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CHINA

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CS01: MULTI-PURPOSE ANTISHIP MISSILE SYSTEM

40080073 Beijing SHIJIE DOADAN YU HANGTIAN [MISSILES AND SPACECRAFT] in Chinese No 3, Mar 87 pp 2-3

[Article by Huang Fengliang [7806 7364 5328]]

[Text] The C801 missile system consists of the C801 missile, the shipborne or airborne fire control system, and the ground support equipment.

1. The C801 Missile

The C801 missile is a high subsonic, low-altitude, multi-purpose anti-ship missile. It can be launched from various types of speedboats, escort ships, destroyers, and submarines; it can also be launched from air-craft. Its mission is to attack medium-size surface ships such as destroyers; it is also capable of attacking small surface ships such as speedboats. The inside front cover shows several pictures of the C801, and Fig. 1 shows the missile layout.

The C801 missile consists of the following components: The missile body, the solid rocket booster, the solid rocket main engine, the terminal guidance radar, the autopilot, the radio altimeter, the electrical system, the warhead, and the fusing device.

The tactical and technical data of the C801 are as follows:

Length	5.814 m
Diameter	0.36 m
Wing span	1.18 m
Weight (shipborne)	815 kg
Warhead weight	156 kg
Effective range	
ship-to-ship model	8-40 km
air-to-ship model	10-50 km
Cruising altitude	20 m, 30 m
Secondary descent altitude	5 m, 7 m
Cruising speed	0.9 m
Guidance mode	On-board control and guidance
Launch mode	Single launch or multiple launch
Reliability	85 percent
Probability of hit	80 percent
Destructive power	Direct hit by a single missile can heavily damage or destroy a 3000-ton class ship

The unique features of the C801 are as follows:

1. It is small in size and light weight.

2. Its power plant is a two-stage solid rocket engine, which is easy to maintain and highly reliable.

3. The terminal guidance radar uses a monopulse system; it is equipped with various interference rejection measures to enhance the anti-interference capability of the missile.

4. By using high-precision radio altimeter, the missile can cruise over ocean without being discovered; hence it is effective in a concealed attack with good penetration capability.

5. The missile uses a semi-armor-piercing warhead, which can penetrate and explode inside the ship hull; therefore, a direct hit can severely damage or sink a destroyer.

6. It uses a box-type launcher, which also serves as a storage and shipping container; it can be used repeatedly for hauling and loading. By keeping the missile in a sealed, dry container, it is well preserved and its life can be extended.

7. The missile can be launched anywhere in a sector without aiming at a specific target.

The ship-based C801 missile is controlled by the on-board fire control system. After launch, the solid rocket booster is ignited and burns for several seconds before it is released; when the velocity reaches Mach 0.9, the main engine is activated, and the missile begins cruising at constant speed over the ocean. Within a certain range, the autopilot keeps the missile on a pre-designated flight course; then the terminal guidance radar begins acquiring and tracking the target, and guides the missile toward it. When the missile is within several kilometers of the target, it descends to a lower altitude and continues cruising until it reaches striking distance of the target, at which time it initiates a final dive, and makes a hit near the waterline.

An air launched C801 missile has no booster. The main engine is ignited right after launch, and the missile quickly descends to its cruising altitude; it continues cruising until it initiates an attack on the target.

Figure 1. Layout of the C801 Missile

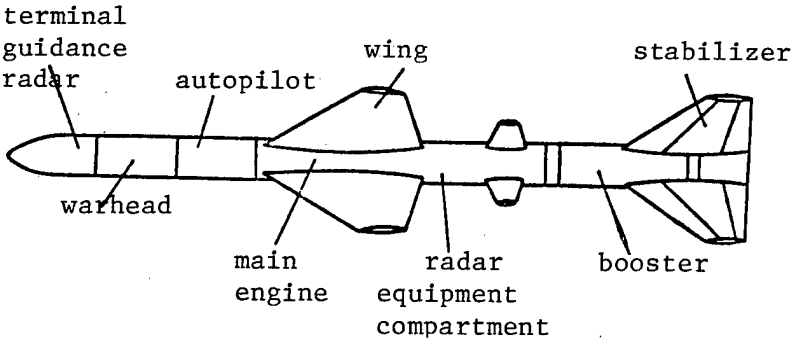
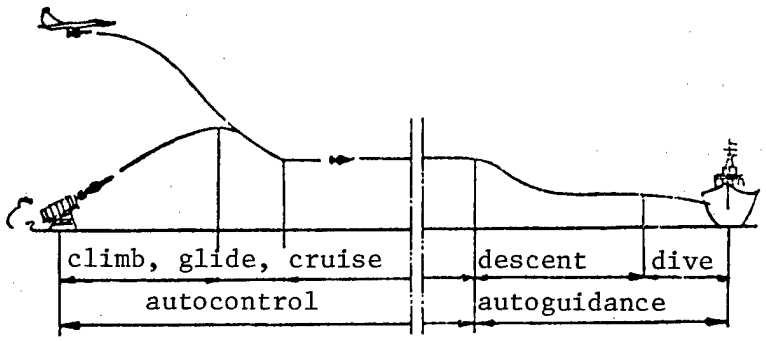


Figure 2. C801 Missile Trajectory



2. The C801 Fire-Control System

The mission of the C801 fire-control system is to search and track the target ship, to monitor the motion parameters of the target ship, the carrier ship or the carrier airplane, to calculate the launch parameters and store them in the missile data base. It also performs pre-launch inspection of the missile, controls the course of the carrier ship or aircraft into combat position, and controls the actual missile launch; it is equipped with a missile simulator which can perform inspection of the pre-launch command unit and the launch control unit, and can also be used for simulated launch in a training exercise.

The C801 fire-control system on a large speedboat consists of the following components: the missile attack radar, the launch command unit, the gyro platform, the bearing indicator, the range measurement unit, the wind gauge, and the automatic rudder system.

The missile launch command unit is the nucleus of the fire control system. The command unit on a large or medium-size ship can be controlled by a micro-computer. It not only can initiate simultaneous attacks on multiple targets, but also has the capability of multi-layered and multi-directional attacks.

3. The Box Type C801 Missile Launcher

For ship based C801 missiles, the advanced box-type launchers are used. Each launcher contains one missile. A small speedboat can carry 4 launchers; a large speedboat can carry 6 or 8 launchers; and an escort ship or a destroyer can carry 8 launchers. The launchers are generally fixed to the deck surface of the ship. The inside front cover shows pictures of the box-type launchers on a speedboat and the process of loading the C801 missile into the launcher.

The components of the launcher include the storage/shipping and launch container, the support frame, the hydraulic system and the electrical system.

The container is 6 m long, 1.16 m wide, and 1.3 m high; it weighs approximately 1000 kg.

The C801 missile is suspended on the guiderails of the launch beam inside the container; the missile is held fixed by the launch beam using the armored shield, the shear mechanism, and the locking unit.

Normally the launch container is sealed and filled with dry air at a certain pressure, so that the missile will not suffer mechanical damage or be subject to hostile environmental conditions such as heat and humidity, salt, mold, cold temperature, rain, snow, wind, and dust. The cover of the launch container is held by explosive bolts; just prior to launch, a command is sent by the launch control, which causes the bolts to explode, thereby quickly removing the cover. Under normal conditions, the opening and closing of the cover are controlled by a hydraulic system.

4. Ground Support Equipment for the C801 Missile

The ground support equipment for the C801 missile are used to transport the missile, to conduct unit tests and integrated tests, and to perform hauling, assembling and loading the missile. They include various test equipment, special-purpose vehicles, hoist equipment tools. They are simple and easy to operate.

Integrated tests are accomplished by two mobile test vehicles, a target simulator and a three-axis rotary platform. These equipment are used for inspecting the terminal guidance radar, the autopilot, the timing unit, the on-board electrical system, and the fusing device; they can also be used in conjunction with other equipment to perform integrated test of the entire missile.

The special-purpose vehicles are used for such tasks as testing, aligning, filing, loading and transporting.

The C801 missile has been called the "Flying Fish" of China. It has a perfect record of scoring 100 percent direct hits on targets during actual tests as part of design verification. Currently, an experienced research team trained in advanced technologies is continuing to improve the C801 missile toward the goal of serialization.

3012/12232

BREAKTHROUGH IN SINGLE-CRYSTAL SILICON TECHNOLOGY MADE

40080059a Beijing ZHONGGUO DIANZI BAO in Chinese 6 Dec 87 p 1

[Article by Ye Jieru [0673 3381 1172]: "Breakthrough in Vertical-Pull Single-Crystal Silicon Technology"]

[Text] The development project "Growth of Power-transistor-grade Single-crystal Silicon in Nitrogen Atmosphere" undertaken by the Institute of Semiconductors at Zhejiang University was evaluated by the State Education Commission and Zhejiang Scientific Committee on 13 November 1987.

Vertical-pull single-crystal silicon is a basic material in fabrication of semiconductor devices. The accomplishment of the project is a new technology for growing vertical-pull single-crystal silicon which has been patented in China. The technology was able to produce high-purity single-crystal silicon at 65-70 percent yield with its carbon impurity level below the infrared detection limit of 0.05 ppm. Experts who attended the meeting believe that this method of growing low-carbon single-crystal silicon has reached the worldwide state-of-the-art.

Compared to the current CZ method which grows single-crystal silicon under a reduced-pressure argon (Ar) atmosphere, nitrogen is more abundant and cheaper. The production cost can be reduced by 10-15 percent. Power transistors made with single-crystal silicon prepared by this technique have consistent parameters, low leakage, and high breakdown resistance. It has been proven in practice that the general product yield and the high-quality product yield can be significantly improved by closely integrating the material with the component-manufacturing technique. When the material was used in Shangwu No 7 plant to make the 3DD201 device, the overall yield went from 28.6 to 51.6 percent and the high-quality product yield rose from 61 to 73.5 percent. Thus, an accomplishment in scientific research is transformed into productivity.

This is a major breakthrough in single-crystal silicon technology. The economic benefit is tremendous in that it will further advance the science of silicon materials.

