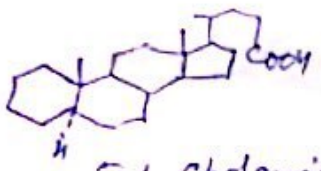
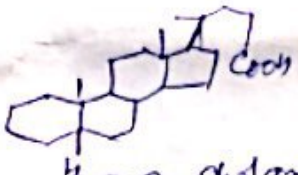
M.Sc. IV Sem. Swami Vivekanand Natural Products (1)
H-4016.
Dr. P.K. Sharma. 11-4-20

BILE ACIDS

Liver secrets a golden viscous blue fluid, which is known as bile. It contains organic substances as well as inorganic ions, dissolved in it. They occurr as sodium salt of glycine or Taurine. Bile acids are hydroxy derivatives of cholanic or allocholanic acid. Based on the number of OH groups present in a molecule, these are divided as mono, di or trihydroxy derivatives.



5-α- cholanic acid
I (allo cholanic acid)



5-β- cholanic acid
II

All the bile acids are found to contain above basic substances, The configuration of OH group is α.

① Monohydroxy cholanic acid — lithocholic acid

② Dihydroxy cholanic acid < Chenodeoxy cholic acid (30–50%)
Deoxy cholic acid (5–25%)

③ Trihydroxy cholanic acid — Cholic acid – (25-60%)

Chemistry of Bile Acids

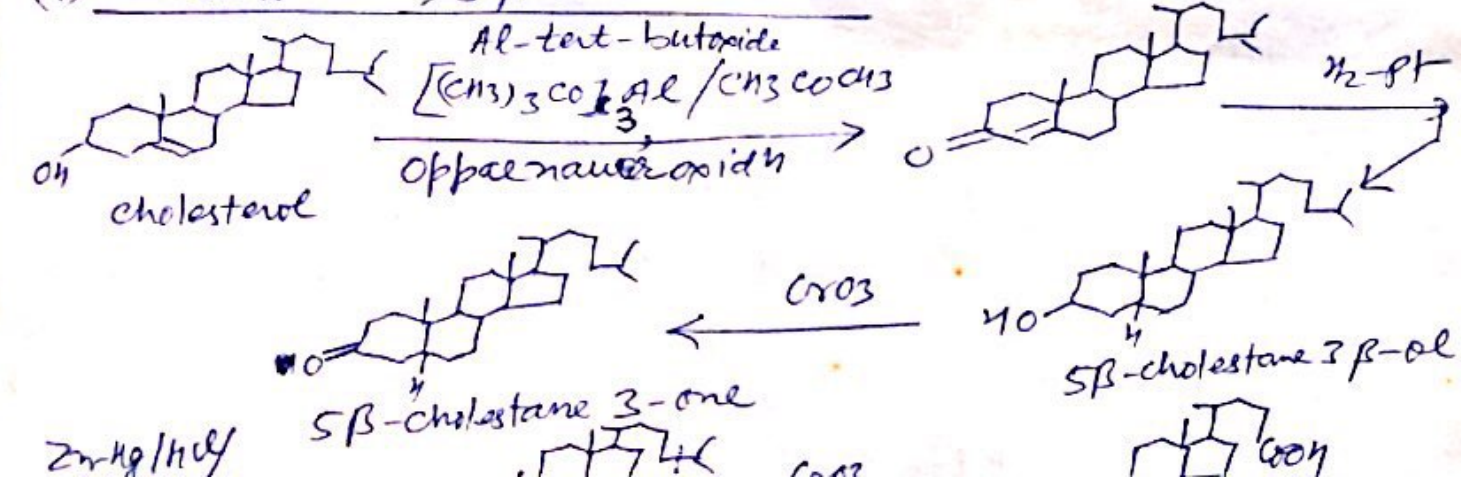
① Prove that Sterols and Bile Acids have common nucleus.

