HISTORY OF SCIENCES – PROPEDEUTICS

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2016.
"Introduction" to the pharmacy profession to give some basic knowledge about pharmacy (general knowledge about pharmacy, about drugs /medicines/, classification of drugs).

History of Sciences

History of Pharmacy with the aim to give the pharmacy students some additional and preliminary perspective to guide the reshaping of traditions and improving of the services and the satisfactions which they expect in the profession.

THEORETICAL SUBJECTS (BASIC KNOWLEDGE)

SPECIAL SUBJECTS
HISTORY OF PHARMACY

Definition

• The history of pharmacy consists of the knowledge of the past of the art of pharmacy in order to better prepare the future. It puts together the study of the evolution of medicines and the men, pharmacists or not, discovering, conceiving, making, controlling and distributing those medicines, as well as the patients to whom it is handed out.
• Thus pharmacy history approaches scientific and medicinal theories, pharmaceutical equipments, medical forms, classes of medicines, therapy, legislation, essential for a regulated profession, magistral and later university teaching, sociology of the pharmacists, their relations with the related health professions, the society, the charlatans, without forgetting its cultural environment.
The search in pharmacy history relies on the study of various documents according to the period concerned, as formularies, inventories after decease, life stories, pharmacopoeias, apothecaries’ accounts, communities’ registers, regulatory texts, prescription books, invoices, medical prescriptions, scientific and technical publications, treatises, handbooks, promotional supports, records of scientific societies or production units, popularising works etc.
The history of pharmacy, a discipline of public health, is closely related to the history of medicine, as well as to the history of chemistry, of botany, of natural sciences, of physiology, of hygiene etc.

The multidisciplinary aspect of pharmacy are to be considered in its history.
The considered period is very extended as it runs from the Neandertal man, chewing his purgative leaves, up to the present times, with its genetic and cellular therapy.
The main characteristic of history of pharmacy is diversity.

At the beginning, *Homo sapiens* was supposed to have had very simple behaviours, close to those of monkeys. In most areas of the world, Men used to masticate purgative leaves whenever they felt sick. As soon as a kind of conscience of the way of curing diseases appeared, as soon as technical practices developed, the evolution of what could not yet be called pharmacy started to follow different pathways.
The ways of conceiving of the relationships between patients, medicines and society became different and were influenced by religions, climate, nature of the drugs found in the region and also by discoveries made by individuals. Pharmacy was, of course, influenced by the philosophical diversity between the various populations.
It would be a mistake to consider that no relationships existed between these different ways to practice pharmacy.

The Silk Road was a great opportunity for exchanges and contacts between Asian and European cultures. Many drugs coming from Asia were then introduced in Europe and contacts existed at a philosophical level.

It appears then most interesting to try to detect from this fruitful diversity, what could be the trends shared by these various conceptions of pharmacy.

History of pharmacy is situated somewhere between diversity and unity.
CHANGING THE PHARMACISTS’ ROLE

- By the end of the 20th century the pharmacists’ work has been dramatically changing in public pharmacies owing to the development of pharmaceutical industry.

- The number of the magistrally made medicines and the number of chemical examinations have been decreasing and the classical drug oriented pharmacy has been transforming to patient and society oriented one.

- These changes together with healthcare needs of masses, including medication optimisation and safety initiated a permanent extension of pharmacists’ competencies in the frame of pharmaceutical care.
Mission statement: The pharmacist is competent on drugs. He promotes the justified use of drugs. He advises on the choice and safe use of prescription and OTC drugs, through medication surveillance and personal information. He also advises on medical supplies and enables justified and individual home care. He confers with physicians on choice and use of drugs and medical supplies.
In this way he promotes a qualitative high standard and affordable health care. The pharmacy is a modern establishment with specialised personnel, which dispense and compound drugs. Translated in position terms this means: quality, safety, reliability, accessibility, client friendliness, competency but also being a centre for information and a public advisor.
THE ROLE OF PHARMACIST:
‘THE SEVEN-STAR PHARMACIST’

Contemporary and future pharmacists must possess specific knowledge, attitudes, skills and behaviours in support of their roles.

These roles can be summerized in ‘the seven star pharmacist’. 
THE ROLE OF PHARMACIST:
‘THE SEVEN -STAR PHARMACIST’

Care-giver – the pharmacist provides caring services. Whether these services are clinical, analytical, technological or regulatory, the pharmacist must be comfortable interacting with individuals and populations. The pharmacist must view his or her practice as integrated and continuous with those of the health care system and other pharmacists. Services must be of the highest quality.

Decision-maker – the appropriate, efficacious and cost effective use of resources (e.g., personnel, medicines, chemicals, equipment, procedures, practices) should be at the foundation of the pharmacist’s work. Achieving this goal requires the ability to evaluate, synthesize and decide upon the most appropriate course of action.
THE ROLE OF PHARMACIST: ‘THE SEVEN-STAR PHARMACIST’

Communicator – the pharmacist is in an ideal position between physician and patient. As such, he or she must be knowledgeable and confident while interacting with other health professionals and the public. Communication involves verbal, non-verbal, listening and writing skills.

Leader – whether the pharmacist finds him/herself in multidisciplinary (e.g., team) caring situations or in areas where other health care providers are in short supply or non-existent, he/she is obligated to assume a leadership position in the overall welfare of the community. Leadership involves compassion and empathy as well as the ability to make decisions, communicate, and manage effectively.
THE ROLE OF PHARMACIST: 'THE SEVEN STAR PHARMACIST'

Manager – the pharmacist must effectively manage resources (human, physical and fiscal) and information; he or she must also be comfortable being managed by others, whether an employer or the manager/leader of a health care team. More and more, information and its related technology will provide challenges to the pharmacist as he/she assumes greater responsibility for sharing information about medicines and related products.
THE ROLE OF PHARMACIST: ‘THE SEVEN –STAR PHARMACIST’

Life-long-learner – it is no longer possible to learn all one must learn in school in order to practice a career as a pharmacist. The concepts, principles and commitment to life-long learning must begin while attending pharmacy school and must be supported throughout the pharmacist’s career. Pharmacists should learn how to learn.

Teacher – the pharmacist has a responsibility to assist with the education and training of future generations of pharmacists. Participating as a teacher not only imparts knowledge to others, it offers an opportunity for the practitioner to gain new knowledge and to fine-tune existing skills.
PHARMACY as a science is most intimately correlated to medical sciences. Pharmacy is concerned with the knowledge and supply of medical substances, drugs capable of maintaining health, improving the physical and mental state of human beings, designed for diagnosis and control of diseases to prolong life and therefore its creative period.
DRUG – MEDICINE

French drogue, German Droge.