12553/06662

Ku-BAND POWER GaAsFET DEVELOPED

40080059b Beijing ZHONGGUO DIANZI BAO in Chinese 15 Dec 87 p 3

[Article by Wang Lieqiang [3769 3525 1730]: "Ku-Band Power GaAsFET Successfully Developed"]

[Text] The 55th Institute of the Ministry of Electronics Industry recently developed the Model WC67 Ku-band power GaAsFET. This is a significant achievement with applications in the areas of Ku-band radar, satellite communication, and electronic countermeasures.

Progress in developing this Ku-band power GaAs device was achieved as a result of a series of advanced techniques and structure design, including continuous growing of a buffer layer, source layer, and contract layer on the semi-insulating GaAs substrate; insulating the device by using a multi-step surface etching method; improving the device's parameters by adopting a groove design; achieving reproducibility in 0.7-micrometer structure lithographically with ultraviolet light; using Mo-Au sputtering and Au electroplating technologies to connect the air gap and to improve back sputtering in order to guarantee contact between the plated layer and the side for better grounding; and sealing with the C-403 tube which is suited to the Ku-band, to achieve convenience and reliability.

The power capability and linear range of the WC67 are expressed by the power output at 1 dB gain compression point. The typical parameters are: operating frequency f = 18 GHz, power output = 150 mW, and gain = 5.4 dB. The device shows good frequency characteristics and linearity.

Four-stage amplifiers have been built with WC67 devices. Preliminary tests done by the Institute and other users showed that in the 14.5--15.5-GHz range, the power output was 40 mW (and could reach over 100 mW), gain was greater than 20dB, fluctuation within band was +/- 1dB, and linearity was good.

The microwave power field-effect transistor (FET) is a key component to be developed in microwave technology in China. The success of the Model WC67 Ku-band GaAsFET has a positive influence on the further development of microwave power FETs in China.

12553/06662

SHANGHAI'S APPLIED MICROELECTRONICS TECHNOLOGY PROGRESSING

40080059c Shanghai WEN HUI BAO in Chinese 12 Jan 88 p 1

[Article by Xiong Haijun [3574 3189 6874]: "Shanghai's Applied Microelectronics Technology Bears Rich Fruit"]

[Text] The so-called "sunrise industry," microelectronic technology, is accelerating the reform of conventional industry in China. It is becoming more and more widely used everyday. The economic committee and scientific committee of the city and the local leading group to promote electronics held in a meeting yesterday to recognize some industries that have made a great deal of progress in microelectronics technology. In the next 3 years, new breakthroughs will be made in the use of microelectronics in machine tools, industrial furnaces, automatic control, and power plants.

The use of microelectronics technology to reform conventional industry is most noticeable in machine tools in Shanghai. In 2 years, 928 tools have been modified and significant economic benefits have been obtained. In the past 2 years Shanghai Miniature Bearing Factory spent 12,000 yuan to modify 34 automated machine tools using microelectronics technology. The down time due to electrical control failure has dropped to 0.2 percent. The productivity of each shift on the average has increased 3.6 percent, which corresponds to 680,000 yuan. Microcomputers have been used to control industrial furnaces used in metallurgy, chemical processing, pharmaceuticals, and electronic instrumentation. A hundred and three ovens and furnaces have been converted so far. The conversion of furnaces for metallurgical applications alone can save 2,130,000 yuan in energy conservation and reduction in metal loss.

In addition, the use of microcomputers is changing some manual-labor industries into technological industries. For instance, Shanghai Umbrella Factory No 2 uses a microcomputer to control a laser used to cut nylon. The process has been expanded to form an entire shop with an annual savings of 55,000 meters of nylon cloth, which correspond to 220,000 yuan.

Demonstrations of computer-aided design and management have been held in over 100 organizations in the electrical machine-building and instrumentation industries. New product development has been accelerated and management standards have been improved.

Vice Mayor Liu Zhenyuan [0491 2182 0337] and Vice Chairman Li Chuanqing [2621 0278 0615] of the Shanghai Economic Committee both spoke at yesterday's meeting on applying microelectronics to accelerate the reform of conventional industries. They stressed that Shanghai must take advantage of its technological edge to accelerate its economic growth. Conventional industry must move forward by relying on modern technology. Use of microelectronics technology to upgrade production equipment, to renew product lines, and to promote modern business management is a beneficial objective.

12553/06662

EFFORT TO CLASSIFY NON-O-1 VIBRIO CHOLERAE

Beijing WEISHENGWUXUE TONGBAO [MICROBIOLOGY] in Chinese Vol 14 No 6, Dec 87 pp 254-257

[Article by Yu Xihua [0060 3886 5478], Huang Shanghuan [7806 0006 4883], Wei Yanling [7614 3601 3781], Xu Guozhou [1776 0948 3166], Wang Li [3769 7787], and Xia Guangming [1115 0342 2494], Microbiology Research Office, PLA Hospital No 302; Zhou Fang [0719 2455] and Ma Qingjun [7456 3237 6874], Military Medical Science Academy, Beijing; Liang Shizhe [2733 1102 0772] and Jiang Yi [3068 1837], Electron Microscope Office, PLA Hospital No 302: "Identification and Diagnosis of Non-O-1 Vibrio Cholerae"]*

[Text] Abstract: This article reports a series of appraisals conducted on the N-1 strain separated from acute diarrhea patients in the No 302 Hospital. Results of the experiment showed that use of an LT coded gene molecule probe on the bacteria found no CT producing gene. The thallus was toxic, however, and strongly pathogenic.

Electron microscope observation showed the surface of the thallus to have a layer of mucous; in addition, cilia were newly discovered. In their physiological and biological characteristics, the N-1 bacteria strongly resembled the)-1 Vibrio cholorae; however, they were serologically negative. Tests including gas chromotography showed them to be a rare O-1 Vibrio cholerae.

Key Words: Non-O-1 Vibrio cholerae; diagnosis; electron microscope pattern. Gas chromotography; biological characteristics.

In 1980 the World Health Organization (WHO) said that all cholerae that are similar in their physiological characteristics and that are able to cause cholera epidemics are Vibrio cholerae.[1] In recent years, taxonomists have divided Vibrio cholerae into an O-1 group and a non-O-1 group.[2]

*Professor Gao Shude [7559 2885 1795], and Research Assistant Zhu Houchu [2612 0624 4342] of the Military Medical Science Academy helped with this article, for which appreciation is hereby expressed!

Non-O-1 group Vibrio cholerae are indeed pathogenic. They tend to be strong in numbers, in epidemicity, and in pathogenicity.[3] As a result, they have attracted serious international attention. Precise diagnosis of Non-O-1 Vibrio cholerae has relied only on serological methods, which have been much too inadequate, and correct diagnosis of treatment, prevention, and epidemiology are of important significance.

By way of identifying and diagnosing these types of bacteria, this test used not only conventional methods, but also molecular biology techniques including LT molecule probes, electron microscope observation, and gas chromotography. Identification results are given below.

Materials and Methods

1. Bacteria strain provided for the experiment: Classic Vibrio cholerae 16017; O-1 group Eltor type Vibrio cholerae, strains A and B; and non-O-1 group vibrio cholerae N_{53}. All of the above were reference bacteria strains on hand in the laboratory, plus a newly isolated N-1 bacteria strain from acute diarrhea sufferers.

2. Experimental animals: Healthy, adult guinea pigs, and white mice weighing between 20 and 25 grams, as well as 1 to 3 day old suckling mice. The above animals included both males and females.

3. Reagents and Instruments: O-1 group Vibrio cholerae smooth and rough antisera (Provided by the Fifth Institute of the Military Medical Science Academy), an LT gene coded molecule probe (provided by the Third Institute of the Military Medical Science Academy), a Model DXBI-12 electron microscope, and a Perkin-Elmer SIGMA Model 115 chromatograph.

4. Electron microscope observation: After negative staining with a 0.5 percent solution of phosphotungstic acid of the dripping mesh [as published] of the above bacteria solution that had been cultured for 18 hours, and disinfection with ultraviolet rays, an electron microscope was used for observation and to take pictures.

5. Gas chromatography observation: The bacteria species were inoculated in the common inclined plane and cultured for from 18 to 24 hours, washed down with 3 ml of common beef broth, and put into a Luoshi [5012 3044] flask and cultured at 37 degrees C for 24 hours, then washed down with a bacteria-free saline solution and deactivated for 30 minutes in a 56 degree C water bath. After deactivation, a bacteria-free saline solution was used for washing three times in a centrifuge at 4,000 rpm for 20 minutes. Then they were freeze dried in a vacuum. See Reference 4 for details of the complete cell fatty acid gas chromatography analysis method.

6. Other observations: A guinea pig cornea experiment was used to test intrusiveness; an Elek experiment was used to test temperature-sensitive enterotoxins LT[5], and a suckling mouse stomach irrigation was used to test for temperature-stable enterotoxins ST.[6] An LT gene coded molecule probe was used to test for the CT gene in the cholera toxin.[7] Conventional methods were used to determine biological characteristics, and standard methods were used in physiological and serological experiments. Special experiments were conducted for identification and diagnosis.

Results of Experiment

(1) Pathogenicity

After culturing in beef broth for 18 hours, 0.3 ml of the solution, in which the concentration of bacteria was 10^{6-7} per ml, was injected into the peritoneums of white mice, all of whom died within 6 to 7 hours. Dissection showed their intestines to be red and swollen, and suffused with blood, and the bacteria were isolated from their peritoneal fluid. This shows the toxicity of the N-1 bacteria to be fairly strong. Another vial of the aforementioned culture was taken and separated at 3000 rpm for 10 minutes after which 0.3 ml of the supernate was injected into the peritoneums of white mice using the same method. The mice did not die. This shows that the toxic element of the N-1 bacteria was in the thallus and not in the supernate.

(2) Toxin Measurement

A sereny test showed negative; an LT molecular probe found the bacteria to have no gene for the production of CT, and the Elek test showed negative, thus confirming that the N-1 bacteria had no LT. The suckling mice experiments also demonstrated there was no ST. Determination of the precise toxic gene awaits further research.

