

Introduction to Pharmacognosy

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The study of medicines derived from natural sources

1. Definition & Scope

Aspect	Description
Pharmacognosy	The scientific discipline that investigates the physical, chemical, biochemical, and biological properties of drugs, drug substances, or potential drug candidates of natural origin (plants, microbes, marine organisms, animals).
Key Objectives	• Identify bioactive compounds • Understand their mechanisms of action • Develop sustainable sourcing and extraction methods • Ensure quality, safety, and efficacy of natural products
Related Fields	Phytochemistry, Ethnobotany, Natural Product Chemistry, Pharmacology, Herbal Medicine, Biotechnology

2. Historical Perspective

Era	Milestones
Ancient civilizations (? 3000?BC)	Use of herbs and minerals recorded in Egyptian papyri, Ayurvedic texts, Chinese materia medica.
Classical period (500? BC–500?AD)	Dioscorides' <i>De Materia Medica</i> (1st?century) catalogues >600 medicinal plants.
Middle Ages	Monastic gardens and Islamic scholars preserve and expand knowledge of medicinal plants.
Renaissance & Enlightenment	Development of botanical illustration, Linnaean taxonomy (1735), early isolation of active principles (e.g., morphine, quinine).
19th?century	Systematic phytochemical methods; discovery of alkaloids, essential oils, glycosides.
20th?century	Rise of synthetic drugs, but renewed interest in natural products for anticancer, antimicrobial, and anti-inflammatory agents.

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Era

Milestones

21st century

Integration of genomics, metabolomics, and synthetic biology to discover and produce natural compounds.

3. Sources of Natural Products

Source	Typical Classes of Compounds	Example Drugs
Higher plants	Alkaloids, flavonoids, terpenoids, phenolics, glycosides	Vincristine (periwinkle), Aspirin (willow bark), Digoxin (foxglove)
Microorganisms (fungi, bacteria)	Antibiotics, immunosuppressants, enzymes	Penicillin (Penicillium), Cyclosporine (Tolypocladium)
Marine organisms (sponges, algae, corals)	Halogenated terpenes, peptides, polysaccharides	Trabectedin (sea squirt), Ziconotide (cone snail)
Animals	Venoms, peptides, steroids	Captopril (derived from snake venom peptide), Hormones from adrenal glands
Synthetic biology/engineered cultures	Recombinant proteins, engineered metabolites	Artemisinin produced in yeast, Taxol in plant cell cultures

4. Fundamental Processes in Pharmacognosy

4.1. Collection & Authentication

1. **Field identification** – botanical keys, GPS tagging, voucher specimens.
2. **Authentication** – macroscopic & microscopic examination, DNA barcoding.
3. **Good Agricultural and Collection Practices (GACP)** – standardize harvesting time, post-harvest handling.

4.2. Extraction & Isolation

Step	Common Techniques	Purpose
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**Pre?
extraction**

Drying, grinding, size reduction

Increase surface area, prevent degradation

Extraction

Maceration, Soxhlet, Ultrasound?assisted,
Supercritical CO?

Transfer target constituents into a