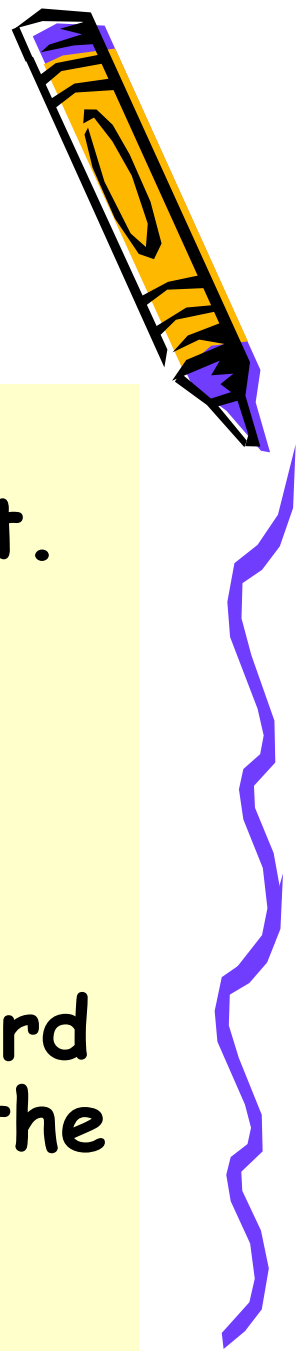


Lung's Auscultation as a method of patient investigations, general rules. Main and adventitious respiratory sounds. Bronhophony.

Professor Valeriu Istrati
Univ.assist. Oxana Sarbu



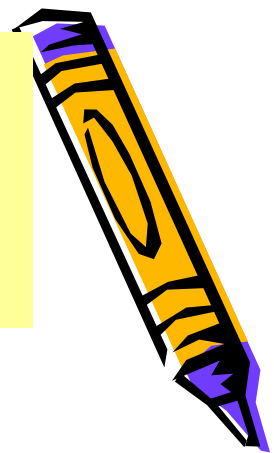
Auscultation



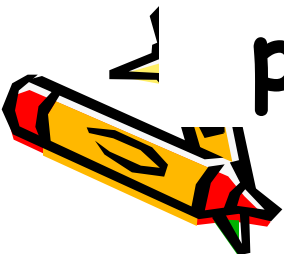
- is a method for revealing sounds produced in the respiratory tract.
- During inspiration and expiration the air passes through the respiratory tract, which is an elastic tube.
- Pronounced sounds which are heard by stethoscope are produced in the regions of narrowing in the respiratory tract.



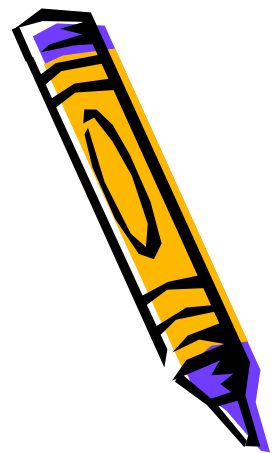
Lung's auscultation is performed



- bilateral,
- comparatively
- symmetrically,
- from apices to lung's basis.
- Should be auscultated 2- 3 respiratory cycles in each point.



Main respiratory sounds



- Vesicular breathing
- Bronchial breathing



1. VESICULAR BREATHING



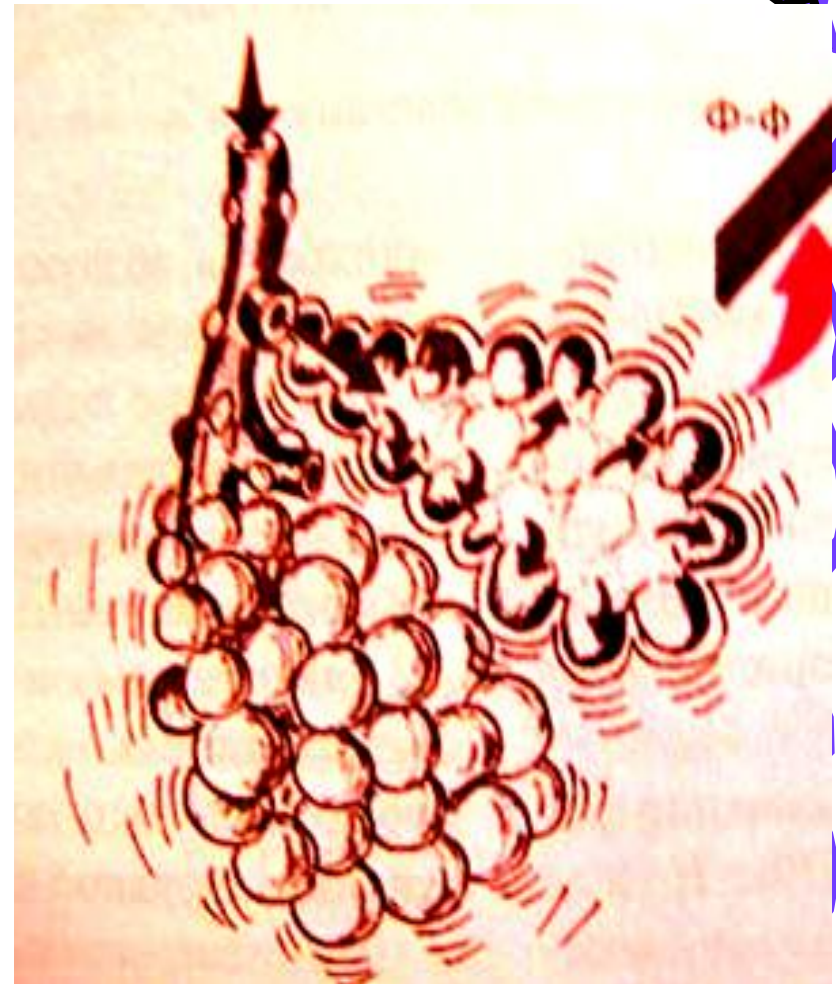
- Vesicular breathing - is the sound heard over the healthy lung tissue.



There are a few known mechanisms of Vesicular breathing:

Is produced when the air passes through the bronchia - alveolar sphincters

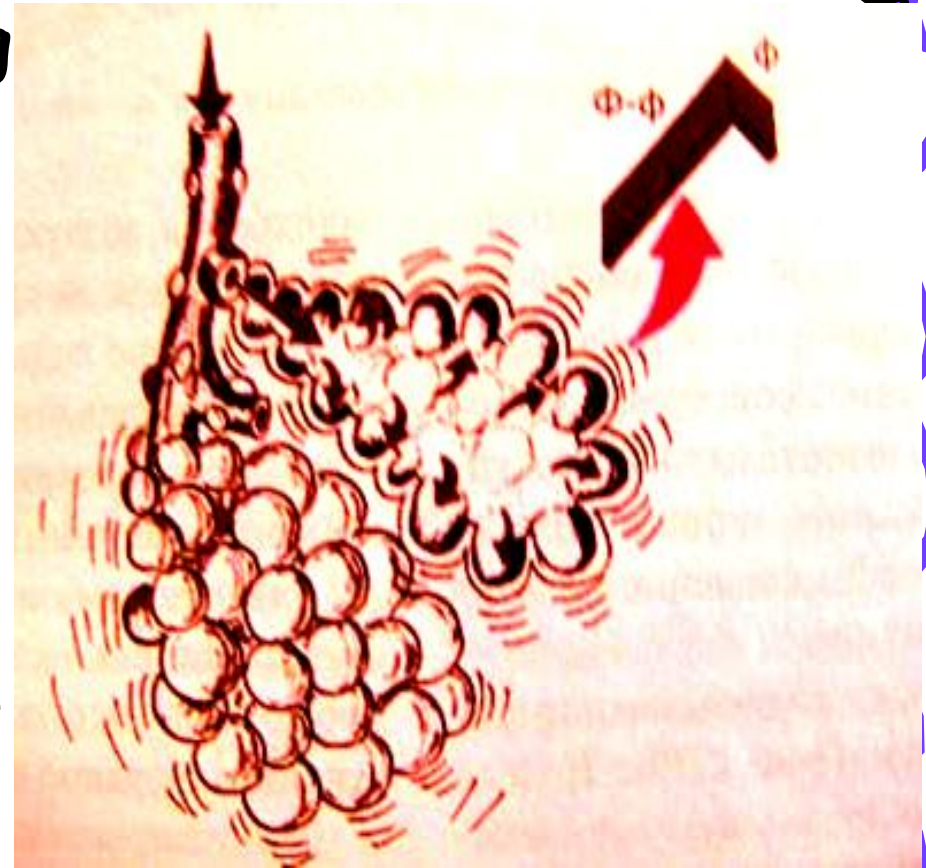
Is the sound produced due to vibration of the elastic elements of alveolar walls during their filling with air.



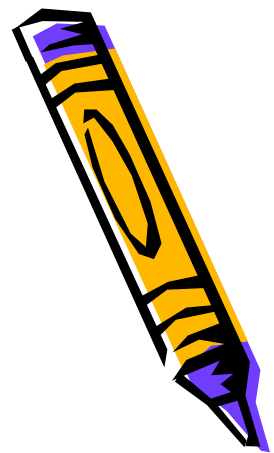
The characteristics of the vesicular breathing:

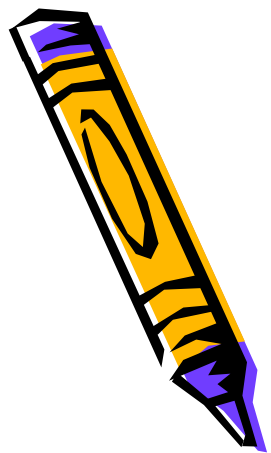
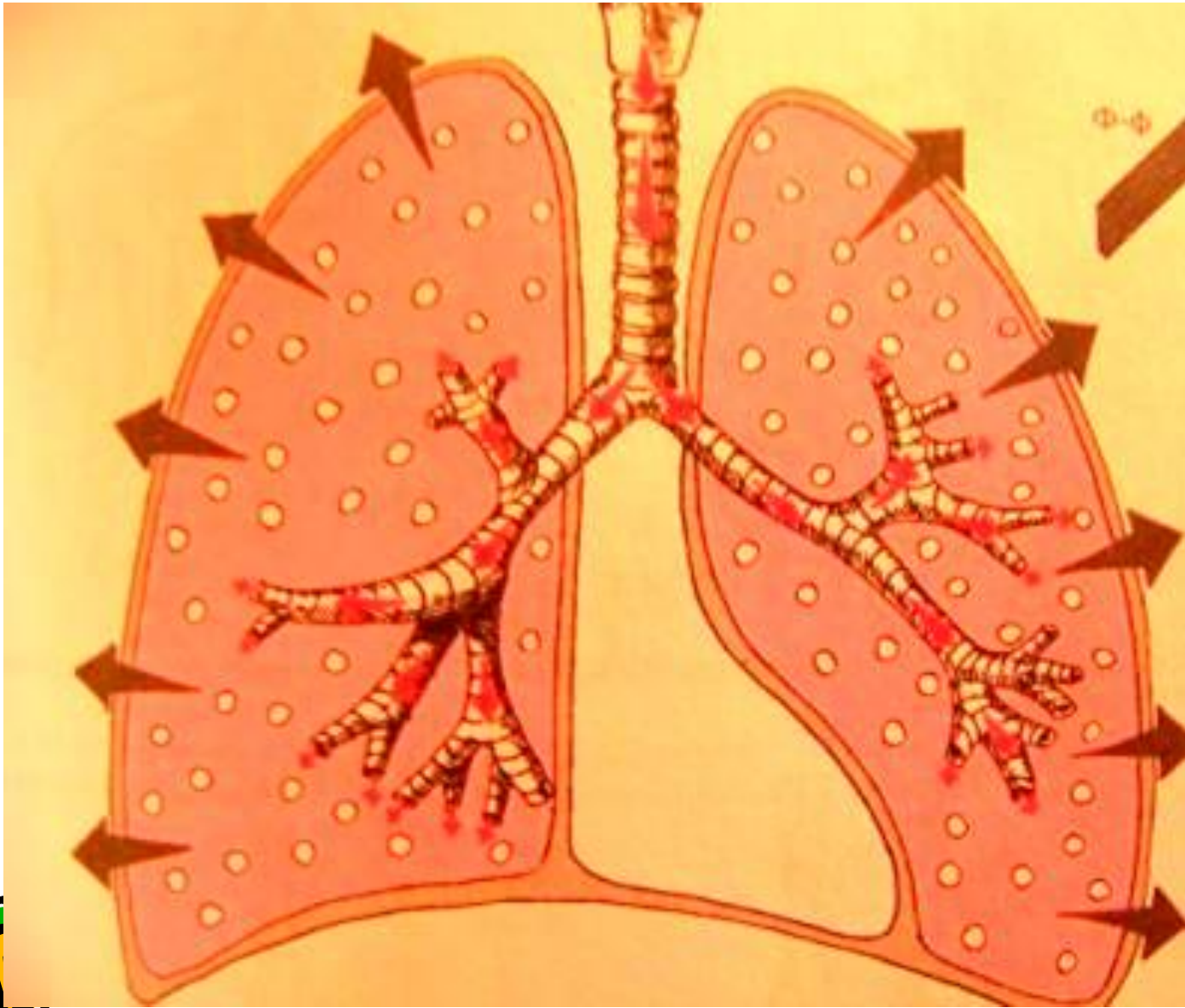
- it can be heard during the entire inspiration phase (its intensity gradually increasing) and in the first third of the expiration phase

(Inspiration : Expiration
= 3:1; 2:1)



- it's a long soft noise
- can be simulated by pronouncing the sound "f-f"
- Auscultation of the vesicular breathing should be provided comparatively in symmetrical points of the thorax.