(3) Test Diagnosis

1. Form and Dynamics: The N-1 bacteria were a G-vibrio with a single flagellum on the tip. The electron microscope newly discovered that the bacteria has a mucous layer and cilia. It is similar in form to the reference strain N_{53}. Discovery of the mucous layer reveals the basic reason why viscoid experiments for that kind of bacteria have been negative.

On a blood plate, the N-1 bacteria form bacteriolytic circle and lamella shaped colonies, and show a "meteorlike movement." Movement was inhibited when the bacteria were neutralized with patients' antiserum. The Mackowiak experiment showed this bacteria collided with rather than adhered to chicken corpuscles.

2. Pysiological Reation: The N-1 bacteria were similar to the Heiberg II group and the N_{53}. (See Table 1)

Table 1. N-2 Bacteria Physiological Reaction and Growth Differentiation Test

Type Bacteria		Physiological Reaction																Growth Experiment				
		Glucose Sugar	Cane	Mannose	Mannitol	Salicylic Acid	Indole	Citric Acid	Nitrate	VP	MR	Sorbitol	Lactose	Lysine	Arginine	Arabose	Inosotol	NaCl (%) 0	3	6	8	43C
0-1 Vibrio Cholerae	Classic 16017	+	+	+	-	-	+	+	+	-	+	-	-	+	-	-	-	+	+	-	-	/
	Eltor Type A	+	+	+	-	-	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	/
Non-0-1 Vibrio Cholerae	N_{53}	+	+	-	+	-	+	+	+	-	+	+	-	+	-	-	-	+	+	-	-	/
Newly Isolated Bacteria Strain N-1		+	+	-	+	-	+	+	+	-	+	+	-	+	-	-	-	+	+	-	-	+

Note: On the table, / means untested

Table 2. N-1 Bacteria Strain Bacteriological Characteristics Identification and Diagnosis Experiment

Type Bacteria	Polymyxin B Test	Chicken Corpuscle Agglutination	Hemolysis Test	Group IV Cholera Bacteriophage Disintegration (pfu/mL)		Bacteriophage Disintegration					Lysogeny	Bacteriophage Sensitivity to Lysogeny	Sorbitol Fermentation
				10^6	10^9	Vp1	Vp2	Vp3	Vp4	Vp5			
Classic Type 16017	-	-	-	+	+	+	+	+	+	+	-	-	-
Eltor Type B	+	+	+	-	+	+	+	+	+	+	+	-	-
N_{53}	+	+	-	-	-	+	-	+	-	+	-	-	+
N-1	+	+	-	+	+	+	+	+	+	+	-	-	+

3. Serological Test: The results showed no agglutination reaction of the N-1 bacteria with the 0-1 Vibrio cholerae smooth and rough anti-sera. The same was true for the N_{53} bacterium strain. This shows that the serological test can verify only that the N-1 bacteria are not 0-1 Vibrio cholerae. It cannot verify the bacterial family to which they belong. Even when non-0-1 type serum was used, because of the many kinds, the serious inter-reactions, and the incomplete typing, it was not possible to diagnose this special strain precisely.

4. Fatty Acid Gas Chromatography: The fatty acid (C_{10}-C_{24}) chromatograph for the N01 bacteria is different from those for the class type and the Eltor type of the 0-1 Vibrio cholerae, and was close to that for the N_{53} bacteria strain in the non-0-1 group. The 18 carbonic acid content of the 16017 strain, for example, was less than 20 percent. The content for the N_{53} and the N-1 bacteria was close. Their non-saturated 16 carbonic acid content was greater than their saturated 16 carbonic acid content, but for the Eltor type bacterium strain A, either the reverse was true or the two were close.

5. Identification and Diagnosis of Biological Characteristics: Table 2 shows the N01 bacteria and the 0-1 Vibrio cholerae to be extremely similar. In 10 out of 13 tests, they were the same as the classic type; in nine tests, they were identical with the Eltor type. Even when the bacteria identification rate was very high (higher than 96 percent), as in the polymyxin B, chicken corpuscle agglutination, and bacteriophage disintegration tests, there was no way to distinguish them from 0-1 Vibrio cholerae. Clearly without the help of other techniques, it will be impossible to diagnose the N-1 bacteria. This shows the special nature of that bacterial strain.

Discussion

It is generally known that there are more than 10 different kinds of bacteria that are similar to the 0-1 Vibrio cholerae. Vibrio he [3109], and Vibrio funisi [1715 1441 2448] are in the Heiberg III group, and Plesiomonas are in group VI. Both furongxue [0479 3310 5877] and Vibrio rongzao [3310 5679] are able to grow in an 8 percent saline peptone solution. Vibrio mimicry [2362 1966] ferment cane sugar, and aeromonas do not break down lysine; both Maxwell [as published] and Vibrio shan [7668] are able to ferment arginine. These features are not consistent with N-1 bacteria. When other properties are judged overall, these nine kinds of bacteria are exceptions.

Though N-1 bacteria very much resembles vibrio bacteria in the 0-1 group, it does not belong in this vibrio category. Instead, it is an extremely rare bacterial strain in the non-0-1 group of Vibrio cholerae. The reasons are: 1) The fresh culture on a blood plate produced lamella colonies. 2) Some researchers type the five strains of Eltor type vibrio as bacteriophages, typing them among the non-0-1 group Vibrio cholerae bacteriophages. Ninety-eight percent of the 190 strains of non-0-1 Vibrio cholerae are bacterial strains of the bacteriophage type VI or below and non-bacteriophage I type, but N-1 bacteria are a bacteriophage type I strain.

3) Of the non-O-1 Vibrio cholerae, 94.2 percent were not sensitive to the Mukerjee cholera Group IV bacteriophages, but N-1 bacteria area a sensitive strain. They can also be broken down by bacteriophages at a concentration of 10^6 pfu/ml. The above three points show that the N-1 bacteria are a rarely seen, special bacteria strain. Even though many of their characteristics are similar to the O-1 group of Vibrio cholerae, a complete assessment showing the N-1 bacteria to be non-O-1 Vibrio cholerae is believable. As to whether these bacteria are a type that lies somewhere in between the O-1 group and the non-O-1 group awaits further research.

The pathogenic factor in some of the non-O-1 group of Vibrio cholerae has not yet been completely identified, and the mechanism has yet to be determined as well. O'Brien (1984) noted that some of these bacteria can produce cell toxins that are like shigella toxins, and that the toxins that cause bloody diarrhea are in the thallus rather than in the supernate. [8] Whether the location of the toxin element in the thallus of the N-1 strain of bacteria also relates to this is a matter meriting thorough study.

Gallut and Quiniou proved that Eltor type bacteria inhibit the classic type of bacteria, and that the inhibiting effect of non-O-1 Eltor type bacteria is more marked. They believe that the disappearance of some O-1 group Vibrio cholerae is the result of the prevalance of non-O-1 Vibrio cholerae. Therefore, special attention to the non-O-1 Vibrio cholerae and through examination of the laws governing their prevalance in China holds far reaching significance.

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CHICKEN SERUM ANTIBODY THAT REACTS WITH HEPATITIS B SURFACE ANTIGENS FOUND

Beijing WEISHENGWUXUE TONGBAO [MICROBIOLOGY] in Chinese Vol 14 No 6, Dec 87 pp 257-258, 263

[Article by Zheng Zhiming [6774 1807 2494], Zhang Jianghong [1728 3068 5725], Liu Shaofan [0491 1421 0416], Zhu Weiping [6175 5898 1627], Hu Jianming [5170 1696 2494], and Xiang Jinmin [0686 6602 2404]. Virus Research Institute, Hubei Academy of Medicine, Wuhan: "An Antibody Found in Chicken Serum That Reacts With HBsAg"]

[Text] Abstract: This article reports use of the biotin-antibiotin protein EIA test to verify that antibodies for human hepatitis B virus surface antigens exist in the blood serum of 18.8 percent (24 out of 128) of chickens and in 43.1 percent (25 out of 58) of ducks. Though these antibodies had no neutralizing role in the RPHA method, in the EIA method they were cut off by the known HBsAg.

Key Words: Chicken; antibodies, and human hepatitis B virus

In the course of research bearing on the relationship between hepatitis and liver cancer, researchers in China discovered early on the existence of HBV-like virus granules in duck serum in Qindong, Jiangsu Province,[1] which has a high incidence of cander, and this led to the discovery of duck hepatitis B virus.[2] Now reports about DHBV research have appeared one after another both in China and abroad;[3-6] however, there have as yet been no references describing the investigation of markers showing a relationship between the duck serum and HBV. This article reports the use of AUSAB produced by the Abbott Company in the investigation of anti-HBs in chicken serum from Hubei. At the same time, the existence of anti-HBs in duck serum was investigated for purposes of comparison. A report is provided below.

Materials and Methods

(1) Origin of Chickens and Ducks, and Blood Serum Preparation

The animals provided came from the Lanling Road Vegetable Market in Wuhan. The chickens and ducks ranged from 1 to 2 years old. Blood taken from their necks was collected in clean test tubes and taken back to the laboratory for isolation of the blood serum for use.

(2) Testing for Blood Serum Anti-HBs

The Abbott Company's AUSAB enzyme immunity analysis sandwich method (EIA method) was used. Biotin from the AUSAB reagent box was used to mark the hepatitis B surface antigens, and antibiotin protein was used to mark the horse radish peroxidase. Work was done in the manner prescribed for the reagent box. Upon completion of the test, the absorption value was tested and the cutoff value determined by using a Abbott Qantam II dual wave length ultra-violet analyzer on a wave length of 492.6 nm. Both judging and reading of the results were performed automatically by a Quantum II computer program.

(3) Serum HBsAg Check

The reverse phase hemoagglutination assay (RPHA method) was used. In the diagnosis, corpuscles purchased from the Wuhan Biologicals Research Institute, Batch No 861, were used.

