

Liver

lies in upper abdomen, below the diaphragm

[DEPTH OF BIOLOGY]

Anatomy

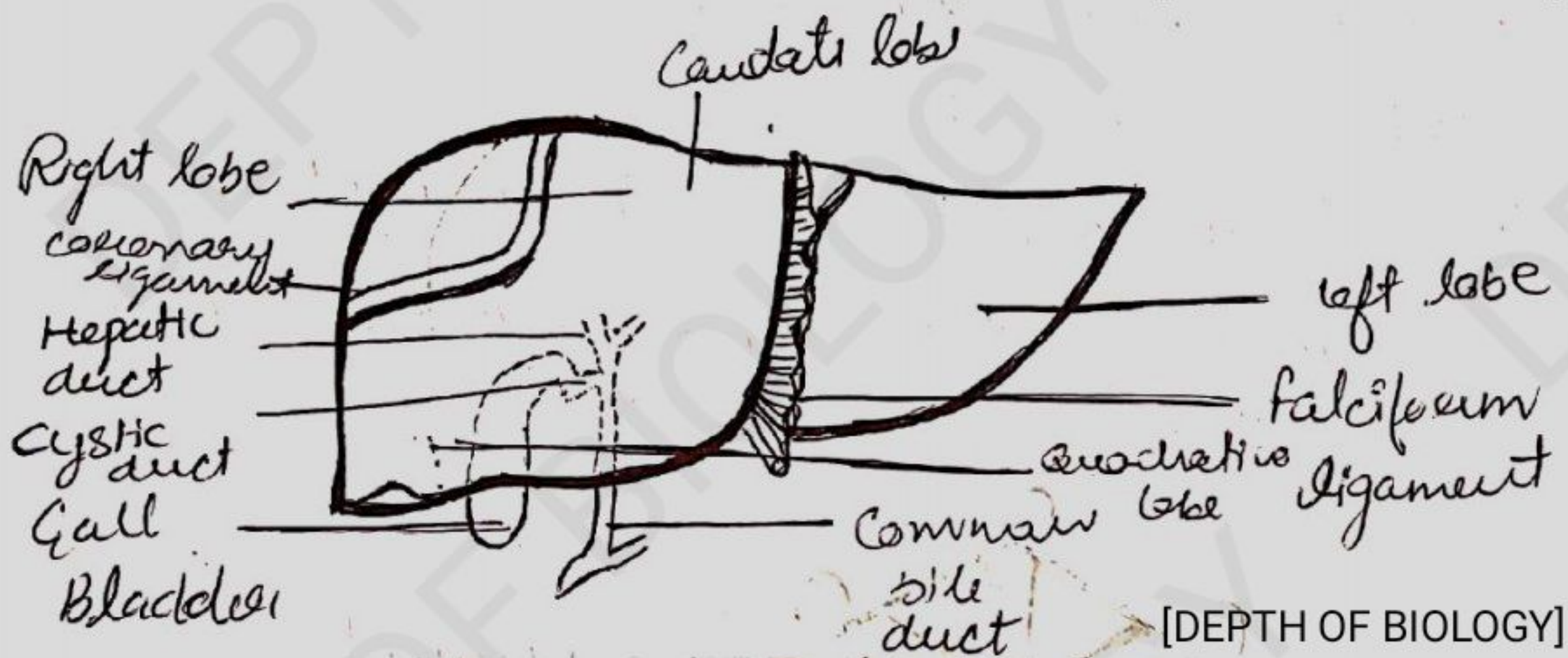
coverings — covered by 2 layers of membranes.

outermost → visceral peritoneal

inner layer → Dense Irregular C.T.

Outer structure

[DEPTH OF BIOLOGY]



- Right lobe
 - Caudate lobe
 - Quadrate lobe

Internal Structure (Histology)