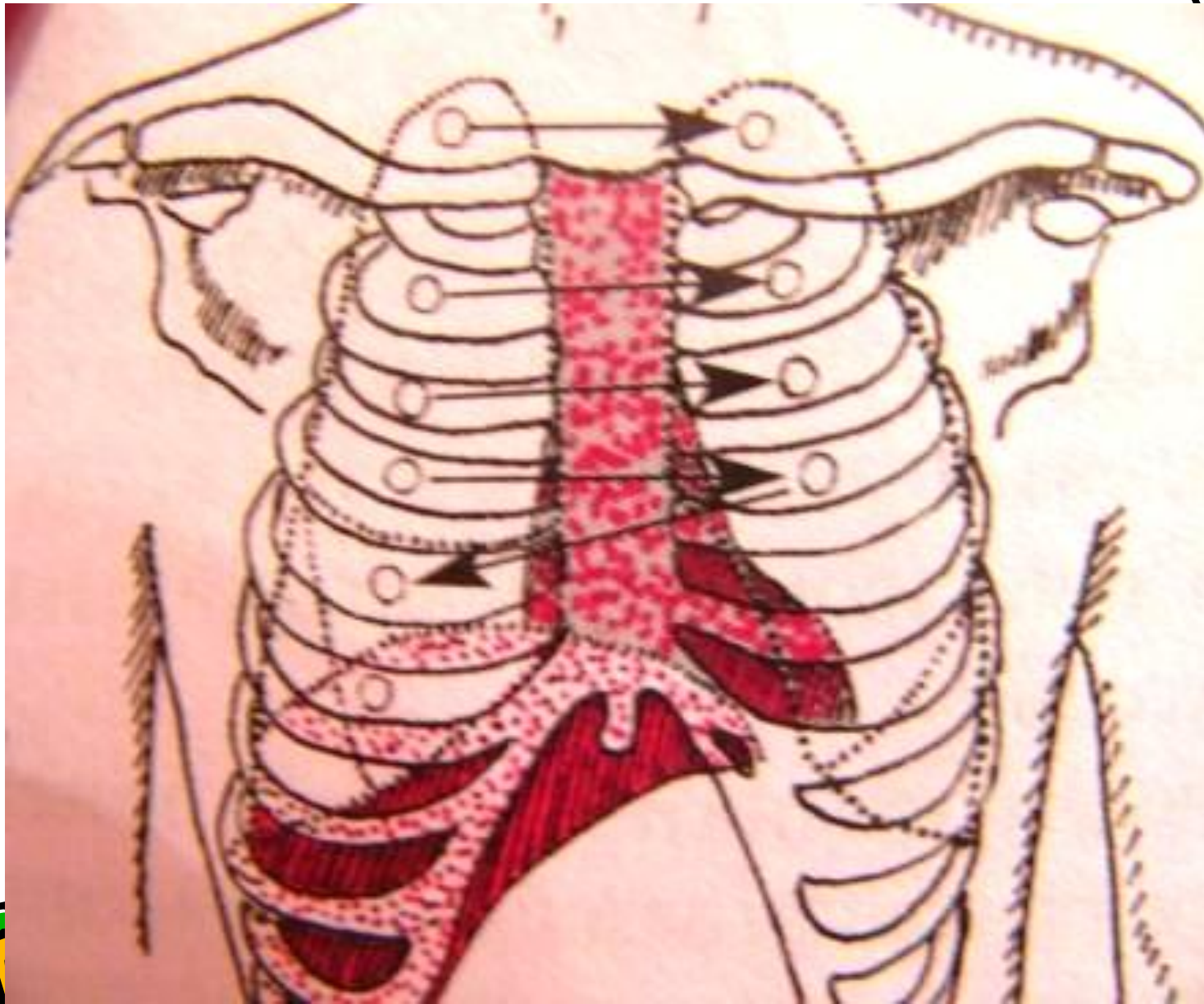


The Points of vesicular breathing auscultation are:



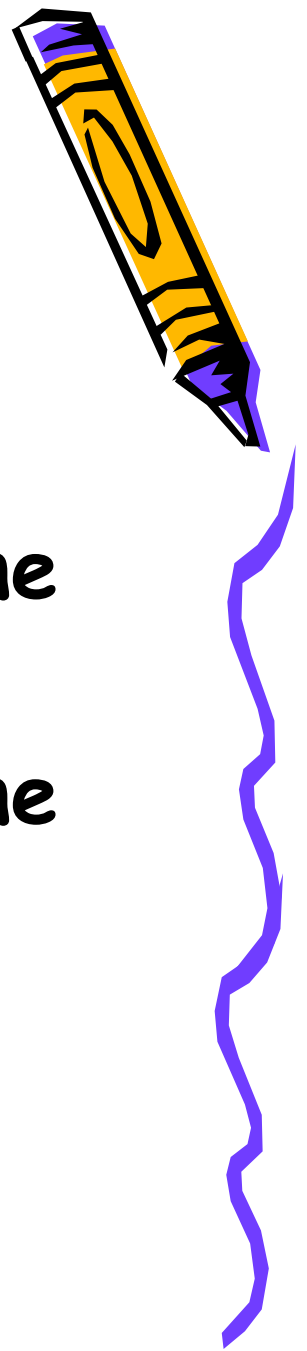
1. Anteriorly - 5 pairs of points:
 - supraclavicular points
 - subclavicular points (I st intercostal spaces), under the previous points
 - II nd intercostal spaces, under the previous points
 - III rd intercostal spaces, at the margin of pectoral muscle
 - IV intercostal spaces, at the margin of pectoral muscle, under the previous points

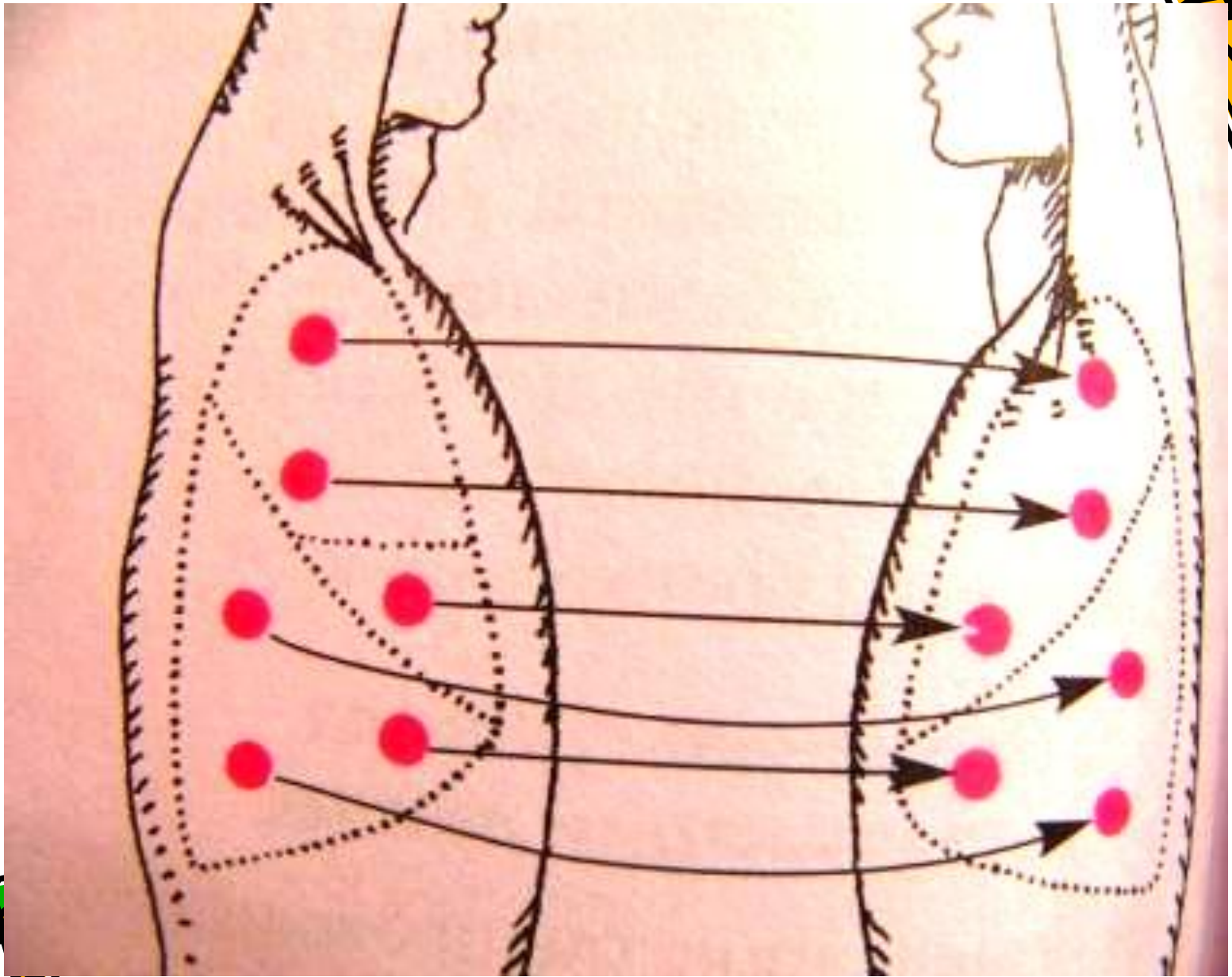




2. Laterally - 3(4) pairs of points:

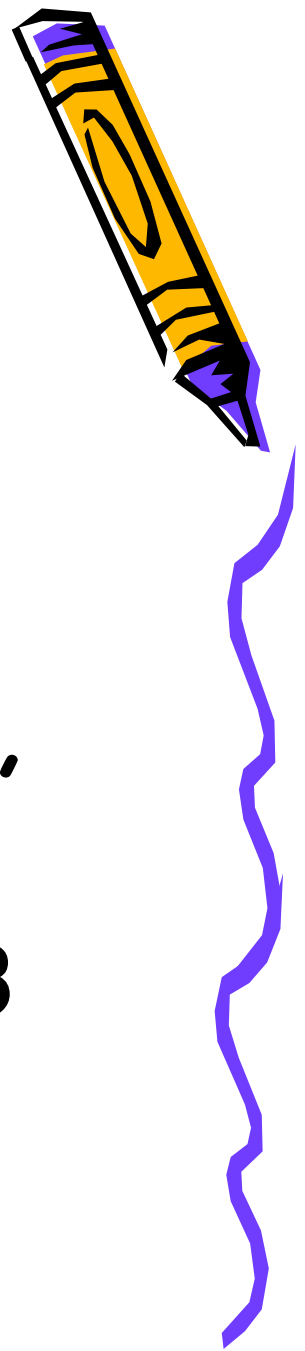
- in the axillary fosses
- under the previous points with one intercostal space
- under the previous points with one intercostal space