(4) Neutralization Test

After the anti-HBs strongly positive sample was diluted 1:5, 1:10, 1:20, 1:40, and 1:80, a square matrix titration was performed to dilute to 1:32, 1:64, 1:128, 1:256, 1:512 the undiluted HBsAg strongly negative serum. After mixing, these samples were allowed to stand at room temperature for 1 hour; then they were centrifuged, and to 0.025 ml of the supernate was added 0.025 ml of RPHA to diagnose the blood corpuscles' metered HBsAg titer. After comparison with an HBsAg positive control, all HBsAg titers that declined to two dilutions were considered to have been neutralized.

(5) AUSAB EIA Cutoff Test

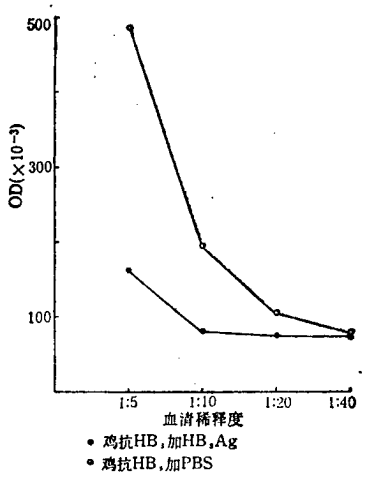
After diluting the anti-HBs strongly positive serum 1:5, 1:10, 1:20, and 1:40, and after HBsAg and PBS provided by the Abbott Company was mixed evenly into each of them and they were allowed to stand at room temperature for 1 hour, they were centrifuged. The supernate was then analyzed using the serum anti-HBs inspection method to obtain the OD value for the serum anti-HBs.

Results and Discussion

A total of 128 samples of chicken serum were tested on this occasion in five separate tests. A total of 58 samples of duck serum were tested in four separate tests, the blood serum anti-HBs positive rate testing out at 18.8

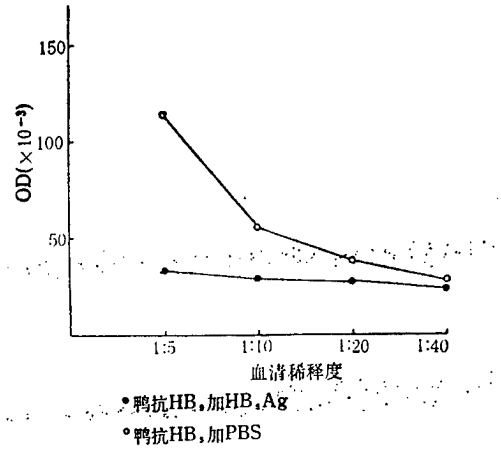
percent (24/128) and 43.1 percent (25/58). Analysis of the OD value for the chicken and duck serum anti-HBs showed the maximum optical density value as 13-fold greater than the cutoff value for the chicken serum, and 16-fold greater than the cutoff value for the duck serum. The average optical density value for the positive samples was $177\pm183\times10^{-3}$, for the chicken serum and $234\pm218\times10^{-3}$ for the duck serum, between 2 and 3 times higher respectively than the cutoff values. The positive chicken serum anti-HBs titer reached as much as more than 1:40. In addition, results from checking the serum HBsAg showed the serum of all ducks to be HBsAg negative, and the titer as being equal to or less than 1:8. Four of the 128 samples of duck serum showed a serum HBsAg RPHA titer of 1:16 in two repeat tests. In two of these four samples of serum, the anti-HBs was positive. Recently a DHBV DNA segment was used as a probe, spot hybridization also showing negative on 20 specimens of the anti-HBs antibody-positive duck serum. These results show that the duck serum does not contain any virus DNA that is able to react with DHBV DNA homogenetic hybridization [as published] (Experiment completed by Dr. D.L.J. Tyrrell laboratory, Alberta University, Canada, but not yet published).

Figure 1. EIA Cutoff Test Using Human Serum HBsAg on Chicken Anti-HBs



*Chicken Anti-HBs plus HBsAg
**Chicken Anti-HBs plus PBS

Figure 2. EIA Cutoff Test Using Human Serum HBsAg on Duck Anti-HBs



Serum Dilution

*Chicken Anti-HBs plus HBsAg
**Chicken Anti-HBs plus PBS

One part of the anti-HBs strongly positive chicken serum and two parts of duck serum were used to conduct an HBsAg neutralization test. At the same time, the Abbott anti-HBs neutralization test was used as a positive control. Except for learning that the Abbott anti-HBs neutralized the HBsAg in 1:5 and 1:10 dilutions, none of the strongly positive anti-HBs chicken and duck serums neutralized the HBsAg. However, in the AUSAB EIA cutoff tests, the chicken and duck serum anti-HBs could be cutoff by the known standard HBsAg (Figures 1, and 2).

The foregoing results show that there exists in the chicken serum some antibody that can react with the HBV HBsAg. This is termed the anti-HBs in this article. In both the neutralization tests and the EIA cutoff tests, this anti-HBs in the chicken serum was similar to the anti-HBs in the duck serum. The only difference was that the detection rate for the chicken serum anti-HBs was far higher than for the duck serum anti-HBs ($X^2 = 12.2$, $P < 0.01$). The existence of anti-HBs in chicken serum suggests the following: (1) In some chicken flocks there may possibly exist a hepatitis virus that is similar to HBV in humans, and whose antibodies can cross-react with HBsAg; and (2) Chickens may, in fact, be an animal that is sensitive to human HBV.

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9432/9738
CSO: 40081045

STUDY OF ANTI-HEPATITIS B VIRUS ASSOCIATED NUCLEAR ANTIGEN IN PRIMARY LIVER CANCER PATIENTS, ANTI-NUCLEAR ANTIBODIES BY IMMUNOFLUORESCENCE

40091043a Shanghai SHANGHAI YIKE DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese Vol 15 No 1, Jan 88 pp 29-34

[English abstract of article by Chen Ziping [7115 1311 1627], et al., of the Department of Microbiology, Faculty of Basic Medical Sciences, Shanghai Medical University; Jiang Baofa [1203 1405 3127], et al., of the Department of Epidemiology, Shandong Medical University]

[Text] Using anti-complement immunofluorescent staining, eight sera were found to be anti-hepatitis B associated nuclear antigen (HBNA) positive from among 111 sera of primary hepatocellular carcinoma patients (7.2 percent). The percentage of anti-HBNA was higher in Chinese patients than in patients abroad. The higher percentage is probably related to the higher rate of hepatitis B virus infection. All anti-HBNA positive sera were anti-HBc positive, but HBV DNA negative, suggesting that HBNA appears only after HBV ceases to replicate. All the anti-nuclear antibodies stained PLC/PRF/5 cells, but all the anti-HBNA did not stain rat liver cells. These results indicate that anti-HBNA is not related to the anti-nuclear antibodies. Anti-HBNA and HBNA comprise a new antigen and antibody system.

9717

ROLE OF ENZYME GENE EXPRESSION IN LIVER CANCER EXPLORED

40081047 Beijing ZHONGGUO KEXUE (B JI) [SCIENTIA SINICA; SERIES B (CHEMICAL, BIOLOGICAL, AGRICULTURAL, MEDICAL AND EARTH SCIENCES)] in Chinese No 11, Nov 87 pp 1198-1202

[Article by Wu Shijun [0702 4258 0689], Basic Medicine Unit, Chinese Xiehe Medical College, and Li Shie [2621 1102 6166] Institute of Basic Medicine, Chinese Academy of Medical Sciences, Beijing: "Study of Canceration Principles. IX. Reciprocal Changes in Cell Multiplication Enzyme and Tissue Specific Enzyme Gene Expression in the Process of Rat Liver Canceration"]*

[Text] Abstract: Results from spot hybridizing and Northern print hybridizing using carbamyl phosphate synthetase [CPS_1], ornithine carbamyl transferase {OCT], and aspartic carbamyl transferase [ACT] cDNA clone segments as probes with the poly(A)$^+$-RNA from different pathologically changed tissues obtained during the process of rat liver canceration induced by diethyl nitrosamine [DENA] showed a decline in the amounts of the tissue specific enzymes CPS_1, and OCT mRNA. Changes in the amounts of these mRNA deepened with the degrees of pathological change. CPS_1 mRNA molecules slightly larger than 28S, the OCT mRNA at approximately 15S, and the ACT mRNA molecules at approximately 35S were correlated with reciprocal changes in the ACT mRNA and the extent of reciprocal changes in the activity of tissue enzymes in differently cancerated liver.

This laboratory has observed an increase in some enzyme activity involved in cell multiplication during the process of inducing skin cancer in mice using methylcholanthrene, and liver cancer in rats using 3'-methyl butter and DENA. At the same time, the activity of tissue specific enzymes related to cell division declined.[1-4]. One classic example was that during the growth of liver cancer in rate induced by DENA, the activity of cell multiplication enzyme ACT increased, while the activity of tissue specific enzymes CPS_1 and OCT, which are related to cell division, declined. These changes were just the opposite of the reciprocal changes in the activity of these two kinds of enzymes in the growth process.[3] Results of CPS_1 immunochemical studies show that the decline in CPS_1 activity in the liver and liver cancers of rats fed DENA resulted from a decrease in the amount of apoenzyme. The qualitative difference has yet to be discovered; however the decrease in the amount of apoenzyme results from a decrease in the speed with which the apoenzyme is biosynthesized.[5,6] Results of translation of immunoreticulocyte red cell prolyzates showed that the amount of CPS_1 mRNA that could be translated in liver cancer duojuti [1122 5112 7555] to be less than in normal livers, and

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*State Science and Technology Commission financially supported Sixth 5-Year Plan key project.

that the extend of decline in CPS_1 activity in liver cancers.[7] On the basis of the foregoing results, changes in the activity of the ACT, OCT, and CPS_1 enzymes in the liver canceration process were clearly related to the regulation of the expression of these three enzyme genes. In this experiment, ACT, OCT, CPS^1 cDNA segments were used as probes, spot hybridizing and Northern print hybridizing being done using poly $(A)^+$-RNA, further studies were done on the reciprocal changes in cell multiplication enzyme and tissue specific enzyme gene expression, as well as their relationship to cell canceration.

