

## What is the endocrine system?

The endocrine system consists of glands that secrete hormones. These hormones travel through the bloodstream to target organs, where they regulate various functions such as metabolism, growth, and development.

The endocrine system includes glands such as the hypothalamus, pituitary, thyroid, parathyroid, adrenal, and gonads.

The main glands of the endocrine system are the hypothalamus, pituitary, thyroid, parathyroid, adrenal, and gonads.

*Doctor 022*



The hypothalamus and pituitary gland

The hypothalamus is a small region of the brain that controls many body functions. It is the master gland of the endocrine system. The pituitary gland is a pea-sized gland located below the hypothalamus. It secretes hormones that regulate the activity of other glands in the endocrine system.

# Histology

Sheet no.2



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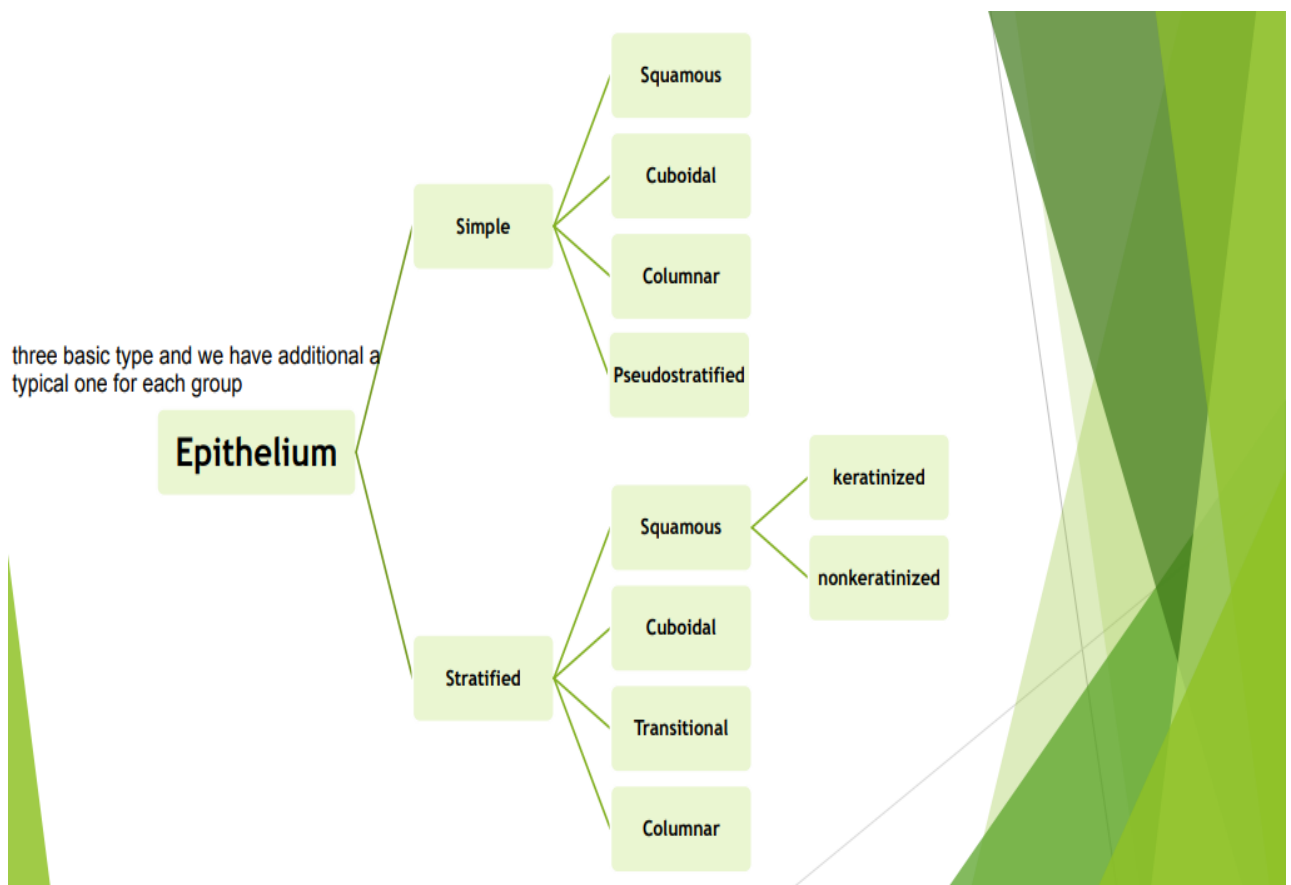
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Doctor: GADA ABU AL-GANIM

## Epithelial tissue (part two)

In the previous lecture we talked about the Epithelial tissue it composed from surfaces that tightly aggregated cells, covering, lining ( cavities ,blood vessel ,lumens).