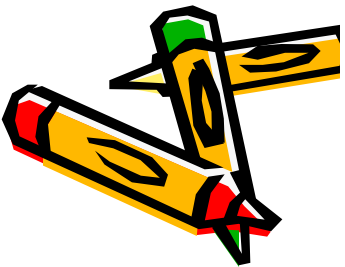
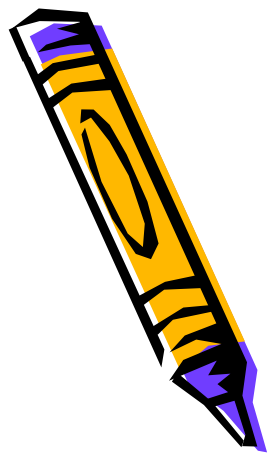
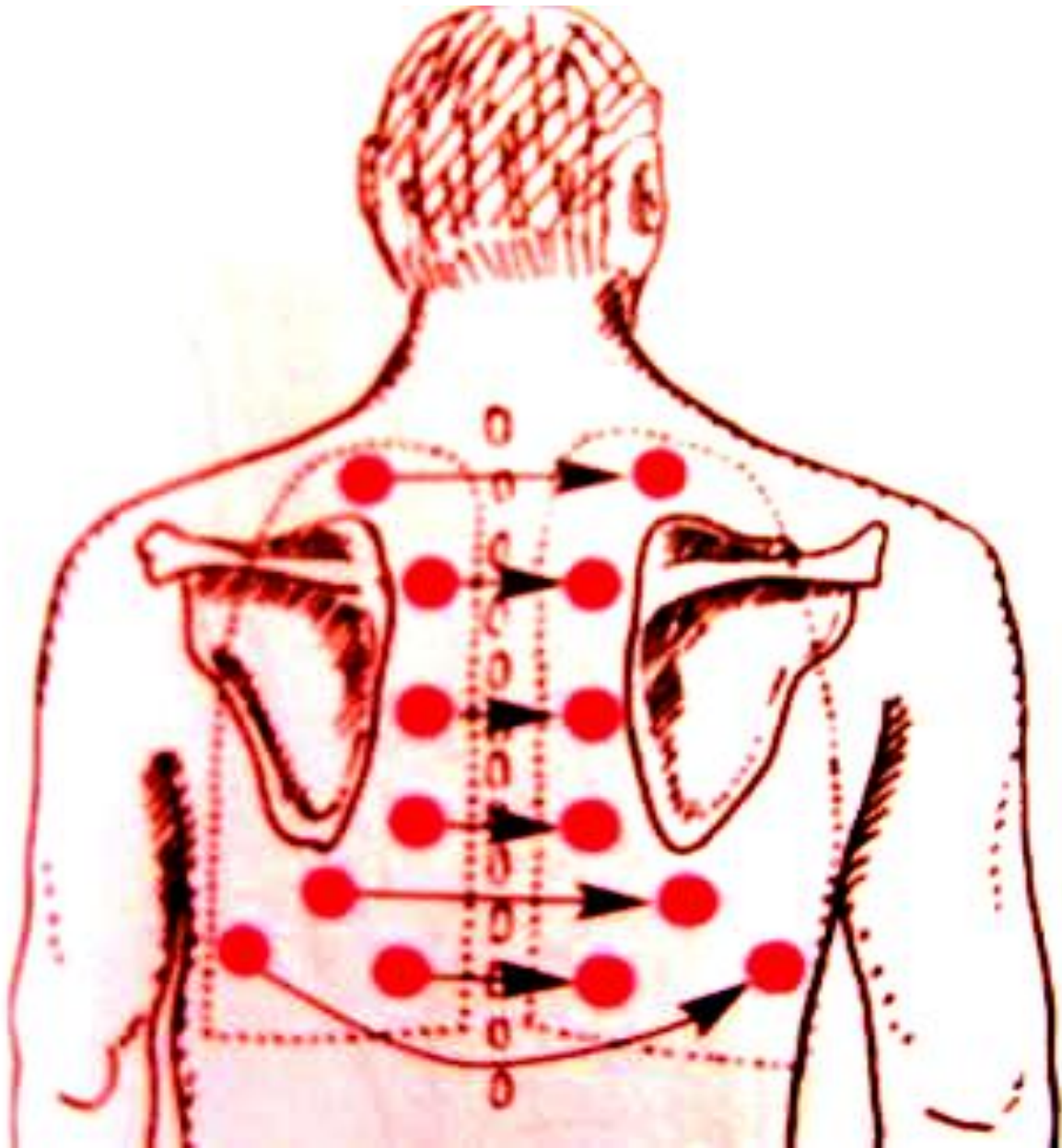




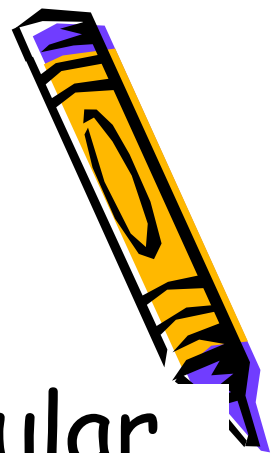
3. Posteriorly - 4 (5-6) pairs of points:

- Above the scapulae
- In the interscapulae space
- In the interscapulae space,
under the previous points
- Under the scapulae (1-2-3
points)





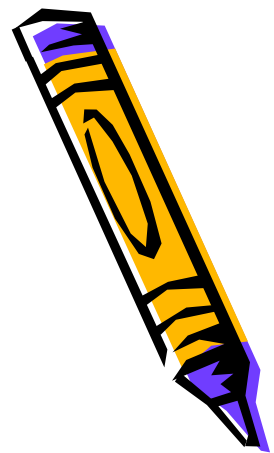
When does the vesicular breathing change ?



- Physiological **weakening** of vesicular breathing - occurs in patient with **excessively developed muscles or fat**.
- Physiological **intensification** - in undeveloped muscles or subcutaneous fat, physical activity.
- in children with thin chest wall vesicular breathing is intensified and is called **puerile respiration**.



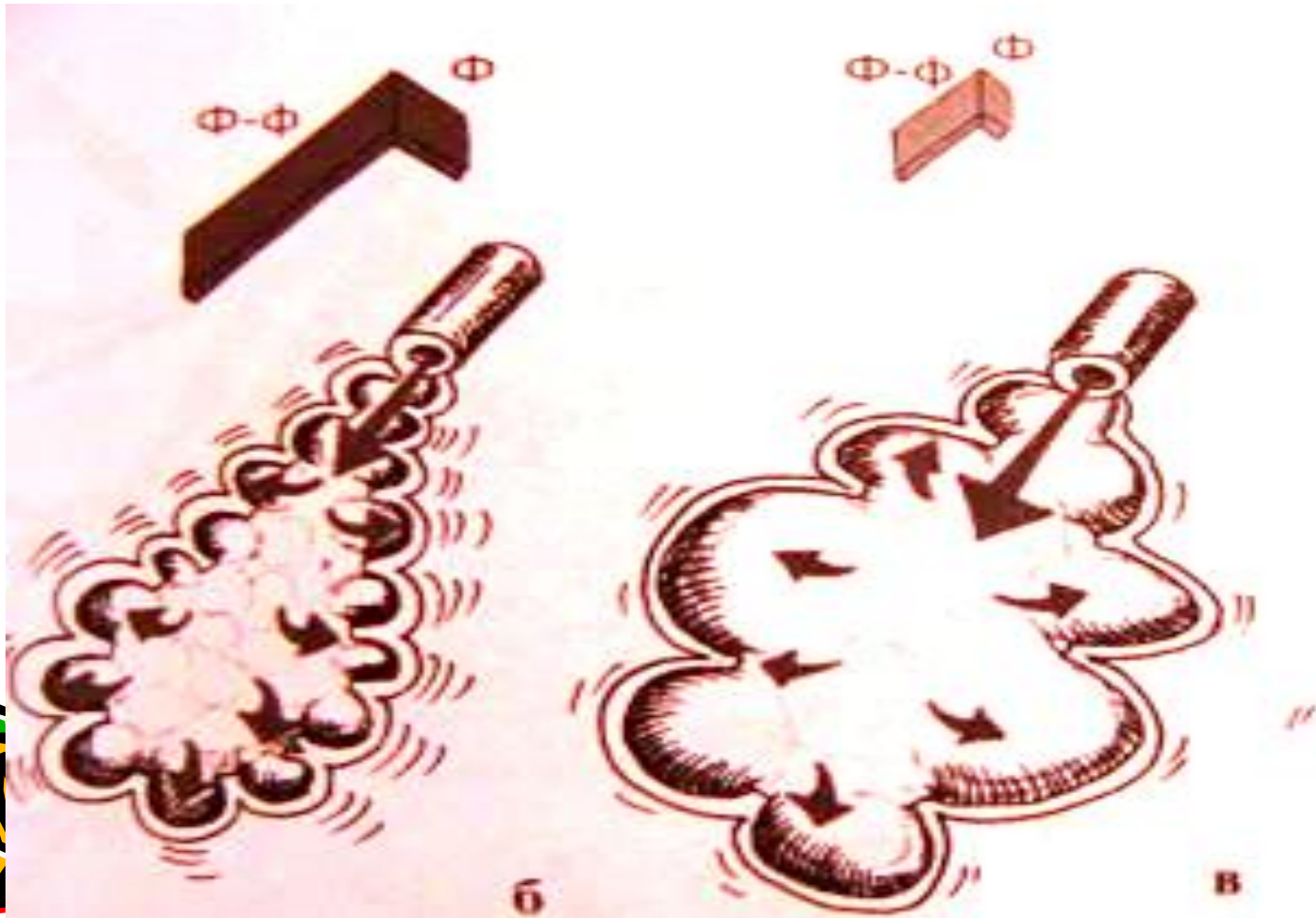
Pathological decreased vesicular breathing

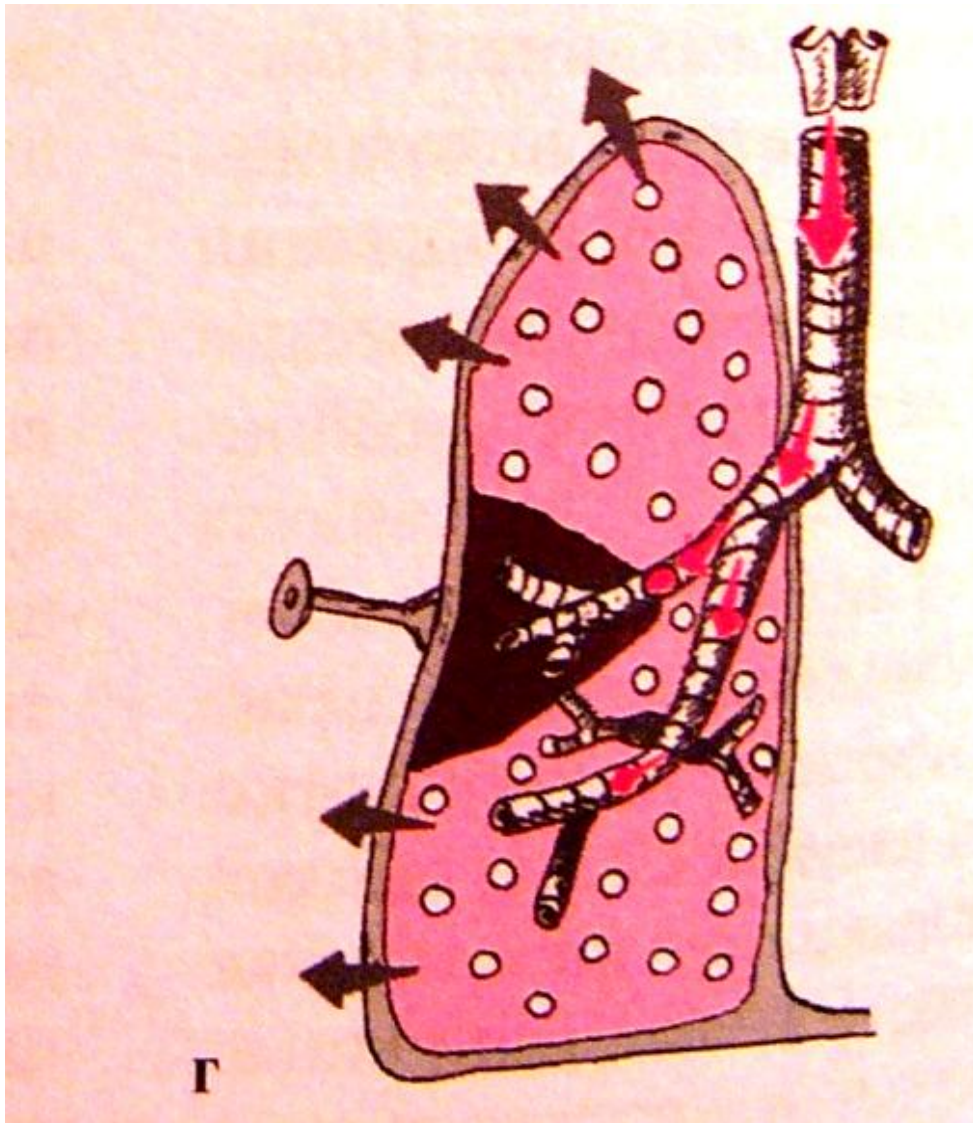


- (1) in the early acute lobar pneumonia (because alveoli become filled with effusion);
- (2) in the weakened inspiration phase (inflammation of the respiratory muscles, intercostal nerves, rib fracture);