In its restricted sense the word has been used to designate so-called „crude” drugs of mineral, vegetable or animal origin, in contrast with galenic preparations or chemicals. *In its wider sense, as defined in state and national laws, the term includes all preventive and therapeutic agents.*

The word „drug” has historically a positive connotation. In recent times however, the word has become associated with products and activities that are societally suspect. In a pilot study of six major U.S.A. daily newspapers, 62 % of the use of the word „drug” was in a pejorative sense. It is important to make efforts to differentiate the words „drug” and „medicine”.

*Medicine (drugs in original meaning) help to preserve restore, or maintain our health and quality of life.*
**PHARMAKON**

The Greek word from which many modern terms pertaining to pharmacy, have been derived.
The meaning of the Greek word developed from that of charm or magic agency, exerted by means of plants with healing but also with poisoning effect, to that of remedy without any collateral significance.
Often the designation was restricted to purgatives in a real as well as figurative sense.

**PHARMACY**

From the Greek pharmakon („remedy“)
1. The art and science of the pharmacist
2. Establishment (synonymons with apothecary shop)

**PHARMACIST**

From Greek pharmakon („remedy“) and ist („pertaining to“), a maker of or dealer in remedies.

**PHARMACOPOEIA**

From the Greek pharmakon („remedy“) and poicin („to make“).
Title for a formulary.
The history of pharmaceutical science and technology has the cumulative, progressive quality that characterizes the history of science at large; the history of the pharmaceutical profession shows the character of social history.

Mode of our survey:

1. Sociohistorical view of pharmacy evolving as a profession in the world.
2. Ignoring the serious study of pharmacy’s history.
3. Involving the truly international character of pharmacy and its development.

Result of our survey:

To know something about where we came from.

Need for ensuring that a person professionally educated be a person generally educated also. – In pharmacy, a practioner equipped for a high level of citizenship within the profession and within the community.
The profession’s own history is a natural bridge between the humanistic and the technical sides, which seems essential to an adequate understanding and philosophy of the pharmacist’s role in society.

1. No subject so readily lends itself to developing in the pharmacists the orientation they should have as professional persons, to producing in them a sense of appreciation for and pride in, their profession.

2. There is an urgent need for pharmaceutical profession to be more appreciated and given the value it deserves, as the qualifications of pharmacists in scientific and technical fields are not yet entirely realised both in developing and in some developed countries. The subjects of pharmaceutical education and the research fields of the pharmaceutical scientists are not well known even by physicians. Also the importance of the pharmacists in the pharmaceutical industry is not fully realised.

3. Over the centuries the pharmacy has changed its appearance superficially, but its basic elements remain ever the same. The pharmacist, too, has retained his basic role in society as drug expert – while drugs (medicines) and his relationship to the patient are reshaped by historical events.
PHARMACEUTICAL SCIENCES

Natural sciences (including the non human oriented life sciences).

Biomedical sciences (human oriented life sciences).

Technical sciences.

Social sciences.
Pharmaceutical sciences

- pharmacy based on natural biomedical and technical sciences
- pharmacy based on social sciences

**drug oriented pharmacy**
To search for the most proper means of medical profilaxis, diagnosis and therapy.

**patient and society oriented pharmacy**
To examine and organize the mutual relations of drugs, patient and society.

<table>
<thead>
<tr>
<th>Pharmacists</th>
<th>expert of drugs</th>
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<tr>
<td>expert in the conventional, natural, biomedical, and technical sciences, as well as in social sciences.</td>
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As a consequence they have to know the pharmaceutical sciences from its starting up to date. Pharmacists know the origin and the trends of its development.
1. History of pharmacy from the prehistoric men, through ancient prelude
   Babylonia – Assyria
   Egypt
   Greece and Rome

2. The Arabs and the European Middle Ages
   The Arabs – Transit ways of knowledge
   The birth of professional pharmacy in Europe

3. The rise of professional pharmacy in Europe – and in Hungary

4. Foundation of universities

5. Start of medicinal chemistry

6. History of the international trends (international commerce, patents, trademarks, social trends, professional trends)

7. Development of professional literature

8. Scientific contributions
PROPEDEUTICS – Introduction to pharmacy profession

1. Basic knowledge about pharmacy, about being pharmacist
2. General knowledge of drugs (medicines)
3. Classification of drugs (medicines) on the basis of:
   - Strength of the pharmacological action
   - Use
   - Place of application
   - Place and way of application of formulated drugs (medicines)
4. Drugs and doses
5. Drug utilization
6. Drug abuse, tolerance, physical dependence
7. Influence of the increased drug consumption
8. Prevention
9. Health for all – all for health
**Ancient prelude**

By the time of the earliest written records, about *four thousand years* ago, the *accumulated materia medica* had come to include quite a number of substances that we call pharmacologically active, as well as substances having only the higher *spirit-powers* (which we call inert).

This trend of speculation about the origin of pharmaceutical endeavor seems reasonable in the light of the pharmaco-magic beliefs of millions of our contemporaries.

*Supernatural belief.* For prehistoric man, we suppose, that therapy would not be first of all drug therapy.

**Magic and empiricism**

*Instinct* had the main role at the very beginning, but later on it was affirmed by an *increasingly self-conscious empiricism.*

This empiricism became the foundation of medical and pharmaceutical “science” (systematized and constantly purified observations).
BABYLONIA – ASSYRIA

3000 B.C.
Clay tablets- „Lost language”.

Aspects of Babylonian – Assyrian medicine:
exorcism
*medical treatment* (healing is a purification)
divination (illness is a divine punishment)

Drugs: 250 vegetable drugs *(styrax, thyme, crocus, cannabis, opium, myrrh, etc.*
120 mineral drugs
alcoholic beverages, fats, oils, honay, wax, various milks.

Forms of prepared drugs for administration:
wines, mixtures, ointments, cataplasm, plasters, lotions, infusions, decoctions, fumigations, etc.

Mesopotomian *drug formulas were not quantitative!*

*Trade in a particular street* (at the time of the great Babylonian king Hammurabi  (2111 B.C.)

*Serpent-cult*; Use of serpent as symbol.

A medical god, *Ninasu* was the „lord of physicians” and his son *Ningischrida*, functioned as messenger of the gods.

