



College of Pharmacy History



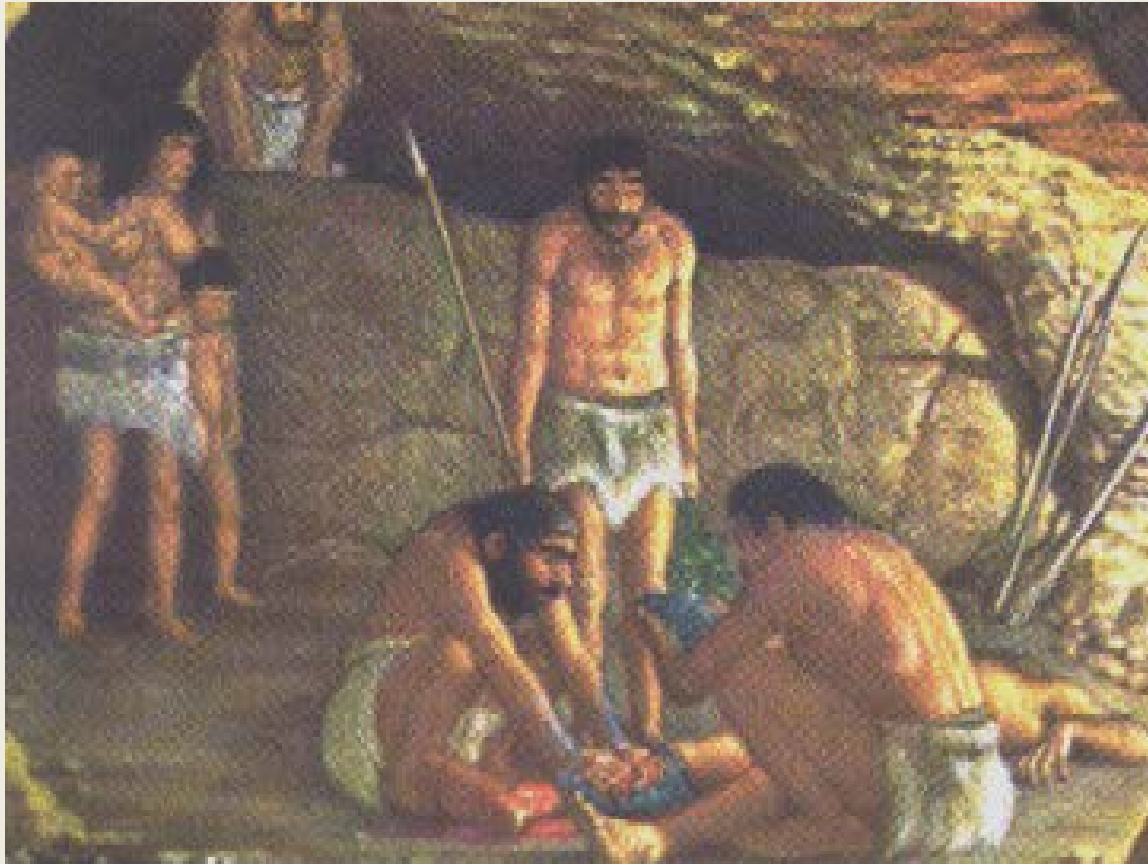
A HISTORY OF PHARMACY IN PICTURES

Taken From the book:
"Great Moments in Pharmacy"
By George A. Bender
Paintings By Robert A. Thom

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I. BEFORE THE DAWN OF HISTORY

From beginnings as remote and simple as these came the proud profession of Pharmacy. Its development parallels that of man. Ancient man learned from instinct, from observation of birds and beasts. Cool water, a leaf, dirt, or mud was his first soothing application. By trial, he learned which served him best. Eventually, he applied his knowledge for the benefit of others. Though the cavemen's methods were crude, many of today's medicines spring from sources as simple and elementary as those which were within reach of early man.



