



SCIENCE BULLETIN

National Science Council
106, Ho-Ping East Road, Sec. 2,
Taipei, Taiwan, Republic of China

A Brief Introduction Promoting a New Area for Basic Research A Scientific Study of Pharmaceutical Technology and Chinese Traditional Medicine

In order to make Chinese Medical Pharmacology scientific and up-to-date, and with the expectation that it would be possible to develop some new medicines from Chinese medicine, many scholars and specialists at the Third ROC National Convention on Science and Technology in 1986 suggested that the ROC carry out its own research, manufacture, and development of new medicines; determine their effectiveness and safety, and conduct research on the toxicity, function, and mechanisms of traditional medical substances. During the 1989 National Development Seminar, it was further suggested that pharmaceutical technology (including research and development of Chinese medicines) be listed as one of the critical technologies by the Executive Yuan. At the Fourth ROC National Convention on Science and Technology in 1991, emphasis was also placed on the research of Chinese medicines, and it was further suggested that different "progressive laboratories and service-oriented laboratories" be established.

Developing new medical products is a long and complicated scientific project, which can principally be divided into four phases: 1) discovery and isolation; 2) pre-clinical testing; 3) clinical testing; and 4) patenting, production and marketing. In light of the present domestic situation and future development, this project has been designed to deal with the first two of the aforementioned phases.

Domestic pharmacological education has flourished with five depart-

ments of pharmacology, and two junior colleges of pharmacology. Data from as recently as the end of March, 1991 indicates that the ROC had 18,239 pharmacists, and 12,225 students of pharmacology. Medical colleges with departments of pharmacology all have M.A. programs in pharmacology, and with the exception of the National Defense Medical College, all have Ph.D. programs as well. However, when compared to the total number of physicians in the ROC (29,138 physicians of Western medicine and 5,693 doctors of Chinese medicine), there is a domestic surplus of pharmacists. Most domestic pharmacological research is conducted by the various departments of pharmacology, pharmacological clinics, and institutes of pharmacology - very rarely does the business sector get involved. However, not only is there a shortage of private university and college faculty in pharmacology departments, even the faculty of state schools are limited in number of official positions, and are mostly preoccupied with teaching college-level courses and providing clinical services in affiliated hospitals, or are engaged in laboratory work. This has resulted in their research efforts generally falling short of international standards.

The most particular feature of medicine in the ROC is that the application of traditional Chinese medicine co-exists with that of modern medicine throughout the ROC. Physicians of Chinese medicine constitute one sixth of all medical doctors, and the amount of Chinese

medicine used exceeds NT\$10 billion. While the long-term application of traditional Chinese medicine cannot really guarantee definite curative effectiveness or lack of toxicity, it has been proven that many of the materials in its medicines come from natural substances. Thus these natural substances are surely one important source for developing or discovering new medicines. Thus, making Chinese medicine more scientific and up-to-date is one task the domestic pharmacological community should actively pursue at the outset.

Chinese medicines are natural substances, but emotionally, Chinese do not regard them merely as natural substances. The number of Chinese medicines has grown with the times, as can be seen in the increase from only 365 types of Chinese medicine listed in the *Materia Medica* of Shen Nong, to the more than 5,000 kinds of herbal medical substances in use recently on the Chinese mainland. In addition, 1,600 of the approximately 6,000 species of plant substances known in the Taiwan area are used in Chinese herbal medicine. With the exception of preliminary selection and rejection of some 3,000 varieties among them of cancer-fighting function by Professor Kin Ming-ju more than a decade ago, scholars in the Taiwan area have only done research on some of the chemical ingredients and pharmacological functions of approximately 400 of them over the past 40 years. In terms of making Chinese medicine more scientific, we must first clarify, screen

and assay how effective and toxic are these Chinese medicines and herbal medicines used by the public, and then conduct a systematic evaluation of their development potential.

Domestic scholars connected with the development of pharmacology feel that every aspect of carrying out pharmacological research requires the cooperation of different departments in academic and research institutions, and should begin with developing the personnel, and setting up both the necessary space and equipment. The order of priority for each aspect of the project is as follows:

1. Pharmaceutical Materials Center
2. New Medicines Development Center
3. Chinese Medicine Assessment Center

4. Theoretical Research and Design of Controlled-Release Dosage Types
5. Development, Design and Related Theoretical Research of New Dosage Types of Medicine.
6. Research on Extraction Techniques for Natural Substances
7. Chemical Synthesis and Modification of Medicines
8. Research on Medicines affecting Cardio-vascular System Function
9. Research on Developing Medicines for Old-age Illnesses
10. Service Center for Isolating and Assaying the Pharmacologic Properties and Toxicity of Medicines
11. Establish a Leading Pharmaceutical Laboratory

