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і технічного перекладу, БГТУ)**PHARMACOGNOSY. OVERVIEW OF SOME NITROGEN-CONTAINING BIOLOGICALYACTIVE SUBSTANCES**

A natural product is a chemical substance produced by living organisms such as plants, mushrooms, animals, and microorganisms. Relevantly, pharmacognosy, as well-known, the science of drugs of natural origins is one of the main disciplines in pharmaceutical sciences.

Pharmacognosy deals with the natural drugs obtained from organisms such as most plants, microbes, and animals. Up to date, many important drugs including morphine, atropine, galanthamine, etc. have originated from natural sources which continue to be good model molecules in drug discovery.

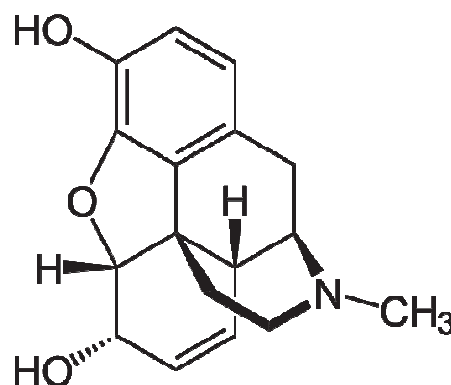
Traditional medicine is also a part of pharmacognosy and most of the third world countries still depend on the use of herbal medicines. Consequently, pharmacognosy always keeps its popularity in pharmaceutical sciences and plays a critical role in drug discovery [1].

Examples of Medicinal Plants**Figure 2 – Taxus Baccata**

Plants are the source of many active ingredients used for medicinal purposes. Examples include salicylic acid and caffeine, among others. These natural compounds are often provide a great basis for the discovery of new drugs.

Some examples of plants that have an effect on humans include:

- a) *Taxus Baccata* (yew tree): this can be used to extract Baccatin III, which is important in the production of some antineoplastic (anticancer) drugs.

**Figure 1 – Morphine**

b) *Catharanthus roseus* (Madagascar periwinkle): a natural source of over 70 different indole alkaloids, *catharanthus roseus* was the origin of medicines for childhood leukaemia and Hodgkin's disease.



Figure 3 – Hericium erinaceus

c) *Hericium erinaceus* (lion's mane mushroom): a fungus that shows some evidence of

improving nerve and cognitive function, as well as protecting the mucus membrane layer of the stomach and improving symptoms of stomach ulcers. It is taken for Alzheimer's disease, dementia, depression, anxiety, Parkinson's disease and multiple sclerosis, although evidence on its efficacy for these conditions is limited.

d) *Aloe marlothii* (mountain aloe): identified as a treatment for intestinal parasites.

e) *Rumex acetosella* (common sorrel): possesses diuretic properties and is used as an approach for sinusitis (inflammation of the nasal passages), bronchitis (inflammation of the bronchial tube lining) and cancer. Evidence for the efficacy of sorrel concerning cancer and bronchitis is limited.

Although most pharmacognostic studies focus on plants and medicines derived from plants, other types of organisms are also regarded as pharmacognostically interesting, in particular, various types of microbes (bacteria, fungi, etc.), and, recently, various marine organisms.

The contemporary study of pharmacognosy can be divided into the fields of:

a) medical ethnobotany: the study of the traditional use of plants for medicinal purposes;

b) ethnopharmacology: the study of the pharmacological qualities of traditional medicinal substances;

c) the study of phytotherapy (the use of plant-derived medications in the treatment and prevention of disease);

d) phytochemistry, the study of chemicals derived from plants. Plants synthesize phytochemicals for many reasons, including to protect themselves against insect attacks and plant diseases. Phytochemicals in food plants are often active in human biology, and in many cases have health benefits. The compounds found in plants are of many kinds, but

most are in four major biochemical classes, the alkaloids, glycosides, polyphenols, and terpenes;

e) zoopharmacognosy, the process by which animals self-medicate, by selecting and using plants, soils, and insects to treat and prevent disease;

f) marine pharmacognosy, the study of chemicals derived from marine organisms. Marine Pharmacognosy gives a complete record of marine-determined bioactive pharmaceuticals and their potential medical advantages[2].

