-down-type growing device under the conditions of a small-temperature gradient and growing speed, $Bi_{12}SiO_{20}$ (BSO) single-crystal optical fibers with orientation [111], a diameter of 0.5 -2 mm, and a length of more than 9 mm have been grown for the first time.

Through measurement, the magneto-optical effect of the fibers is apparent and their linearly-related coefficient of current and light intensity conversion is greater than 0.95. They can be used for fiber-optic-type magneto-optical devices.

### References

1. Bridges, T.J., et al., OPT LETTERS, Vol 5, 1980 p 85

2. Mimura, S., APPLIED PHYSICS, Vol 52, 1983 p 311

3. Stone, J., Burrus, C.A., J OPT SOC AMER, Vol A2 No 13, 1985 p 28

4. Fejer, M.M., et al., PROC OF SPIE, Vol 460, 1984 p 26

5. Sudo, S., et al., OPT LETTERS, Vol 12, 1987 p 938

6. Tan Zhongke, Li Guangao, PHYSICS, Vol 17, 1988 p 203

7. Dong Xiaoyi, PHYSICS, Vol 17, 1988 p 714

## Studies of Susceptibility Among Geographic Strains of *Aedes Albopictus* in China to Infection with Dengue Viruses

*40091006b Beijing ZHONGHUA LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 10 No 6, Dec 89 pp 348-351*

[English abstract of article by Zhang Sheng [1728 0581] and He Guiming [0149 2710 6900] ofthe Department of Parasitology, Sun Yatsen University of Medical Sciences, Guangzhou]

[Text] The comparative susceptibility to dengue serotype 1, 2 and 4 viral infections of nine geographic strains of *Aedes albopictus* has been studied by experimentally feeding mosquitoes on pledgets soaked with a virus-erythrocyte suspension and intrathoracic inoculation with dengue viruses. A variation in susceptibility for both dengue serotypes 1 and 2 was found among the geographic strains by feeding, but no significant difference was seen in these with intrathoracic inoculation. It was evident that a "gut barrier" was involved. The thresholds of oral infection were not the same for dengue serotypes 1, 2 and 4. In terms of infection rate, the Haikou strain was more susceptible to all three viral serotypes, while the Beijing and Chengdu strains were more susceptible to serotypes 1 and 2, respectively. All the geographic strains were more susceptible to dengue serotype 2 than to the other two serotypes.

The mosquito head squash method, used to demonstrate the dengue virus antigen by the indirect fluorescent antibody technique, was modified by a mosquito brain tissue smear. This will be more accurate for detecting the dengue virus antigen in the brain tissue.

### References

1. Lu Baolin, "Comprehensive Mosquito Control," Science Press, 1984, p 170

2. Chen Riguang, Hu Dingjin, "Observation of *Aedes Albopictus* Susceptibility to Thoracic Infection with several Insect-carried Viruses and Its Reproduction Mode," CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY, Vol 2 No 1, 1982 p 33

3. Chamberlain, R.W., Sudia, W.D., "Mechanism of Transmission of Viruses by Mosquitoes," ANN REV ENTOMOL, Vol 6, 1961 p 371

4. Gubler, D.J., Rosen, L., "Variation Among Geographic Strains of *Aedes Albopictus* in Susceptibility to Infection with Dengue Viruses," AM J TROP MED HYG, Vol 26 No 2, 1976 p 318

5. Gubler, D.J., "Factors Influencing the Distribution and Spread of Epidemic Dengue Hemorrhagic Fever," ASIAN J INFECT DIS, Vol 2, 1978 p 128

6. Gubler, D.J., et al., "Variation in Susceptibility to Oral Infection with Dengue Viruses Among Geographic Strains of *Aedes Aegypti*," AM J TROP MED HYG, Vol 28 No 6, 1979 p 1045

7. Hardy, J.L., et al., "Intrinsic Factors Affecting Vector Competence of Mosquitoes for Arboviruses," ANN REV ENTOMOL, Vol 28, 1983 p 229

8. Kuberski, T.T., Rosen, L., "A Simple Technique for the Detection of Dengue Antigen in Mosquitoes by Immunofluorescence," AM J TROP MED HYG, Vol 26 No 3, 1977 p 533

9. Reed, L.J., Muench, H., "A Simple Method of Estimating Fifty Percent Endpoints," AM J HYG, Vol 27, 1938 p 493

10. Rosen, L., Gubler, D.J., "The Use of Mosquitoes to Detect and Propagate Dengue Viruses," AM J TROP MED HYG, Vol 23, 1974 p 1153

11. Tesh, R.B., "A Method for the Isolation and Identification of Dengue Viruses, Using Mosquito Cell Cultures," AM J TROP MED HYG, Vol 28 No 6, 1979 p 1053

## Study of 438 Strains of Pathogenic Vibrio, Resistance to Drugs

*40091006a Beijing ZHONGHUA LIUXINGBINGXUE ZAZHI [CHINESE JOURNAL OF EPIDEMIOLOGY] in Chinese Vol 10 No 6, Dec 89 pp 337-340*

[English abstract of article by Xu Haiying [1776 3189 5391], et al., of the Sanitary and Anti-epidemic Station of Haikou City, Hainan Province]

[Text] This paper reports the results of monitoring the pathogenic vibrio from 1461 diarrhea outpatients in Haikou City from April to November 1986. A total of 438 strains of pathogenic vibrio (29.98 percent) have been identified. Among them, *Vibrio parahemolyticus* (14.99 percent) was most common, followed by non-0:1 *V. cholerae* strains (11.84 percent). The attack time, age, sex and clinical symptoms, etc., are discussed.

### References

1. Popoff, M., "Bergey's Manual of Systematic Bacteriology," Williams and Williams Company, Baltimore, 1984, No 1 p 517

2. Fu Bingnan, et al., "Study of Etiology and Epidemiology of Acute Infectious Diarrhea in Four Provinces (Regions) of Central and Southern China," CHINESE PUBLIC HYGIENE, No 1, 1986 p 21

## Recognition of All Chromosomes, Chromosomal Changes in Common Wheat (*Triticum Aestivum* L.) Using C-Banding*

*40091007a Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese Vol 16 No 6, Dec 89 pp 415-419*

[English abstract of article by Zhong Shaobin [6988 1421 2430], Xu Jie [1776 2638], et al., of the Institute of Agrobiological Genetics and Physiology, Jiangsu Academy of Agricultural Sciences, Nanjing]

[Text] The somatic chromosomes of the common wheat "Chinese Spring," "84001-1-33" and "Yang Mai" No 3 were analyzed by means of the C-banding technique. The results were as follows:

1) All chromosomes except 1A of common wheat exhibited stable distinctive banding patterns. 2) The C-banded karyotype of Chinese Spring was established. 3) Taking the banding pattern of Chinese Spring as a reference, it was found that the reciprocal translocations between chromosomes 5B and 7B occurred in "8441-1-33," resulting in the formation of reconstituted chromosomes 5BS/7BS and 7BL/5BL. 4) Remarkable changes were found on chromosomes 1B and 4B of Yang Mai No 3. Based on a comparison of the banding patterns, it is possible that an exchange took place between the long arms of the two chromosomes, involving large portions of the arms.

*Key S&T project "75" of the Ministry of Agriculture.