- Generally, we classified them based on the number of layers
- ( this diagram show it )



stratified squamous divide into types:

a. Keratinized (all cavity membranes cover epidermis of skin in the superficial because it is a surface, Epithelial always in the surface )

b. nonkeratinized

**simple epithelial tissue type:**

we have discussed the **1. Simple squamous**

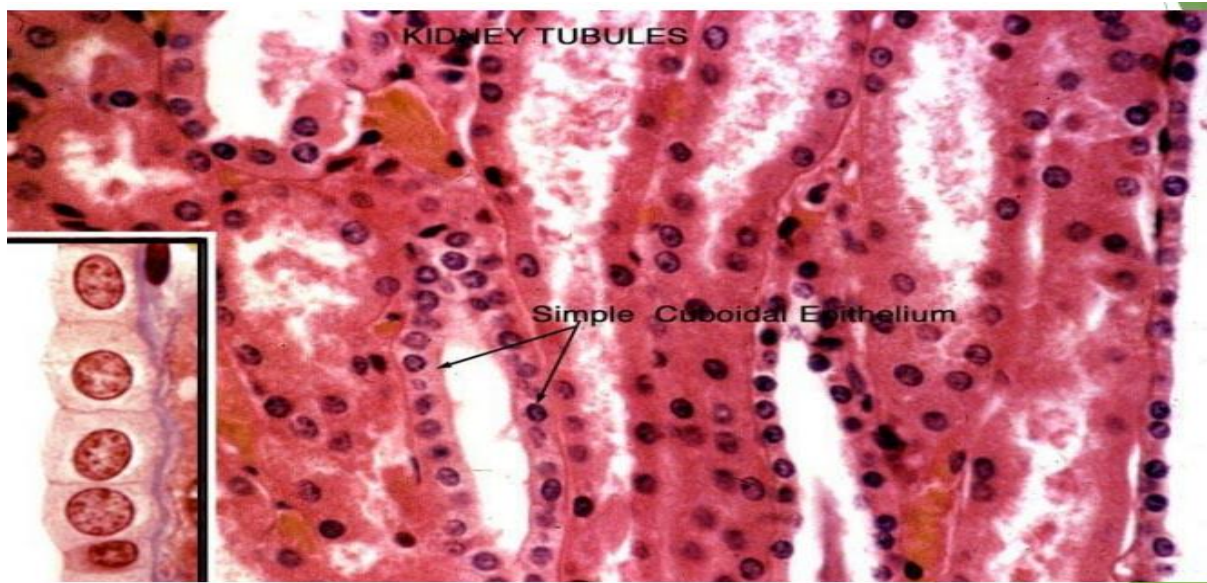
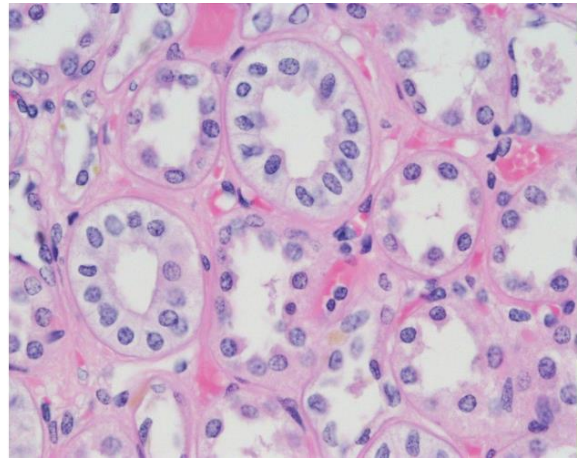
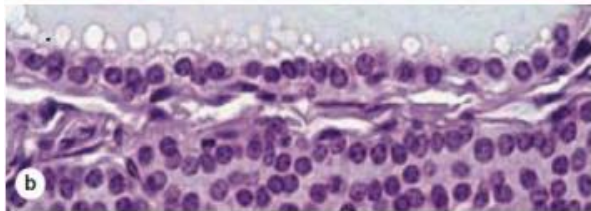
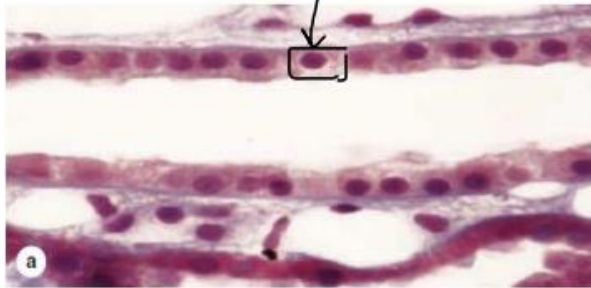
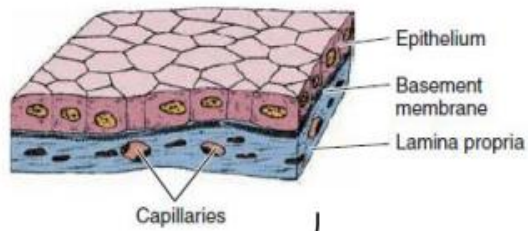
**2. simple cuboidal**