I. Materials and Methods

1. Cancer inducement. After feeding DENA (60 ppm) for 10 weeks to male Wistar rats weighing approximately 200 grams, feeding was changed to ordinary drinking water until death after 20 weeks. The liver was removed for testing of CPS_1, OCT, and ACT activity and for pathogenic observation (conducted by the Professor Ding Lian [0002 3425] at the pathology laboratory of the Institute of Basic Medicine). The other parts of the animals were stored in liquid nitrogen.

2. Isolation of mRNA From the Livers of Rats With DENA-Induced Cancer and Normal Rats. On the basis of pathological examination results, 20 grams of dispersed liver tissue was taken from variated cell foci, cancer tubercles, and liver cancer cells respectively, as well as from normal liver tissue. The phenol method[8] was used to isolate all the RNA, and the Oligod(T)-cellulose column affinity chromatographic method[9] was used to isolate the poly$(A)^+$-RNA.

3. Preparation of CPS_1, OCT, and ACT cDNA Probes. The rat liver CPS_1 cDNA clone probes were prepared by our laboratory, the cDNA segments being 0.8 kb long.[10] The rat liver OCT cDNA was provided by Dr Horwich[11], the cDNA segment being 0.5 kb. The ACT cDNA was provided by Dr Stark[12] from a hamster cADCDNA clone, the cDNA insertion segment was 6.5 kb long. In addition to the coded ACT nucleotide sequence, it included a coded dihdroorotic acidase and CPSII nucleotide sequences.

The cDNA clone was subjected to plasmid augmentation, CsCl density gradient centrifugation isolation, purification, and notch translation method 32P-dCTP marking to serve as a hybrid probe. After marking, radiation specific activity was 1-5 x 10^8 cpm/μ g DNA.

4. mRNA-cDNA Spot Hybridizing. Specimens of poly$(A)^+$-RNA with different pathological changes were denatured using the White and Bancroft method[13]. Specimens were dissolved in water to 1 μ g/μ l, to which was added a 20 x SSC solution to a final concentration of 6 x SSC. Then formaldehyde (that had been processed to remove ions) was added to one-fifth the total volume. This was maintained at 60 degrees C for 15 minutes after which is was cooled in ice water.

The specimen of poly$(A)^+$-RNA was spotted to the nitrocellulose membrane in a spot hybridizing specimen intensifier (a BRL Company product). After spotting of the specimen, it was washed twice with 6 x SSC, and vacuum dried for 2 hours at 80 degrees C. The hybridizing process was as described by Thomas.[14]

Cleansing of the membrane following hybridizing was done using the method at Wahl et al.[15] After cleansing, it was dried at room temperature and covered with a plastic film, pressed flat with an X-ray plate, and flashed [3615 0342] at -70 degrees C.

5. Northern Print Shift and Hybridizing. Thirty μ g of poly(A)+-RNA from liver with different pathological changes were denatured and then subjected to agarose gel electrophoresis, the buffering solution being 0.1 mol/L Na_2HPO_4-NaH_2PO_4 at a pH of 7.0 containing 50 percent formamide. Following electrophoresis, the mRNA was zone shifted to a nitrocellulose membrane[16], the hybridizing procedure being the same as described above.

6. CPS_1, OCT and ACT Action and Protein Determination. See Reference 1.

II. Conclusions

1. Spot Hybridizing of Liver poly(A)+-RNA and cDNA in Different Pathological Stages.

The amounts of poly(A)+-RNA used for CPS_1 and OCT cDNA spot hybridizing were 30, 15, 7, and 3 μ g respectively. Results from the hybridizing of ^{32}P marked CPS_1, and OCT cDNA were as shown in figures 1(a) and (b), which show a CPS_1 and OCT mRNA that is lower when cancer has been induced by DENA than in normal liver, the extent of decline deepening with the extent of pathological change in canceration. The amounts of poly(A)$^+$-RNA used in the ACT cDNA spot hybridizing were 30, 20, 10 and 5 μ g respectively. Hybridizing results showed an ACT mRNA that is higher than in normal liver, the extent of increase deepening with the extent of pathological change in canceration. Reciprocal changes in amounts of CPS_1, OCT and aCT mRNA during the canceration process are related to reciprocal changes in the activity of CPS_1, OCT and ACT (See Table 1).

2. Northern Print Hybridizing

After 1 percent agarose electrophoresis, 28S and 18S rRNA zones were visible in the poly(A)$^+$-RA specimens of all tissues. This showed a substantial portion of rRNA remaining in specimens following oligoxionggan [1391 5112 5127 537D] cellulose chromatography, and it also showed that the Poly(A)$^+$-RNA also remained substantially intact following isolation procedures. Hybridizing results from CPS_1 cDNA and for OCT cDNA following the transfer to nitrocellulose membrane of the RNA specimens showed that in the process of inducing cancer using DENA, decline in the amount of CPS_1 and OCT mRNA increased with the degree of pathological change. The CPS_1 mRNA molecules were slightly larger than 28S, and the OCT mRNA molecules were approximately 15S. This result is identical with results reported in references.[11,17] Conversely, in the cancer inducing process, the increase in the amount of ACT mRNA also increased with the degree of pathological change, the ACTA mRNA molecules being approximately 35S in size. Clearly the size of the rat liver ACT mRNA molecules was basically identical with that of the hamster ACT mRNA molecules.[12]

Table 1. Changes in CPS_1, OCT, and ACT Activity in Differently Pathologically Changed Liver Tissues During the Canceration Process

Differently Pathologically Changed Liver Tissues	Enzyme Activity (u mol/mg Protein/h)		
	CPS_1	OCT	ACT
Normal Liver Tissue	2.5±0.09	99±3.0	0.30±.01
Liver Tissue Dispersed in Varieted Cell Foci	2.1±0.15	84±3.6	0.44±0.025
Liver Tissue in Cancer Foci	0.98±0.10	40±4.0	0.55±0.06
Liver Tissue in Liver Cancer	0.52±0+08	20±4.5	0.81±0.015

Data for each group were average values per three or four animals plus or minus standard deviation.

III. Discussion

During study of principles underlaying canceration, we concluded that abnormalities in the unity of opposites relationship between cell multiplication and cell division brought about unwanted unlimited cell multiplication and division, and that this was an important causative factor in cell canceration. We used the key enzyme ACT formed from pyrimidine to represent a phenotype of cell replication genes, and key enzymes CPS1 and OCT formed form urea to represent phenotypes of cell division genes, observing that in the process of chemically induced cancer and in process of growth,[3] well as under the influence of certain external factors such as thyroxine[18] and putrescene19, changes in the phenotypes these two kinds of genes exhibited a contrary state. Thus, we believe this study pretty well systematizes the correlation between the coordinated regulations of cell multiplication genes and cell division genes and cell canceration. Use of CPS_1, OCT and ACT cDNA probes also showed clearly a) changes in the levels of tissue multiplication enzyme and division enzyme mRNA as well as a contrary state in differently pathologically changed tissue during the process of rate liver canceration induced with DENA, and a reciprocal change in enzyme activity. This shows that changes in the aforestated enzyme activity during canceration may result from enzyme gene transcriptional control abnormalities that bring about changes in the speed with which apoenzymes are biosynthesized. b) There was a correlation between changes in the cell multiplication enzyme and cell division enzyme mRNA and the degree of malignancy of cell pathology. Changes in the amount of mRNA have a bearing on gene transcription and regulation. Whether the changes in the aforestated amounts of mRNA in the canceration process resulted from regulation of the level of transcription is a matter awaiting further verification. On the

basis of a previous experiment,[7] the amount of translatable mRNA declined in The CPS_1 in the DENA-induced rat liver cancer; thus,it is conjectured that changes in the amount of CPS_1 mRNa may arise from the level of transcription regulation.

The molecular mechanism for enzyme gene transcription regulation in eucaryocytes is not presently understood. Just how carcinogens give rise to enzyme gene transcription regulation abnormalities, thereby bringing about abnormalities in apoenzyme biosynthesis and in enzyme activity, whether carcinogens activate certain protocancer genes to produce large amounts of transforming proteins or transforming proteins with abnormalities in their molecular structure, thereby giving rise to cell canceration, are questions awaiting further study. One matter that merits attention is that cell canceration is not just a matter of abnormal multiplication or abnormal division, but is more likely a problem involving abnormality in the coordinated regulation of multiplication and division. A series of experiments performed by Sachs et al[20] showed the mechanism triggering leukemia to be related to the decoupling of cell growth and division as well as to the regulation of two proteins (MGI-1) and MGI-2) that induce growth and division. It is also believed that under certain condition, it may promote division of leukemia cells, while inhibiting their multiplication at the same time, thereby making it possible for leukemia cells to reverse in the direction of becoming normal. Whether coordinated regulation of the division enzyme CPS1 and OCT genes and the multiplication enzyme ACT gene also play a role in the regulation of certain genes is a topic that we are currently studying. Recently we observed a correlation between changes in the chromatin conformation of the CPS_1 gene and the ACT gene in mouse liver cancer cells and reciprocal changes in expression by the division and multiplication enzyme genes (enzyme activity and amount of mRNA) (results awaiting publication). Further explanation of abnormalities in cell multiplication enzyme and cell division enzyme gene regulation on the basis of the level of chromatin may be related to the canceration of liver cells.

Finally, it should be noted that ACT is a multi-enzyme system. Not only did the cDNA probes of CPS_1, ACT and dihydroorotic acidase[CAD] compounds used in this experiment contain coded ACT nucleotide sequences, but also nucleotide sequences of coded CPSII and dihydroorotic acidase. Currently it is still not possible to prepare probes containing only coded ACT cDNA. From the results of CAD probes and the RNA hybridizing, as well as from changes in ACT activity, we believe that results of CAD cDNA and RNA hybridizing can represent changes in the amount of ACT mRNA. In addition, the hamster CAD cDNA probe could be hybridized with the rat liver RNA showing that the hamster and rat liver RNA contained homologous nucleotide sequences of CAD compounds.

