A TEXT BOOK OF

PHARMACOGNOSY

FIRST YEAR DIPLOMA IN PHARMACY (As Per E. R. 1991)

THIRTY-EIGHTH EDITION

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PREFACE TO THE THIRTY-EIGHTH EDITION

We are pleased to release the revised Thirty-eighth edition of "Text Book of Pharmacognosy" within a span of twenty years.

It is needless to say that the overwhelming response from the students and colleagues has made this possible. In response to the constructive suggestions, we have added few figures, index to biological names, information on isolation of terpenoids, resins, volatile oils and glycosides as desired.

We hope, we shall keep receiving the same co-operation in future as received in the past.

July 2016

Authors
It gives us immense pleasure in bringing out the first edition of our book in Pharmacognosy for the benefit of the students of Diploma in Pharmacy.

The contents of this edition have been prepared in accordance with the syllabus prescribed in New Education Regulations, 1991 of Pharmacy Council of India. While describing the crude drugs according to their pharmacological or therapeutic profiles, enough care has been taken to incorporate adequate information about their cultivation, collection and processing, as well as, chemical composition. The text has been updated by incorporation of extra figures and chemical structures. The additional information about the crude drugs based on recent investigations, wherever possible, has been included. Different pharmaceutical journals, scientific reviews, technical bulletins of agencies like C.I.M.A.P., I.C.M.R., I.C.A.R. and C.S.I.R, medicinal plant abstracts and proceedings of seminars have been referred for additional information on crude drugs. The new edition is being brought out with an attractive appeal. It is hoped to be useful for all those who are engaged in spheres of activities pertaining to medicinal plants.

We are thankful to Mr. Dineshbhai Furia and staff of NIRALI PRAKASHAN for their efforts in bringing out this new edition in the shortest- period.

S. B. GOKHALE  
C. K. KOKATE  
A. P. PUROHIT

July 1993
1. Definition, history and scope of Pharmacognosy including indigenous system of medicine.

2. Various systems of classification of drugs of natural origin.

3. Adulteration and drug evaluation: Significance of Pharmacopoeial standards.

4. Brief outline of occurrence distribution, outline of isolation, identification tests, therapeutic effects and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.

5. Occurrence, distribution, organoleptic evaluation, chemical constituents, including tests wherever applicable and therapeutic efficacy of following categories of drugs:

   (a) Laxatives - Aloes, rhubarb, castor oil, ispaghula, senna.

   (b) Cardiotonics - Digitalis, arjuna

   (c) Carminatives and gastro-intestinal regulators - Umbelliferous fruits: coriander, fennel, cardamom, ginger, black -pepper, asafoetida, nutmeg, cinnamon, clove.

   (d) Astringents - Catechu.

   (e) Drugs acting on nervous system - Hyoscyamus, belladonna, datura, aconite, ashwagandha, ephedra, opium, cannabis, nux vomica.

   (f) Antihypertensives - Rauwolfia

   (g) Antitussives - Vasaka, tolu balsam, tulsi

   (h) Antirheumatics - Guggul, colchicum

   (i) Antitumour - Vinca

   (j) Antileprotics - Chaulmoogra oil

   (k) Antidiabetics - Pterocarpus, gymnema

   (l) Diuretics - Gokhru, punernava

   (m) Antidysenterics - Ipecacuanha

   (n) Antiseptics and disinfectants - Benzoin, myrrh, neem, curcuma

   (o) Antimalarials - Cinchona

   (p) Oxytocics - Ergot

   (q) Vitamins - Shark liver oil, amla

   (r) Enzymes - Papaya, diastase, yeast.

   (s) Perfumes and flavours - Peppermint oil, lemon oil, orange oil, lemon grass oil, sandalwood.
Pharmaceutical aids - *Honey*, arachis oil, starch, kaolin, pectin, olive oil, *lanolin*, *beeswax*, acacia, tragacanth, sodium alginate, agar, guar gum, *gelatin*.

Miscellaneous - Liquorice, garlic, picrorrhiza, dioscorea, linseed, shatavari, shankhpushpi, pyrethrum, tobacco.

6. Collection and preparation of crude drugs for the market as exemplified by *Ergot*, *Opium*, *Rauwolfia*, *Digitalis*, *Senna*.


8. Gross anatomical studies of - Senna, datura, cinnamon, cinchona, fennel, clove, ginger, nux vomica and ipecacuanha.

- Crude drugs of animal origin
- Crude drugs of mineral origin

Total Practical Hours: 75

Marks: 100

1. Identification of drugs by morphological characters.

2. Physical and chemical tests for evaluation of drugs wherever applicable.

3. Gross anatomical studies (t.s.) of the following drugs - Senna, datura, cinnamon, cinchona, coriander, fennel, clove, ginger, nux vomica, ipecacuanha.

