TERPENOIDS

Primary Metabolite	Secondary Metabolites
1) Primary metabolites are essential for life process. (Growth of the cells)	These are non-essential.
2)These are identified universally, throughout the source.	These are seldom, like in some portions of the source, like steam, bark, etc.
3) These are produced continuously during the growth phase and are involved in primary metabolic processes such as respiration and photosynthesis, etc	These compounds do not have a continuous production. However they are produced during non-growth phase of cells. (Synthetically).
4) Heavy mol.wt compounds.	Low mol.wt compounds.
5) Structure cannot be drawn.(Undefined)	Can be drawn. (Defined)
6) DNA, Proteins, carbohydrates, and lipids are the main primary metabolites.	Alkaloids, Terpenoid, phenolics, sterols, steroids, essential oils and lignins, etc

Definition

- Terpene – german word – terpentin – mixture of isomeric hydrocarbon occur in turpentine.
- The oxygenated derivatives of these hydrocarbon like alcohol, aldehydes, ketones were called as camphor.
- When terpenes are modified chemically the resulting compounds are terpenoids.

- Terpene represents only hydrocarbon of molecular fomula $[C5H8]_2$.
- Terpenoids with general formula [C5H8] n as well as their oxygenated, hydrogenated and dehydrogenated derivatives.
- Terpenoids are optically active.

- The suffix ene signifies unsaturated hydrocarbon so it is inappropriate to include the compounds such as alcohols, aldehydes and ketones.
- The terpenoids composed of isoprene units they are called as isoprenoids.
- Major terphenoids occur in plant kingdom but few obtain from other source.

- Most of the fragrance component of plant are volatile and isolated by steam distillation is called as essential oil.
- Due to their pleasant smelling nature the mono and sesquiterpenoids are of considerable commercial importance particularly in perfumery.

Essential oil	Terpenoids
Turpentine	Pinene
Caraway	Carvone
Coriander	Linalol, pinene
Eucalyptus	Cineole
Lemon	D-Limonene
Peppermint	Menthol

- The di and tri terpenoids are non volatile obtained from gums and resins of plant without perfumery value.
- The tetra terpenoids constitute a group of compounds called carotenoids
- Rubber is the most important polyterpenoid

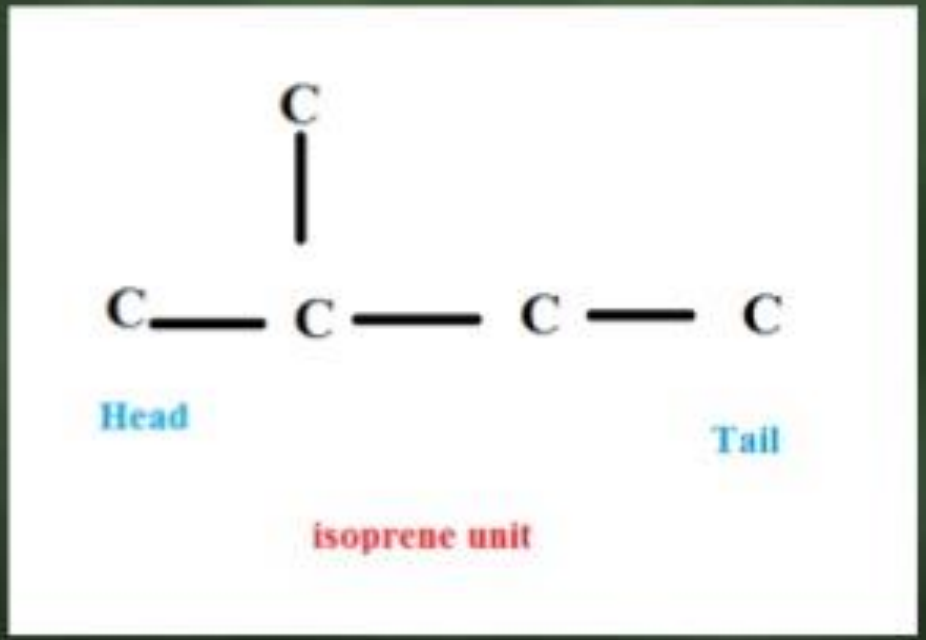
Why terpenoids in pharmacy?

- Terpenoids shows biological activity like insecticidal, anthelmintic and antiseptic action thus useful in pharmacy.

Properties

- Colorless liquid lighter than water.
- Boils between 150 – 180 ◦ C
- Few are solids
- Optically active
- Unsaturated compound with one or more double bond.
- It undergoes addition reaction, Polymerization and dehydrogenation

- Thermal decomposition yield isoprene.