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9432/12232

RELATIONSHIP BETWEEN CHROMOSOMAL ABERRATIONS INDUCED BY ULTRAVIOLET IRRADIATION AND SKIN CANCER

40091043b Shanghai SHANGHAI YIKE DAXUE XUEBAO [ACTA ACADEMIAE MEDICINAE SHANGHAI] in Chinese Vol 15 No 1, Jan 88 pp 57-60

[English abstract of article by Liao Kanghuang [1675 1660 3552] of the Institute of Dermatology, Shanghai Medical University; L.R. Seguin and J.H. Robbins of the Dermatology Branch, National Cancer Institute, United States]

[Text] The purpose of this study was to analyze the relationship between chromosomal aberrations induced by ultraviolet irradiation and sunlight-induced skin cancer in two kinds of photosensitive skin diseases. One is Xeroderma Pigmentosum (XP) and the other is Cockayne Syndrome (CS). Both are autosomal recessive diseases with defective DNA repair processes. Clinical, cellular and biochemical studies suggest that there are many features in common to both XP and CS, however, XP, and not CS, patients have an increased incidence of UV-induced skin cancers. This study showed that both the XP and CS lines had considerably more UV-induced chromosomal aberrations than did the normal lines, and the types of chromosomal aberrations in both XP and CS were very similar. Therefore, the authors conclude that an abnormally high number of UV-induced chromosomal aberrations is not sufficient cause for the development of UV-induced skin cancer, at least not in the case of CS.

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Study on ^{125}I-Labelled Snake Venom

40081050a Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese Vol 11 No 1, Nov 87 pp 26-27

[Article by Zhang Lizeng (1728 0448 1073), Institute for Application of Atomic Energy, Chinese Academy of Agricultural Sciences; Lei Shaoqiong (7191 1421 8825), University of Science and Technology); Wu Jiayi (0702 1367 1355), Sino-Japanese Friendship Hospital]

[Summary] Although snake venom thrombin-like enzyme (TLE) and neurotoxin (NT) are fatal toxins, optimal doses can be useful for treating deadly diseases. The purpose of preparing ^{125}I-labelled TLE and NT was to study their toxicology, half-lethal doses, pharmacology, effective doses, biological half-life, and the metabolic processes in the body. In the experiment, saline was used to prepare the reagents, Ch-T and Iodogen methods were used for ^{125}I labelling, column chromatography and dialysis for purification, paper chromatography and gamma thin layer scanner for measuring the labelled rates, specific activity, and purity of TLE and NT. The results showed 62-74 percent labelled rate, 130 x 10^4 Bq/μg specific activity, 94-96 percent purity for TLE, and 60-72 percent, 130 x 10^4 Bq/μg, 95-96 percent for NT respectively. It also proved that Iodogen method was superior to Ch-T method.

/09599

^{3}H-T-2-Toxin Preparation

40081050b Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese Vol 11 No 1, Nov 87 pp 44-45

[Article by Gong Xiongqi (7895 7160 7784), et al., Institute of Pharmacology and Toxicology, Academy of Military Medical Sciences; Li Zhimin (2621 1807 2404), Chinese Institute of Atomic Energy]

[Summary] T-2 toxin, the fusarium toxin isolated from spoiled grains, causes malignant tumors, Keshan disease, Kaschin-Beck disease and food poisoning leukocyte deficiency diseases in human beings and livestock. In order to study its toxic mechanism, ^{3}H-T-2-toxin was prepared by synthesis and microwave catalized ^{3}H-labelling methods. The results indicated that the specific activities of ^{3}H-T-2-toxin were 629 GBq/mmol and 246 GBq/mmol respectively; the chemical purities were both more than 98 percent by both methods.

/09599

Study on Pharmacokinetics of Fibrinolytic Enzyme of Snake Venom in Vivo

40081050c Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese Vol 11 No 1, Nov 87 p 59

[Article by Dai Tingen (2071 1656 1869), et al., Kunming General Hospital, Chengdu Military Region)]

[Summary] In this article the chloroamine T method ^{125}I-labelled snake venom was used to conduct the pharmacokinetics study in mice and rabbits. The results showed that in mice, the peak labelling time for blood and the organs was 30 minutes, and gradually decreased after one hour, in about 2 hours it slowly disappeared after reaching its balanced peak. The sequence of labelling time of organs and blood is: kidney > blood > liver > lung > muscle > spleen; the half-life of its distribution phase ($T_{\alpha/2}$) was 0.64 h, and the half-life of its elimination phase ($T_{\beta/2}$) was 12.16 h, it indicated that in mice the elimination time was longer than its preservation time. The same results were obtained in testing in rabbits: $T_{\alpha/2}$ was 0.34 h, and $T_{\beta/2}$ was 6.88 h.

Snake venom fibrinolytic enzyme showed remarkable fibrinolysis action either in vitro or in vivo and it has been used to treat blocking thrombosis and coronary heart diseases. The toxin mainly dissolves beta-chain fibrinogen and inhibits platelet agglutination and it is an ideal thrombosis treatment drug due to its high vitality and its low toxic side effect.

/09599

GAMETOPHYTES GROWN FROM PLANT TISSUE CULTURE

40081054a Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 4 Mar 88 p 1

[Article by reporter Wang Xiyuan (3769 3305 0337)]

[Summary] Lu Wenliang [7120 2424 4731] of Plant Research Institute of Chinese Academy of Sciences has succeeded in growing a large quantity of plants with sexual organs (ovule and androecium) directly from hyacinth flower perianth chunk cultures. He has successfully produced large numbers of flower buds and grown a large quantity of ovules and androecia directly from the perianth tissue cultures, and also has induced the maturation of ovules and androecia in culture media. The technique of inducing plant propagation from tissue cultures promises a future of increasing production of plants, vegetables, fruit trees, forestry seedlings, and many specific economic crops which were traditionally produced asexually. The achievement also provides a sound model for the seed-producing industry.

/06662

CATTLE EMBRYO SEX CONTROL

40081054b Beijing RENMIN RIBAO [OVERSEAS EDITION] in Chinese 5 Mar 88 p 4

[Article by reporters Jiang Gefeng (1203 7245 6912) and Zhang Chunsheng (1728 2504 3932)]

[Summary] Chao Yuqing (2513 3768 1987) and Nian Jingsheng (1628 2529 5116) of the College of Agriculture and Animal Husbandry have correctly determined the sex of cattle embryos in 20-day pregnant cows. This success has provided a new way to control cattle sex in order to increase female calves' birth rate by artificially controlling gestation in male calves. The birth ratio of baby cows and baby bulls is 1:1; the female firth rate can be increased from 50 percent to 87 percent if artificial selections were adopted. The research was done by analyzing embryonic chorionic tissue cells from the uterus of 20-day pregnant cows, from which the sex of the embryo could be accurately determined without causing nay harmful effect to the pregnancy.

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SECOND GENERATION HEPATITIS B VACCINE FOUND

40101004 Beijing XINHUA in English 1239 GMT 11 Mar 88

[Text] Shanghai, 11 Mar (XINHUA)--Genetic engineers in Shanghai have developed a second generation hepatitis B vaccine.

The new product has the same effect and meets the same safety standards as the first generation vaccine developed from serum of patients, Wang Yuan, associate researcher of [Shanghai?] biochemistry institute, announced today.

The development provides a welcomed alterative to the first generation vaccine which is costly and difficult to get because the serum source is scarce.

"Trail clinical use and production of the vaccine will begin soon," Wang said.

Scientists from biochemistry institutes in Shanghai and Beijing and the institute for the control of drugs and biological products isolated the virus in 1980. From that they got virus genes for the research.

/06662

Development of Telecommunications Technology in the PRC

40080031 Beijing DIANZI XUEBAO [ACTA ELECTRONICA SINICA] in Chinese Vol 15 No 3, May 87 pp 104-111

[Article by Cai Changnian [5591 7022 1628] of the Beijing Institute of Posts and Telecommunications: "On the Development of Telecommunications Technology in China"]

[Excerpts] One of the main characteristics of the new technological revolution is that "the growth of material demand and production in society will give way to information and the use value of information will in a certain sense exceed that of materials and energy"[1]. The essence of communications is the transmission of information. The degree of modernization of a particular nation's telecommunications technologies, including networks, channels, intra-network equipment, and network operation, can be assessed in two areas: 1) whether or not they are adapted to the needs and development of that nation's economy, culture and people's livelihood, and 2) whether or not communication with other nations is inexpensive and reliable.

Three things should be the basis for discussing the development of telecommunications technologies in China:

1. China is a developing nation. To build modern telecommunications, the short-term need is to purchase some equipment and mature technologies from foreign countries. In the short term, exchanges within China will exceed exchanges with foreign countries, but overall equilibrium should appear soon.

2. China's comparable size to the United States is only one aspect of the problem. There are huge differences in other areas. China's terrain, for instance, varies only from eastern coastal areas to mountains and valleys, which in turn lead to differences in production, the economy, and demographics. Moreover, there are major differences in the traditions and customs of the people. This point has major effects on telecommunications construction but is seldom taken into consideration. It is common, for example, for a man in Houlton, Maine to call a woman in National City, California. It will be some years, however, before a resident of Aihui County, Heilongjiang Province would wish to call a friend in Zhongba, Xizang.

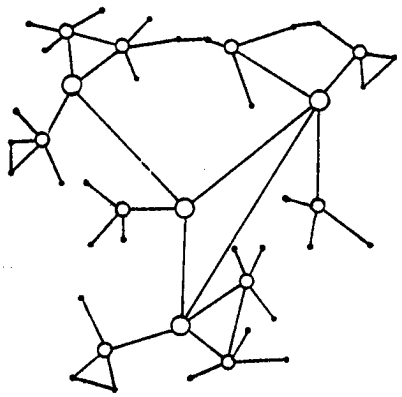
3. Telecommunications in China are very poorly adapted to the needs of economic and cultural development and the people's livelihood, but we still have a telecommunication network on a rather large scale. We can only utilize and transform this network, not abandon it.