Their symbol: rod, serpent
(reminding us of the modern symbol of medicine).
The Babylonian – Assyrian and the ancient Egyptian cultures were closely related

- theocratic foundation
- theurgic medicine.

Egyptian medicine appears to have been less dominated by metaphysical concepts.

1799. – Rosetta stone – Translation of Egyptian hieroglyphics.

Medical Papyri

Eight medical papyri are translated and commented on. Between 1990 – 1100 B.C. (much of the knowledge in them is far older).

Ebers papyrus (bearing the name of a German Egyptologist, Georg EBERS)

20 meteres long: 700 drugs, 800 formules.
The text is dominated by drug formulas and it suggests that the pharmaceutical side of medical care received more attention than it did in ancient Greece later on.

**Mode of administering** drugs: gargles, inhalations, suppositories, fumigations, decoctions, infusions, pills, ointments, plasters, etc.

Drugs are of plant, animal, mineral origin. Predominate 700 drugs, 800 formulas.

Excrements of some animals were used (magic idea).

Vehicles for drugs: beer, milk, wine, honey.

Quantitative formulas but not exactly defined.

Definitions: „small amount“, „very small amount“, „small pieces“, „several pieces“, etc.

4 days specified as the coarse of treatment occurs commonly in Egyptian pharmacotherapy and originate in magic formula rather than in clinical observations.

Technical tools: mortars, hand mills, sieves, balances.
Mithologic deities: *Thoth, Osiris, Iris, Horns, Imhotep, Anepu.

„phar-ma-ki” (symbolized by a fishing bird)

Comparing with Babylonia – Assyria, a more definitely distinguished group of preparers of medicines. However, the *pharmaceutical* and *medical professions* not separated, both were done by priest (physicains and herbalists).

**Main curing method:** laxation

It is the consequence of that belief, that every food contained an excess, the accumulation of which were thought to be the source of illness. The aim of the medication was to avoid the accumulation.

**Place of medical treatments:** churches.

„*Ancient laboratories*”

Expedition for medical plants; *cultivation* around the churches.
**Medical preparations** from the Papyrus Ebers which are very similar to those written nowadays:

Caraway seed (*Remidium prinipale* = the main part of the medicinal)

Goos fat (*Vehiculum* = substance in which the cardinal part is dispersed)

Milk (*Vehiculum*)

This pharmaceutical preparate was used against stomach ache.

<table>
<thead>
<tr>
<th>Honey</th>
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<tbody>
<tr>
<td>Powder of St. John’s bread</td>
<td>1</td>
</tr>
<tr>
<td>Powder of Vitex agnus</td>
<td>1</td>
</tr>
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This preparate was used as a diuretic. The number after the substances means proportions.
PHARMACY IN THE ANCIENT HELLAS

The medical treatment and the materia medica were taken over by the Greeks according to Herodotus. In the fifth century B.C. Greece medicine separated itself from magicoreligious practices and become a profession in its own right.

The Greeks after having occupied the peninsula Peloponnesos, they built an intensive commercial connection with the nations living around them. The arts and sciences (like in our societies) were supported by the Gods of the Greek mythology and this practice was taken over by the general public. Any sport and body training was highly cultivated. As an evidence I mention only the idea and practise of the ancient Olympic Games, which were as popular and it stood in the front of the interest of the whole population, to the extent that it could stop the hostilities between cities (this can not be compared with our „democratic relations“).

Greeks based their culture on individuality

Secrecy and mystery were replaced gradually by communications and critical discussion.

5th–7th century B.C.
According to the Greek mythology Apollo is the God of the sun. His son Asclepius (Aesculapius in Latin) who made a good practice in the medical sciences and he was able to cure patients whose conditions were very serious, moreover he was able to raise patients from the death. By the activity of Asclepius the nether world begin to depopulate. Therefore Plato the God of the nether world denounced him to Zeus, who accepted the charge and he stroked Asclepius by his lightning and he was changed to a snake and forced to live in the nether world under a large stone. His father intervened on behalf of his son with Zeus, who had mercy on Asclepius and he opened the earth for him to come from the depth of the earth and then to cure the suffering humans. So long the mythological story. Churches were built in Greece in recognition of the honour of God Asclepius who lived in the form of a snake.
**Hygeia** the daughter of Asclepius is the Goddess of health has been portrayed as a charming young lady keeping a cup in her hand from which she allowed to drink the sacred snake and she wore on her head a wreath braid from medicinal herbs. The drinking cup portrayed in the ancient time was a cup with a wide mouth (like a patendula in pharmacy) on which the snake crept round.

**Hygeia’s sister** – according to the mythology – was *Panacea*. The meaning of her name is a cure-all (panacea) a medicine for all illnesses. The ideology of a cure-all originated from that time and it is easy to understand that it has caught the imagination of physicians and pharmacists of any time. So Panacea became a symbol of medical and pharmaceutical sciences. The snake with its shedding means the vigorous health with a yearly rejuvenation and the cup with the snake contains the cure-all (the wonder medicine).
Philosophy and its influence on medical concepts:

Most of the philosophers were eager to explain nature and its phenomena in a rational way.

The most important problem: „What rational explanation can be found both for the origin of the kind of „world that human beings are living in and for the diseases?”

Most famous Greek philosophers:

**Empedocles** (504 B.C.) four elements (water, air, fire, earth)
Health is the result of equilibrium of these elements in the body, and disease is the result of a disequilibrium.

**Pythagoras** (580-489 B.C.)
Astrology
Importance of astrology in pharmacy (time, when plants were to be collected, some preparations were to be compounded, etc.)

**Leucippos and Democritus** (about 440 B.C.)
Atomic theory
(explanation to motion and qualitative change)
Hippocrtates (460-370 B.C.) = „Father of medicine”

He knew of a lot of medical treatment coming from India. Middle (Near) East, or from other parts of the world. Hippocrates, arsenal, and highly developed materia medica qualified him to be called „the father of medical sciences”.

After his death his teaching notes were collected by his followers and given the title: „Corpus Hippokratium” and this was the first manual of medical treatment. Hippocrates and his contemporaries rejected firmly all spells and magical formulas. Replacing them by the doctrine of Humors as an underlying principle to guide the physicians seeking to help his patients. This taught that a proper balance of the four humors – blood, phlegm, black bile and yellow bile - was necessary for the maintenance of good health.
Hippocrates, who believed strongly in the self-healing capacity of the body, favored gentle dietary measures such as the consumption of gruel or the taking of honey with either water (hydromel) or vinegar (oxymel). Consuming these instead of normal foods was seen as a means of allowing the correct humoral balance to be restored. Although Hippocrates spurned the excessive administration of drugs, he did make use of a variety of herbs and even some animal products in order to correct alleged humoral imbalances.