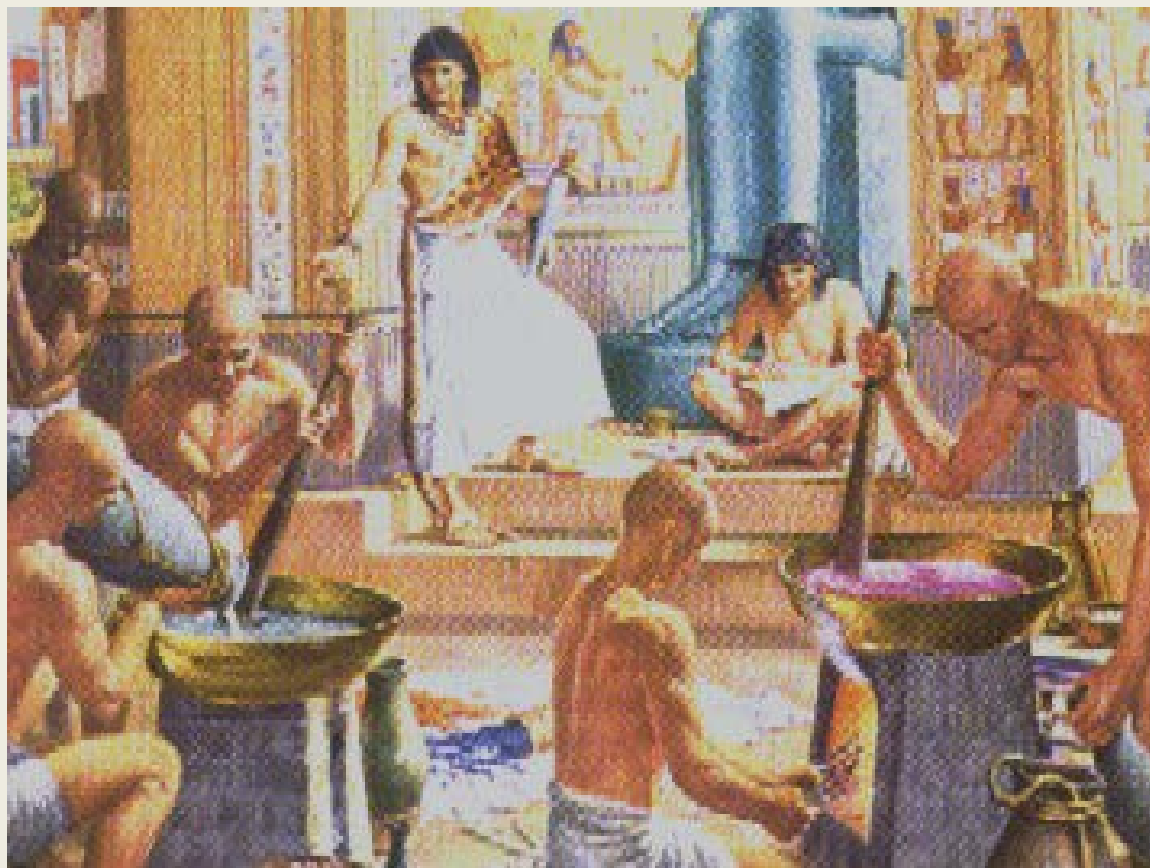
2. PHARMACY IN ANCIENT BABYLONIA

Babylon, jewel of ancient Mesopotamia, often called the cradle of civilization, 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.



3. PHARMACY IN ANCIENT CHINA

Chinese Pharmacy, according to legend, stems from Shen Nung (about 2000 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. Still worshiped by native Chinese drug guilds as their patron god, Shen Nung conceivably examined many herbs, barks, and roots brought in from the fields, swamps, and woods that are still recognized in Pharmacy today. In the background is the "Pa Kua," a mathematical design symbolizing creation and life. Medicinal plants include podophyllum, rhubarb, ginseng, stramonium, cinnamon bark, and, in the boy's hand, ma huang, or Ephedra.



4. DAYS OF THE PAPYRUS EBERS

Though Egyptian medicine dates from about 2900 B.C., best known and most important pharmaceutical record is the "Papyrus Ebers" (1500 B.C.), a collection of 800 prescriptions, mentioning 700 drugs. Pharmacy in ancient Egypt was conducted by two or more echelons: gatherers and preparers of drugs, and "chiefs of fabrication," or head pharmacists. They are thought to have worked in the "House of Life." In a setting such as this, the "Papyrus Ebers" might have been dictated to a scribe by a head pharmacist as he directed compounding activities in the drug room.



5. THEOPHRASTUS – FATHER OF BOTANY

Theophrastus (about 300 B.C.), among the greatest early Greek philosophers and natural scientists, is called the "father of botany." His observations and writings dealing with the medical qualities and peculiarities of herbs are unusually accurate, even in the light of present knowledge. He lectured to groups of students who walked about with him, learning of nature by observing her treasures at firsthand. In his hands he holds a branch of belladonna. Behind him are pomegranate blooms, senna, and manuscript scrolls. Slabs of ivory, coated with colored beeswax, served the students as "slates." Writing was cut into the surface with a stylus.



6. THE ROYAL TOXICOLOGIST – MITHRIDATES VI

Mithridates VI, King of Pontus (about 100 B.C.), though he battled Rome for a lifetime, found time to make not only the art of poisoning, but also the art of preventing and counteracting poisoning, subjects of intensive study. Unhesitatingly, he used himself as well as his prisoners as "guinea pigs" on which to test poisons and antidotes. Behind him are rhizotomists, offering fresh, flowering aconite, ginger, and gentian. At lower right is a crater - a two-piece forerunner of the champagne bucket. His famed formula of alleged panantidotal powers, "Mithridatum," was popular for over a thousand years.



7. TERRA SIGILLATA – AN EARLY “TRADEMARKED” DRUG

Man learned early of the prestigious advantage of trademarks as a means of identification of source and of gaining customers' confidence. One of the first therapeutic agents to bear such a mark was Terra Sigillata (Sealed Earth), a clay tablet originating on the Mediterranean island of Lemnos before 500 B.C. One day each year clay was dug from a pit on a Lemnian hillside in the presence of governmental and religious dignitaries. Washed, refined, rolled to a mass of proper thickness, the clay was formed into pastilles and impressed with an official seal by priestesses, then sun-dried. The tablets were then widely distributed commercially.



