

HISTORY OF PHYTOTHERAPY AND PHARMACOGNOSY (compiled by Milan Nagy)

PREHISTORIC EVIDENCE

Where, in the eons of human evolution do we begin to chronicle the history of herbalism? Archaeological studies at Shanidar in Iraq have shown that the eight species of pollen grains found at the burial site reveal that seven of these were plants that are still commonly used as folk medicine throughout the world. These include yarrow (*Achillea*), marshmallow (*Althaea*), groundsel (*Senecio*), centaury (*Centaurea*), ephedra and muscari. There are no definite reasons why Neanderthal man (ca. 60.000 B.C.) included these plants in their burial rites, but it is suggested that they were intended to "exert a beneficial effect on every important part of the body, and may have been chosen to fortify the dead man in his journey to another world."

NEW STONE AGE (8,000 TO 5,000 B.C.)

Transition from the paleolithic to neolithic period - from a food gathering to a food producing economy. Stone was polished, creating tools to clear trees, help farming. Lake-dwellers cultivated or gathered over two hundred different plants, among which are not a few that possess medicinal qualities: *Papaver somniferum*, *Sambucus ebulus*, *Fumaria officinalis*, *Verbena officinalis*, *Saponaria officinalis*, *Menyanthes trifoliata.*, etc..

In the history of phytotherapy (herbalism), women prepared food and healing potions - women generally practiced herbalism on a day to day basis, as well as took care of the ills of other members of the family or tribal unit. However, throughout history, men compiled the remedies and wrote them down, which is why nearly all the herbals are by men. Early mind-body medicine is seen to be practiced in the many rituals, magic rites, beliefs of higher beings affecting health and disease, etc. This was especially prevalent up until the time of the Egyptians (2500 B.C.), when "rational" medicine began to rise, and continued to run concurrent with religious and magical medicine. Magic, religion, and medicine are one to the primitive mind. The belief in spirits that reside in animate and inanimate objects of man's environment, in the elements of nature, spirits that interfere in man's life for good or evil and therefore may cause disease, is extremely widespread, in fact almost universal.

ANCIENT MESOPOTAMIA

The name Mesopotamia (meaning "the land between the rivers") refers to the geographic region which lies near the Tigris and Euphrates Rivers. Given the combination of fertile soil and the need for organized human labor, perhaps it is not surprising that the first civilization developed in Mesopotamia. The origins of civilization can be traced to a group of people living in southern Mesopotamia called the Sumerians. By c.3500 B.C. the Sumerians had developed many of the features that characterized subsequent civilizations, however, true civilization is said to have begun around 3100 B.C. with the development of cuneiform writing. After its development, cuneiform became the dominant system of writing in Mesopotamia for over 2000 years.. As a result of its extensive use of several centuries, many cuneiform tablets have survived. Unfortunately, while an abundance of cuneiform tablets have survived from ancient Mesopotamia, relatively few are concerned with medical issues. Many of the tablets that do mention medical practices have survived from the library of Assurbanipal, the last great king of Assyria. The library of Assurbanipal was housed in the king's palace at Nineveh, and when the palace was burned by invaders, around 20 000 clay tablets were baked (and thereby preserved) by the great fire.

The largest surviving such medical treatise from ancient Mesopotamia is known as "Treatise of Medical Diagnosis and Prognoses." The text of this treatise consists of 40 tablets collected and studied by the French scholar R. Labat. Although the oldest surviving copy of this treatise dates to around 1600 B.C., the information contained in the text is an amalgama-

tion of several centuries of Mesopotamian medical knowledge. The medical texts are, moreover, essentially rational, and some of the treatments, as for example those designed for excessive bleeding (where all the plants mentioned can be easily identified), are essentially the same as modern treatments for the same condition.

Babylon in ancient Mesopotamia provides the earliest known record of practice of the art of the apothecary. Practitioners of healing of this era (about 2600 B.C.) were priest, pharmacist and physician, all in one. Medical texts on clay tablets record first the symptoms of illness, the prescription and directions for compounding, then an invocation to the gods. Ancient Babylonian methods find counterpart in today's modern pharmaceutical, medical, and spiritual care of the sick.