(i) cholesterol ⟶ 5β- cholanic acid

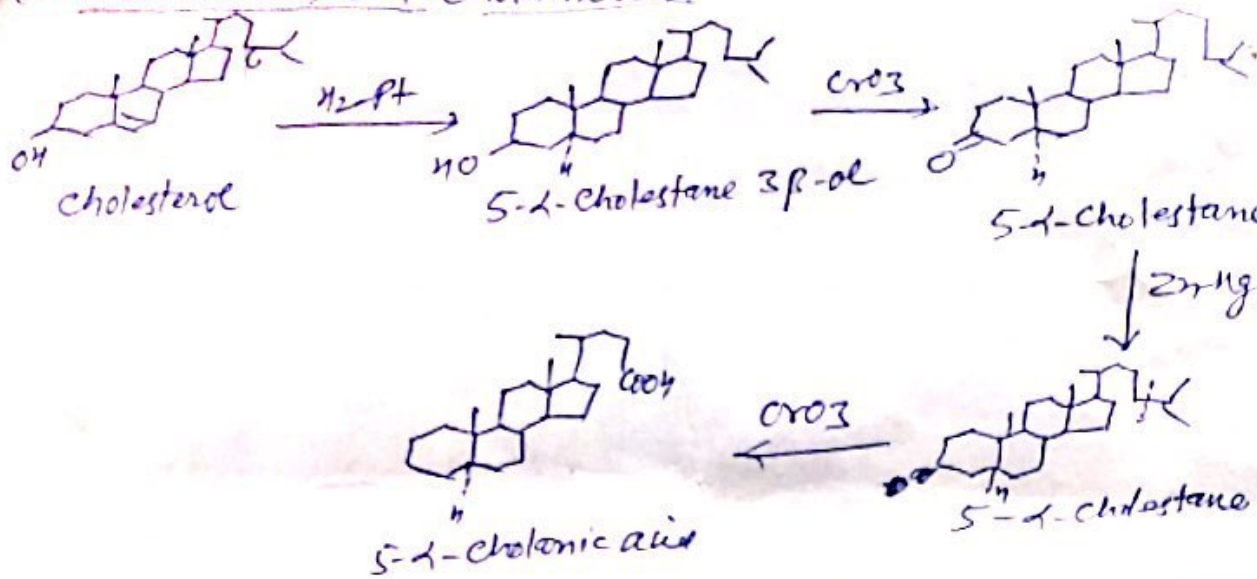
(ii) cholesterol ⟶ 5α- cholanic acid

(iii) lithocholic acid ⟶ 5β-cholanic acid

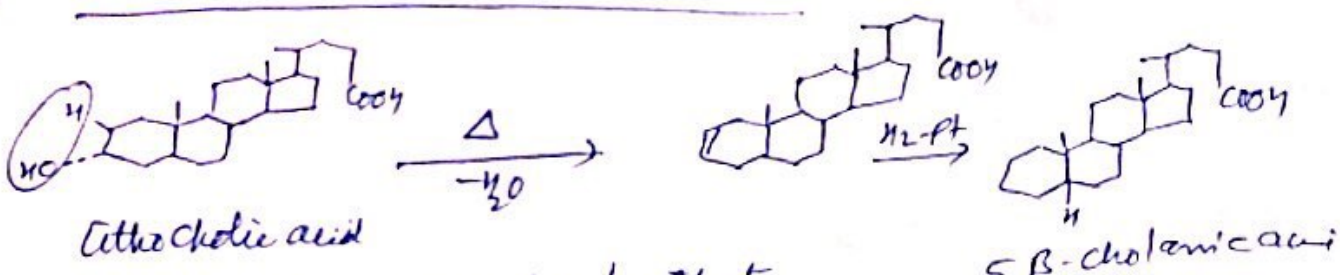
(i) cholesterol ⟶ 5β-cholanic acid



(ii) Cholesterol → 5-α-cholanic acid