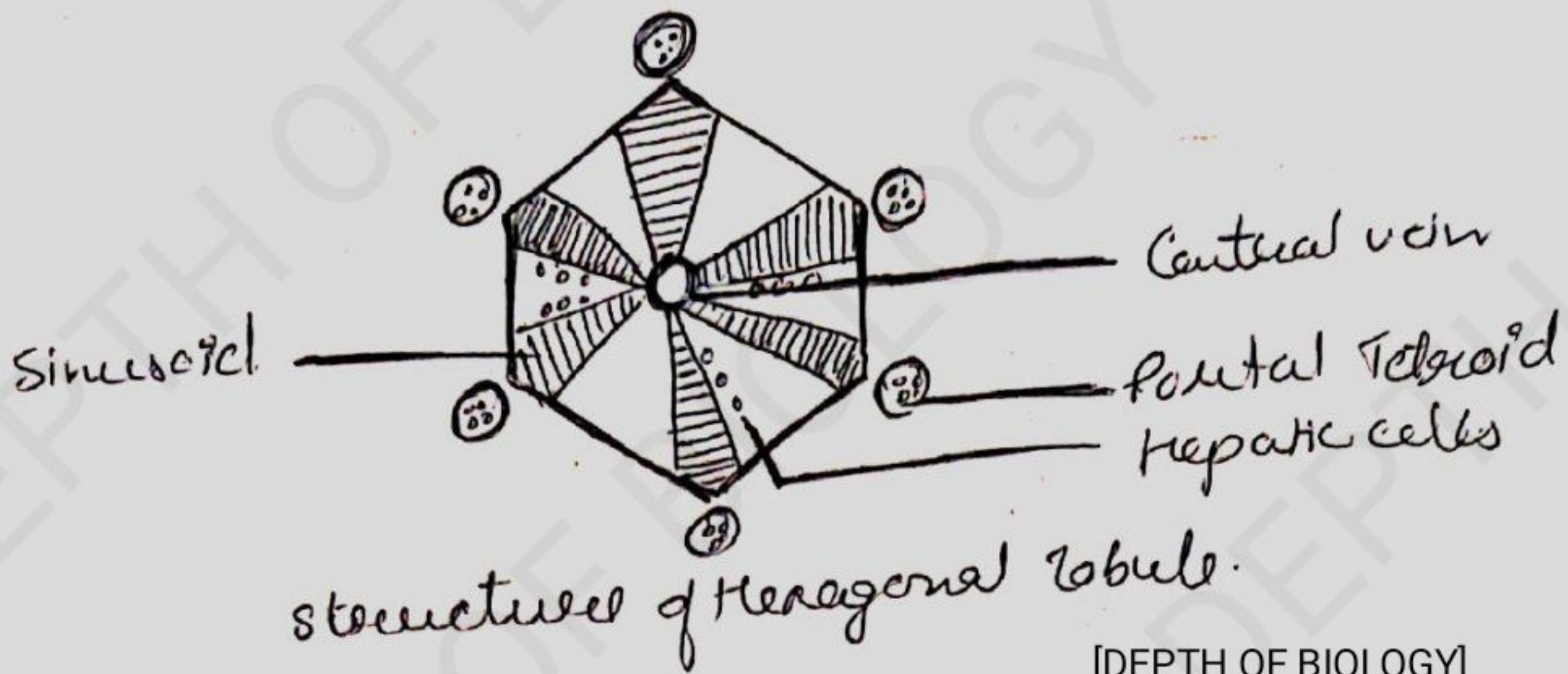
lobules → The lobes of liver are made up of many functional units are called lobules.

* Each lobule has a hexagonal structure

1. Central vein
2. Sinusoid
3. Portal Triad
4. Hepatic cells.

[DEPTH OF BIOLOGY]