By examining the surviving medical tablets it is clear that there were two distinct types of professional medical practitioners in ancient Mesopotamia. The first type of practitioner was the *ashipu* (Fig.1), in older accounts of Mesopotamian medicine often called a "sorcerer." One of the most important roles of the *ashipu* was to diagnose the ailment. The *ashipu* could also refer the patient to a different type of healer called an *asu*. He was a specialist in herbal remedies, and in older treatments of Mesopotamian medicine was frequently called "physician" because he dealt in what were often classifiable as empirical applications of medication.

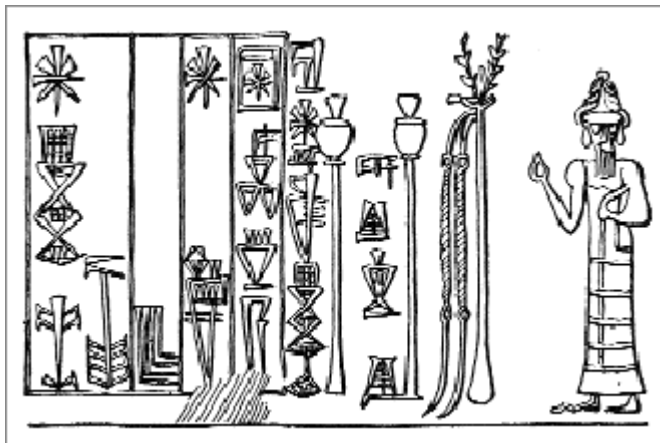


Fig.1 : Reproduction of a clay tablet with *ashipu* in action

Another textual source of evidence concerning the skills of Mesopotamian physicians comes from the *Law Code of Hammurabi* (c. 1700 B.C.). This collection was not found written on a tablet, but was discovered on a large block of polished diorite (Fig.2). One of these texts recommends the application of a dressing consisting mainly of sesame oil, which acted as an anti-bacterial agent. Other references to the use of many familiar medicinal plants including poppy, belladonna, mandrake senna, henbane, licorice and mint are also described.

Another important consideration for the study of ancient Mesopotamian medicine is the identification of the various drugs mentioned in the tablets. Unfortunately, many of these drugs are difficult or impossible to identify with any degree of certainty. Often the *asu* used metaphorical names for common drugs, such as "lion's fat" (much as we use the terms "tiger lilly" or "baby's breath"). The *Asu* physicians utilized an extensive repertory of herbal medicines. They made use of milk, snakeskin, turtleshell, cassia, myrtle, thyme, willow, pear, fir, fig and dates. Herbal treatments were distilled into decoctions by boiling them in water, to which they added alkali and salts.



While many of the basic tenants of medicine, such as bandaging and the collection of medical texts, began in Mesopotamia, other cultures may have developed these practices independently. Even in Mesopotamia itself, many of the ancient techniques became extinct after surviving for thousands of years. It was Egyptian medicine that seems to have had the most influence on the later development of medicine, through the medium of the Greeks.

Fig.2 : A large block of polished diorite

ANCIENT CHINA

Chinese Pharmacy, according to legend, stems from **Shen Nung** (about 2700 B.C.), emperor who sought out and investigated the medicinal value of several hundred herbs. He reputed to have tested many of them on himself, and to have written the first *Pen T-Sao, or native herbal*, recording 365 drugs. These were subdivided as follows: 120 emperor herbs of high, food grade quality which are non-toxic and can be taken in large quantities to maintain health over a long period of time, 120 minister herbs, some mildly toxic and some not, that have stronger therapeutic action to heal diseases, finally there are 125 servant herbs that have specific action to treat disease and eliminate stagnation. Most of those in the last group are toxic and are not intended to be used daily over a prolonged period of weeks and months. Shen Nung conceivably examined many herbs, barks, and roots brought in from the fields, swamps, and woods that are still recognized in pharmacy today (podophyllum, rhubarb, ginseng, stramonium, cinnamon bark, and ephedra).