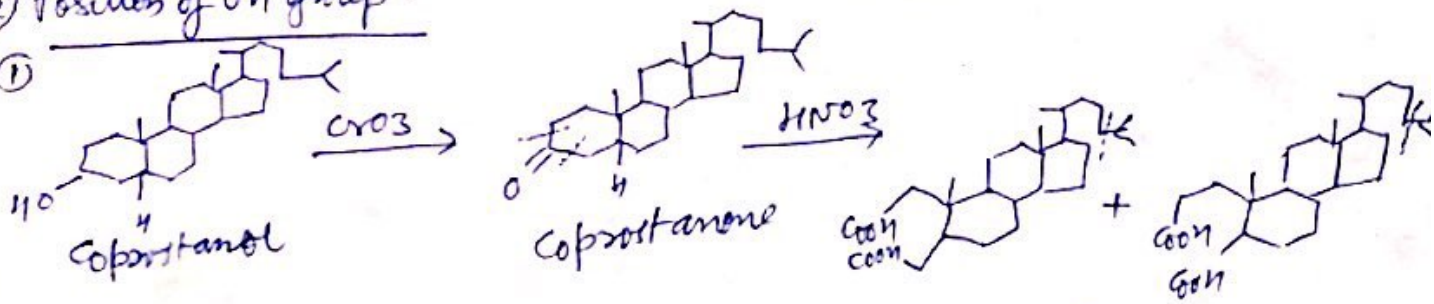
(iii) Lithocholic acid → 5β-cholanic acid

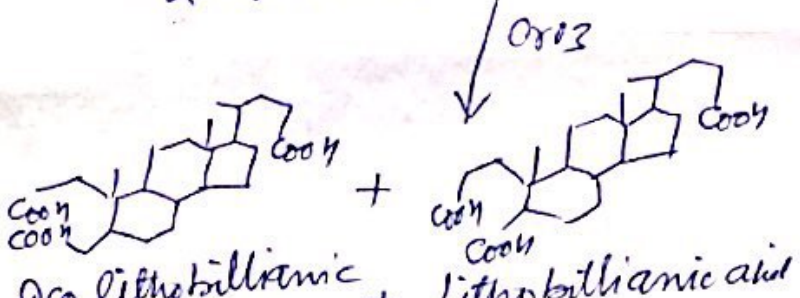


The above reaction proves clearly that bile acids and sterols have common nucleus.

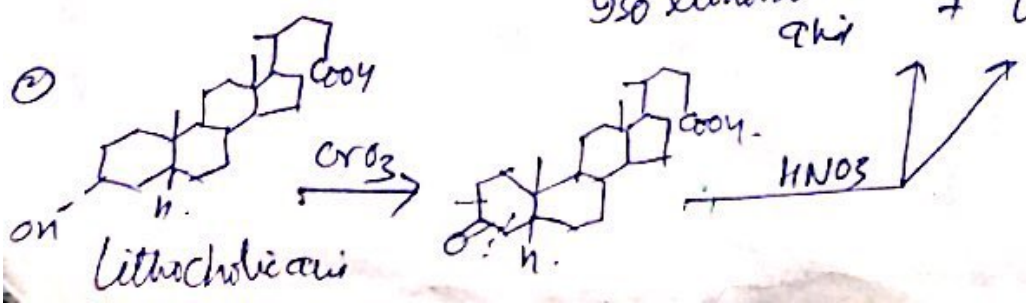
2) Position of OH group.