### References

1. Zhang Zili, et al., ACTA BOTANICA SINICA, Vol 24 No 2, 1982 pp 120-124

2. Liu Dajun, Chen Peidu, ACTA GENETICA SINICA, Vol 11 No 2, 1984 pp 106-108

3. Caspersson, T., et al., EXPTL CELL RES, Vol 58, 1969a pp 128-140

4. Caspersson, T., et al., EXPTL CELL RES, Vol 58, 1969b pp 141-152

5. Chen, P.D., Gill, B.S., in "Proc 6th Int Wheat Genet Symp," Kyoto, Japan, 1983, pp 39-48

6. Dvorak, J., CAN J GENET CYTOL, Vol 25, 1983 pp 210-214

7. Endo, T.R., Gill, B.S., CHROMOSOMA, Vol 89, 1984 pp 361-369

8. Endo, T.R., JPN J GENET, Vol 61, 1986 pp 89-93

9. Gill, B.S., Kimber, G., PROC NAT ACAD SCI USA, Vol 71, 1974 pp 4086-4090

10. Gill, B.S., Kimber, G., CROP SCI, Vol 17, 1977 pp 264-266

11. Jewell, D.C., in "Proc 5th Int Wheat Genet Symp," New Delhi, India, 1979 pp 1208-1212

12. Larsen, J., in "Proc 4th Int Wheat Genet Symp," Missouri, 1973 pp 87-93

13. Lukaszewski, A.J., Gustafson, J.P., THEOR APPL GENET, Vol 64, 1983 pp 239-248

14. Riley, R., et al., HEREDITY, Vol 22, 1967 pp 233-248

15. Seal, A.G., THEOR APPL GENET, Vol 63, 1982 pp 39-47

## Characterization of Cloned DNA Fragment of Rice Chloroplast, Location of *rbcL* Gene in Recombinant Plasmid*

*40091007b Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese Vol 16 No 6, Dec 89 pp 430-435*

[English abstract of article by Shen Zhiwei [3088 1807 0251], Sun Chongrong [1327 1504 2837], et al., of the Biochemistry Department, Fudan University, Shanghai]

[Text] Pure rice (*Oryza sativa*, subsp *Indica*, cv Zhenshan 97B) chloroplast DNA was digested by the restriction enzyme *Bam*HI, and the resulting fragments were ligated to the *Bam*HI site of pBR322. One recombinant plasmid which contains a 19.3 kb inserted DNA fragment was isolated from the clone bank and was named pOSB1. A physical map of the recombinant plasmid was constructed by cleavage with 10 restriction endonucleases, and the gene *rbcL* was located on the pOSB1.

* Project supported by the National "75" Science Research Fund and the Open Laboratory Fund of Fudan University.

### References

1. Shen Zhiwei, et al., BIOCHEMISTRY, Vol 5 No 1, 1989 pp 7-11

2. Bard, J., et al., PROC NATL ACAD SCI USA, Vol 82 No 12, 1985 pp 3983-3987

3. Zhu Jingdong, et al., BIOTECHNOLOGY, Vol 3, 1985 pp 1014-1016

4. Larrinua, L.M., et al., PLANT MOL BIOL, Vol 2 No 2, 1983 pp 129-140

5. Maniatis, T., et al., in "Molecular Cloning, A Laboratory Manual," Cold Spring Harbor Laboratory, New York, 1982

6. McIntosh, L., et al., NATURE, Vol 288 No 11, 1980 pp 556-560

7. Orozco, E.M. Jr., NUCLEIC ACIDS RES, Vol 13 No 4, 1985 pp 1283-1302

8. Palmer, J.D., Thompson, W.F., GENE, Vol 15 No 1, 1981 pp 21-26

9. Shinozaki, K., Sugiura, M., GENE, Vol 20 No 1, 1982 pp 91-102

10. Shinozaki, K., et al., PLANT MOL BIOL REP, Vol 4 No 1, 1986 pp 110-147

## Low Copy Number Mutant of pUC-Derived Plasmid

*40091007c Beijing YICHUAN XUEBAO [ACTA GENETICA SINICA] in Chinese Vol 16 No 6, Dec 89 pp 463-469*

[English abstract of article by He Xiaosong [0149 4562 2646], Wu Xiaoyun [0702 1420 0061], et al., of the Institute of Genetics, Fudan University, Shanghai]

[Text] A low copy number mutant of the ColE1-like plasmid of *Escherichia coli* is reported in this paper. The recombinant plasmid pPGVT3 derived from the vector pUC4 was unstable in the *E. coli* host strain DF2145. No transformant could be obtained at 40°C when DF2145 was transformed with pPGVT3. By *in vitro* mutagenesis of the pPGVT3 plasmid DNA with hydroxylamine, which induces point mutations, a mutant plasmid pPGVT3HA was obtained which was stable in DE2145. The mutation site was localized within the pUC moiety of pPGVT3HA. The copy number of the mutated pUC vector and its derivatives were found to be reduced. The effect of low copy number mutation on the stability of the recombinant plasmids is discussed.

### References

1. He Xiaosong, "Construction of *Bacillus Stearothermophilus* Plasmid Vector," Fudan University Doctoral Dissertation, 1987

2. Li Xiexun, et al., HEREDITAS, Vol 6 No 1, 1984 pp 1-2

3. Tao Wufan, "Study on *Bacillus Stearothermophilus* Isoenzyme," Fudan University Doctoral Dissertation, 1987

4. Bolivar, F., et al., GENE, Vol 2, 1977 pp 95-113

5. Brosious, J., et al., GENE, Vol 27, 1984 pp 161-172

6. Cesareni, G., et al., PROC NATL ACAD SCI USA, Vol 79, 1982 pp 6313-6317

7. Cesareni, G., et al., EMBO J, Vol 3, 1984 pp 1365-1369

8. Davison, J., GENE, Vol 28, 1984 pp 1-15

9. Eichenlaub, R., in A. Pühler and K.N. Timmis, eds., "Advanced Molecular Genetics," Springer-Verlag, Berlin, 1984

10. Freese, E., et al., PROC NATL ACAD SCI USA, Vol 47, 1961 pp 845-855

11. Herendeen, S.L., et al., J BACTERIOL, Vol 139, 1979 pp 185-194

12. Maniatis, T., et al., "Molecular Cloning, A Laboratory Manual," Cold Spring Harbor Laboratory, 1982

13. Messing, J., "Recombinant DNA Technical Bulletin," NIH Publication No 2, 1979, pp 79-99, 43-48

14. Mongkolsuk, S., et al., J BACTERIOL, Vol 155, 1983 pp 1399-1406

15. Projan, S.J., et al., PLASMID, Vol 9, 1983 pp 182-190

16. Summers, D.K., Sherratt, D.J., CELL, Vol 36, 1984 pp 1097-1103

17. Tomizawa, J., CELL, Vol 38, 1984 pp 861-870

18. Tomizawa, J., Som, T., CELL, Vol 38, 1984 pp 871-878

19. Vieira, J., Messing, J., GENE, Vol 19, 1982 pp 259-268

## Oriented, Continuous DNA Sequencing*

*40091007d Shanghai SHENGWUHUAXUE YU SHENGWUWULI XUEBAO [ACTA BIOCHIMICA ET BIOPHYSICA SINICA] in Chinese Vol 21 No 6, Nov 89 pp 491-495*

[English abstract of article by Zheng Zhongcheng [6774 0112 2110], Cao Ping [2580 5393], et al., of Shanghai Institute of Biochemistry, Chinese Academy of Sciences]

[Text] A simple, practical and speedy method for the orientation and continuous determination of DNA sequences is developed. A clone of the target DNA fragment in the plasmid vector pWR13 is constructed. After digestion of the determined DNA fragment within the recombinant DNA by the proper restriction enzyme, the DNA fragment is progressively shortened from this site by ExoIII. The family of the recombinant DNA molecule can then be obtained. These DNAs contain the determined DNA fragments of different sizes, with either common fixed ends or progressively shortened ends. Their sequences can be determined by end-termination methods. Since these fragments overlap, the sequencing data can be analyzed conveniently.

*Project supported by the National Natural Science Foundation of China.