Different perspectives can be used to evaluate and assess the prospects for a nation's telecommunications. This article will discuss the three aspects of telecommunications networks, channels, and equipment.

I. Telecommunications Networks

China's existing public telecommunications network is basically a multi-level star network. Channels link some of the paired points in a single star center, as shown in Figure 1. Actually, this is just a telephone network. Telegrams and facsimile are handled by telephone networks. The telegram network actually is a rudimentary backbone and facsimile still involves point-to-point communications, so they are not really networks. Low-speed and medium-speed data are transmitted via modem through telegram and telephone channels. Very little is handled by special digital networks. Urban telecommunications mainly involves telephones, and urban subscribers at the county level and above can connect with long-distance telecommunications networks. International telecommunications are handled by several international bureaus, and the communications quality is better than the average quality in China.

Figure 1. A Multi-Level Star Network



The backwardness of the existing telecommunication network is most apparent in: 1) Insufficient channels, leading to underutilization of long-distance telephones and long delays of telegrams outside of large and medium-sized cities and between neighboring cities. 2) Insufficient side channels and detour channels, which has exacerbated the shortages caused by pointl. 3) The quality of some channels does not meet information transmission standards, causing unacceptable distortion, signal-to-noise ratios, crosstalk, and other problems. 4) Exchange patterns are backward, with about 20 percent of long-distance telephone calls being handled on automated or semi-automated exchange channels and about 70 percent of urban telephones employing automated exchanges.

Although the degree of automation in subscriber telegram network exchanges is high, such networks hold a minor status, which has lowered the utilization rate of most channels within the networks. 5) Network operations are mainly done manually. Computers are used very little and most networks are not prepared to use computers.

I have five suggestions for the development of telecommunications networks in China.

1. Existing analog telephone networks will be fully utilized for a long time and must be developed. Specifically, analog channels should predominate among the added channels when expanding these networks. Investment in digital channels should be held at a suitable level. Our understanding of "a suitable level" should change as time passes and the national economy develops. It should be based on market demand, not something else. Network development should give full consideration to correcting the irrational topology of existing networks. Switching of the new digital channels and new digital urban telephone networks into and out of the national telecommunications network and new services for digitized information can depend on digital/analog and analog/digital conversion equipment for interconnection with the original network. This is a mature technology.

2. It is not realistic to consider digitization of China's national telecommunications network in the short term, nor is it even economical in the large developed nations. Thus, the best alternative is to lease telecommunications network channels to form an independent network for national public data transmission. From the amount of services, this also would be appropriate. Some economic bodies or administrative organs also should establish a special-purpose data network for communication throughout China. A national integrated services digital network (ISDN) has not become the order of the day, which is different from the situation in the smaller developed nations. Please note that the present discussion concerns large telecommunications networks, not theoretical research or technical development.

Construction of a regional ISDN over small areas may be economical. Technical experiments can be carried out to gain experience. However, prior to construction of the network, sufficiently accurate forecasts of service volume should be made. When information carried by this type of network enters the national telecommunications network, it must pass through an interface station and be separated according to information category. The reverse-direction information would flow together according to the comprehensive pattern of small networks. This is technically feasible now. The main technical problem is network synchronization.

3. There are definite problems with the topology of China's telecommunications network which have affected network performance. They are manifested mainly as: insufficient network economy, flexibility, and reliability. Some channels are busy while others are underutilized. When expanding existing the telecommunications network, we also should be concerned with its transformation. Because of the different problems and characteristics of each telecommunications network, there basically is no way that experiences in network transformation

can be borrowed. The optimum design may not be realistic in engineering terms, and revisions to make the design more realistic in engineering terms often affects its optimization. We must therefore strengthen theoretical research to deal with these questions, and this research should be integrated with engineering practicality.

Because of geographical restrictions, information transmitted to the national telecommunications network from southwest China and other frontier regions must utilize satellite channels to be economically effective.

4. Urban telecommunications networks are mainly telephone networks. Network structure is to a great extent affected by the performance of exchange machinery. During the early period, for example, a step-by-step system exchange is only suitable for a fully-connected network. The network topology obviously is not suited to long, narrow cities. The appearance of program-controlled electronic exchanges has enabled the design topology of urban telephone networks to be based entirely on set principles. Data transmission also is restricted by exchange structure. High-speed data or other broadband information places rather strict demands on the electrical characteristics of subscriber lines and interoffice relay channels. Electronic exchanges account for less than 10 percent of China's 70 percent of automated telephones, and step-by-step system exchanges account for nearly one-half, so they are too unbalanced for a transition to an integrated services communications network.

Automated office systems in large cities and in some economic bodies and administrative organs require integrated services information transmission, so study and formation of local area networks (LANS) should become the order of the day. The integrated telecommunications networks of these units in local regions of connected cities also can be called LANS. All of these networks can become ISDNS. Computer communications are the source of LANS and China is now studying them. Attention must be given to three adaptations when establishing these LANS. They must be adapted to the type and quantity of services; they must be adapted to computers and other network connection equipment, which is one definition of compatibility; and they must be adapted to the scope of network-entering technologies and interface equipment in telecommunication networks in urban areas, or to go even further, in a national telecommunications network. This especially requires cautious action concerning today's lead-in equipment and technologies.

5. Expanding telecommunications networks and higher demands for economy, flexibility, and reliability have made manual operation more difficult. In China, construction of telecommunications networks is in its early stages. It may be easier if we focus on total network operation in design, equipment selection, operational regulations, and other aspects. Still, we must depend on manpower in China, and work now is beginning.

II. Channels

Channels include transmission media and multi-purpose equipment. Excluding secondary ones, they include wire, microwave relay, satellite, and fiber-optic types. It still is best to count the number of channels on the basis of telephone channels.

1. Wire channels began with overhead open wires. China began building a long-distance telephone network in the late 1930's in China and it has depended on frequency multiplexing channels for about 30 years. In addition to 12 line systems used widely in various countries, we also developed high-band or 12 + 12 systems, and they remain a cheap way to expand channel clusters. Because construction of balanced cables began rather late, we skipped over K12 or similar technologies and began to develop 60-line multiplex systems in the 1960's. Afterwards, they were expanded to 120 lines, and they were built into and used within networks. The development of even higher-frequency stages to increase channels also should be considered given the urgent demand now. The 1,800-line and 4,380-line multiplex channels on 2.6/9.5-mm coaxial lines and the 300-line and 960-line multiplex channels on 1.2/4.4-mm coaxial lines are now being used in networks. The electrical characteristics of these lines and the distance from primary relay stations permit increased multiplex use and the technologies for developing them are rather mature. However, there is no need to take the old paths of the developed nations and pursue multiplex beyond 10,000 lines. Careful policy decisions are needed concerning the question of whether or not we should continue to construct new coaxial line channels, particularly 2.9/9.5-mm systems.

2. One cannot ignore the proportion of 4-GHz and 6-GHz analog microwave relay channels in China's national telecommunications network, and construction of them should continue for some time to come. Low-level networks now are building 2.8-GHz microwave relay channels with frequency-division multiplex and time-division multiplex (digital) compatibility. For analog microwave channels, the technology that needs to be developed is that of fully solid-state systems with higher degrees of multiplexing and computer-controlled operations.

International research and development of digital microwave relay systems was done during the early 1970's. The author considers these to be the most convenient beginning measures for establishing digital telecommunications networks. Besides building new channels, existing analog channels also can be transformed. At present, a substantial gap remains between China and the developed nations. The theories which should be studied and the technologies which should be developed include fade resistance; modem technologies to increase the number of bits contained in each band and their realization, such as 64QAM and 256QAM; adaptive digital equilibrium technologies; polarization-resistant interwave interference, and so on. If this work is not begun immediately, it will be hard to avoid problems for a long time to come. Development of 11-GHz systems also is necessary. Moreover, other nations are working to develop the Ka-band (30 to 33 GHz) and we should take note.

3. Global communications are possible via three geosynchronous satellites stationed about 120° apart. Because satellites have advantages such as requiring a lower investment than with other channels, their use has grown rapidly in the past 20 years. The author feels that satellite channels can be used not only for linking up frontier regions but also can be organized within domestic telecommunications networks. Although there is much interest in fiber-optic communications now, the reduced flexibility of their channel allocations compared to satellite systems means that channels between two

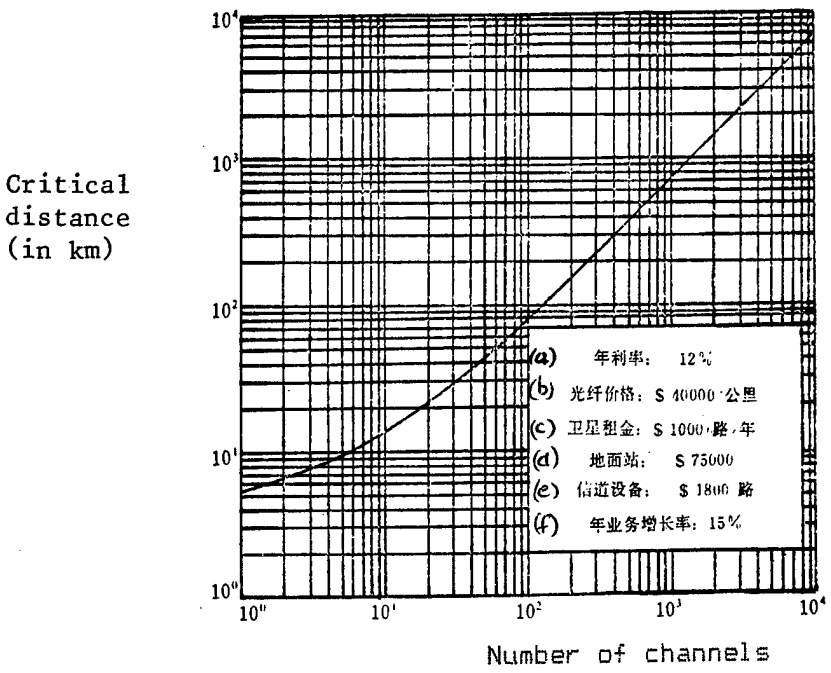
points which do not handle massive amounts of information cost more than using satellites, especially for long-distance communications. Thus, satellite channels must be used in large amounts, especially in developing nations. Tactical researchers in China should take full note of this.

