

JUL 1970

# SCIENCE BULLETIN

*National Science Council  
214 Roosevelt Road, Section III  
Taipei, Republic of China*

## Proposal for a Ten-Year Earthquake Research Program

According to a local legend, the earth rests upon a coiled-up eel in a state of perpetual hibernation. However, so the legend goes, the gigantic eel occasionally wriggles and, when that happens, earthlings and their buildings shake or tumble, depending on the force of the wriggling.

Legends aside, Taiwan has had its fair share of earthquakes, including many disastrous ones within living memory. Prof. Teng Ta-liang of the University of Southern California, who was here last month as a short-term visiting scientist under the Sino-US Cooperative Science Program, has come up with a proposal for a ten-year program to step up research about the quake phenomenon with a view to reducing the disastrous consequences of the tremors.

According to the professor, Taiwan lies along a segment of the most active earthquake zone on the earth. Commonly known as Circum-Pacific Belt, this zone consists of less than one per cent of the earth's surface area, yet accounts for more than 90 per cent of the annual large earthquakes. A study of global earthquake statistics reveals that out of every ten large destructive quakes, there will be one occurring on or near Taiwan. Statistics accumulated during the past century indicate that Taiwan may expect about one large destructive earthquake every year and several small ones daily.

### Big Loss Potential

In view of the frequency of earth tremors and the rapid industrialization taking place in Taiwan, Professor Teng predicts, the potential of dollar loss will accelerate rapidly over the next 30 years if not offset by the

introduction of new technological measures to reduce the potential.

Despite the ever-present earthquake threat, quake study facilities in Taiwan are glaringly inadequate. Of the 17 earthquake stations located in different parts of the island, all but one are equipped with obsolete equipment of prewar vintage, Professor Teng says.

It is to make up for this deficiency that Professor Teng and his team of experts made the proposal calling for the establishment of a network of high-sensitivity seismographs. The principal objective of this program is to delineate the hazardous seismic regions in Taiwan. Due to the strategic location of the island, the professor observes, the network would also provide an excellent means of detecting nuclear explosions conducted on the China mainland. Academically, it will also be a most desirable training ground for solid-earth geophysicists, whose service is particularly needed in Taiwan as the government authorities have decided to step up exploration of underground resources.

### Proposed Program

The primary objectives of the proposed program are to establish through research and synthesis the following: —

- 1) Identification of areas of Taiwan likely to be subjected to economically significant earthquake loss.
- 2) For areas of potential hazard, identification of:
  - a. Accurate locations of active faults.
  - b. Earthquake probability.
  - c. Instability of geological materials under significant

earthquake motion.

- d. Means of estimating critical information for predicting intensity in terms of amplitude, accelerations, displacement, and duration of earthquake motions in different geological environments.
- 3) Criteria for site planning, particularly for large constructions.

To achieve the above objectives, the following program is proposed:

- 1) Geological and geophysical survey of earthquake fault zones—to gain clearer insight into the present and possible future behavior of the fault systems on Taiwan. This includes:
  - a. Detailed geological mapping along fault zones.
  - b. Gravity surveying along fault zones.
  - c. Seismic profiling near fault zones.
  - d. Aftershock studies.
- 2) Installation of a short-period seismic network of eight to ten stations around the Island with telemetering and digital recording capabilities—to conduct systematic studies on seismic zoning, and to detect nuclear explosions on Mainland China.
- 3) Expansion of the network to include long-period instruments—to supplement the capability of detecting nuclear explosions, and to study the regional tectonic structure around Taiwan.

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# NSF, NSC Review Progress

Two representatives of the U.S. National Science Foundation, counterpart of the National Science Council in the Sino-US cooperative science program, arrived in Taipei last month for a series of meetings with NSC officials. They are Dr. Walter Hodge, NSF's outgoing resident representative in Japan, and

Dr. Henry Birnbaum who will succeed Dr. Hodge August 1.

The NSF officials came here to take stock with NSC of the progress of the Sino-U.S. program during the first year of its operation. The meeting also afforded the two sides a chance to map out broad plans for future actions. They were particularly satisfied with the brisk pace in the sector of short-term visiting scientists as reflected in the fact that 24 scientists visited the Republic of China during the short span of the past six months.

Besides meeting with NSC officials, the visitors also toured Taiwan's high altitude farms. Dr. Hodge, who is an expert in the field, offered many valuable suggestions regarding the cultivation of capital crops on such farms.