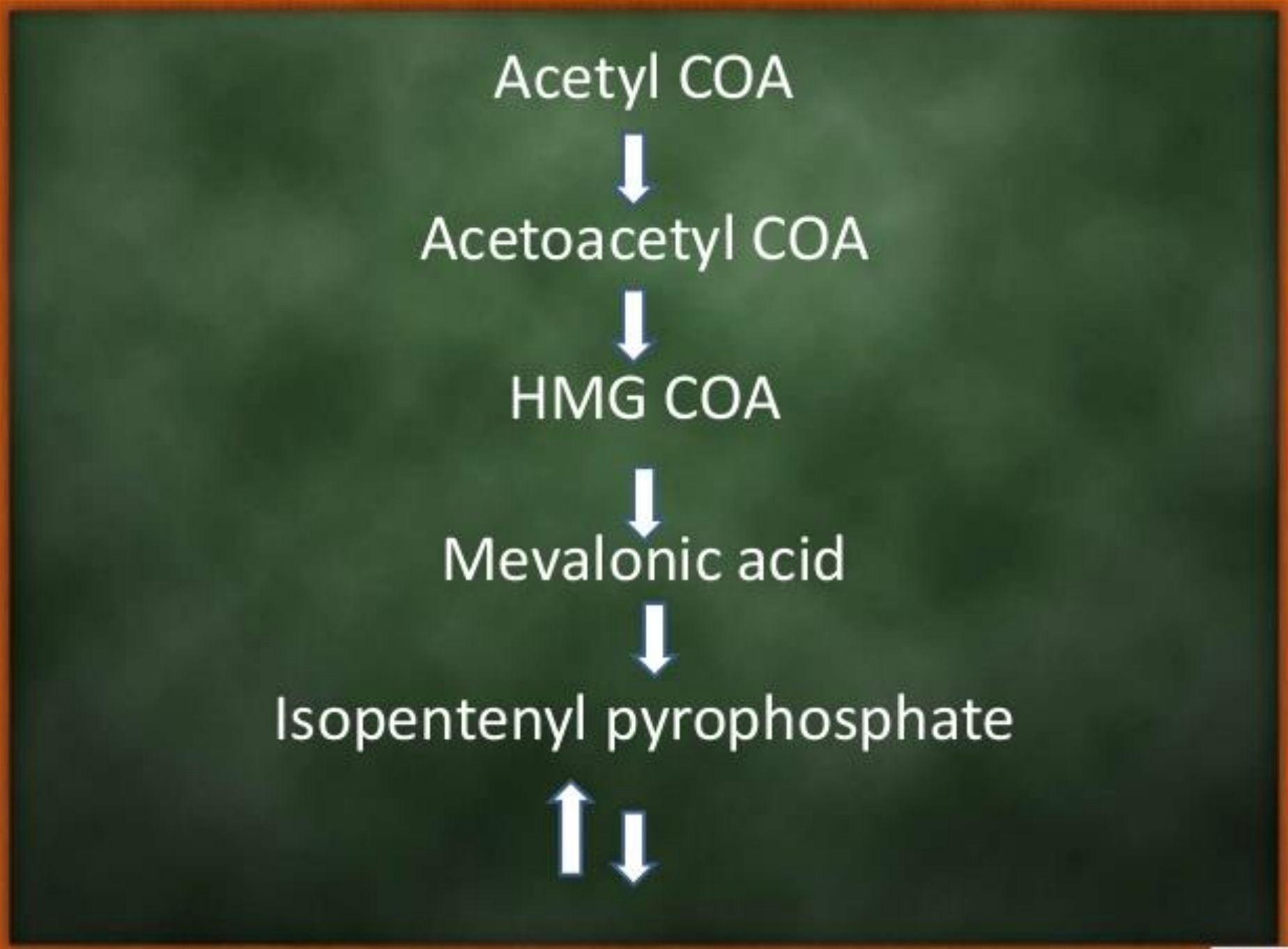


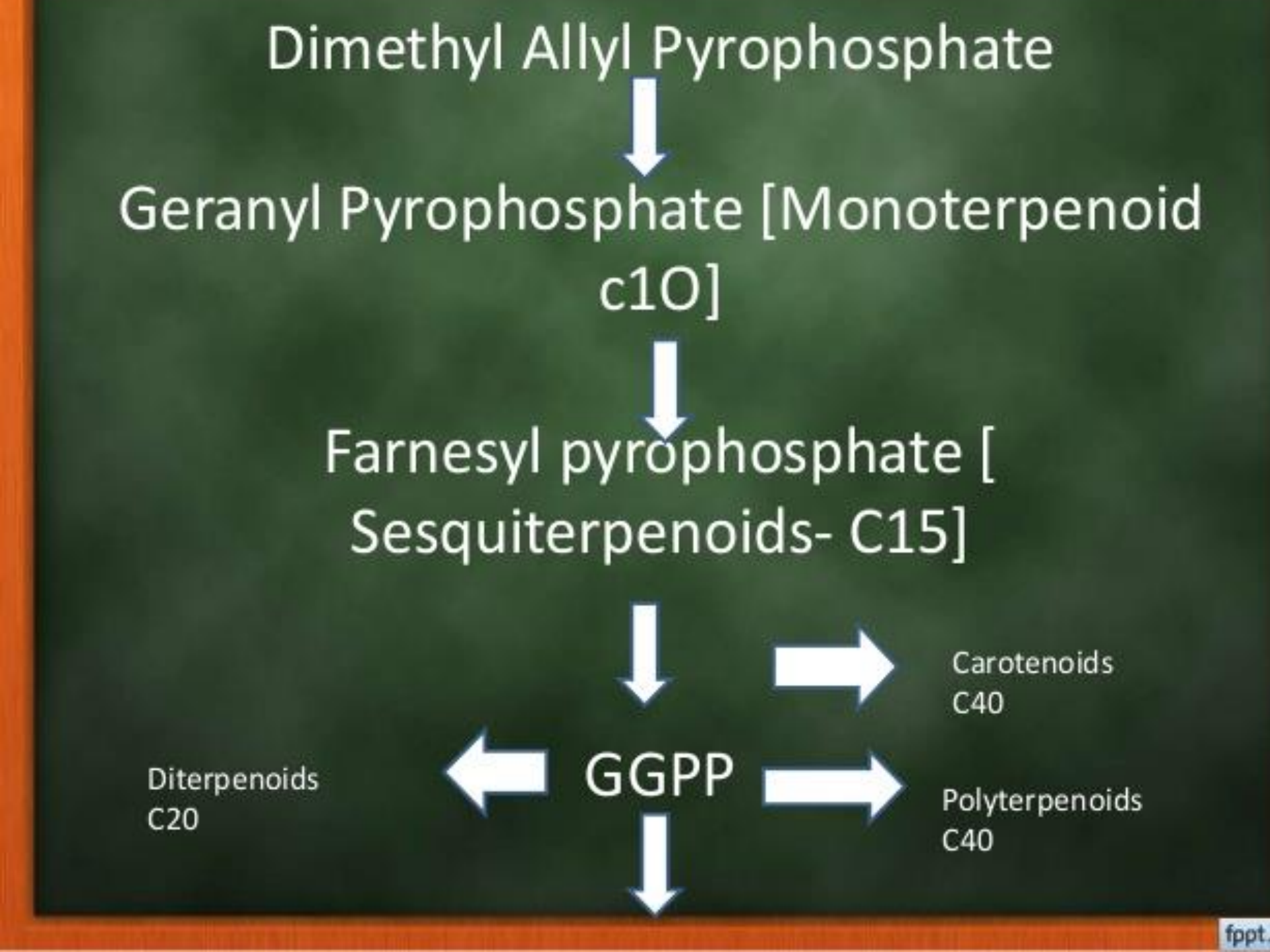
Classification based on number of isoprene unit

Terpenoids	no of isoprene	Molecular formula
Hemiterpene or isoprene	1	C5H8
Monoterpenoids	2	C10H16
Sesquiterpenoids	3	C15 H24
Diterpenoids	4	C20 H32
Sesterterpenoids	5	C25H40
Triterpenoids	6	C 30 H48
Tetraterpenoids	8	C40H64
Polyterpenoids	n	[C5H8]n

Terpenoids subdivided into subclasses according to number of rings present in the molecule

- Acyclic terpenoid– open chain-citral
- Monocyclic terpenoid – one ring - limonene
- Bicyclic terpenoid – two ring - camphor
- Tricyclic terpenoid- three ring
- Tetracyclic terpenoid – four ring


Acetyl COA
Acetoacetyl COA
HMG COA
Mevalonic acid
Isopentenyl pyrophosphate


Dimethyl Allyl Pyrophosphate
Geranyl Pyrophosphate [Monoterpenoid c1O]
Farnesyl pyrophosphate [Sesquiterpenoids- C15]
GGPP
Carotenoids C40
Diterpenoids C20
Polyterpenoids C40

Geranyl farnesyl pyrophospate

Sesterpenoids C25

Geranyl pyrophosphate act as a key intermediate in the biosynthesis of about 40 terpenoids

THANK YOU ALL