China already has the capability to launch satellites into geosynchronous orbits, but the equipment on the satellites is outdated and the number of channels too small, so this approach is not very appropriate. Consideration should be given to leasing satellites to establish a domestic auxiliary telecommunications network or serve as part of the national telecommunications network. As for earth stations, it would be best to start by relying on Chinese products. If appropriate development tactics are chosen in China, we may be able to skip over a historical stage which the developed nations have already passed through.

4. The utilization of fiber-optic communications in China is limited to telephone PCM pulse code modulation relay channels in cities. Research is underway on single-mode long-wavelength, long-distance systems and preparations are being made for construction of a few experimental systems.

Optical fibers have advantages like low attenuation, broad transmission bandwidth, good resistance to electromagnetic wave interference, availability of raw materials, and so on. Nevertheless, they are most appropriate for use in large channel clusters. There are problems with large investment and wasted capacity when developing nations use fiber-optic communications, so decisions must be based on local conditions. Kan suggested a strategy for integrating satellites and optical fibers[2] which uses satellite channels to meet current needs and shifts to fiber-optic systems when the volume of services reaches a certain level. He established a simplified mathematical model using data from the United States to compute several economic comparison curves. One of the illustrations is show in Figure 2[2]. When first establishing channels between two points in the network and deciding on the number of channels required, the use of satellite channels first is most economical if the channel distance falls above the curve. An incidental benefit of this strategy is that satellite earth stations can be converted for use when shifting to fiber-optic communications. Satellite channels usually do not have to be connected with other long channels, so their establishment does not affect other parts of the network. Moreover, the establishment of high-capacity fiber-optic channels between two sites could create "bottlenecks" in the network. The Kan model was based on certain assumed conditions, and the data it uses are not entirely suitable for China's actual conditions, so there would be discrepancies in the numerical results obtained. Nevertheless, the author feels that this strategy has value. It also should be pointed out that the single and possibly the greatest advantage to delaying construction of long-distance fiber-optic channels in China may be that it benefits technical development and equipment production. However, it may be necessary to establish an extremely small number of experimental optical cable channels. Optical cable systems also are suitable for communications in coastal areas and between the mainland and nearby islands.

Figure 2. Returns to Investment in a Satellite/Fiber-Optic Strategy[2]



Key:

a. Annual utilization rate: 12 percent
b. Cost of optical fibers: $40,000/km
c. Cost of leasing satellites: $1,000/line/year
d. Earth station: $75,000
e. Channel equipment: $1,800/line
f. Annual rate of growth in services: 15 percent

Attaining a speed of a Gb/s over long distances requires transmission via laser generation of a coherent or nearly unitary frequency. Coherent lasers permit wavelength multiplexing for a substantial increase in channel clusters. Coherent transmitters and detectors are being made in the laboratory but are quite expensive. China should increase investment and reinforce work in these areas.

III. Equipment

This discussion concerns exchange equipment and terminal equipment. There are many types and models, so it is only possible to point out some suggestions of principle.

1. Exchange equipment

(1) First are telephone exchanges. The appearance of digital communications and other new services means that, with the exception of rural telephones, there is no need for further development of step-by-step exchanges. Medium-sized and smaller cities and some regions of large cities, however, should continue to develop crossbar systems. The reason is that we must depend mainly on imports of digital program-controlled exchanges for a rather long time to come. Even after production in China gets underway, it will not meet demand. When increasing capacity, digital program-controlled equipment can be adopted in some fast-growing medium-sized cities or coastal cities. Inability to meet demand for telecommunications services is most prominent in the area of urban telephones. This is a problem which urgently requires solution by strategic comparison of investment and economic results. The situation with long-distance telephone exchange equipment is basically similar to that of urban telephones, but the author feels that the focus should be placed on semi-automated exchanges. Since there is no rush to deal with the question of national automation, fully automated exchanges should be limited to certain areas. More than ten types of digital program-controlled exchanges are available on world markets now. Choices on equipment imports and production lines as well as definition of developmental forms in China should be coordinated with the relevant opinions put forth in Section 1 of this article, especially concerning operational compatibility. Moreover, there should not be too many models.

The special-purpose small exchanges (PBX) used in foreign countries now have grow to integrated services exchanges for data at 64 kb/s and under. Models have changed very quickly in this area, so attention should be given to the characteristics of China's telecommunication networks when importing. I propose that development of the related technologies be accelerated, and that they be placed into production to end our reliance on foreign countries at the earliest possible date.

(2) No additional independent telecommunications network will be built in China. Because of the rather close relationship between telephone exchange equipment and installation of local stations, the author feels that it would be best to encourage a stress on Chinese-made products and adopt a strategy of "proceeding in an orderly and step-by-step way." The best topic of discussion concerning the development and prospects of facsimile communications should be subscriber facsimile services (including the installation of public facsimile machines at residential sites), but this is beyond the scope of the present essay. As for exchanges, they should rely on telephone networks. This is true because the operational quality of telephone networks determines the development of this service, and it does not involve demands placed on exchange equipment by facsimile services.

(3) LANS and PBXS can be combined. This should be handled in the same manner as the ideas in Section 1 of this article concerning internal exchange in local area ISDNS and connection with public telecommunications networks. In the area of equipment, we should move as needs dictate and not do things blindly. At

the same time, we also should give attention to research and development of Chinese technologies.

(4) I propose that networks be the basis for choosing exchange equipment in special-purpose data networks. They can employ Chinese-made equipment, or they can purchase foreign products. The conditions for finalized decisions on models do not exist at present. Technical development, however, should not wait.

2. Terminal equipment

(1) Demand for telephones is very large. They must be compatible with urban exchange networks. Existing analog telephones will be around for a long time to come, and development of digital telephones or those with special functions should be coordinated with digital program-controlled exchanges. Telephone improvement has never received sufficient attention in China. Much can be done to improve the efficiency and frequency response of voice transmitters and receivers as well as their sidetone-elimination performance. Improvements in these areas of telephone performance can reduce the diameter of subscriber lines. Most subscriber lines in China have a diameter of 0.5 mm and their characteristics are absolutely unsuited to high-speed information transmission.

(2) The technological development of data modems is rather mature and the main issues are integrated technologies.

(3) In the area of conventional facsimile equipment, China is developing in an international tri-level fashion, as is necessary. Developments in newspaper facsimile equipment include bit-rate compression, where there is enormous potential. The main technical problems are discrimination between words and images, and the negative effects of reduced channel error rates on quality.

(4) Each country has developed its own subscriber teletype machines, so there is no need to discuss them here. There are problems with decoding telegrams in Chinese characters at telegram bureaus and distribution stations. Although we have the equipment now, it is not very good. A possible direction is to use special-purpose microcomputers, where the technical problems which must be solved are information compression and telegram code conversion.

(5) There is no rush to propose directions for development of the terminal equipment for TV-phones and many other new services in China.

(6) Last, I wish to raise the issue of information pre-processing. It may be necessary to compress, convert, encrypt, or otherwise process information before it reaches terminals (reverse processing occurs during transmission to the recipient terminal). Development of these technologies and the corresponding theoretical and applied research should become the order of the day.

In conclusion, the author wishes to point out that the opinions outlined above are not technical policies, but are instead this author's outline of a near-term development strategy for telecommunications technologies in China. The

core ideology of this article is that the development of telecommunications technologies must be integrated with the characteristics of communications in China. Developmental strategies must be motivated by the market, meaning the volume of services, and should not be pushed forward by progress in the technologies themselves since technical progress actually is stimulated by market demand.

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NUCLEAR INDUSTRY'S CONSTRUCTION FORCES MOVING INTO CIVILIAN SECTOR

40080090 Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 25 Mar 88 p 3

[Summary] The Ministry of Nuclear Industry has announced that with the cutback of production of nuclear weapons and the cessation of nuclear weapons atmospheric testing, the huge number of construction personnel formally associated with this industry will turn their talents and efforts to economic construction in support of the Four Modernizations.

Over the past few years, the nuclear industry has spawned seven civil engineering, construction, and installation companies employing over 47,000 personnel. Many key state construction projects have signed contracts with these units in the past. Examples include the 300,000-ton ethylene plant at the Daqing oil field, the Shanghai Jinshan petrochemical complex's first and second stages, and a portion of the No. 2 automobile plant. After gearing its needs to economic construction, nuclear industry construction enterprises will be transformed into crack professional units exhibiting initiative and management savvy. Of six organizations bidding, the HCCM Group, a consortium consisting of the 27th Construction Company, the China Construction Company, CB of France, and Maeda Corp. of Japan won the contract for the civil engineering work on the nuclear island of the Daya Bay Nuclear power plant. Of four groups bidding on the equipment installation contract for Daya Bay, the 23rd Construction Company and France's Framatome won. The 23rd and 27th construction companies' work on the high-flux reactor and the "China HL-1" projects earned them silver medal awards for quality from the state. The 24th Construction Company, known for its expertise in developing and applying state-of-the-art technology to high-rise construction, is now building the ultra-modern International Services Center in Beijing.

CSO: 4008/0090

PRC TO BUILD BIOMACROMOLECULAR LABORATORY

40101005 Beijing XINHUA in English 1239 GMT 12 Mar 88

[Text] Beijing, 12 Mar (XINHUA)--The Chinese Government has decided to invest 6 million yuan to build a biomacromolecular laboratory which will become operational within the year.

The laboratory will be built in the Beijing-based Institute of Biophysics under the Chinese Academy of Sciences, a researcher from the institute said.

The laboratory will help researchers gain better understanding about relations between the structure and function of biomacromolecules.

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