Dr. Birnbaum, formerly vice chancellor of the East-West Center in Hawaii, expressed the view that Taiwan and Hawaii are remarkably alike in many respects. Therefore, he was of the view that scientists in the two areas should cooperate more closely to mutual advantages.

## Earthquake Research

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- 4) Instrumentation along active fault zones—to install ultra-long-period strain seismometers and tiltmeters in order to monitor extremely minute fault movements. Correlation of these fault movements with seismic events has long been suspected of holding the key to an earthquake-warning system.

In the above program, little emphasis is put on earthquake engineering, although the latter comprises one-third of the total research effort in the United States' Earthquake Hazards Program. This is so planned, because the result of American or Japanese research on earthquake engineering will very likely be general enough to apply to situations in Taiwan.

*Yet knowledge on local active fault systems and data for local seismic zoning can be obtained by no other means than by the efforts of the concerned nation itself.* Not all of the above recommended program is to be started at this time. The first two program categories are of more immediate importance and are less costly. Therefore, they should be started as soon as possible. The final two categories are of more academic, than practical, interest, as they would help bring China to the frontier of international geophysical research, Professor Teng said.

## NSC Subsidies for Science Education

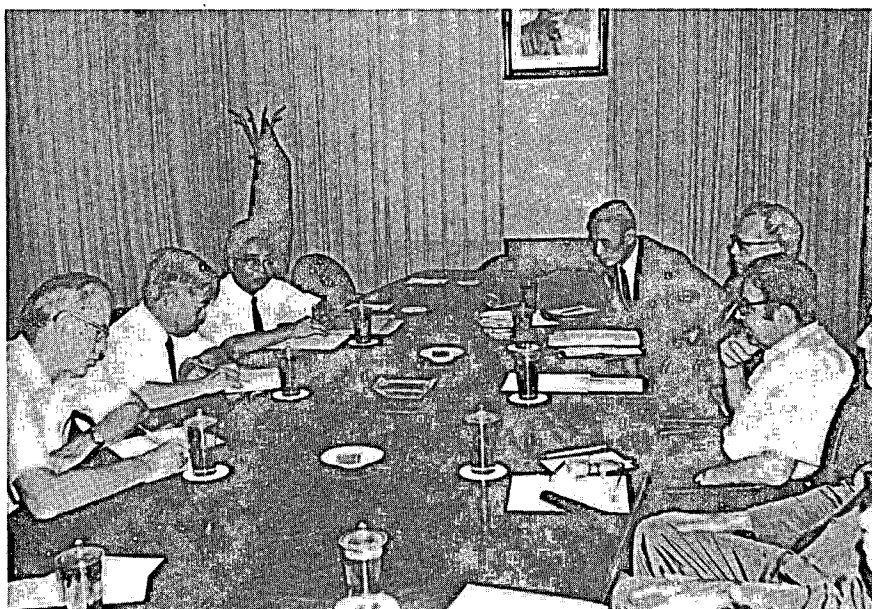
The Committee on Science Education, National Science Council, last month approved three appropriations for science education projects totalling NT\$1,532,000.

The lion's share of the funds, to the tune of NT\$1,032,000 is for the procurement of audio-visual teaching aids for four senior middle schools and 26 sets of laboratory equipment for junior middle schools.

Another subsidy, amounting to NT\$200,000, is earmarked for the compilation of a set of textbooks on geophysical science for senior middle schools.

The remaining subsidy is meant for an itinerant exhibition on vocational education, applied science, and technical skills. Jointly sponsored by the National Educational Data Center, the Taiwan Provincial Education Department, and the Taipei Municipal Education Department, the exhibition will start in August.

Exhibits will be shown in Taipei City, Taichung City, Kaohsiung City, Hualien or Taitung in eastern Taiwan.



*NSF representatives and NSC officials met in Taipei late June to review the progress of the Sino-US cooperative science program. Participants in the meeting include (L-R) Dr. Bruce H. Billings, special assistant to the American ambassador for science and technology; Dr. Ta-you Wu, NSC chairman; Mr. Wang Chi-wu, NSC deputy secretary general; Prof. K. P. Zi, NSC secretary general; Dr. Walter Hodge, outgoing NSF resident representative in Tokyo; Dr. Henry Birnbaum, who will succeed Dr. Hodge in Tokyo in August; Mr. Richard Goodrich, deputy director of US AID in Korea; and Dr. Chang Ming-cheh, director of Engineering Division, NSC.*

# Prof. Tung Reports Discovery of Anti-cancer Substances

Professor Tung Ta-cheng of the College of Medicine, National Taiwan University, departed for the United States in late May to report on a significant discovery in cancer research. He is the first Chinese scientist to visit the United States under the U.S.-China Cooperative Science Program.

