REPORT OF
THE THIRD MEETING OF
DIRECTORS OF
WHO COLLABORATING CENTRES
FOR TRADITIONAL MEDICINE

BEIJING, PEOPLE'S REPUBLIC OF CHINA
23-26 October 1995

Sponsored by the World Health Organization
in association with the
State Administration of Traditional Chinese Medicine
of the People's Republic of China

WORLD HEALTH ORGANIZATION
ACKNOWLEDGEMENT

It is a great pleasure to acknowledge the excellence of the arrangements made by the State Administration of Traditional Chinese Medicine of the People's Republic of China and to express the deep appreciation of the Organization and the Directors of the WHO Collaborating Centres for Traditional Medicine to all who contributed to the success of the Meeting.
# REPORT OF THE THIRD MEETING OF DIRECTORS OF WHO COLLABORATING CENTRES FOR TRADITIONAL MEDICINE

**Beijing, People's Republic of China, 23-26 October 1995**

## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>ADDRESS OF WELCOME</td>
<td>2</td>
</tr>
<tr>
<td>Dr Zhang Wenkang, Vice-Minister of Public Health and</td>
<td></td>
</tr>
<tr>
<td>Director-General, State Administration of Traditional Chinese Medicine</td>
<td></td>
</tr>
<tr>
<td>INAUGURAL ADDRESS</td>
<td>4</td>
</tr>
<tr>
<td>Dr Fernando S. Antazana, Assistant Director-General, WHO</td>
<td></td>
</tr>
<tr>
<td>RECENT RESEARCH AND DEVELOPMENTS IN TRADITIONAL CHINESE MEDICINE IN CHINA</td>
<td>7</td>
</tr>
<tr>
<td>Dr Shen Zhixiang, State Administration of Traditional Chinese Medicine</td>
<td></td>
</tr>
<tr>
<td>INTRODUCTORY REMARKS</td>
<td>11</td>
</tr>
<tr>
<td>Dr Xiaorui Zhang, Medical Officer, Traditional Medicine Programme, WHO</td>
<td></td>
</tr>
<tr>
<td>WHO ACTIVITIES IN TRADITIONAL MEDICINE IN THE AFRICAN REGION</td>
<td>17</td>
</tr>
<tr>
<td>Dr Mamadou Kouraré, AFRO, WHO</td>
<td></td>
</tr>
<tr>
<td>WHO ACTIVITIES IN TRADITIONAL MEDICINE IN THE EASTERN MEDITERRANEAN REGION</td>
<td>23</td>
</tr>
<tr>
<td>Dr Abdel-Azim Hebib, EMRO, WHO</td>
<td></td>
</tr>
<tr>
<td>OVERVIEW OF USE OF TRADITIONAL MEDICINE IN THE WHO WESTERN PACIFIC REGION</td>
<td>25</td>
</tr>
<tr>
<td>Dr Chen Ken, WPRO, WHO</td>
<td></td>
</tr>
<tr>
<td>EXCERPTS FROM THE REPORTS OF WHO COLLABORATING CENTRES</td>
<td>31-34</td>
</tr>
<tr>
<td>African Region: Ghana, Mali, Nigeria</td>
<td></td>
</tr>
<tr>
<td>The Americas: U.S.A.</td>
<td>35-36</td>
</tr>
<tr>
<td>Europe: Italy</td>
<td>37</td>
</tr>
<tr>
<td>Western Pacific: People's Republic of China, Japan, Republic of Korea, Viet Nam</td>
<td>38-52</td>
</tr>
<tr>
<td>CONCLUSIONS AND RECOMMENDATIONS</td>
<td>53</td>
</tr>
<tr>
<td>CLOSING REMARKS</td>
<td>56</td>
</tr>
<tr>
<td>Dr Xiaorui Zhang, Medical Officer, Traditional Medicine Programme, WHO</td>
<td></td>
</tr>
<tr>
<td>ANNEX 1 LIST OF PARTICIPANTS</td>
<td>57</td>
</tr>
<tr>
<td>ANNEX 2 SCHEDULE OF THE MEETING</td>
<td>59</td>
</tr>
<tr>
<td>ANNEX 3 TRADITIONAL MEDICINE AND MODERN HEALTH CARE (WHA44.34)</td>
<td>61</td>
</tr>
</tbody>
</table>
INTRODUCTION

The Third Meeting of Directors of WHO Collaborating Centres for Traditional Medicine was held at Beijing, People's Republic of China, from 23 to 26 October 1995.

The purpose of the meeting was to review and discuss activities, progress, problems, needs, developments and plans for future work.

At the meeting, 19 of the 25 Collaborating Centres for Traditional Medicine were represented. Unfortunately, for reasons of financial stringency, not all those invited were able to attend. Participants, including Observers and Members of the WHO secretariat are listed in Annex 1.

The meeting was held at the Beijing Grace Hotel. At the opening ceremony, an address of welcome was given by Dr Zhang Wenkang, Vice-Minister of Public Health and Director-General, State Administration of Traditional Chinese Medicine. The inaugural address was delivered by Dr Fernando S. Antezana, Assistant Director-General of the World Health Organization, who formally opened the meeting.

An account of recent research and developments in Traditional Chinese Medicine in China was then given by Dr Shan Zhixiang, Director, Department of Foreign Affairs, State Administration of Traditional Chinese Medicine.

This was followed by a general introduction to the meeting by Dr Xiaorui Zhang of the WHO Traditional Medicine Programme, and by the nomination of Dr Xiao Peigen as Chairman, Dr Keita Arouna as Vice-Chairman, and Dr N.R. Farnsworth as Rapporteur.

Subsequently, the meeting proceeded with series of presentations on activities in traditional medicine in three WHO Regions, and at the Collaborating Centres represented.

These presentations were followed on the second day by discussions on the role of the Collaborating Centres and their work plans for the next four years, on strengthening cooperation between these Centres and WHO, and on collaboration between the Centres themselves.

The third day was devoted to a consideration of the conclusions and recommendations of participants, and to concluding remarks by Dr Xiaorui Zhang.

On the fourth and final day, visits were made to four institutions in Beijing, namely: the Hospital of the Beijing College of Acupuncture and Traumatology; the Beijing University of Traditional Chinese Medicine; the Instituto de Acupuntura and the Institute of Information on Traditional Chinese Medicine of the China Academy of Traditional Chinese Medicine.

The schedule of the meeting is given in Annex 2.
ADDRESS OF WELCOME

Dr Zhang Wenkang

Honourable Assistant Director-General of WHO, Dr Antezana, My guests, ladies and gentlemen.

Today, at this Third Meeting of Directors of WHO Collaborating Centres for Traditional Medicine convened in Beijing, on behalf of the Chinese Ministry of Health and the State Administration of Traditional Chinese Medicine and as a private individual, I would like to express my sincere congratulations to the meeting and extend a warm welcome to Assistant Director-General Dr Antezana, the honoured Directors and guests, and all participants at the meeting.

The Chinese State Administration of Traditional Chinese Medicine, entrusted by WHO to host this meeting of Directors of Collaborating Centres for Traditional Medicine, is greatly honoured in doing so. The meeting is a distinguished event in the circles of traditional medicine and pharmacy, which provides an excellent opportunity for the various centres to exchange experience and learn from each other, and is of great significance in further stimulating collaboration in these fields throughout the world and in promoting the development of traditional medicine and pharmacy. Convening the meeting in Beijing makes it easier for the Chinese profession of traditional medicine to learn from friends coming from other parts of the world, and to make use of their good experience and practices, so as to develop further traditional medicine and pharmacy in China.

Many countries in the world have their own form of traditional medicine. Not only has traditional medicine played an important historical role in the multiplication and prosperity of the human race, it is still of significance as a real force through its use by the people of some countries for preventing and treating disease and providing health care.

To achieve its strategic goal of "health for all", the World Health Organization has paid great attention to the development of traditional medicine, successively designating 25 Institutions as WHO Collaborating Centres for Traditional Medicine, so as to make full use of their scientific expertise. Such centres have played a useful role in promoting and stimulating the development of traditional medicine in countries throughout the world.

The Chinese Government lays great emphasis on and fully confirms the scientific value, historical contribution, significant practical importance and role of traditional medicine and pharmacy. It is stipulated in the Constitution of the People’s Republic of China "to develop modern medicine and the traditional medicine of our country", and the State Administration of Traditional Chinese Medicine has been specifically established to control traditional medicine and pharmacy at the national level, providing a legal and organizational guarantee for their development. Traditional Chinese medicine and pharmacy have been integrated into national programmes for socio-economic development as a governmental action, and a series of principles and policies, such as "giving equal emphasis to modern and traditional medicine", have been established to protect them and provide a strong stimulus to their development. At present, a system for medical care, education and research with a relatively rational layout and involving a fairly comprehensive range of disciplines has been established, together with a newborn industry for the large-scale production of traditional Chinese medicines and a nation-wide network for their distribution.

---

1 Vice-Minister of Public Health and Director-General, State Administration of Traditional Chinese Medicine, Beijing, People’s Republic of China
The underlying thinking for the development of traditional medicine and pharmacy in China is to comply with the developmental pattern and peculiarities of traditional Chinese medicine and pharmacy while fully exploiting their characteristics and advantages and, at the same time, to utilize advanced scientific technology and modern means to promote their integration with modern science. The seven WHO Collaborating Centres for Traditional Medicine in China are operating on the basis of such thinking. In recent years, certain progress has been made in research on the basic theory of traditional Chinese medicine and pharmacy, the development of traditional Chinese preparations, and the dissemination and application of non-medication therapies.

In the future, as in the past, we will continue to support the work of WHO’s Programme for Traditional Medicine, and further strengthen our relationship with WHO and our cooperation with professional circles in traditional medicine from other countries. I am sure that this Meeting of Directors of WHO Collaborating Centres for Traditional Medicine will increase concern, attention and support for traditional medicine and pharmacy in all countries, and will enhance friendship and understanding among colleagues from different countries, leading to the further development of traditional medicine and pharmacy world-wide and to a larger number of joint contributions to the health of humankind.

Thank you.
INAUGURAL ADDRESS

Dr Fernando S. Antezana

Honourable Dr Zhang Wen Kang, Vice-Minister of Public Health, Director-General of the State Administration of Traditional Chinese Medicine, Distinguished colleagues, Ladies and gentlemen,

It is for me an honour and special privilege to welcome you to this Third Meeting of Directors of WHO Collaborating Centres for Traditional Medicine and to address such a distinguished group of scientists and public health officials.

I should first of all like to transmit to you the greetings of the Director-General, Dr Hiroshi Nakajima. I should also like to extend our thanks to the Government of the People’s Republic of China, the Chinese Ministry of Public Health and the State Administration for Traditional Chinese Medicine for their collaboration and support which have made this meeting possible.

As you all know, the WHO Collaborating Centres are the technical backbone of the Organization. They are the world-wide technical network in the different areas of WHO’s work, which provides the Secretariat and Member States with fundamental technical inputs, which are a result of the research and experience that these Collaborating Centres put at the disposal of health care systems in different economic, social and cultural contexts.

Over the past decade, interest has revived in the study and use of traditional systems of medicine in different cultural settings. As a result, countries have sought cooperation from WHO in identifying and using the safe and positive elements of traditional medicine in national health systems.

WHO is aware that many elements of traditional medicine are beneficial, but others are not, and some are definitely harmful. In this respect, the Organization encourages and supports countries to identify and provide safe and effective remedies and practices for use in the public and private health services. However, this does not amount to a blind endorsement of all forms of traditional medicine. WHO’s role is to ensure that traditional medicine is examined critically and with an open mind.

Both WHO and many of its Member States have sought to foster a realistic and pragmatic approach to the subject. This has ensured progress in the Programme’s primary objective of linking proven, useful traditional practices and modern scientific medicine within the national health system.

The policy of the Traditional Medicine Programme is based on a number of resolutions adopted by the World Health Assembly and the Regional Committees. These draw attention to the fact that: (1) most of the world’s population depend on traditional medicine for primary health care; (2) the work force represented by practitioners of traditional medicine is a potentially important resource for the delivery of health care; and (3) medicinal plants are of great importance to the health of individuals and communities. Moreover, the Declaration of Alma-Ata in 1978 provided, inter alia, for the accommodation of proven traditional remedies in national drug policies and regulatory measures.

1 Assistant Director-General, World Health Organization, Geneva, Switzerland
China has a long history in the practice of traditional medicine. It has achieved considerable success in providing health care to its entire population which comprises over one thousand million inhabitants. Over the past 10 years, China has also been very successful in integrating modern Western medicine with the traditional practices that have been applied for several hundreds of years. For these reasons, it is particularly meaningful that the Third Meeting of Directors of WHO Collaborating Centres for Traditional Medicine takes place in China. The objectives of the meeting are to exchange experiences, to learn of the failures or disappointments that you might have had, and, particularly, to decide how, in the future, the role of traditional medicine can be more clearly established within national health care systems.

In this modern world, financial resources are diminishing in the social sectors, particularly in the health sector, whilst the demand for health services and equity is increasing. In these circumstances, the possibility of using local and national resources of natural origin is very promising. An interesting example of how traditional and modern health technologies can come together to improve the health care situation in the world is that achieved with the Artemisia family of plants, particularly the new antimalarial drug developed from Artemisia which is now being produced on an industrial scale in Europe following a licensing agreement with the Chinese Government.

Several World Health Assemblies have recognized the merits of traditional medicine and also its limitations. What is important for us is to see how we can best utilize the positive contribution of traditional medicine to the essential care of populations and thus to the goal of health for all. Traditional remedies are extensively used to respond to health care needs, not only of indigenous populations but also of today's affluent societies, where it is now accepted that some therapeutic merit can be accorded to traditional medicine, particularly medicinal plants and acupuncture. Herbal medicine has been recognized as an alternative or complementary practice in today's health care systems and, in some countries, selected practices originally classified as traditional medicine are now reimbursed by the social and health security system.

In 1991, the Forty-fourth World Health Assembly reiterated the important contribution of traditional medicine to the health of many societies. In fact, resolution WHA44.34 (Annex 3) urged Member States:

(1) "to intensify activities leading to cooperation between those providing traditional medicine and modern health care, respectively, especially as regards the use of scientifically proven, safe and effective traditional remedies to reduce national drug costs;"

(2) "to introduce measures for the regulation and control of acupuncture methods;"

and requested the Director-General

(1) "to ensure that the contribution of scientifically proven traditional medicine is fully exploited within all the WHO programmes where plant-derived and other natural products may lead to the discovery of new therapeutic substances;"

(2) "to seek appropriate partnerships with governmental bodies and nongovernmental organizations as well as with industry in implementing this resolution."

Your participation in this meeting is once more a clear expression of your interest, knowledge and dedication to the different facets of traditional medicine in the context expressed in the various World Health Assembly resolutions. It also proves your readiness to continue collaborating with WHO and its Programme on Traditional Medicine.
In the present and future health care systems, the responsibility of individuals and society must be enlarged. The democratization of the health care system in many countries requires the allocation of additional resources from all those concerned, that means society as a whole. At the same time, the costs of health care are escalating to a degree that not many countries can afford to finance. In this regard, several mechanisms for cost containment have been put into place and the roles of the State and the private sector are under review. Since traditional medicine is in many ways linked to some kind of self-medication or family self-care, it is an obvious alternative for the treatment of minor illnesses and other diseases that for centuries have been treated with traditional medicine. Of course, caution should be exercised in terms of safety, efficacy and appropriateness in the application of traditional medicine. Finally, the cultural context in which a particular traditional medicine practice may or may not be acceptable should be taken into account.