Depth of Biology

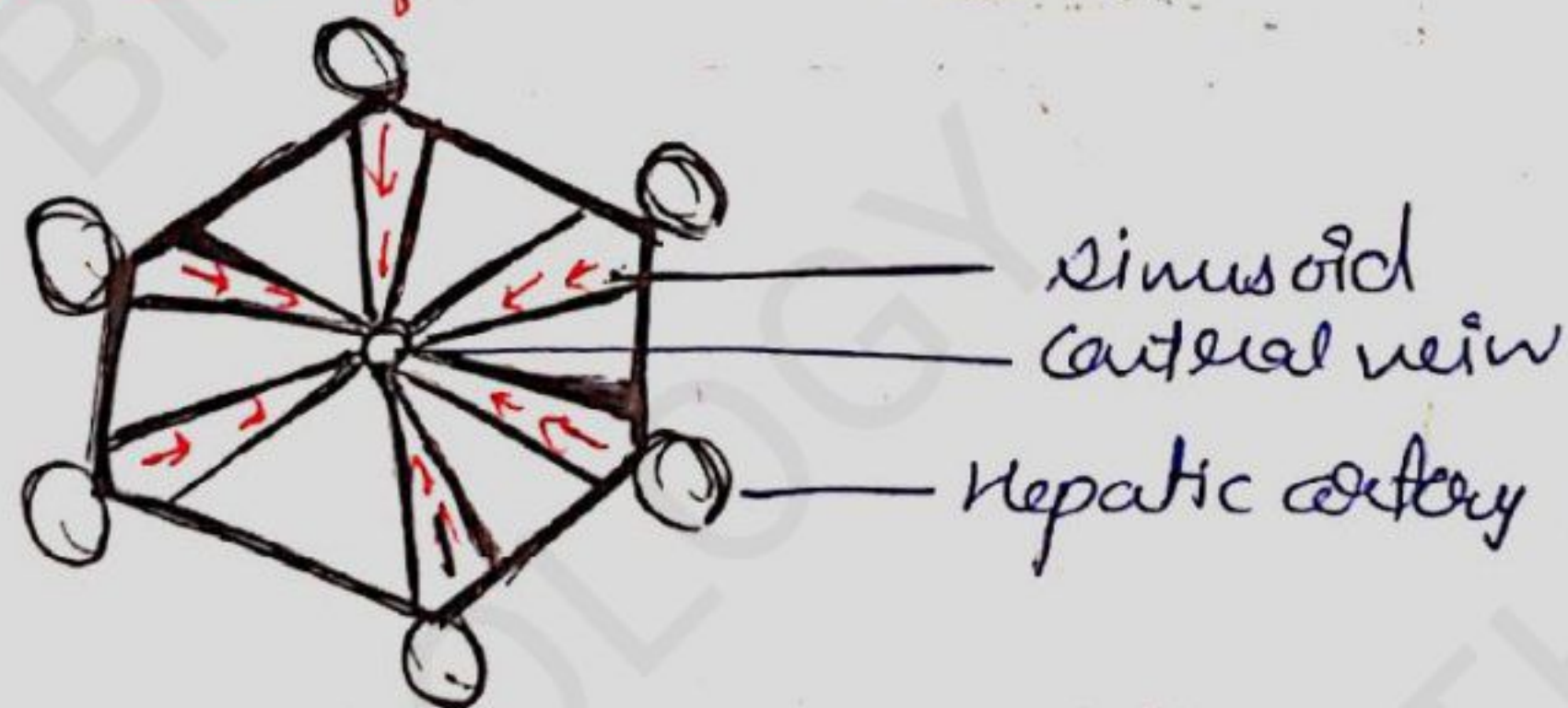


[DEPTH OF BIOLOGY]

① Central Vein

- In the center of each hexagonal lobule there is a central vein present.
- Hepatic artery drain the blood in sinusoid.
- Blood is moving from the periphery to the center
 - *centripetal blood flow in sinusoid*

[DEPTH OF BIOLOGY]



② Sinusoid

[DEPTH OF BIOLOGY]

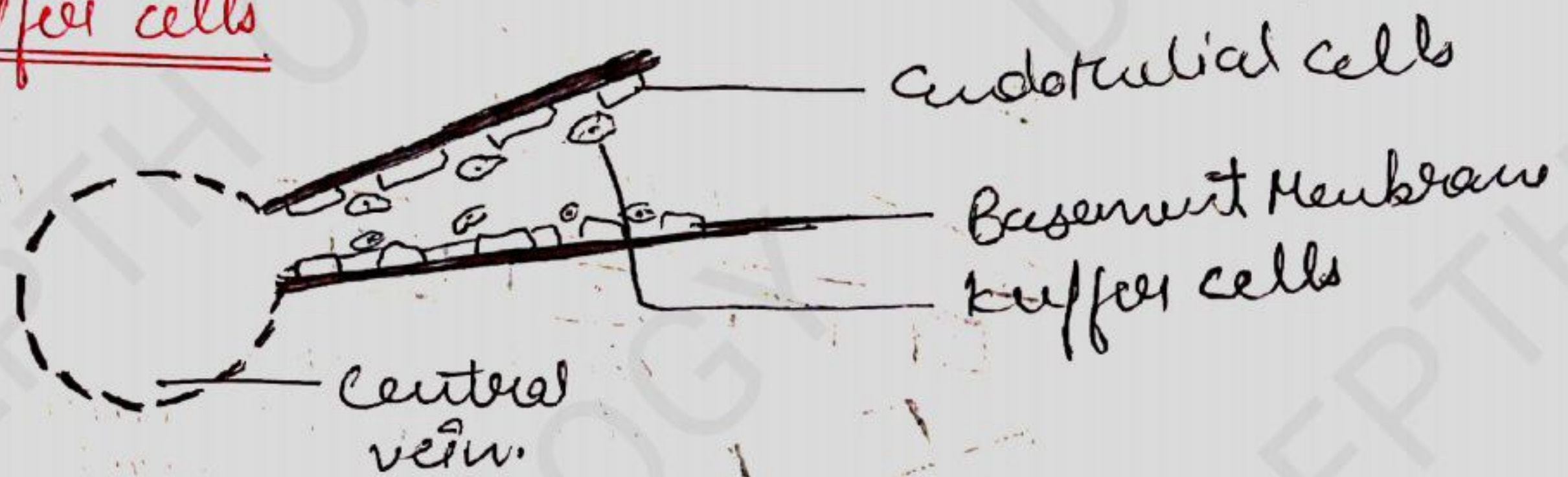
- These are wide gaps - wide diameter capillaries
- extended from outer part of classic lobules to the inner central vein.
- lined by endothelial cells.

