Respiratory System

- Cell continously use oxygen for the metabolic reaction that release energy from nutrient molecule and produce ATP.
- At the same time these even release CO_2.
- Since an excessive amount of CO_2 produce acidity that is toxic to cells,
  The excess CO_2 must be eliminated quickly and efficiently.
- The 2 system that coperate to supply O_2 and eliminate CO_2 are the cardio-vascular system and the respiratory system.
- The respiratory system provide gas for exchange, whereas cardiovascular system, transport the gasses in the blood b/w the lungs and Body cells.

- Inaddition to functioning in gas exchange, the respiratory system also contains ⟶
- Receptor for the sense of smell.
- Filters inspired air.
- Produce sound.
- Help eliminate wastes.

Structurally the Respiratory system is divided into

- The upper respiratory tract (nose, pharynx)
- The lower respiratory tract. (Larynx, Trachea, Bronchi and lungs)

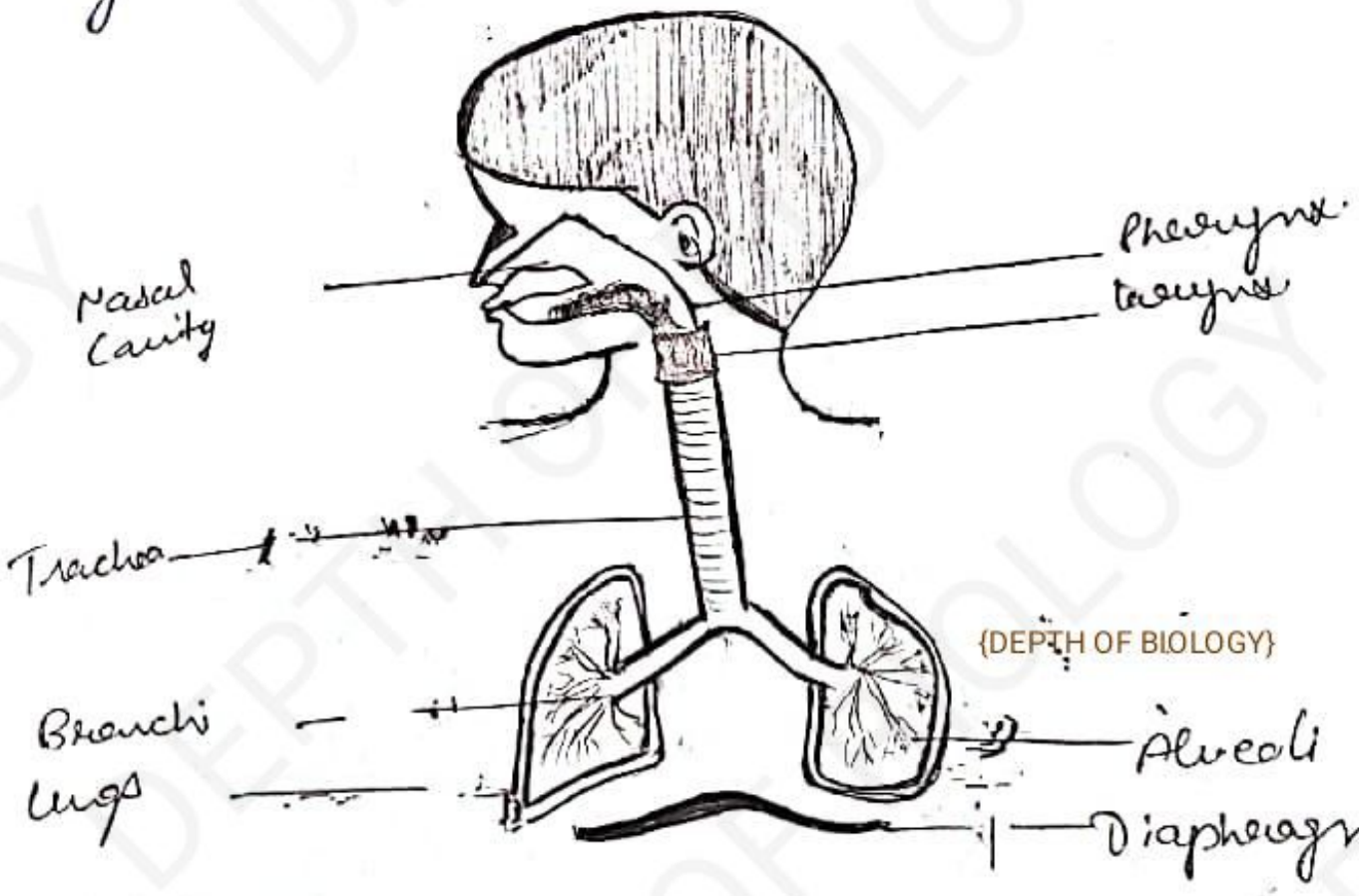
- functionally resp. system is divided into