We estimate that the total required cost for the National Science Council to carry out this Pharmaceutical Technology Development Project will amount to NT\$16.1 billion over six years. Given that the

cost of developing one new medicine in the U.S. or Europe averages approximately NT\$5 billion, and that the average development time is approximately 10 years, one can see that the cost mentioned above is only that for the exploratory phase. Development of new medicines not only requires the efforts of government and academia, but also the business community. In order to guarantee the commercial rights of these research results, it will take applying for patents and trademarks to effectively protect our intellectual property rights and prevent the vitiation of our research efforts.

National Science Council Improved Plan (for Specialized Research Applications)

Providing support for specialized research is one important function of the National Science Council. Its efficacy can affect the future direction and scope of research carried out in every school and research unit nationwide. Every researchers across the nation is involved with applying for research projects, project review, approval, contract signing, disbursement of funds, and itemization of expenses. The National Science Council has gradually computerized its internal paperwork but still remains in the mode of using application forms which research personnel fill out by hand.

Since the domestic use of personal computers has become increasingly widespread, many documents and materials are already being prepared by typing on a computer. Hence the National Science Council took up the planning and design of a Specialized Research Application Software Package in 1991 to switch over from manually filling out application forms to using computers to directly enter the data. In the fu-

ture, we are considering using modern network equipment to allow the data to be directly sent to the NSC computer, thus completely computerizing the procedure.

Since researchers are numerous and spread out over a wide area, it is hoped that prior to its application, this software receive the most detailed design. The preliminary phase will be to invite every academic department in the NSC to recommend 50 researchers to test it out in the first quarter of 1992 when applying for stipends. The basic sequence for applying will not change. The only difference is that those giving it a try should get two floppy disks from the NSC. One, copied from the individual data file at the NSC, contains basic individual data and data on the applicant's academic background, professional experience, and publications, supplied when applying to the NSC for support or a stipend, and all of which can be corrected or updated by the applicant. The second disk is the Specialized Research Application

software package. It includes some commonly used rules and budget standards added during design to prevent the applicant from losing out on some of the rights he or she is entitled to as a result of not being familiar with the regulations. This may also reduce much of the minute and complicated calculations and proof-reading by office personnel. The applicant then need only enter data for the abstract of the research project to be undertaken, motivation for the research, research background, personnel, and expenses, then use a computer to print out the application form and personal data chart. These, along with the disks, should be sent to the NSC.

The NSC Information Processing Committee will revise the software on the basis of the results obtained during this trial period. We estimate that in September of 1992, we can commence comprehensive use. It is hoped that this project will increase future operating efficiency and we welcome the advice and criticism of researchers.

The Administrative Office of the SIP Assists Manufacturers in R&D on Key Parts and Devices

In the hopes of encouraging industries within the Science-based Industrial Park (SIP) at Hsin Chu to develop key parts, devices, and products with the aim of developing independent sci-tech capabilities to lessen dependency on other nations, the administrative office of the SIP has revised the "Essential Award Measures for Innovative Sci-tech R&D Projects within the SIP." Starting in fiscal year 1993, financial awards will be raised from the current NT\$2 million to NT\$5 million, and the new "Plan for Research and Development for Key Parts, Devices, and Products" will be put into motion. The proposed budget for 1993 is NT\$470 million; this figure has already been approved by the Executive Yuan.

Applications under the "Plan for

R&D of Key Parts, Devices, and Products" are placed according to the "Development Assistance Method" of the Industrial Development Bureau (IDB). All manufacturers within the Park apply directly to the Park administration in the same way non-Park manufacturers apply to the IDB. The Park administration is prepared to assist with 50% of the expenditure for product development and the balance must be covered by the manufacturer.

The IDB will cooperate fully with the Park administration to guarantee efficiency of the plan. Interested manufacturers are encouraged to contact the administrative office as soon as possible so that the plan can be effectively put into operation.

In addition, the Park administration plans to cooperate with the government in protecting computer

software-related intellectual property rights. All manufacturers within the Park are required to comply with the regulations set forth by the Board of Foreign Trade in its communication of March 13, 1992 (reference number 02705) as follows: •

(1) All software being exported which is copyrighted in the R.O.C. must include proof of the copyrighter's permission as well as a copy of the copyright license.

(2) All software being exported which is registered in other countries must include proof of the owner's permission as well as a copy of the registration.