. These cell taller than squamous and higher and the nuclei appear rounded , spherical

.The cytoplasm in the two image appear square which mean that the cytoplasm remains square in **cuboidal** so same amount of cytoplasm around the nuclei

while in the **squamous** it flat (cytoplasm unevenly and less a in the dimension)

Note: doctor said it in 7 slide ... in preparation the place of water in mucus appears like a space.



Cuboidal in 3d image that show it stained by H&E  
it appers small cell and next to each other

We find this type (Simple cuboidal) in several places:

- a. Kidney tubules ...most of them is cuboidal.
- b. Covered the ovaries.

\*Here the doctor mentioned the mesothelium, Let's remember

It is Simple squamous, we see it the most in the (Cavities, abdomen, peripheral, peritoneum, heart vessels and the pleura which surround the arrangement of thorax)

c. glands .... what means glands? **It is small ducts .**

we have secretion cell and other cell transport the secreted materials as the gland wasn't endocrine.



if the gland is endocrine it secret material in the blood stream

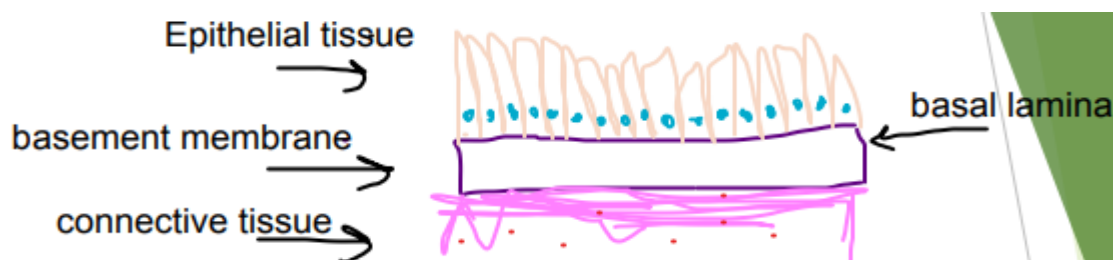
\*gland like pancreas and mammary glands transports it's secretion by **small ducts** (tubes)

### 3. Simple Columnar

Elongated cells (tall) and nuclei too, so these cell is big, this mean it do some function .... it's Capable to **secretion** and **absorption** (we can find it in gallbladder and intestines)

