

Ministry of Higher Education
Salahaddin University-Erbil
Field Crops and Medicinal Plants Department



THE PRIMARY SOURCE OF NATURAL PRODUCTS

Third Grade

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Lecture 2



1



Where do we find natural products?

- Natural products may be extracted from the cells, tissues, and secretions of microorganisms, plants and animals.
- A crude (unfractionated) extract from any one of these sources will contain a range of structurally diverse and often novel chemical compounds.



2



Where do we find natural products?

- Chemical diversity in nature is based on biological diversity, so researchers travel around the world obtaining samples to analyze and evaluate in drug discovery screens or bioassays.
- This effort to search for natural products is known as bioprospecting.



3



The Primary Sources of Natural Products

1. Plants

A. Terrestrial Plants

Terrestrial plants are one of the most significant sources of natural products.

Examples:

Alkaloids: Found in plants like opium poppy (morphine), cinchona (quinine), and nightshade (nicotine).

Terpenoids: Citrus fruits (limonene), conifers (pinene), and cannabis (cannabinoids).

Phenolic Compounds: Flavonoids in fruits and vegetables (quercetin), and tannins in trees (oak tannins).



4



The Primary Sources of Natural Products



B. Medicinal Plants

Certain plants have been traditionally used for their medicinal properties.

Examples:

Aloe vera: Used for its soothing and healing properties.

Ginkgo biloba: Believed to enhance memory and cognitive function.

Echinacea: Used as an immune system booster.

5



The Primary Sources of Natural Products



2. Microorganisms

Microorganisms, including bacteria, fungi, and actinomycetes, produce a wide range of natural products.

Examples:

Penicillium mold: Produces penicillin, a widely used antibiotic.

Streptomyces bacteria: Source of streptomycin, used to treat tuberculosis.

Fungi: Some fungi produce immunosuppressants, like cyclosporine.

6



The Primary Sources of Natural Products



3. Marine Organisms

The oceans are a treasure trove of natural products, many of which are still being explored.

Examples:

Sponges: Produce compounds with anti-inflammatory and anticancer properties.

Coral Reefs: Source of compounds with potential as painkillers and anticancer agents.

Marine Algae: Contain compounds like carrageenans used in the food industry.

7



8



The Primary Sources of Natural Products



4. Animals

Some animals also produce natural products, often for defense or communication.

Examples:

Poison Dart Frogs: Secrete toxic alkaloids used by indigenous people for poison-tipped darts.

Venomous Snakes: Produce venom with potential therapeutic applications.

9



Venomous Snakes



10



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5. Insects

Insects produce a variety of compounds for defense and communication.

Examples:

Silk Worms: Produce silk, which has numerous industrial applications.

Honey Bees: Produce beeswax and honey, both used in cosmetics and food.



11



Honey Bees

12



The Primary Sources of Natural Products

6. Marine Microorganisms

Microorganisms in marine environments, such as deep-sea bacteria, are a relatively untapped source of natural products with unique properties.

Examples:

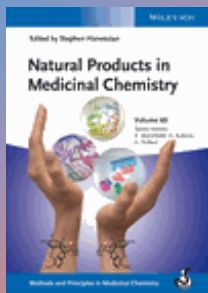
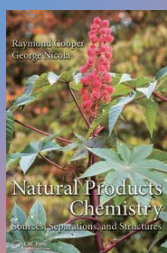
Deep-Sea Actinomycetes: Known to produce novel antibiotics and enzymes.



13

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References

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14



