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Medicinal Plants Today (**)

This international meeting, organized by the Academy on the initiative of its members, G. Penso and A. Imbesi in collaboration with the World Health Organization Center for Traditional Medicine, concerns not only cultural and scientific aims but also the need to face the problem of medicinal plants in a global context, so as to provide a basis for their study, cultivation, harvesting and utilization, and also especially to provide the authorities with guidelines for quality control and rules governing the use of these plants.

Perhaps anyone not acquainted with the problems related to medicinal plants might consider this subject unimportant, or of only minor importance. Others may feel that in a period in which synthetic and highly efficient drugs are available for the treatment of various diseases, medicinal plants have become obsolete and represent only a centuries-old tradition. Still others, denying, if not entirely at least in great part, their therapeutic properties and their scientific interest, consider them a form of natural remedy to oppose modern drug consumerism.

Therefore I wish to state that medicinal plants today do not represent only a historic stage of therapy inasmuch as, from prehistoric times up to the production of the first synthetic pharmaceutical a century ago, they have constituted the only means to relieve pain and cure illnesses. Plants with medicinal properties, and their cultivation, are still indispensable for providing raw materials for the pharmaceutical industry. Even at present medicinal plants play an important role in our society and in our economy, a role that perhaps we underplay and under-estimate.

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Definition and Classification of Medicinal Plants

In fact, if we define *medicinal plants* as plants having pharmacological activity — or even substances coadjutant to the therapeutic action, such as tannins, mucilage, etc. — we have the following categories:

1) Plants containing substances active on the central nervous system. We may enumerate: *Papaver somniferum*, which yields *opium* among other products such as morphine; *Erythroxylon coca*, from which cocaine and other tropane alkaloids are obtained; the Indian hemp (*Cannabis indica*) which is used to prepare hashish and marijuana, the active principles being the cannabinoids; *Khat* (*Catha edulis*), very common in Arabia and the horn of Africa, containing catinone and other phenyl-ethylamine alkaloids. Other plants with CNS activity are *Cereus* of Mexico, or Peyotl, producing a number of hallucinogenic alkaloids of the ethylamine and isoquinoline group; *Ipomeoa corymbosa*, which gives derivatives of lysergic amide and other hallucinogenic plants, such as *Peganum harmala* and *Mimosa sp.* The use by man of all the above substances, known as narcotics, represents one of the greatest problems of our present society. They generally cause addiction and modify the behavior of persons using them, and frequently may even cause death.

2) Plants of extensive production, for direct consumption:

a) *Coffea arabica*, coffee; *Thea*, tea; *Ilex paraguayensis*, maté. They all contain active principles, with stimulant activity like caffeine and thein. They are consumed daily in hundreds of tons to prepare beverages in every country of the world, and constitute a very important item of international trade.

To this particular category of « medicinal » plants we can add *Theobroma cacao*, which yields cocoa, as well as other plants used in some countries in the tropics, like the *cola nut* or the *betel*, which contain caffeine and arecaain, respectively.

b) *Nicotiana tabacum*, or tobacco, was introduced in the XVI century from Central America to Europe, as a sniffing powder, and later for the preparation of cigars, cigarettes, dried leaves, etc., for smoking.

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If narcotics may be considered one of the great problems for all mankind, the use of tobacco — so far considered a harmless recreation is now considered one of the most dangerous causes of tumors. On the whole, these categories of "medicinal plants" constitute a huge source of trade and revenue, legal or illegal, for the economy of many countries.

I will mention only the economic importance of coffee for Brazil and Central America; tea for Sri-Lanka, India, Malaysia and China; cocoa for western Africa, to say nothing of the huge problems caused by the illegal cultivation of poppies in the Middle and far East (Asia), and Coca leaves in the sub-Andine regions.

3) Plants containing pharmacologically active principles used for their specific properties. Specific examples in this category include *China calycosa*, which gives quinine and quinidine; *Rauwolfia vomitoria*, which yields reserpine; *Digitalis lanata*, containing cardiotonic glucosides, and many others.

4) Plants containing substances devoid of pharmacological activity but largely used for their coadjuvant activity in drug preparation, like the mucilage of *Polligala virginiana* in the treatment of cough; and pods of the carob for the preparation of astringent beverages rich in tannins.

5) Aromatic plants, containing essential oils or aromatic substances largely used to prepare beverages and liquors and to correct the taste of pharmaceutical preparations.

Only the last three categories constitute the subject of the present meeting. It is not possible to discuss at the same time the pharmaceutical and therapeutical aspects of medicinal plants together with the problem of narcotics in the world. Even the problem of the production and trade of coffee, tea, and cocoa is beyond the purpose of this meeting.