I should like to thank you once more for your readiness to put your knowledge, experience and time at the disposal of the World Health Organization. The proceedings and outcome of this meeting will be published and will hopefully be useful for those Member States that may wish to continue the effort to incorporate traditional medicine into their national health care systems. The Chinese authorities and scientists have provided us with a shining example in this regard and have set the pace for future developments.

The outcome of this meeting will also be of great importance for the future of the WHO Programme on Traditional Medicine since next January, during the ninety-seventh session of the Executive Board, the Programme on Traditional Medicine will be reviewed by the Board for the first time and the Board will give comments and suggestions for the future orientation of the Programme. Your discussions here will provide us with substantial material for presentation to the Board.

Distinguished colleagues, ladies and gentlemen, I wish you much success in your deliberations, and I now have pleasure in declaring this meeting open.
RECENT RESEARCH AND DEVELOPMENTS IN
TRADITIONAL CHINESE MEDICINE IN CHINA

Dr Shen Zhixiang ¹

Traditional Chinese Medicine (TCM) is an integral part of the glorious culture of the Chinese nation. In the past several thousand years, it has made outstanding contributions to the flourishing and prosperity of the Chinese nation, and with remarkable efficacy. With its striking national characteristics, unique diagnostic methods, systematic theoretical system and abundant historical literature, it stands as an indispensable part of the medical sciences of the world, constituting a common wealth of the medical treasure house of mankind. The fact that it has remained intact over several thousand years indicates its vitality. Both traditional Chinese and Western medicine are used in China and play an important role in the health and medical care for Chinese people.

The Chinese Government has always attached great importance to TCM sciences and technology and has formulated a series of policies and guidelines to promote the development of scientific research in this field. The State Administration of Traditional Chinese Medicine has a special division responsible for national scientific research and personnel training. At provincial-municipal level, each Health Department has an officer in charge of science and technology work. Research projects are managed by the Health Departments of different levels. All provinces and cities have their own projects. In addition, the State appropriates a certain amount of money as a scientific research fund which is used in project bidding. When passing the appraisal of an expert group organized by the State, the projects are listed as State-level projects under the supervision of the State. Finally, each project has to be appraised according to the relevant regulations. Research projects are classified into three categories: basic research, applied research, and development research. The State's policy is to stabilize basic research and open up a vast area for applied research. To encourage scientific research of potential economic benefit and resolve practical problems encountered in production, the State, taking five years as a cycle, assigns a number of key projects and organizes cooperative groups to complete them. To ensure the development of basic research, the State has established an international science fund to support major programmes in basic research. The State has stressed the need to transform the results of scientific research in TCM into practical achievements. According to their academic value and the profits obtained from such transformation, and based on the appraisal by experts, the projects are honoured and granted awards of different grades. To stimulate the initiative of researchers, their salaries are linked to their contributions to the projects which have received awards.

Since the adoption of the policy of reform and opening up, the scientific work of TCM has made much progress. At the end of 1994, there were 170 TCM institutions in China, including 77 national independent scientific research units, with more than 10,000 professional technicians, and about 100 institutions attached to TCM universities or colleges and provincial hospitals. This constitutes a system of scientific research, with the national and the provincial scientific research institutions and a number of universities and colleges as its main body, and with TCM personnel of different disciplines and levels as its backbone. Over the period 1978-1994, 127 programmes were awarded State level prizes including 39 National Invention Prizes and 60 National Scientific Progress Prizes, and 1362 programmes were awarded scientific and technological prizes of the various ministries and commissions, including 541 from the Ministry of Public Health and the State

¹ Director, Department of Foreign Affairs, State Administration of Traditional Chinese Medicine, Beijing, People's Republic of China
Administration of Traditional Chinese Medicine. All of these are of paramount importance in China’s development of science and technology. There follows a brief introduction to the key achievements.

Most of the achievements were obtained by means of modern scientific (including modern medical) and technological methods, based on studying, systematizing and analysing traditional Chinese medicine and pharmacology.

Artemisinin (Qinghaosu), an extract from the Chinese medicinal herb, sweet wormwood, has been tried in more than 2000 patients with malarial infection. Success was observed with vivax malaria and plasmodium falciparum and, especially, with the chloroquine-resistant plasmodia. Since the invention of artemisinin and dihydro-artemisinin, other artemisinin derivatives have been developed, such as artemisinin artesunate and oil suspension of artemether which are of higher efficacy and lower toxicity and give lower recurrence rates. The WHO authorities have described the development of artemisinin as a great contribution to world medicine.

Anisodamine, an alkaloid extract from Anisodus tanguicus (maxium) pascher, can be semi-synthesized into 654-2. The latter is comparable in effectiveness to the natural 654 in the treatment of fulminating epidemic encephalo-spinal meningitis in children and toxic dysentery. It can also be used to treat a variety of conditions with impaired microcirculation. An anti-cholinergic drug, anisodamine hydrobromate, for oral or parenteral administration, has also been prepared. It is effective in vaso-spastic conditions (e.g., central retinopathies, obstructive cerebro-vascular disorders), organic phosphorus poisoning and motion sickness.

Huperzine A, a new and true cholinesterase suppressor, isolated from Huperzia serrata (Thunb) Trev. and Pinus massoniana Lamb., which were screened out from more than 3000 different Chinese medicinal herbs, is superior to neostigmin for myasthenia gravis. Biphenyl-dimethyl-dicarboxylate and Schizandrol, designed and prepared according to the pharmacological actions of Fructus Schizandrae, are indicated for chronic hepatitis and give good curative effects.

Having observed the efficacy of the composite Dang Gui Lu Hui Wan for chronic granulocytic leukaemia, Chinese researchers set out to find its active ingredient. The final result was the discovery of indirubin which has undergone trials on 314 patients in 52 hospitals. Complete response was observed in 82 patients and partial response in 105 patients, with an overall response rate of 87.3%. This drug has been partially synthesized at present. A pessary made of the traditional Chinese drug - San Pin Yi Tiao Qiang, was found to cure early cancer of the uterine cervix by local chemotherapeutic application. Nearly 1000 cases of primary hepatocellular carcinoma, oesophageal and gastric cancer and cancer of the gastric cardia have been treated by nor-cantharidin, an active ingredient from Mylabris cichoni (Linn) Fabricius. The survival of these patients was prolonged and no adverse effects were observed. In about 70% of cases, the leucocyte count was found to have returned to normal. Based on the efficacy of Papoyryym dibbryys (c.Don) Hara, 608 patients suffering from chronic lung abscess were treated with an over-all cure rate of 72.7%. A new, substance, Armillarisin A, was found to be a potent drug for acute cholangitis. It is superior to the administration of double or triple antibiotics, and used in smaller doses gives rise to no drug resistance. The discovery of pearl extract injections for uterine bleeding, 3-acetylaconitine for its analgesic and tranquillizer effects, Ilex pubescens Hook. et Arn preparations in tablets or ampoules for ischaemic and thrombotic cerebro-vascular disorders, Populus simonii Carr. decoction for coronary heart diseases, and tooth extraction with laser acupuncture anaesthesia all indicate that there is a tremendous treasure in the traditional Chinese medicine with its limitless knowledge.

The treatment of cerebro-vascular accidents and encephalitis B by an injection prepared from a prestigious Chinese prescription An Gong Niu Huang Wan gave response rates of 84.2% and 90% respectively. Its use in upper respiratory infection and pneumonia gave response rates of 90%. It can also lower the mortality rate of fulminating hepatitis to less than 30%. Satisfactory results have been observed in the prevention of pre-cancerous lesions of hepatocellular carcinoma. A cure rate of 90.7% was observed in acute renal failure using a Chinese herbal enema. An improvement rate of
91.2% and an expulsion rate of 65% were demonstrated in patients with gallstones by the combined use of modern and traditional Chinese medicine. One third of patients suffering from cholelithiasis could be managed by a non-interventional regime. Based on the experience of modern and traditional Chinese doctors, the Qiang Ji Jiang Li soft drink gave a response rate of 98.8% in 252 patients with myasthenia gravis. Prepared Yu Lin Tang gave a response rate of 97.1% in psoriasis, and the five-year recurrence rate was only 33%. Tablets and a syrup preparation are on sale. Di Ao Xin Xue Kang, Shen Shao tablets for cardiovascular disorders, Qian Lie Kang for prostatic hypertrophy, Gu Yan Tang with surgical removal of sequestrum for chronic osteomyelitis, and delay of chronic renal failure by Rheum are all recent accomplishments in traditional Chinese medicine.

Xiao Zhi Ling injection, designed and prepared according to the theory "acids shrink and astrigent fix", achieved a cure rate of 90% in more than 50,000 cases of internal or mixed haemorrhoids. "Yin Huang aerosol for relieving asthma" has successfully treated 315 cases of asthma of "heat" type, giving some benefit in 94.9% and with marked efficacy in 65.71%. An ancient prescription, Liou Wei Di Huang Wan, was found to be effective in preventing oesophageal carcinoma. These are other examples of the benefits of TCM.

Acupuncture anaesthesia is an important part of acupuncture. More than two million surgical operations under acupuncture anaesthesia have been done in China. It has proved to be of definite value in: surgery of the thyroid, anterior cranial fossa, posterior cranial fossa, and the temporal, parietal and occipital cerebral lobes; the anterior approach to the cervical spine; open heart surgery, lung lobectomy, caesarean section and tooth extraction, as approved by the government authorities.

Basic physiologic mechanisms for the analgesic effects of acupuncture analgesia have been investigated, and the action of opioid peptide and other neurotransmitters proposed. In the project "Role of afferent C fibres and the nucleus raphe magnus involving negative feedback mechanism of pain in acupuncture analgesia", the antidiromic activation and collision technique was firstly used to analyse qualitatively and quantitatively the relation of the properties of acupuncture-induced afferent signals to the activities of raphe spinal neurons in the nucleus raphe magnus (NRM). It was found that only when acupuncture stimulation is so strong as to be noxious can the NRM play its role. The finding gives an answer to the dispute as to what kind of afferent fibres are involved in activating the analgesic structures in the brain in acupuncture.

To meet the demand for supply of conventional and precious Chinese medicinal herbs, techniques of cultivation and synthesizing the active ingredients have been developed. The extensive cultivation of Gastrodia tuber by the fungus bed methods has solved the problem of limited supply of the drug. Synthetic musk, successfully developed, has been put on the market as a first class product. This will not only relax the demands of 295 kinds of Chinese patent medicine, but will also enable the reserves of wild musk deer to be built up again. Opportunities for them to multiply have been developed and the resources of precious wild musk deer have been protected effectively in our country. A-Shan district in Inner Mongolia has invented "Vegetable soil inoculation bed substrate cultivation method" to cultivate artificially Herba cistanches, effectively resolving the problem of shortage of seeds. "Systematic research on artificial cultivation of Radix Glycyrrhizae" has played an important role in protecting resources and increasing its production. Furthermore, a new technique for cultivation of Hericium erinaceum (Bull. ex Fr.) Pers. and Hericium erinaceus (Bull.) Pers. Mycelium, the new cultivation technique for Radix Astragali, the cultivation technique for Coptis chinensis by planting corns and trees for shadow, the chemical synthesis of coptisine, and the aforementioned accomplishments have all contributed greatly in the development of traditional Chinese medicinal technology. The studies on the age determination of uncut trees by the bark and the processing technique of Behmanniae Praeparata founded the scientific basis of developing and protecting the resources of the traditional Chinese medicinal herbs.
Methods of differentiation and quality control of Chinese medicinal materials are important requirements for satisfactory results in traditional Chinese medicine. In the research work "identification of traditional Chinese drugs by electrophoresis and its application in Chinese plant and animal drugs", by taking for the first time protein molecules controlled by hereditary genes and existing generally in the cells of animals and plants as an index, corresponding graphs have been drawn to identify different kinds of crude drug, similar-looking but different species of the same genus, and to distinguish the genuine from the fake species, with rapidity, high sensitivity, strong specificity, and good reproducibility. Thus a breakthrough has been achieved in identification of traditional Chinese drugs. Reliable methods of examining and classifying imported pharmacotherapeutic agents, X-ray diffraction crystallography of Chinese medicinal herbs, physiological and morphological investigations on 300 types of Chinese medicinal herbs, and classification studies on Fructus Amomii, Rhizoma Dryopteris Grassirhizomae, Bulbus Fritillariae, Flos Lonicerae have all helped to provide a scientific basis for the quality control of the Chinese medicinal herbs.

On the basis of medicinal herb cultivation and knowledge on resources and protection, the supply of high-quality and rare drugs was ensured. The successful cultivation of American ginseng on large farmlands gives yields comparable to those of imported ginseng. The technology of high yield *Carthamus tinctoria* ended the need to import the crocus from abroad. Growing Radix Rehmanniae by tissue culture resolves the problems of degeneration of this drug. Many others: e.g., artificial cultivation of Calculus Bovis, new methods of cultivating Flos Lonicerae in Ping Yuan area, mound planting of Fructus Cori, polyplloid and haploid seeding of Radix Achyranthis Bidentatai, home cultivation of wild Radix Gentianae, and partial surface cultivation of Bulbus Fritillariae represent a big step forward in the traditional Chinese medical technologies. Aerated protection and pest monitoring have put a stop to moulding, decay and pest development in Chinese medicinal herb storage. The combined investigation on the Chinese Lycopodium plants and the Anhul fritillary bulb, and studies on the supply of *Actinidia chinensis*, Hua Tua Zai Zao Wan, Jin Shui Bao, Yin Feng Lun (interruption of blood flow), Dual Chinese Goldthread injections, Wu Miao Shui Xian Gao, preparation of Jinlin red ginseng, A-conitine A-hydrobromate, have all demonstrated the possibility of protecting resources, and of the preparation and extraction of active ingredients from the traditional medicinal herbs.

In recent years, progress has also been made in the study of TCM basic theory. For example, "Research on etiology and pathogenesis of deficiency of spleen-qi syndrome" has deepened understanding of the essence of spleen-deficiency from the aspects of morphology, function and metabolism, and presented a new perspective of spleen-deficiency syndrome. The "Experimental study on the regulatory effect of Er Xian Tang and its prescription on hypothalamus-pituitary-sexual gland axis" proves that the drugs with function of nourishing yin and purging pathogenic fire can delay the aging process of the sexual gland axis, and that drugs with the function of warming the kidney can enhance the function of the sexual gland axis.

Looking into the future, with the concern and guidance of the Chinese Government and the collaboration of Chinese scientists, much more will be accomplished in the field of traditional Chinese medicine.
INTRODUCTORY REMARKS

Dr Xiaorui Zhang

Mr Chairman,
Distinguished participants, colleagues and friends, ladies and gentlemen.

May I add my welcome to that of the distinguished speakers who have addressed you this morning before the coffee break, and at the same time express to our Chinese hosts and colleagues my deep appreciation of the consideration, kindness and generosity that they have shown in making this meeting possible. It will be obvious to all how much care and thought and hard work have gone into the preparations they have made to ensure that our visit to their great country will be not only agreeable but highly rewarding and full of interest.