Depth of Biology

Endothelial Cells.

are arranged on Basement membrane but basement membrane is discontinuous, it means B. membrane contains very very big gaps. [DEPTH OF BIOLOGY]

* Specific type of cells are present in these gaps these cells are physically fixed macrophage that are known as Kuffer cells



Kuffer cells - Kuffer cells remove fragment of broken RBCs in blood [DEPTH OF BIOLOGY]

• Sinusoids are very leaky in nature due to the porous basement membrane and wide gaps between endothelial cells.

3) Portal Tetrads

Every corner of Hexagonal lobule there are 4 duct present. that's why it is called as Portal Tetrads.

Four ducts present are

Portal vein → each lobule is made of veins

Bile duct → since bile juice is filled in it.

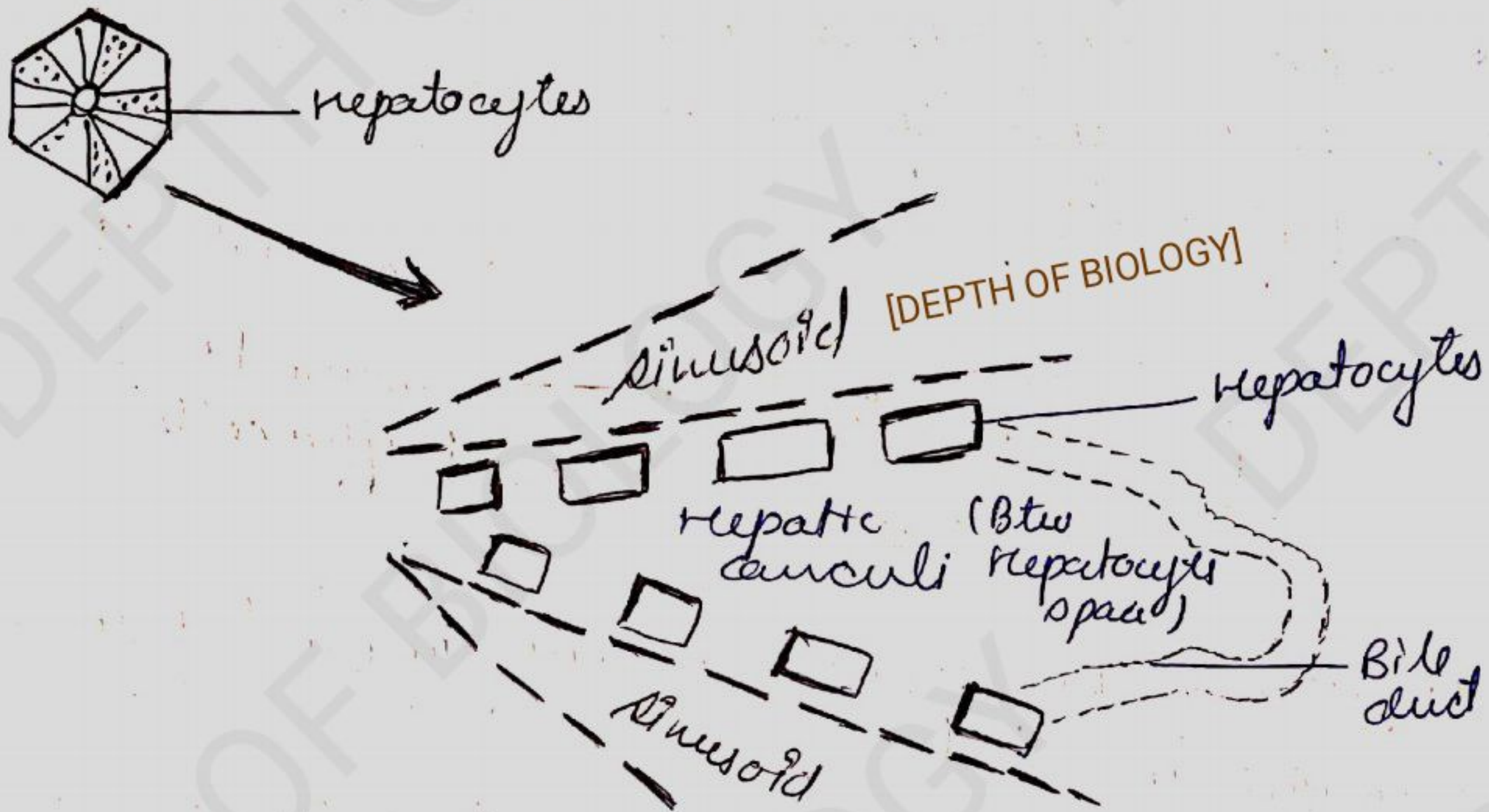
Lymphatic duct → lymph remains present here

