Chapter

1

Definition, History and Scope of Pharmacognosy

Pharmacognosy is defined as the scientific and systematic study of crude drugs' structural, physical, chemical, and biological characteristics, as well as their history, cultivation methods, collection, and preparation for the market.

The term 'Pharmacognosy' is derived from Greek words Pharmakon, meaning 'a drug,' and Gignosko, meaning 'to acquire knowledge.' It means 'knowledge of the science of drugs.

Pharmacognosy focuses on crude drugs derived from plant, animal, and mineral origins.

1.1 ORIGIN OF PHARMACOGNOSY

The beginning of life on Earth and the role of plants in human evolution have been subjects of long-standing debate and research. However, the vegetable kingdom predates human existence, providing essential resources for early humans. Initially, humans relied on plants not only for food but also for their medicinal properties. They identified which plants were edible and had therapeutic effects through observation and experimentation, categorizing them into painkillers, febrifuges, antiphlogistics, soporifics, and more. Despite the risks involved, including potential fatalities, these early experiments also led to the discovery of antidotes for poisons and alternative treatments.

This process of identifying and utilizing natural curative agents marks the origins of pharmacognosy. The historical development of pharmacognosy is not attributed to a single civilization or region. Still, it is the cumulative result of contributions from numerous ancient cultures, including the Chinese, Egyptians, Indians, Persians, Babylonians, Assyrians, and others. The medicinal practices of these civilizations laid the foundation for many modern drugs, highlighting the deep-rooted connection between traditional remedies and contemporary pharmacological advancements.

1.2 HISTORY OF PHARMACOGNOSY

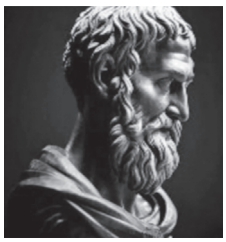
Pharmacognosy, the study of medicinal drugs derived from natural sources, has a rich history that spans various ancient civilizations:

1. **Ancient Egypt:** Egyptians were knowledgeable about the medicinal uses of various plants and animals and understood human anatomy.
2. **Ancient Greece:**
    i. **Hippocrates (460–360 BC):** Known as the Father of Medicine, he significantly contributed to medical science.

ii. **Aristotle (384–322 BC):** The renowned philosopher significantly contributed to studying the animal kingdom.
iii. **Theophrastus (370–287 BC):** Known for his extensive plant studies, he is often called the Father of Botany.
iv. **Pedanius Dioscorides (40–90 AD):** A Greek physician who, in 78 AD, described numerous medicinal plants in his seminal work "De Materia Medica."
v. **Pliny the Elder (23–70 AD):** Compiled "Natural History," a 37-volume work that includes information on natural medicinal substances.

3. **Galen (129–216 AD):** A Greek pharmacist who described various methods for preparing medicinal concoctions containing active constituents of crude drugs. This branch of pharmacognosy focuses on extracting and preparing drugs from plants and animals and is known as Galenical Pharmacy.
4. **Ancient India:** The use of medicinal plants in India dates back to 3500 BC, referencing their curative properties in the Suktas of the Rigveda and Atharvaveda.


Hippocrates


Aristotle


Theophrastus


Pedanius


Pliny


Dioscorides

Ayurveda

An ancient Indian system of medicine that describes numerous plants with therapeutic properties. Key ayurvedic texts include the *Charaka Samhita*, authored by Charaka, and the *Sushruta Samhita*, written by Sushruta.

Pharmacognosy has thus evolved through the centuries, integrating the knowledge and practices of various ancient cultures to form the foundation of modern medicinal science.

1.3 SCOPE OF PHARMACOGNOSY

Pharmacognosy studies crude drugs from natural sources, including plants, animals, and minerals. These natural products contain active chemical constituents used in treating various diseases and are also valuable in the cosmetic, textile, and food industries. In the early nineteenth century, apothecaries played a crucial role by stocking crude drugs to prepare a variety of herbal tea mixtures, tinctures, extracts, and juices. These preparations were further utilized in making medicinal drops, syrups,

infusions, ointments, and liniments, demonstrating the diverse applications of natural products in healthcare and other industries.

