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# China Report

SCIENCE AND TECHNOLOGY

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22 May 1984

# CHINA REPORT SCIENCE AND TECHNOLOGY

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## NATIONAL DEVELOPMENTS

### QIAN XUESEN ON UNDERSTANDING THE 'NEW TECHNOLOGICAL REVOLUTION'

HK230700 Shanghai SHIJIE JINGJI DAobao in Chinese 2 Apr 84 p 3

[Article by Qian Xuesen [6929 1331 2772]: "Certain Basic Problems Concerning Understanding the New Technological Revolution"--Part I]

[Text] Editor's note: We must study and create the science of socialist modernization, which is actually the theory of the management of the entire country as well as the theoretical basis of social systems engineering or social engineering. This subject also concerns the application of systems science and systems engineering to the work of overall organization and management of the country. [end editor's note]

#### I. Scientific Revolutions, Technological Revolutions, and Social Revolutions

The question we are going to discuss actually concerns the laws of development of man's social activities. Nothing in the world ever develops smoothly and steadily, but invariably follows a tortuous path. At various times, there may be advances, stagnation, or leaps. A leap is a revolution.

I wish to expound on this question from four aspects. I will first discuss three of them.

The first aspect concerns leaps in man's understanding of the objective world. These can be called scientific revolutions. "Scientific revolution" is a term used by an American philosopher of science, Thomas Kuhn. He wrote the book "The Structure of Scientific Revolutions." His book contains some idealist viewpoints which we cannot accept. However, he holds that man's understanding of the objective world does not develop smoothly and steadily, and sometimes revolutions may occur. The concept of scientific revolution is compatible with Marxist philosophy.

In this connection, what scientific revolutions have occurred in the history of science? What developments were leaps in man's understanding of the objective world? For example, during the 16th century, the heliocentric theory, which states that the earth revolves round the sun, appeared in Western countries. At that time, this was a leap in man's understanding of the objective world. The appearance of Newtonian mechanics in the 17th century was another scientific revolution in man's understanding of the

objective world. The discovery of oxygen in the latter half of the 18th century was another leap in man's understanding of the objective world. In the 19th century, there were three epoch-making scientific discoveries, namely, discoveries of the cell, the transformation of energy, and the evolution of living organisms. Engels considered them epoch-making scientific discoveries. Scientific revolutions also took place in the realm of social sciences, and there were two revolutions of this kind in the mid-19th century, both of which were initiated and caused to develop by Marx. The first one was the putting forth and founding of historical materialism by Marx. This was a scientific revolution. Soon afterward, Marx put forth the surplus value theory. This was also a scientific revolution. Both of these revolutions were leaps in man's understanding of his own society. Later, the electromagnetic field theory appeared, which integrated electricity with magnetism. In the early 20th century, there was an even larger number of discoveries, for example, Pavlov's discoveries in psychology, the relativity theory, quantum mechanics, and so on. At present, a scientific revolution in quantum field theory is probably brewing. This theory attempts to unify the roles of four categories of forces in physics; these are the gravitational force, which is weakest, as well as weak interaction, electromagnetic interaction, and strong interaction. These four kinds of interactions must be unified and a general and unified field theory must be established. At present, this task has not been accomplished. Its accomplishment will certainly be a scientific revolution. I wish to demonstrate through these examples that scientific revolutions are leaps in man's understanding of the objective world.

The second aspect concerns the question of man acquiring an understanding of the objective world in order to transform the objective world. Do leaps occur in man's transformation of the technology existing in the objective world? The answer is of course in the affirmative. This kind of leap is a technological revolution. The term technological revolution was used at a very early time by Comrade Mao Zedong. In his comments and instructions, written in a document in 1969, he very clearly stated that ordinary and minor technological improvements can be called technological innovations, while major and basic technological changes which have extensive effects are called technological revolutions. Comrade Mao Zedong not only put forth this term, but also gave three examples of technological revolutions, namely, the appearance of the steam engine, the appearance of electric power, and the appearance of atomic energy (which we now call nuclear energy) in today's world. Thus, the meaning of technological revolution has been very precisely set forth.

In light of this meaning, we can also trace back to other technological revolutions in history. In ancient times, many began to learn how to use stone tools. At that time, the making of stone tools was an extraordinary major achievement to man's transformation of the objective world. It was a technological revolution in history. The use of fire can also be said to be a technological revolution. In modern times, leaps in man's transformation of science and technology in the objective world include the appearance of the steam engine, the diesel engine, chemical engineering technology, electric

power, radio technology, and aeronautics technology. At present, there are new technological revolutions which we frequently talk about, for example, those involving computers, genetic engineering, laser technology, nuclear energy, nuclear technology, space technology, marine engineering, and so on. Therefore, there are a number of, or a group of, new technological revolutions, instead of a single one. I think that the group of new technological revolutions probably should not only include the above-mentioned items, but should also include systems engineering. This is because nowadays the organization and management of a complicated natural or artificial system, such as a factory, a project, or even something as large as a country, do not merely depend on thinking, envisioning, and conjecture, but must depend on quantitative scientific analysis. This represents an extraordinary change, which is the introduction of systems engineering. Therefore, the introduction of systems engineering should be regarded as a leap in man's transformation of the objective world, that is, a technological revolution.