There were 10 Collaborating Centres for Traditional Medicine throughout the world when the First Meeting of Directors of WHO Collaborating Centres for Traditional Medicine was held in Geneva in 1981. In 1987, a second meeting attended by Directors of 21 WHO Collaborating Centres was held in China, and the recommendations adopted by that meeting were later included in WHO’s priority activities in traditional medicine of the medium-term programme for 1990-1995. Today, those recommendations are still fully relevant to WHO’s priority setting and programming which focuses on five main areas: (1) national programme development; (2) health systems and operational research; (3) clinical and scientific investigations; (4) education and training; (5) exchange of information.

The WHO Traditional Medicine Programme was started some eighteen years ago, and there are now 25 Collaborating Centres (Table 1). I would like to share with you today some thoughts on its development and implementation which will touch upon four important aspects.

1. Promoting and developing traditional medicine

The activities and experiences of the Collaborating Centres are contained in their annual reports to WHO, and these Centres should be congratulated for their performance. Traditional medicine in various countries has been promoted and further developed through scientific research, clinical investigations, education and training, as well as information exchange. This is crucial for WHO’s national programme development and implementation. I will not burden you with too many details, as you will soon hear the reports to be presented by Directors themselves on their latest achievements.

2. Providing technical support

To facilitate the safe and effective use of traditional medicine, a series of technical guidelines on herbal medicines and acupuncture is under preparation. Our Centres have provided their technical knowledge and wisdom to assist WHO in developing these important documents. For example, the University of Illinois at Chicago, United States of America, and the Natural Products Research Institute at Seoul, Republic of Korea have participated actively in the preparation of the WHO...

---

1 Medical Officer, Traditional Medicine Programme, World Health Organization, Geneva, Switzerland
Guidelines for the Assessment of Herbal Medicines which were adopted for general use by the Sixth International Conference of Drug Regulatory Authorities (ICDRA) in Ottawa in 1991, and were subsequently finalized and endorsed by a WHO Expert Committee in 1994. The Institute of Medicinal Plant Development in China, and the University of Illinois at Chicago, made valuable contributions in the preparation of the WHO Guidelines on the Conservation of Medicinal Plants.

3. Promoting the proper use of traditional medicine

WHO is aware that many elements of traditional medicine are beneficial, but others are not. In this respect, the Organization encourages and supports countries to identify and provide safe and effective remedies and practices for use in the public and private health services. Training programmes are very important for traditional practitioners to upgrade their knowledge and skills and to make proper use of traditional medicine. Every Centre undertakes training assignments in accordance with its terms of reference. Many WHO fellows and practitioners have undergone training at these Centres. For example, according to a report by three WHO Collaborating Centres for Traditional Medicine in China, more than 6000 WHO fellows and practitioners from over 100 countries were trained during the last decade.

4. Information exchange

WHO acts as a clearing house for the dissemination of information on various forms of traditional medicine. The network of Collaborating Centres forms the basis of the programme at WHO headquarters and regional offices. For example, the College of Pharmacy of the University of Illinois at Chicago maintains a computerized database, containing scientific information gathered in a systematic way from the world literature on the chemistry, pharmacology and ethnopharmacology of natural products. NAPRAERT is the acronym for Natural Products ALERT which consists of a computerized database on the medicinal uses of natural products, in the form of plant profiles. Information is available on request and, in the case of developing countries, without charge. This service represents a great saving of time, effort and financial resources.

Support for institution strengthening is being provided to a number of Centres by some WHO regional offices. Unfortunately, at headquarters resources have not been sufficient to allow any such financial support. I feel that there is an urgent need to raise, in a well coordinated manner, extrabudgetary resources for the Programme.

As you are aware, the purpose of this meeting is to consider the work of Collaborating Centres over the past few years; to review their research achievements; to develop a publication on the latest developments and research in traditional medicine based on new research results and achievements; to discuss their work plans for the next 4-8 years; and to promote the exchange of technical knowledge and information among the Centres.

The outcome of this meeting will be crucial for the programme review of the WHO Traditional Medicine Programme which will be presented for the first time at the forthcoming Executive Board meeting in January 1996, and it could also be used to enlist support from donors.

Finally, I would like to congratulate three colleagues on their nomination, namely: Professor Xiao Peigen, Director of the Institute of Medicinal Plant Development, China, our Chairman; Dr Kaita Aruna, Institut National de Recherches en Santé Publique, Mali, as our Vice-Chairman; and Professor Norman Farnsworth, Director of the WHO Collaborating Centre at University of Illinois at Chicago, as our Rapporteur. During the meeting, Dr Shen Zhixiang, Director of the Department of Foreign Affairs, State Administration of Traditional Chinese Medicine, China, will together with myself be responsible for the day to day arrangements. We will be glad to assist you in any way possible.
I have great pleasure in conveying to you greetings from the World Health Organization and its best wishes for the success of our meeting.

Mr Chairman, distinguished participants, ladies and gentlemen, I thank you for giving me the opportunity of addressing you today and of meeting old friends and making new ones.
### AFRICAN REGION

<table>
<thead>
<tr>
<th>Country</th>
<th>Date designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>December 1981</td>
<td>Centre for Scientific Research in Plant Medicine, Mampong - Akwapim</td>
</tr>
<tr>
<td>Madagascar</td>
<td>January 1986</td>
<td>Centre National de Recherches Pharmaceutiques (CNRP), Antananarivo</td>
</tr>
<tr>
<td>Mali</td>
<td>December 1981</td>
<td>Institut National de Recherches en Santé Publique, Bamako</td>
</tr>
<tr>
<td>Nigeria</td>
<td>December 1981</td>
<td>Faculty of Pharmacy, Department of Pharmacognosy, University of Ife, Ile-Ife</td>
</tr>
</tbody>
</table>

### THE AMERICAS

<table>
<thead>
<tr>
<th>Country</th>
<th>Date designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.A</td>
<td>March 1981</td>
<td>College of Pharmacy, University of Illinois at Chicago</td>
</tr>
<tr>
<td></td>
<td>July 1981</td>
<td>Institute for Advanced Research in Asian Science and Medicine, Brooklyn</td>
</tr>
</tbody>
</table>

### EASTERN MEDITERRANEAN

<table>
<thead>
<tr>
<th>Country</th>
<th>Date designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudan</td>
<td>March 1984</td>
<td>Traditional Medicine Research Institute, Medical Research Council, Khartoum</td>
</tr>
</tbody>
</table>
Table 1. (cont’d)  WHO COLLABORATING CENTRES FOR TRADITIONAL MEDICINE

<table>
<thead>
<tr>
<th>Country</th>
<th>Date designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EUROPE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>February 1979</td>
<td>Istituto Italo-Africano, Rome</td>
</tr>
<tr>
<td>Romania</td>
<td>September 1984</td>
<td>State Institute for Drug Control and Pharmaceutical Research, Bucharest</td>
</tr>
<tr>
<td>Belgium</td>
<td>November 1990</td>
<td>Natural Product Research Institute, University of Antwerp, Antwerp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Date designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOUTH-EAST ASIA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>July 1979</td>
<td>University of Ayurveda, Jamnagar</td>
</tr>
<tr>
<td></td>
<td>September 1981</td>
<td>Faculty of Ayurveda, Banaras Hindu University, Varanasi</td>
</tr>
<tr>
<td>Democratic People's Republic of Korea</td>
<td>August 1988</td>
<td>Academy of Traditional Korean Medicine, Pyongyang</td>
</tr>
</tbody>
</table>
### WESTERN PACIFIC

<table>
<thead>
<tr>
<th>Country</th>
<th>Date Designated</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>People's Republic of China</td>
<td>August 1983</td>
<td>Institute of Acupuncture &amp; Moxibustion, Academy of Traditional Chinese Medicine, Beijing</td>
</tr>
<tr>
<td></td>
<td>August 1983</td>
<td>Institute of Chinese Materia Medica, Academy of Traditional Chinese Medicine, Beijing</td>
</tr>
<tr>
<td></td>
<td>August 1983</td>
<td>Institute of Clinical Research &amp; Information, Academy of Traditional Chinese Medicine, Beijing</td>
</tr>
<tr>
<td></td>
<td>February 1988</td>
<td>Institute of Medicinal Plant Development (IMPLAD), Chinese Academy of Medical Sciences, Beijing</td>
</tr>
<tr>
<td></td>
<td>August 1983</td>
<td>Nanjing College of Traditional Chinese Medicine</td>
</tr>
<tr>
<td></td>
<td>August 1983</td>
<td>Institute of Acupuncture Research, Shanghai Medical University</td>
</tr>
<tr>
<td></td>
<td>August 1983</td>
<td>Shanghai College of Traditional Chinese Medicine</td>
</tr>
<tr>
<td>Japan</td>
<td>February 1986</td>
<td>Oriental Medicine Research Centre (OMRC), The Kitasato Institute, Tokyo</td>
</tr>
<tr>
<td></td>
<td>April 1988</td>
<td>Department of Japanese Oriental Medicine, Toyama Medical &amp; Pharmaceutical University</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>April 1988</td>
<td>East-West Medical Research Institute, Kyung Hee University, Seoul</td>
</tr>
<tr>
<td></td>
<td>April 1988</td>
<td>Natural Products Research Institute, Seoul National University</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>February 1988</td>
<td>Institute of Traditional Medicine, Hanoi</td>
</tr>
</tbody>
</table>
WHO ACTIVITIES IN TRADITIONAL MEDICINE
IN THE AFRICAN REGION

Dr Mamadou Koumare

INTRODUCTION

Many countries in the WHO African Region are now convinced that the use of traditional health practitioners (especially traditional therapists and traditional birth attendants) within an organized and official structure is a high priority for their health systems. Since the second meeting of Directors of WHO Collaborating Centres in November 1987, requests for policy orientations made by countries are increasing and the Programme is, at the present time, very well known even if the resources available are not yet sufficient to face adequately the challenge.

OBJECTIVES

General Objectives

To promote and develop the rational utilization of traditional medicine in order to contribute to the establishment of national health care systems, bearing in mind the peculiarities of the socio-cultural environment of each country.

Specific Objectives

1. ROLE OF TRADITIONAL MEDICINE IN THE ORGANIZATION AND DELIVERY OF THE GENERAL HEALTH CARE SYSTEM

To support countries, which so desire, in the formulation of relevant national policy and the elaboration of a legal framework for the practice of traditional medicine and the use of standardized and licensed remedies and methods.

2. STUDIES AND RESEARCH ON TRADITIONAL MEDICINE

To assess appropriate methods, traditional practices and remedies within the cultural setting concerned so as to identify and licence those which are safe and effective.

3. TRAINING IN TRADITIONAL MEDICINE

To improve the skills and knowledge of practitioners in both traditional and modern health care systems through complementary training.

---

1 Medical Officer, Clinical, Laboratory and Radiology Technology and Traditional Medicine, WHO Regional Office for Africa, Brazzaville, Congo
TARGETS

The Programme strives to promote national and international action so that by December 1995, for specific objectives:

1. - 35 of the Member States of the Region would have drafted organizational and regulatory texts, and would have set up formal structures;
2. - in 30 of the Member States, an inventory of resources and practices would be drawn up and studies initiated to license certain remedies; and
3. - 25 of the Member States would have designed and implemented complementary training programmes.

STRATEGIES

1. CAPACITY BUILDING BY TRAINING

To achieve the above indicated targets a certain critical mass of qualified personnel is essential.

2. EDUCATION, INFORMATION AND ADVOCACY

This is done in the framework of workshops on traditional medicine to allow the exchange of experiences and information.

ACHIEVEMENTS

In its role of guidance and coordination, the WHO Regional Office for Africa (AFRO) has taken the following actions:

National Policies, Programmes and Structures

With assistance from AFRO, UNDP and UNESCO, the Central African Countries of Bantu Civilization, under the auspices of the International Centre for Bantu Civilization (CICIBA) adopted the community approach to defining their policy and drafting their legislation according to WHO models.

Studies and Research

At the 40th session of the Regional Committee in September 1990, Ministers of Health adopted resolution AFR/RC40/R8 on traditional medicine, urging Member States to promote and develop their traditional medicine systems.

In the area of practices, diseases, cures and other forms of care, efforts are being focused on standardization, evaluation of rational use and efficacy, and on the improvement of the skills and knowledge of practitioners of the two systems of medicine.

Information, Training and Exchange of Experiences

AFRO has provided researchers in the Region with selected technical documentation and information from outside sources before its own databank becomes fully operational.
From 25 to 29 April 1994, the first intercountry workshop on the selection and rational use of traditional drugs was held with the participants from Burkina-Faso, Guinea and Mali.

Some countries benefited from study tours or workshops on selected themes within the African and South-East Asia Regions, in the framework of Technical Cooperation among Developing Countries (TCDC).

Supply

Countries have been supplied with laboratory equipment, reagents and vehicles needed for field surveys.

Financial

Seed money has been sometimes given to the Centres, but it is AFRO’s experience that providing supplies is preferable to financial support.

Survey

SUB-REGIONS AND CENTRES

The African Regional Office comprises 48 Member States divided into three sub-regions, and has four Collaborating Centres for Traditional Medicine, three in Sub-region 1 (Ghana, Mali, Nigeria) and one in Sub-region 3 (Madagascar).

SITUATION ANALYSIS

A questionnaire on traditional medicine has been sent to all the countries of the Region. Analysis of the responses to the questionnaire by these countries (Table 1) shows that:

- Some official regulations exist (18 countries), but these are sometimes not implemented (the legal void in some countries is often the consequence of the absence of national policy and plans);
- 17 countries have created national bodies in charge of the management of activities of traditional medicine;
- 24 countries have research institutions;
- 19 countries have their own inventory of medicinal plants or remedies;
- 21 countries have a budgetary allocation for traditional medicine;
- 23 countries have a register of traditional practitioners;
- 27 countries have an association for traditional medicine;
- in 25 countries traditional practitioners are involved in primary health care;
- 8 countries have training facilities; and
- 6 countries have a procedure for official approval of traditional drugs and practices.
International Cooperation

In the field of international cooperation in traditional medicine in the Region, AFRO has:

- contributed, in collaboration with the OAU, to the publication of the first African pharmacopoeia;
- acted as the executing technical assistance agency for various UNDP projects in African countries;
- organized the first meeting of Collaborating Centres in Niamey (Niger) in February 1989 with the following organizations attending: UNDP, UNIDO, OAU, ECA, CAMES and CICIBA, (and signed an agreement with the latter in March 1988); and
- partly funded the International Conference of Experts of Developing Countries on Medicinal Plants, held in Arusha, United Republic of Tanzania, from 19 to 23 February 1990.

Regional Data Bank

AFRO is setting up a regional data bank on traditional medicine. Once it is operational, researchers will have faster access to the required bibliography for research on medicinal plants and traditional practices.

CONSTRAINTS

The absence of a focal point for traditional medicine in countries has often resulted in a diversity of targets and lack of coordination between the ministries concerned (health, research, industry, education, culture), and has sometimes made the efforts of certain countries in this field ineffective.

The scepticism of certain decision-makers is still a serious brake to progress, and inadequate cooperation and exchange of experiences between isolated and poorly equipped research teams constitutes an obstacle to the timely production of results.

Retraining of practitioners in the two medical systems and basic training or specialization of students are still difficult since they primarily require the establishment of learning objectives, an appropriate national programme, and teaching materials which are at present non-existent in most of the countries.

The Programme still does not receive adequate funds.