The conducting portion

- Consists of series of interconnecting cavities and tubes (nose, pharynx, larynx, trachea, bronchi, bronchiole and terminal bronchioles - that conduct air into lung.)

The respiratory portion

- Consists of those portion of resp. system where the exchange of gases occurs (resp. bronchiolus, alveolar ducts, alveolar sacs and alveoli.)



The respiratory System

I. Nose and Nasal Cavity.

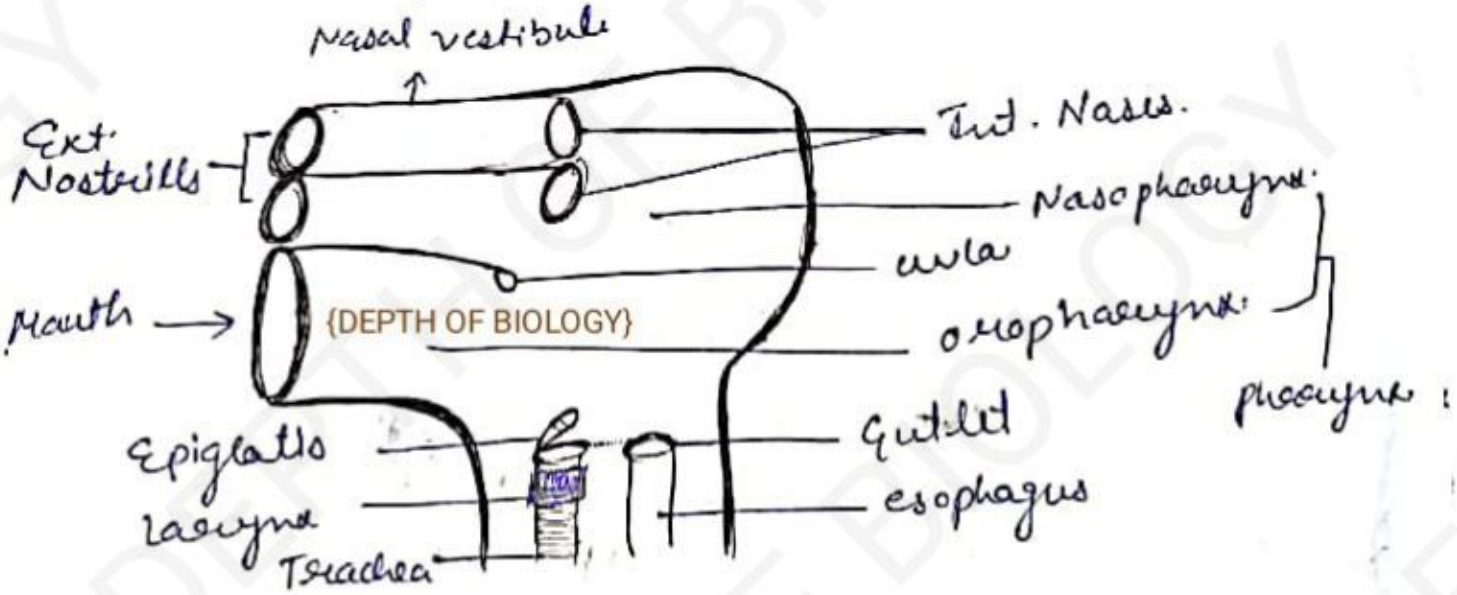
Nose can be divided into

- External
  - Bones
  - cartilage
- Internal
  - shelves
  - openings.