His main rule which governed him throughout his life was „nil nocere“ (Latin) that is the most important thing in medical treatment is not to harm. He applied every medicine according to his own judgment and criticism. His progressive thinking about ethics is reflected in the oath taken by the physicians in the ancient Greeks after having finished their studies.
„Corpus Hippokratium” (His followers collected his teachings)

„Nil nocere” (Not to harm)

Drugs and therapeutics:
200-400 drugs.
Regulation of diet!
Formulations.
Narcotics.

Most important features in the hippocratic theory:
Simplicity
Freedom from irrationalism
The idea that each individual represents a unit that has to be treated as such.
„Back to Hippocrates!”

Hippocrates – *ethics*
It is reflected by the outh taken by physicians in the ancient Greece.
„I swear by Apollo by the doctor and by Acclepius, Hygeia and Panacea by all Gods and Goddesses calling them as witness, that I will keep the words of the oath according to my ability and my knowledge... The people who taught me this profession I will accept as my own parents. I will share my property with them. If they are in need I will pay them my debt. I accept their family members as my brothers and I teach them this profession (if they want to learn it) without any charge. I will impart my skill to my sons and to the sons of my masters...” „Even if I will be asked I do not dispense any medicine which cause death and I never give such an advice. Similarly I never dispense anticoncipients for women. I will live and sacrifice my life pleasing the Gods...” „I will not cut (I do not make surgical operation) I go out of the way of those handicraftsman who do this practice. I will do my best for the interest of the sick and I never harm them. I keep away myself from the unlawfulness, especially the sexual misuse both with women and men and both slaves and free citizens. I keep the secret of the sick...”
Some „up to data” points: (Hippocratic oath)

The need of high level professional knowledge
Good intention, modesty
To give over the knowledge free of charge

- To use the medicines according to the prescriptions
  Workman like health advice.
  Correct private life

- The first thing is the interest of the sick.
  Keeping away from unlawfulness.
  Etc.

rhizotomoi (rhizoma) (experts in medicinal plants)
Dioscorides (A.D. 60)

The most important work of the ancient Greek medicine is the five volumes treatise of Dioscoridea (1. century) entitled „De Materia Medica” which exerted considerable influence throughout the Ancient World. More than 600 plants, 90 minerals, and 35 animal products are featured in an attempt to collect together all existing knowledge concerning medicinal products.

Materia Medica I-V.
Informations about plants and their possible use in medicine
Explanation of their effects
Systematic arrangement of his descriptions...

Preparation of lead plaster.
Maceration, evaporation, concentration, remarks on collection of drugs.
Early in the 6th century this illustration was painted into a manuscript copy of Dioscorides’ work on pharmacy, an applied botany.

Probably it is the oldest illustrated work of its kind that has survived.

**Asclepiades** (108 B.S.)

diets, cold and hot baths, gymnastics, massages, special curing.

**Menacretes**
„Emplastrum diachylon” – (it is used today on the same way.)

**Pamphilus**
Claudius Galenus ≡ Galen was well-known Greek physician, surgeon and philosopher.

Born: in 130 A.D. in Pergamon, Turkey
Died: in 200 A.D.

He was a surgeon to the gladiators of Pergamon but moved to Rome in 160 and became the physician of Emperor Marcus Aurelius. The rest of Galen’s life was spent at the court writing the corpus of medical works.

Galen’s writings were medical, philosophical and philological. His medical writings started important advances in anatomy, physiology and therapeutics. (urine was formed in the kidney as opposed to the bladder which was the common belief). He discovered that it was the arteries that carried blood in the human body and not air.

He was founder of experimental physiology (performed surgical dissections on animals).

His work suggested that investigation and observations are required for active elements in medications.

He discovered that in the preparation of medicinal substances there were increase in quantity and not quality of the ingredients used. In order to increase medicinal products, poor quality ingredients were substituted.

Galenus suggested that there is active components in drugs that makes it effective.

Although, not all his findings and works were scientific, some could be explained scientifically.
He created a system of pathology and therapy which ruled western medicine for 1500 years

- Preparation of medicines
  The essential part of herbs are responsible for the action (Galenus’ idea) „Galenics” are called after him.

- The preparation of medicines should have been the task of pharmacists.

- To test the action of drugs both qualitatively and quantitatively.

473 drugs of vegetable, animal and mineral origin.

Famous remedies of his recommendation (which gained a worldwide reputation for a millennium and a half
  - hiera picra (holy bitter)
  - terra sigillata (sealed earth)
  - theriaca (treacle)

His methods were referred to as „Galenism”.

Galenic laboratory refers to laboratories where minimum technology is required.
Galenus (131-200 A.D.)

(family-physician of the emperor Comodus)

83 works (translated to several languages)

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„Herbarii“

„Pharmacopoleae circumforanei“

„Taberna“ (stall)

„Theka“ ➔ APOTHEKA

„Pharmacopei“

„Medicamentarii“

„Pigmentarius“

Pharmacists
Arabs and the Middle Ages

7th – 8th centuries, a group of Semetic tribes, called Arabs beame the heir and administrator of the surviving remains of Greco-Roman cultures.

Nestorius – and Nestorians.

Greco Oriental synthesis

Arabic manuscripts (9th – 13th centuries)

„New literatura“

Theodoq (709 A.D.)

Ibn Masawalk (857 A.D.)

Their influences.
Main types of drug-oriented contributions:

1. Formularies and compendiums.
   Abd Rabbic – (Al-Dukkan = Apothecary Shop)
   Discussion of useful medications.
   These formularies are: practical, precise, side effects, additive effects.

2. Herbals and books on the materia medica
   Strongly influenced by the Greco-Roman authority, Dioscorides.
   Ibn el Bayer (best Islamic botanist)
   (13th century)
   1800 botanical drugs,
   145 mineral drugs,
   135 drugs from animal sources.

3. Toxicology treatises
   They described toxic substances, toxic symptoms, antidotes
   „Theriac“ (panacea)

4. Diet and drug therapy in relation to human ecology
   The sick person requires a different mode of living, different food and drink, than does the healthy person. Importance of unpolluted air for good health.
**Al Razi** was one of the greatest eastern scholars, he made a lot of contributions which have a great impact on eastern society and many sciences.

*Born:* in 865 in Rayy, Iran  
*Died:* in 925

He was physician, philosopher, scholar and made fundamental and enduring contributions to the fields of science.