Inscriptions on oracle bones from the Shang Dynasty (1766 to 1122 B.C.), discovered in Honan Province, have provided a record of illness, medicines and medical treatment. Furthermore, a number of medical treatises on silk banners and bamboo slips were excavated from tomb number three at Ma-Huang-Tui in Changsha, Hunan Province. These were copied from books some time between the Chin and Han periods (300 B.C. to 3 A.D.) and constitute the earliest medical treatises surviving in China.

The most important clinical manual of Traditional Chinese Medicine is the *Shang Han Lun* (Treatise On the Treatment of Acute Diseases Caused by Cold) written by **Chang Chung-Ching** (142-220). The fame and reputation of the Shang Han Lun as well as its companion book, *Chin Kuei Yao Lueh* (Prescriptions from the Golden Chamber) is the historical origin of the most important classical herbal formulas that have become the basis of Chinese and Japanese-Chinese herbalism (called "Kampo").

With the interest in alchemy came the development of pharmaceutical science and the creation of a number of books including in 492, **Tao Hong Jing's** (456-536) compilation of the *Pen T'sao Jing Ji Zhu* (Commentaries on the Herbal Classic) based on the Shen Nong Pen T'sao Jing. In that book 730 herbs were described and classified in six categories: 1) stone (minerals), 2) grasses and trees, 3) insects and animals, 4) fruits and vegetables, 5) grains and 6) named but unused. During the Sui dynasty (589-618) the study of herbal medicine blossomed with the creation of specialized books on plants and herbal medicine. Some of these set forth the method for the gathering of herbs in the wild as well as their cultivation. Over 20 herbal's were chronicled in the *Sui Shu Jing Ji Zhi* (Bibliography of the history of Sui). These

include the books *Zhong Zhi Yue Fa* (How to Cultivate Herbs) and the *Ru Lin Cai Yue Fa* (How to collect Herbs in the Forest).

From the Sung Dynasty (960 to 1276) the establishment of pharmaceutical system has been a standard practice throughout the country. Before the ingredients of Chinese medicine can be used to produce pharmaceuticals, they must undergo a preparation process, for example baking, simmering or roasting. The preparation differs according to the needs for the treatment of the disease. Preparation methods, production methods and technology have constantly been improved over time.

In 1552, during the later Ming Dynasty, **Li Shi Zhen** (1518-1593) began work on the monumental *Pen T'sao Kan Mu* (Herbal with Commentary). After 27 years and three revisions, the *Pen T'sao Kan Mu* was completed in 1578. The book lists 1892 drugs, 376 described for the first time with 1160 drawings. It also lists more than 11 000 prescriptions.

ANCIENT EGYPT

The most complete medical documents existing are the *Ebers Papyrus* (1550 B.C.) – (Fig.3), a collection of 800 prescriptions, mentioning 700 drugs and the *Edwin Smith Papyrus* (1600 B.C.) which contains surgical instructions and formulas for cosmetics. The *Kahun Medical Papyrus* is the oldest - it comes from 1900 B.C. and deals with the health of women, including birthing instructions.



However, it is believed that the *Smith Papyrus* was copied by a scribe from an older document that may have dated back as far as 3000 B.C. Commonly used herbs included, senna, honey, thyme, juniper, cumin, (all for digestion); pomegranate root, henbane (for worms) as well as flax, oakgall, pine-tar, manna, bayberry, ammi, alkanet, aloe, caraway, cedar, coriander, cyperus, elderberry, fennel, garlic, wild lettuce, nasturtium, onion, peppermint, papyrus, poppy-plant, saffron, watermelon, wheat and zizyphus-lotus. Myrrh, turpentine and acacia gum were also used.

Fig.3 : A fragment of *Ebers Papyrus*

ANCIENT INDIA

The basic medicinal texts in this world region - The Ayurvedic Writings – can be divided in three main ones (*Caraka Samhita*, *Susruta Samhita*, *Astanga Hridayam Samhita*) and three minor ones (*Sarngadhara Samhita*, *Bhava Prakasa Samhita*, *Madhava Nidanam Samhita*). Ayurveda is the term for the traditional medicine of ancient India. Ayur means life and veda means the study of, which is the origin of the term. The oldest writing - *Caraka Samhita* - is believed to date six to seven centuries before Christ. It is felt to be most important

ancient authoritative writing on *Ayurveda*. The *Susruta Samhita* is thought to have arisen about the same time period as the *Caraka Samhita* but slightly after it. *Astanga Hridayam* and the *Astanga Sangraha* have been dated about the same time and are thought to date after the *Caraka* and *Susruta Samhitas*. Most of mentioned medicines origin from plants and animals, e.g.: ricinus, pepper, lilly, valerian, etc.