### References

1. Maxam, A.M., et al., "A New Method for Sequencing DNA," PROC NATL ACAD SCI, Vol 74, 1977 p 560

2. Sanger, F., et al., "DNA Sequencing with Chain-Terminating Inhibitors," PROC NATL ACAD SCI, Vol 74, 1977 p 5436

3. Hong Guofan, "A Systematic DNA Sequencing Strategy," J MOL BIOL, Vol 158, 1982 p 539

4. Guo Lihe, et al., "An Improved Strategy for Rapid Direct Sequencing of Both Strands of Long DNA Molecules Cloned in a Plasmid," NUCL ACIDS RES, Vol 11, 1983 p 5521

5. Li Qiliang, et al., "A Versatile and Simplified Non-random Strategy for Nucleotide Sequencing," GENE, Vol 56, 1987 p 245

6. Wu Xiangfu, et al., "Asexual Reproduction of Silkworm Ribosomal RNA Gene in *E. coli*," ACTA GENETICA SINICA, Vol 10, 1983 p 423

## Synthesis of HBsAg in Yeast Under Control of PHO5 Promoter

*40091007e Shanghai SHENGWUHUAXUE YU SHENGWUWULI XUEBAO [ACTA BIOCHIMICA ET BIOPHYSICA SINICA] in Chinese Vol 21 No 6, Nov 89 pp 552-555*

[English abstract of article by Ao Shizhou [2407 0013 3166], Gong Yi [7895 3015], of Shanghai Institute of Biochemistry, Chinese Academy of Sciences]

[Text] The authors constructed a plasmid of the HBsAg gene under the control of a yeast acid phosphatase promoter. The yeast strain transformed by this plasmid synthesized up to 2-3 mg of HBsAg per liter. A yeast 3'-terminal sequence is necessary for high expression of the heterologous gene. The HBsAg particle derived from the yeast is similar in shape and immunity to that derived from human serum.

### References

1. Chen Jiangye, et al., "Cloning of Yeast W272-5c Acid Phosphatase Gene PHO5, PHO3," ACTA BIOCHIMICA ET BIOPHYSICA SINICA, Vol 20, 1988 p 62

2. Ito, H., et al., "Transformation of Intact Yeast Cells Treated with Alkali Cations," J BACTERIOLOGY, Vol 153, 1983 p 163

3. Miyanohara, A., et al., "Expression of Hepatitis B Surface Antigen in Yeast," PROC NATL ACAD SCI USA, Vol 80, 1983 p 1

4. Ao Shizhou, et al., "A Strong Expression System of HBsAg Gene in *E. coli*," SCIENTIA SINICA, No 3, 1985 p 252

5. Ao Shizhou, et al., "Expression of HBsAg Gene in Yeast Cell," BIOTECHNOLOGY, Vol 1, 1985 p 49

6. Shen Luping, et al., "High Expression of HBsAg Gene Under Control of Yeast GAP Promotion," ACTA BIOCHIMICA ET BIOPHYSICA SINICA, Vol 19, 1987 p 433

7. Hinnen, A., et al., "Heterologous Protein Secretion in *Saccharomyces cerevisiae*," YEAST, Vol 4, 1988 p s26

## Construction, Characterization of Chimaeric Plasmid of *Streptomyces-E. Coli*

*40091007f Shanghai SHENGWUHUAXUE YU SHENGWUWULI XUEBAO [ACTA BIOCHIMICA ET BIOPHYSICA SINICA] in Chinese Vol 21 No 6, Nov 89 pp 556-560*

[English abstract of articie by Chen Liang [7115 0081] and Zheng Youxia [6774 1635 7209] of Shanghai Institute of Plant Physiology, Chinese Academy of Sciences]

[Text] *Streptomyces-E. coli* chimaeric plasmids were constructed by ligating the *streptomyces* plasmid pIJ702 and *E. coli* plasmid pBR325 through their unique BglII and BamHI sites, respectively. It was found that the chimaeric plasmids were unstable and deletions occurred in both hosts.

### References

1. Bibb, M.J., et al., "Experimental Manipulation of Gene Expression," Inouye, M., ed., Academic Press, New York, 1983, p 54

2. Malpartida, F., Hopwood, D.A., "Molecular Cloning of the Whole Biosynthetic Pathway of a *Streptomyces* Antibiotic and Its Expression in a Heterologous Host," NATURE, Vol 309, 1984 p 462

3. Hopwood, D.A., et al., "Genetic Manipulation of *Streptomyces*, A Laboratory Manual," The John Innes Foundation, Norwich, 1985, p 12

4. Meyers, J.A., et al., "Simple Agarose Gel Electrophoretic Method for the Identification and Characterization of Plasmid DNA," J BACT, Vol 127, 1976 p 1529

5. Kieser, T., "Factors Affecting the Isolation of CCC DNA from *Streptomyces lividans* and *Escherichia coli*," PLASMID, Vol 12, 1984 p 19

6. Maniatis, T., et al., "Molecular Cloning, A Laboratory Manual," Cold Spring Harbor Laboratory, New York, 1982, p 97

7. Hong Mengmin, et al., "Cloning and Expression of K88 Antigen Gene. I. Production of K88 Antigen-Engineered Bacteria," BIOTECHNOLOGY, Vol 1, 1983 p 36

8. Lee, Y.H.W., et al., "Structure Instability of Heterogeneous Genes Cloned in *Streptomyces* Plasmid pIJ702," BIOPHYS RES COMMUN, Vol 140, 1986 p 372

## Proteins, Proteinase-Resistant Polypeptides of δ-Endotoxins from *Bacillus Thuringiensis*, Their Insecticidal Activity

*40091007g Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 29 No 6, Dec 89 pp 397-404*

[English abstract of article by Li Rongsen [2621 2837 2773] and Luo Cheng [5012 2052] of Wuhan Institute of Virology, Chinese Academy of Sciences, Wuhan]

[Text] Proteins, their solubility in alkaline buffer and proteinase-resistant polypeptides (PRP) of parasporal crystals (δ-endotoxin) from *Bacillus thuringiensis* were investigated. A total of 19 kinds of crystals were divided into 7 types. The differences between crystalline proteins coincided with their solubility and PRP. The characteristics of the protein, solubility and PRP were basically subspecies specific, but in a few crystals they were strain specific. A closed relationship existed between the biochemical properties of the crystal protein and the toxicity in two insect species. Crystals with proteins of MW 130-138 kD or MW 130-138kD and 60-65 kD, and PRP of MW 68-75 kD were highly toxic in *Bombyx mori* (Lepidoptera), but most of them exhibited weak or no toxicity in *Culex fatigans* (Diptera). Crystals containing more than three kinds of proteins, with MW 15-138 kD in the major protein, MW 35-75 kD in the minor protein, and PRP of 35-65 kD, exhibited very strong toxicity in *Culex fatigans*, but no toxicity in *Bombyx mori*. The structure of the crystal protein and the importance of the protein and PRP characteristics in the selection of the expected strain and genetic engineering in *Bacillus thuringiensis* are discussed.

### References

1. Angus, T.A., CAN J MICROBIOL, Vol 2, 1956 pp 416-426

2. Lecadet, M.M., et al., SEANCE ACAD SCI PARIS, Vol 254, 1962 pp 2457-2459

3. Pendleton, I.R., J APPL BACT, Vol 31 No 2, 1968 pp 208-214

4. Zalunin, I.A., et al., BIOCHEMISTRY, Vol 44 No 4, 1979 pp 693-698

5. Chestunina, G.G., et al., BIOCHEMISTRY, Vol 42 No 9, 1977 pp 1600-1677

6. Nickerson, K.W., BIOTECHNOLOGY AND BIOENGINEERING, Vol 22 No 7, 1980 pp 1303-1333

7. Yamamoto, T., et al., BIOCHEM AND BIOPHYS RES COMMUN, Vol 103, 1981 pp 414-421

8. Lizuka, T., et al., FEMS MICROBIOL LETTERS, Vol 19, 1983 pp 189-192

9. Thomas, W.E., et al., J CELL SCI, Vol 60, 1983 pp 181-197

10. Li Rongsen, et al., J INVERT PATHOL, Vol 50 No 3, 1987 pp 277-284

11. Hurley, J.M., et al., BIOCHEM BIOPHYS RES COMMUN, Vol 126 No 2, 1985 pp 961-965

12. Lee, S.G., et al., BIOCHEM BIOPHYS RES COMMUN, Vol 126 No 2, 1985 pp 953-960

13. Knowles, B.H., et al., J CELL SCI, Vol 83, 1986 pp 89-101

14. Fast, P.G., "Microbial Control of Pest and Plant Disease 1970-1980," H.D. Burges, ed., Academic Press, 1981, pp 223-248