External Nose →

1. Roof → Ethmoid, sphenoid, Frontal, Nasal bone.
2. Floor → Hard palate and soft palate
3. lateral wall → Maxilla, Ethmoid
4. Medial wall → Hyaline cartilage

Internal Nose → Superior Meatus, Middle meatus, Inferior Meatus.



openings into Nasal Cavity

1. Sinus
2. Nares
3. Nasolacrimal ducts.

II. Pharynx

- belongs to both resp. and digestive system.
- its wall is composed of skeletal muscle and lined with mucous membrane. {DEPTH OF BIOLOGY}
- funnel shaped tube 12-14 cm long.

Function

- passage for air and food.
- provide a resonating chamber speech and sound.
- Houses the tonsils. {DEPTH OF BIOLOGY}

Its structure is divided into 3 parts.

- Nasopharynx
- oropharynx
- laryngopharynx

- Nasopharynx
  - 5-opening in its wall.
    - 2-Internal nares
    - 2-Eustachian tube
    - 1-opening into oropharynx.
- Posterior wall contains the Pharyngeal tonsil
  ↓
  Lined with pseudostratified ciliated epithelium.

III Larynx (Voice Box)

- short passage way that connects the laryngopharynx with the trachea.
- The larynx consists of cartilages, connected by ligament and skeletal muscles.
- Wall of larynx is composed of Nine pieces of cartilage.

3 are single → (Thyroid, epiglottis, Cricoid cartilage) {DEPTH OF BIOLOGY}

3 are paired → (arytenoid, Cuneiform, corniculate cartilage).

(a) Thyroid Cartilage

(Adam's apple) consists of two fused plates of hyaline cartilage that forms the anterior wall of larynx. and give its triangular shape.

- The ligament that connects the thyroid cartilage to the hyoid bone is called Thyrohyoid membrane

(b) Epiglottis

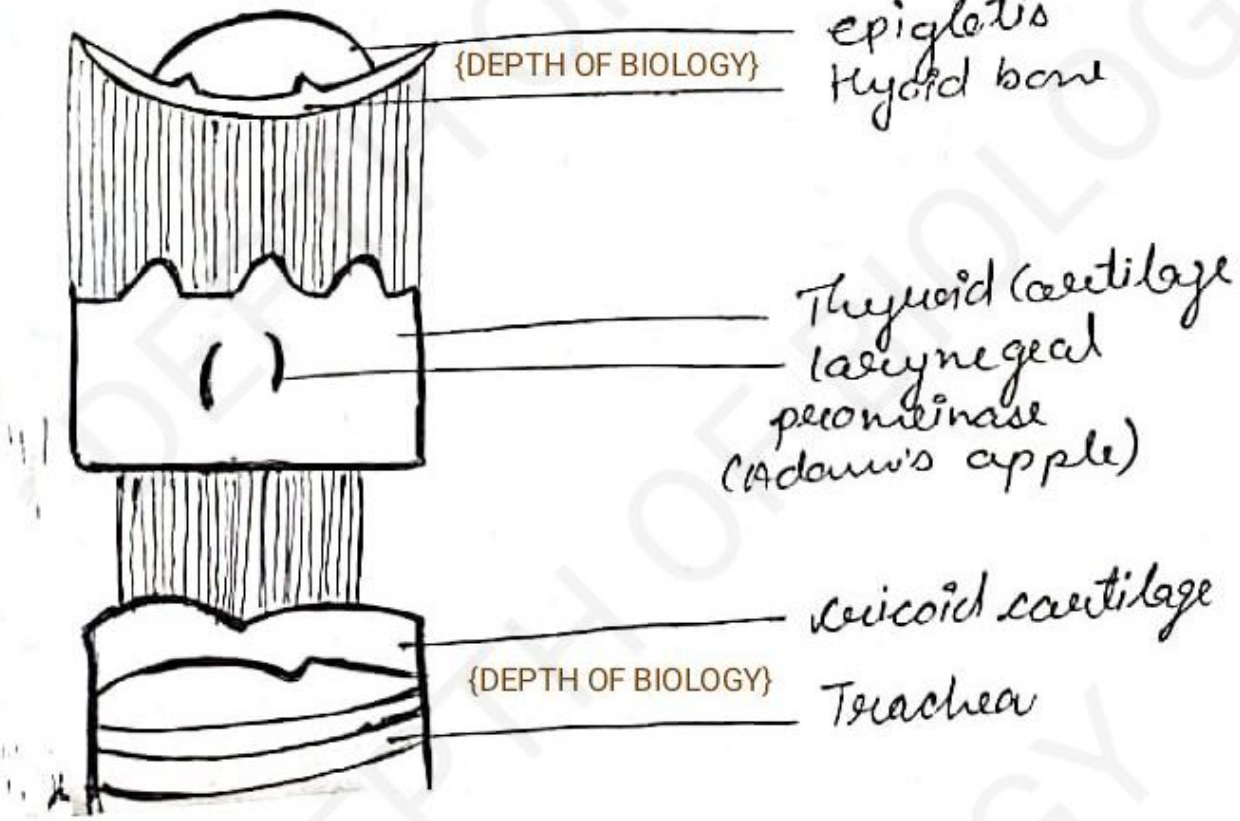
large leaf shaped piece of elastic cartilage that is covered with epithelium. {DEPTH OF BIOLOGY}