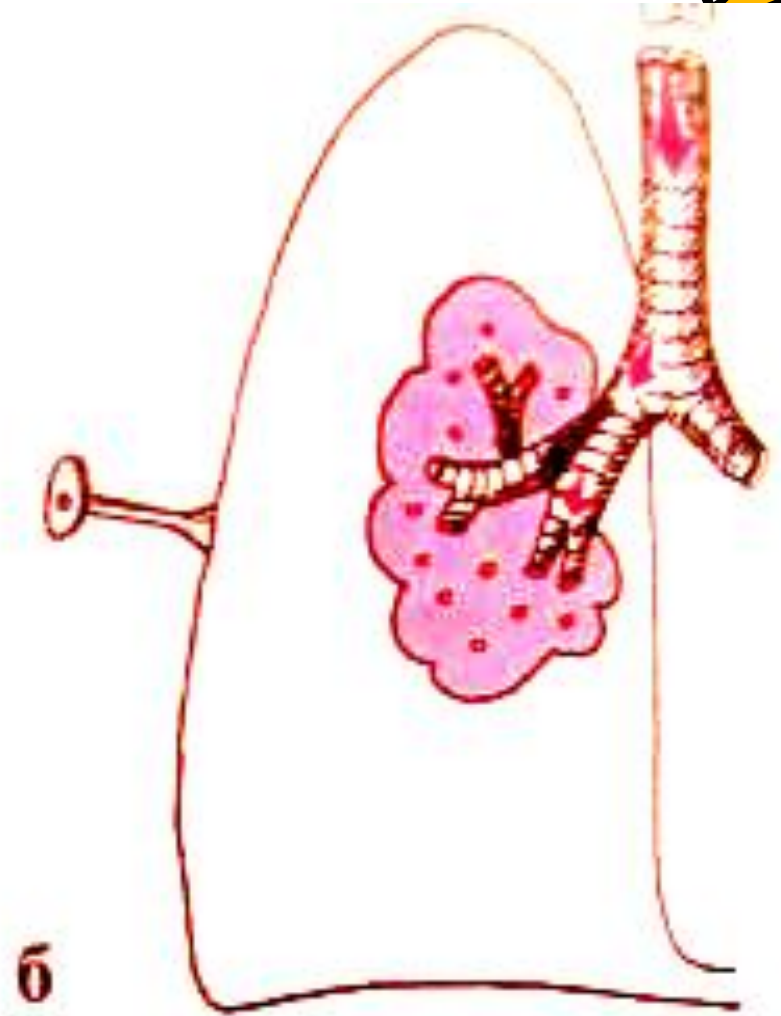
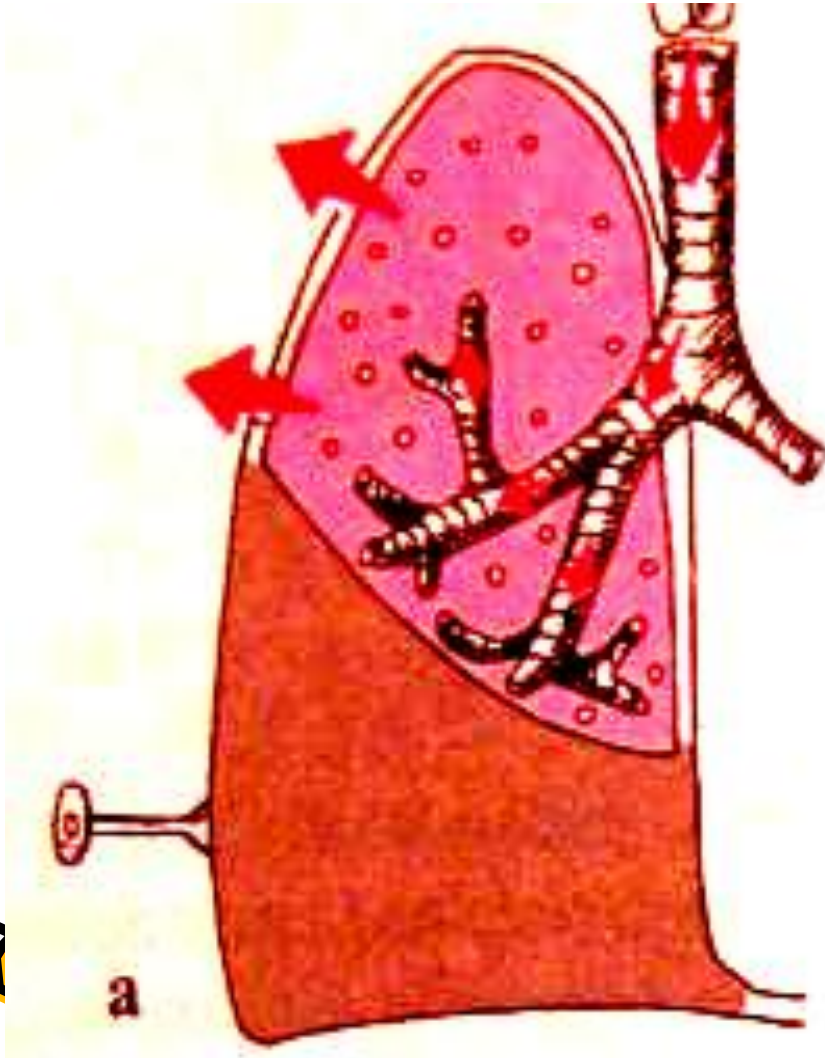
(3) in lung emphysema - significantly decreasing of the number of functional alveoli because of their dystrophy ;



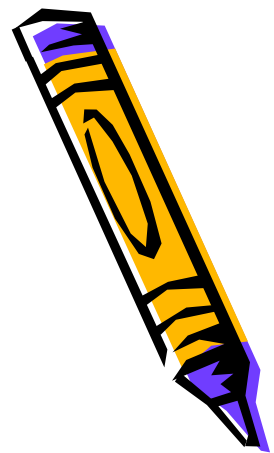


- (4) in obstruction of a large bronchus lumen;

(5) over a large amount of fluid or air in pleural cavity.

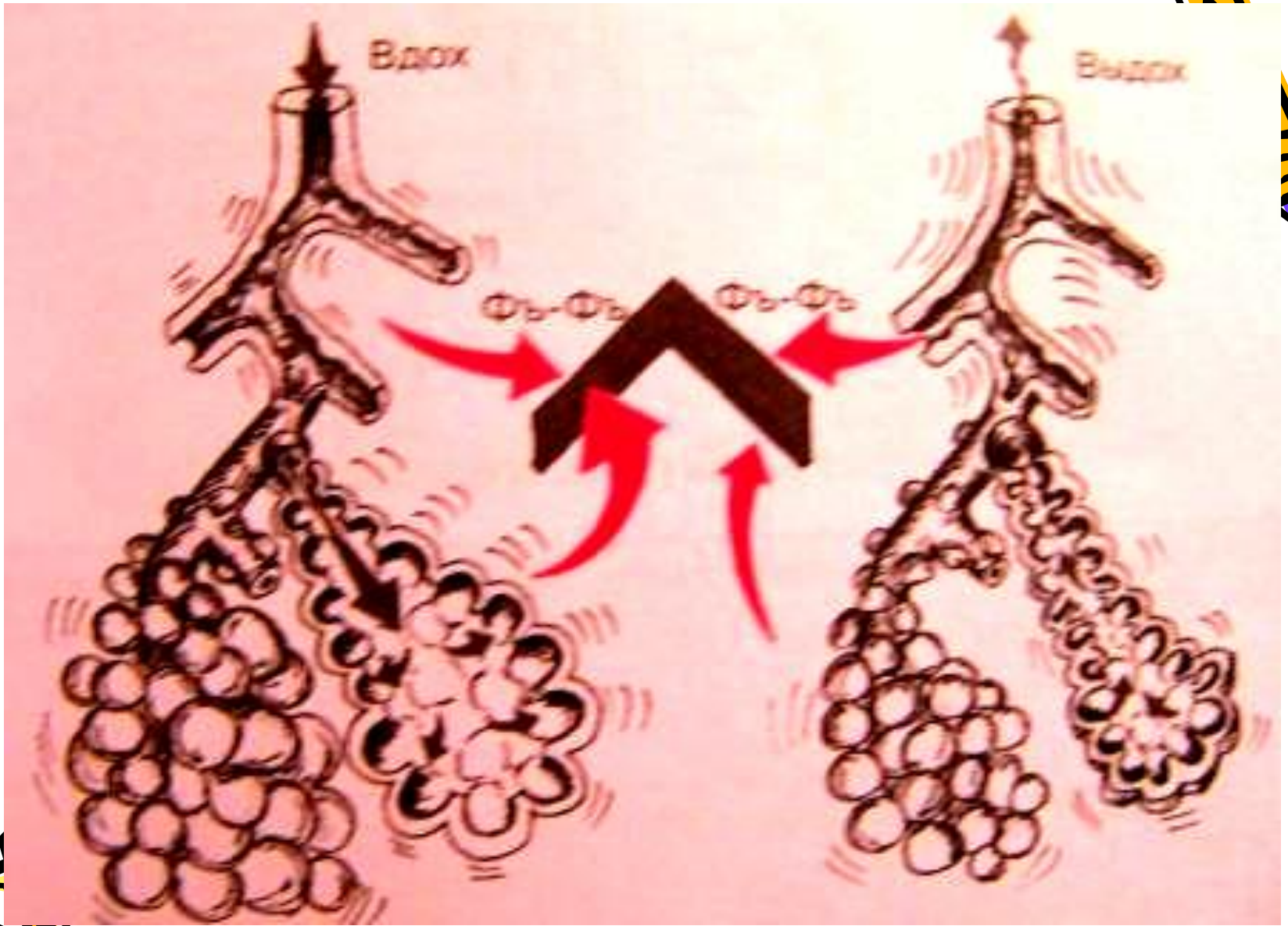


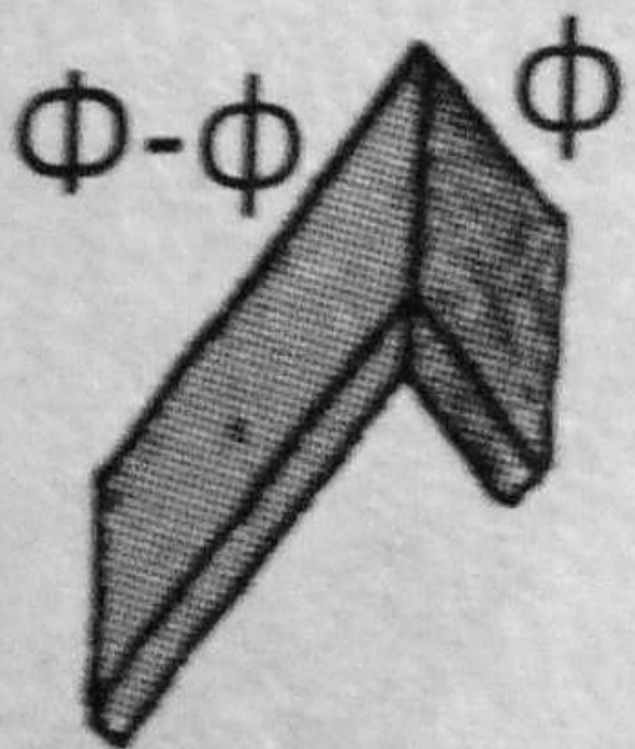
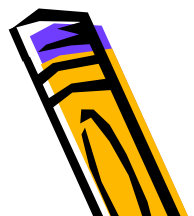
Abnormally increased vesicular breathing



- can be heard in increased expiration - because of the obstruction of the air passage through the small bronchi;
- this obstruction usually is due to contracted lumen of small bronchi and bronchiole (bronchospasm, inflammatory edema of the mucosa).







This increased vesicular breathing is called **harsh respiration**

- and it appears in the uniform narrowing of small bronchi (bronchitis).

