



# Pharmacognosy: Science of natural products in drug discovery

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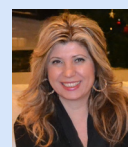
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## Summary

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.

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Prof. Dr. Orhan obtained her PhD degree in Pharmacognosy from Faculty of Pharmacy, Gazi University, Ankara, Turkey in 2002. She is Young Affiliate Representative of the Central & South Asia region (ROCASA) of Third World Academy of Sciences (TWAS) for the period of 2011-2016. She is now affiliated as full professor at Gazi University. Her research interests are inhibitory activity of natural products against enzymes, phytochemistry, and marine natural products.



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. In other words, pharmacognosy is described as systematic science of morphological, chemical, and biological properties along with history, cultivation, collection, extraction, isolation, bioassaying, quality control, and preparation of crude drugs of natural origin. Actually, mineral sources can be also considered within the scope of pharmacognosy. Seydler, the German botanist, was the first one to use the term “pharmacognosy”.<sup>1</sup>

Plants have been always used as medicine by mankind to treat health-threatening diseases and still popular to obtain new drug candidates as it is the oldest medical practice for humans. The use of botanical natural health products are on the increase all over the world. It is known that almost 80% of the populations in developing countries rely on the traditional medicine, mainly composing herbal prescriptions.<sup>2</sup>

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, an isolated gland or other organ of an animal), 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. In fact, approximately 25%

of the prescription drugs dispensed in the United States contain at least one active ingredient of plant origin.<sup>3</sup> 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.<sup>4</sup> Apicidin isolated from the microorganism *Fusarium pallidoroseum* (Costa Rica) has been reported to be a fungal metabolite with potent broad spectrum antiprotozoal activity *in vitro* and efficacy against malaria factor *Plasmodium berghei*.<sup>5</sup>

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.<sup>6</sup>

In this sense, natural compounds are definitely valuable leads for drug discovery and the current importance of drugs of natural origin is undebatable.



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### Ethical issues

There is none to be declared.

### Competing interests

The author declares no competing interests.

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