- The stem of the epiglottis is attached to the thyroid cartilage, but the leaf portion is unattached and free to move up and down like a trap door.

(c) Cricoid Cartilage

Is a ring shap cartilage that forms the Inferior wall of larynx. {DEPTH OF BIOLOGY}

Anterior View of larynx



4. Trachea (Wind Pipe)

↓

located anterior to the esophagus

- Tubular passage way for air about 12cm in height and 2½ cm in diameter

In front of 5th Thoracic vertebrae, It is divided into Right and left Primary bronchi

layers of Trachea from deep to superficial are—

1. Mucosa ⟶ Pseudostratified ciliated columnar epithelium. (PSCCE)
2. Sub-Mucosa ⟶ Areolar Connective Tissue
3. Hyaline cartilage ⟶ 16-20 C-shaped rings arranged.
4. Adventitia ⟶ Loose connective tissue.

C-shaped Cartilage Rings :-

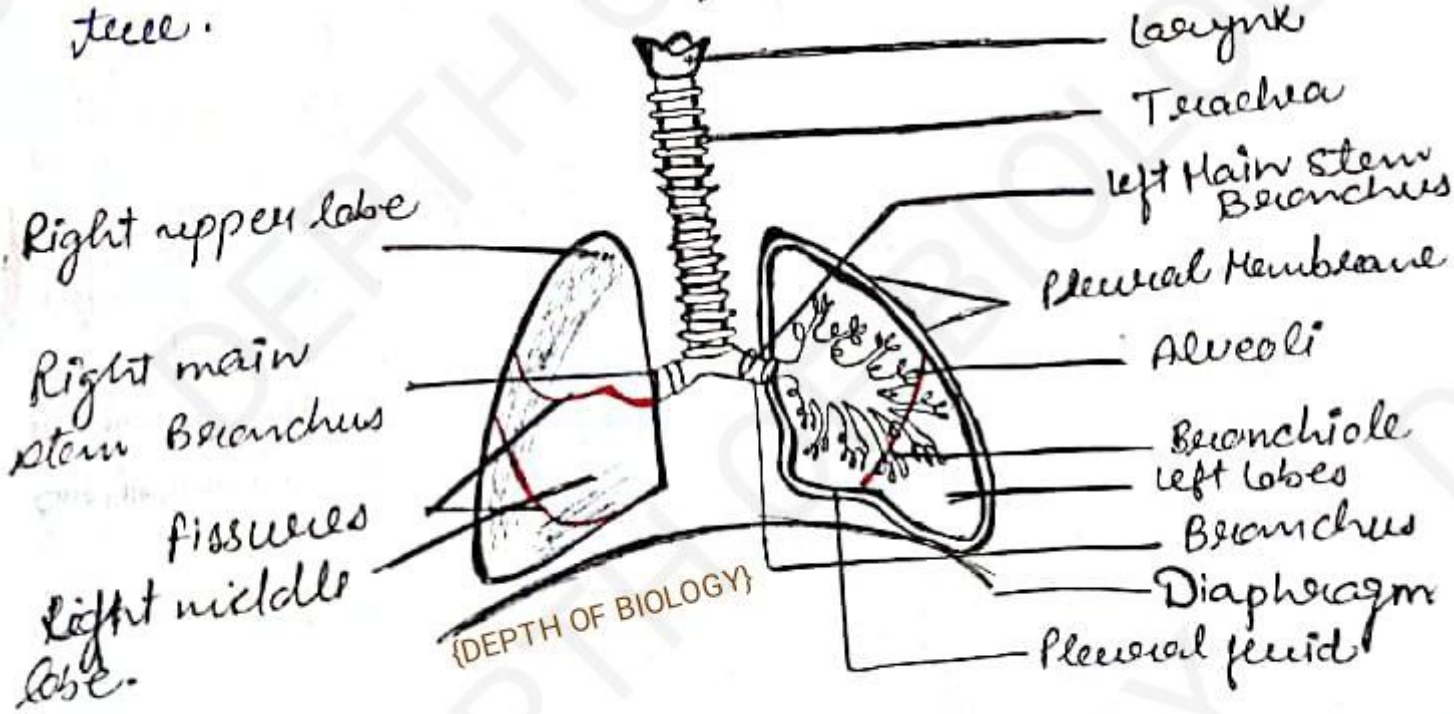
- The third layer of trachea is made up of 16-20 cartilagenous rings.
- These rings are incomplete (C-shaped)
- These are arranged horizontally and stacked one on the top of another.
- The open part of each C-shaped cartilage rings faces the esophagus.
- The accomodates slight expansion of the esophagus in to the trachea during swallowing.
- Transverse smooth muscle fibre and elastic C.T holds the open end of the cartilage rings together. Transverse smooth muscle are called as Trachealis muscle.