ANCIENT GREECE AND ROME

The earliest source of Greek medical knowledge and descriptions of ancient Greek medical practices is **Homer**. The two epic poems attributed to Homer, the *Iliad* and the *Odyssey*, date to around the eighth century B.C. Of these two works the *Iliad* contains the more information concerning the treatment of injuries. Beyond the description of wounds, to a lesser extent Homer also recorded the care given to an injured warrior. Generally speaking, medical care focused on the comfort of the wounded man and not on treating the wound itself. Among the warriors, however, there were a few who were considered to be specialists in the art of healing through means of herbal remedies and bandaging. One of these doctors was *Machaon*, the son of the legendary healer *Asclepius* who later became deified. When *Machaon* was wounded himself, however, he was treated by being given a cup of hot wine sprinkled with grated goat cheese and barley.

Hippokrates (460 – 375 B.C.) is usually considered an entire school of “rational” or “scientific”; medicine, though the individual may also have lived. Hippokrates may also have been the first “nature doctor” in a more modern sense, for he utilized simple natural remedies such as vinegar, honey, herbs and hydrotherapy in healing.

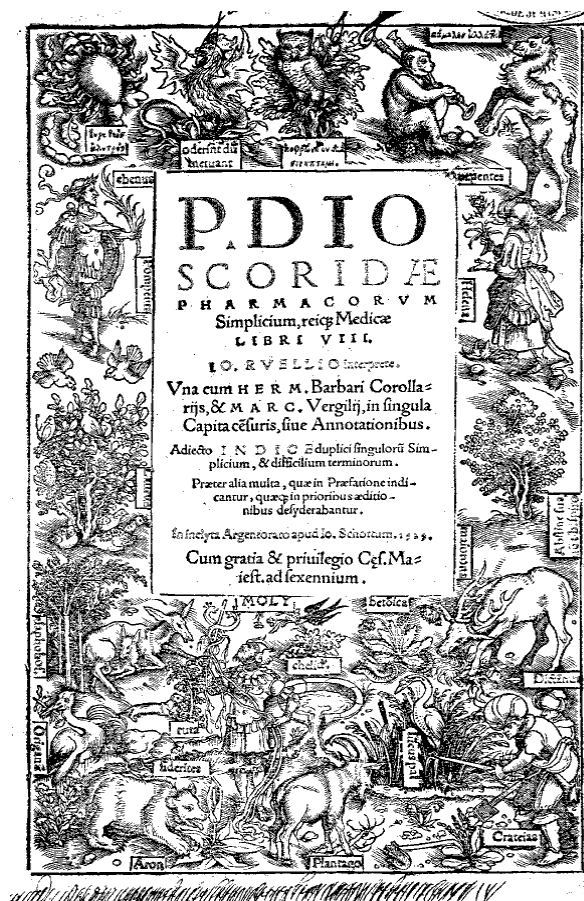
Theophrastus (340 B.C.) wrote *De Historia Plantarum* (Fig.4) and *De Causis Plantarum*.with many kinds of plants and how they are used in medicine, how to grow them and many other observations.



Fig.4 : *De Historia Plantarum*

Krateus (about 100 B.C.) is a Greek herbalist who is considered the first person to produce an illustrated work on medicinal plants. Pliny speaks of his illustrated “herbal”, which does not unfortunately, survive. His influence is thought to be felt in the *De Materia Medica* of *Dioscorides*, as well as other later works on medicinal plants.

This kind of extensive observation is found in the ancient world in herbals, the best-known of which is the *De Materia Medica* (78 A.D.) of **Dioscorides Pedanius of Anazarbos**, considered the authoritative source of pharmacological information until the Renaissance. In this work, a number of the recipes are the same as listed in *Papyrus Ebers*, and prescribed for the same ailments.