Hepatic artery → liver get blood supplied through it

(4) Hepatocytes → Each lobule is made up of special type of cells called hepatocytes.

[Size → 20-30 μm → large cells]

[DEPTH OF BIOLOGY]



• space between hepatocytes and Basement Membrane is called a space of DISSE.

• space between hepatocyte rows is called Hepatic canaliculi. [DEPTH OF BIOLOGY]

• All hepatocyte together made a drainage system

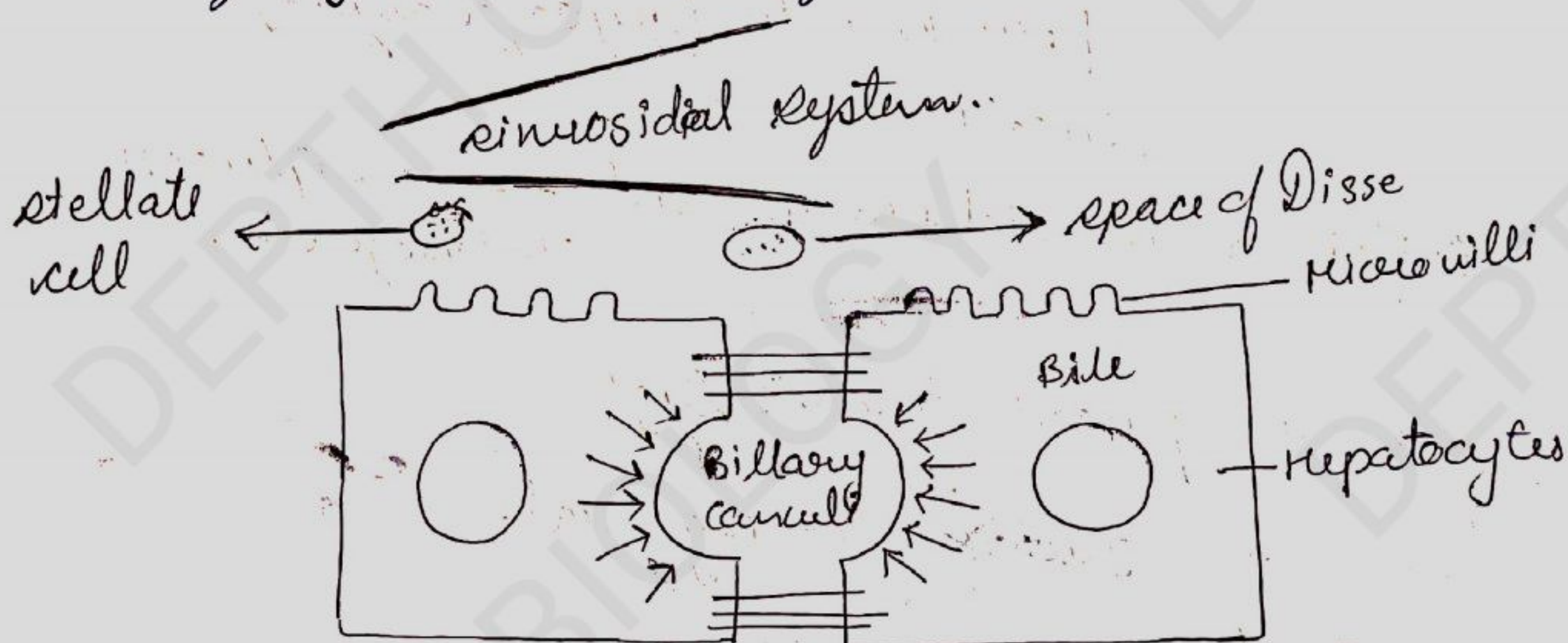
↓
called as Bile drainage system.