A third kind of revolution is the leap in the realm of social systems, which we call social revolutions, or simply revolutions. For example, the collapse of the primitive communes and the birth of the slave system constituted a leap in the realm of social systems, or constituted a social revolution. Subsequent social revolutions or leaps in the realm of social systems included the transformation of the slave society into a feudal society and the transformation of the feudal social system into a capitalist social system. The establishment of the socialist and communist social system is of course, a leap in the realm of social systems, or a social revolution.

## II. Revolutions in Production

The term revolution in production [chanye geming (3934 2814 7245 0730)] was used by Engels as early as in the book "The Condition of the Working Class in England" published in 1845. However, there is great confusion in the capitalist countries' use of the terms "revolution in production, industrial revolution, and scientific and technological revolution. Under this condition, it would be fine if we were not to talk about revolution in production for the time being. However, we cannot evade this question because this term appears in the works of Engels and Marx. We should, according to the concepts of dialectical materialism and historical materialism, study what revolution in production is. Moreover, what the capitalist countries call revolution in production, "the fourth global revolution in production," "the third tide," and so on, also contain a hidden idea which we cannot agree to, that is: Marxist theory, or Marxism, was derived through analysis based on the results of the first revolution in production, and this is the basis of your scientific socialism; but now because a new revolution in production has appeared and because Marx, Engels, and Lenin naturally could not have seen this new revolution, their theories no longer hold. The criticism against us is that our set of things--our communism and our scientific socialism--have become something questionable. In his book, Toffler vigorously preaches that now that a new revolution in production, or "the third tide," has appeared, capitalism can be saved and the contradictions of capitalism can now be resolved. This kind of argument naturally aims

to generate confusion, just as one tries to make water turbid by stirring up mud at the bottom of water. It is naturally groundless. We must solemnly analyze and refute it. I think we should aim to acquire a new understanding of the meaning of revolution in production.

To achieve this aim, we must go back to Engel's book "The Condition of the Working Class in England." Engels wrote a great deal about the changes in industry, communications, transportation, and agriculture, which occurred in England over a period of nearly 60 years from the end of the 18th century to the 19th century. He called these drastic changes a revolution in production. Engels' book enables us to understand that a revolution in production definitely does not mean a partial change and does not mean a leap arising from the application of production technology to a specific realm, but means some overall leaps and changes affecting the entire system of production. Changes occur not only in industry, agriculture, and communications and transportation, but also in economic relations. Therefore, expressed in the form of a definition, a revolution in production consists of leaps and changes in the organizational structure of the production system and in economic structure. It consists of leaps which are caused by a development of the productive forces, which is in turn promoted by advances in production technology.

Is this definition applicable to the history of man's development? Are there other examples in human history? I think revolution in production did occur in ancient history. A revolution in production happened in the primitive commune period. The appearance of crop growing and animal husbandry greatly changed the production system whereby man made a living by relying solely on collecting or hunting for plant products or animal products in nature. Thus, man himself could control production, at least partially, resulting in a leap in the realm of the production system. Therefore, the appearance of agriculture was a revolution in production, probably the first of its kind in human history. The second revolution in production possibly happened in the slave society; for the first time, the production of commodities appeared, that is, production was carried out for the sake of exchange. This was also a leap in the realm of economic structure and in the organizational structure of the production system, and was consequently also a revolution in production. Therefore, the revolution in production which occurred between the end of the 18th century and the beginning of the 19th century was the third revolution in production in human society.

Can revolutions in production be distinguished from social revolutions? Are they different things? I think they can be distinguished from each other and they are different things. In the first place, past examples can enable us to understand this point. For example, Marx said that though the appearance of limited joint-stock companies under the capitalist system was a change in the form of production, this change was an instance of sublation within the scope of the capitalist mode of production itself and did not cause the capitalist system to change. Today, in capitalist countries, some workers hold one or more shares in some companies. However, the number of shares owned by workers is negligible, so that instead of exercising great

control over the companies, the workers must obey the capitalists and must be exploited by them. Therefore, great changes or even leaps may occur in economic structure and in the organizational structure of the production system, leading to a revolution in production without any change in the social system.