8. DIOSCORIDES – A SCIENTIST LOOKS AT DRUGS

In the evolution of all successful and enduring systems of knowledge there comes a time when the observations of many men, or the intensive studies of one, transcend from the level of trade or vocation to that of a science. Pedanios Dioscorides (first century A.D.), contributed mightily to such a transition in Pharmacy. In order to study *materia medica*, Dioscorides accompanied the Roman armies throughout the known world. He recorded what he observed, promulgated excellent rules for collection of drugs, their storage and use. His texts were considered basic science as late as the sixteenth century.



9. GALEN – EXPERIMENTER IN DRUG COMPOUNDING

Of the men of ancient times whose names are known and revered among both the professions of Pharmacy and Medicine, Galen, undoubtedly, is the foremost. Galen (130-200 A.D.) 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.



10. DAMIAN AND COSMAS – PHARMACY’S PATRON SAINTS

Twinship of the health professions, Pharmacy and Medicine, is nowhere more strikingly portrayed than by Damian, the apothecary, and Cosmas, the physician. Twin brothers of Arabian descent, and devout Christians, they offered the solace of religion as well as the benefit of their knowledge to the sick who visited them. Their twin careers were cut short in the year 303 by martyrdom. For centuries their tomb in the Syrian city of Cyprus was a shrine. Churches were built in their honor in Rome and other cities. After canonization, they became the patron saints of Pharmacy and Medicine, and many miracles were attributed to them.



II. 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. Manuscripts from many islands 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.



12. THE FIRST APOTHECARY SHOPS

The Arabs separated the arts of apothecary and physician, establishing in Bagdad late in the eighth century the first privately owned drug stores. They preserved much of the Greco-Roman wisdom, added to it, developing with the aid of their natural resources syrups, confections, conserves, distilled waters and alcoholic liquids. The apothecary is examining logs of sandalwood offered by a traveling merchant, while children indulge their taste for sweets with stalks of sugar cane. When the Moslems swept across Africa, Spain and southern France, they carried with them a new pattern of Pharmacy which western Europe soon assimilated.



13. AVICENNA – THE “PERSIAN GALEN”

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 A.D.), called Avicenna by the Western world. Pharmacist, poet, physician, philosopher and diplomat, Avicenna was an intellectual giant, a favorite of Persian princes and rulers. He wrote in Arabic, often while secluded in the home of an apothecary friend. His pharmaceutical teachings were accepted as authority in the West until the 17th century; and still are dominant influences in the Orient.



I4. 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 A.D. 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.



15. THE FIRST OFFICIAL PHARACOPEIA

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, (seated, foreground) who, at the time, was the political leader in Florence.



16. THE SOCIETY OF APOTHECARIES OF LONDON

Trade in drugs and spices was lucrative in the Middle Ages. In the British Isles, it was monopolized by the Guild of Grocers, which had jurisdiction over the apothecaries. After years of effort, the apothecaries found allies among court physicians. King James I, flanked by two "Beefeaters" wore heavily padded attire because of fear of stabbing. Upon persuasion by the philosopher-politician, Francis Bacon, the King granted a charter in 1617 which formed a separate company known as the "Master, Wardens and Society of the Art and Mystery of the Apothecaries of the City of London" over vigorous protests of the grocers. This was the first organization of pharmacists in the Anglo-Saxon world.



17. LOUIS HÉBERT, APOTHECARY TO NEW FRANCE (CANADA)

Young Parisian Apothecary Louis Hébert answered the call of the New World in 1605, when he helped de Monts and Champlain build New France's first settlement, the Habitation, at Port Royal (Nova Scotia, Canada). Hébert looked after the health of the pioneers, cultivated native drug plants, and supervised the gardens. At the waterfront, he examined specimens of drug plants offered by Micmac Indians. These included Arum, (Jack-in-the-Pulpit), Eupatorium (Boneset), Verbascum (Mullein), and Hydrastis (Golden Seal). When the Habitation was destroyed by the English in 1613, he returned to his Parisian apothecary shop. The lure of Canada was strong, however, and in 1617, he and the family returned with Champlain to Quebec, where Hébert's "green thumb" gained him lasting fame as the first successful farmer in what is now Canada.



18. THE GOVERNOR WHO HEALED THE SICK

Many Europeans "of quality and wealth, particularly those who were non-conformists in religion" were attracted to the possibilities of the American Colonies. From Britain came John Winthrop, first Governor of Massachusetts Bay Colony and founder of Boston. Governor Winthrop, unable to induce professionals to the Colony, sought advice from English apothecaries and physicians, and added to his small store of imported drugs those derived from plants native to New England. In his home (about 1640), he made available as best he could the "art and mystery" of the apothecary for his citizens.



19. THE MARSHALL APOTHECARY

Christopher Marshall, an Irish immigrant, established his apothecary shop in Philadelphia in 1729. During 96 years, this pioneer pharmaceutical enterprise became a leading retail store, nucleus of large-scale chemical manufacturing; a "practical" training school for pharmacists; an important supply depot during the Revolution; and finally, it was managed by granddaughter Elizabeth, America's first woman pharmacist. Christopher earned the title of "The fighting Quaker" during the Revolution; his sons, Charles and Christopher, Jr., (shown as youths with their father, about 1754) earned individual fame and carried on his fine traditions.