Depth of Biology

Bile Drainage System

→ The cell membrane of two adjacent cells are curved inside the cells and form a circular space, known as Biliary canaliculi. [DEPTH OF BIOLOGY]

→ The membrane above and below the circular space is tightly bind with tight Junction.



→ In the space of Disse there is also ⊕snt a specific type of cell which is known as stellate cell / Ido cell.

stellate cell / Ido cell

[DEPTH OF BIOLOGY]

It works in different condition in different ways.

In Normal conditional

↓
It act as storage cell

↓
store of fat vit. A

In Pathological condition

eg → in chronic hepatitis

It produce & secrete collagen

↓
Blocks sinusoidal pores

↓
less blood flow

[DEPTH OF BIOLOGY]

Depth of Biology

[DEPTH OF BIOLOGY]

Functions of Liver

Liver performs very vital functions →

① Carbohydrate Metabolism

Imp. in maintaining a Normal blood Glucose level

- when blood glucose level is low.

Liver glycogen

↓ breaks into [glycogenolysis]

Glucose [DEPTH OF BIOLOGY]

Certain amino acid + lactic acid → Glucose
gluconeogenesis.

- when glucose level is high

↓
Just after eating meal.

Glucose / Galactose → Glycogen
Glycogenesis

[DEPTH OF BIOLOGY]

② Lipid Metabolism

Liver stores some triglycerides Breakdown fatty acid into Acetyl-co-enzyme A.

Process is called β -Oxidation

→ Liver converts excess co-enzyme A into ketone bodies

→ Hepatocyte synthesize → Cholesterol

↓

[DEPTH OF BIOLOGY] use it to make bile salts.

Depth of Biology

Protein Metabolism

without the role of liver in protein metabolism death would occur in a few days. [DEPTH OF BIOLOGY]

Hepatocyte synthesize \longrightarrow most plasma protein

\downarrow
 α, β globulin
albumin, Prothrombin, Fibrinogen

i) Deamination \longrightarrow

Remove Amino ($-NH_2$) Group from Amino acid

[DEPTH OF BIOLOGY] \downarrow req. for the Production of

- ATP
- Synthesis of fat
- Synthesize of Carbohydrate

ii) Transamination \longrightarrow

Transfer of amino group ($-NH_2$) from amino acid to other substance.

iii) Urea formation \longrightarrow

To convert toxic ammonia ($-NH_3$) into much less toxic urea for excretion. [DEPTH OF BIOLOGY]

Ammonia in Body

\downarrow
By two ways

(a) As by product of chemical reaction in the body

(b) Produced by bacteria present in the GIT

Depth of Biology

④ Removal of Drug and Hormones.

↓
Liver detoxify substance
↓
Alcohol

* Liver excrete some drugs

↓
Penicillin
Erythromycin
Sulfonamide } Into
Bile

[DEPTH OF BIOLOGY]

↓
Alter and Excrete

↓
Thyroid Hormone
steroid Hormone

↓
Estrogen
Aldosterone.

[DEPTH OF BIOLOGY]

⑤ Secretion and synthesis of Bile.

⑥ Carbohydrate metabolism

⑦ Synthesis of Heparin

⑧ Synthesis of Vit. A.

⑨ Detoxification

⑩ Haemopoiesis

⑪ Udk synthesis.

⑫ Purification of Blood

⑬ Synthesis of Plasma protein

⑭ Storage of fats

⑮ Deamination and urea formation

⑯ Liver stores vit. A, D, E, K, B₁₂

⑰ Activation of AD (VITAMIN)

⑱ Heat Regulation.

⑲ Phagocytosis.

[DEPTH OF BIOLOGY]