

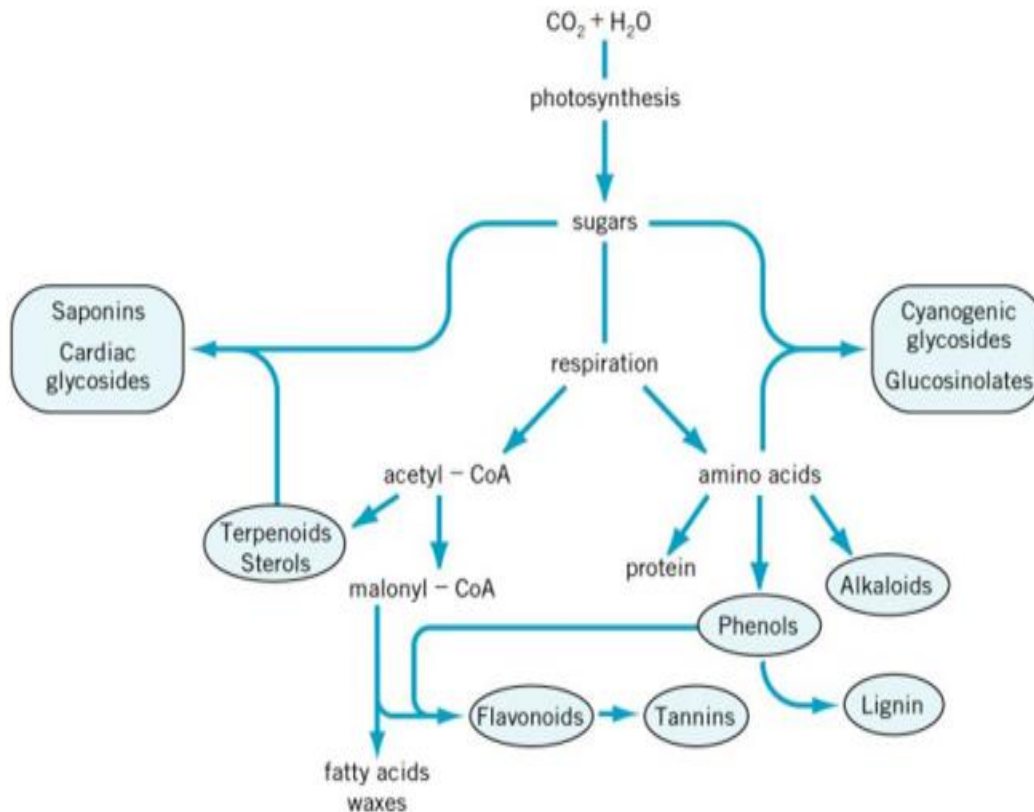
Secondary Metabolise

Metabolites are the intermediates and products of metabolism, are typically characterized by small molecules with various functions. The word metabolism is derived from the Greek word "Metabolismos" or from the French word *métabolisme*. Metabolism and metabolic pathways have been studied over several centuries and has moved from examining whole animals in early studies, to examining individual metabolic reactions in modern biochemistry and molecular biology.

What are metabolise- Metabolites are the intermediates & products of metabolism. The term metabolite is usually restricted to small molecules. A primary metabolite is directly involved in the normal growth, development, and reproduction. Metabolites can be categorized into following

1. **Primary metabolites-** A primary metabolite is a kind of metabolite that is directly involved in normal growth, development, and reproduction. It usually performs a physiological function in the organism (i.e. an intrinsic function). A primary metabolite is typically present in many organisms or cells. examples of primary metabolites are carbohydrates, proteins, fats, vitamins, and nucleic acid components
2. **Secondary metabolites-** Secondary metabolites are considered to be the end products of primary metabolites because they are derived by the pathways in which the primary metabolites involve. For eg., antibiotics, toxins, pheromones, enzyme inhibitors, etc. Streptomycetes and related actinomycetes are the sources of novel secondary metabolites.