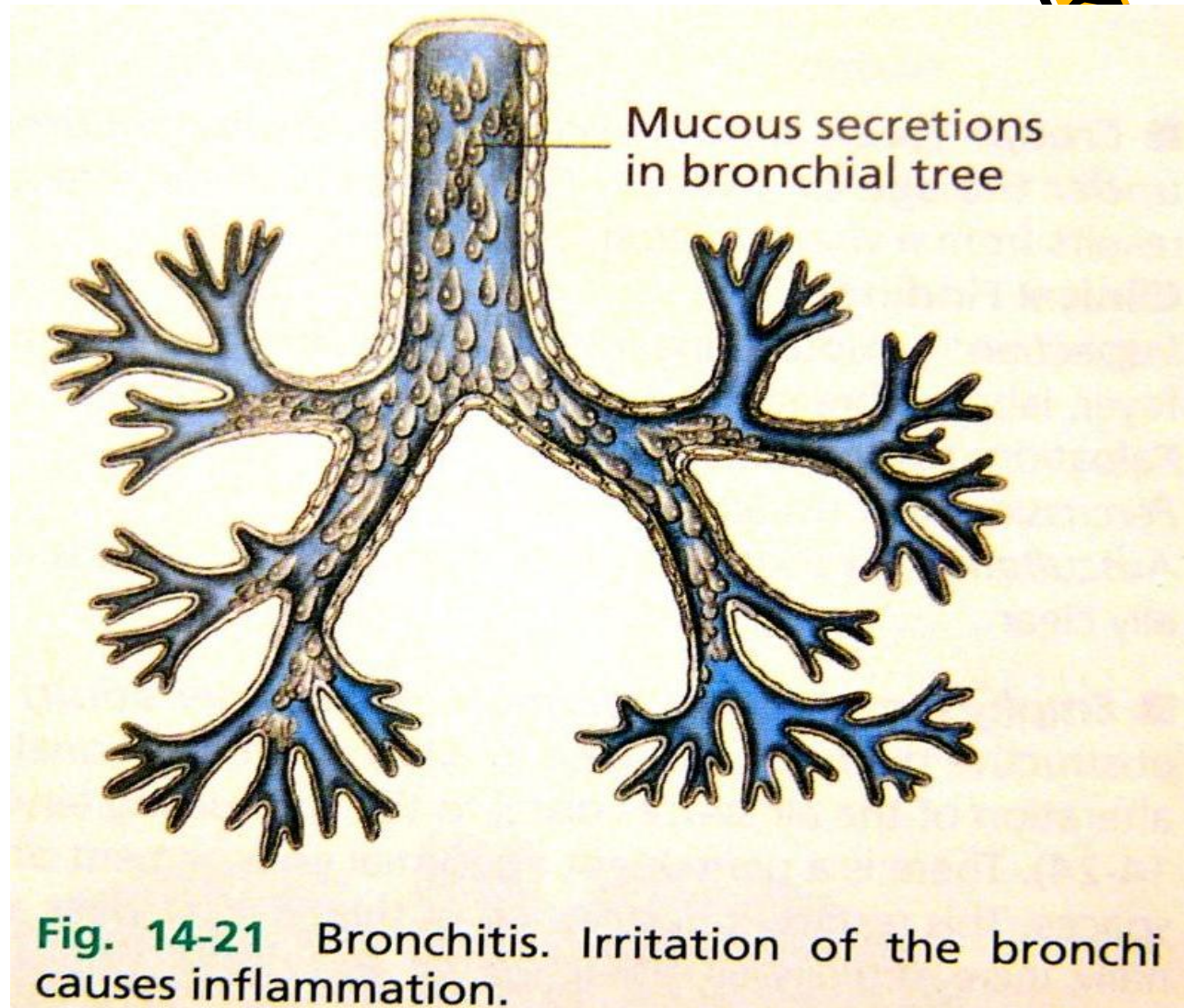
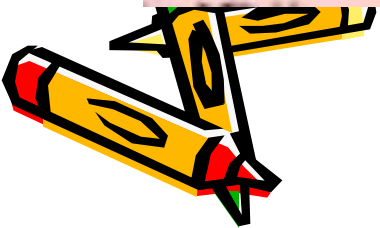
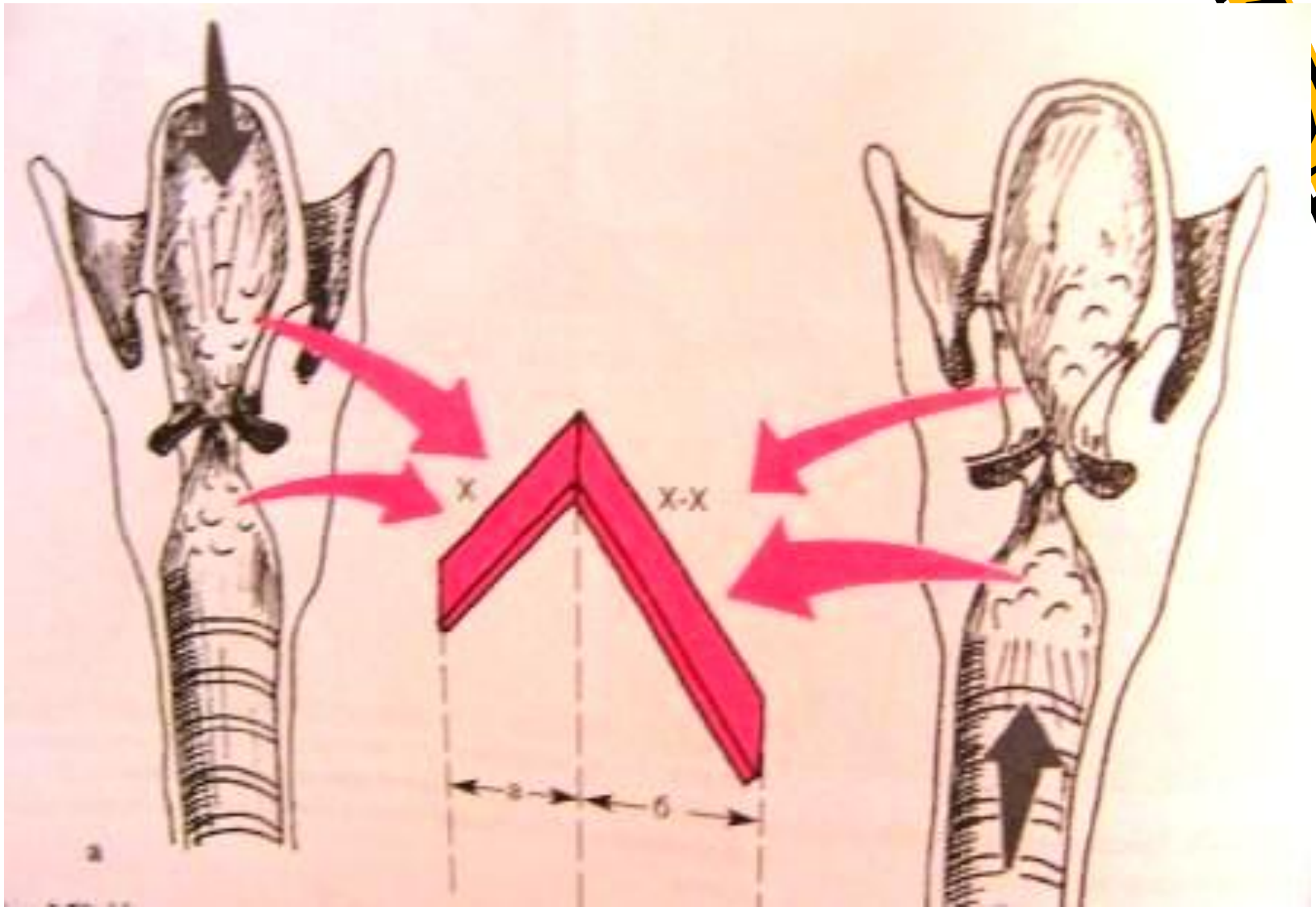
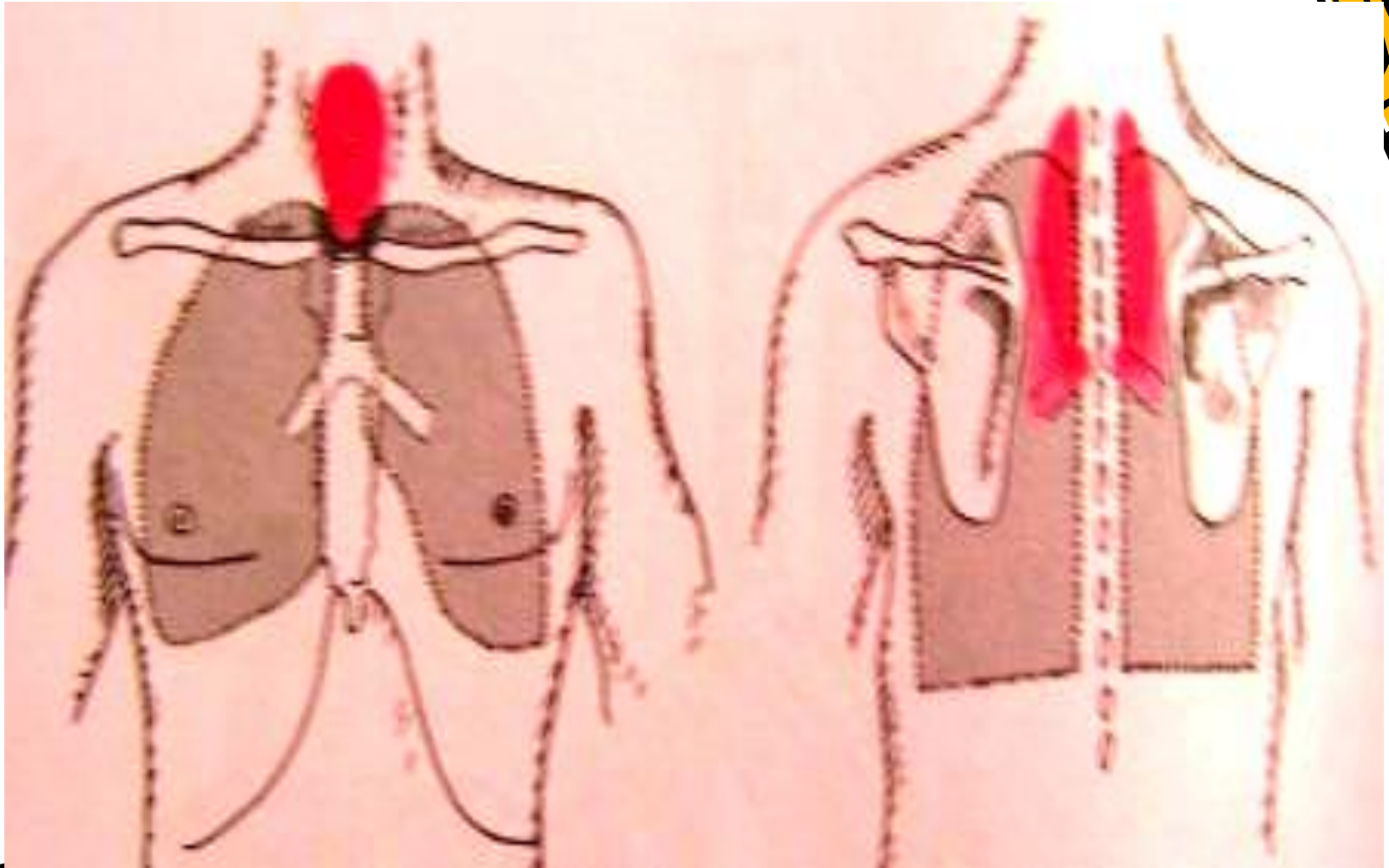


Fig. 14-21 Bronchitis. Irritation of the bronchi causes inflammation.