PROPOSALS

Regional Level

Recognizing the important contribution of traditional medicine to the provision of essential health care in Africa, and realizing that medicinal plants have true economic potential and can meet a part of the basic drug needs of the community, the Fortieth session of the Regional Committee, paved the way for rational use of the human and material resources available in its resolution AFR/RC40/R8: The development and success of this approach requires triangular South-South-North
cooperation, in which South-South cooperation is the first step. In pursuit of this approach, it is proposed that a biennial workshop on a selected theme in traditional medicine be held at regional level. The main areas would be:

- Policy formulation;
- Studies and research on systems, practices, diseases (diagnostics and treatments);
- Training of health practitioners of the two systems; and
- Information and advocacy.

Global Level

At global level, it is proposed that two types of WHO meeting be held on a regular basis, namely:

- An annual meeting for WHO traditional medicine advisers to plan and evaluate the Traditional Medicine Programme and share experiences; and
- Every four years, the Directors of WHO Collaborating Centres to meet to plan and evaluate their activities and cooperation with WHO.
Table 1. ANALYSIS OF RESPONSES TO THE AFRO QUESTIONNAIRE ON TRADITIONAL MEDICINE IN THE AFRICAN REGION (updated: October 1995)

<table>
<thead>
<tr>
<th>Existence of</th>
<th>Number of Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Council</td>
<td>17</td>
</tr>
<tr>
<td>Legal Framework of Practice</td>
<td>18</td>
</tr>
<tr>
<td>Research Institutions</td>
<td>24</td>
</tr>
<tr>
<td>National Research Programme</td>
<td>20</td>
</tr>
<tr>
<td>Inventory of Plants and Remedies</td>
<td>19</td>
</tr>
<tr>
<td>Herbarium and/or Garden</td>
<td>16</td>
</tr>
<tr>
<td>Annual Report</td>
<td>19</td>
</tr>
<tr>
<td>Newsletter</td>
<td>7</td>
</tr>
<tr>
<td>Budget Allocation</td>
<td>21</td>
</tr>
<tr>
<td>Registration of Practitioners</td>
<td>23</td>
</tr>
<tr>
<td>Practitioners Licensed</td>
<td>18</td>
</tr>
<tr>
<td>Association for Traditional Medicine</td>
<td>27</td>
</tr>
<tr>
<td>Involvement in Primary Health Care</td>
<td>25</td>
</tr>
<tr>
<td>Standardized Fees</td>
<td>7</td>
</tr>
<tr>
<td>Reimbursement of Fees</td>
<td>0</td>
</tr>
<tr>
<td>Training Facilities</td>
<td>8</td>
</tr>
<tr>
<td>Training Programme</td>
<td>8</td>
</tr>
<tr>
<td>Procedure for Official Approval</td>
<td>6</td>
</tr>
<tr>
<td>Remedies Registered</td>
<td>5</td>
</tr>
<tr>
<td>Remedies on Essential Drugs List</td>
<td>3</td>
</tr>
<tr>
<td>Remedies Exported</td>
<td>7</td>
</tr>
</tbody>
</table>
WHO ACTIVITIES IN TRADITIONAL MEDICINE
IN THE EASTERN MEDITERRANEAN REGION
(Summary of presentation)
Dr Abdel-Azim Habib

The presentation discussed briefly the latest activities of the WHO Regional Office for the Eastern Mediterranean (EMRO) in the Traditional Medicine Programme, mainly through the last three consultative meetings, i.e., Cairo 1991, Alexandria 1993 and Cairo 1995. Attention was drawn to the recent EMRO document "Guidelines for the Formulation of National Policies for Traditional Medicine". The aim of these activities was to:

- recommend the means to promote traditional herbal medicine;
- prepare a list of essential medicinal herbs and information sheets about them; and
- develop guidelines for the formulation of national policies for traditional herbal medicine.

The main constraints to progress are due to the negative influences that result from a lack of appropriate regulations and control. The development of national policies for traditional medicine is therefore considered an urgent necessity.

The ultimate goal is to extend health care coverage, hopefully for the whole community, using authenticated, safe and efficacious traditional herbal medicine. This may require some or all of the following actions:

- recognition of traditional medicine in the national health care system;
- appropriate public and professional information;
- drawing up a selected list of essential medicinal herbs;
- ensuring a regular supply of essential medicinal herbs;
- research for production of simple herbal medicines (potential new drugs);
- a national quality assurance system for traditional herbal medicines; and
- regulatory measures and legislation for Good Manufacturing Practices (GMP).

A National Expert Committee (NEC) can be developed to design a national policy on traditional medicine, and to advise on the means of implementation, monitoring and evaluation at its different stages.

Among the principal tasks of the NEC would be to select a national list of medicinal herbs: the main criteria of selection should be safety, efficacy, community needs as determined by the morbidity pattern, availability of the herb, and the overall cost of procurement. Preference should be given to those herbs that are used for limited and specific indications rather than those for which several unrelated or contradictory claims are made.

Another task of the NEC would be the preparation of information sheets for the selected medicinal herbs. These should include the common English name, the scientific (taxonomic name),

---

1 Professor of Pharmacognosy, University of Alexandria, Alexandria, representing the WHO Regional Office for the Eastern Mediterranean, P.O.Box 1517, Alexandria-21511, Egypt
synonymous botanical names, local or vernacular names, the plant part or organ of interest, the
season of optimum activity, the method of preparation, the indications, the recommended dosage and
treatment regimen, and any cautions about use and contraindications.

Further information should also be prepared for practitioners and other professionals, which
should include, for example: allied herbs, substitutes, adulterants, directions for packaging and
storage, and methods of authentication.

The NEC may advise on ways to ensure a continuous supply of the selected medicinal herbs,
and to encourage local production and industrialization.

An important task of the NEC would be: to develop a national quality assurance system and
suggest appropriate standards, regulations and legislation; and to control registration, manufacturing
practice, and the quality of the marketed products.

The NEC should advise on medicinal herbs research policy with the main objectives of
validating efficacy and proving safety, as well as specifying dosages and treatment regimens.
OVERVIEW OF USE OF TRADITIONAL MEDICINE IN THE
WHO WESTERN PACIFIC REGION

Dr Chen Ken ¹

TRADITIONAL MEDICINE IN THE WESTERN PACIFIC REGION

Traditional medicine is a part of the tradition of each country or society. In this Region, many
simple family therapies are practised in different communities. The knowledge and skills are usually
kept secret in the community, even in families, and never recorded. However, the highly developed
traditional system of medicine is also practised in this Region with comprehensive theory, abundant
therapeutic techniques, a couple of thousand years of recorded experience and well-documented
literature.

Traditional medicine is an integral part of the people’s culture. Traditional systems of
medicine have a heritage of community acceptance. Traditional medical practitioners are
well-patronized by the communities where they live and work. Their services and advice are valued
because they are offered in a way that patients or their relatives can understand, in the context of
their cultural values. The practices are shared by patients and practitioners alike.

In many developing countries, traditional medicine is still the only available or affordable
health service for the majority of the population. Traditional medicine provides a first-line and basic
health service for people living in these areas. WHO’s report on the world drug situation showed that
75% of the world population living in developing countries consumed only 21% of the world’s
pharmaceutical products. At the same time, expensive pharmaceutical products become a heavy
financial burden to many governments in the world. A survey done in Cebu, a Southern city in the
Philippines, revealed that only 30% of the population studied could afford the full cost of their health
requirements. Another 30% could partially afford them, while 40% could not afford entirely the cost
of their medical requirements. People go for the traditional system of medicine as it is easy to reach
and is cheaper in most cases.

In industrialized countries, the picture is different from that of the developing countries owing
to the fact that the service provided by modern medicine is available there. However, it is noted that
the number of people who visit traditional medical practitioners is increasing. In Japan, a study
conducted in Tokyo showed that 71.2% of hospitals provide an oriental medicine service. So,
traditional medicine becomes an alternative approach for the modern health service system.

Traditional medicine has been practised for hundreds of years. It must work in many cases,
otherwise it would not be able to survive the long test of time. In fact, the random screening of
traditional remedies by our prehistoric ancestors has provided evidence on the effectiveness of those
remedies. It is noted that traditional medicine is effective for the treatment of certain diseases and
disorders. Consumers also seek service from traditional medicine for many difficult cases which may
not respond well to modern medicines. The biomedical effectiveness of traditional medicine ensures
a role for traditional medicine in today’s health work.

¹ Medical Officer, Traditional Medicine, WHO Regional Office for the Western Pacific, Manila,
Philippines
Traditional medicine makes its contribution to the development of human knowledge on health and medicine. Until now, efforts have been exerted to find new drugs from medicinal plants used by traditional systems of medicine. A recent example is "qinghaosu". The use of the herb "qing hao" as a medicine was recorded in 169 BC in China. Now qinghaosu and its derivatives extracted from qinghao are the most effective anti-malarial drug in areas where most malaria cases are multi-drug resistant cases. Medicinal plants are great potential sources for pharmaceuticals.

WHO POLICY ON TRADITIONAL MEDICINE

WHO, an international organization, bases its policies and activities on the resolutions of its governing bodies, the World Health Assembly and its Executive Board and, at regional level, the Regional Committees, composed of representatives from its Member States.

The Organization has long been aware of the vital role traditional medicine plays in the health delivery system of many of its Member States, and of the potential contribution of traditional medicine for the achievement of its goal of health for all.

The Regional Committee for the Western Pacific Region adopted two resolutions on traditional medicine in 1985 and 1987, respectively.

The field of traditional medicine is vast and the interests in traditional medicine are various in many aspects of the subject. However, based on related resolutions, WHO has set priorities and concentrates on herbal medicine and acupuncture which are the most important to national health services.

THE WHO TRADITIONAL MEDICINE PROGRAMME IN THE REGION

The objective of WHO's traditional medicine programme in the Region is to promote traditional medicine and useful traditional practices and support their incorporation into the general health service system, where applicable, particularly in primary health care.

The place of traditional medicine in the health system differs from country to country. In countries where traditional medicine is accepted by health authorities, WHO will promote the formulation of relevant national policies on traditional medicine as part of primary health care. WHO will thus promote the evaluation of traditional health practices reflecting social and cultural traditions and beliefs, and support the incorporation of useful elements of traditional medicine into national health systems. National establishments engaged in research on traditional medicine will be identified and, within the context of an overall health research strategy, will be supported. In supporting training for traditional practitioners, emphasis will be laid on developing their knowledge and skills with respect to primary health care while still enabling them to maintain their individuality within the overall health system. The incorporation of elements of traditional medicine into training of other health workers, where appropriate, will be encouraged.

NATIONAL POLICY AND PROGRAMME DEVELOPMENT

In this Region, traditional medicine is an integral part of the national health service system in China, Japan, the Republic of Korea and Viet Nam, with their different models.

In China, there are 530,000 personnel working in 2,457 traditional medicine hospitals with about 188 million out-patients and 2.68 million in-patients every year. At the same time, in general hospitals, the departments of traditional Chinese medicine take care of about 20% of out-patients everyday. Recently, the countrywide sales of medicinal plants and herbal medicines were valued at
US$ 1.8 billion annually. The State Administration of Traditional Chinese Medicine is a government agency with overall responsibility for the utilization, administration and development of traditional medicine in the country.

In the Republic of Korea, there are 8000 oriental medical doctors with 53 oriental modern hospitals and 5077 oriental medical clinics. Eleven universities have oriental medical colleges with 3922 students for a six-year course. A national medical insurance programme for oriental medical services has been in effect since 1 February 1987.

In Hong Kong, the Government nominated a working party on Chinese medicine to review the current status of traditional medicine. After several years' work, the Working Party on Chinese Medicine in Hong Kong released its final report in October 1994. The Executive Council of Hong Kong has endorsed the report which supports the safe practice of traditional medicine.

In Kiribati, the integration and promotion of traditional medicine with primary health care is one of the priority areas of the Ministry of Health, in line with government policy.

In the Philippines, policies to promote the national programme on traditional medicine were developed by the Department of Health. To develop, establish, and utilize traditional medicine in the Philippine health care delivery system as a strategy for achieving health for all, the Department of Health issued an administrative order in April 1993, which covers the areas of establishment of the traditional medicine service, use of traditional medicine in government hospitals, resource development and a legislation agenda. For planning and implementation of the Traditional Medicine Programme, a Traditional Medicine Unit was created in 1992.

In Singapore, the Minister of Health appointed a Committee on Traditional Chinese Medicine to review the practice and the training of traditional Chinese medical practitioners in the country, and to recommend measures to protect the interests of the public. The report of the Committee, which was released in October 1995, recognizes the role of traditional Chinese medicine in Singapore. The recommendations include training, a regulatory mechanism, control of herbal medicines and research.

SAFE AND EFFECTIVE USE OF TRADITIONAL MEDICINE FOR PRIMARY HEALTH CARE

Efforts have been made to promote the safe and effective use of traditional medicine for primary health care, in collaboration with Member States.

In Viet Nam, training materials on the use of traditional medicine for primary health care have been prepared, and workshops and training courses on the use of traditional medicine in primary health care held in provinces, districts and communities. As a result of the workshops, community health workers, school teachers, retired people and housewives received some training on traditional medicine and began to provide a basic health service for members of their families and communities. The use of traditional medicine in the community provides a first-line service and obviously reduces the expenditure of families for the treatment of family members. For example, since 1991, in Binh Luc District which is 70 kilometres from Hanoi, with WHO’s support, cooperation has been established between the district and the National Institute of Traditional Medicine, a WHO Collaborating Centre for Traditional Medicine. Based on the study of the common diseases in the district, medicinal plants and other self-care techniques were selected. Six training courses to introduce those plants and remedies were held in the district. The evaluation conducted in Dong Du Community of Binh Luc District, showed that 902 families out of 1251 have medicinal plants in their gardens or backyards. The village health workers could easily find medicinal plants growing in the villages to help villagers. The evaluation also showed that the number of patients who needed to be transferred to provincial hospitals or Hanoi was reduced after implementing the programme in the district.
In the Lao People's Democratic Republic and in the Philippines, the medicinal plants commonly used for primary health care have been selected. The basic principles for selection of medicinal plants are: (1) they should be indigenous plants which are widely available in the country; (2) they should actually be used for common health problems in the country; and (3) the scientific literature indicating safety and efficacy of the plants should exist. Booklets which introduce those plants have been printed in both countries in local languages. One which introduces 30 medicinal plants commonly used in the Lao People's Democratic Republic is entitled "The Medicines in Your Garden". Training courses have been conducted in these countries.

Medical doctors and other health workers are encouraged to be involved in the use of traditional medicine. In the Lao People's Democratic Republic, medical doctors and other health workers attended training courses on medicinal plants. Philippine medical doctors have been trained in acupuncture in China and locally. The first acupuncture clinic is being operated in a government hospital in Metro Manila. The first acupuncture research clinic in a government hospital in Singapore is also now open.

Working with the Programmes for Health Promotion and Health of the Elderly, support has been provided to promote the use of culture-based knowledge and traditional exercise for promoting the health of the elderly. A national workshop was held in Hanoi, Viet Nam, in November 1993. Training seminars on traditional exercises for retired people have been organized on a regular basis by the National Institute of Traditional Medicine in Hanoi.

IMPROVING THE SERVICE PROVIDED BY TRADITIONAL MEDICINE

The practice of traditional medicine still relies to a large extent on personal experiences. To meet the new requirements for the use of traditional medicine in today's world and the integration of traditional medicine into the health service system, efforts have been made to improve the service provided by traditional medicine through three approaches: research; information exchange; and quality control of herbal medicines.

1. RESEARCH

Traditional medicine is developed against a philosophy and culture which are different from modern medicine. It still cannot be fully understood and explained by modern science. However, scientific research on traditional medicine will provide additional evidence to reconfirm its effectiveness, thereby enhancing its acceptance and improving its application.