Al-Razi took up the study of medicine after his visit to Baghdad, when he was at least 30 years old, under the well-known physician Ali ibn Sahl. He showed such a skill in the subject that he quickly surpassed his master. He wrote no fewer than a hundred medical books. He also composed 33 treatises on natural science, mathematics and astronomy.

As chief physician of the Baghdad hospital, Razi formulated the first known description of smallpox.

He contributed in many ways to the early practice of pharmacy by compiling texts, in which he introduced the use of “mercural ointment” and his development of apparatus such as mortars, flasks, spatulas and phials, which were used in pharmacies until the early twentieth century.
**Abu Ali al-Husayn ibn’Abd Allah ibn Sina**

Born: in 980 in Bukhara, Iran (now in Uzbekistan)
Died: in 1037 in Hamadan, Iran

Avicenna’s most important work of philosophy and science is *Kitab al-shifa*, which is a four part encyclopaedia covering logic, physics, mathematics, and metaphysics.

"*Medicine is the science by which we learn the various states of the human body, in health, when not in health, the mean by which health is likely to be lost, and when lost, is likely to be restored to health.*"

*Ibn Sina, The Canon*
Influence in medicine

His influence over Europe’s great medical schools extended well into the early modern period.

Canon of Medicine (Al-Quanun fi al-tibb) became the preeminent source.

It is devided into five books

The first book (Book I.) contains four treatises (four elements–earth, air, fire, water- in light of Greek physician Galen of Pergamum’s four humours: blood, phlegm yellow bile, black bile, anatomy.

The second treatise examines etiology (cause) and symptoms, the third covers hygiene, health and sickness, death’s inevitability.

The fourth treatise is a therapeutic nosology (classification of diseases), a general overview of regimens and dietary treatments.
Influence in medicine

The **Book II.** of the Canon is a „Materia Medica”

**Book III.** covers „Head to Toe Diseases”

**Book IV.** examines „Deseases That Are Not Specific to Certain Organs”

**Book V.** presents „Compound Drugs” (theriacs, electuaries, cathartics, etc.)

Books II. and V. each offer important compendia of about 760 simple and compound drugs.
The Canon is considered one of the most famous books in the history of medicine.

The book explains the causes of health and disease. Ibn Sina believed that the human body cannot be restored to health unless the causes of both health and disease are determined. He defined medicine (tibb) as follows:

„Medicine is the science by which we learn the various states of the body; in health, when not in health; the means by which health is likely to be lost; and, when lost, is likely to be restored. In other words, it is the art whereby health is concerned and the art by which it is restored after being lost."

Avicenna as a practitioner was „the prototype of the successful physician who was at the same time statesman, teacher, philosopher and literary man” (Osler, 1913).
The Canon laid out the following rules and principles for testing the effectiveness of new drugs and medications, which still form the basis of clinical pharmacology and modern clinical trials:

1. „The drug must be free from any extraneous accidental quality”
2. „It must be used on a simple, not a composite, disease”
3. „The drug must be tested with two contrary types of diseases, because sometimes a drug cures one disease by its essential qualities and another by its accidental ones”
4. „The quality of the drug must correspond to the strength of the disease. For example, there are some drugs whose heat is less than the coldness of certain diseases, so that they would have no effect on them”
5. „The time of action must be observed, so that essence and accident are not confused”
6. „The effect of the drug must be seen to occur constantly or in many cases, for if this did not happen, it was an accidental effect”
7. „The experimentation must be done with the human body, for testing a drug on a lion or a horse might not prove anything about its effect on man”

The great physician and philosopher continues to attract the attention of scholars and the public. His tomb in Hamadan is much visited by pilgrims. There is an impressive mausoleum, a museum and 8.000 – volume library.

In Iran Avicenna is considered a national icon, and is often regarded as one of the greatest Persians to have ever lived.
The time of Alchemy

The idea of gold making goes back to the I.-II. century in Egypt.

„Alchemy“ — „chema“ = Egypt in the ancient Egyptian language

„al“ = article in Arab language.

To whom belonged kings, physicians, priests, scientists, pharmacists, etc. all were about to have wealth and power by making gold.

The alchemists could not produce any gold, but they developed the chemical tools, and methods. With their special symbols they wrote down a lot of substances and operations.

— Production of crystalline sugar from sugar-cane
— Production of china — clay (porcelain)

Bottger (1682-1729) pharmacist and alchenist of the Saxon court in Dresden.
(Porcelain factory of Meissen)
Monastic medicine

Monastics who acted as physicians were required to consult Dioscorides writings, read Latin translations of the works of Hippocrates and Galen (Galenus) and study the works of others.

By their natura monastic medicine and pharmacy were dogmatic, their most important element being faith.
Monastic medicine and pharmacy

SALERNO

Regimen sanitatis = health manual. Consisted of dietetic and pharmaceutical rules in verse form. (≈ 1300 A.D.)

364 verses
300 additions.

Universities emerge

Salerno (848, 1180)
Parma (1110)
Bologna (1110)
Oxford (1167)
Cambridge (1209)
Prague (1347)
Vienna (1365)
Heidelberg (1385)
Pécs (1367)
Buda (1385)

These universities were the main seats of scolasticism, but they were simultaneously the places where new ideas originated.
Renaissance (XV.-XVI. century)

The word „Renaissance” originated from the Italian „renascimento” = rebirth

Renaissance meant a return not only the original writings of the Greeks, but also the Greek spirit.

(individualism, liberty of thought, ....etc.)

Characteristics:

- the human life has came into the centre of interest.
- the attention is focused to the nature
- interest in new informations
- rebirth of independent thought
**Innovations**

— Columbus reached *America* (1492) = opportunity for physical expansions and expression.

— Vasco da Gama found an all water route to *East India* 1498.

— Introduction of *printing*

Europe became the dominant continent of the world.

Varying ideas and systems gained international acceptance, influencing the materia medica and through it, pharmacy.

*(Leonardo de Vinci – human dissections, etc...)*
The start of medicinal chemistry

- The alchemists produced a lot of new substances instead of gold.
- New inventions

Vasalius

Andreas Vasalius (1543) anatomical on the human body.