On this question, things can be seen more clearly in our country. Considering our social system or our state system, after the transition period, and since the adoption of the first constitution of the PRC at the First Session of the First NPC convened in September 1954, our system has remained unchanged and we have always had a socialist system and a socialist state. However, there have been many changes in the production relations and in the superstructure. First, the state system as one aspect of the superstructure has changed many times. Changes have accompanied each revision of the constitution. Our existing new constitution, drawn up in April 1982, represents a great advance compared with the old constitutions. Second, considering those reforms of the system of leading cadres of our party and our state which Comrade Deng Xiaoping put forth, are they not some major changes to come in the realms of production relations and superstructure? Third, do not both Comrade Hu Yaobang's report at the 12th CPC Congress and Comrade Zhao Ziyang's reports at the 4th Session of the 5th NPC and the 1st Session of the 6th NPC clearly set forth the guiding principles and tasks of reform as well as point out those aspects of the production relations and the superstructure which urgently need to be changed? Fourth, there have been heartening changes in our countryside over the past several years, which have been brought about by reforms in the production relations and the production system. Fifth, at present, in our country, there are national corporations such as the National Shipping Corporation, the National Petrochemical Corporation, the National Nonferrous Metals Corporation, and so on. Are these not economic entities which organize production on the basis of entire industries and which are similar in form to monopolist companies abroad? We can give many other examples of changes in production relations and in the superstructure, which take place under the precondition that the social system remains unchanged in our country. These changes incorporate changes in economic structure and in the organizational structure of the production system. Because changes and development will lead to leaps, revolutions in production will happen under the precondition that the social system remains unchanged.

Comrade Mao Zedong said at an early time that in socialist society, the contradiction between the production relations and the productive forces and that between the superstructure and the economic base continue to be the basic contradictions. Our productive forces must invariably continue to develop, and therefore the economic structure and the organizational structure of the production system must inevitably continue to develop, so that leaps or revolutions in production will occur.

We have described revolutions in production as leaps in the realm of economic structure and in the organizational structure of the production system, and we have distinguished them from social revolutions. Is this compatible with

historical materialism? I think so, in light of the arguments given above. Moreover, the arguments above have also demonstrated that the two formulations used abroad--the so-called "industrial revolution" and the so-called "scientific and technological revolution"--are not precise. The first formulation, being limited to a narrow scope, is not comprehensive enough, while the second formulation, whose connotations are not clear, cannot be distinguished from the scientific and technological revolutions that we talk about. Our view is more profound and can more clearly explain the essence of the issues under consideration compared with some Western economists' "long cycle theory" which is based on statistical data. However, we should continue to study hard, and we should particularly study the question of the interactions between scientific and technological revolutions, revolutions in production, and social revolutions.

CSO: 4008/258

## NATIONAL DEVELOPMENTS

### MEETING ON DEVELOPMENT RESEARCH PLANNING ENDS

HK160933 Urumqi Xinjiang Regional Service in Mandarin 1300 GMT 14 Apr 84

[Text] The meeting on scientific research planning for developing Xinjiang held by the Chinese Academy of Sciences ended this afternoon. During the meeting, the experts, professors, scientific and technological workers, and comrades of the relevant departments studied the important speeches by central leading comrades on developing and building Xinjiang. They held enthusiastic discussions, and had consultations and talks with the relevant departments of the autonomous region. Thus, the goal of 11 items of scientific research in developing Xinjiang becomes more specific, and their content becomes more substantial and more suited to the reality of Xinjiang, thereby conforming to the principle of scientific research serving the economy. At the meeting, adequate and detailed arrangements were made concerning the exploitation of resources in Xinjiang in conjunction with the development of agriculture. Serious studies and discussions were held regarding the items of scientific research set forth by the autonomous region, and some of the items were under detailed planning.

Sun Honglie, vice president of the Chinese Academy of Sciences, made a concluding speech. He hoped that all the relevant units taking part in the meeting would ensure the implementation of the tasks and the assigning of personnel in an all-round way and as soon as possible, so that all work could be developed on schedule. He pointed out: It is necessary to strengthen leadership and management, and to support the work in various respects. The spirit of taking the overall situation into consideration and of unity and cooperation should be encouraged. Division of work and close cooperation should be practiced between topics of research, and exchange of information and mutual support are also needed. It is necessary to strengthen the connection with the relevant departments of the autonomous region and to proceed from the reality of the region in accordance with its needs and development planning. Adequate arrangements and plans should be made concerning long-term and short-term planning and the urgency and importance of each item, so as to achieve positive results in different periods and to serve the target of developing Xinjiang and realizing the quadrupling of the gross annual output value of industrial and agricultural production.

CSO: 4008/265

NATIONAL DEVELOPMENTS

PROBLEMS IN SHANGHAI SCIENCE INSTITUTES REPORTED

HK150816 Beijing CHINA DAILY in English 15 Apr 84 p 3

[Report "Special to CHINA DAILY": "Director Bemoans 'Cup of Bitterness'"]

[Text] Much has been done during the current reform to improve the management of Shanghai's science institutes, but one director complains he still has not the power to authorize the purchase of a packet of tea.

Shanghai, which led the country in introducing economic reform at research institutes, is now lagging behind, a responsible cadre in the policy study laboratory of the Shanghai Science and Technology Committee told a forum recently in Shanghai.

Six Shanghai research institutes--the Shanghai Machine Building Research Institute, Laser Research Institute, Light Industry Research Institute, Textile Industry Research Institute, Building Science Research Institute, and Crop Research Institute of the Academy of Agricultural Science--were the first to experiment with reform.

Under the responsibility system, the State no longer sees to everything and the research institutes have learned to do business on their own account.

On the other hand, the institutes are far from having a free hand, it was said, and a speaker from the Shanghai Building Science Research Institute complained that its director does not have the right to decide to buy a packet of tea.