2. Bronchial breathing

- Bronchial breathing arise in the larynx and is transmitted into the trachea when air passes through the vocal slit (because of the turbulent movements of the air).
- is well heard upon the larynx (on the neck), trachea and points of tracheal bifurcation's projection (the sternum till the 4th thoracic vertebrae anterior and 2nd - 4th thoracic vertebrae posterior)

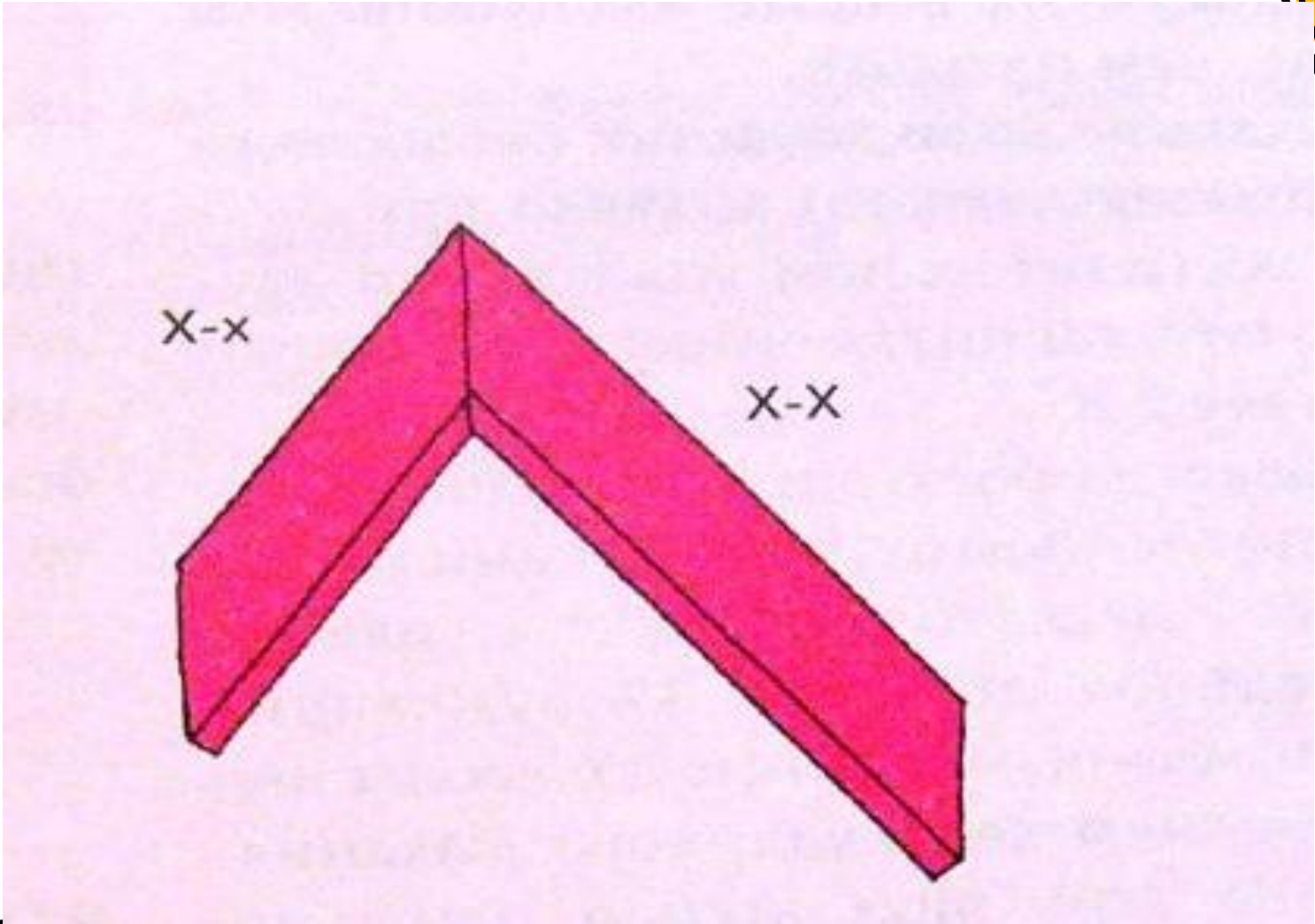




The characteristics of the Bronchial breathing:

- its sound is harsh
- can be simulated by pronouncing the sound "h-h"
- it can be heard at the end of inspiration phase and during the whole expiration phase (Inspiration : expiration = 1:3)



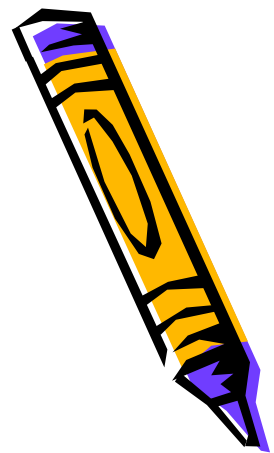


Pathological bronchial breathing

- Bronchial breathing can be heard instead of vesicular breathing over the chest, because of the transmission of the BB through the consolidated territories,
 - in this case it is called *pathological bronchial breathing*.



Causes of *pathological bronchial breathing*:

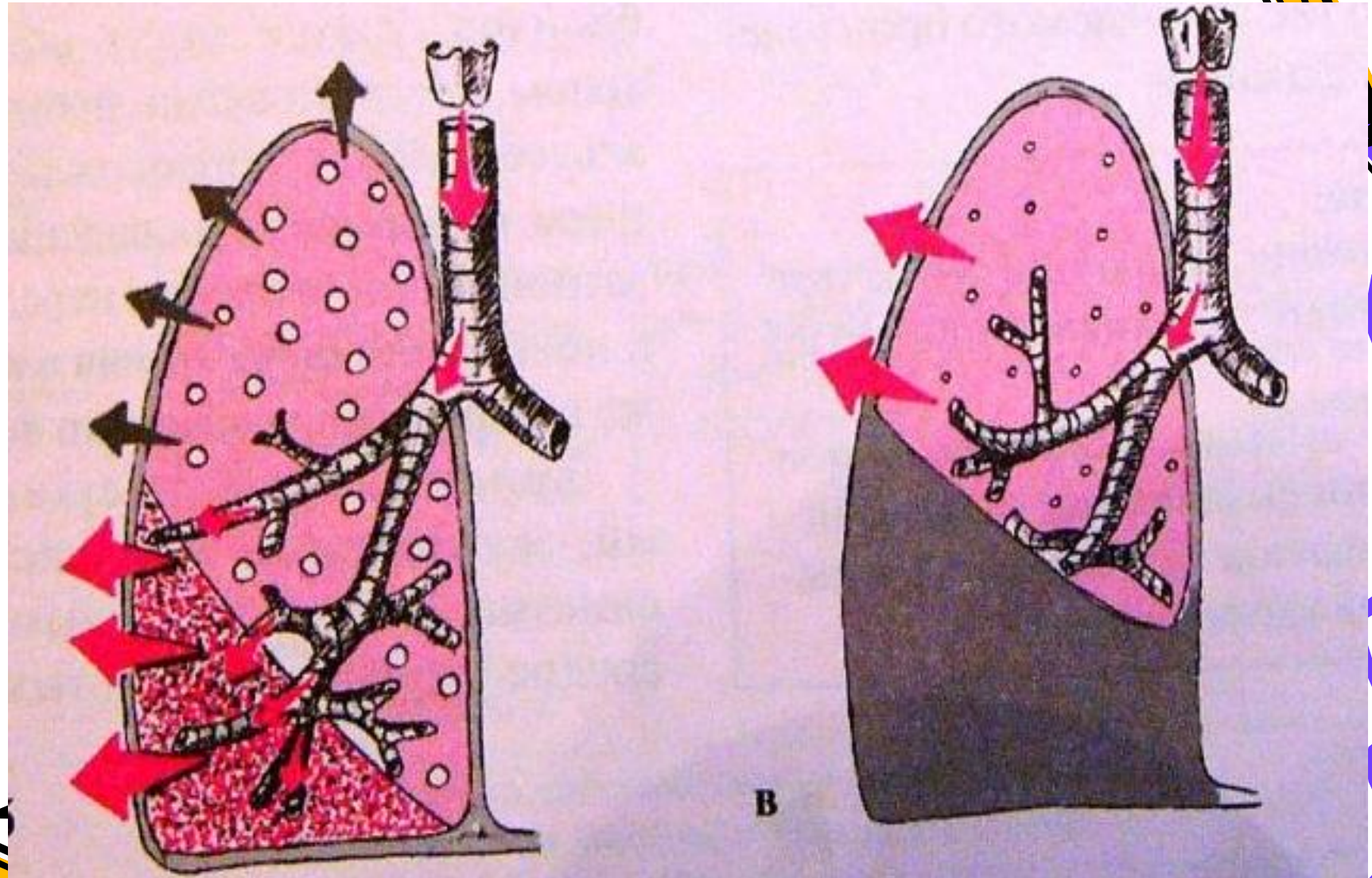


- (1) a pulmonary tissue consolidation
(when alveoli are filled with effusion or blood - for example, lobar pneumonia, tuberculosis, lung infarction)

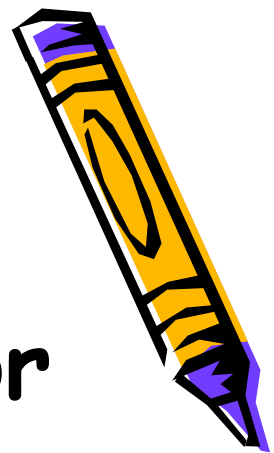


Pneumonia

Atelectasis



- (2) alveoli compression by air or fluids accumulated in pleural cavity, compression of the lung against its root, which lead to consolidation of the lung tissue (atelectasis by compression).



If the indurations of the lung tissue are large and superficial we hear the loud bronchial breathing (Pathological), it is heard as if near ear.

If the segment is seated deeply, breathing will be weaker and the pitch of the sound is lower.

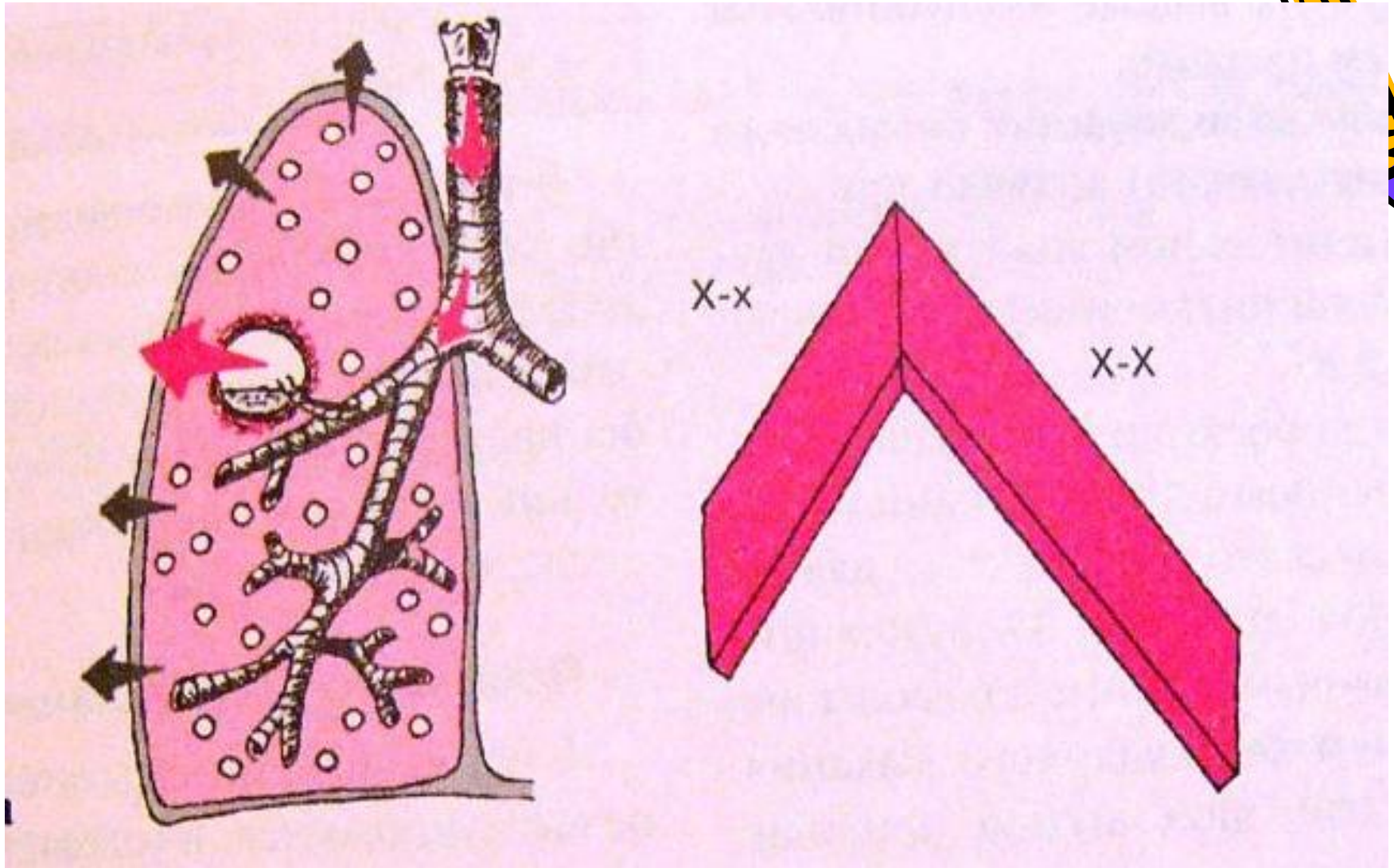


Amphoric respiration



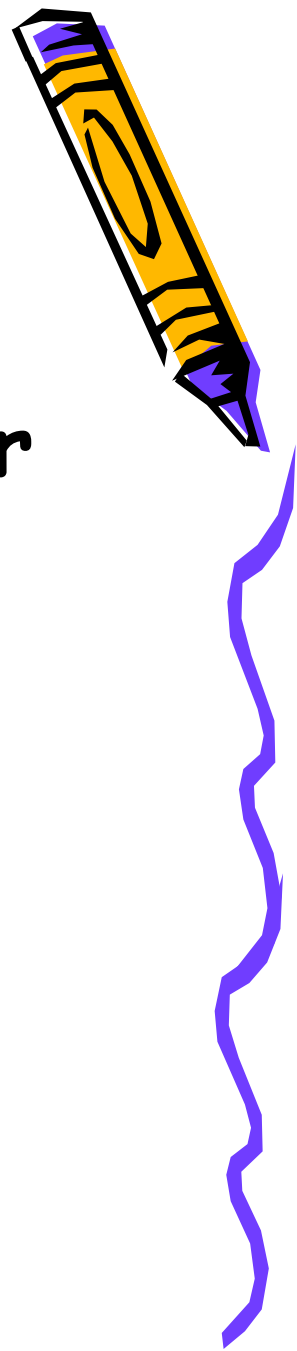
- is a type of Pathological bronchial breathing
- arises in the case of a large cavern communicated with big bronchi (because of a resonance effect).
Example - in tbc or abscess cavern.