In the latter half of the nineteenth century, significant advances in chemistry led to important discoveries, particularly concerning medicinal plants. Phytochemists isolated pure active constituents from these plants, gradually replacing crude drugs. This shift gave rise to the dominance of semisynthetic and synthetic medicines, relegating herbal drugs to the background. The belief that medicinal plants were replaceable by synthetic drugs has been challenged in modern times, as the value of drug plants is once again being recognized. The field of pharmacognosy now benefits from a deeper understanding of the active constituents and their therapeutic effects.

Researchers are exploring traditional plants and related species worldwide, seeking similar beneficial constituents. Additionally, attention has turned to marine flora and fauna, uncovering remarkable natural products and their biological activities. Advances in genetic engineering and tissue culture biotechnology have enabled the production of genetically engineered molecules and bio-transformed natural products, enhancing the potential of pharmacognosy to contribute to medicine and various other fields.

Crude drugs and their derivatives hold substantial economic value and are profitable commercial products. Historically, when these drugs were sourced from the wild, their availability was limited, and their prices were exceptionally high. This scenario has dramatically changed with the cultivation of industrially important species, allowing for large-scale production and significant economic returns. Drug plants, standardized extracts, and therapeutically active pure constituents now constitute a major segment of international trade.

The scope of pharmacognosy is vast, encompassing medicine, bulk drugs, food supplements, pharmaceutical necessities, pesticides, dyes, tissue culture biotechnology, genetic engineering, and more. The field's potential continues to grow, driven by ongoing research and the expanding market for natural products.

The scope for doctoral graduates in pharmacognosy is anticipated to expand in the coming years, offering diverse career opportunities:

Academics: Teaching positions in colleges, universities, museums, and botanical gardens.

Private industry: Roles in pharmaceutical companies, consumer products testing laboratories, private commercial testing laboratories, herbal products, and cosmetic and perfume industries.

Government: Positions in federal agencies such as the Drug Enforcement Agency, Food and Drug Administration, and the US Department of Agriculture. Opportunities exist in medicinal plant research laboratories and state agencies like forensic and environmental laboratories.

The plant kingdom still holds many species with undiscovered medicinal value. Many plants have been screened for their pharmacological properties, such as hypoglycemic, hepatoprotective, hypotensive, anti-inflammatory, and antifertility effects. Pharmacognosists with multidisciplinary backgrounds can make significant contributions to the field of phytomedicines.

PRACTICE QUESTIONS

Long Answer Questions

1. Describe the present status of pharmacognosy in the field of healthcare and its relevance in modern drug development.
2. What is the scope of pharmacognosy? Discuss its application in natural product research and alternative medicine.

Short Answer Questions

1. What is the definition of pharmacognosy?
2. Who is considered the father of pharmacognosy, and why?
3. Briefly explain the historical significance of pharmacognosy.
4. What is the present status of pharmacognosy in modern medicine?
5. What role does pharmacognosy play in drug discovery?

Multiple Choice Questions

1. Who is known as the 'father of medicine'?
   a. Aristotle b. Hippocrates
   c. Galen d. Avicenna
2. Who is the author of the ancient Chinese medicinal text 'Pen-T'sao'?
   a. Hippocrates b. Shennong
   c. Charaka d. Dioscorides
3. Who is considered the first pharmacist in history?
   a. Avicenna b. Dioscorides
   c. Serturner d. Galen
4. Which scientist classified herbs into 50 groups of 10 each?
   a. Hippocrates b. Charaka
   c. Dioscorides d. Shennong
5. Who is considered the father of surgery?
   a. Sushruta b. Aristotle
   c. Galen d. Dioscorides

Answers: 1. (b), 2. (b), 3. (d), 4. (b), 5. (a)