In the preface to *De Materia Medica* (Fig.5) Dioscorides claims extensive experience with and knowledge of more than 500 plants, and arranges them in his work according to their "properties". Approximately 80% of Dioscorides' materia medica consists of plant medicines while the remaining 20% is divided more or less 10% mineral and 10% animal. The organization of Dioscorides' work, especially with plants follows an organized pattern of one plant, one chapter. The description of the plants themselves are laid out as follows:

Fig.5 : *De Materia Medica* (transcription)

- | | |
|-------------------------------------|---|
| 1. plant name, synonyms and picture | 6. harmful side effects |
| 2. habitats | 7. quantities and dosages |
| 3. botanical description | 8. harvesting, preparation and storage instructions |
| 4. drug properties or actions | 9. adulteration and methods of detection |
| 5. medicinal usages | 10. veterinary uses |

Pliny's (60 A.D.) *Natural History* is the largest compellation on plants from the Roman period. Although Pliny was not very critical, he reports from the writings of many authors whose work does not survive, so is a valuable resource for the medicinal uses of plants in ancient medicine. Pliny lists more than 1000 plants.

Galen (130-200) practiced and taught both Pharmacy and Medicine in Rome; his principles of preparing and compounding medicines ruled in the Western world for 1,500 years; and his name still is associated with that class of pharmaceuticals compounded by mechanical means - galenicals. He was the originator of the formula for a cold cream, essentially similar

to that known today. Many procedures Galen originated have their counterparts in today's modern compounding laboratories.

MIDDLE AGES

In the middle ages, taken here to mean the long period between Greek and Roman culture and the Renaissance, several "schools" of medicine which contributed substantially to the progression of herbalism can be noted. But it must be remembered that these times were built from the day to day practice of herbalism and investigation of the natural world. As has been mentioned before, it is mostly men who wrote down and compiled the works we have to go by when considering the history of herbalism, but it was both men and women who practiced and developed herbalism--perhaps women more than men on a day to day basis.

AVICENNA

Among the brilliant contributors to the sciences of Pharmacy and Medicine during the Arabian era was one genius who seems to stand for his time - the Persian, Ibn Sina (about 980-1037), called **Avicenna** (Fig.6) by the Western world. Pharmacist, physician, philosopher and diplomat, Avicenna was a favorite of Persian princes and rulers. He wrote in Arabic. His pharmaceutical teachings were accepted as authority in the West until the 17th century; and still are dominant influences in the Orient. He composed the *Kitab ash-shifa`* ("Book of Healing"), a vast philosophical and scientific encyclopaedia, and the *Canon of Medicine* (Fig.7), which is among the most famous books in the history of medicine. Avicenna's "Book of Healing" was translated partially into Latin in the 12th century, and the complete Canon appeared in the same century.



Fig.6: Avivenna



Fig.7: *Canon of Medicine* (transcription)

ARABIAN SCHOOL

In botany Spanish Muslims made the greatest contribution, and some of them are known as the greatest botanists of mediaeval times. They were keen observers and discovered sexual difference between such plants as palms and hems. They roamed about on sea shores, on mountains and in distant lands in quest of rare botanical herbs. They classified plants into those that grow from seeds, those that grow from cuttings and those that grow of their own accord, i.e., wild growth. The Spanish Muslims advanced in botany far beyond the state in which "it had been left by Dioscorides and augmented the herbology of the Greeks by the

addition of 2 000 plants" Regular botanical gardens existed in Cordoba, Baghdad, Cairo and Fez for teaching and experimental purposes.

The Cordovan physician, **Al-Ghafiqi** (died 1165) was a renowned botanist, who collected plants in Spain and Africa, and described them most accurately. His description of plants was the most precise ever made in Islam; he gave the names of each in Arabic, Latin and Berber. His outstanding work *Al Adwiyah al Mufradah* dealing with simples was later appropriated by Ibn Baytar."