Although a floating bonus system is practiced, there is a ceiling. The average maximum is only 20 percent higher than in institutes or factories where reform has not been introduced. A representative of the Shanghai Light Industry Research Institute told the forum that the floating bonus encouraged scientists in the first year, but it became far less effective in the second year.

One complaint is that free circulation of skilled personnel remains only a theory. Most institutes try to hold on to scientists even if they have no work, rather than let them go elsewhere.

CSO: 4010/79

## NATIONAL DEVELOPMENTS

### BEIJING CENTER AIDS SCIENCE, TECHNOLOGY COOPERATION

OW131223 Beijing XINHUA in English 1126 GMT 13 Apr 84

[Text] Beijing, April 13 (XINHUA)--In 1983, the Beijing Science and Technology Cooperation Center organized instrument and equipment sharing projects among 200 of the city's institutes and enterprises which save the country about 20 million yuan in import costs.

The center undertook to arrange 1,200 cooperation projects last year among municipal industry bureaus, factories, universities, colleges and scientific research institutes. This year, the center plans to focus on application of microcomputers.

Beijing started large-scale science and technology cooperation in 1981, when central, local and departmental research institutes and enterprises were called upon to make joint efforts to promote the nation's modernization program. A science and technology consultation office was established in Beijing in 1981 for the purpose.

Sun Jia, director of the office and a computer scientist, said the cooperative effort had aroused the enthusiasm of scientists and technicians.

The office served as a bridge between the factories that have technical problems and research institutions based in Beijing that have the capability of solving them.

In one case, the Beijing No. 8 chemical plant was unable to make use of a waste product, a boron-clay mixture. As a result, the clay was piled up near the plant and also caused pollution. The plant was fined by environmental protection departments every year and so management was eager to find a solution.

The consultation office put the plant in touch with the Beijing Iron and Steel Engineering Institute. The institute analyzed the boron-clay and came to the conclusion that the clay could be used to make refractory materials. The factory is now making a profit of about one million yuan annually by selling the waste.

The office has helped many of Beijing's factories, mines and other enterprises that were unable to solve their own technical problems because of lack of technicians and equipment.

The consultation office became the Beijing Science and Technology Cooperation Center in May 1983.

Cooperation has especially benefited small and medium-sized enterprises, which had difficulties in technical transformation and development of new products. Some projects have been carried out by several institutes in joint efforts.

CSO: 4010/79

## NATIONAL DEVELOPMENTS

### BRIEFS

XINJIANG RESEARCH PROJECTS--Urumqi, April 15 (XINHUA)--Eleven research projects crucial to the development of Xinjiang have been decided at a conference which closed here yesterday. The 7-day conference was participated by 200 scientists, professors and specialists of 30 institutes under the Chinese Academy of Sciences and over ten colleges from Beijing, Shanghai, Shenyang, Nanjing, Wuhan, Lanzhou and other cities. The topics, which were decided after much discussion, involve earth science, biology, chemistry, soil, deserts, glaciers, genetics, electronics and remote sensing. Chinese leaders proposed that China's northwest be turned into a major base area in the country in the next century. Xinjiang, occupying one sixth of the country's land, has fertile soil, vast stretches of grassland, and rich mineral resources, some of which rank first in the country. Promising oil-bearing structures have also been located in the region. Its ample light and heat and other natural resources offer great potential for economic development. [Text] [OW150847 Beijing XINHUA in English 0648 GMT 15 Apr 84]

CSO: 4010/79

ENVIRONMENTAL POLLUTION FROM URANIUM ORE EVALUATED

Beijing ZHONGHUA FANGSHE YIXUE YU FANGHU ZAZHI [CHINESE JOURNAL OF RADIOLOGICAL MEDICINE AND PROTECTION] in Chinese No 1, 25 Feb 84 pp 38-42, 71

[Article by Qin Shizhong [4440 1102 1813], Mei Zhishou [2734 1807 1108] and Xiong Baozhen [3574 1405 3791], et al., all of the Jiangxi Institute of Industrial Hygiene, Nanchang: "Environmental Pollution from an Uranium Ore and Its Hygienic Evaluation"]

[Summary] A survey was made of the environmental pollution from an uranium ore with the following results: (1) The main sources of pollution contaminating the water supply in the open air were waste water of tailings and the mining pit. The pollution raised the radiation level of the lower reaches at 1 kilometer approximating or exceeding the standards promulgated by the state. At the distance of 6 or 7 kilometers, the pollution was still evident. The contamination was lowered to a background level gradually after the streams at the lower reaches emptied into the river. (2) Irrigated by the waste water or the water carrying large amounts of contaminated pit soil, paddy fields were severely polluted. The dose rate of r-radiation was high and the estimated values of harvested crops were 9 or 10 times higher than those of the control rice, while the vegetables irrigated with this kind of water were not markedly polluted. (3) The internal exposure caused by the environmental pollution from the uranium ore mainly resulted from drinking the contaminated water and consuming the contaminated foods, whereas the external exposure was principally attributed to the dose received while farming the polluted paddy fields. Under the above-mentioned conditions, if the drinking of contaminated water were strictly controlled, the total dose received would certainly not exceed the standards promulgated by the state.