4. Identification of fibres and surgical dressings.
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HISTORY, DEFINITION AND SCOPE OF PHARMACOGNOSY

INTRODUCTION

The substances from plants and animal sources are being used as food since antiquity. Later on, these substances were differentiated as food stuffs and therapeutic agents, as man tried to explore and utilize these natural products for treating the ailments. Thus, their utility to remove the disorders earned them the title-\textit{drug} (originally from French language).

\begin{figure}[h]
\centering
\begin{tabular}{ccc}
\includegraphics[width=0.3\textwidth]{charak.png} & \includegraphics[width=0.3\textwidth]{sushruta.png} & \includegraphics[width=0.3\textwidth]{hippocrates.png} \\
(a) Charak (300 BC) & (b) Sushrutha & (c) Hippocrates (460 - 360 BC) \\
\includegraphics[width=0.3\textwidth]{aristotle.png} & \includegraphics[width=0.3\textwidth]{diocordies.png} & \includegraphics[width=0.3\textwidth]{galen.png} \\
(d) Aristotle (384 - 322 BC) & (e) Dioscordies (640 - 080 AD) & (f) Galen (131 - 200 AD) \\
\end{tabular}
\caption{The Great Contributors}
\end{figure}
As mentioned in *Papyrus Ebers*, an old document written in 1500 B.C., Egyptians were aware of medicinal uses of several plants and animals and also about human anatomy. The great Greek physician **Hippocrates** (460 – 360 B.C.) known as 'Father of Medicine', dealt with anatomy and physiology of human beings. **Aristotle**, the renowned philosopher (384 – 322 B.C.), is well known for his studies on animal kingdom and **Theophrastus** (370 – 287 B.C.) for plant kingdom.

**Dioscorides**, (040 - 080 A.D.) a Greek physician in 78 A.D. described several plants of medicinal importance in *De Materia Medica*. It was **Pliny the Eider** (23 – 70 A.D.), who compiled 37 volumes of natural history. Greek Pharmacist **Galen** (131 - 200 A.D.) described various methods of preparation containing active constituents of crude drugs, and even at present the branch dealing with the extraction of plant and animal drugs is known as Galenical Pharmacy.

Gradually, all the natural products, utilized by physicians were compiled together to form the 'Materia Medica' giving their detailed information. The products from plants, animals and mineral origin are the three broad classes of naturally occurring drugs.

Indian history of medicinal plants is dated back to 3500 B.C. The curative properties of plants have been mentioned in the Suktas of *Rigveda* and *Atharvaveda*. *Ayurveda* has also described good number of plants with their therapeutic properties. The ancient well known treatises in Ayurveda the Charak Samhita and Susruta Samhita are written by **Charak** and **Susruta** respectively.

**Definition :**

While studying Sarsaparilla, it was **Seydler**, A German scientist, who coined the term Pharmacognosy in 1815 in his work entitled, *Analec ta Pharmacognostica* from combination of two Greek words viz., *Pharmakon*, a drug and *gignosco*, to acquire the knowledge of. Further, **Tschirsh** made it more meaningful by restricting the term to the utilization of products from natural sources. Thus, pharmacognosy is the subject of crude drugs obtained from the plant, animal and mineral origins. It is the objective study of crude drugs of the natural sources processed scientifically. The word 'crude drug' itself is self-explanatory and is used with the meaning of 'simple drug' and also as it exists in the natural form. The crude drugs are plant or animal drugs that have undergone no other processes than collection and drying.

Broadly, Pharmacognosy is defined as the scientific and systematic study of structural, physical, chemical and biological characters of crude drugs along with their history, method of cultivation, collection and preparation for the market.

The synthetic drugs do not fall within the scope of Pharmacognosy. With the recent developments in science and technology, several chemicals, which were originally found in plants and animals are synthesized at present. The reasons for their synthesis are either the scarcity or non-availability of natural drugs in which they occur, apart from the lack of knowledge of chemical processes required to extract them.
**Scope of Pharmacognosy:**

Most of the crude drugs are obtained from plants and only a small number comes from animal and mineral origins. Drugs obtained from plants consist of entire plants or their parts. Ephedra and datura are entire plants, while senna leaves and pods, nux-vomica seeds and cinchona bark are parts of plants. Crude drugs may also be obtained by simple physical processes like drying (opium) or extracting with water (catechu, agar).

Several other useful substances affecting health of animals and human beings are also included along with crude drugs in the study of Pharmacognosy. These substances include allergens, antibiotics, flavouring agents, colours, pesticides, immunizing agents, vehicles and diagnostic aids.

The following are few examples of each class of crude drugs.

<table>
<thead>
<tr>
<th>Source</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vegetable</td>
<td>Cinnamon, digitalis, saffron, clove.</td>
</tr>
<tr>
<td>2. Animal</td>
<td>Bees wax, cantharides, cod-liver oil, gelatin.</td>
</tr>
<tr>
<td>4. Antibiotics</td>
<td>Penicillin, streptomycin, tetracycline.</td>
</tr>
<tr>
<td>5. Allergens</td>
<td>Pollen grains, mold spores, feathers, webs</td>
</tr>
<tr>
<td>6. Immunizing agents</td>
<td>Vaccines, sera, antitoxins.</td>
</tr>
<tr>
<td>7. Pesticides</td>
<td>Pyrethrin, rotenone, nicotine.</td>
</tr>
</tbody>
</table>

