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NOTES
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
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NOTES
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
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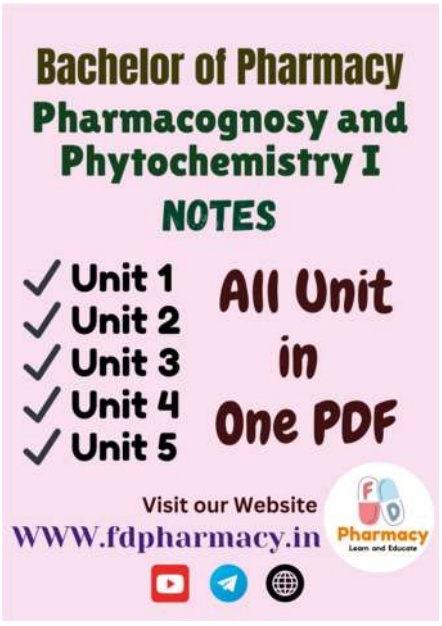
Bachelor of Pharmacy
Pharmacognosy and Phytochemistry I
NOTES
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
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Bachelor of Pharmacy
Pharmacology I
NOTES
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
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Bachelor of Pharmacy
Physical Pharmaceutics II
NOTES
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
All Unit in One PDF
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PHARMACOGNOSY AND PHYTOCHEMISTRY – I

UNIT 5

TOPIC :

- **Marine Drugs :**

  Novel medicinal agents from marine sources

Novel Medicinal Agents from Marine Sources

- Marine organisms represent a vast and untapped resource of bioactive compounds.
- Marine ecosystem covers >70% of Earth's surface and harbors diverse species such as sponges, algae, tunicates, mollusks, corals, sea hares, cone snails, and marine microbes.
- These organisms produce secondary metabolites for survival and defense, many of which have pharmaceutical potential.

Sources of Marine-Derived Drugs

1. **Marine Algae (Seaweeds):**
    - **Types:** Red, Brown, and Green algae.
    - **Bioactive compounds:** Polysaccharides (alginate, carrageenan), sterols, polyphenols.
    - **Activities:** Antiviral, antioxidant, anticoagulant.
2. **Marine Sponges:**
    - Rich in alkaloids, peptides, terpenoids, sterols.
    - Source of many FDA-approved drugs.
3. **Marine Microorganisms:**
    - Includes bacteria, fungi, actinomycetes.
    - Produce antibiotics, anticancer, and antifungal compounds.
4. **Marine Mollusks and Tunicates:**
    - Produce toxins, peptides, and alkaloids for self-defense.
    - Important in neurological research and drug discovery.

Examples of Marine-Derived Drugs

Drug Name	Source Organism	Activity / Use
Cytarabine (Ara-C)	Sponge (*Tethya crypta*)	Anticancer (Leukemia)
Vidarabine (Ara-A)	Sponge (*Tethya crypta*)	Antiviral (Herpes)
Trabectedin (Yondelis)	Tunicate (*Ecteinascidia turbinata*)	Anticancer (Soft tissue sarcoma)
Eribulin (Halaven)	Sponge derivative (*Halichondrin B*)	Anticancer (Breast cancer)
Ziconotide (Prialt)	Cone snail (*Conus magus*)	Analgesic (Chronic pain)
Brentuximab vedotin	Sea hare derivative (*Dolastatin*)	Anticancer (Lymphoma)
Plitidepsin (Aplidin)	Tunicate (*Aplidium albicans*)	Antiviral, Anticancer

Therapeutic Uses

- **Anticancer agents:** Cytarabine, Trabectedin, Eribulin, Brentuximab.
- **Antiviral agents:** Vidarabine, Plitidepsin.
- **Analgesics:** Ziconotide (for severe chronic pain).
- **Antioxidant & Anti-inflammatory agents:** Algal polysaccharides.
- **Antimicrobial & Antifungal agents:** Marine microbe-derived compounds.

Advantages of Marine-Derived Drugs

- Unique chemical structures not found in terrestrial sources.
- High potency and selectivity.
- New mechanisms of action.
- Active against drug-resistant pathogens and cancers.

Challenges in Marine Drug Development

- **Sustainable supply:** Many organisms are rare and hard to harvest.
- **Complex structures:** Compounds are difficult and costly to synthesize.
- **Environmental concerns:** Overharvesting may harm biodiversity.
- **Regulatory hurdles:** Long clinical trials, high development cost.

Future Prospects

- **Marine biotechnology:** Use of fermentation and synthetic biology for sustainable production.
- **Genomics & Metagenomics:** Discovery of new bioactive genes and metabolites.
- **Nanotechnology:** Improved drug solubility, delivery, and targeting.
- **Drug pipeline expansion:** More marine-derived drugs expected in oncology, neurology, and infectious diseases.

Conclusion

- Marine organisms are a promising frontier for drug discovery. With advancements in biotechnology, synthetic methods, and sustainable harvesting, more marine drugs are likely to reach clinical practice, addressing unmet medical needs.