Stenotic respiration

- is present in narrowed trachea or large bronchus, it is an exaggerated bronchial breathing.

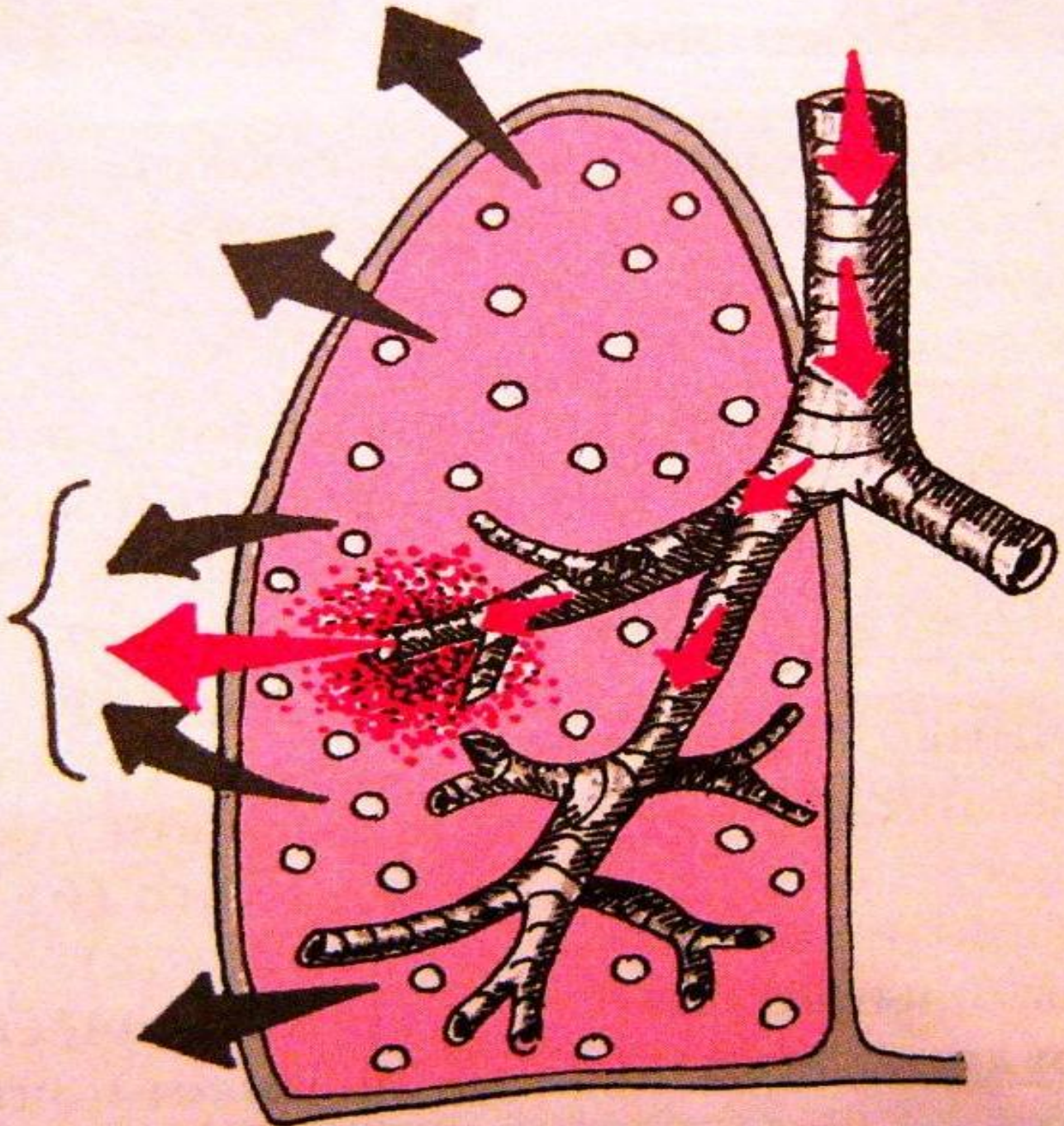


Bronhovezicular breathing

In case of alternations of healthy and consolidated lung tissue :

1. **Bronhopneumonia** (deep localization or small dimension of a consolidated lung area);
2. **tbc.**





Adventitious respiratory sounds



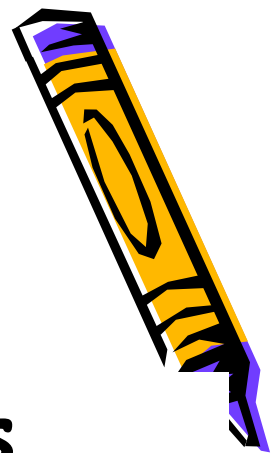
- There are 3 types of adventitious respiratory sounds:
 - rales
 - crepitation
 - pleural friction

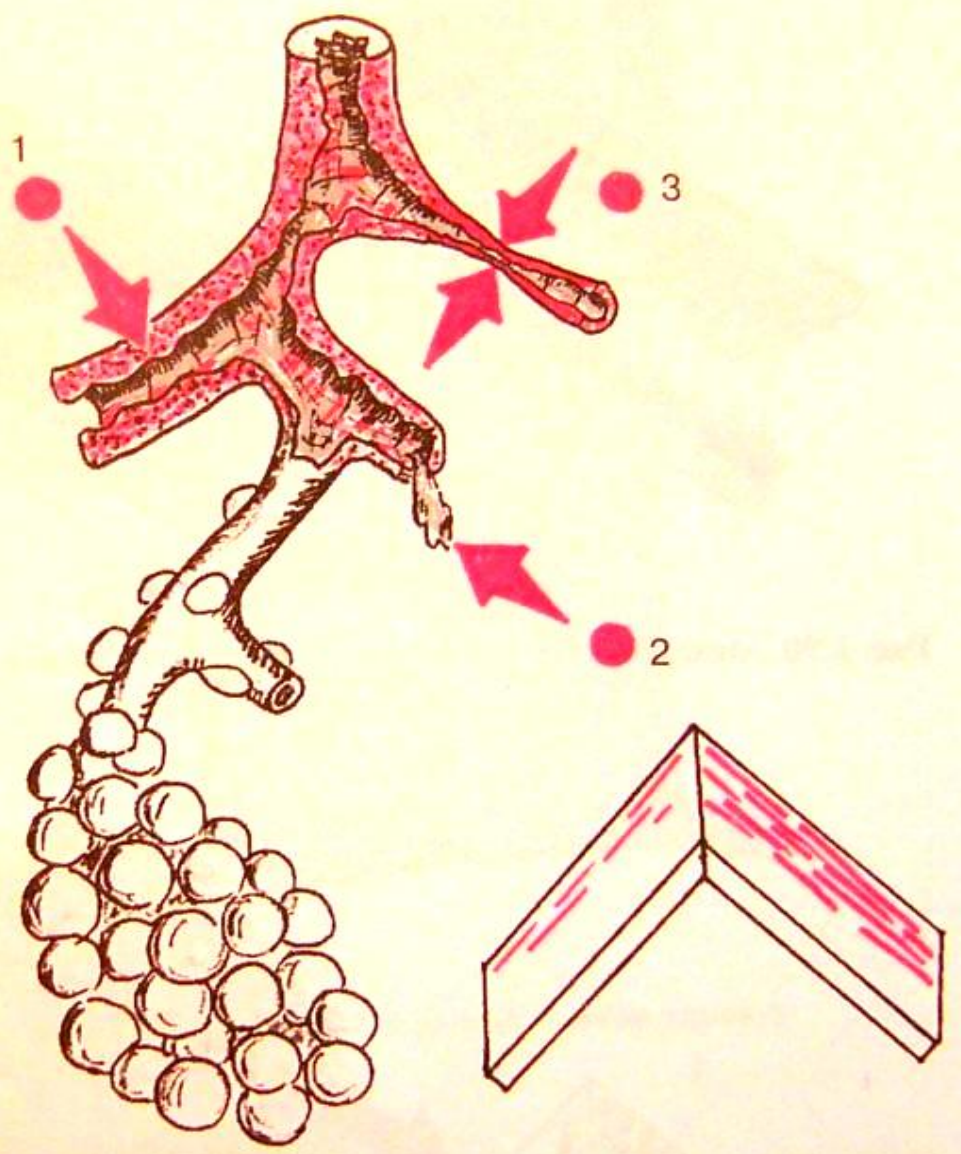


Rales

are sounds produced in the bronchus because of pathological changes in them:

- Spasms of bronchial smooth muscles (bronchospasm), which are narrowing the bronchial lumen;
- Swelling of the bronchial mucosa during the inflammation
- Accumulation of sputum in the bronchi





Characteristics of the rales:

- All the rales are heard in both respiratory phases - in the inspiration and in expiration;
- Are various in their loudness, tone and pitch.
- Are modified after coughing (because the sputum could change its position after cough)
- During the imitation of respiratory act they disappear

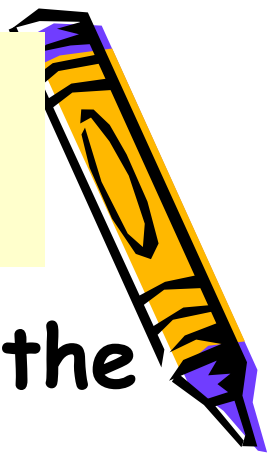
Rales could be of different types:

- 1.) dry rales (also called wheezes, ronchi)
- 2.) moist rales (crackles)

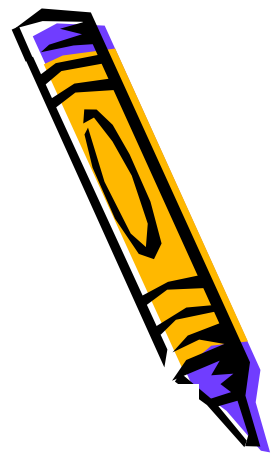


Dry rales are caused by:

- Accumulation of viscous sputum in the bronchi which adheres to the bronchus wall and narrows its lumen
- it vibrates when the air passes through the bronchus, producing a specific sound - rale.



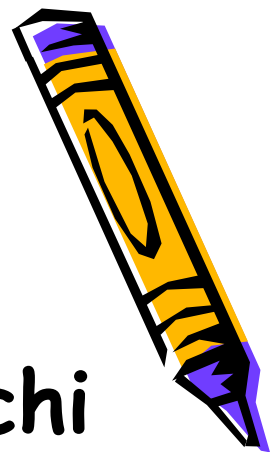
Dry rales are divided into:



- sibilant rales - wheezes (high-pitched and whistling sounds), which are produced because of the narrowing of the small bronchus;
- sonorous rales - rhonchi (low-pitched and sonoring sounds), which are produced because of the stenosis of the medium and large bronchi, or because viscous sputum in their lumen;



- Diffuse inflammation of the bronchi or bronchospasm arising during bronchial asthma attacks could generate both sibilant and sonorous sounds and can be heard at a distance (*wheezing*).



Moist rales are generated because of:

Accumulation of liquid secretion (sputum, blood, edematous fluid) in the bronchi through which the air passes.



Moist rales are divided into:



- fine bubbling - are generated in small bronchi
- medium bubbling - are produced in medium caliber bronchi
- coarse bubbling - are produced in large caliber bronchi or cavities



Also moist rales could be:



- consonating (are heard when the affected bronchi is surrounded by consolidated pulmonary tissue)
- non-consonating (in bronchitis)

If cavities are located in the lung, the rales can be heard over the limited area of the chest.

In chronic bronchitis or left-sided chronic failure the rales can be heard in symmetric parts of the chest.