On the other hand, if medicinal plants are no longer used in modern therapy and are thus cancelled from the pharmacopoeia of industrialized countries, they constitute even now the basis of therapy in the countries of the Third World, through traditional medical practice. That means that plants are used for medicinal purposes by about 60% of the 5 billions of the earth's population.

Even after their official ban in developed countries, medicinal plants are still marketed for their direct use, through a number of channels, like herbalists and others.

Plants, like vegetal raw materials, can be divided into two groups: those which by simple extraction give the desired active principles, e.g., *Digitalis* for cardiac glucosides or *Rauwolfia* for the alkaloids, reserpine, ajmaline, etc. The second group gives us precious synthones, molecules of a certain complexity, which serve as intermediaries for the preparation of active compounds. This is the case of *Dioscorea*, from which are extracted steroidal glucosides, which can easily be transformed into steroidal hormones.

It is now easy to understand under this optic how the medicinal plants we have considered represent important and particular raw materials, which are produced or gathered, transported, sold and elaborated in a world without frontiers.

Medicinal Plants: Research

The problem in fact is multifaceted, involving agricultural production, international commerce, distribution and the pharmaceutical industry. It is therefore necessary to examine closely the scientific, botanical, chemical and pharmacological bases of these plants.

Chemical analytical methods have made it possible to point out the pre-

sence of many new products and understand the complex biochemical reactions for their formation. The techniques of genetic engineering open the way to the possibility of modifying and improving the plants' active principles, and biotechnology makes possible the industrial production of active principles from vegetal cells or from sprouts without sacrificing the plant. This is important when a tree is involved, as can be the case in the production of reserpine from *Rauwolfia*, which is now an endangered species.

This conference therefore will point out the present frontiers of research on medicinal plants in the botanical, chemical and pharmacological fields.

I wish to mention the interest aroused in the active principle of an Artemisia from China, *Artemisiðime*, or *Qing-yao-shu*, because of its antimalarial properties. At the same time we must face today's reality and probe more deeply into the production of medicinal plants in the various parts of the world, which are the item of trade and manufacture as raw materials of the pharmaceutical industry, or for their conditioning for direct use and sale through various channels.

An evaluation of medicinal plants, broadly speaking — including also those used in cosmetics and in the beverage industry — cannot disregard the characteristics which determine their purity and identity.

Medicinal Plants and Standards of Quality

This is a point which will be of great importance in our discussion today. In the absence of a reference standard for quality control and because of the elimination of medicinal plants from the pharmacopoeas, it is difficult to assure the quality, the genuineness and the botanical purity of the plants.

I recall that since the very important discovery, by the Spaniards in Peru in the 17th century, of the antimalarial properties of the *China calystaya*, the bark of quinine was imported into Europe and was soon widely falsified and mixed with the bark of other plants which were not effective, as is observed by the « Maestri » of the Hospital of Santo Spirito in Rome.

Today it is more than ever necessary that quality standards exist for these medicinal plants, which represent also an important item in international trade.

The Istituto Superiore di Sanità and the Ministry of Health are interested in knowing our opinion, which is that of so many countries, in order to suggest in Italy adequate regulations to protect the quality of medicinal plants and their consumers.

While there is no doubt of the economic importance of medicinal plants as raw materials for the pharmaceutical industry, we must also remember the extensive direct use that is made of medicinal plants in various industrialized countries (Germany, Holland, Austria).

At this point the question becomes more delicate: often the medicinal plant serves as a form of self-medication. Hence the objection of official medicine to allowing the use of medicinal plants without the control of a medical doctor. Often self-medication can be dangerous, due to either excessive or insufficient

dosage, especially in the case of infusions and other beverages indicated as cures but which are in practice ineffective or toxic. To assume in a plant an active principle, highly active pharmacologically — for example, the leaves of digitalis — can cause serious dangers and even cause death.

This happens with many other plants containing glucosides and alkaloids. For this reason there must be a rigid discipline in the use and distribution of medicinal plants in order to avoid complications.

On the other hand, many plants considered medicinally usefull do not have active principles which justify their use, even if they may have coadjuvant properties. Nevertheless they are capable of influencing particular conditions in the patient and therefore they can even be useful in the psychosomatic field.

Moreover, self-medication, induced by the idea of return to nature, can lead to another danger, and that is the lack of proper diagnosis of pathological conditions that could be cured promptly by appropriate means.

Discipline is thus necessary in this field in order that plants find their place in modern medicine, but also to avoid any excuse for evading medical controls and cure.

It is indispensable that medicinal plants be used rationally and scientifically, not only as an alternative to synthetic pharmaceuticals or because they are natural and thus believed safe. These attitudes can often be dangerous whereas under the guidance of a medical doctor who knows their properties and advantages, plants can continue to be a precious gift of nature for the well-being of humanity.