Abu Zakariya Yahya Ibn Muhammad Ibn Al-Awwan, who flourished at the end of 12th century in Seville (Spain) was the author of the most important Islamic treatise on agriculture during the mediaeval times entitled *Kitab al Filahah*. The book treats more than 585 plants and deals with the cultivation of more than 50 fruit trees. It also discusses numerous diseases of plants and suggests their remedies.

Abdullah Ibn Ahmad Ibn al-Baytar, was the greatest botanist and pharmacist of Spain of mediaeval times. He roamed about in search of plants and collected herbs on the Mediterranean littoral, from Spain to Syria, described more than 1400 medical drugs and compared them with the records of more than 150 ancient and Arabian authors. The collection

of simple drugs composed by him is the most outstanding botanical work in Arabic. It is an encyclopedic work on the subject. One of his works *Al-Mughani-fi al Adwiyah al Mufradah* deals with medicine. The other *Al Jami Ji al Adwiyah al Mufradah* (Collection of Simple Drugs and Food) (Fig. 8) is a very valuable book containing simple remedies regarding animal, vegetable and mineral matters which has been described above.



It deals also with 200 novel plants which were not known up to that time.. It is an alphabetically arranged compendium of medicinal plants of all sorts, most of which were native to Spain and North Africa, which he spent a lifetime gathering. Where possible, he gives the Berber, Arabic, and sometimes Romane names of the plant, so that for linguists his work is of special interest. In each article, he gives information about the preparation of the drug and its administration, purpose and dosage.

Fig. 8: *Al Jami Ji al Adwiyah al Mufradah*

ANGLO-SAXON LEECHCRAFT (512-1154)

Leech was the collective English word for medical practitioners - those who practiced all forms of healing. Several works survive from Anglo-Saxon medicine in England, among them *Herbarium Apuleius* (480-1050), one of the most copied herbal manuscripts. This work contains recipes and uses of over 100 herbs. Europe's oldest surviving Herbal that was written in the vernacular is *The Leech Book of Bald* (925), containing may formulas and herbal remedies in a fairly sophisticated system of therapeutics, but many superstitious notions about how to apply herbal treatments as well. In this book some of the most used herbs of the Saxon times were Wood Betony, Vervain, Mugwort, Plantain, and Yarrow . Meanwhile, a number of generations of the family **Myddvai** practiced herbalism in a highly artful degree, their herbal therapies were written down in the work, *Physicians of Myddvai* (1250).

SALERNO

The school of Salerno (11th to the 12th century) in Italy was a famous and influential medical and health center, epitomized by the work of the Christian physician, **Constantine the African**, who is generally credited with the introduction of Arabian medicine into Europe. Two works are notable: *Experiments of Cohpon* (1080) and the famous poem of health, *Regimen Sanitatis Salerni*.

MONASTIC PHARMACY

During the Middle Ages remnants of the Western knowledge of Pharmacy and Medicine were preserved in the monasteries (fifth to twelfth centuries). These scientists are known to have been taught in the cloisters as early as the seventh century. Many manuscripts were translated or copied for monastery libraries. The monks gathered herbs and simples in the field, or raised them in their own herb gardens. These they prepared according to the art of the apothecary for the benefit of the sick and injured. Gardens such as these still may be found in monasteries in many countries.

THE RENAISSANCE

During this period, new political independence from the church and a renewed interest in the classics fostered a flowering of scientific, medical and cultural achievement that is unparalleled in human history. Many of the great herbal's were written, compiled and printed during this time. Some of these were as follows:

BRUNFELS, OTTO

The work by Brunfels (1488-1534) a pastor and naturalist (Fig.9), and the town physician at Bern, offers the first original work in botany. Its importance rests less in its text than in its elegant woodcut illustrations (Fig.10). The herbal is arranged alphabetically and emphasizes the illustrations more than written descriptions. Botanists credit Brunfels as the prime motivator of Hieronymous Bock. Because of Brunfels' urging, Bock completed his herbal. **Bock's work was more truly scientific than Brunfels' and is considered one of the pillars upon which later botanical study rests.**



Fig.9: Brunfels



Fig.10: Herbal (Brunfels)

BOCK, HIERONYMUS

Bock's purpose was not just to identify plants known by Dioscorides, but also to discuss their characteristics. Although Bock (1498-1554) was self-taught, he was the first to create a system of botany that classified plants into three categories: herbs, shrubs, and trees. He then subdivided each group by similar characteristics or relationships. Although he did not develop such concepts as "genus" or "species," his work laid the foundation for Linnaeus. To



compensate for a lack of illustrations he focused on writing such clear descriptions of the plants that even laymen would recognize what he was trying to portray. Thus he developed the prototype of modern phytography, the science of plant description. When later editions were issued, however, the publisher decided that illustrations should be included to make the book more useful (Fig.11).