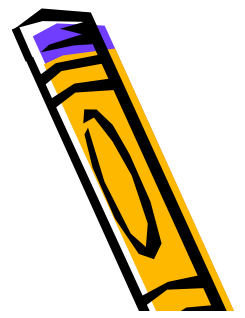


Crepitation

- Crepitation originates in alveoli. Its sound can be imitated by rubbing a lock of hair.
- The main condition for crepitation arising is: the presence of a small amount of liquid secretion in alveoli.

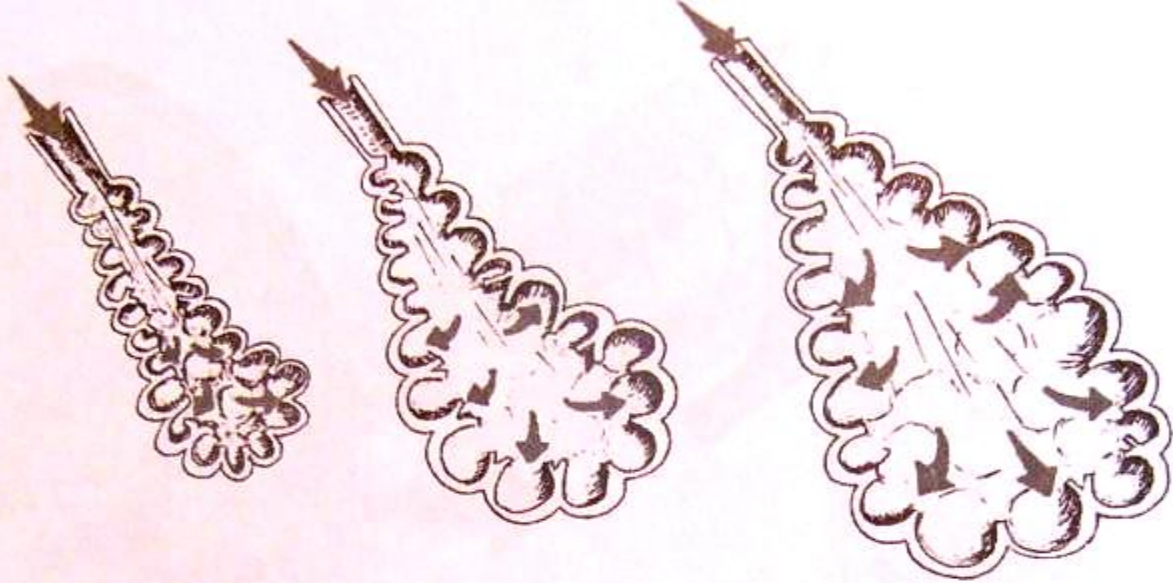


Mechanism

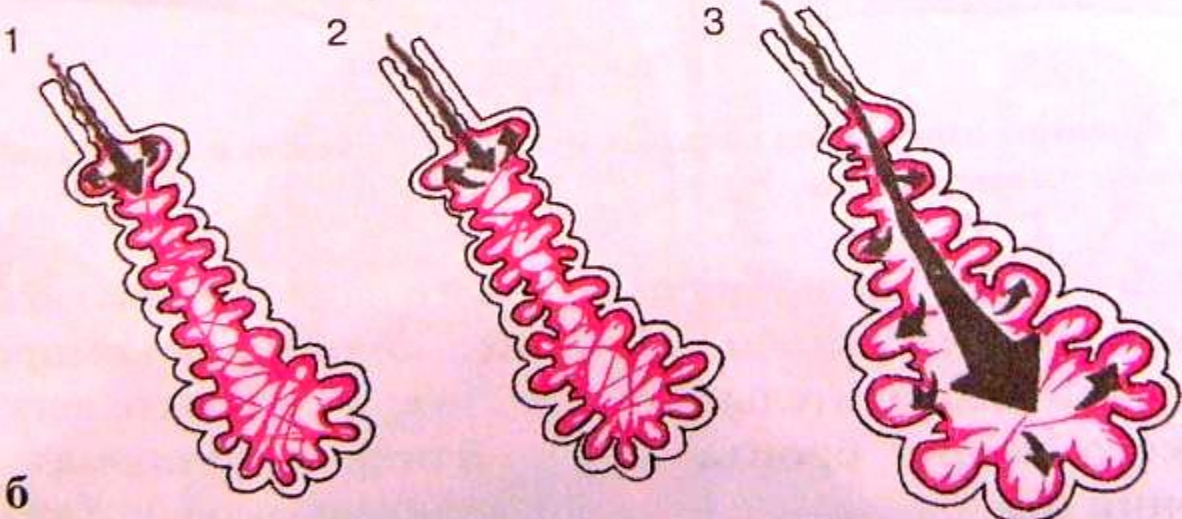
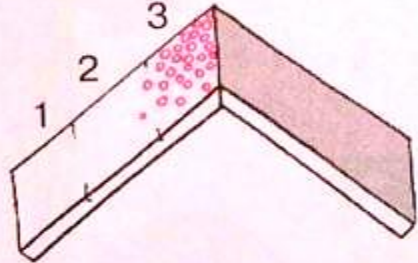


- Because of the exudate in inspiration the alveoli walls are separated with difficulty - and only at the end of the inspiration phase.
- This separation produces noise, because in expiration the liquid from alveoli will stick the walls between them; in inspiration the walls will get apart with difficulty and with noise.

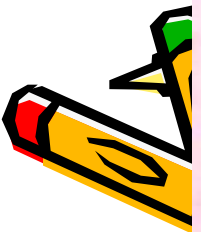




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- Crepitation is mainly heard :
 1. in the first and third phases of acute lobar pneumonia,
 2. in tbc,
 3. lung infarction
 4. in congestions caused by left heart failure.

- Crepitation will not change after coughing.

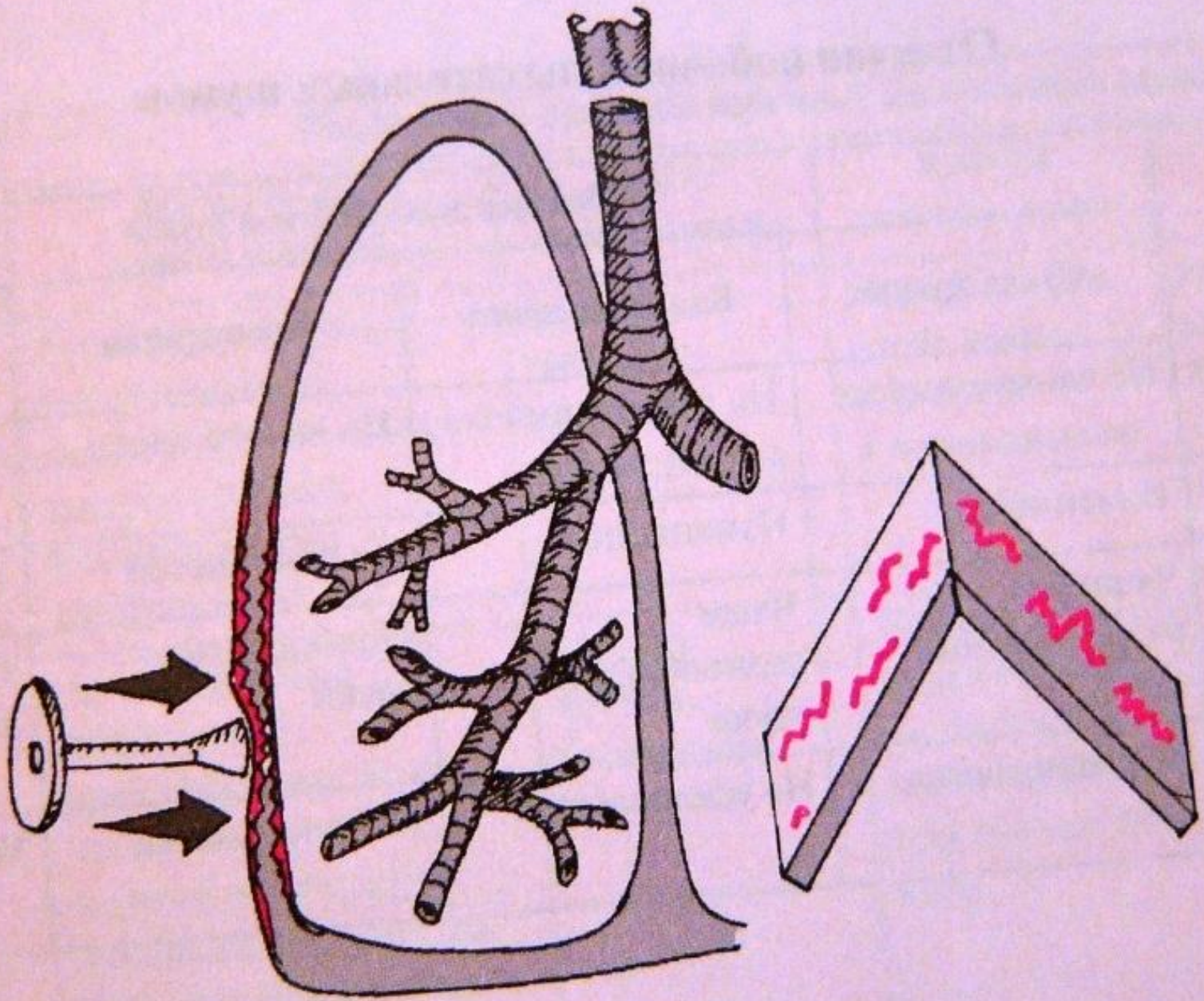


Pleural rub (friction)



- The friction of visceral and parietal layers is going noiseless.
- Fibrin deposits on inflamed pleura make the surface rough; between the layers appear scars, bands, commissures.
- The pathological conditions alter properties of pleural surfaces and generate adventitious sound - pleural friction.



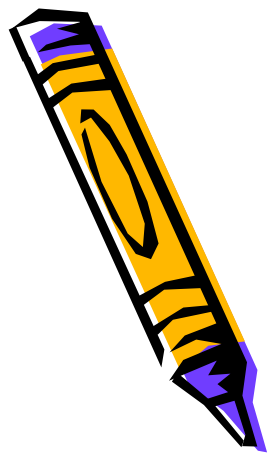


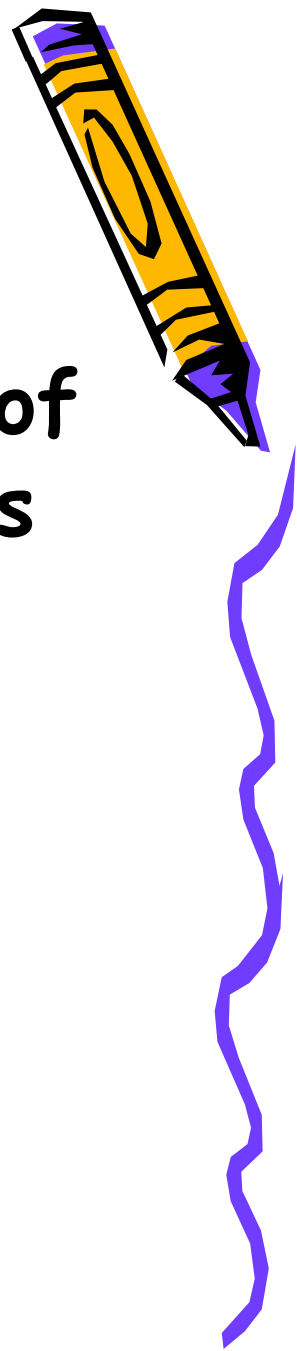
How could be differentiated these three adventitious sounds - bubbling moist rales, pleural friction and crepitation?

1. the character of the rales is altered after coughing, the crepitation and pleural friction sounds - not.



2. the pleural friction sound intensified after pressure with fonendoscope upon the chest, rales and crepitation - not.





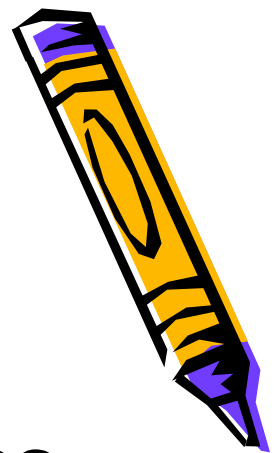
3. crepitation is heard at the top of the inspiration, friction and rales are heard in both phases.



4. crepitation and rales cannot be heard when the patient will imitate the respiration (with mouth and nose are closed and the air will not enter the respiratory ways), but the pleural friction will be heard.



Bronhophony



- The patient is asked to pronounce "ninety-nine" during auscultation,
- upon the consolidated areas the pronounced words will intensify;



Whispering Pectorilocvia

- is performed like bronchophony, only the patient is asked to pronounce whispered words.

It will be intensified upon the consolidated areas (like bronchophony)