The development of modern science and techniques has provided greater opportunities to assess traditional remedies. But the routine procedures used for research on modern medicine are not always practical and feasible for research on traditional medicine, owing to technical, cultural and economic reasons. For developing countries, where traditional medicine is still widely used by the people, it may not be so urgent to identify the active compounds of medicinal plants, purify them, and then synthesize the chemical structure. The priority for research on traditional medicine is to prove the remedies used by traditional medicine to be safe and effective. For this purpose, we need a simple procedure to test the safety and efficacy of traditional remedies and standardize their effectiveness.

The need for basic principles which can be followed by researchers involved in research on traditional medicine has been raised on several occasions. To meet this requirement, a Working Group was held in Manila in October 1992, by the WHO Regional Office for the Western Pacific, to develop and finalize Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicine. Later, in June 1994, the Regional Office held another Working Group in Aomori, Japan, to finalize the Guidelines for Clinical Research on Acupuncture. Basic principles and methods used by modern scientific research have been introduced in research on herbal medicines and acupuncture. At the
same time, attention has been given to the nature and characteristics of traditional medicine. The principles of traditional systems of medicine are fully respected. The guidelines suggest that traditional knowledge and experience on the use of herbal medicines or acupuncture should be considered when the research is proposed, prepared and conducted.

Guidelines on herbal medicine and acupuncture have been published by the WHO Regional Office for the Western Pacific. These guidelines have been translated into Chinese, Japanese and Vietnamese. Based on the guidelines prepared by WHO, guidelines for evaluating traditional Vietnamese medicines have been prepared by the Ministry of Health, Viet Nam. In 1993, three workshops introducing research methods for herbal medicine were organized in Viet Nam. This year (1995), four workshops on clinical research methodology for acupuncture were conducted in China and Viet Nam, respectively.

Research projects on the use of herbal medicines for malaria, cancer and other diseases were supported in China, the Lao People's Democratic Republic and Viet Nam. Clinical and laboratory research on acupuncture has been conducted in China, and important results achieved.

To strengthen scientific research on traditional medicine, WHO has designated 12 institutions in the Region as WHO Collaborating Centres for Traditional Medicine. All of them are actively involved in research on traditional medicine.

2. INFORMATION EXCHANGE

In the past, there was rarely an opportunity to exchange information or experiences on traditional medicine practice with others. Nowadays, the significance of the use of traditional medicine, as supported by WHO and health authorities, may be very different from its original use. To enhance the role of traditional medicine in today's health work, WHO has made great efforts to promote information exchange on traditional medicine.

With the great increase in the use of acupuncture that has occurred throughout the world in recent years, it has been noted that the lack of a common language or terminology on acupuncture has affected information exchange, and the need for a standard reference nomenclature has become evident and pressing. Again, the WHO Regional Office for the Western Pacific took the initiative to meet this need and spent seven years to develop the standard acupuncture nomenclature which was adopted by a global scientific group on international acupuncture nomenclature which met in Geneva in 1989. To enhance the use of this nomenclature, the Regional Office printed two booklets entitled "Standard Acupuncture Nomenclature", Part 1 and Part 2, in 1984. These were subsequently revised in 1991. Thousands of copies of the two booklets were distributed throughout the world. Teaching institutions, editors of appropriate reviews and journals and acupuncture societies are encouraged to use these booklets developed by WHO. A larger publication with the same title which also includes a brief explanation of the 361 classical acupuncture point names and their equivalent names and codes in other languages, was issued by the Regional Office in 1993.

To promote information exchange on medicinal plants, the WHO Regional Office published two books on medicinal plants: "Medicinal Plants in China" and "Medicinal Plants in Viet Nam". Information on medicinal plants in the South Pacific, the Republic of Korea and Japan, with colour photos, has been collected and will be used for the preparation of new publications entitled "Medicinal Plants in the South Pacific", "Medicinal Plants in the Republic of Korea" and "Medicinal Plants in Japan".

Modern techniques are also used for exchange of information on traditional medicine. Computerized literature data banks on medicinal plants and acupuncture have been developed by WHO Collaborating Centres for Traditional Medicine. The ACULARS (Acupuncture Literature Analysis and Retrieval System) developed by the Institute of Information, China Academy of Traditional
Chinese Medicine, has greatly expanded the coverage of traditional Chinese medicine. A database on traditional medicine, namely TRADIMED, has been prepared by the Natural Products Research Institute, Seoul National University in the Republic of Korea.

3. QUALITY CONTROL OF HERBAL MEDICINES

Herbal medicines are the major remedies used by traditional systems of medicine. In China, there are 684 factories producing patent Chinese medicines and 1500 factories preparing raw plant materials used by traditional Chinese medicine practitioners. Chinese herbal medicines have been exported to more than 100 countries and regions. In the Philippines, medicinal plants are processed in tablet form by the Department of Health. Attention has been given to the quality of herbal products. The document "Quality control methods for medicinal plants materials" was prepared to provide recommended general test methods for medicinal plant materials which are widely used, both as home remedies and as raw materials for the pharmaceutical industry, particularly in developing countries. Collaboration with China over improvements in the quality of herbal products is continuing, especially through control of residues of pesticides used in growing medicinal plants and of heavy metals in herbal medicines. After several years of efforts to increase awareness of the importance of controlling the quality of herbal medicines, activities have been focused on the improvement of testing methods and techniques. The importance of quality of herbal products and good manufacturing practices of herbal products is accepted.

CONCLUSION

Traditional medicine remains an area where WHO support and advice are sought by Member States. During the past few years, more countries in the Region have considered the role of traditional medicine in relation to their health care delivery systems and have initiated activities to promote its safe and effective use. Significant progress has been made. However, certain problems still exist. Awareness of the existing and potential value of traditional medicine is still not accompanied by strong, vigorous programmes at national level. Government involvement and commitment will be necessary for the success of country programmes and programme activities. As stated in the WHO Ninth General Programme of Work covering the period 1996 to 2001, the potential of services provided by traditional practitioners is far from being fully utilized. The training of traditional medicine practitioners needs to be strengthened, together with training of modern medicine practitioners in traditional medicine. The dissemination and exchange of information are also not well developed and need to be improved. Financial support is still very much needed.
EXCERPTS FROM THE REPORTS OF COLLABORATING CENTRES

Lack of space does not permit the inclusion in this report of the details provided by the Collaborating Centres of their activities since the Second Meeting in 1987. Those wishing to have such information should write to the Directors of the Collaborating Centres concerned (Annex 1).

However, it seemed appropriate for the general reader to give at least some examples of the nature and scope of the work of these Centres, without going into too much details, and this has been done in the pages which follow in the form of selected "EXCERPTS" from their reports.

AFRICAN REGION

GHANA

CENTRE FOR SCIENTIFIC RESEARCH INTO PLANT MEDICINE (CSRPM)

MAMPONG-AKWAPIM

Phytochemical Screening of Documented Medicinal Plants of Ghana

Over the past four years, phytochemical screening of a number of recognized medicinal plants (14 in 1991, 8 in 1992, 7 in 1993, 4 in 1994) was done with a view to compiling a database. In some cases, isolates were obtained for biological work.

Improvement and Standardization of Herbal Preparations

Routine testing is done on herbal preparations to ensure their safety and to establish standards for them. They may be new products from the Centre itself or substances used by herbalists and referred to the Centre by the Ministry of Health.

Isolated and Characterization of Active Compounds

To identify the substances responsible for the observed activity of medicinal plants and herbal preparations, a screening programme is under way, certain compounds have been isolated and some characterized completely. Biological studies are in progress on isolates from Croton membranaceus (Euph.), Cryptolepis sanguinolenta (Perip.), and Bidens pilosa (Comp.). Antimicrobial screening has been done on a 50% ethanolic extract of Gossypium arboreum.

Preparation of Monographs

Monographs are in preparation on three herbal products made at the Centre, namely:

1. "Tonica" - a liquid, made from the bark of Khaya ivorensis, Kigelia africana, and Mitragyna stipulosa, which is used for anaemia.

2. "Ninger Powder" - the dried whole plant of Thonningia sanguinea, used for asthma and dysmenorrhoea.

3. "Lippia Tea" - The dried, powdered leaf of Lippia multiflora, used as a mild sedative.
Organization of the Traditional Health System

The traditional system of health is a domain of the private sector and includes healers, herbalists, and sellers of drugs prepared from minerals or parts of animals. About 30 associations of traditional healers and herbalists are registered with the Ministry of Territorial Administration, and an office has been created to unify them in a Federation.

Training of Research Workers and Health Staff

Part of this training is done in schools for nurses and pharmacists. From 1988 to 1994, many theses for PhD degrees have been presented - 33 in pharmacy and eight in medicine.

Training has also been given to the children of traditional healers, since their knowledge and skills are passed from one generation to another. These schoolchildren are taught the desiccation and pulverization of vegetable drugs, and their weighing and production in suitable forms for infusion.

Production of Improved Traditional Medicines

The Centre currently produces 12 improved traditional remedies of which four are already commercialized - "Hepatisane" for liver disorders, "Dysenteral" for amoebic dysentery, "Laxa-cassia" for constipation, and "Balemba" for cough. Three others were approved for marketing in June 1995 and will be on sale in pharmacies in January 1996, namely: "Psorospermia ointment" for eczema, "Gastrosepal granules" for gastric ulcer, and an infusion form of "Malaria" a traditional treatment for malaria.

Efficacy and Safety Testing of Traditional Remedies

Remedies used for the treatment of arterial hypertension, diabetes mellitus, gastric ulcer, hepatitis, and malaria have been the subject of extensive pharmacological and toxicological research and animal experimentation.

For arterial hypertension a mixture of two plants - Cymbopogon giganteus and Vepris heterophylla - is traditionally utilized. For diabetes mellitus, Solerocarya birrea or Bridelia ferruginea are used at the Centre. Another remedy, based on three plants - Cassia occidentalis, Tapinanthus dodonefolius and Terminalia macroptera - which has a distinct hypoglycaemic effect is being investigated.

Two improved traditional remedies - "Gastrosepal" (Verronia kotschyana) for gastritis, and "Calmogastryl" (Pteleopsis suberosa) for gastric ulcer - are being studied clinically and by animal experiment.

"Hepatisane", already commercialized and used for hepatitis, is a cholangogue and choleric and contains inositol, sorbitol, choline and stachydrine, found in the leaves which have not turned red of Combretum micranthum. An aqueous extract of the roots of Entada africana has been found to have in vitro activity against hepatitis A virus.
Studies have been made to compare the efficacy of a traditional remedy for malaria ("Malarial") with that of chloroquine. While chloroquine produced a rapid fall in parasitaemia, the reduction with "Malarial" was more gradual and blood slides remained positive. Despite this, spectacular improvement (temperature and headache) was obtained after 48 hours of treatment.

An important programme is the identification of zones where medicinal plants are found in nature or which present the most favourable conditions for their cultivation.

NIgerIA

DEPARTMENT OF PHARMACOGNOSY

OBAFEMI AWOLOWO UNIVERSITY, ILE-IIFE

Research

The Centre participated in the ethnobotanical surveys of Western Nigeria 1989, Uganda 1991, and Cameroon 1995. Medicinal plants were screened and extracts made of 28 plant species (different morphological parts), but these have not been screened pharmacologically due to lack of funds for further extraction.

A survey of the level of use of plant-derived drugs in health care in Nigeria in public pharmacies in the early 1980s showed that this was less than 5% nationwide. This needs to be re-evaluated.

Individual and group research by the Department has included:

1. Formulation and stability studies on Datura metel (for primary dysmenorrhoea), and Cassia podocarpa (laxative) tablets;
2. Phytochemical investigation of plants for the management of sickle cell anaemia;
3. Phytochemical and pharmacological investigations on Lagenaria breviloba (used as an abortifacient);
4. Studies on the antimicrobial activity of Cassia alata;
5. Fermentation studies on Agave and Fucraea spp. for steroidal sapogens, and
6. Studies of alkaloids of Dysosyllum lenticulare, etc.

Publications

Professor Sofowora's book on medicinal plants and traditional medicine in Africa, revised in 1993, is used by African schools of pharmacy and is being translated into French. A newsletter on African Medicinal Plants Research, edited by Professor Sofowora, is published twice a year (number 22 is the latest) and is distributed world-wide free of charge.

The reports on the ethnobotanical surveys of Western Nigeria and Uganda were published by OAU/STRC in 1981 and 1983 respectively; that of Cameroon is due to be published in 1996.
Training

The Department offers training programmes on medicinal plant research at bachelor, masters and doctorate levels, and since 1988 has trained 710 students at undergraduate level in the course on traditional medicine and medicinal plants.

The Department of Pharmacognosy is one of only two recognized by the OAU's Scientific, Technical and Research Commission (STRC) as regional centres for high-level training in the area of African traditional medicine and medicinal plants.
THE AMERICAS

U.S.A

COLLEGE OF PHARMACY, UNIVERSITY OF ILLINOIS AT CHICAGO

Technically, the entire College of Pharmacy has been designated as a WHO Collaborating Centre for Traditional Medicine; however, so far, the major activities have been with the Programme for Collaborative Research in the Pharmaceutical Sciences (PCRPS) of the Department of Medicinal Chemistry and Pharmacognosy.

Research Training

During the period 1988-1995, the Centre hosted 37 visiting scientists/research associates from 20 developing countries for research training of 6-24 months duration.

A one-month "Workshop on Assessment of Efficacy and Safety of Traditional Medicine" was held in Chicago in 1989 on behalf of WHO/SEARO for 14 participants.

Fifteen students from nine developing countries have completed their PhD studies under the guidance of faculty members of the Centre. Of these, 11 have returned to their own countries and assumed academic positions, and four are pursuing post-doctoral studies in other USA institutions.

The Centre also hosted many scientists and academicians for short visits, whose countries included: Brazil, People's Republic of China, Costa Rica, Egypt, India, Indonesia, Iran, Madagascar, Malaysia, Mexico, The Philippines, Trinidad and Tobago and Turkey.

NAPRALERT activities

During the period 1988-1995, over 6700 requests from WHO regions were processed, representing a substantial work load and mailing cost, but without charge for developing countries.

Some 600 scientific articles a month are added to the database which holds more than 115,000 such articles, mostly pertaining to traditional medicine plants.

Costs, work load and personnel constraints present problems in maintaining the NAPRALERT service at the level desired, and various ways of resolving these problems are being explored.

Consultation and Advisory Services

At the invitation of WHO/TRM and/or the Regional Offices, members of the Centre have participated in a number of consultations and workshops on traditional medicine.

Research Activities

Over the same period, the Faculty, post-doctoral fellows, visiting scientists and graduate students of the Centre published more than 240 scientific papers, 58 scientific review articles, 16 book chapters, 1 patent, and 35 professional service articles, and supervised 24 PhD dissertations.
**Model Monographs**

Under the sponsorship of WHO/TRM, the Centre is currently engaged in the preparation of samples of model monographs on 31 medicinal plants which are widely used in primary health care. It is expected that initial drafts will be completed by early 1998 for review by a WHO/TRM expert advisory panel.
EUROPE

ITALY

ISTITUTO ITALO-AFRICANO, ROME

The scientific activities of the WHO Collaborating Centre are carried on at three institutions, namely:

- Department of Chemistry of Natural Products, Istituto Superiore di Sanita (Professor C. Galeffi, Director of the Collaborating Centre).
- C.N.R. Centre for Chemistry of Receptors and Biologically Active Molecules, Istituto di Chimica, Universita Cattolica “Sacro Cuore” (Professor F. Delle Monache).
- Department of Plant Biology, Universita “La Sapienza” (Professor M. Nicoletti).