Fig.11: Herbal (Bock)

FUCHS, LEONHART

His work is one of the most beautiful books printed with full-page illustrations. Important in the history of botanical illustration, this is the first early illustrated book to recognize not only the author for his contributions to the project, but also the painter, the transfer draftsman, and the block cutter. While drawing upon the works of Dioscorides, Pliny, and Galen, Fuchs (1501-1566) added to his work at least 100 plants not mentioned in earlier herbals. He included many that had been introduced into 16th century Germany from elsewhere, and he tried to ensure that all plants in his work were portrayed accurately. He wanted no mistakes made in their identification. The genus Fuchsia was named in his honor. A particularly interesting entry is the first representation of maize (corn), where the text mistakenly refers to the grain as Turkish in origin, rather than American.

MATTIOLI, PIETRO ANDREA

Mattioli (1500-1577) was one of the most famous herbalists of the 16th century and



was responsible for incorporating many New World plants into botanical knowledge. He was called to be the personal physician to the Archduke Maximilian in Prague. in 1555. **His commentary on Dioscorides' works was first printed in 1544 without illustrations. The 1565 edition is the most complete and the one most valued for its comprehensiveness** (Fig.12).

Fig. 12: Herbal (Mattioli, transcription 1604)

SEPARATION OF PHARMACY AND MEDICINE

In European countries exposed to Arabian influence, public pharmacies began to appear in the 17th century. However, it was not until about 1240 that, in Sicily and southern Italy, Pharmacy was separated from Medicine. Frederick II of Hohenstaufen, who was Emperor of Germany as well as King of Sicily, was a living link between Oriental and Occidental worlds. At his palace in **Palermo**, he presented subject Pharmacists with the first European edict completely separating their responsibilities from those of Medicine, and prescribing regulations for their professional practice.



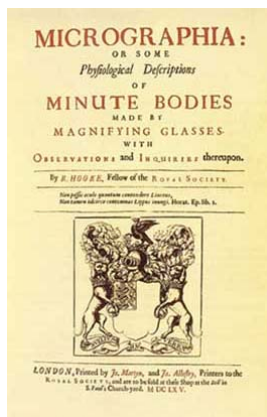
Fig.13: Savonarola

THE FIRST OFFICIAL PHARMACOPOEIA

The idea of a pharmacopoeia with official status, to be followed by all apothecaries, originated in Florence. *The Nuovo Receptario*, originally written in Italian, was published and became the legal standard for the city-state in 1498. It was the result of collaboration of the Guild of Apothecaries and the Medical Society - one of the earliest manifestations of constructive interprofessional relations. The professional groups received official advice and guidance from the powerful Dominican monk, **Savonarola** (Fig.13), who, at the time, was the political leader in Florence.

MICROSCOPE HISTORY

There is a terrific amount of mis-information about who invented the microscope. Many people think that Leeuwenhoek invented the microscope. This is also very untrue, as while his microscopes were very simple and crude, he started making them long after very elaborate models were available and many important discoveries had been made by them. Credit for the first microscope is usually given to **Zacharias Jansen** in Holland around the year 1595. Since Zacharias was very young at that time, it's possible that his father Hans made the first one, but young Zach took over the production.



ROBERT HOOKE

His reputation as a biologist largely rests on his book *Micrographia* (Fig.14), published in 1665. Hooke (1635-1703) devised the compound microscope and illumination system, one of the best such microscopes of his time. Perhaps his most famous microscopical observation was his study of thin slices of cork. He had discovered plant cells - more precisely, what Hooke saw were the **cell walls in cork tissue**.