5. Bronchi

- At the superior border of fifth Thoracic Vertebral the trachea divides into 2 branches (Primary bronchi) {DEPTH OF BIOLOGY}

Right Primary bronchus Left Primary bronchus.

- On entering the lungs the primary bronchi divided to form smaller bronchi — the secondary bronchi (lobar), one for each of the lung. {DEPTH OF BIOLOGY}
- The secondary bronchi continue to branch, forming still smaller branchi, called tertiary bronchi (segmental)
- The tertiary divided into bronchioles. {DEPTH OF BIOLOGY}
- This extensive branching from the trachea resembles a tree trunk with its branching and is commonly referred to as the bronchial tree.



LUNGS

Lungs → light weight, since the lungs float
→ lungs are paired. {DEPTH OF BIOLOGY}
→ cone shaped organ

* separate from each other by the heart and other structures in mediastinum
* If trauma cause one lung to collapse, the other may remain expand

alveoli (alveolus) and alveolar sac
(2 or more alveoli that share a
common base)

Each bronchopulmonary segment of the lungs has many small compartments — lobules.

- Each lobule is wrapped in elastic connective tissue contains.
  - A lymphatic vessel
  - An arteriole
  - An venule
  - a branch from terminal bronchiole.

Terminal Bronchiole — subdivided into microscopic branches [resp. bronchioles]

As the resp. bronchioles penetrate more deeply into the lungs it subdivided into several alveolar ducts.

Location —

In thoracic cavity
Extend from the Diaphragm.
Lie against the ribs.

Anatomy of Lungs

Externel anatomy —

- Each lung is divided into lobes by one or more fissures.
- Right lung has 3 lobe whereas left lung has 2 lobes.
- Both lungs have oblique fissure (superior and inferior)
- Right lung has more fissure Hz. fissure. (middle lobe)
- Each lobe receive its own sec. branches. Thus, the right primary branches gives rise to 3 sec. branchi.
- Within the lung the sec. branchi give rise to the tertiary branchi.
- There are 10 tertiary branchi in each lung.

Primary Branchi
↓
Secondary Branchi
↓
Tertiary Branchi
↓
Bronchioles
↓
Terminal Bronchiole
↓
Resp. Bronchiole
↓
Alveolar duct
↓