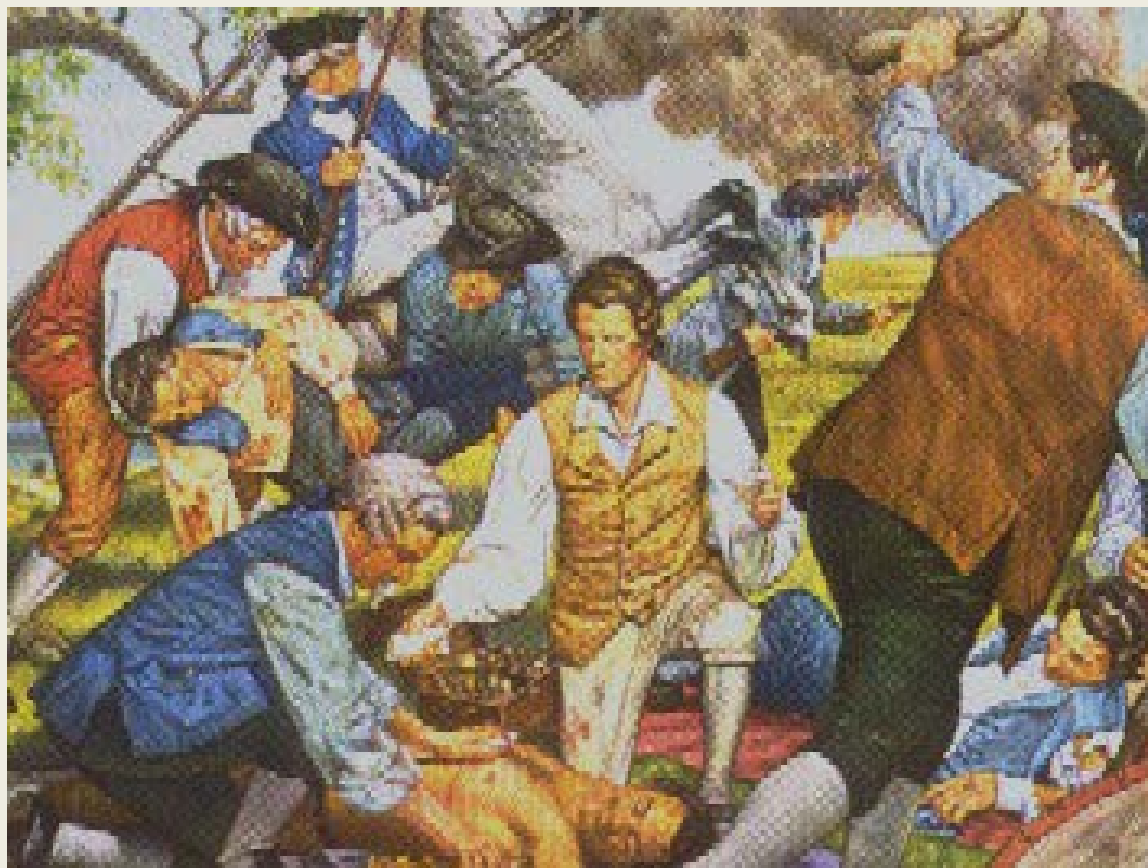
20. FIRST HOSPITAL IN COLONIAL AMERICA

Colonial America's first hospital (Pennsylvania) was established in Philadelphia in 1751; the first Hospital Pharmacy began operations there in 1752, temporarily set up in the Kinsey house, which served until the first hospital building was completed. The ingenuity of Benjamin Franklin was helpful in both. First Hospital Pharmacist was Jonathan Roberts; but it was his successor, John Morgan, whose practice as a hospital pharmacist (1755-56), and whose impact upon Pharmacy and Medicine influenced changes that were to become of importance to the development of professional pharmacy in North America. First as pharmacist, later as physician, he advocated prescription writing and championed independent practice of two professions.



2I. SCHEELE – GREATEST OF THE PHARMACISTS-CHEMISTS

During his few short years, Carl Wilhelm Scheele gave to the world discoveries that have brought its people incalculable advantages. Yet he never forgot that he was, first of all, a pharmacist. Encouraged by enlightened preceptors, all of his discoveries were made in the Swedish pharmacists in which he worked, as apprentice, as clerk, and finally as owner, in Köping. He began in a corner of the stock room of Unicorn Apothecary in Gothenburg. With rare genius, he made thousands of experiments, discovered oxygen, chlorine, prussic acid, tartaric acid, tungsten, molybdenum, glycerin, nitroglycerin, and countless other organic compounds that enter into today's daily life, industry, health, and comfort.



22. CRAIGIE – AMERICA'S FIRST APOTHECARY GENERAL

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23. SERTÜRNER – FIRST OF THE ALKALOID CHEMISTS

Swedish pharmacist Scheele paved the way for isolating organic plant acids; but it remained for a young German apothecary, Friedrich Wilhelm Adam Sertürner, 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, startling experiments in his apothecary shop in Einbeck, including a series of physiologic tests on himself and three young friends. Recognition and fame followed. Relocating in an apothecary shop in Hameln, Sertürner continued organic chemical experimentation and discovery throughout his life.