15. Tojo, A., et al., APPL AND ENVIRON MICROBIOL, Vol 45 No 2, 1983 pp 576-580

16. Kim, K.H., et al., J INVERTEBR PATHOL, Vol 44 No 2, 1984 pp 214-219

17. Knowles, B.H., et al., FEBS LETTERS, Vol 168 No 2, 1984 pp 197-202

18. Haide, M.Z., et al., EUR J BIOCHEM, Vol 156, 1986 pp 531-540

19. Pendleton, I.R., et al., J APPL BACT, Vol 29 No 3, 1966 pp 519-527

20. Laemmli, U.K., NATURE, Vol 227 No 5259, 1970 pp 680-685

21. Huber, H.E., et al., ARCH MIKROBIOL, Vol 129, 1981 pp 14-18

22. Li Rongsen, et al., ACTA MICROBIOLOGICA SINICA, Vol 21 No 3, 1981 pp 311-317

23. Li Rongsen, ACTA MICROBIOLOGICA SINICA, Vol 26 No 2, 1986 pp 143-150

24. Chestukhina, G.G., et al., ARCH MIKROBIOL, Vol 132, 1982 pp 159-162

## Three New Serotypes of *Salmonella* II

*40091007h Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 29 No 6, Dec 89 pp 405-412*

[English abstract of article by Pan Ruonan [3382 5387 3948], Zeng Guihua [2582 2710 5478] and Hu Hongding [5170 4767 0002] of Nanchang Institute of Medical Sciences, Nanchang; Wu Caifei [0702 6846 5481] of the Salmonella Reference Library, CMCC(B), Beijing]

[Text] Eight cultures isolated from the intestinal contents of reptiles belonged to three new serotypes of *Salmonella*. They were all ducitol fermented and malonate utilized, but there was no attack lactose or salicin and no growth in KCN broth, and they were ONPG negative. Therefore, they can all be classified as *Salmonella* II. They were all attacked by Felix phage O-1. Three

representative strains were selected for antigen analysis. Their antigenic formulas were identified as the following:

S3194 *Salmonella* II 6,7:1,v:e,n,$z_{15}$ S3196 *Salmonella* II 6,7:y:e,n,$z_{15}$ S3195 *Salmonella* II 6,8:e,h:1,2

Among them, S3196 was indole positive and belonged to a rare biotype. There were two other cultures in addition to the S3194 formula and three other cultures in addition of the S3196 formula (one indole positive and two indole negative).

### References

1. WHO Collaborating Center for Reference and Research on *Salmonella*, "Antigenic Formulas of the *Salmonella* Serovars, 1987" Institut Pasteur, Paris, 1988

2. Le Minor, L., et al., ANN MICROBIOL (Inst Pasteur), Vol 133B, 1982 pp 245-254

3. Le Minor, L., et al., ANN MICROBIOL (Inst Pasteur), Vol 137B, 1986 pp 211-217

4. Fourner, RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR DE CHANGHAI, Vol 1, 1948 p 45

5. Zigong Sanitary and Anti-epidemic Station, Sichuan Province, et al., ACTA MICROBIOLOGICA SINICA, Vol 19, 1979 pp 227-229

6. WHO Collaborating Center for Reference and Research on *Salmonella*, "Antigenic Formulae of the *Salmonella* 1979," Institut Pasteur, Paris, 1980

7. Liu Xiangping, et al., ACTA MICROBIOLOGICA SINICA, Vol 28, 1988 pp 68-73

8. He Xiaoqing, et al., ACTA MICROBIOLOGICA SINICA, Vol 24, 1984 pp 282-299

9. He Xiaoqing, et al., CHINESE JOURNAL OF MICROBIOLOGY AND IMMUNOLOGY, Vol 8, 1988 pp 96-100

10. Pan Ruonan, et al., MICROBIOLOGY, Vol 13, 1986 pp 206-208

11. Ewing, W.H., "Edwards and Ewing's Identification of *Enterobacteriaceae*," 4th ed., Elsevier Science Publ Co., Inc., Amsterdam, 1986

## CMV Specific Monoclonal Antibody Production by Electrofusion

*40091007i Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 29 No 6, Dec 89 pp 444-451*

[English abstract of article by Cai Wenqi [5591 2429 0796], Wang Rong [3769 2837], et al., of the Institute of Microbiology, Chinese Academy of Sciences, Beijing; Zhang Chengliang [1728 2052 5328], Chen Jing [7115 0079], et al., of the Experimental Institute of Plant Quarantine, Ministry of Agriculture, Husbandry and Fishery, Beijing]

[Text] Six hybridomas stably producing high titer monoclonal antibodies against CMV have been derived by means of electrofusion from the spleen cells of CMV-ss-30 and CMV-p immunized BALB/c mice with SP2/0 using the BAEKON 2000 Advanced Gene Transfer System. They were then cloned by two to three times of simple, efficient standard dilution. The monoclonal antibodies were of the $IgG_1$ and $IgG_{2a}$ subclass. Their specificities were determined by indirect ELISA and demonstrate quite strong binding ability against ss-30, p, yellow, Japan, Shandong, banana, sunflower and Q isolates of CMV. The lower binding ability was observed with the CMV $C_{59}$ isolate. They did not react at all with PSV. The affinity constant and affinity index of the monoclonal antibodies have been determined by indirect ELISA. The $C_7H_3$ and $A_6H_4$, $G_4G_8$ and $G_4H_5$ have the same determinant, although they might recognize different determinants.

### References

1. Köhler, G., et al., NATURE, Vol 265, 1975 p 495

2. Zimmermann, U., et al., "Sixth Int Biophys Cong Kyoto Abstr," IV, 19(H), 1978 p 140

3. Berg, H., STUD BIOPHYS, Vol 90, 1982 p 169

4. Zimmermann, U., BIOCHEM BIOPHYS ACTA, Vol 694, 1982 p 227

5. Lo, M.M.S., et al., NATURE, Vol 310, 1984 p 792

6. Karsten, U., et al., EUR J CANCER CLIN ONCOL, Vol 21, 1985 p 733

7. Abel, H., et al., ACTA BIOTECHNOL, Vol 6, 1986 p 287

8. Lot, H., et al., ANU PHYTOPATHOL, Vol 4, 1972 p 25

9. Cai Wenqi, et al., BIOTECHNOLOGY, Vol 1, 1985 p 34

10. Mernaugh, R.L., et al., BIOTECHNOLOGY TECHNIQUES, Vol 1, 1987 p 31

11. Galfre, G., et al., METHODS IN ENZYMOLOGY, Vol 73, 1981 p 3

12. Frighet, B., et al., J IMMUNOL METH, Vol 77, 1987 p 305

13. Shen Beifen, et al., BIOCHEMISTRY, Vol 3, 1987 p 463

14. Gu Dengfeng, et al., ACTA MICROBIOLOGICA SINICA, Vol 27, 1987 p 128

## Antibiotic Effect of *Pseudomonas Jinanensis* Sp Nov

*40091007j Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 29 No 6, Dec 89 pp 452-459*

[English abstract of article by He Zuze [0149 4371 3419], Xu Dajiang 1776 1129 3068], et al., of the Institute of Materia Medica, Shandong Academy of Medical Sciences, Jinan]

[Text] *Pseudomonas jinanensis* has been isolated from the soil and screened by antibioticgram and spermatogonial assay. It has certain antibiotic properties. The metabolite produced is quite effective against *Staphylococcus aureus* and some other positive germs.

A *Pseudomonas jinanensis* vaccine, referred to as PJV, has been prepared. It exhibits biological activity against the growth of tumors in mice and murine spermatogenous cells. It is believed that enhancing the nonspecific immunologic functions of the host might increase the efficacy of praziquantel on schistosomiasis in mice. PGV has already demonstrated its effectiveness against malignant pleural effusion (effective rate 76.5 percent), lung cancer (effective rate 58.3 percent), and many solid kinds of cancer (effective rate 52.1 percent), with a total effective rate of 64.2 percent. It has the potential for increasing the sensitivity of cancer cells to radiation, as well as for stimulating animals (rabbits) to develop specific antibodies. PJV may belong to the class of immunomodulating agents.