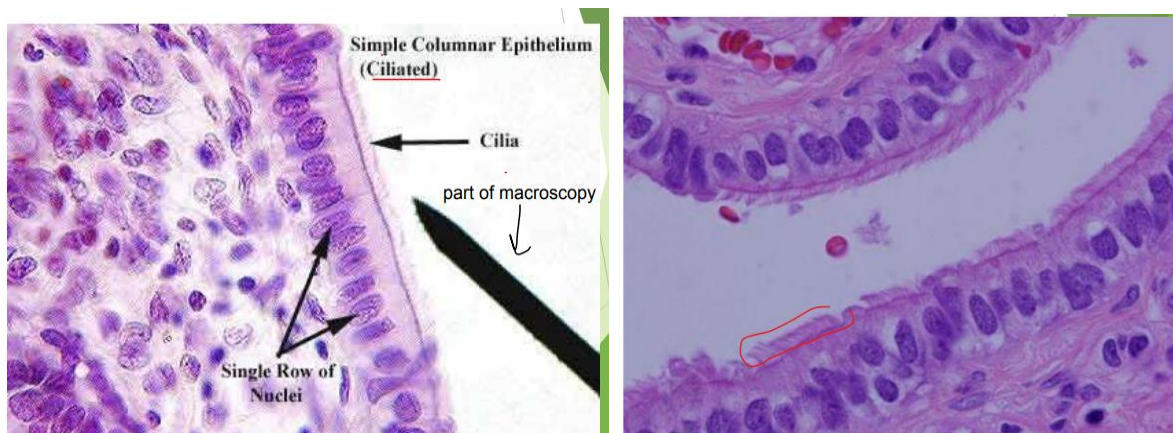
It's able to absorb nutrients and store it and then transfer it to (base) other cell like blood vessel, these scenarios occur in the digestive it starts from the oral cavity .... \*\* the stomach (digestion) passing through small intestines (digestion ,90% of absorption occur here.) to big part of the large intestines lining with simple columnar

Note: the nutrients situated in the apical of epithelium and blood vessel in the connective tissue below the basal lamina.



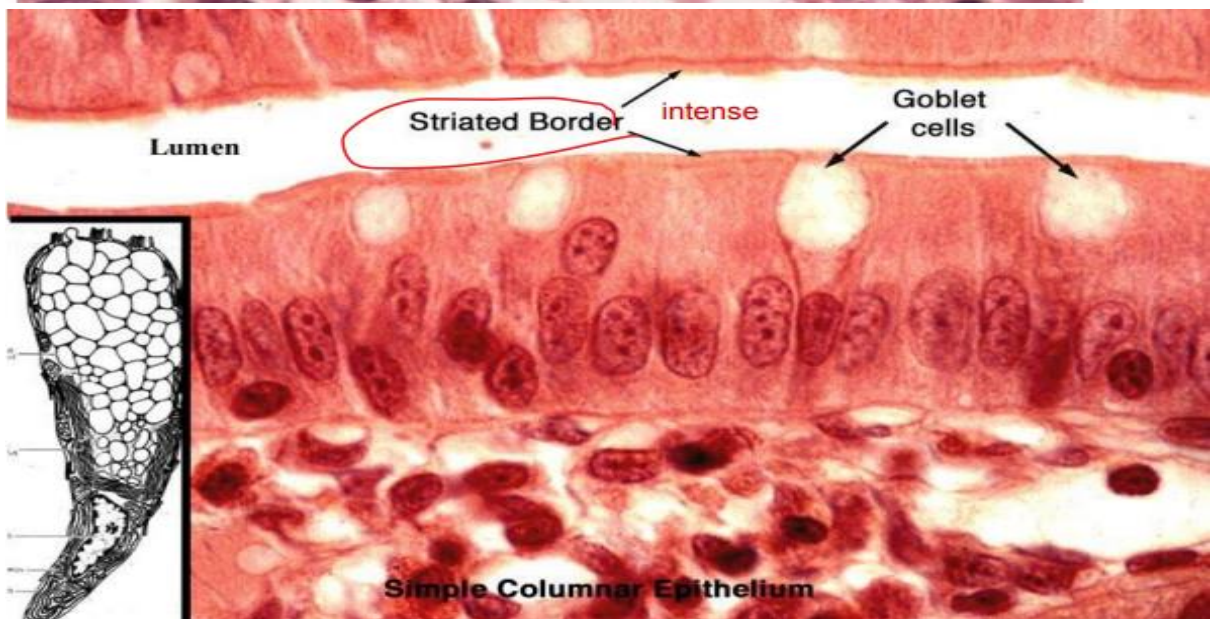
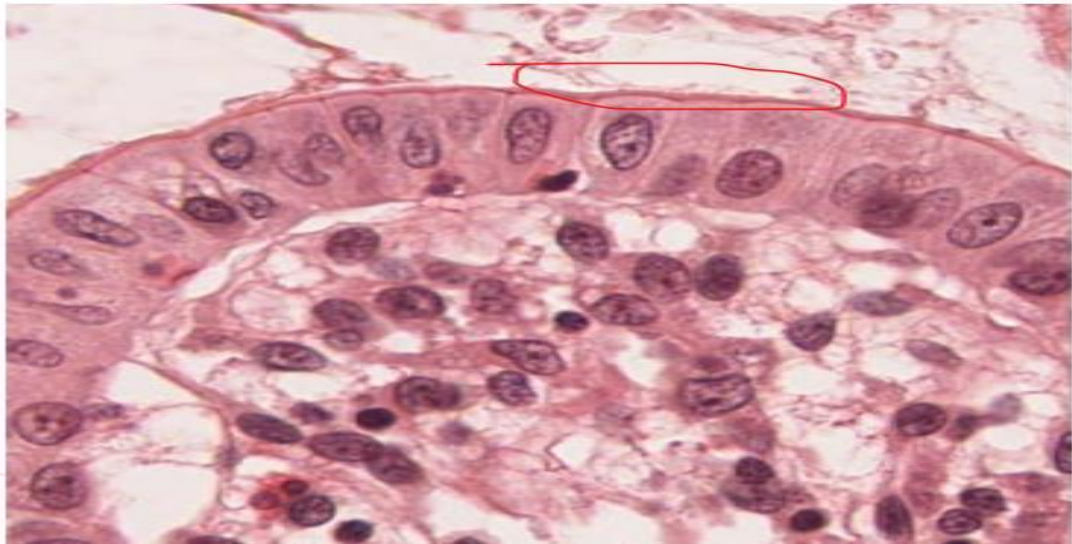
The apical surface cells are usually associated with specialized **structures** like:

- a. **Cilia** ... is found in the fallopian tube (oviduct) and the certain region of respiratory tract , in the embryology we knew that the end of oviduct (laterally ) Fimbriae pick the ova and it pass through fallopian tube (which lining with Ciliated simple columnar that move it to reach the uterus)



the second image is Longitudinally... **the length of cilia with the total length of cell, relatively it is a high ratio.**

- b. **Microvilli** ... with goblet cells (mucus (-rich in water-) -secreting cells) is found lining the intestines, (it increase the surface area therefor increase the absorption), there are many modification in the GI tract like increase the folding **in the epithelium**

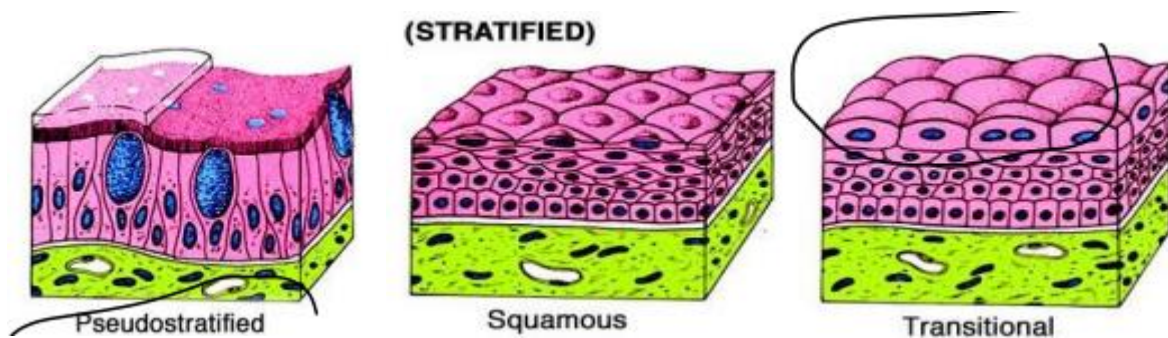


**Note: no space between microvilli and it's stain similar to that of the cytoplasm .... the length of microvilli with the total length of cell, relatively it is a small ratio.**

**4. Pseudostratified columnar epithelium: it's appearance as stratified and nuclei with different levels, and no ordered, in other word, it is tall irregular cells all are attached to the basement membrane and up to the top of the epithelium, but their nuclei are at different levels and not all cells extend to the free surface**