Besides attending the Conference of Neonatal Enteric Infections Caused by Escherichia Coli sponsored by the New York Academy of Science, Professor Tung plans to discuss with Dr. G. N. Wogan of the Department of Nutrition and Food Science, Massachusetts Institute of Technology, and Dr. Jonathan L. Hartwell, head of Natural Products Section, National Cancer Institute, National Institute of Health, U.S.A. on his current experiments with crystalline abrin and ricin to cure a type of cancer in mice.

Professor Tung and his research associate, Lin Yung-yao, discovered a highly poisonous substance extracted from castor oil beans and *Abrus*

*precatorious* which they say is an effective cure for a form of cancer in mice.

Tung said he and Lin extracted substances known as ricin from the castor bean and abrin from the *Abrus precatorious*, and found it to be completely effective in treating acites tumors in mice if applied within five days after the rodents begin to show symptoms of cancerous tumors.

According to medical experts here, the importance of the discovery is that it appears to disclose a type of drug that attacks cancer cells without damaging normal cells. Many drugs now exist which will destroy cancerous cell, but they also attack normal tissues and result in the death of the patients.

Tung said samples of ricin and abrin have already been airlifted to the U.S. National Cancer Institute for reference and verification. His research is supported by the National Science Council (NSC).

Meanwhile, the Joint Commis-

sion on Rural Reconstruction (JCRR) will help collect special herbs in Taiwan and have their anti-tumor substances investigated. The study is to be completed in three years through the National Research Institute of Chinese Medicine (NRICM) with a view to finding a potent cure of cancer.

Specimens will be collected in Taipei, Puli and Chiayi for the first year. Medicinal substances will be extracted from their roots, leaves and seeds for further studies by the Medical College of National Taiwan University and other interested research institutes.

Collection of specimens will continue in Pingtung and Hengchung during the second year and be extended to Taitung, Hualien and Orchid Island in 1972. In support of his study, NSC will help NTU organize a research group to cooperate with NRICM.

Mr. Yang Tsai-i of NRICM is the executor of the project. His 1,080-page *Nomenclature of Plants in Taiwan* will serve as a guidepost for the study. The book itself is expected to become more comprehensive with the anticipated addition of materials to be gathered during the period of investigation.

## Seminar on Engineering and Technology to Start in June

Taipei will host a large-scale engineering seminar from June 29 through July 17. Some 40 Chinese engineering experts in the United States will come to give lectures on the occasion.

Officially named Seminar on Modern Engineering and Technology, the gathering is designed to inject the latest scientific and technological knowhow into Taiwan's economic infrastructure and to place Chinese engineering on a par with international standards.

The subjects to be discussed, which have been chosen according to the economic needs of Taiwan, are industrial design, textile industry, industrial management, urban development, communications engineer, materials research, electrical and electronic engineering, and ceramics.

The seminar will be divided into nine subcommittees to discuss these topics for two weeks. The remaining time will be devoted to a survey of

the island's factories, and to conferences with public and private executives aimed at solving the country's development problems.

The seminar will be attended by members of local engineering and educational circles, including senior engineers in the government and public and private enterprises, professors and researchers.

The forthcoming seminar will be the third of its kind. The first one was held in 1966 under the joint sponsorship of the Chinese Institute of Engineers in Taiwan and its sister institute in New York with the financial support of Asia Foundation. The second seminar was held in 1968 with the participation of the Taiwan Provincial Chengkung University and the Union Industrial Research Institute with financial support from both Asian Foundation and the National Science Council. The two organizations will continue backing the forthcoming seminar.

## Candidate Picked for Assistantship at Univ. of Mass.

The National Science Council has selected, through the recommendation of National Taiwan University, a young scientist to work under Dr. John Strong, Astronomy Research Facility, University of Massachusetts, Amherst, as a research assistant.

The man picked for the post is Mr. Ho Shau-yau, a doctoral candidate in the Physics Department of National Taiwan University. He has been to the United States several times and earned his M.S. Degree in electro-physics at the Polytechnic Institute of Brooklyn.

Dr. Strong has started a research program about the development of a precision pyrheliometer and plans to study polish both for the visible and for the far UV. Mr. Ho will work under him for a period of two years.