### References

1. Cai Hongdao, et al., "Practical Clinical Medical Technology," Vol 3, Shanghai Health Press, Shanghai, 1958, p 1058

2. Shanghai Institute of Pharmaceutical Research, Chinese Academy of Sciences, SCIENCE BULLETIN, Vol 16, 1979 pp 765-768

3. Zhang Ling, et al., CHINESE JOURNAL OF IMMUNOLOGY, Vol 1 No 3, 1985 pp 25-30

4. Lowell, A.G., et al., CANCER TREATMENT REPORTS, Vol 62, 1978 pp 1931-1935

5. Richard, M.S., et al., CANCER TREATMENT REPORTS, Vol 62, 1978 pp 1937-1941

6. Zheng Shanshan, et al., "Chinese Medical Encyclopedia (Immunology)," Shanghai S&T Publishing House, Shanghai, 1983, pp 37-38

7. Hortobagyi, G.N., et al., CANCER TREATMENT REPORTS, Vol 64, 1980 pp 157-159

8. Harukazu, M., et al., GANN, Vol 70, 1972 pp 687-692

9. Yu He, et al., FOREIGN MEDICINE—IMMUNOLOGY, No 1, 1980 pp 1-15

10. Zang Renjie, et al., FOREIGN MEDICINE—IMMUNOLOGY, No 1, 1979 pp 1-9

## Study of Selection of Higher Yield Strain of Agricultural Antibiotic 120 by Protoplast Fusions*

*40091007k Beijing WEISHENGWU XUEBAO [ACTA MICROBIOLOGICA SINICA] in Chinese Vol 29 No 6, Dec 89 pp 464-466*

[English abstract of article by Zhu Changxiong [2612 2490 7160], Xie Deling [6200 1795 7881], et al., of the Biological Control Laboratory, Chinese Academy of Agricultural Sciences, Beijing]

[Text] Protoplast fusion between two strains, TF-120 ($Sm^s120^r$) and KT-739 ($Sm^r120^s$) of *Streptomyces hygrospinosus* var. *beijingensis* was carried out, producing agricultural antibiotic 120. The fusion was induced by the addition of PEG (MW 1000), and the fusants displayed variations in spore color, resistance and antibiotic products. Among the fusants, FR32 gave a 30 percent higher yield of the antibiotic than the parent strains did.

*Project supported by the National Natural Science Foundation of China.

### References

1. Pigas, J., et al., APPL ENVIRONMENTAL MICROBIOL, Vol 44, 1982 p 1178

2. Vournakis, J.N., et al., SCIENCE, Vol 219, 1983 pp 703-709

3. Zheng Youxia, et al., BIOTECHNOLOGY, Vol 1 No 3, 1985 pp 32-37

4. Xing Kongzhao, et al., "Collection of Papers of Fifth National Antibiotics Conference," (Part 1), Antibiotics Society of the Chinese Pharmaceutical Association, Jinan, 1985, pp 173-178

5. Xie Deling, et al., ANTIBIOTICS, 1984 p 169

6. Zhuang Zenghui, MICROBIOLOGY, Vol 12 No 4, 1985 pp 175-179

7. Okanishi, M., et al., J GEN MICROBIOL, Vol 80, 1974 pp 389-400

8. Baltz, R.H., J GEN MICROBIOL, Vol 107, 1978 pp 93-102

9. Hopwood, D.A., et al., NATURE, Vol 263, 1977 p 171.

## Experimental, Clinical Studies of Pathogenicity of Extracellular Proteinases of Streptomyces Thermohygroscopicus in Farmer's Lung

*40091007l Beijing ZHONGGUO JIEHE HE HUXI ZAZHI [CHINESE JOURNAL OF TUBERCULOSIS AND RESPIRATORY DISEASES] in Chinese Vol 12 No 5, 1989 pp 282-285, 318*

[English abstract of article by Dai Huaping [0108 5478 1627], Division of Respiratory Medicine, Tongji Hospital, Tongji Medical University, Wuhan]

[Text] Streptomyces thermohygroscopicus is a thermoactinomycetes which has recently been found to be related to farmer's lung in China. In this study, a model of acute farmer's lung was successfully developed with extracellular proteinases of streptomyces thermohygroscopicus (EPST) in a rabbit, and the precipitating antibodies against EPST were detected in the sera from patients with farmer's lung or bagassosis. A lack of cross reactivity was demonstrated among EPST, the T. vulgaris antigen and the Micropolyspora faeni antigen.

### References

1. Saivaggio, R.A., "Cooke Memorial Lecture: Hypersensitivity Pneumonitis," J ALLERGY CLIN IMMUNOL, Vol 79, 1987 p 558

2. Nicolet, J., et al., "Experimental Farmer's Lung: Immunological Response in Rabbit to Protein Fractions of Micropolyspora Faeni," Z IMMUNITAETESFORSCH IMMUNOBIOL, Vol 155, 1979 p 399

3. Che Dongyuan, et al., "Comprehensive Study of Farmer's Lung in Honghu County," JOURNAL OF TONGJI MEDICAL UNIVERSITY, No 1, 1986 p 36

4. Lu Yunyu, Shen Yie, "Jiangsu Area Pathogens of Farmer's Lung—Isolation and Identification of Thermophilic Actinomycetes," ACTA MICROBIOLOGICA SINICA, Vol 25, 1985 p 351

5. Zheng Ling, Niu Ruji, "Model Construction of Farmer's Lung Using Streptomyces Thermohygroscopicus," JOURNAL OF TONGJI MEDICAL UNIVERSITY, No 5, 1987 p 341

6. Cesar, N., et al., "The Pulmonary Pathology of Farmer's Lung Disease," CHEST, Vol 81, 1982 p 142

7. Schällibaum, M., et al., "Histopathological and Immunohistological Changes in Rabbit Lung After Experimental Exposure to a Purified Enzyme of Micropolyspora Faeni," CLIN EXP IMMUNOL, Vol 28, 1977 p 535

8. Ghose, T., et al., "Immunopathological Studies in Patients with Farmer's Lung," CLIN ALLERGY, Vol 4, 1974 p 119

9. Barboriak J.J., et al., "Immunologic Cross-Reactions of Thermophilic Actinomycetes Isolated from Home Environments," J ALLERGY CLIN IMMUNOL, Vol 49, 1972 p 81

10. Roberts, R.C., et al., "Isolation and Possible Relevance of Thermoactinomycetes Candidas Proteinases in Farmer's Lung Diseases," INFECT IMMUN, Vol 40, 1983 p 553

## New Developments in High-Speed Computing Reported

### Parallel Computing Institute Established

*40080010 Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 24 Jan 90 p 1*

[Unattributed article]

[Text] China's first "Research Institute for Parallel Computing," located at Central China Science & Engineering University (CCSEU) in Wuhan, has been established. It is reported that the present gap between domestic and foreign research in parallel computing is not great, and that in some respects domestic research is in the lead. The "YH [Galaxy] three-dimensional residue static check module" [sanwei shengyu jing jiaozheng mokuai] developed by CCSEU has basically taken shape; it can be used as an application software product for processing actual seismic data.

### New Array Processors Developed by CAS Institute

*40080010 Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 24 Jan 90 p 16*

[Article by Shao Xiangqian [6730 0686 0467]: "CAS Computing Institute Puts Out APSUN Array Processors"]

[Summary] The Chinese Academy of Sciences' (CAS) Institute of Computing Technology has recently developed a new series of general-purpose, single-board, high-speed array processors (AP) which, when used in conjunction with Sun3 or Sun4 workstations (WS), can increase array processing power by a factor of several dozen to several hundred times—i.e., up to that of a mainframe. The new AP's, which can be used for seismic-prospecting data processing, image and graphics processing, signal processing, emulation and simulation, weather forecasting, finite element analysis, and radar guidance, are to be technically certified in the near future.

The new series currently consists of two models, the APSUN 1600 and the APSUN 2000, which have clock speeds of 8MHz and 10MHz, respectively; peak operating speeds are 16MFLOPS [million floating-point operations per second] and 20MFLOPS, respectively. Consisting of six sections—the floating-point processor (FPP), the integer processor, the sequence controller, the data memory, the microinstruction code memory, and the interface (standard VME bus hook-up to host computer)—the new AP's incorporate such advanced devices as CMOS VLSI circuits (in the FPP and data processor). On-board RAM is 1 Mbyte, which is expandable. Via a DMA [direct memory access] controller, the AP's data memory can directly exchange data with the host computer's internal memory.