Nicolaus Copernicus (1543) The earth moves around the sun.
Theophrastus Bombastus von Hohenheim called Paracelsus (1493-1541)

Before Paracelsus, various modifications of two main hypothesis concerning pathologies played their part again and again: the *humoral* and the *solidar* pathologies

<table>
<thead>
<tr>
<th>humors</th>
<th>quality</th>
</tr>
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<tbody>
<tr>
<td>blood</td>
<td>moist and warm</td>
</tr>
<tr>
<td>phlegm</td>
<td>moist and cold</td>
</tr>
<tr>
<td>yellow bile</td>
<td>warm and dry</td>
</tr>
<tr>
<td>black bile</td>
<td>could and dry</td>
</tr>
</tbody>
</table>

Galenus : simples – composites

Correct *balance* of the four elements (humors) meant health, while every *disturbance* of this balance spelled *disease*
Paracelsus introduced instead of this, the concept of *the body as a chemical laboratory*.

**Results**

— International use of chemical remedies (mineral salts, acids, and substances prepared by chemical processes such as distillation and extraction)

— Famous phrase: „It is not the task of alchemy to make gold, to make silver, but to prepare medicine”

1527 : He started his lectures at *Basel* in German. In his lectures he explained the *symptoms of the life* on the basis of *chemistry*. 
According to his opinion there is a „selection force” in the living organs called „archens” which divided the foods in the stomach to a „pure” and “impure” (= tartarus) parts. The former goes to the blood and the latter is secreted.

According to his conception all drugs used for medical treatment contain an „arcanum” which can be prepared in the form of „quintessentia” (in the form of tincture) or „elixir” the prepared tinctures, extracts and infusums instead of the total herbs.

He introduced metal compounds to pharmacy, like antimony, arsenic, lead, iron and mercury.

Mercury was the most successful medicina.
By emphasizing these aspects of Paracelsus we have to say that he was too „modern” and „scientific”. His system of medicine was embedded within a larger religious, mystical philosophy. Paracelsus’s search for effective remedies was thus not carried out on strictly empirical and scientific grounds.

While Paracelsus’ relation to the rise of pharmaceutical chemistry is complex. He did influence tremendously the transformation of pharmacy from a profession based primarily on botanic science to one based on chemical sciences.

Under the influence of the followers of Paracelsus, many chemical remedies were introduced – into the pharmacopeias of Western Europe in the 17th century.
In his own speculation on the vasic nature of matter he did not drop the idea of the four “Aristotelian” elements as such. However Paracelsus considered them primary principles “sulphur, mercury and salt” were by no means simply identical with the substances generally understood by these names

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sulphur</td>
<td>represented the principle of combustibility</td>
</tr>
<tr>
<td>mercury</td>
<td>that of liquidity and volatility</td>
</tr>
<tr>
<td>salt</td>
<td>being permanent and resisting the action of fire, represented that of stability</td>
</tr>
</tbody>
</table>

— Disease was caused, according to Paracelsus, by a local separation of one of these three principles from the other two. This idea did have the advantage of emphasizing the localized nature of disease. Disease as believed to be localized in a given organ.

— Paracelsus stressed the need for a treatment that would be specific for that particular disease.

— The action of a remedy, did not depend upon qualities, such as moisturs, but on its specific healing virtue, which was determined by its chemical properties.
Jatrochemistry

Paracelsus was a mystic as well as a revolutionary empiricist. His idea of a vital force and the concept that sickness reflects chemical changes in the body has followers.

Jean Baptist van Helmont (1577-1644).

He is famous as the discoverer of carbonic acid, which he called "gas sylvestre" thus originating the concept and the term "gas".

Francois de le Boi Sylvius (1614-1672)
Real founder of the doctrine of "jatrochemistry". His theory was a kind of compromise between humoral pathology and the ideas of Paracelsus.

"fermentation"

He believed that food is transformed through saliva and a ferment secreted from the pancreas, and that blood becomes the life maintaining substance.
Continuous transformations take place, which influenced by the body temperature, and the spirits of life; resulting in either alkaline or acid end product. If both are in the right proportion qualitatively and quantitatively, the person concerned is healthy.

Disease, on the contrary, is caused by an "acrimony" or excess of either the acid or the alkaline substances, or their being at a wrong place.

According the iatrochemical theory this "acrimony" leads to a change in the blood, the bile or the lymph. Hence all diseases were subdivided into those based on alkaline or an acid acrimony.
This *medical-chemical theory* became naturally the basis for preparing new chemical drugs.

This felt need for an adequate explanation of known effects attracted a number of physicians of the XVII.c. to another hypothesis, the *jatrophysical or mechanical theory*, developed some decades before *Sylvius*, hypothesis of Santorio Santorio (1561-1636).

It was based on a concept of the body as a kind of engine, following mainly physical laws. Santorio invented the *first instrument* to measure *body temperature*, a predecessor to our clinical thermometer, and to make the first systematic attempt to explain by as exact means as possible, what we call *metabolism*.
Other important factor influencing European therapeutics in the 16\textsuperscript{th} and 17\textsuperscript{th} centuries: 
the introduction of many new drugs from foreign lands, particularly the Americans.

- cinchona
- ipecac
- curare
- tobacco
- cascara sagrada
- coca

It became obvious that the book of Dioscorides and other Graeco-Roman and Arabic works did not contain all of the drugs of the world, and the \textit{specific} action of drugs such as cinchona (which apparently cured only the so-called intermittent fevers) was difficult to fit into the traditional Galenic categories.
Speculative theories

The attacks upon the Galenic tradition in the 16th, 17th centuries had destroyed its monopoly upon therapeutic thought, although Galen still retained a significant influence upon medicine.

The humoral theory had not been replaced, however, by any systematic theory of pathology and therapeutics having universal acceptance.

The 18th century saw various attempts to create comprehensive medical systems, however, producing theories that were certain to be speculative and debatable, since the health professions still lacked experimental techniques for establishing the site and mechanism of drug action.
Friedrich Hoffman (1660-1742)  
Life depends on a normal tension of the solid parts of the body (solidar theory)  
Materialistic theory. (either-like fluid)

Ernst Stahl (1660-1734)  
„Animismus“  
(soul = anima) It is the highest principle of life, balancing all bodily functions by a distinct rhythmic movement. This movement produces a certain tension called tonus.

R.J-Barthez (1778)  
„vitalism“  
Soul is replaced by the so-called vital principle

William Cullen (1770-1790)  
Nervous principle, in cases of illnesses tries to restore normal conditions by convulsion or by atony. Therefore the remedies had to be either irritating or emollient.
Homeopathy, an example of medical sectarianism.

Speculative medical systems did not completely disappear with the end of the 18th century.

A number of medical sects based upon unorthodox and highly speculative theories, grew up to challenge the prevailing therapeutic practices of orthodox practitioners.