24. CAVENTOU, PELLETIER AND QUINNE

Taking their cue from Sertürner's alkaloidal experiments, two French pharmacists, Messrs. Pierre-Joseph Pelletier and Joseph-Bienaimé Caventou, 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 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. Many other discoveries came from their pharmacy-laboratory; high honors were accorded them.



25. AMERICAN PHARMACY BUILDS ITS FOUNDATIONS

Faced with two major threats; deterioration of the practice of pharmacy, and a discriminatory classification by the University of Pennsylvania medical faculty, the pharmacists of Philadelphia held a tempestuous protest meeting in Carpenters' Hall, February 23, 1821. At a second meeting, March 13, the pharmacists voted formation of: an association, which became The Philadelphia College of Pharmacy; a school of pharmacy; and a self-policing board. Sixty-eight pharmacists signed the Constitution of the first pharmaceutical association in the United States; American Pharmacy's first educational institution, bearing the same name, opened November 9.



26. THE SHAKERS AND MEDICINAL HERBS

First U.S. industry in medicinal herbs was carried on by the United Society of Believers in Christ's Second Appearing, commonly known as the Shakers. Begun about 1820, and commercially important by 1830, the medicinal herb industry grew, hit its peak in the 1860's, then waned at the close of the century. The Shakers gathered or cultivated some 200 varieties; dried, chopped, and pressed them into "bricks"; wrapped, labeled, and sold them to pharmacists and physicians world-wide. Tons of solid and fluid extracts also were produced. The Shaker label was recognized for reliability and quality for more than a century.



27. THE AMERICAN PHARMACEUTICAL ASSOCIATION

Need for better intercommunication among pharmacists; standards for education and apprenticeship; and quality control of imported drugs, led to calling of a convention of representative pharmacists in the Hall of the Philadelphia College of Pharmacy, October 6 to 8, 1852. Under leadership of its first President, Daniel B. Smith, and first Secretary, William Procter, Jr., the twenty delegates launched The American Pharmaceutical Association; mapped its objectives; and opened membership to "All pharmacutists and druggists" of good character who subscribed to its Constitution and to its Code of Ethics. The Association continues to serve Pharmacy today.



28. EUROPEAN AND AMERICAN PHARMACY MEET

Over the years, no real discord has existed between representatives of European and American Pharmacy so far as ethical and scientific aims are concerned. But when the groups met for the first time, at the Second International Congress of Pharmacy in Paris, France, August 21 to 24, 1867, there was a great divergence of opinion on the subject of compulsory limitation of pharmacies. William Procter, Jr., leading the delegates of The American Pharmaceutical Association, told the international body that "Public opinion is in America a forceful agent of reform," and that, in his country, "there is not the slightest obstacle toward a multiplication of drug stores save that a lack of success." His declaration vividly documented the American Way of Pharmacy.



29. THE FATHER OF AMERICAN PHARMACY

Rarely has a titular distinction been so deserved. William Procter, Jr., graduated from The Philadelphia College of Pharmacy in 1837; operated a retail pharmacy; served the College as Professor of Pharmacy for 20 years; was a leader in founding The American Pharmaceutical Association; served that organization as its first secretary; later, as its president; served 30 years on the U.S.P. Revision Committee; was for 22 years Editor of the American Journal of Pharmacy. In 1869, though retired, Procter continued to edit the Journal in a small publication office located beside the College's Tenth Street building. From retirement he returned to P.C.P.'s chair of Pharmacy in 1872; literally died "in the harness," in 1874.