The new AP's have over 130 library functions; C or FORTRAN languages can be used, and the UNIX operating system is employed. Several kinds of application software, checking programs, and development programs have been made available.

### Donghai 32-Bit Workstation To Be Marketed

*40080010 Beijing JISUANJI SHIJIE [CHINA COMPUTERWORLD] in Chinese No 4, 24 Jan 90 p 16*

[Article by Li Qingci [2621 3237 1964]]

[Summary] Based on the Donghai 0540 microcomputer, the Shanghai Electronic Computer Plant has developed the Donghai 32-bit workstation (WS), which employs the 25MHz 80386 CPU chip and is also completely compatible with the 8086 and 80286 chips. Physical memory space is 4.2GB (gigabytes), while virtual memory is 64,000GB. The WS operates with zero wait states; has 4Mbytes of basic internal memory, expandable to 16Mbytes; and comes with a 32K buffer RAM. The new WS can support several kinds of hard disk, floppy disk, and tape drive, and has eight card slots which are designed to handle XT and AT cards and boards. The graphics controller (for 1280 x 1024 x 8 high-resolution graphics) uses the TMS34010 third-generation chip, and permits CGA and EGA emulation [on the motherboard].

## Environmental Protection Law Promulgated

*90CF0267A Beijing JINGJI RIBAO in Chinese 28 Dec 89 p 2*

[Text] The People's Republic of China Environmental Protection Law (Passed in the Eleventh Session of the Standing Committee of the Seventh National People's Congress on 26 December, 1989)

By order (No 22) of the Chairman of the People's Republic of China:

The Environmental Protection Law of the People's Republic of China has been passed by the Eleventh Session of the Standing Committee of the Seventh National People's Congress on 26 December, 1989. It is hereby made public and to take effect immediately.

Signed Yang Xiangkun

Chairman, The People's Republic of China

26 December, 1989

Chapter 1. GENERAL REGULATIONS

Article 1 This law is established to protect and improve the living environment and ecology, to prevent pollution and other public hazards, to ensure human health and to promote the development of socialist modernization.

Article 2 In the law, the term environment refers to all the natural factors, altered or unaltered, that affect the living and development of humankind. These include the atmosphere, water, ocean, land, mines, forests, prairies, wild living things, natural relics, civil relics, natural protection areas, scenic areas, cities and rural towns.

Article 3 This law applies to the territories of the People's Republic of China and other sea areas under the jurisdiction of the People's Republic of China.

Article 4 The environmental protection plan set by the state must be included in the national economy and societal development plan. The state shall adopt economic and technological policies and measures that benefit environmental protection so that the latter will be coordinated with economic construction and societal development.

Article 5 The state shall encourage scientific education for environmental protection, strengthen the research and development of science and technology to raise the level of environmental science and promote the knowledge on environmental protection.

Article 6 All units and individuals have a responsibility to protect the environment and a right to report and charge those units or individuals polluting or damaging the environment.

Article 7 The environmental protection administrative department in the State Council shall monitor and manage the environmental-protection work nationwide.

The environmental-protection administrative department in local people's government at the level of county and above shall monitor and manage environmental-protection tasks in local areas.

Based on the stipulations of relevant laws, the state oceanography administrative department, the harbor supervisors, the fishing and fishing-harbor supervisors, the army environmental protection department, and various-level public safety, transportation, railroad, and civil-aviation supervisors shall manage the environment and prevent pollution.

Based on the stipulation of relevant laws, the administrative departments in charge of land, mines, forests, agriculture, and water conservancy of local people's governments at the county level and above shall protect and manage the resources.

Article 8 Units and individuals with distinguished achievements in environmental protection and improvement shall receive awards from the people's government.

Chapter 2. ENVIRONMENTAL MONITORING AND MANAGEMENT

Article 9 The environmental protection administrative department in the State Council shall set the national environmental quality standards.

The people's governments of provinces, autonomous regions, and direct-jurisdiction municipalities may set local standards on environmental quality for items not covered under the national standards and report to the environmental protection administrative department in the State Council for reference.

Article 10 The environmental protection administrative department of the State Council is responsible for setting the national emission standards based on the national environmental quality standards and the economic and technological conditions of the nation.

For items not covered in the national emission standards, the people's governments of provinces, autonomous regions and direct-jurisdiction municipalities may set their local emission standards. For items already covered in the national emission standards, local governments may set local standards that are stricter than the national standards. Local emission standards must be filed with the environmental protection administrative department of the State Council.

In areas where local emission standards already exist, the local standards will be enforced.

Article 11 The environmental protection administrative department of the State Council shall establish a monitoring system and set monitoring regulations to improve environmental monitoring and management in collaboration with other departments and organizations.

The environmental protection administrative department of the State Council, and people's governments of provinces, autonomous regions, and direct-jurisdiction municipalities will publish environmental-condition bulletins periodically.

Article 12 The environmental protection administrative departments of the people's governments at the county level and above should, in collaboration with related departments, investigate and evaluate the environment in the region of their jurisdiction, and formulate environmental-protection regulations. After integration into the planning department, the regulations should be submitted to the people's government of the same level.

Article 13 Construction of facilities that pollute the environment must follow the state's regulation on construction and environmental protection.

Environmental-impact reports of construction projects must evaluate the pollution generated by the construction and the effects of the pollution. Preventive measures must be stated, reviewed by the supervising department and approved within the channel of environmental-protection administration. After the environmental-impact report is approved, the planning department can then approve the construction-design report.

Article 14 The environmental protection administrative departments of people's governments at the county level and above, or other departments permitted by law to monitor and manage the environment, have the right to conduct on-site inspection of polluting units in their region of jurisdiction. The units being inspected should report the facts and provide the needed information. The inspecting department should keep the technical secrets and business secrets confidential.

Article 15 Prevention of environmental pollution and damage in inter-regional areas should be carried out by the people's governments involved, or decided by the people's government of a higher level.

Chapter 3. PROTECTING AND IMPROVING THE ENVIRONMENT

Article 16 The people's governments at various levels shall be responsible for the environmental quality of their region and take actions to improve it.

Article 17 The people's governments at various levels should take measures to protect representative natural ecological systems, distribution areas of rare and endangered species of wild animals and plants, important water resources, geological structures of great scientific and cultural value, renowned caverns and fossil distribution areas, natural relics such as glaciers, volcanoes, hot springs, and cultural relics such as old trees and famous forests.

Article 18 In scenic areas, natural protection areas, and other special protection areas declared by the State Council, departments in the State Council, and people's governments of provinces, autonomous regions and direct-jurisdiction municipalities, construction of polluting industrial facilities is prohibited. Other construction is permitted provided the emission of polluting materials does not exceed the permitted level. If the emission of existing facilities exceeds the allowed level, corrections must be made within a specified period.

Article 19 When natural resources are developed, actions must be taken to protect the ecological environment.

Article 20 People's governments at various levels should intensify the effort to protect the agricultural environment, to prevent soil contamination, to prevent land from becoming sand, swamps, or salinized, to prevent land from settling, to prevent damages to the vegetation cover, to prevent soil erosion, dry-up of water resources, extinction of species, and other ecological ailments, to prevent pests and plant diseases, and to sensibly apply chemical fertilizers, insecticides, and growth hormones.

Article 21 The State Council and the people's governments in coastal areas should protect the marine environment. The law must be observed and damages to the ocean environment prevented when pollutants and wastes are released to the ocean, in the construction of coastal structures, and in the prospecting and development of off-shore petroleum.

Article 22 Goals and tasks of environmental protection and improvement must be included in urban planning.

Article 23 For urban and rural construction projects, consideration must be given to the unique characteristics of the local environment to protect vegetation, bodies of water and natural scenery and to improve parks, greenbelts, and scenic spots.

Chapter 4. PREVENTION OF ENVIRONMENTAL POLLUTION AND OTHER PUBLIC HAZARDS

Article 24 Units producing pollution and other public hazards must include environmental protection in their work plan and establish an environmental-protection responsibility system. Effective measures must be taken to prevent the generation of waste gas, waste water, waste sludge, dust, foul-smelling gas, radioactive material, noise, vibration, and electromagnetic radiation.