One of the most interesting of these sects from a pharmaceutical point of view was homeopathy.

# Samuel Hahnemann (1755-1848) German physician was the first proposer.

The general idea of homeopathy is to incite the defense mechanisms of the body by adequate irritation, rather than to attack the disease as such.
This leads the „simile” principle, which states that disease is cured by remedies that produce symptoms resembling the disease in question.

Drugs are tested on healthy individuals to determine the type of symptoms they produce, and thus their therapeutic indications.

Homeopathy = from the Greek homoiou = similar

**Minute doses**

„biologic fundamental law”  Rudolf Arndt
Hugo Schulz

„minute stimuli initiate the activity of living organisms and those medium strength promote it, while strong stimuli slow it down and very strong ones stop it”
In his prescriptions Hahnemann himself insisted on the use of only a single active drug at a time. His followers often have been less rigorous in regard to prescribing of mixtures and compounded drugs.

Another pharmaceutical principle required that the homeopathic tinctures be made from fresh crude drugs (not dried!)
The birth of European professional pharmacy

1231 – 1240

German Superior Frederick II.

(profession of pharmacy)

Three essential regulations:

Separation of the pharmaceutical profession from the medical profession.

Official supervision of pharmaceutical practice.

Obligation by oath to prepare drugs reliably, according to skilled out in a uniform, suitable quality.
ITALY

Venetian statuta (1258) the first real Italian legal regulation of the duties of both physicians and pharmacists.

- Forbade the practice of medicine by the pharmacist
- Forbade to examine the urine of patients (which up to the 17th century was one of the most important means of medical diagnosis).

Organization:

Guild system

(The organization of merchants and craftsmen into guilds, according to the kind of goods sold or manufactured, is one of the most significant features of the Middle Ages).

- In Italy these guilds are also political.
- Often physicians and pharmacists combined in the same guild, together with some others.

Guild document (1349) mention no less than 206 different articles as belonging to the monopoly of the pharmacists or spicers. Their trade extended to many products that at this time were rare and costly, such as book manuscripts and way candles, etc. Even funerals were inspected by a comission of the guild.
The task of the guild were:
- the care of poor and sick members
- the immatriculation and location of all pharmacists who have passed the examinations
- the regulation of the distance between pharmacies
- the regulation of the prices of remedies
- the collection of taxes
- the supervision of the producers

From the 12th to the 16th centuries Italy was once more the cultural center of the world.

Early large scale manufacturing

The Italian drug trade was supplemented very early by the development of a chemical industry.

In 1294! Venice was producing corrosive sublimate, sugar of lead, borax. Soap, Venetian tale. V. turpentine etc.

Industrial pharmaceutical activity in monasteries:

E.g. Church of Santa Maria Novella in Florence:
- distilled water
- cosmetics

Status in the society

The Italian pharmacists was always considered a patrician.
**Development in education**

**Venetian statutes (1565)**

A student had to serve 5 years as an *apprentice* and another 3 years as *clerk*, finally he was required to pass a rather rigid *examination*, after which he became a pharmacist (fully qualified).

**Austrian legislation (1778)**

*Academic study* and examination is a requirement for pharmacists.

Pharmaceutical education thus gradually was transferred from the craft-like schooling by the guilds to the *Italian universities = Science-based higher education*.

Italian pharmacists utilized *botanic gardens* for their learning in botanic science.

First chair at a University *in Europe* for pharmacognosy was established *in Padua (1533)* and others soon followed.

**Pharmaceutical formulary (1499)**

Since the guild intended this book to be obligatory for pharmacists, it often has been considered the *first European Pharmacopoeia*.”
FRANCE

Pharmacy had emerged in a form we can recognize by about 1300. From this time a development, similar to Italy took place.

In France, as in Italy, during the Middle Ages, pharmacy found its place in the guilds.

These French associations were nonpolitical.

They were professional or commercial organizations, based on decree of royal, parliamentary or local authorities.

*Three kind of regulations of pharmaceutical life:*

- central government

-- local authorities

-- pharmacists themselves (associations) *the most common.*

By the 13th century the field of pharmacy had developed sufficiently. In Paris pharmacists had an association in the middle of the 13th century.

To this association King Philip IV. entrusted (1312) the control of weights and balances used by all retailers, thus making the pharmacists and spicers the appointed custodians of the standard weight.
Until 1400 neither the public nor the governmental authorities had seen much difference between the apothecary and the spicer, though the term apothecaire appeared in 1270.

An edict in 1484 forbade the practice of pharmacy by spicers.

- Small spicer
- Apothecary – spicer

The small spicer was forbidden to practice pharmacy, which according to the ordinance:

„requires much art, science, experience and knowledge of drugs as well as of the compounding of prescription: which enter into the human body”

1977: Royal declaration = definite separation of the pharmacists and the spicers.

College of Pharmacy = administrative as well as educational institution.

**Supercision:** entirely responsibility of the physicians. From 1353 mixed commissions (pharmacists + physicians)

**Large scale manufacturing**

Pharmacists played a large and important part in the development of the French pharmaceutical industry.

**French discoverers of alkaloids**

<table>
<thead>
<tr>
<th>J. Pelletier</th>
<th>(quinine)</th>
<th>basis of large-scale manufacturing</th>
</tr>
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<tr>
<td>P.J. Robiguet</td>
<td>(codein)</td>
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</table>
Development in education

During the time of the guilds the applicant had to meet high social, financial and educational requirements (Examinations – 13th century)

A Parisian ordinance (1484) stated that the candidate had to prove his knowledge of drugs and of the compounding of medicaments by undergoing a prolonged and difficult examination and lastly had to perform his masterpiece, by preparing a number of galenics requiring special technical skill and scientific knowledge. This masterpiece became a general requirement throughout France up to the 18th century.

Total time of 4 to 10 years as apprentice and clerk.

Academic studies were introduced in 1536.

To attend two lectures each week (Faculty of medicine) University of Montpellier: the doors were always open to the students of pharmacy of the entire world!

Instructional collection of drug specimens (Montpellier), in 1588.

Durance, the practicing pharmacist was appointed as curator, being the first practicing pharmacist to become officially a member of the teaching staff of a European university.
Germany

Pharmacies may have appeared in Germany during the 13th century, but their number remained too small to make pharmaceutical guilds or guildlike associations. Pharmacists were forced to join guild of another calling.

