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Botanical Miracles. Chemistry of Plants that Changed the World

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Plants have became one of the totems of our times and support and help us at many levels, supplying, drugs, cosmetics, food, textiles, fuel, furniture and many other comforts. The growing interest for plants is due to a personal lifestyle and a movement towards the new concern for a green economy linked to the renewable energy and conservation of the Planet water and resources, together with the organization of an organic farming and holistic medicine. It is however to remember that plants not only produce oxygen, necessary for the survivals of humans and animals, but regulate also the amount of carbon dioxide, water and hydrogen in the atmosphere, probably controlling the basic temperature range of the earth. By photosynthesis, in fact, they convert sunlight into chemical energy and give out oxygen, while take in carbon, much of which passes into the food chain or in the soil. They, in fact, affect the soil, taking elements as nitrogen, phosphorous, and potassium, passing them to the food chain, from where they are recycled once more to the soil in the firm of animal waste.
Additionally, they produce proteins, sugars, vitamins, enzymes and hormones, eliciting immunostimulant compounds to protect the plant growth and preserve them from the environmental and pests aggression. All these ingredients are useful as basic human raw materials for producing drugs, food, cosmetics, paper, clothing and are linked in symbiotic relationship with the rest of the living world. Despite the complexity of the different compounds, in fact, many metabolic pathways in plants and animals begin from simple and similar building blocks. Thus, it is fascinating how frequently a plant ingredient, when applied to humans, mimics its normal reaction inside the parent plant. Human sex hormones, for example, have been found in yeasts and some fungi. Chemicals that inhibit parasites and tumors in plants have been found to have the same effects on humans, as well as some promising antiviral compounds. Many plants also contain compounds very similar to the endorphins useful to control pain. Plant ingredients, in fact, may have a comparable effect on humans because we have evolved from a common biological ancestry, so that most basic elements in human cells share many properties with those in plants. As an example, the enzyme chitinase that metabolizes chitin defending the plant from the microorganisms' aggression, as well as the chitotriosidase exerts the same activity in humans.
Although the relevance of chitin for humans is poorly understood, chitin exposition is relevant at host-pathogen interfaces, such as lung, gut and the skin, modulating alveolar macrophage activation, activating the innate immune system and triggering skin allergies such as cockroaches and house dust mites.

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In short, plants represent non only a crucial source of energy and chemicals, but are at the base for resources and energy conservation supporting human and animal life on the earth. Understanding the complexity of all the compounds produced from plants may contribute to preserve the traditional knowledge of their use for future generations and can led to discover new drugs and compounds useful for ameliorating the health and quality of our life.

This interesting book, organized in **7 chapters**, and written by two well known scientists reports and discusses the impact the more important plants and herbs have on humans and the environment, describing not only their organic chemistry but also the effectiveness they have on health and wellness, according to the traditional cultures also, such as, for example, Ayurvedic and Chinese medicine.

Plants support and help the human body at many levels. They condition the natural environment, air, and climate. But the most direct contact with plants is through food and medicine, interacting directly with our body and influencing all the organs with their active ingredients. As example potato is one of the first commercial sources of the key chemicals, known as steroid saponins; the active ingredient in willow bark is salicin, converted naturally within the human body into salicylic acid and developed industrially to produce aspirin i.e. acetylsalicylic acid; from the bark of the cinchona tree, it has been extracted quinine, employed in the fight against malaria as well as from artemisia annual it has been obtained the artemisinin which became the treatment of choice of malaria; digitalis obtained from the roots and seeds of digitalis purpurea is a drug used for people having congestive heart problems; vincristine and vinblastine are two alkaloids extract from the African plant catharantus rosea, used as anticancer agents as well as the anticancer paclitaxel is a terpenoid isolated from the bark of the tree taxus brevifolia.

Moreover, new substances and materials have shown to help a wide range of minor metabolic disorders such as the seed oil of the evening primrose rich of linoleic acid useful for atopic dermatitis, or the jojoba oil used as emollient and hydrating ingredient, as swell as the extract from aloe Vera used as anti-inflammatory compound for cosmetics. Additionally Rosemary essential oil is an excellent remedy for headaches and an antibacterial and antifungal properties when applied directly to head or skin; allium sativum has an antibacterial activity exerted by its allicin content.

In conclusion, plants are enormous valuable bought, sold and consumed materials and commodities, representing as wheat, rice and soya, and coffee, tea and chocolate, important source of survival food and drinks for all.

The book, reporting the daily use of the plant products from every corner of the globe (rubber, flax and hemp; coffee, tea and cocoa from South America and South east Asia; wine and olive oil from the Mediterranean; morphine and codeine from the Burmese opium poppy; spices from Far East etc), represents a valuable source of innovative knowledge for all scientists, marketing managers and university students of both the medical and chemical community who wish to learn and appreciate in simple and practical ways the magic biology and chemistry of plants with the extraordinary diversity of use and range of properties their active ingredients have.

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