Article 25 In the construction of new industrial enterprises and in the remodeling of existing industries, high-efficiency, low-pollution equipment and technology and economical waste-utilization and pollutant-processing techniques should be used.

Article 26 In construction projects, pollution-prevention facilities and the main body of the structure must be designed, built, and put into operation simultaneously. A pollution-prevention facility must be inspected and approved by the original environmental-protection administrative unit that reviewed the environmental-impact report before the facility can be built and put into use.

Pollution-prevention equipment must not be dismantled without authorization or left unused. When it is necessary to dismantle such equipment or leave it unused, approval must be obtained from the local environmental-protection administrative unit.

Article 27 Enterprises and business units releasing pollutants must register according to the regulation of the State Council environmental protection administrative unit.

Article 28 Enterprises and business units that exceed the national or local pollutant emission standards must pay an amount of pollution fee set by the state and be responsible for the clean-up. When water pollution laws apply, such laws will be followed.

The fees collected for exceeding pollution standards must be used for pollution prevention and not any other purpose. Specific regulations for the usage of the fee are set by the State Council.

Article 29 Enterprises and business units causing serious pollution of the environment will be ordered to clean up within a specified time period.

Enterprises and business units directly under the central government or the people's governments of provinces, autonomous regions, and direct-jurisdiction municipalities will be ordered to clean up their pollution by the people's governments of the provinces, autonomous regions and direct-jurisdiction municipalities. Enterprises and business units under city and county people's governments will be ordered to clean up by the city and county people's governments. Enterprises and business units so ordered must complete the clean-up tasks within the allowed period.

Article 30 The import of technologies or equipment not conforming to China's environmental-protection regulations is forbidden.

Article 31 In case of accidents or other unanticipated incidents that have caused or may cause pollution of the environment, units must take immediate action and notify other units or residents in danger of being contaminated. Such incidents must also be reported to the local environmental protection agencies and other relevant units for investigation.

Enterprises and business units likely to cause major pollution incidents should take preventive measures to avoid such incidents.

Article 32 Environmental protection administrative departments of people's governments at the level of county and above must report to the local people's government in case of serious contamination of the environment that threatens the safety of life and property, so that the people's governments may take action to eliminate or reduce the risk.

Article 33 The production, storage, transport, sale and usage of poisonous chemicals and radioactive materials must follow the applicable regulations of the state in order to prevent pollution.

Article 34 No unit is allowed to transfer production equipment capable of causing serious pollution to units with no pollution-prevention capability.

Chapter 5. LEGAL RESPONSIBILITY

Article 35 Violations of the environmental protection law by committing one of the following acts will be warned or fined by the environmental protection administrative department or other departments given the right to monitor and manage the environment by law:

(1) Refusal of on-site inspection by environmental protection administrative departments or other departments given the right to monitor and manage the environment by law, or committing falsification in such inspections.

(2) Refusal to report or falsification of a report of pollutant emissions as required by the State Council environmental protection administrative department.

(3) Failure to pay the fine for exceeding the emission standards.

(4) Import technology or equipment not conforming to China's environmental-protection regulations.

(5) Transfer of production equipment generating serious pollution to units without pollution-prevention capability.

Article 36 If a construction project is put into production or operation without completing its environmental protection equipment or without meeting the state-set requirements, the environmental-protection department that approved the environmental-impact report of the construction project should order the production or operation to stop and may impose a fine.

Article 37 Those removing or disabling environmental-protection equipment without the permission of environmental-protection agencies, and exceeding the emission-release standards should be ordered to reinstall the equipment and be fined.

Article 38 Enterprises or business units violating this law and causing pollution of the environment will be fined according to the resulting damage by the environmental-protection administrative department or other departments exercising the right permitted by law to monitor and manage the environment. In more severe cases, the responsible parties will be given administrative punishment by the unit or the governmental office.

Article 39 Enterprises or business units ordered to take environmental treatment actions but failing to do so must pay an extra fee for exceeding the standards, and may be ordered to pay a fine based on the degree of damage, or be ordered to shut down or close.

The amount of the fine will be determined by the environmental-protection administrative department. The decision to shut down or close an enterprise or business unit should be made by the people's government that ordered the cleanup before a certain date. The order to shut down or close enterprises or business units under the direct jurisdiction of the central government must be approved by the State Council.

Article 40 A decision of administrative penalty may be appealed within fifteen days from the date of receipt of the notice. The appeal should be made to the office one level above the office that made the penalty decision. To challenge the decision of the appeal, one may file a suit in the people's court within fifteen days. A client may also file a suit directly in the people's court without appealing to the office one level above. If the client did not execute the penalty decision and no appeals were filed within the allowed time period, and no suits were filed in the people's court, then the office making the penalty decision may request the people's court to enforce the punishment.

Article 41 The party that caused pollution and damage to the environment shall be responsible for removing the hazards and be responsible for paying for the damages incurred to individuals or units.

When there are disagreements on the responsibility and monetary amount of compensation, such disagreements may, at the request of the parties involved, be resolved by the environmental-protection administrative department or by departments given the right by law to monitor and manage the environment. If the party or parties do not agree with the decision, the party or parties may appeal to the people's court. The parties involved may also file a suit directly in the people's court without going through the environmental-protection administrative department.

For environmental pollution and damages caused entirely by natural disasters beyond the human power to resist, assuming that reasonable and timely actions were taken to prevent damages to the environment, no legal responsibility will be assessed.

Article 42 The statute of limitations for environmental-damage suits is three years, from the date when the client became aware of or should be aware of the damages caused by pollution.

Article 43 When this law is violated and severe damage to the environment is caused by pollution, leading to grave consequences of great losses of public or private property or casualty, the persons directly responsible will be prosecuted for criminal responsibility according to law.

Article 44 When this law is violated and damages are done to land, forests, grass, water, minerals, fisheries and wild-animal and plant resources, the offenders will have legal responsibility based on the laws that apply.

Article 45 If the environmental-monitoring and management personnel misuse their authority, neglect their duty, or commit collusion, administrative measures will be taken by the host unit or an office at a higher level; if crimes are committed, then the offenders will be prosecuted for criminal responsibility according to law.

Chapter 6. APPENDIX

Article 46 When an international treaty regarding environmental protection engaged or participated in by the People's Republic of China differs from the law of the People's Republic of China, the international treaty applies, except the articles declared to be reserved by the People's Republic of China.

Article 47 This law takes effect on the day it is announced. On the same day the (Tentative) Environmental Protection Law of the People's Republic of China expires.

## New Advances in Research, Practical Device Fabrication Reported

*40080012B Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 11 Feb 90 p 1*

[Article by Huang Yong [7806 0516]: "China's Superconductivity Research Steadily Develops"]

[Summary] Beijing, 8 Feb—From the General Committee Meeting of the Chinese Academy of Sciences' [CAS] Division of Mathematics and Physics, it has been learned that China's superconductivity research has been advancing steadily, and that in some respects domestic research is in the forefront worldwide. As revealed by Beijing University Professor Gan Zizhao [3927 1311 6856], the critical current density of superconducting thin films developed domestically has now reached 3 million amperes per square centimeter (A/$cm^2$), about the same as that achieved in the United States, the FRG, and other countries. Moreover, China can supply superconducting thin-film samples to universities in the United States and elsewhere. China's micromachining of superconducting thin films is at a level no less than that overseas; micromachining can be done to [an accuracy of] 2 x $10^{-5}$ centimeters.

In the area of devices, China has developed a superconducting quantum interference device [SQUID] with a magnetic-field sensitivity of 5 x $10^{-8}$ gauss, a value less than one-100-millionth that of the Earth's magnetic field and one that is at a world-class level. China has also developed geological instruments that have been used to measure magnetic fields in rock, and has also developed antennas, transmission lines, and delay lines that incorporate superconducting devices.

In the area of superconducting bulk materials, the critical current density reached domestically is 14,000 A/$cm^2$ with no magnetic field, and 4,000 A/$cm^2$ with a 10,000-gauss magnetic field.