①





②

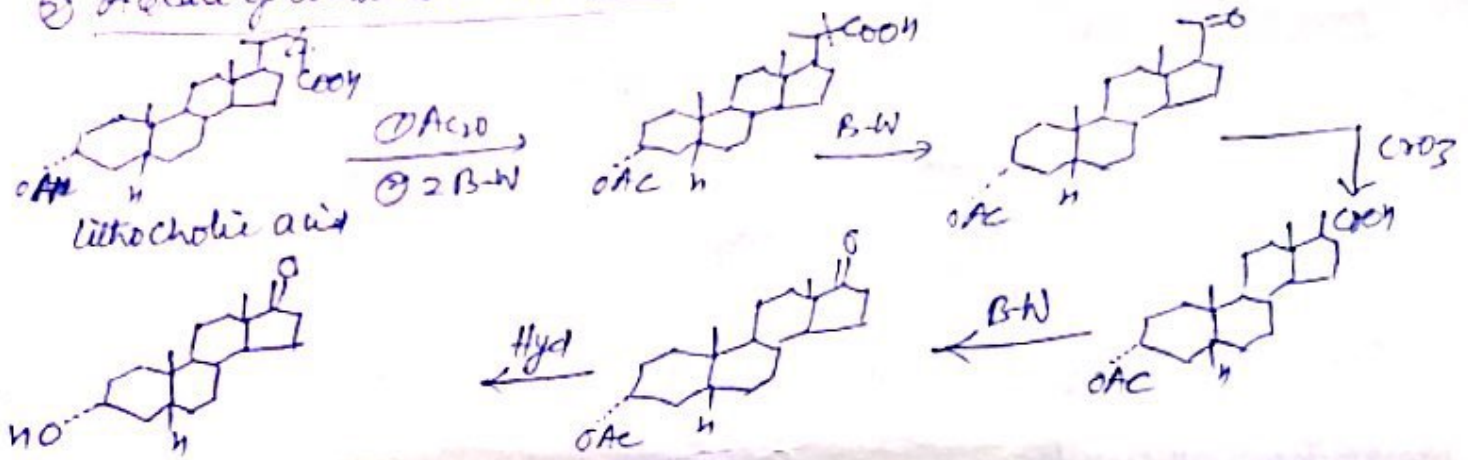


Coprostanol can be converted into two bis dicarboxylic acids which on further oxidn with CrO_3 form a mixture of two tricarboxylic acids, Lithobilliamic and Isolithobilliamic acids. The same tricarboxylic acids are obtained by oxidn of lithocholic acid, proving identical position of OH groups of Lithocholic acid and Coprostanol. Thus OH group is present at C-3 in Lithocholic acid.

(3) Configuration of OH group:

① Epi-Coprostanol → 5β androsterone (OH as α)
(3α-hydroxy 5β cholestane)

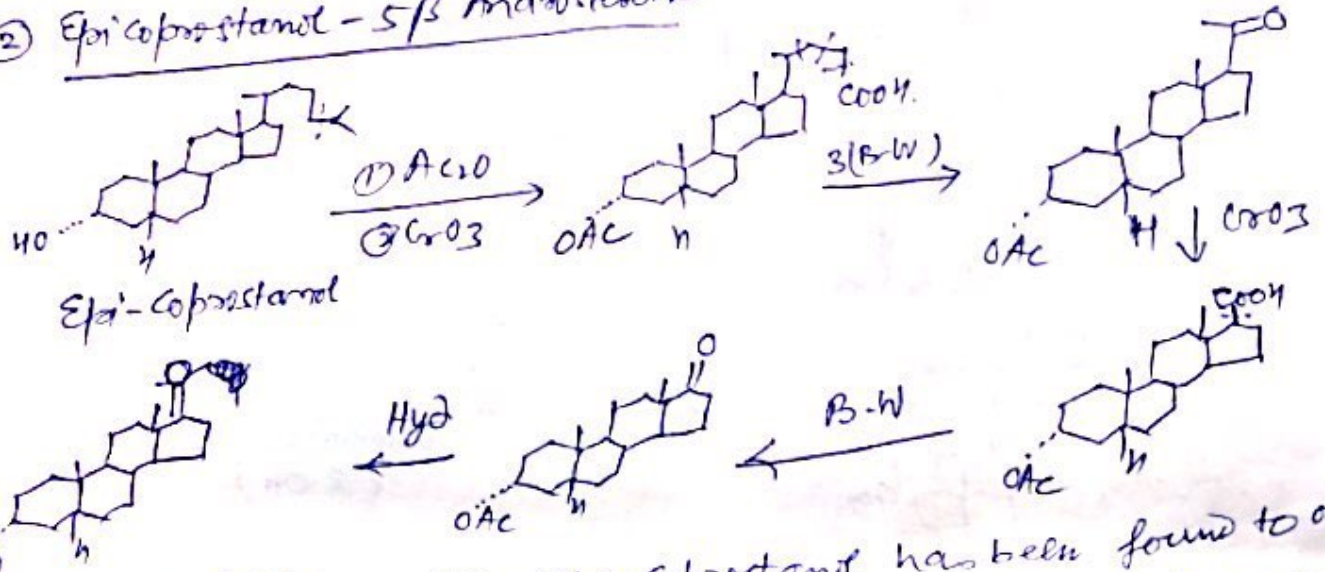
② Acetate of Lithocholic acid



Lithocholic acid

5-β Androsterone

② Epicoprostanol – 5β Androsterone



Epi-Coprostanol

5β-Androsterone

Since Epi-Coprostanol has been found to occur in α-configuration, therefore, lithocholic acid, too, will show α-configuration of OH group.

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