Fig.14: *Micrographia*

ANTONY VAN LEEUWENHOEK

He was an unlikely scientist. A tradesman from Holland, he received no higher education or university degrees, and knew no languages other than his native Dutch. Yet with skill and diligence, Leeuwenhoek (1632-1723) succeeded in making some of the most important discoveries in the history of biology. It was he who discovered bacteria free-living and parasitic microscopic protists sperm cells or blood cells. He seems to have been inspired to take up microscopy by having seen a copy of Robert Hooke's illustrated book *Micrographia*.

HISTORY OF THE TERM "PHARMACOGNOSY"

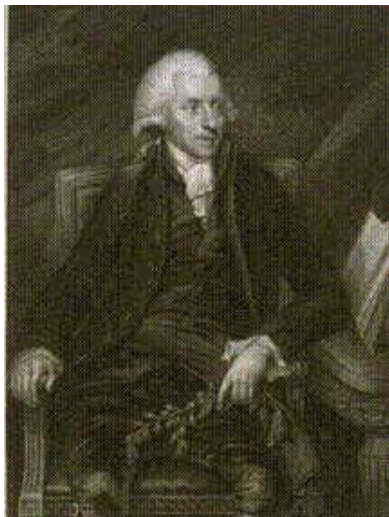
Etymologically, **pharmacognosy** is the knowledge (from the Greek *gnosis*) of poison (*pharmacon* or *medication*). Pharmacognosy studies only natural substances used in treatment and preventing of the diseases or having a biological activity on different living organisms.



There is a historical mis-information about who created the term "pharmacognosy". According some sources, it was C.A. Seydler, a medical student in Halle an der Saale, Germany in 1815 - he wrote his thesis: *Analecta Pharmacognostica*. However, recent historical research has found an earlier usage of this term. The physician **J.A. Schmidt** (Vienna) (Fig.15) used that one in his "*Lehrbuch der materia medica*" in 1811, to describe the study of medicinal plants and their properties.

Fig. 15: J.A. Schmidt

MODERN SCIENTISTS



WILLIAM WITHERING (Fig.16)

While European physicians eagerly added plants brought from Asia and the New World to their drug compounds, they did not attempt to compare new drugs with old ones, nor did they study the effects of varying drug doses. The first inkling of change came in 1785, when an English physician Withering (1741-1799) discovered the use of digitalis and published *An Account of The Foxglove and Some of Its Medical Uses*. In 1875, the first active part of Foxglove was isolated and called digitoxin. Its chemical structure was identified in 1928.

Fig. 16: W. Withering



F. W. A. SERTÜRNER

Swedish pharmacist Scheele paved the way for isolating organic plant acids; but it remained for a young German apothecary, Friedrich Wilhelm Adam Sertürner (1783-1841), to give the world opium's chief narcotic principle, **morphine**; and to recognize and prove the importance of a new class of organic substances: alkaloids. His first announcements challenged, Sertürner in 1816 conducted a new series of bold, starting experiments in his apothecary shop in Einbeck, including a series of physiologic tests on himself and three young friends.



Joseph-Bieniamin CAVENTOU and Pierre-Joseph PELLETIER

Taking their cue from Sertürner's alkaloidal experiments, two French pharmacists, P.-J. Pelletier (1788-1842) and J.-B. Caventou (1795-1877), isolated **emetine** from ipecacuanha in 1817; **strychnine** and **brucine** from nux vomica in 1818; then, in their laboratory in the back of a Parisian apothecary shop, they tackled the problem that had baffled scientists for decades - wresting the secrets of the Peruvian barks that were so useful against malaria. In 1820 Caventou and Pelletier (Fig.17) announced the methods for separation of **quinine** and **cinchonine** from the cinchona barks; prepared pure salts, had them tested clinically, and set up manufacturing facilities.

Fig.17: P.-J. Pelletier



Alexander W. O. TSCHIRCH (Fig.18)

Professor in Berlin und Bern, one of most famous Pharmacognosy lecturers. Tschirch (1856-1939) spend 17 years on writing three volumes of monumental *Handbuch der Pharmakognosie*, which became a standard for a long time.

Fig.18: A.W.O. Tschirch