Feudal grants of „Privilage” were typical either with or without the „exclusive” right, privilages remained the usual legal basis of pharmacies in Germanic states. Also the concession system was typical.

Most of the privilegia issued between the 14th and the 18th centuries contained instructions about the management of the pharmacy, often including such products as sugar, spices, liquers, wine, tobacco, coffee, chocolate, etc.

Some of these were used as edicine and were costly substances.

Later on, the monopoly rights of the pharmacists became restricted more and more to medicaments.

Drogisten – Drogerien (distinct class of shops)

Development of education

During the early period, the professional education of the German pharmacists was not so well regulated as it was in France. Until the end of the 17th century the numeran decrees concerning pharmacy contain only vague remarks concerning professional education, although examinations were required.

6 years apprenticeship. Latin knowledge.
Since no fixed course of study was specified, German pharmacy on the whole could scarcely rise above the level of technical skill until after the 17th century.

In the 18th century the situation changed. Obligatory examinations based on definite requirements were introduced. Pharmacy became a scientific profession.

Thereafter two classes of pharmacists existed.

- **second class**: who were permitted to practice in small towns only, - no academic studies.
  - 5 + 6 years clerkship + examination.

- **first class**: 7 years clerkship + course at the higher *Collegium medicum*.

  This course consisted of lectures in chemistry and botany, chemicals used in remedies, their preparations and the chemicophysical reasons, practical pharmaceutico chemical instructions.
<table>
<thead>
<tr>
<th>BRITAIN</th>
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</thead>
<tbody>
<tr>
<td>It differs <strong>significantly</strong> from the other large European cultural zones. Separation of medical and pharmaceutical professions was not the beginning but a late result of the development.</td>
</tr>
<tr>
<td>In the <strong>11th century</strong> a few spicers and pepperess came to Britain from France. Some of the more knowledgeable and skillful spicers <strong>specialized</strong> increasingly in dispensing and compounding medicines. In the <strong>13th century</strong> some were being called „spicer” or „apothecary”.</td>
</tr>
<tr>
<td>In the <strong>absence of legal regulation</strong>, the functions of medicine and pharmacy remained <strong>poorly separated</strong>.</td>
</tr>
<tr>
<td>In <strong>1511</strong>, in the time of Henry VIII, the King issued the <strong>first regulations</strong> for the English practice of medicine and pharmacy. The continental practice subjecting apothecaries to medical supervision was introduced into England. The <strong>College of Physicians</strong> (later Royal College) was empowered in <strong>1540</strong> to „search, view and see the apothecary wares, drugs and stuffs”.</td>
</tr>
<tr>
<td>A <strong>new act</strong> was passed in <strong>1543</strong> which not only protected the numerous irregular practitioners, but encouraged the ambitions of the apothecaries.</td>
</tr>
<tr>
<td>In <strong>1607</strong> privileges were given to the apothecaries by King James T. <strong>1617</strong>: a separate City Guild called the „Mester, Wardens and Society of the Art and Mystery of the Apothecaries of the City of London”.</td>
</tr>
<tr>
<td>Early in its history, the Society started to manufacture galenic and chemical medicines cooperatively – <strong>regular commercial company from 1682</strong>.</td>
</tr>
</tbody>
</table>
A few decades after the founding of the Society of Apothecaries of London the new group found itself in a fight on two fronts.

1. against the physicians
2. against the druggist and chemists.

Results:

- Apothecaries Act in 1815
- Foundation of the Pharmaceutical Society in 1841

This gave the London Society of Apothecaries certain powers over professional standards and medical education and forbade "unqualified persons from judging disease by external symptoms"

Inspection and regulation

The inspection of the pharmaceutical work reflects the general development of English pharmacy.

- Royal order gave the grocers power to examine "anise, wormseed, senna, rhubarb and all sorts of drugs belonging to medicice" (1447).
- Decrees gave the supervision of pharmacies to the medical profession (1540, 1553).
- Society of Apothecaries was chartered (1617). Masters were empowered to inspect any pharmacy.
- College of Physicians (18th century) had the power to examine the shops of apothecaries, chemists and druggists.
- 1933 – Pharmacy Act made the pharmacists definitely self-governing, under the supervision of their own Society.
Social standing

Pharmaceutical establishments:
- apothecary shops
- chemist’s shops.

Pharmaceutical education

Examination was required by law for the first time in Glasgow. There was issued a license to practice pharmacy to candidates who passed its examination in pharmacy (1599).

1657: an examination became compulsory for all those who wished to practice pharmacy within the city.

- Botanic courses – establishment of „Physic garden” in Chelsea (1673)
- Lectures in materia medica were offered after 1753.
- First regular curriculum of the Society of the Apothecaries was issued in 1827. (Mainly medical)
  5 years apprenticeship: including attendance at courses in such subjectes as anatomy, physiology, theory and practice of medicine.
- Real pharmaceutical education began in England only after the founding of the Pharmaceutical Society.
HUNGARY

Oldest Hungarian remains from the history of medication and pharmacy are from the Roman Empire (Pannonia, Transylvania)

„Containers, signatures Crocomagna” – famous medicament (crocus, gummi arabicum, myrrh, flower of rose).

Aquincum – votives

Torda – Hygeia and Aesculap

9th century – medication was not first of all drug therapy, it was rather a combination of mystery, magic elements and experience, knowledge in natural sciences.

Monastic hospitals and pharmacies

First pharmacy in Buda 12th century, about in the same time, like in Napoli, Köln, Prague, etc.

The statue of Buda (1244-1421), the first document concerning the duties of pharmacists. It forbades to sale any goods except those for curing ill patients, and regulates the activity on Sundays.
15th century – some famous Italian physicians and pharmacists came into the country to the court of King Mátýás, who opened the first university in Pozsony in 1467.

In the 15th century there was a street in Buda, called Platea Apothecariorum, and we know that about 4-6 pharmacies existed here that time.

Pharmacists joined guilds in Hungary like in other European countries.

Development of literature specially botanical literature is worthwhile to mention.

The language was latin in all countries. The first recipe published in Hungarian was that of 1416 Meliusz Juhász Péter (1558) – Herbarium)

Development of education

Before 1770 there was only a very few pharmacists educated in foreign universities.

In 1635 a university was opened in Nagyszombat which consisted medical faculty from 1770.

The queen Maria Terezia ordered teaching and examining pharmacist at university.

In 1770 there was only two pharmacist at Nagyszombat University and got „magister pharmacie” diploma, but their number increased rapidly.

They were examined in botany, pharmaceutical knowledge and chemistry in latin language.