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CSO: 4009/83

DOG THYROID CHANGES FOLLOWING RADIATION EXPOSURE

Beijing ZHONGHUA FANGSHE YIXUE YU FANGHU ZAZHI [CHINESE JOURNAL OF RADIOLOGICAL MEDICINE AND PROTECTION] in Chinese No 1, 25 Feb 84 pp 38-42, 70

[Article by Xie Guoliang [6200 0948 5328], Chen Heyi [7115 0735 5030] and Ye Changqing [0673 1603 7230], all of the Institute of Radiation Medicine, Academy of Military Medical Sciences, Beijing: "Histopathological Changes of Thyroid Gland in Dogs Exposed to Early Fallout or Fission Products"]

[Summary] This report summed up the results of histopathological changes of thyroid glands in 27 dead and killed dogs 7~69 months after ingestion of early fallout or fission products. The absorbed dose of thyroid was  $2.89 \sim 1.7 \times 10^5$  rads. Histopathological appearances of various thyroid glands could be divided approximately into five types: (1) no apparent change; (2) follicular degeneration with extensive stromal fibrosis; (3) follicular atrophy; (4) disappearance of follicles with fibrosis and hyaline change; (5) necrosis and calcification. Within the dose range of  $2.7 \times 10^3$  to  $1.0 \times 10^5$  rads, the thyroid damage increased with the increase of the absorbed dose; with the dose below  $1.2 \times 10^3$  rads, no histopathological changes were seen. Above  $1.0 \times 10^5$  rads, the histopathological changes were not increased apparently. Therefore,  $2.7 \times 10^3$  rads may be considered as the minimum dose which induces thyroid changes, while the dose causing serious destruction of the thyroid may be above  $1.0 \times 10^5$  rads.

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TITLE: "Kinetic Studies on the Solvent Extraction (I)--Extraction Rate and Mechanism of Cerium (IV) Nitrate in the TBP-HNO<sub>3</sub> System"

SOURCE: Shanghai FUDAN XUEBAO (ZIRAN KEXUE BAN) [FUDAN JOURNAL (NATURAL SCIENCE)] in Chinese No 2, Jun 81 pp 148-154

TEXT OF ENGLISH ABSTRACT: A single drop technique has been used to study the kinetics of the extraction of Ce(IV) nitrate with TBP-hexane. The influence of the concentrations of Ce(IV), HNO<sub>3</sub> and TBP on the extraction rates for Ce(IV) have been examined.

The extraction rate as a function of Ce(IV) concentration showed a pseudo-first order. Moreover, the rate varied as [TBP]<sup>1/2</sup> and was independent of [HNO<sub>3</sub>] between 2-5M nitric acid. The extraction rate was nearly independent of the temperature over 5-35°C. This suggests that the rate-controlling step may be diffusion rather than a chemical reaction. The extraction rate equation can be written as:

$$R = k[\text{Ce(IV)}][\text{TBP}]^{1/2}.$$

The apparent rate constant  $k$  was evaluated to be  $2.66 \times 10^{-5}$  at 25°C.

In addition, the extraction equilibrium of Ce(IV) nitrate in the TBP-HNO<sub>3</sub> system and the absorption spectra of the extracted complexes of Ce(IV) in the organic phase have also been studied. The cerium (IV) species predominant in the organic phase has been confirmed to be Ce(NO<sub>3</sub>)<sub>4</sub>·2TBP at low nitric acid concentration and to be H<sub>2</sub>Ce(NO<sub>3</sub>)<sub>6</sub>·2TBP at high nitric acid concentration.

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TITLE: "Kinetic Studies on the Solvent Extraction. II. Extraction Rate of Uranium (IV) Chloride in the TOPO-HCl System"

SOURCE: Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese No 12, Dec 83 pp 1100-1107

TEXT OF ENGLISH ABSTRACT: The kinetics of the extraction of U(IV) chloride in the TOPO-HCl system have been studied using the single drop technique. The effects of the concentrations of U(IV), TOPO and HCl on the extraction rate for U(IV) have been examined.

The extraction rate measured was found to be of first order with respect to [U(IV)] and [TOPO]<sub>(0)</sub>. Moreover, the rate varied with [HCl]<sup>3/2</sup> between 2~7 M hydrochloric acid. The extraction rate equation can be written as

$$R = k[U(IV)][TOPO]_{(0)}$$

The rate constant  $k$  was evaluated to be  $3.7 \times 10^{-5}$  at 3M HCl and 15°C.

The extraction rate was increased with increasing temperature. The apparent activation energy was found to be 10.8 kcal/mol between 15 and 45°C. It is suggested that the rate-controlling step may be the chemical reaction of UCl<sub>4</sub> with TOPO at the interface and the formation of the interfacial complex UCl<sub>4</sub>·TOPO.