# Five Short-term Visiting Scientists Due in Summer

The U.S. National Science Foundation and the National Science Council have approved five more short-term visiting scientists from the United States during the next three months. Three other scientists have just completed their assignments under the binational cooperative science program.

Scheduled to arrive in Taipei July 1 is Dr. Robert Y. Hsu, a biochemist from the State University of New York. During his 10-day visit in Taipei he will conduct one or two seminars for faculty members and students of the Biochemistry Department of the National Taiwan University Medical College and National Defense Medical Center. He will also meet local biochemists who are interested in purified chicken liver fatty acid synthetase and crystalline pigeon liver malic enzyme.

Dr. S. C. Wang of Columbia University Medical College will be here July 25-August 25. During his month-long stay in Taiwan, he proposes to give lectures in his field of study and to consult with Dr. C. Y. Chai of the National Defense Medical Center. The two scientists began two research projects last year when Dr. Chai visited Columbia, and they expect to complete the work during Dr. Wang's forthcoming visit to Taiwan.

Dr. Duey-wen Liu of the Department of Electrical Engineering of Notre Dam University will be in Taipei August 16 through August 29. The National Taiwan University, which will be Dr. Liu's host institution, has arranged six lectures for him in addition to other activities.

Dr. A. C. Storn of the Department of Environmental Sciences and Engineering of the University of North Carolina at Chapel Hill is expected here on August 18 for an eight-day visit. He will give two lectures on air pollution and discuss with Chinese experts on air pollution and other environmental health problems.

Dr. Y. R. Shen of the Department of Physics, University of California at Berkeley will be in Taiwan August 26 through September 5. He will conduct a seminar in the field of Quantum Electronics at National

Tsinghua University and have an informal discussion on the topic of Nonlinear Optics with interested scientists at the National Taiwan University.

Dr. Charles William Vossler, a visiting scientist at the University of Tokyo's Department of Physics, spent the last two weeks of June in Taiwan. He conducted a seminar at the Physics Research Center at National Tsinghua University and had informal exchanges with Chinese physicists in Taiwan.

Dr. Jerry P. Becker of Rutgers University in New Jersey stayed in Taiwan June 21 through June 25. He lectured at the National Taiwan Normal University and had informal discussion with Chinese scientists in the field of mathematics education.

Dr. Teng Ta-liang of the University of Southern California spent over three weeks in Taiwan visiting all the 17 quake stations on the island and made recommendations for strengthening quake research in Taiwan (see separate story on page 1).

## Education Minister Becomes NSC Vice Chairman

Education Minister Choong Kow-kwong assumed his concurrent post last month as vice chairman of the National Science Council. The post was vacated by Dr. Yen Chen-hsing, who resigned after becoming chancellor of the National Taiwan University.

Born in Kwangtung in 1907, Choong was a graduate of the National Chiaotung University. He earned his master's degree and doctorate in science at the Massachusetts Institute of Technology. He had been a university professor and research engineer before becoming an education administrator several years ago.

Dr. Choong's major publications include 'The Huge-sized Pressure-entropy Chart Showing All Thermodynamic Properties of Steam Through the Bounds of Engr. Application; the Illustrated Explanations of the Principles of Mach., The "Land Grand Idea" as Seen at Michigan State U., etc.

## Relationship

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When Progesterone therapy was applied for two cows shown threatened abortion, the abortion which appeared before treatment disappeared. However, MacDonald and Krisman had stated that if the abortion was found in the mucus of woman during pregnancy, the possibility of causing abortion would be 50-75% high. The relationship between sperm penetrability and crystallization pattern of the mucus recognized in the present work is corresponding with the result of Takada.

### Conclusions

- (1) The cervical mucus obtained from 35 Holstein cows at varying stages of estrous cycles and the abnormal situations were investigated.
- (2) An attempt was made to find out what factors of PH, cell content, spinnberkeit, crystallization and electrophoretic pattern of cervical mucus might be related to and perhaps be responsible for the sperm penetrability and survival in vitro.
- (3) Although an extreme acidic or a alkaline mucus may repress the sperm penetrability, it seems not very often to cause the situation.
- (4) With increasing spinnberkeit of the cervical mucus, the degree of sperm penetration was found to increase.
- (5) As appearing arborization is not surely enhancing sperm migration. Nevertheless a high penetrative mucus would surely appear the abortion.
- (6) With increasing leucocyte content of mucus, it would surely repress the sperm penetrability.
- (7) A specific electrophoretic pattern had obtained in the case of Retentio secundinarum.