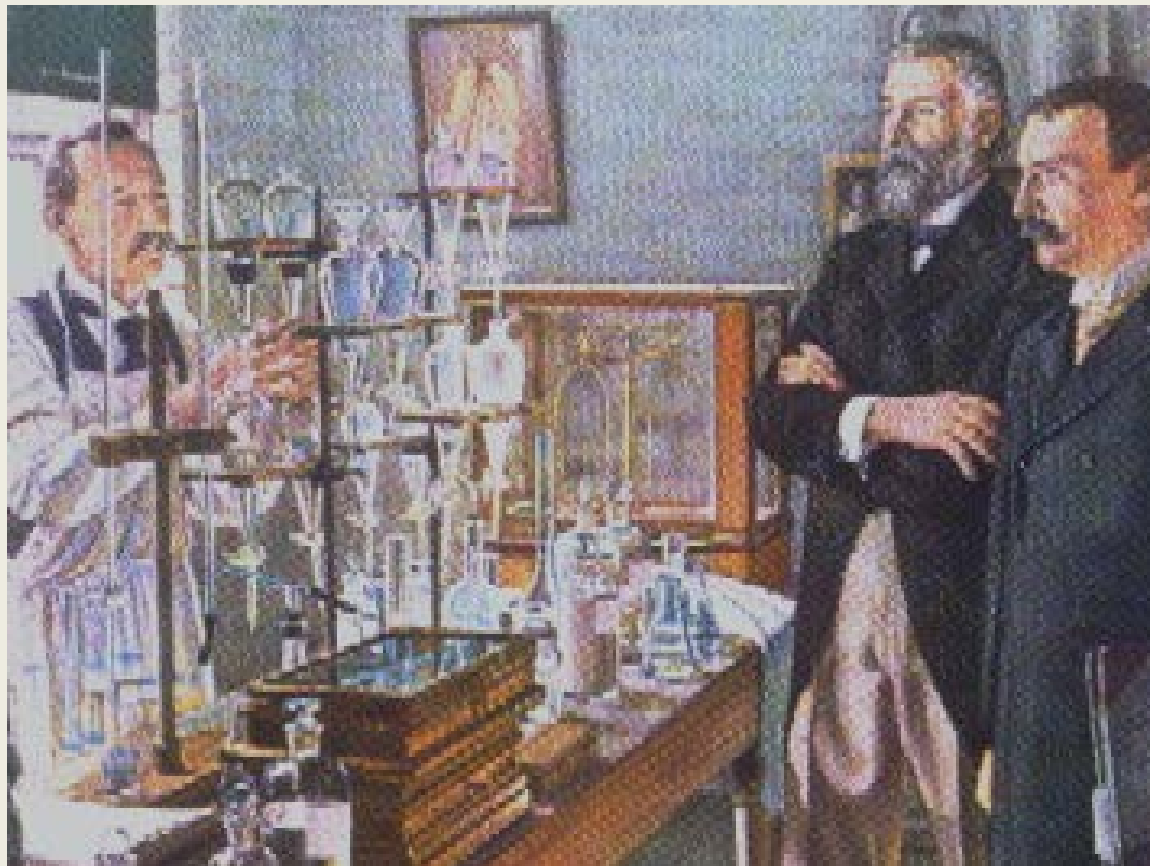
30. A REVOLUTION IN PHARMACEUTICAL EDUCATION

When Dr. Albert B. Prescott launched the pharmacy course at the University of Michigan in 1868, critical attention was aroused because he abandoned the traditional requirement of pregraduation apprenticeship. At the 1871 convention of the American Pharmaceutical Association, he was denied credentials and ostracized. However, the Michigan course pioneered other major changes: laboratory pharmacy, a definite curriculum that included basic sciences, and a program that demanded students' full-time attention. During the next thirty years, Dr. Prescott had the satisfaction of seeing his once revolutionary innovations generally adopted by pharmaceutical faculties.



31. THE PHARMACOPEIA COMES OF AGE

The first "United States Pharmacopoeia" (1820) was the work of the medical profession. It was the first book of drug standards from a professional source to have achieved a nation's acceptance. In 1877, the "U.S.P." was in danger of dissolution due to the lack of interest of the medical profession. Dr. Edward R. Squibb, manufacturing pharmacist as well as physician, took the problem to The American Pharmaceutical Association convention. Pharmacists formed a "Committee on Revision" chairmanned by hospital pharmacist Charles Rice, assisted by pharmacist-educator Joseph P. Remington, and by Dr. Squibb, their indefatigable collaborator. The "U.S. Pharmacopoeia" surged to new importance.



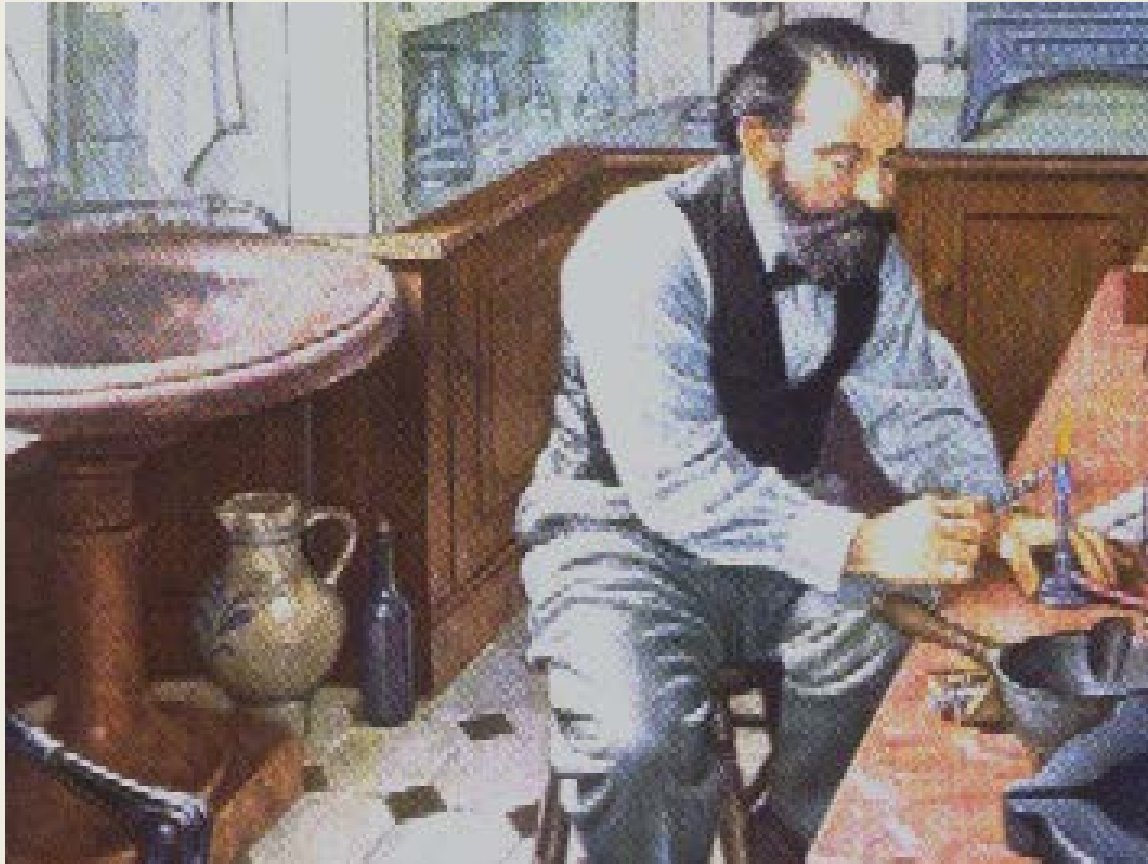
32. THE STANDARDIZATION OF PHARMACEUTICALS