In the area of practical finished/formed materials [cheng cai], China has developed materials with a critical current density of 1,000 A/$cm^2$ which it can theoretically manufacture in endless lengths. This achievement is without equal worldwide.

Chinese scientists are currently conducting active physical research to improve the quality of the sample materials it intends to supply to the international market. Research centers in the United States and other countries have asked China for these samples.

## Implementation of Multiprocessor Parallel Processing in SCPC-DAMA Satellite Communications System

*90CF0303A Shanghai DIANXIN KUAIBAO [TELECOMMUNICATIONS INFORMATION] in Chinese No 12, Dec 89 pp 14-16*

[Article by Tang Jihua [0781 4480 5478]; see also JPRS-CST-89-007, 17 Mar 89, p 156 for earlier report]

[Text] Satellite communications is an effective means of communication for remote regions. In the design of satellite communications channels, the demand assignment mode is preferred over the preassigned mode because of its versatility and convenience; it is particularly effective in light-traffic regions. The systems currently operating in this country all use the preassigned mode; if the existing communications equipment are modified to operate in the demand assignment mode, regional satellite communications capabilities can be significantly enhanced. In this article, an analysis of the computer signal flow of the SCPC-DAMA [single channel per carrier/demand assignment multiple access], (or simply DAMA) system developed by Institute No. 1 of the Ministry of Posts and Telecommunications (MPT) is presented. The article points out the necessity of parallel processing, and discusses in detail the parallel processing techniques for the multiprocessor of the DAMA system.

### I. Introduction to the DAMA System

The key role of a DAMA system is to select and occupy a free satellite channel for voice communications whenever a channel is requested by a ground user, and to release the channel for other users when the conversation is completed. The entire communications process is initiated by a telephone signal on the ground and is automatically executed under computer control. The DAMA system developed by Institute No. 1 of MPT contains the following segments:

1) the main control segment of the DAMA system: i.e., the computer and its interfaces;

2) the trunk lines between the ground-based trunk exchanges and the computer ground interfaces;

3) the shared channel equipment dedicated to transmission signaling [i.e., common-channel signaling].

### II. Computer Signal Flows and Analysis—The Necessity for Parallel Processing

The primary signal flows handled by the computer in a DAMA system are:

1. Signal flow between the computer and the ground interfaces

The computer identifies and receives standard commands from the ground segment, and stores the commands in tabular form in the order of the trunk lines; in the case where the called station is idle, the command signals are sent to a buffer zone based on the transmission priorities. The computer also converts the commands received from the space segment into standard ground-segment signals, and sends them back to the trunk exchanges on the ground. In addition, the computer also performs various control actions in response to the command signals.

2. Signal flow between the computer and the shared channel equipment

The shared channels operate in the TDMA [time-division multiple access] mode; during the time slot of transmission of each local station, the computer must send the space-segment commands to the transmission port of the synchronizer in real time; during other split-frame time slots, the computer must receive the signals transmitted from the ground stations in real time. These signals must be analyzed and categorized; information about the local stations are stored in the computer in tabular form according to the satellite line number. In response to signals from the space segment and from the synchronizer of the shared channels, the computer initiates the appropriate control actions.

3. Computer control of other equipment

The computer controls in real time the operation of the channel frequency synthesizer, channel selection, and processes various fault signals and manual-interrupt signals.

The above description shows that most of the work done by the DAMA system is concentrated in the following two areas: 1) the ground-interface processing subroutines, and 2) the shared channel processing subroutines. The ground-interface subroutines require long processing times (particularly when there are a large number of trunk lines). The shared-channel equipment which operates in the TDMA mode has strong real-time requirements; in each split-frame time slot, the computer must respond in a timely manner. In order to prevent loss of command signals and code errors caused by incomplete data transmission, excessive interrupts by other programs during split-frame information processing are not permitted. Since the occurrence of ground commands and fault signals is random, one approach to ensure that the DAMA system functions normally under the extreme condition of "simultaneous calls" is to increase the speed of the computer; however, this implies higher cost. The other approach is to use a parallel processing technique, which will be discussed in this article. In this approach, a sequentially executed program is divided into several subroutines which are executed simultaneously by multiple processors. Today there are many low-cost, high-performance monolithic microprocessors on the market; by connecting these monolithic processors to a main computer to form a parallel-processing system, the performance-to-cost ratio of the system can be significantly improved.

### III. Implementation of the Parallel Processing System

The multiprocessor, parallel-processing system which we have developed is shown in Figure 1.

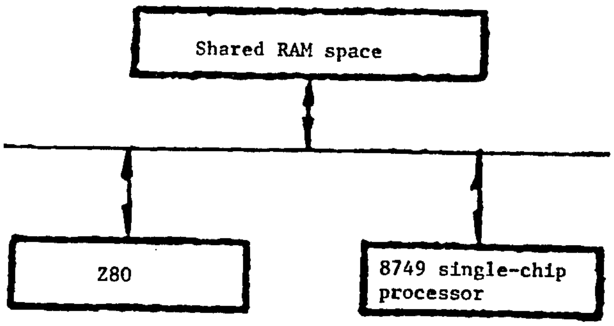



**Figure 1**

This is called a distributed processing system,[2] whose unique feature is that the software and hardware resources are separated, and the same storage is shared by a number of different processors.

The main control segment of the DAMA system consists of a dual-processor system. One is the CS-II system computer's Z80 chip, which performs the main control function of the DAMA system; the other is an 8749 chip, which performs the function of processing the high-volume but relatively independent TDMA space-segment command signals. The shared data space is a 2000-byte RAM.

A bus link exists between the two processors and the storage; this method of connection is structurally simple, inexpensive, reliable and easy to implement.[2] A single bus is shared by the two processors through their respective ports, which are staggered in time. The shared storage can be treated randomly as the resource for one of the processors.

The main control computer and the monolithic computer of the DAMA system perform the functions of program execution and signal processing simultaneously, and they communicate to each other via the shared data space.

### IV. The Problems Associated With Parallel Processing

The basic problems that must be addressed are those associated with the core of the distributed processing system, which is the storage shared by the processors.

1. The signals in a DAMA system appear randomly. In order to prevent signal overlay and loss of signals when a large number of signals arrive simultaneously, each processor must have an adequate (or unlimited)buffer zone. In this system the main computer stores the ground-segment command signal in tabular form in the order of the trunk lines; the monolithic computer stores the space-segment command signals in tabular form in the order of the satellite channels.

2. A multiprocessor system effectively increases the processor speed, but competition for the bus link prior to random access to the shared space will impose an extra load on the CPU. Therefore, the number of accesses to the shared space should be minimized in the program design; this can be achieved by setting up the necessary table control blocks, and establishing a logical data structure and various control information. See Ref. [1] for details.

3. In order to ensure the integrity of data transmission and to maintain normal system operation under extreme conditions, the dwell time of each processor in the shared data space must be kept sufficiently short. This imposes the requirement of optimizing the program design and retaining a special buffer zone for each processor.

4. Since all the processors share a single bus link, each processor should be equipped with a bus isolator. Furthermore, since the visits by the processors to the shared data region are mutually exclusive, hand-shake signals and shared-resource control signals should be established between the processors. A processor can occupy a shared data region only when both of the following conditions are satisfied: 1) when this processor has permission to occupy the shared resource, and 2) when this processor has occupied the bus link.

5. In order to ensure the reliability of interlocking when competing for resources, and to prevent loss of lock caused by time delays of the hand-shake signals, a criterion based on test results should be established for software design; in other words, a software "AND" gate should be added.[1]

### V. Conclusion

This article gives a description of the parallel processing techniques used by the SCPC-DAMA system developed by Institute No. 1 of MPT. It also discusses some of the detailed engineering problems associated with the implementation of a parallel-processing, multiprocessor distributed system.

#### References

1. Tang Jihua, "Synchronizer-Computer Interfaces," Internal Report, Institute No. 11 of the Ministry of Posts and Telecommunications, 1988, 4.

2. Jin Lan [6855 5695] et al., "Structure of Parallel Processing Computers," 1982.

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