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A Brief Note on Natural Products

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Short Communication

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ABSTRACT

A Natural product is a chemical compound or substance that is produced by a living organism and is therefore found in nature. Natural products, in the broadest sense, include any substance produced by life. Natural products can also be synthesised chemically (both semi synthesis and total synthesis) and have played an important role in the development of organic chemistry by providing challenging synthetic targets. The term "natural product" has also been used commercially to refer to cosmetics, dietary supplements, and foods derived from natural sources that do not contain any artificial ingredients.

INTRODUCTION

Natural products are typically defined in the field of organic chemistry as organic compounds isolated from natural sources and produced by primary or secondary metabolic pathways. In the field of medicinal chemistry, the definition is frequently narrowed down to secondary metabolites. Secondary metabolites are not required for survival, but they do provide an evolutionary advantage to organisms that produce them. Many secondary metabolites are cytotoxic and have evolved to be used as "chemical warfare" agents against prey, predators and competing organisms [1].

Primary metabolites are components of basic metabolic pathways that are required for life. They are linked to cellular functions such as nutrient assimilation, energy production and growth/development. They have a diverse species distribution that includes many phyla and in many cases, more than one kingdom. Carbohydrates, lipids,

amino acids and nucleic acids are examples of primary metabolites and they are the fundamental building blocks of life [2].

Respiratory and photosynthetic enzymes are examples of primary metabolites involved in energy production. Enzymes, in turn are made up of amino acids and non-peptidic cofactors that are required for enzyme function. Primary metabolites are also present in the basic structure of cells and organisms. Cell membranes (e.g., phospholipids), cell walls (e.g., peptidoglycan, chitin) and cytoskeletons are examples of these (proteins).

Vitamin B family members are primary metabolite enzymatic cofactors. Thiamine diphosphate, a form of vitamin B1, is a coenzyme for pyruvate dehydrogenase, 2-oxoglutarate dehydrogenase and transketolase, all of which are involved in carbohydrate metabolism. Vitamin B2 (riboflavin) is a component of FMN and FAD, both of which are required for many redox reactions. Vitamin B3 (nicotinic acid or niacin) is a component of the coenzymes NAD^+ and $NADP^+$, which are required for electron transport in the krebs cycle, oxidative phosphorylation and a variety of other redox reactions. Vitamin B5 (pantothenic acid) is a component of coenzyme a, which is essential for carbohydrate and amino acid metabolism as well as fatty acid and polyketide biosynthesis. Vitamin B6 (pyridoxol, pyridoxal and pyridoxamine) is an antioxidant [3].

Secondary metabolites, as opposed to primary metabolites, are optional and not absolutely necessary for survival. Furthermore, secondary metabolites are typically restricted to a small number of species. Secondary metabolites serve a variety of purposes. These include pheromones, which act as social signalling molecules with other members of the same species, communication molecules, which attract and activate symbiotic organisms, agents that solubilize and transport nutrients (siderophores, for example) and competitive weapons (repellents, venoms, toxins, for example) used against competitors, prey and predators. The function of many other secondary metabolites is unknown. According to one theory, they provide a competitive advantage to the organism that produces them. Another point of view is that, like the immune system, these secondary metabolites serve no purpose other than to keep the machinery running [4,5].

CONCLUSION

Carbohydrates are an essential source of energy for most living things. Furthermore, polysaccharides formed from simpler carbohydrates are important structural components of many organisms, such as bacterial and plant cell walls. Carbohydrates are the by-products of photosynthesis in plants and gluconeogenesis in animals. Initially, photosynthesis generates 3-phosphoglyceraldehyde, a three carbon atom sugar (a triose). Through the Calvin cycle, this triose can be converted into glucose (a six carbon atom sugar) or a variety of pentoses (five carbon atom sugars). Lactate and glycerol, two carbon precursors found in animals, can be converted into pyruvate, which can then be converted into carbohydrates in the liver.

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