Despite the professional skill and integrity of 19th-century pharmacists, seldom did two preparations of vegetable drugs have the same strength, even though prepared by identical processes. Plant drugs varied widely in active alkaloidal and glucosidal content. The first answer to this problem came when Parke, Davis & Company introduced standardized "Liquor Ergotae Purificatus" in 1879. Dr. Albert Brown Lyons, as the firm's Chief Chemist, further developed methods of alkaloidal assay. Messrs. Parke and Davis recognized the value of his work, and in 1883, announced a list of twenty standardized "normal liquids." Parke-Davis also pioneered in developing pharmacologic and physiologic standards for pharmaceuticals.



33. WRESTING THE JUNGLE'S SECRETS

Expeditions in search of new medicinal plants probably are as old as Pharmacy. Scientific adventurers, such as Henry Hurd Rusby (1855-1940), opened vast new horizons for the advancement of Pharmacy and Medicine, late in the nineteenth century. Sent by Parke, Davis & Company in 1884 to Peru for supplies of coca leaves, Dr. Rusby crossed the Andes and journeyed down the Amazon to the Atlantic amid incredible hardships. He returned with 45,000 botanical specimens. Among them were many new drug plants, including cocillana bark, pharmaceutical preparations of which are still important to Medicine. Dr. Rusby later became Dean of the College of Pharmacy of Columbia University.



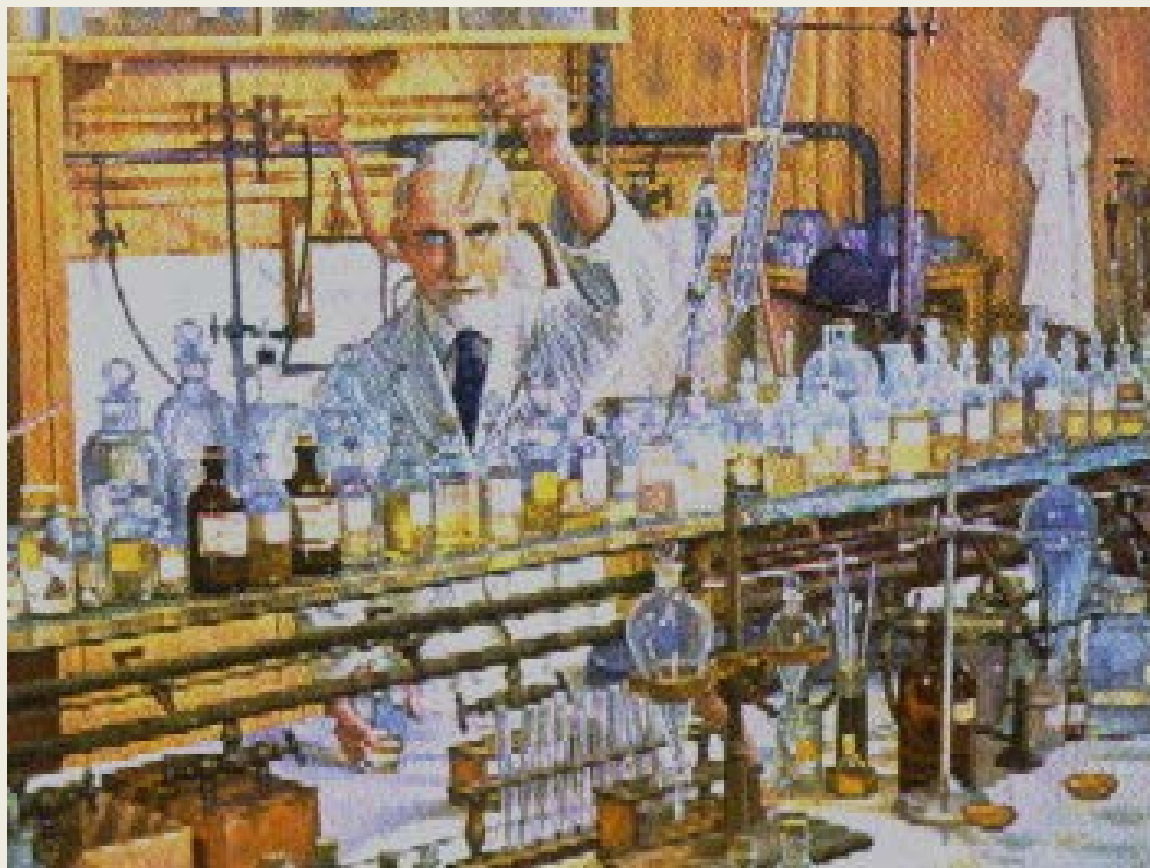
34. STANISLAS LIMOUSIN – PHARMACAL INVENTOR