Secondary metabolites are derived from primary metabolites



Major categories of secondary metabolites

1. Mycotoxins
2. Antibiotics
3. Alkaloid
4. Amino acids
5. Steroids
6. Vitamins

A. Mycotoxins refer to the toxic secondary metabolites. They are neither necessary for growth nor the development of the fungi. Some of these very severe effects on animal, plant and microbial systems (fungal food poisoning- mycointoxication).

Symptoms of a mycotoxicosis depend on:

The type of mycotoxin

The concentration

Age

Health and sex of the exposed individual

B. Antibiotics The term 'antibiotic' was coined by selman waksman in 1942. The secondary metabolites isolated from microbes and exhibits either antimicrobial(antibacterial, antifungal, antiprotozoal), antitumor and antiviral activities used to be called as antibiotics. It is used to treat infections caused by microorganisms, including fungi and protozoa

- a. Penicillin- Penicillin is an antibiotic. It is used to treat infections caused by bacteria. It does not work on viral infections (such as colds and flu).
- b. Cephalosporins- Cephalosporins are beta-lactam antimicrobials used to manage a wide range of infections from gram-positive and gram-negative bacteria. The five generations of cephalosporins are useful against skin infection, resistant bacteria, meningitis, and other infections.
- c. Streptomycin- **Streptomycin** is an antibiotic medication used to treat a number of bacterial infections, including tuberculosis, Mycobacterium avium complex, endocarditis. Streptomycin injection is used to treat moderate to severe bacterial infections in many different parts of the body.
- d. Griseofulvin- Griseofulvin is used to treat skin infections such as jock itch, athlete's foot, and ringworm; and fungal infections of the scalp, fingernails, and toenails. This medication is sometimes prescribed for other uses; ask your doctor or pharmacist for more information.

C. Alkaloids are a group of naturally occurring chemical compounds which mostly contain nitrogen atoms. Beside carbon and hydrogen molecules of alkaloids may contain-
• Sulfur • Rarely chlorine • Bromine Or phosphorus.

D. Steroid is a biologically active organic compound with four rings arranged in a specific molecular configuration

- I. Rhizopus arrhizus :- hydrolyzes progesterone forming another steroid— with introduction of oxygen. Cunninghamella blakesleeana :- can hydroxylate steroid corticosterone to— form hydrocortisone.
- II. Rhizopus nigricans :- numerous similar transformations are carried out— to produce various steroid derivatives for medicinal uses.

E. Vitamins

- I. Riboflavin (B2) Ashbya gossypii- Riboflavin (also known as vitamin B2) is one of the B vitamins, which are all water soluble. Riboflavin is naturally present in some foods, added to some food products, and available as a dietary supplement.
- II. L-Sorbose Gluconobacter oxidans- Sorbose is a natural product found in Carica papaya and Panax ginseng with data available. A ketose sugar that is commonly used in the commercial synthesis of ASCORBIC ACID. Sorbose is a ketohexose often involved in the commercial production of vitamin C. It has been found to occur naturally in grapes. It has a role as a plant metabolite.

III. Vitamine B12 Propionibacterium shermanii, Streptomycin, Aureomycin- Vitamin B12 is an essential vitamin found in foods such as meat, fish, and dairy. It can also be made in a lab and is often taken with other B vitamins. Vitamin B12 is required for the function and development of many parts of the body, including the brain, nerves, and blood cells.

F. Aminoacid- Amino acids are molecules that combine to form proteins. Amino acids and proteins are the building blocks of life. When proteins are digested or broken down, amino acids are left.

- a. Tryptophan Escherichia coli- Tryptophan is an amino acid needed for normal growth in infants and for the production and maintenance of the body's proteins, muscles, enzymes, and neurotransmitters. It is an essential amino acid. This means your body cannot produce it, so you must get it from your diet.
- b. Threonine Streptomyces racemosus- Threonine mainly serves as a substrate for protein synthesis, particularly mucin. In addition, Thr can enter the catabolic pathway, where it can be metabolized to a variety of important products (glycine, acetyl CoA, pyruvate) that play a crucial role in host metabolism.
- c. Phenyl alanine Corynebacterium glutamicus- Phenylalanine is an essential aromatic amino acid in humans (provided by food), Phenylalanine plays a key role in the biosynthesis of other amino acids and is important in the structure and function of many proteins and enzymes.