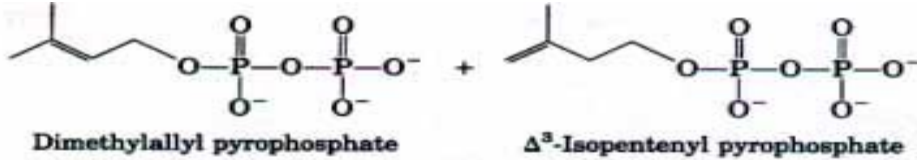
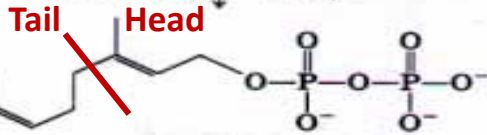


Figure 3-3
red.



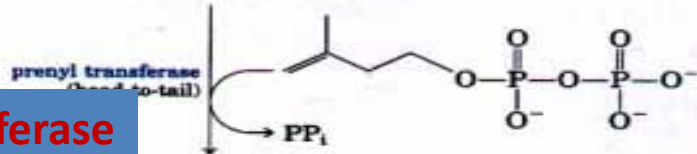
Prenyl transferase

prenyl transferase
(head-to-tail
condensation) → PP_i



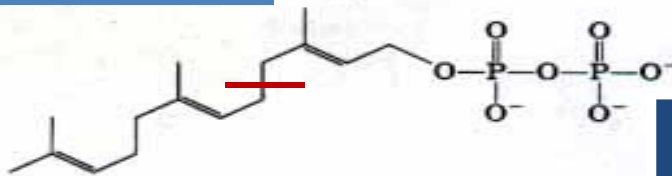
C10

Geranyl pyrophosphate



Prenyl transferase

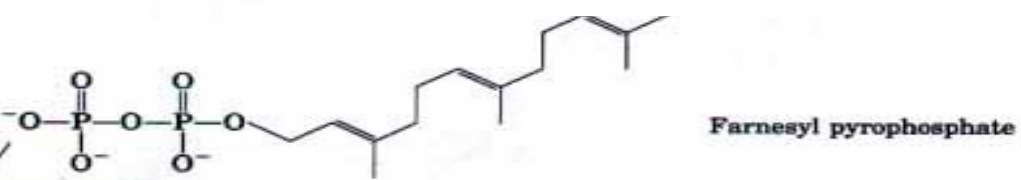
Isopentenyl pyrophosphate



Farnesyl pyrophosphate

C15

Squalene synthase
Head to Head

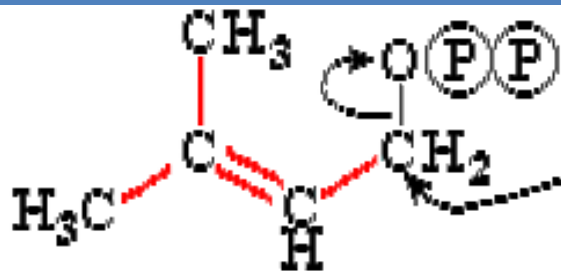


C30

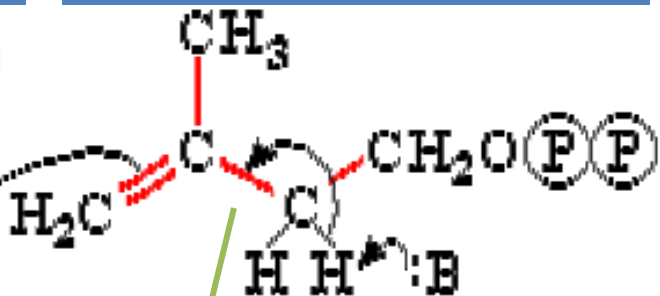
Squalene

③ **Condensation of Six Activated Isoprene Units to Squalene**
 Isopentenyl pyrophosphate and dimethylallyl pyrophosphate undergo a "head-to-tail" condensation in which one pyrophosphate is displaced and a 10-carbon chain, **geranyl pyrophosphate**, is formed (Fig. 20-34). (The "head" is the end to which the next unit is joined.) Geranyl pyrophosphate undergoes another head-to-tail condensation with isopentenyl pyrophosphate, yielding the intermediate **farnesyl pyrophosphate**. Finally, two farnesyl pyrophosphate molecules join head to head, with the elimination of two pyrophosphate groups, forming **squalene** (Fig. 20-35). The names of these compounds derive from the sources from which they were first isolated. Geraniol, a component of rose oil, is named after geraniums, and farnesol is a scent found in the flowers of the acacia. Many natural scents of plant origin are derived from these compounds.