9717

CSO: 4009/50

AUTHOR: CHEN Shupeng [7115 6615 1756]

ORG: Institute of Remote Sensing Application, Chinese Academy of Sciences

TITLE: "Geographic Information System Exploration and Experiments"

SOURCE: Changchun DILI KEXUE [SCIENTIA GEOGRAPHICA SINICA] in Chinese Vol 3 No 4, 1983 pp 287-302

TEXT OF ENGLISH ABSTRACT: Geographic Information System (GIS), developed during the past 15 years, consists basically of a common geographic base, data digitization and standardization procedure and a multidimensional structure.

Its evolution reflects the following characteristics of geosciences:

- regional integrating capability
- dynamic monitoring ability
- the third generation of geographic language.

China has paid attention to exploring GIS since 1980 and several thematic experiments have been conducted in some study areas since then. The experiments could only be carried out at the thematic level or on the selected areas due to the lack of large computer systems available in related organizations.

#### 1. Pre-study on Data Acquisition

During the 1978 remote sensing experiment in Tengchong, series thematic mapping

[Continuation of DILI KEXUE Vol 3 No 4, 1983 pp 287-302]

using color IR aerial photographs as the same information source was realized. Meanwhile, the possibility of deriving various thematical maps based on a common landscape unit was also studied. This was actually the thematic extraction from the same remote sensing data and then the presentation of the information extracted on a series of maps under a "standard" map scale (e.g., 1:100,000). This work is known as an essential procedure in any GIS subjects in the experiment mentioned below, from which the primary knowledge of data acquisition was learned.

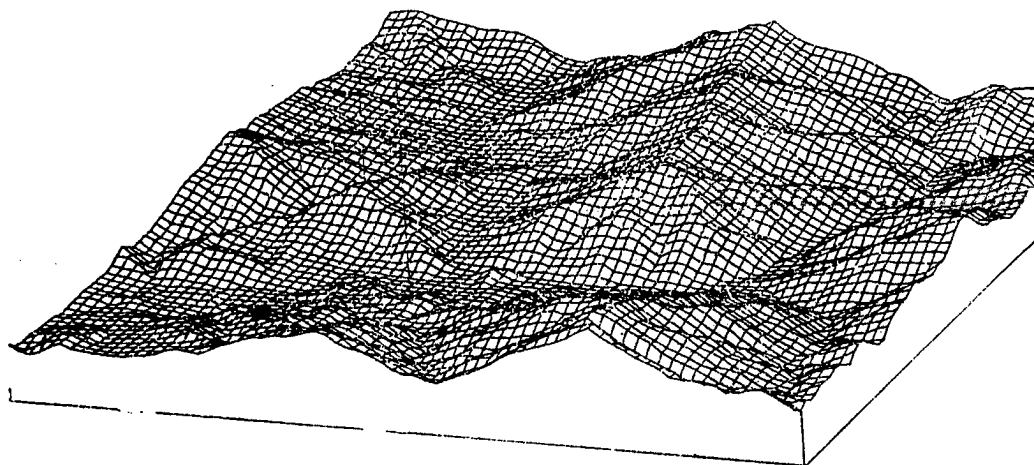
- A. The relationship between landscape unit and the cartographic unit.
- B. Digital terrain model.
- C. Image enhancement and classification.
- D. Computer assisted cartography for statistical data.

Only the polygon system was used in the Tengchong experiment. Neither a grid system nor network system was studied during that period.

#### 2. A Model of Regional Data Bank

An experiment system consisting of an IBM370/158 computer, IMS system and a JTS-86 digital controlled plotter was constructed. Attention was also given to studying the applicability of a microprocessor to GIS in order to popularize the mini-system at the county level for agricultural management, planning, inquiring, analyzing and mapping.

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Digital terrain model of a GIS sample study area at Yanbian, Sichuan Province.

To establish the model, experiments were conducted on the following aspects:

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A. Information acquisition

In this field, the methodology for data acquisition from various data sources and the techniques for information registration were tested. Techniques concerning thematic information presentation and digitization were also explored.

B. Data processing

The study covered such a great diversity of activities as software development for interface system, data assessment system, data input system and utility program package.

C. Output and application

In this scope, it provides programs for quality evaluation, dynamic analysis and forecasting models. The application covers such areas as assessment of submersion losses caused by reservoir construction, water resources estimation, land resource inventory, environmental quality evaluation and population development analysis, etc.