Some 72 original studies of plants by foreign authors alone were published during 1988-1995, the authors coming from Brazil, Chile, People’s Republic of China, Colombia, Costa Rica, Ethiopia, India, Kenya, Madagascar, Malawi, Nigeria, Rwanda, Venezuela, Zaire and Zimbabwe.

The facilities available enable the Centre to accomplish the following functions:

- phytochemical research, biologically oriented and stemming from ethnobotanical and ethnomedical information;
- entry of bibliographic information (MEDLARS, STN, ESA-ESRIN, DATA STAR) on properties and components of plants used in traditional medicine and of industrial interest; and
- training at postgraduate level in the field of isolation of new substances and their identification by spectroscopic methods.

Within the aim of “health for all”, and utilizing traditional medicine and exploring the possibilities offered by vegetable resources, this Centre is particularly interested in the field of antimalarial, cytotoxic and Ca\(^{2+}\)-antagonist drugs, in cooperation with the Institut Malagasy de Recherches Appliquees (IMRA), Antananarivo, Madagascar.

Antimalarial research is carried out in vivo by measuring the reduction of parasitaemia in mice infected with *Plasmodium berghei* and *P. yoelii*, and in vitro by inhibition of [\(\text{G}^{-}\text{H}\)]-hypoxanthine uptake by *P. falciparum* in parasitized human erythrocytes.

The cytotoxic tests are carried out by growth inhibition of HeLa cells and L 929 fibroblasts.

The Ca\(^{2+}\) channel blocker-like activity is measured by inhibition of K\(^{-}\)-induced contraction in isolated tissue preparations of guinea-pig, rabbit and rat.
WESERN PACIFIC

PEOPLE'S REPUBLIC OF CHINA

INSTITUTE OF MEDICINAL PLANT DEVELOPMENT (IMPLAD)

CHINESE ACADEMY OF MEDICAL SCIENCES (CAMS), BEIJING

Since 1988 IMPLAD has made important contributions in relation to its terms of reference as a Collaborating Centre.

Training

Over the period, the Institute received more than 2500 visitors in 600 groups from 50 countries and regions.

The Institute has also conducted training programmes, arranged through UNIDO, for four groups, with trainees from Canada, the Democratic People's Republic of Korea, Nepal and Thailand. Subjects covered included medicinal plant introduction and cultivation, extraction and analysis. The trainees regarded this kind of programme as one of the best ways of acquiring knowledge of traditional Chinese medicine.

Scientific Exchange

The Institute has sent three delegations of experts on herbal medicine to Congo, Ghana and Syña, upon invitation, to share their experience in techniques of medicinal plant research and development. These missions were well received and appreciated, and demonstrated that such scientific exchange is an excellent way of promoting progress in this field.

Research

The research staff of the Institute, in their various disciplines, are engaged in the following areas:

1. Theoretical basic studies aimed at the contemporary utilization and development of medicinal plant resources.
2. Projects related to the study of quality control and quantity enrichment of medicinal herbs.
3. Improved processing of traditional Chinese medicines and medicinal plants into drugs of greater value or products with newly revealed medical functions.

Publications

Nearly 600 scientific papers were published in national or international journals during the past eight years. In addition, 24 volumes were compiled, including: Chinese Materia Medica (revised edition, 3 vol.); Pictorial Encyclopedia of Chinese Medicinal Herbs (in colour, 10 vols.); Cultivation
of Chinese Medicinal Plants; the Application of Chromatography in Organic Chemistry, Handbook of Medicinal Plant Seeds, and Chinese Panaxquinquefolium, etc.

Conclusion

IMPLAD has developed in the past few years into an organization which is highly specialized in the wide-ranging investigation of medicinal plants with appropriate applied research, and is well placed to function as an International Training Centre for Traditional Chinese Materia Medica studies.

CHINA ACADEMY OF TRADITIONAL CHINESE MEDICINE

BEIJING

The Academy includes three Institutes which were designated as WHO Collaborating Centres in 1993. A brief account of some aspects of their work is given below.

INSTITUTE OF ACUPUNCTURE AND MOXIBUSTION

BEIJING

During the past several years, the Institute has been mainly carrying out clinical and experimental research on the treatment of cardio-vascular diseases with acupuncture, and studying the mechanism of acupuncture analgesia.

Clinical Research on Acupuncture Treatment in Cardio-vascular Disease

108 cases of angina pectoris of coronary heart disease were divided into two groups, an acupuncture group of 76 cases and a control group of 32 cases, the former receiving only two courses (24 sessions) of acupuncture, and the latter receiving Western pharmaceutical treatment, isosorbide dinitrate or nifedipine for two courses (24 days). The research focused on the alleviation of clinical symptoms (angina pectoris, sensation of tightness in the chest, shortness of breath), changes in the ECG, the recovery of myocardial contractility, blood rheology and the status of the nail-fold microcirculation.

32 cases of angina pectoris of coronary heart disease were divided into two groups, 17 receiving acupuncture and 15 receiving Western pharmaceutical treatment for two courses (24 days). The research was oriented to the observation of the recovery or improvement of cardiac function. The results of the two researches indicate that acupuncture treatment for angina pectoris of coronary heart disease is superior to that of Western drug therapy (as measured by the amelioration of the clinical symptoms, the improvement of myocardial function and the blood supply to ischaemic cardiac muscle, decrease of blood viscosity, regulation of myocardial contractility) in preventing or treating attacks.
Clinical Observations on Treatment of Coronary Heart Diseases by Applying Ointment at Acupoints

Treatment methods: 32 cases of coronary heart disease and angina pectoris were divided into two groups.

1. Ointment group: 22 cases. First an ointment was made with herbs such as Danshen (Radix Salviæ Milii), Huanggi (Radix Astragali seu Hedysari) and Tanxiang (Lignum Santali) etc. The ointment was then applied to such points as: (1) Xinshu (UB 15 bilateral), Neiguan (P6 bilateral), Dazhong (Ren 17), and (2) Jueyinshu (UB14 bilateral) Xiping (Extra, bilateral) and Juque (Ren 14). The two groups of points were used alternatively.

2. Control group: 10 cases. These received isosorbide dinitrate or nifedipine (10mg tid) orally. Treatment was given for 4 weeks. The following rates of alleviation were recorded in the two groups:

<table>
<thead>
<tr>
<th>Index of Improvement</th>
<th>Ointment group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain in precordial region</td>
<td>81.3%</td>
<td>80%</td>
</tr>
<tr>
<td>Chest distress</td>
<td>75%</td>
<td>60%</td>
</tr>
<tr>
<td>Palpitation</td>
<td>75%</td>
<td>60%</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>78.6%</td>
<td>82%</td>
</tr>
<tr>
<td>ECG</td>
<td>50%</td>
<td>44.4%</td>
</tr>
</tbody>
</table>

Experimental Research on Animals

Extensive animal experiments were also done, but space does not permit an account of them to be given here.

Training

Since its establishment in 1975, the China Beijing International Acupuncture Training Centre, which is affiliated to the Collaborating Centre, has made important contributions both in acupuncture medical treatment and education, and in spreading knowledge of acupuncture medicine in the world.

Since 1985, the China Beijing International Acupuncture Training Centre has held 33 three-month regular courses and trained 726 acupuncturists from 70 different countries and regions. The 33 courses included 22 introductory courses with 533 participants, and 11 advanced courses with 193 participants.

The Centre has adopted flexible training styles. Besides regular acupuncture courses, it also conducts various kinds of short-term courses to meet the different needs of participants. From 1985 until the present, it has held 140 short-term courses and trained 1907 participants from 32 different countries and regions.

In addition, it has sent instructors to Chile, India, Japan, Mauritius, Papua New Guinea, Spain and Turkey, to hold acupuncture training courses. Nineteen courses were held and 233 foreign doctors trained.
INSTITUTE OF CHINESE MATERIA MEDICA

BEIJING

The Institute was first designated as a Collaborating Centre in 1983, with the following terms of reference:

1. To study the safety and efficacy of traditional herbal medicine.
2. To carry out research on the prevention and treatment of malaria and tumours.
3. To study the traditional theory of Chinese materia medica.
4. To compile reference materials on Chinese materia medica.
5. To provide training opportunities in herbal medicine for foreign students.

Studies on malaria have been made with dihydro-artemisinin. In experiments on mice infected with 
*Plasmodium berghei*, a combination of artemisinin and tetrandrine has been used with good results. 
A new preparation of qinghaosu for external use has been investigated.

In neoplastic disease, a research group has carried out clinical and experimental investigations on liuweidi huang decoction for the prevention and treatment of carcinoma of the oesophagus.

By screening hundreds of Chinese herbal medicines, the same group has found that the fruits of dogwood and glossy privet have the effect of increasing white blood cell counts.

"Medicinal Plants in China", one of the very few publications in English introducing Chinese herbal medicines, was compiled by the Centre and subsequently published by the WHO Regional Office for the Western Pacific in 1989. The book presents 150 of the most commonly used Chinese medicinal plants, with appropriate photographs, and describes their medicinal properties, indications, dosage, botanical characteristics, habitat and distribution.

With regard to the basic concept and traditional theory of Chinese herbal medicine, a study on the pharmacodynamics of Gu Zhi (Cassia Twig) decoction was awarded First Prize in 1992 by the State Administration of Traditional Chinese Medicine. This research was considered to have created a new method for the study of compound prescriptions in applying the theory of herbal medicine to clinical treatment.

In training, the Centre has received many foreign students and scientists from countries in the South-East Asian and Western Pacific Regions. Teaching has included such subjects as: "Thin-layer chromatography and its application in separating components in traditional Chinese medicine"; "Quality control of crude drugs and their preparation"; and "The history and clinical applications of Chinese herbal medicine".
Clinical Research

Under the guiding principles of TCM theory and modern medicine, the techniques and methodology of modern science are applied to clinical and experimental research on the prevention and treatment of common diseases and conditions that seriously jeopardize health.

In internal medicine, research on cardio-vascular and cerebro-vascular disorders has included: tachycardia, stroke and its sequelae, senile hypertension, hyperlipidaemia, diabetes and its complications, and rheumatoid arthritis.

Other studies included research on the rationale and methodology of preservation of life, convalescence and longevity, the treatment of chronic hepatitis B, the prevention and treatment of bone marrow suppression induced by chemotherapy, impotence and the treatment on chronic prostatitis, to mention only a few.

TCM Literature and Information

The China Centre for Traditional Chinese Medicine Literature Retrieval was officially established at the Institute in July 1992. As the key laboratory of the State Administration for Traditional Chinese Medicine, it now maintains several databases, namely:

- TCM literature database, with 1 700 000 entries for 1984-1993, and a further 12 000 for 1994;
- TCM award database, with over 2 880 scientific achievements awarded prizes at ministry or commission level recorded in it;
- TCM patented products database, with patents of over 7000 medical and health products;
- Database of books collected in the Academy, with 10 645 bibliographic citations for the years of 1965-1994;
- AIDS information database, the work of collection, indexing, abstracting, classification and input having been completed (Journals of 1989-1992, newspapers of 1990-end 1993), now the collection and translation of the literature in Western languages are under way;
- Newspaper database, now contains 6661 items from all TCM newspapers since 1989;
- Merchandise database, covers over 3400 kinds of TCM products from 862 corporations;
- Foreign institutions and scholars, covers 2 125 TCM institutions and 3 508 scholars; and
- Data for the 2nd edition of TCM subject headings (5 813) and non-subject headings (1 118);

To improve the working of the information system and reduce errors, a Chinese-English journal database and a Chinese-English database for literature types, specific terms and history of medicine were established in 1992.
Access to INTERNET and on-line retrieval of MEDLARS (1966-1995) are available, and a better and more extensive service can be offered to users.

Three journals are published: (1) Chinese Medical Abstracts - TCM section; (2) Medicine in Foreign Countries - TCM section; and (3) The Chinese Journal of Information on Traditional Chinese Medicine.
Chinese Herbal Medicine

Based on the experience of famous doctors of traditional Chinese medicine, several drugs for the treatment of "chronic renal diseases" and renal failure have been developed. Complete remission in chronic renal diseases reached 40-50% (with an efficacy rate of 80-95%).

Based on the study of the treatment of shock by using herbal medicines in regulating "Qi" and blood, promoting resuscitation and preventing collapse, new anti-shock drugs for the treatment of non-infectious shock have been developed. They include Kang Jue Tong Mai Zhu She Ye (injection for clearing obstruction and resuscitation), and Yi Qi Jiu Yin Zhu She Ye (injection for reinforcing Qi and saving Yi), and Yi Qi Hui Yang Zhu She Ye (injection for tonifying Qi and restoring Yang). These three newly developed injections have been tested on 193 patients in four hospitals. The case fatality rate in those treated was 4.4%, compared with 23.9% in the control group.

Investigations were made into the reasons why the toxicity of Maqianzi (Semen strychni) is decreased during its preparation. It was found that the detoxification was due to heat which caused changes in chemical composition and resulted in compounds of lower toxicity and stronger biological activity.

Clinical and experimental studies have been made on the treatment of epidemic haemorrhagic fever with Chinese medicine, and have received the First Award for Scientific Advancement issued by the State Administration for Traditional Chinese Medicine.

Other studies on pharmacology, therapeutic effects and toxicity have been made on a compound medicine Gan Du Jing Chong Ji (herbal tea for eliminating hepatitis virus) which has been tested in the treatment of chronic hepatitis B.

Acupuncture

In acupuncture, clinical and experimental studies in 178 cases of simple obesity have shown that with the proper selection of points and needling techniques, it can produce "active regulation" of metabolism.

Publications

The Centre has compiled and translated the following books: TCM Emergencies; Practical Diagnosis in TCM; A Clinical Handbook of TCM; Ancient Chinese Language of TCM. Translation of Commentaries on Selected Prescriptions for Emperor Guangxu and Dowager Cixi has been completed. The main body of a dictionary of Chinese prescriptions, with 15 million Chinese characters and covering 90,000 prescriptions, has also been completed and the first three volumes published.

Three volumes of Chinese Materia Medica have been completed and approved, containing 20 million Chinese characters, dealing with more than 80,000 kinds of herbal ingredients.
Training

Up to the present, the Centre has run 88 regular training courses for 1888 students from more than 70 countries and regions. During 1987-1995, some 30 short-term courses were conducted for 480 students from 19 countries and regions.

INSTITUTE OF ACUPUNCTURE RESEARCH
SHANGHAI MEDICAL UNIVERSITY

The Institute was first designated as a Collaborating Centre in 1983, and has been appointed by the State Education Commission as the key organization in "Basic Sciences for the Combination of Western and Traditional Chinese Medicine".

Some of the main achievements over the past eight years are listed below:

Clinical Research in Acupuncture Analgesia

- Studies on the potentiation of acupuncture analgesia (AA) with certain depressants in laboratories and clinics; a large variety of acupuncture-enhancing drugs has been selected and successfully used in hospitals to improve acupuncture anaesthesia for surgical operations.

- Treatment of pain patients according to the principles of traditional Chinese medicine, Chinese herbs and acupuncture.

- Acupuncture relief of post-operative pain and reduction of the inhibition of intestinal activity and the immunosuppression produced by epidural morphine.