One of those men singularly gifted in combining scientific knowledge with technical skill and with inventive genius was the french retail pharmacist, Stanislas Limousin (1831-1887). Among the many devices which he introduced to Pharmacy and Medicine were the medicine dropper; the system of coloring poisons (such as corrosive sublimate); and wafer cachets (which found favor prior to mass production of the gelatin capsule). His greatest contributions, however, were the development and perfection of apparatus for the inhalation and therapeutic administration of oxygen; and invention of glass ampoules that could be sealed and sterilized for preservation of solutions for hypodermic use.



35. THE ERA OF BIOLOGICALS

When, in 1894, Behring and Roux announced the effectiveness of diphtheria antitoxin, pharmaceutical scientists both in Europe and in the United States rushed to put the new discovery into production. Parke, Davis & Company was among the pioneers. The serum became available in 1895, and lives of thousands of children were saved. Inoculation of horses with diphtheria toxin was the first step of many in producing antitoxin. In 1903, Parke-Davis received U.S. Biological License No. 1. New, improved biological products have continued to become available, climaxed in 1955 by poliomyelitis vaccine.



36. THE DEVELOPMENT OF CHEMOTHERAPY

One of the successful researchers in the development of new chemical compounds specifically created to fight disease-causing organisms in the body was the French pharmacist, Ernest Francois Auguste Fourneau (1872-1949), who for 30 years headed chemical laboratories in the world-renowned Institut Pasteur, in Paris. His early work with bismuth and arsenic compounds advanced the treatment of syphilis. He broke the German secret of a specific for sleeping sickness; paved the way for the life-saving sulfonamide compounds; and from his laboratories came the first group of chemicals having recognized antihistaminic properties. His work led other investigators to broad fields of chemotherapeutic research.



37. PHARMACEUTICAL RESEARCH

Research in some form has gone hand in hand with the development of Pharmacy through the ages. However, it was the chemical synthesis of antipyrine in 1883 that gave impetus and inspiration for intensive search for therapeutically useful compounds. Begun by the Germans, who dominate the field until World War I, the lead in pharmaceutical research passed thereafter to the United States. Research in Pharmacy came into its own in the late 1930's and early 1940's; has grown steadily since, supported by pharmaceutical manufactures, universities, and government. Today it used techniques and trained personnel from every branch of science in the unending search for new life-saving and life-giving drug products.



38. PHARMACEUTICAL MANUFACTURING COMES OF AGE

Pharmaceutical manufacturing as an industry apart from retail Pharmacy had its beginnings about 1600; really got under way in the middle 1700's. It developed first in Germany, then in England and in France. In America, it was the child of wars - born in the Revolution; grew rapidly during and following the Civil War; became independent of Europe during World War I; came of age during and following World War II. Utilizing latest technical advances from every branch of science, manufacturing Pharmacy economically develops and produces the latest and greatest in drugs in immense quantities, so that everywhere physicians may prescribe them and pharmacists dispense them for the benefit of all mankind.



39. THE ERA OF ANTIBIOTICS

Antibiotics are not new. Their actions probably were first observed by Pasteur in 1877. However, the second quarter of the 20th century marked the flowering of the antibiotic era - a new and dramatic departure in the production of disease-fighting drugs. Fleming's discovery of penicillin in 1929 went undeveloped and Florey and Chain studied it in 1940. Under pressure of World War II, the pharmaceutical manufacturers rapidly adapted mass production methods to penicillin; have reduced costs to 1/1000th the original. Antibiotic discoveries came rapidly in the '40's. Intensive research continues to find antibiotics that will conquer more of men's microbial enemies.



40. PHARMACY TODAY AND TOMORROW

Pharmacy, with its heritage of 50 centuries of service to mankind, has come to be recognized as one of the great professions. Like Medicine, it has come through many revolutions, has learned many things, has had to discard many of its older ways. Pharmacists are among the community's finest educated people. When today's retail pharmacist fills a prescription written by a physician, he provides a professional service incorporating the benefits of the work of pharmacists in all branches of the profession - education, research, development, standards, production, and distribution. Pharmacy's professional stature will continue to grow in the future as this great heritage and tradition of service is passed on from preceptor to apprentice, from teacher to student, from father to son.