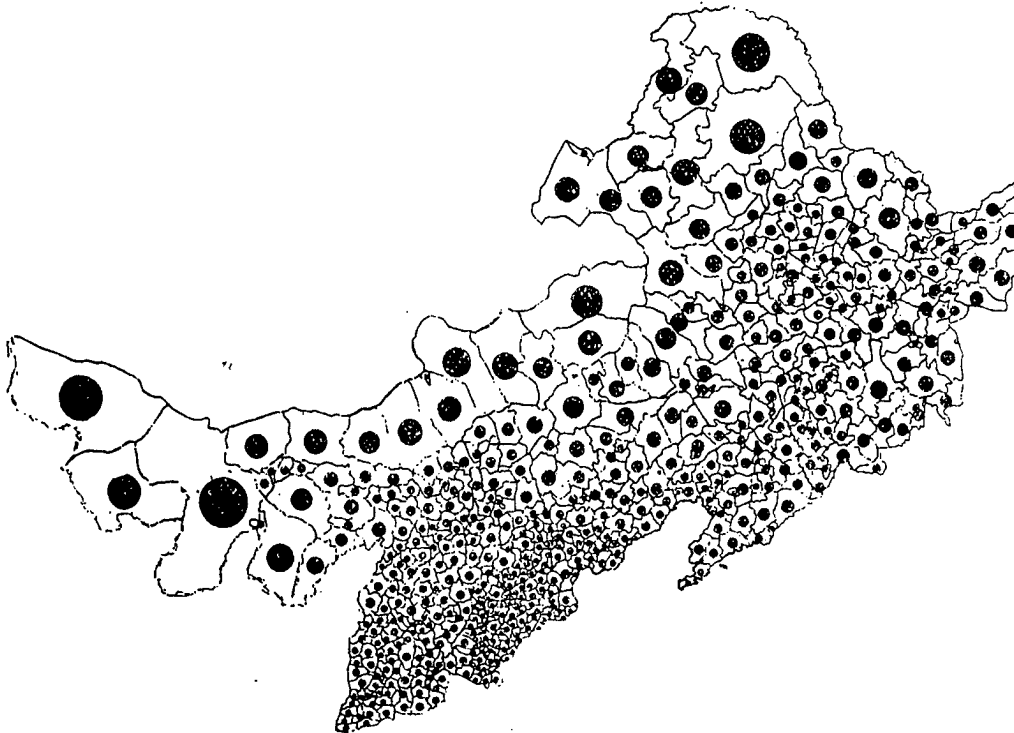
D. Integration analysis in case study areas

In an industrial area, data concerning land use, population and social economic statistics, environmental quality evaluation and resources exploitation problems were integrately analyzed. In one agricultural area, 14 different types of data were collected and then analyzed on two levels.

3. Data Base at the County Level

The Institute of Geography of the Chinese Academy of Sciences has completed a

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A statistical map of area of every county in Northeastern China by computer-assisted cartography.

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county boundary data base of the whole country (Liu Yue and Liang Qizhang, 1982), which provides the polygon spatial information of county administration boundaries for over 2,800 counties. The base also provides the map base for cartographic automation of the socio-economic data, resources inventory and regional integrated analysis of national scale.

This data base has more than 150 files, including 30 programs for file generation, maintenance, updating, exploration and application, etc. The Institute of Geography used the data base in the statistical analysis of some local diseases and in producing population distribution maps and density maps at the scale of 1:4,000,000. The results were quite successful.

In summary, the experiments conducted so far affect GIS works covering a number of areas. The main achievements are as follows:

A. Primary experiences relating to the construction of data bases at different levels, such as national, county, commune and landscape unit, have been gained, and the relationship between these levels and ground resolution of remote sensing data has been studied.

B. A primary understanding of a certain number of key technical problems has been gained. To wit, improvement of the accuracy of map measurement and transference,

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achievement of information registration between natural and socio-economic data, and the updating of the data base by using Landsat data.

C. Some application software for statistical analysis and cartographic automation were developed or partially improved, which has opened a new channel for geographically integrated study, thematic series mapping, remote sensing and telemetry techniques.

D. The possibilities for cooperation at the provincial or county level or between different water basins have been studied.

In short, based on conventional geography, computational mathematics, photogrammetry and remote sensing techniques have stimulated further studies of the subject. For example, population, social survey, agricultural, forest, water resources, environment monitoring and urban planning departments have prepared to establish various data bases to meet their needs. There is a strong tendency toward qualitative analysis in the geosciences and biology. Such fields as mathematical geology, biological mathematics, geographical qualitative analysis and glacier records, etc., have been receiving increased attention. Thus favorable conditions for the development of GIS are evident.

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CSO: 4009/56

## Gynecology

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TITLE: "A Further Clinical Study of Termination of Early Pregnancy by Administration of Long-acting DL-15-Methyl-Prostaglandin  $F_{2\alpha}$  in Combination with Testosterone Propionate (II)"

SOURCE: Shanghai SHENGZHI YU BIYUN [REPRODUCTION AND CONTRACEPTION] in Chinese No 1, Feb 84 pp 35-38.

TEXT OF ENGLISH ABSTRACT: Sixty cases of early pregnancy with periods of amenorrhea 49 days or fewer counted from the last menses were terminated by using long-acting dl-methyl-PGF<sub>2 $\alpha$</sub>  (15-me-PGF<sub>2 $\alpha$</sub> ) in combination with testosterone propionate (TP) and were divided into two study groups at random. The procedure was to use two 15-me-PGF<sub>2 $\alpha$</sub>  sponges (4 mg each) in the vaginal vault at an interval of 4 hours, followed by an intramuscular injection of 2 mg 15-me-PGF<sub>2 $\alpha$</sub>  4 hours later in group I. The only difference in the treatment of group II was to reduce the dosage of the 15-me-PGF<sub>2 $\alpha$</sub>  sponge to 3 mg each. The maximum dosage of 15-me-PGF<sub>2 $\alpha$</sub>  was limited to 10 mg in group I and 8 mg in group II. The complete course of 15-me-PGF<sub>2 $\alpha$</sub>  in both groups was not more than 8 hours, a period which was shorter by 4 hours than with the previous study. In addition, before the administration of 15-me-PGF<sub>2 $\alpha$</sub> , a dose of 100 mg TP was injected each day intramuscularly for 3 days in all cases. The success rates for the two groups were 96.67 percent and 100 percent respectively ( $P > 0.05$ ). The mean dosage of 15-me-PGF<sub>2 $\alpha$</sub>  in group II was reduced from 9.67 mg (as used in group I) to 7.70 mg ( $P < 0.05$ ) without any apparent reduction in the success rate.