Dimethylallyl pyrophosphate

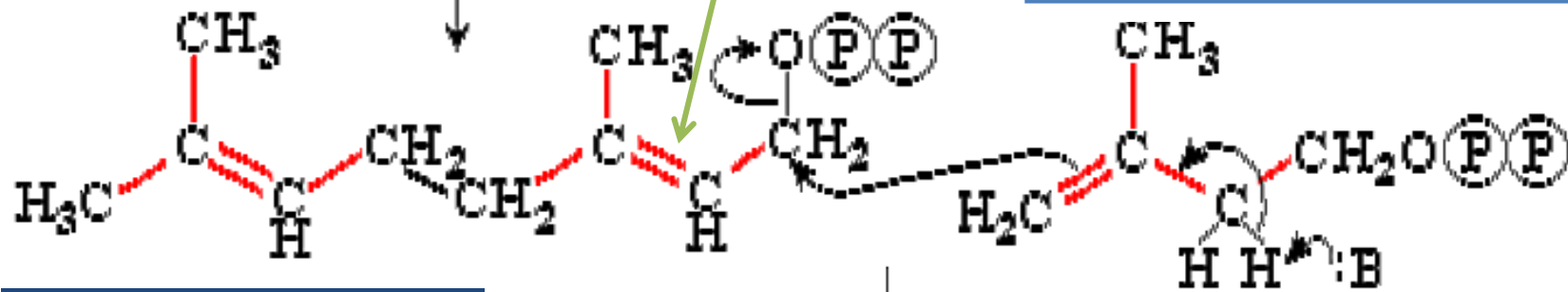


Isopentenyl pyrophosphate



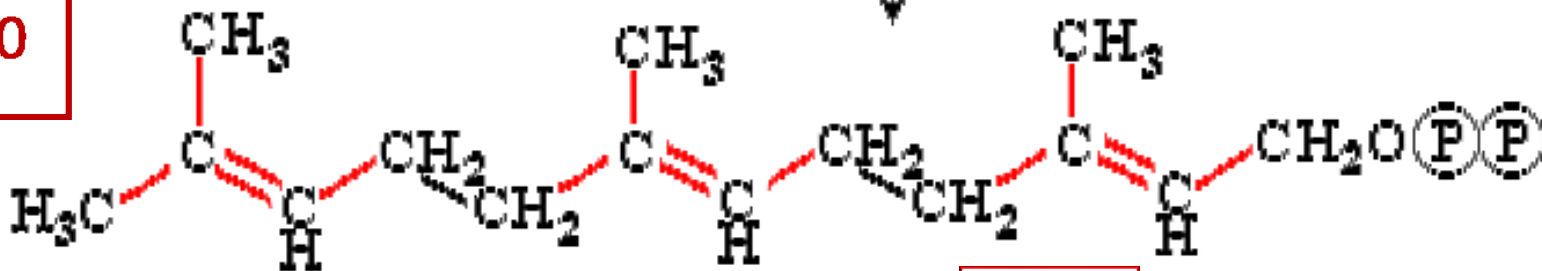
Elimination of the pyrophosphate creates a **carbocation**, which then reacts with isopentenyl double bond; the enzyme then removes a proton from C-2 of the isopentenyl.

Isopentenyl pyrophosphate



Geranyl pyrophosphate

C10



Farnesyl pyrophosphate

C15

Prenyl transferase links up isoprenyl units by *condensation-elimination of pyrophosphate*

Prenyl transferase starts with one unit of dimethylallyl pyrophosphate, and arrange in a line the pyrophosphate (head end) with the terminal double bond of isopentenyl pyrophosphate (tail end).

Elimination of the pyrophosphate (a good leaving group) creates a **carbocation**, which then reacts with isopentenyl double bond; a basic group in the enzyme then removes a proton from C-2 of the isopentyl.