- The clinical Pain Research Centre has satisfactorily treated different kinds of pain patients.

- Scientific basis of Yang and Yin deficiency with reference to acupuncture effects.

Research on Acupuncture Treatment

- Acupuncture therapy for inducement of ovulation.

- Role of endogenous opioid peptidergic system in acupuncture anticonvulsive therapy, electroacupuncture of Du channel points effectively inhibits experimental epilepsy.

- Electroacupuncture of Du channel points can improve the inhibition of brain electrical activity and promote recovery in morphology and function of the brain after brain ischaemia.

Acupuncture Analgesia

- Survey of the best Chinese herbs (CH) for attenuating the development of morphine or dihydroetorphin tolerance in rats.

- Study of the mechanisms of CH antinorphine-like substance tolerance, using molecular techniques.
Acupuncture Treatment

- Study of the mechanism of the anticonvulsive effect of acupuncture during epilepsy, and the neuroprotective effect of acupuncture after cerebral ischaemia.

- Increasing therapeutic efficacy by combining Western medicine with Chinese medicine in clinical practice.

- Study of the effect of acupuncture on the immune system, and clinical observations on electroacupuncture reducing the side-effects and immunosuppression produced by morphine.

Training Programmes

- Course on neurobiology for undergraduate and graduate students.

- Course on acupuncture analgesia for administrative staff.

- Graduate project for senior college students.

- MMS and PhD programmes and advanced programmes for domestic research fellows.

SHANGHAI UNIVERSITY OF TRADITIONAL CHINESE MEDICINE

Clinical Applications of Acupuncture and Moxibustion

One hundred patients with allergic asthma and 74 with asthmatic bronchitis were treated by acupuncture, and in 42 of those with allergic asthma mucosal SIgA levels were estimated. Five points, Feliu (BL13,both sides), Fengmen (BL12, both sides) and Dazhui (GV14) were stimulated for 30 minutes. Subsequently, a cupping jar was applied for 10 minutes in the triangle between GV14 and the two BL13 points. This treatment was given on 20 occasions at two-day intervals between July and September each year. The following results were obtained:

<table>
<thead>
<tr>
<th></th>
<th>Allergic Asthma</th>
<th>Asthmatic Bronchitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>After one summer course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total efficacy</td>
<td>85%</td>
<td>85.1%</td>
</tr>
<tr>
<td>After one year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant efficacy</td>
<td>30.4%</td>
<td>20%</td>
</tr>
<tr>
<td>After three years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cure rate</td>
<td>22.2%</td>
<td>12%</td>
</tr>
</tbody>
</table>

After treatment, concentrations of SIgA and total IgA in saliva and nasal secretions and of IgA in serum, the numbers of IL-2R+T lymphocyte subset, and absolute and differential eosinophil counts in peripheral blood were all significantly decreased.
In a study of the effect of acupuncture on the urinary bladder and urethra, 40 cases of vesical dysfunction associated with diabetes mellitus and 60 cases of stress incontinence mainly due to urethral dysfunction were divided at random into two groups - one to be treated with acupuncture in combination with the appropriate TCM therapy, and the other to act as a control. As objective indices of the effect of treatment, residual urine volume, intravesical pressure and maximal urethral pressure were measured before and after. In the acupuncture group, the total efficacy rate was 99.4% and in the control subjects it was 16.7% (p<0.05).

Studies were also made on clinical and therapeutic effects and immunological mechanisms in acupuncture and acupuncture plus antithyroid (Tapazole) treatment of 131 patients with hyperthyroidism. The best results were obtained with combined treatment, using the acupoints Qiyi, Neiguan (PC6), Jianshu (PC5), Zusanli (ST36) and Sanyinjiao (SP6), and Tapazole 10, 30, and 40mg/day in three groups of patients. In these groups, efficacy rates were 95%, 97% and 85% respectively, the differences not being significant, and the recurrence rate was 26.4% over two years of follow-up observation. The advantages of combined treatment included faster and better response, shorter therapeutic course, wider indications, fewer adverse side effects and a lower recurrence rate.

Research on the effect of Chinese herbal treatment (CHT) in neoplastic disease suggested that CHT:
- may improve the immunological response of patients with non-small-cell lung cancer (NSCLC), and improve the quality of life; and
- increase survival in the treatment of advanced gastric cancer.

Another herbal remedy, Fu zheng Huayu, used in cirrhosis of the liver, was found to inhibit hyperplasia of fibrous tissue in the liver, and improve hepatic function and immunity.

Research on 84 cases of Alzheimer’s disease treated for three months with “Heart and Brain Benefit Recipe (HBBR)” showed the following total effective rates: intelligence 67.1%; remote memory 51%; recall 40.5%; orientation 48.6%; calculation 14%; concentration/attention 23.4%; expression 35.5%; personality 77.3%; cooperation 51.6%; eating 87.1%; sleeping 71%; and incontinence 67.7%. These findings suggest that “HBBR” could improve mental and behavioural functions in Alzheimer’s disease and, possibly, some other conditions also.

In addition to research in traditional Chinese medicine, the Centre has an extensive programme of education and publications in the subject, providing training for foreigners and new teaching materials.

JAPAN

ORIENTAL MEDICINE RESEARCH CENTRE (OMRC)

OF THE KITASATO INSTITUTE, TOKYO

The OMRC was founded in 1972 as the first facility in Japan for the investigation of all aspects of oriental medicines, at both the fundamental and clinical levels. As a Collaborating Centre, the terms of reference of OMRC are:
to provide training opportunities for foreign research scientists;

- to develop appropriate methodologies for the validation of the safety and efficacy of herbal medicines, acupuncture and moxibustion, and to conduct studies using such methodologies;

- to develop research methodology, guidelines and criteria for the evaluation and standardization of herbal remedies; and

- to serve as a reference library for literature on traditional medicine, and promote exchange of information.

Educational and Scientific Exchange

OMRC has accepted and trained many foreign scientists and will continue this policy. To offset the high cost of living in Tokyo, OMRC has provided accommodation and a cafeteria for such visitors. About US$ 40 000 are budgeted for training foreign scientists and physicians each year.

Research

Four major research programmes are being pursued: (1) the effects of traditional medicines on host-defence mechanisms; (2) the use of neuropharmacological techniques to evaluate the effects of traditional medicines on the central nervous system; (3) the use of phytochemical techniques to determine the bioactive components of herbal medicines; and (4) the use of modern clinical methodology to evaluate the safety and efficacy of traditional remedies and treatments, and to clarify the appropriateness of traditional diagnostic methods.

Information Exchange

Research on medical history and the Kampo classics is essential for the understanding and clinical application of traditional medicine. For this purpose, OMRC has materials to support the information needs for education, research and patient care, and offers a wide range of services including circulation, information and reference assistance; its collection includes over 10 000 books and volumes of journals. OMRC has also published reprints of old medical texts which are still preserved in Japan but have been lost in China, mostly dating from the Sung and Ming dynasties. From 1988 to 1994, members of OMRC published over 50 books, 100 reviews and 300 journal articles. OMRC is in an unique position within the Kitasato Institute to offer both graduate and postgraduate education in a wide range of traditional Japanese Oriental (Kampo) medicine.

DEPARTMENT OF JAPANESE ORIENTAL MEDICINE

TOYAMA MEDICAL AND PHARMACEUTICAL UNIVERSITY

After its designation as a Collaborating Centre in 1988, the Department was entrusted by the WHO Regional Committee for the Western Pacific with studies on the current situation regarding terminology in traditional medicine, which seemed to be a first step toward the development of a standardized terminology. This first project (1988-1992) consisted of comparative studies on the terminology (origin and constitution) of medicinal herbs and prescriptions in East Asia, for example in China, Japan, Republic of Korea and Viet Nam.
A second project (1992-1996), in cooperation with the Institute for Wakan-Yaku (Oriental Medicine) of Toyama Medical and Pharmaceutical University, includes the development of a model curriculum in Japanese oriental medicine in modern medical schools, as a basis for mutual understanding between modern and traditional medicine.

The Department has worked on various educational activities for medical and pharmaceutical students, and for postgraduates. For fourth year medical students the curriculum provided for 35 hours a year. For fifth and sixth year medical students, bedside teaching is provided. Students are divided into 40 small groups which receive training each week in the various departments of the University Hospital. The weekly schedule of the Department of Japanese Oriental Medicine is, for example:

- **Tuesday**: Orientation in the ward (a.m.), Bedside teaching (p.m.)
- **Wednesday**: Bedside teaching (a.m. and p.m.)
- **Thursday**: Out-patient clinic (a.m.), Round discussion (p.m.)
- **Friday**: Bedside teaching (a.m.), Clinical conference (p.m.)

The Department also has a postgraduate course and, by 1994, had accepted a total of 64 residents.

With the title Wakan-Shinryo-Gaku. (Literal translation Textbook of Practical Application of Japanese Oriental Medicine), a work by Professor K. Terasawa, Director of the Centre, was published in Japanese in 1990, and was subsequently translated into English in 1992 and into German in 1994.

Four major topics are currently being studied in the research programme of the Department: (1) the development of a system to evaluate the efficacy of traditional medicines on neurological disorders; (2) the effects of traditional medicine on host-defence mechanisms; (3) haematological techniques to evaluate the effects of traditional medicine on the blood circulation; and (4) the use of physiological methods in clarifying the appropriateness of traditional diagnostic methods.

**REPUBLIC OF KOREA**

**EAST-WEST MEDICINE RESEARCH INSTITUTE (EWMRI)**

**KYUNG-HEE UNIVERSITY, SEOUL**

The EWMRI was established in 1971 under the guidance of Dr Young Seek Choue, Founder-Chancellor of Kyung-Hee University, who advocated the development of a well integrated oriental and western medicine - "The third medicine".

The role of the Institute comprises four principal areas of activity, as follows:

- evaluation of traditional methods of treatment;
- standardization and improvement of traditional remedies and methods of treatment;
- comparative studies of modern and traditional medicine; and
- attempting to reconcile problems that may arise out of the dual medical system.
The EWMRI consists of five major divisions, namely: clinical studies, basic sciences, studies on pain and acupuncture, ethnopharmacology, and information resources.

Traditional healing practices have been officially recognized in the Republic of Korea since 1952, when the Medical Practitioners Act was amended to permit traditional practitioners to be registered and licensed, thus establishing a dual system of health care.

There are now more than 8000 licensed oriental medicine doctors, and 11 colleges provide formal training in a six-year course which includes two years of pre-medical education. Postgraduate training of traditional practitioners is well developed in Korea, but research activities have been neglected in the past. However, this situation has changed and various university centres are becoming involved in research in traditional medicine, including traditional pharmacopoeias.

The Korean people have believed fully in traditional medicine because the indigenous medical system is firmly based within the national sociocultural context and is well accepted by the community. However, with the more scientific thinking of the younger generation and the rapid internationalization of the country, the attitude of the community may change and become negative towards traditional medicine, unless the approach to it is modernized.

Oriental medicine, with its thousands of years of experience, contains many elements which will make a contribution to the development of medical sciences, if it is explored and systematized by a scientific approach and methods. Traditional practitioners must employ quantitative methods rather than subjective judgement in the assessment of traditional remedies.

NATURAL PRODUCTS RESEARCH INSTITUTE (NPRI)
SEOUl NATIONAL UNIVERSITY

The NPRI was established in 1939 and is the premier institution in Korea in the field of natural product research. As a Collaborating Centre, it holds workshops and seminars, produces publications, and provides consultant services on resources, efficacy, safety, quality control, production, and other subjects.

At the national workshop in 1983 on Herbal Medicine Research, the following topics were addressed and the proceedings published:

- the status of research in herbal medicine;
- governmental policies and regulations;
- research and development of new drugs from traditional medicine;
- the contribution of traditional medicine to primary health care;
- prospects for integration between Western and Oriental medicine;
- technical approaches to safety and toxicity of traditional remedies;
- technical problems in quality control;
- governmental policies and regulations related to the licensing of newly developed traditional remedies;
- problems of mass production in the pharmaceutical industry; and
- research coordination and information exchange.

A publication on "Medical Plants in the Republic of Korea" is being prepared in English by NPRI professors and is expected to be ready in mid-1998. Funds were provided by WPRO. The work will cover 150 medicinal plants used in Korea, and will include accounts of their traditional use,
biological activities and chemical constituents, in addition to the relevant botanical data.

The NPRI has been designated as the supervising institute for the "New Korean Drugs Screening Project", launched by the Ministry of Science and Technology. This is a research project which, over the period 1995-1998, aims to apply modern scientific methods and technology to verify the outstanding values of Korean traditional remedies, followed by the development of new drugs from their phytochemically isolated active principles. In cooperation with scientists in related industry, and in educational and research institutions, the NPRI hopes to patent many potential drugs, and "to mark an epoch of new natural drug development in Korea".

VIET NAM

THE NATIONAL INSTITUTE OF TRADITIONAL MEDICINE

HANOI

In Viet Nam, traditional and modern medicine exist side by side as formal components of the national health care system.

The National Institute of Traditional Medicine was established in 1957, and designated as a Collaborating Centre in 1968.

The programme of work for 1995 broadly reflects the nature and scope of the Institute's activities:

Training

- Completion of a one-year course in traditional medicine for general doctors (September 1994 - September 1995).
- Organization of a course to improve traditional medical knowledge of internal medicine, paediatrics, acupuncture, and traditional processing methods of herbal remedies (two months each).
- Postgraduate training in traditional medicine (Masters, specialists of first and second degrees) in conjunction with Hanoi Medical College.
- Finalization of teaching materials in traditional medicine.

Guidance for Traditional Medical Systems

- Participation in developing a strategic project in traditional medicine up to the year 2005.
- Promotion of traditional medicine activities in community health care in Nam Ha Province and publication of the results.
- Organization of a workshop on utilizing traditional medicine in community health care for the Southern Provinces, with participants from 21 provincial traditional medicine hospitals in the South, to disseminate the experiences of Bin Luc District.
Research

- Studies on traditional methods of processing herbal remedies and on improving the forms of these medicines.

- Studies to evaluate the efficacy of traditional medical methods in the treatment of skin diseases, kidney disease, childhood diseases, trauma cases, and of traditional exercises and acupuncture.
CONCLUSIONS AND RECOMMENDATIONS

Following reviews of the activities of the WHO Collaborating Centres for Traditional Medicine, which included their terms of reference and their goals and accomplishments from 1988 to the present, in-depth discussions were held on: (1) the improvement of Centre activities at national, regional and global levels, and (2) strengthening the relationship of Centres with WHO headquarters and regional offices. Although it was recognized that traditional medicine encompasses many disciplines related to primary health care, it was decided to concentrate discussions and recommendations on the most important aspects of herbal medicines and acupuncture, since the major expertise of the Collaborating Centres lay in these areas.

THE ROLE OF CENTRES

The vital role of WHO Collaborating Centres is to support the Programme and WHO regional offices in carrying out and implementing WHO's resolutions on traditional medicine. The terms of reference of each Centre have been fulfilled, with many valuable achievements. The results of scientific research have not only supported the development of traditional medicine in countries and assisted its integration into national health care systems, but have also facilitated international technical standardization of herbal medicines and acupuncture, and information exchange.