Gastrointestinal side effects appeared to be less frequent and less severe in group II, although a significant difference could not be demonstrated due to the limited size of the study group. In general, side effects were tolerated by the patients, because the course of treatment was short and the symptoms usually subsided rapidly after completion of the treatment. According to the present study, we feel that the method for the termination of early pregnancy used in group II could be applied in the out-patient department. In addition, we have also used radioimmunoassay of  $\beta$ -hCG to diagnose early pregnancy and evaluate the effects of the above-given medication in this study. We found that the hCG doubling time was delayed greatly in the early pregnant women after TP administration, with the mean time being  $11.67 \pm 1.7$  days (Mean  $\pm$  SE). This suggests that the secretion of hCG in early pregnancy could be inhibited by TP. Thus TP seems to enhance the effect of 15-me-PGF<sub>2 $\alpha$</sub>  in the termination of early pregnancy.

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TITLE: "The Development of GS-I Type IUD"

SOURCE: Shanghai SHENGZHI YU BIYUN [REPRODUCTION AND CONTRACEPTION] in Chinese  
No 1, Feb 84 pp 39-41

TEXT OF ENGLISH ABSTRACT: The development and short-term clinical tests of a  
new type of IUD ("contraception flower") made of silicone rubber are reported.

The structure of this IUD is appropriate and the excellent in vivo stability and  
aging-resistant property of silicone rubber make it contraceptively effective.  
All this lowers the side effects (especially menorrhagia, soreness and other  
discomforts) and makes it suitable for long-term employment and easy sterilization.

The materials used to produce this IUD are domestically available. The technology  
and equipment involved are simple, and the production can easily be popularized.

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## Oncology

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TITLE: "Esophageal Cancer and Hypertension"

SOURCE: Beijing ZHONGHUA ZHONGLIU ZAZHI [CHINESE JOURNAL OF ONCOLOGY] in Chinese No 2, 23 Mar 84 pp 93-97

TEXT OF ENGLISH ABSTRACT: Yangcheng County is the region with the highest mortality rate of esophageal cancer in Shanxi Province, where the Cancer Standard Mortality Rate (CSMR) of the male is 143.12 per 100,000 and of the female is 79.07. In addition, 53.78 percent of the esophageal cancer patients had positive family histories.

A survey of 475 couples who suffered from cancer of the esophagus was carried out in this county. It was found that in both paternal and maternal lines, positive family rates reached up to 63.78 percent. Moreover, among their children, 346 (45.3 percent) died of the same disease, with the male death rate being four times higher than that of the female, and 5.4 percent of them died of apoplexy. However, among couples of which the male suffered esophageal cancer and the female apoplexy or vice versa, 45 percent of their children died of esophageal cancer, with males accounting for 82.5 percent of the total. Of those couples, both of whom suffered apoplexy, 43.7 percent of their offspring died of cancer of the esophagus, more of which were males; 11.2 percent died of apoplexy, with the female rate three times higher than that of the male.

Among lineal consanguinities of 414 households positive for cancer of the esophagus in this series, 110 (26.6 percent) households and 141 persons suffered from apoplexy. This is obviously much higher than that of the control group. The difference between the consanguinous relatives in the two groups was also remarkable. Consequently, in this high incidence area of cancer of the esophagus, hypertension also shows up among consanguinous relatives of esophageal cancer patients. The relationship between these two diseases requires further study.

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TITLE: "Detection of Human T-cell Leukemia/Lymphoma Virus (HTLV) Antibody in Normal Subjects in China"

SOURCE: Beijing ZHONGHUA ZHONGLIU ZAZHI [CHINESE JOURNAL OF ONCOLOGY] in Chinese No 2, 23 Mar 84 pp 98-100

TEXT OF ENGLISH ABSTRACT: Human T-cell Leukemia/Lymphoma Virus (HTLV) was the first retrovirus isolated from the human being by Gallo and his coworkers in 1980. The virologic and epidemiologic data tentatively suggest that HTLV is etiologically linked to human T-cell malignancy. Four hundred sixty-two sera samples from normal subjects in Beijing, Tianjin, Kunming and Shenyang were assayed for HTLV antibodies. The positive rates were 3.0 percent, 3.5 percent, 2.3 percent and 5.2 percent respectively. This is the first report on HTLV infection and transmission in China.

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END