**RELATIONSHIP TO ALLIED FIELDS OF STUDY**

Even though, pharmacognosy is a branch of science dealing with crude drugs, it is very important to know all other indirectly related aspects of biomedicinals. To understand crude drugs completely, various terms used to describe the vegetable drugs as covered in botany and animal drugs as covered in zoology must be known to a pharmacognosist. He should also possess knowledge of pharmacology in order to understand the actions of drugs in human body. Pharmacology, like pharmacognosy, is an outgrowth of Materia Medica. Pharmaceutical chemistry and phytochemistry are also essential to understand the chemical composition of crude drugs. The art of preparing the galenicals and the use of pharmaceutical aids are covered under the subject, pharmaceutics. Knowledge of several other subjects apart from those mentioned above is necessary for various reasons. The knowledge of the principles of genetics, plant breeding and plant pathology is essential to understand cultivation of medicinal plants. The basic knowledge of biochemistry, chemical engineering and storage technology helps us to know the principles of collection, preparation and preservation of crude drugs. Chemotaxonomy and biosynthesis are the fields, which ought to be understood for inter-relationship of active constituents and their physiological importance to the plants and animals. Pharmacognosy plays a very important role in the development of pure sciences, e.g. in descriptive botany, plant classification (taxonomy) and plant chemistry (phytochemistry).
Thus, pharmacognosy is an important liaison between pharmaceutical and all related subjects.

**TRADITIONAL INDIAN SYSTEMS OF MEDICINE**

**Ayurveda**

The system of Ayurveda—Ancient Science of Life—originated in India about 3000 years ago. It is one of the oldest systems of medicine identified exclusively with ancient Indian civilization and dealing with both preventive and curative aspects of life. The principles of positive health and therapeutic measures embedded in this system relate to mental, physical, social and spiritual welfare of human beings. Ayurveda encompasses the knowledge of Kayachikitsa (Internal medicine), Kaumarabhritiya (Paediatrics), Trachchikitsa (Psychological medicine), Shalakya Tantra (Otorhinolaryngology and Ophthalmology), Shalya Tantra (Surgery) Agada Tantra (Toxicology), Rasayana Tantra (Geriatrics) and Vajikarana Tantra (Eugenics and Aphrodisiacs).

The Pharmacopoeia of Ayurveda consists of more than 8000 recipes made of natural drugs derived from herbal, mineral, animal and marine sources. These are used singly or in combinations and in varied forms such as decoctions, infusions, distillates, extracted juices, powders, pills, tablets, syrups, fermented liquids, bhasmas, medicated oils etc.

**SIDDHA SYSTEM OF MEDICINE**

The term 'Siddha' means achievement and 'Siddhars' were saintly personalities, who attained proficiency in medicine through practice of Bhakti and Yoga. This is the system of pre-vedic period identified with Dravidian culture and it is largely therapeutic in nature. Like Ayurveda, this system believes that all objects in universe are made up of five basic elements namely, earth, water, sky, fire and air. The identification of causative factors of diseases is done through pulse reading, colour of body, study of voice, urine examination, status of digestive system and examination of tongue. The literature of Siddha system is mostly in Tamil.

Few natural drugs used in Siddha system of medicine are:

Abini : (Papaver – somniferum),
Alari : (Nerium – Indicum),
Ethi : (Strychnous – Nux vomica),
Gomathi : (Datura – stramonium),
Haikalli : (Ephorbia – neriifolia),
Rotha Polam : (Aloe – barbadensis)

**NATUROPATHY AND YOGA**

Naturopathy is not merely a system of treatment, but also a way of life, which is based on laws of nature. The attention is particularly paid to eating and living habits, adoption of purificatory measures, use of hydrotherapy, mud packs, baths, massage etc.

The system of Yoga is as old as Ayurveda. The eight components of Yoga are restraint, observance of austerity, physical postures, restraining of sense organs, breathing exercises, contemplation, meditation and samadhi. Yoga exercises have potential in improvement of better circulation of oxygenated blood in the body, restraining the sense organs,
improvement of social and personal behaviour and induction of tranquility and serenity in the mind.

⭐⭐⭐
INTRODUCTION

Though, a pharmacist is responsible for the entire process of manufacturing the pharmaceutical products, isolation or extraction of active principles from crude drugs has become a chemical or biochemical operation, rather than a pharmaceutical one. Drugs are rarely administered in singular form. They are essentially mixed with various types of additives or adjuncts or converted them into effective drugs. Thus, a pharmacist during the manufacturing process of dosage forms comes across the actual drugs and the adjuncts used alongwith them.

DRUGS

Etymological survey reveals that the word drug has its origin in French language and has been derived from the word drogue, which means any substance used in preparation of medicine. However, at present the term drug includes not only the medicines, but several other related substances without any pharmacological action.

Technically and legally the term drug as defined in India under Drugs and Cosmetics Act of 1940 reads as follows:

1. All medicines for internal or external use of human beings or animals and all substances intended to be used for or in diagnosis, treatment, mitigation or prevention of disease in human beings or animals.

2. Such substances, other than food, intended to affect the structure or any function of the human body or intended to be used for the destruction of vermin or insects, which
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