Among the carbazole compounds found a significant amount of biologically active substances and effective drugs.

In nature, biologically active carbazoles are able to produce and accumulate plants of four species belonging to the family of *Rutaceae* (lat. *Rutaceae*), as well as a number of bacteria. These plants are used in folk medicine in China, Taiwan and the Philippines. Interestingly, damage to these plants, and in particular infection with pathogenic fungi *Botrytis cinerea* induces the synthesis and accumulation of carbazoles. Carbazole is an aromatic heterocyclic organic compound.

A classic laboratory organic synthesis for carbazole is the Borsche–Drechsel cyclization.

Ondansetron is used to prevent nausea in chemotherapy and radiotherapy of cancer.

3-Methylamino-1,2,3,4-tetrahydrocarbazole-6-carboxamide is the active substance in the composition of the medicinal product of frovatriptan, applica-direct in the treatment of migraines.

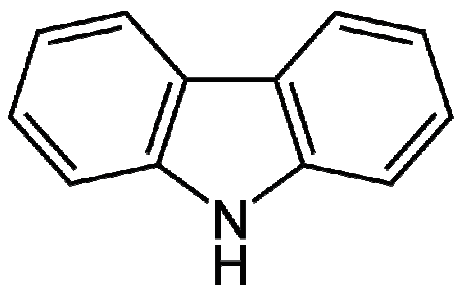


Figure 4 – Carbazole

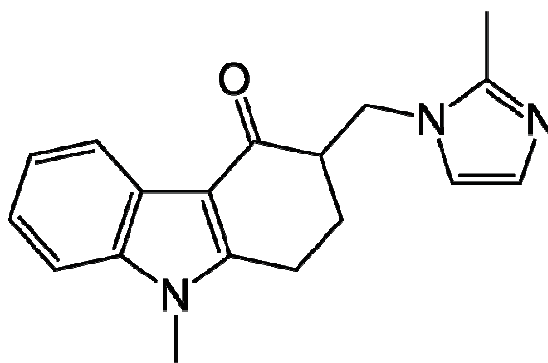


Figure 5 – Ondansetron

When the term “natural product” is mentioned, they can be the organism itself (plant, animal, and microorganism), any part of an organism (a leaf or flower of a plant), and extract or pure substances. Doubtlessly, plants are

prolific sources of new bioactive chemicals such as atropin, ephedrine, morphine, caffeine, salicylic acid, digoxin, taxol, galantamine, vincristine, colchicine, etc.

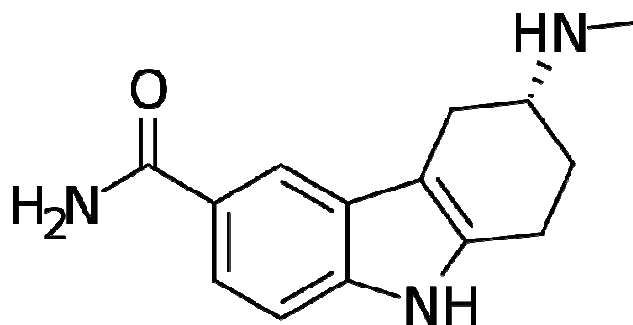


Figure 6 – Frovatriptan

Consequently, natural products or compounds are still attracting a great attention from scientists. Not only plants, but also other organisms including marine animals, ants, frogs, worms, etc as well as microorganisms produce very important drug candidate molecules. For instance, the precursor of acyclovir, the potent antiviral drug, was firstly discovered in a marine sponge and then developed into an antiviral drug [3].

Some compounds are used as active ingredients in the form directly isolated from plant extracts; others are synthesized to mimic a natural plant compound. Therefore, natural compounds could be good models for developing novel drug molecules. Modelling or modifying is an important action for drug industry. Because in some cases, natural products exert little or even no activity themselves, but by modification and using chemical or biological methods, potent drugs can be produced. A good example for this case could be baccatin III isolated from *Taxusbaccata* (yew tree), which is modified into taxol, a potent anticancer drug. In this sense, natural compounds are definitely valuable leads for drug discovery and the current importance of drugs of natural origin is undebatable.

ЛИТЕРАТУРА

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