The general rules governing the identification, designation and functions of WHO Collaborating Centres were reviewed. It was pointed out that Collaborating Centres are selected because they have expertise of value in aspects of traditional medicine that can be applied locally, regionally or internationally to the improvement of primary health care. This expertise is clearly defined in the terms of reference for each Centre. In effect, each such Centre has been approved at the individual country level, as well as at WHO regional and headquarters levels. The primary resources required for Centre activities should generally be derived from the institution itself or from appropriate national governmental agencies within the country concerned. Each Collaborating Centre should contact the appropriate authorities at national level and solicit support and resources for the implementation of the Centre’s terms of reference and work plan, which should also relate to the national health plan and the WHO goals of health for all.

THE FUTURE DIRECTION OF ACTIVITIES WITHIN CENTRES

Where consistent with the terms of reference for each Centre, emphasis should be laid on the following:

1. Centres should promote the proper use of traditional medicine in primary health care.
2. Centres should act as expert country resources on information concerning medicinal plants and acupuncture.
3. Research and studies on the safety, efficacy, quality control and proper use of widely employed medicinal plants and other forms of traditional medicine in the region. Research methodology should be developed that is suitable for the evaluation of clinical trials relating to traditional medicine.
4. In appropriate Centres, further clinical studies on medicinal plants and acupuncture should be carried out and the results widely disseminated.

5. Centres should identify the areas pertaining to traditional medicine for which training and postdoctoral and predoctoral education are available in their institutions, and make available this information to other Centres and to WHO regional offices and headquarters.

The participants at the meeting agreed that, in the light of the excellent progress of the WHO Collaborating Centres for Traditional Medicine over the past eight years and of the recognized successes of Traditional Birth Attendants and Traditional Bone Setters, it is now time to re dedicate efforts to promote the use of traditional herbal medicines and acupuncture at all levels for improvement of health care. Several areas were identified where activities can be improved or increased, and these are outlined below.

ADMINISTRATION AND IMPROVED COMMUNICATIONS

The participants recognized the importance of strengthening administrative systems at WHO headquarters and regional offices in the area of traditional medicine in order to manage more effectively the Collaborating Centre mandates, activities and functions. To achieve this, consideration should be given to providing more resources, both financially and by increased staffing. These are necessary for the following reasons:

1. Annual reports from the Centres should be evaluated relative to the terms of reference and a critique should be prepared and submitted to the Regional Office concerned.

2. Each Centre should be visited once a year, by the regional office staff member responsible for traditional medicine at which time the annual report should be discussed and progress assessed.

3. It is anticipated that because of a dramatic increase in interest in traditional medicine globally, in developed as well as in developing countries, requests for WHO assistance and information will increase measurably.

To improve communications between the Centres, WHO regional offices and headquarters, it is recommended that the International Traditional Medicine Newsletter be revived and that each Centre contribute, on a regular basis, articles on their progress so that all may be brought up-to-date on activities within the network. At times, a Centre may deem that the terms of reference need to be changed and this should be done with the agreement of the Regional Office concerned and headquarters.

The terms of reference for each Centre should be communicated to all the other WHO Collaborating Centres for Traditional Medicine so that areas of potential collaboration can be identified.

ASSISTANCE BY WHO HEADQUARTERS AND REGIONAL OFFICES

Five areas were outlined in which WHO should act to support and promote progress in traditional medicine world-wide.

1. WHO should assist Centres, on request, to identify agencies within countries or external agencies from which financial and other resources might be sought.
2. WHO should award fellowships of six months to one year for qualified scientists or students who desire to acquire advanced training in any of the areas relevant to traditional medicine.

3. Each WHO regional office should designate a staff member as having primary responsibility for traditional medicine.

4. Meetings of Directors of WHO Collaborating Centres for Traditional Medicine should be held more frequently, both on a global and a regional basis.

5. Additional WHO Collaborating Centres should be identified and designated in areas of the world where there is a void but where traditional medicine is widely practised, and where government support for it is strong.

**STRENGTHENING COLLABORATIVE ACTIVITIES BY CENTRES**

It is recommended that each Centre identify activities and capabilities that could strengthen other Centres through collaboration and sharing. This could be accomplished by means of a questionnaire from WHO headquarters. These shared activities could include:

1. Biological testing by other Centres of plants used in regional traditional medicine practices, if the capability is not present at the Centre desiring the testing. Such tests would provide preliminary and presumptive evidence of safety and efficacy. Samples could be provided under a code number to maintain confidentiality.

2. Provision of a spectroscopy service, including ultraviolet, infrared, mass spectrum, proton magnetic spectrum, carbon-13 magnetic spectrum, circular dichroism, optical rotation. Such a service could be provided to scientists in developing countries, if the requests are routed with the endorsement of the WHO Regional Office or the Director of a WHO Collaborating Centre for Traditional Medicine. This service would have to be assessed after one year to determine if the extra work load was a financial burden to the Centre providing it.

3. Increased use of on-line database information services, such as NAPRALET at the Chicago Centre. Centres should send reprints of articles on clinical or pharmacological studies (in vitro or in vivo) on medicinal plants, when published in regional journals not generally available, so that they can be included in NAPRALET. Efforts should be made by Centres to identify computer lines, e.g., INTERNET, so that direct on-line access to NAPRALET would be possible.

4. Acquisition of information on the utilization of plants used in traditional Chinese medicine through the Institute of Clinical Research and Information of the China Academy of Traditional Chinese Medicine (both on-line and off-line).

5. Acquisition and exchange of information on TradMed (Traditional, Oriental Medicines DB) from the Natural Products Research Institute, Seoul National University (on-line from 1996 and off-line).
CLOSING REMARKS

Dr Xiaorui Zhang

Chinese Officials from the Ministry of Public Health
and the State Administration of Traditional Chinese Medicine,
Distinguished participants, colleagues and friends, ladies and gentlemen,

Today is the last day of our Meeting of Directors of WHO Collaborating Centres for Traditional Medicine. We have reviewed the research activities and developments at each Centre since the Second Meeting, established a working plan for the coming years, discussed further cooperation between the Centres and WHO. Tomorrow we shall visit a number of Centres, an university and a hospital of traditional Chinese medicine and share their remarkable experiences. The report and recommendations of the meeting have been finalized this afternoon. I thank you sincerely for the efforts you made to discuss all of the items on our agenda and to prepare the report and recommendations. My thanks go particularly to our Chairman, Professor Xiao Peigen, our Vice-Chairman, Professor Keita Arouna and our rapporteur Professor Farnsworth. The efforts that you have made not only at this meeting but also in the cooperation with WHO during the past years are very much appreciated. Among us, there is no doubt that the Third Meeting of Directors of WHO Collaborating Centres for Traditional Medicine has been very successful and will play an important role in the development of traditional medicine.

I wish to repeat my whole-hearted thanks to the Chinese officials, especially Dr Shen Zhixiang and his colleagues for the perfect arrangements that they have made for our meeting. I also thank the translators and secretaries for their hard work. Our successful discussions and report would not have been possible without their efforts.

I believe that cooperation and communication will be enhanced among the Centres, the Traditional Medicine Programme and WHO regional offices as a result of this meeting, and there is no doubt that our Collaborating Centres for Traditional Medicine will constantly be strengthened.

I look forward to hearing of greater successes from all of you and to seeing you again soon. I wish you a safe and pleasant journey home.

---

1 Medical Officer, Traditional Medicine Programme, World Health Organization, Geneva Switzerland
LIST OF PARTICIPANTS

Dr Ketta Arcuna, Institut National de Recherches en Santé Publique, B.P. 1748, Bamako, Mali

Professor Ill-Moo Chang, Natural Products Research Institute, Seoul National University, 28 Yeonkeun Dong, Chongno Ku, Seoul 110, Republic of Korea

Dr Hoang Sao Chau, Institute of Traditional Medicine, 29, Nguyen Binh Khiem Street, Hanoi, Viet Nam

Professor Chen Zi-de, Director, Foreign Affairs Office, Nanjing College of Traditional Chinese Medicine, 282 Hanzhong Road, Nanjing, People’s Republic of China

Professor N.R. Farnsworth, University of Illinois at Chicago, College of Pharmacy, 833, South Wood Street, Chicago, Illinois 60612, United States of America

Professor C. Galeffi, Istituto Italo-Africano, 16, Via Ulisse Aldrovandi, 00197 Rome, Italy

Professor Chen Guiting, Director, Institute of Clinical Research and Information, China Academy of Traditional Chinese Medicine, Beixincang, Dongzhimenbei, Beijing 100700, People’s Republic of China

Dr Makoto Mayanagi, Pharmacist, Chief of Laboratory, Department of Medical History and Literature, Oriental Medicine Research Centre (OMRC) of the Kitasato Institute, 5-9-1 Shirokanedai, Minato-ku, Tokyo 108, Japan

Professor Soo-Myung Oh, Head of WHO Collaborating Centre for Traditional Medicine, East-West Medical Research Institute, Kyung Hee University, Seoul 131 - 702, Republic of Korea

Dr Xiao Peigen, Director, Institute of Medicinal Plant Development (IMPLAD), Chinese Academy of Medical Sciences, Xi Bei Wang, Beijing, People’s Republic of China

Mr George Sam, Research Officer, Head of Phytochemistry Department, Centre for Scientific Research in Plant Medicine, Mampong - Akwam, Ghana

Dr Takahiro Shintani, Department of Japanese Oriental Medicine, Toyama Medical and Pharmaceutical University, 2630 Sugitani, Toyama 930-01, Japan

Professor Abayomi Sofowora, Director, Department of Pharmacognosy, Obafemi Awolowo University, Ile Ife, Nigeria

Dr Jiang Tiangiang, Director, Institute of Chinese Materia Medica, China Academy of Traditional Chinese Medicine, Beixincang, Dongzhimenbei, Beijing 100700, People’s Republic of China

Dr Chao Weikang, Shanghai College of Traditional Chinese Medicine, 530 Lingling Road, Shanghai, People’s Republic of China
ANNEX 1

Professor Wu Gen-Cheng, Vice-Director, Institute of Acupuncture Research, Shanghai Medical University, 138 yi Xue Yuan Road, Shanghai, People’s Republic of China

Professor Zhu Bing, Vice-Director, Institute of Acupuncture and Moxibustion, China Academy of Traditional Chinese Medicine, Beixincang, Dongzhimennei, Beijing 100700, People’s Republic of China

OBSERVERS

Dr Nancy A. Hazleton, International and Professional Liaison, Office of Alternative Medicine, National Institute of Health, Bethesda, MD 20892, United States of America

Dr Andries Kleynhans, Head, School of Chiropractic, Osteopathy and Complementary Medicine, RMIT University, Plenty Road, Bundoora, Victoria 3083, Australia

Mr Emanuel Micalef, Director, Corporate Services, Ministry for Social Development, Casa Leoni, Sta Venera, CMR 02 Malta

Professor Umberto Solimene, Director, Research Centre of Biotechnology and Natural Medicine, University of Milan, Via Cipogna, 7, 20139 Milan, Italy

Dr Kazuo Torizuka, Pharmacist, Chief of Laboratory of Pharmacology, Department of Clinical Research, Oriental Medicinal Research Centre (OMRC) of the Kitasato Institute, 5-9-1 Shirokane, Minato-Ku, Tokyo 108, Japan

WHO SECRETARIAT

Dr Xiaorui Zhang, Medical Officer, Traditional Medicine, Action Programme on Essential Drugs, World Health Organization, Avenue Appia, 1211 Geneva 17, Switzerland

Dr M. Koumadé, Medical Officer, CLM/TRM, World Health Organization, Regional Office for Africa, P.O.Box No. 6, Brazzaville, Congo

Dr Abdel-Azim Habib, Professor of Pharmacognosy, University of Alexandria, representing the World Health Organization, Regional Office for the Eastern Mediterranean, P.O.Box 1517, Alexandria-21511, Egypt

Dr Chen Ken, Medical Officer, Traditional Medicine, World Health Organization, Regional Office for the Western Pacific, P.O. Box 2932, 1099 Manila, Philippines

Responsible Officer, Office of the WHO Representative in the People’s Republic of China, 9-2-151 Ta Yuan Diplomatic Compound, 1 Xingdonglu, Dongzhimen Wai, 100600 Beijing, People’s Republic of China
ANNEX 2

SCHEDULE OF THE MEETING

1995

Sunday 22 October
Arrival and registration of participants

Monday 23 October

Morning
Opening ceremony
Address of welcome: Dr Zhang Wenkang, Vice-Minister of Public Health and Director-General, State Administration of Traditional Chinese Medicine
Inaugural address: Dr Fernando S. Antezana, Assistant Director-General, World Health Organization
Recent Research and Developments in Traditional Chinese Medicine in China: Dr Shen Zhixiang, Director, Department of Foreign Affairs, State Administration of Traditional Chinese Medicine
Introductory remarks: Dr Xiaorui Zhang, Medical Officer, Traditional Medicine Programme, World Health Organization
Nomination of Chairman, Vice-Chairman and Rapporteur
Presentations by WHO Regional Offices on activities in traditional medicine:
Africa
Eastern Mediterranean
Western Pacific

Afternoon
Presentations by Collaborating Centres:
Africa
The Americas
Europe
Western Pacific

Evening
Welcome banquet
Tuesday 24 October

Morning
Country presentations continued
Discussion on the role of the Collaborating Centres and their work plans for the next four years

Afternoon
Discussion on strengthening cooperation between the Collaborating Centres and WHO
Discussion on collaborative activities among the WHO Collaborating Centres for Traditional Medicine

Wednesday 25 October

Morning
Recommendations by participants

Afternoon
Finalization of the Conclusions and Recommendations
Concluding remarks: Dr Xiaorui Zhang

Thursday 26 October

All day
Visits to:
- the Hospital of Beijing College of Acupuncture and Traumatology
- the Beijing University of Traditional Medicine
- the Institute of Acupuncture & Moxibustion Beijing (WHO Collaborating Centre)
- the Institute of Clinical Research & Information Beijing (WHO Collaborating Centre)
FORTY-FOURTH WORLD HEALTH ASSEMBLY

TRADITIONAL MEDICINE AND MODERN HEALTH CARE

The Forty-fourth World Health Assembly,

Having considered the Director-General's report on traditional medicine and modern health care;

Recalling resolutions WHA22.54, WHA29.72, WHA30.49, WHA40.33, WHA41.19, and WHA42.43;

Aware of the accepted crucial importance of traditional medicine in many societies;

Recognizing the important contribution of traditional medicine to the provision of essential care;

Acknowledging the role of traditional medicine in the treatment of illness by informed self-medication;

Cognizant of the potential medical and economic value of plant substances;

Mindful of the fact that many species of medicinal plants are threatened by ecological and environmental changes:

1. NOTES with satisfaction the progress made in the development of the programme of traditional medicine;

2. REITERATES that a substantial increase in national and international funding and support is needed to enable traditional medicine to take its rightful place in health care;

3. URGES Member States:

   (1) to intensify activities leading to cooperation between those providing traditional medicine and modern health care, respectively, especially as regards the use of scientifically proven, safe and effective traditional remedies to reduce national drug costs;

   (2) to introduce measures for the regulation and control of acupuncture methods;

4. REQUESTS the Director-General:

   (1) to continue to recognize the great importance of this programme and to mobilize increased financial and technical support as required;

   (2) to ensure that the contribution of scientifically proven traditional medicine is fully exploited within all the WHO programmes where plant-derived and other natural products may lead to the discovery of new therapeutic substances;

   (3) to seek appropriate partnerships with governmental bodies and nongovernmental organizations as well as with industry in implementing this resolution;

   (4) to keep the Executive Board and the Health Assembly informed of the progress made in the implementation of the programme of traditional medicine.

May 1991