(3) All software being exported which is not registered anywhere must include a letter from the importer specifying use of this software and stating clearly that the importer will be fully responsible.

The NSC Signs Mutual Cooperation Agreements with Australia

In response to an invitation by the Australian Academy of Science, a delegation of five visited Australia from March 22 to 29 of this year. The delegation was made up of the Vice Chairman of the NSC, Dr. S.M. Wang; Prof. C.C. Su of Agricultural Chemistry at National Taiwan University; the Director of the Natural Science Division, Dr. M. H. Yang; the Director of the Science Education Division, Dr. J.F. Hsu; and a researcher from the International Cooperation Division, Mr. A.K. Lee.

The main purpose of the trip was to sign sci-tech cooperative agreements with the Australian Academy of Technological Science and Engineering. In addition, the Australian Academy of Science arranged for the group to visit the Commonwealth Scientific and Industrial Research Organization (CSIRO), the Walter and Eliza Medical Research Institute, and two well-known Aus-

tralian Universities.

Wang signed the two agreements in his capacity as an executive officer of the National Sci-tech Foundation under the auspices of the National Science Council of the R.O.C. The directors of the two Australian organizations signed on behalf of their respective organizations. Under the new agreements, mutual cooperation and exchange will include short-term study visits, 12-month long fellowship visits for cooperative research, and academic seminars on topics of mutual interest.

Short-term study visits will last from one to four weeks and will be of an investigative nature. Exchange scholars will agree on the topic for a fact-finding visit to be able to provide needed background information for future follow-up cooperative research projects. For such short-term visits, the visiting country will pay round-trip air fare,

while the host country will be responsible for all local fees incurred as well as arranging the visitor's schedule.

The term for fellowship visits for cooperative research will be dependent upon the period of time needed for the research project. These visits also include visits for particular specialized training. The visiting country will cover all expenses incurred, and the host country will be responsible for all arrangements.

The purpose of academic seminars is the same as that for short-term study visits. The focus will be on better understanding topics of mutual interest to both countries in order to make possible cooperative research.

Sci-tech research efforts in Australia are second only to Japan in the Asian region. Hopefully, these new cooperative agreements with Australia will open a new route of cooperation with our neighbor.

Exhibition of Information Science Literature Held at the NSC Information Science Exhibition Center

In order to help promote literature on information science and make the computer more effective, the Information Science Exhibition Center of the NSC held a special exhibit of books and other materials from April 25 through May 20 of this year. The purpose of the exhibit was to allow the general public to browse in a comfortable environment to absorb some of the new knowledge regarding information science.

This special exhibit was focused on published material in the field of information science. This included all types and levels of computer series. To spark greater interest in the exhibit, side exhibitions included computer graphics, computer-aided instruction, computerized music, and a sci-tech movie. The computer graphics exhibit included 80 life-like, imaginative drawings by children who attended the computer graphics course held at the Center. The other exhibits included a variety of intelligent software and musical software for the public to try firsthand.

The Information Science Exhibi-

tion Center, under the guidance of the NSC and the Institute for Information Industry has plans to join the forces of the Software Series Alliance, the China Productivity Center, and well-known manufacturers, such as Hewlett Packard and Digital, in arranging a variety of exhibitions and seminars to be held during the second half of this year. The Center acts as an important bridge among industrial, governmental, and academic organizations. These exhibits will allow the public to understand at a glance how these bodies conduct research and how the newest technologies and research results are promoted and applied.

In actually, the Information Science Exhibition Center began operations in 1986 when the NSC first commissioned the Institute for Information Industry which still administers operations. The mission of the Center includes educating the public in the area of information science and reducing the gap among groups of different with the ultimate goal of increasing general interest in information science. In order to help information education get properly rooted, the Center

takes a "Please Touch" approach, encouraging the public to try the exhibits and the equipment for themselves under the direction of professional instructors. This type of exhibition can be a great boost to traditional teaching methods.

According to statistics compiled by the Center, as of April 1992, nearly 800,000 visitors had entered the Center; that is approximately 220,000 visitors per year. The director of the Center, Mr. Y. Y. Ge has indicated that, in order to keep step with the rapid development of information technology, in addition to regular exhibitions and seminars, special exhibits will soon be open to the public. The Center will continue moving forward in the development of CAI software and in the introduction of new technology and equipment. In order to help improve the understanding of information science of people living in southern or distant regions, the Center arranges a variety of traveling exhibitions.

The Information Science Exhibition Center is pressing forward in all aspects of its mission and urges the public to take advantage of its services.

印
刷
版
本
台
北
市
延
平
南
路
一
一
號
十
一
樓
報
社