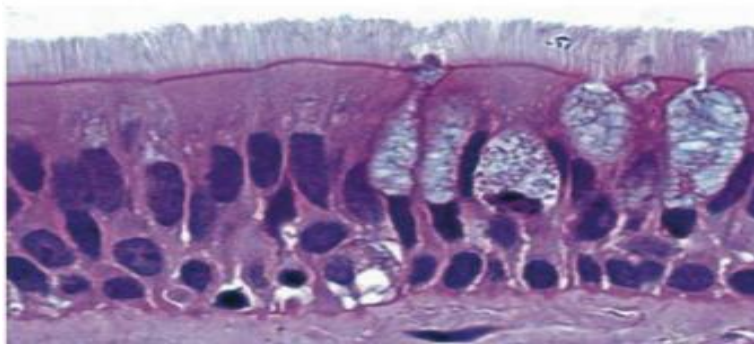
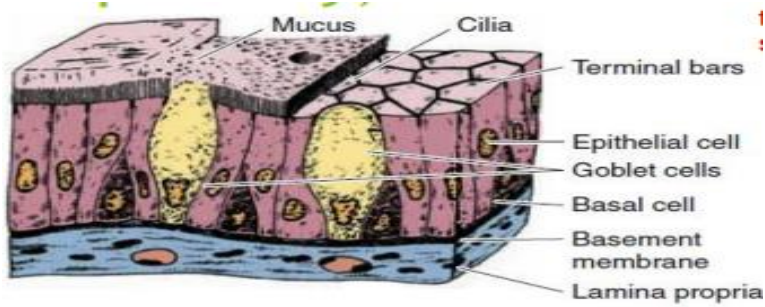
here, the doctor compares between the **pseudostratified** and **(stratified** that the basal layer usually smaller cell with small nuclei and in same plan with tightly and closely together and cell rest in the basal lamina, **also** the cells in basal only rest in the basal lamina than apical))



*The thing that represented in white is the lumen.*

Like the simple columnar it is associated with apical structures:

- a. special type found in respiratory system (**remember there is exception which is alveoli it simple squamous**) and in male genetic tract especially in Epididymis structure which is cilia with goblet cell named **Pseudostratified columnar epithelium with goblet cell.**



**Note: the microvilli is 1/3 of cilia and when we compare the length of cilia with the total length of cell, relatively it is a high ratio the opposite to microvilli this is a one way to distinguished microvilli to cilia.**

**b. stereocilia: \*** we find it in **pseudostratified columnar epithelium** it is not ordered in the same side the opposite cilia are arranged next to each other and in one direction.



**Note:** we distinguished the Goblet cell it Contains large vacuole fill with nutrients, water, protein, and when prepare it we dehydrate the water and its place become empty.

. the goblet cell doesn't have cilia or microvilli.

**Here \*** the doctor talked a lot about distinguishing between the **Pseudostratified (respiratory ) & stratified**

## **Stratified Epithelia tissue:**

- two layers or more.
- we have basal layer and many apical ones.
- Regenerate from below (mitosis is limited to the basal layer) because it is exposed to many things, such as liquid, bacteria, virus, and food. Here we are talking about the tissue in the digestive system.
- Are named and determine it's type according to the shape of cells at apical layer.
- **Specific types**

**Keratinized** – contain the protective protein keratin

Surface cells are dead and full of keratin

**Non-keratinized** – forms moist lining of body openings

### **Function**

Protects underlying tissues in areas subject to abrasion ∪

### **Location**

**Keratinized** – forms epidermis, because it acts as an insulator like wax. It is known that when we wash our hands, we lose these layer.

**Non-keratinized** – forms lining of oral cavity (mouth), oesophagus, **and vagina** .

**Note: we have stratified tissue in oral cavity because it compose of many layers and thick so , it can protect the inner structure like gland ,muscle .... if we have simple squamous tissue, the material reaches the connective tissue directly.**

**\*\*Finally, some important information that Dr. mentioned:**

. The most tissue present in the body is **stratified squamous**, we find it in cornea

. the less is **cuboidal** and the least is **Columnar** , we find it in secretory glands .



رمضان كريم  
كل عام وانتم بألف خير  
جعلنا الله واياكم من عتقاء هذا الشهر الفضيل  
وأعاننا على إكمال المسير



V2

Page 5: I am delete ( in  
the gland ).

Page7: delete (which is  
covered by cilia).

Page12: delete ( Stratified  
Squamous Keratinize)

I have mark the place before the  
deletion in red. Do not worry!!! I think  
I was thinking about cytology and  
organic at the time.

