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КАФЕДРА МОРФОЛОГИИ ЧЕЛОВЕКА

# ОСТЕОЛОГИЯ, АРТРОЛОГИЯ, МИОЛОГИЯ

# OSTEOLOGY, ARTHROLOGY, MYOLOGY

Практикум по анатомии человека

*3-е издание, исправленное*



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**ОСТЕОЛОГИЯ, АРТРОЛОГИЯ, МИОЛОГИЯ**  
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На английском языке

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## INTRODUCTION

The study of Human Anatomy involves memorizing a large amount of information and a lot of special terms. It is important not only to remember this or that term, but also understand the composition of the structure it denotes. This approach involves mastering the applied knowledge necessary for subsequent clinical training.

Taking into account that junior students are not adapted to higher education, and the logical components of their thinking are not yet formed, there are real challenges in mastering the curriculum in Human Anatomy. This guide will help the students cope with the difficulties and is aimed at organizing their educational activities in the most efficient way. Due to the presence of control questions focused on the basic concepts of the topics studied, a differentiated approach to the selection of educational material is implemented. The selective principle is also applied to the list of terms that are required for memorization. Assignments for independent work — drawings, diagrams, tables, etc. — help the student not only “see” the studied object, but also form an idea of its topography. The indisputable advantage of this publication is the glossary, which includes a list of specialized terms with their interpretation.

This practical work guide is intended for first-year students majoring in “Dentistry” 1-79 01 07.

It documents students’ independent work and must be completed in accordance with the requirements formulated below.

1. The tasks included in the practical work guide are performed by the student in the process of self-study on the subject of the lesson.
2. Signatures to drawings, designations of structures, completing the tables, etc., should be carried out accurately, competently and in accordance with anatomical terminology.
3. The quality of accomplishing the tasks is assessed by the teacher at the lesson.
4. The correctness of completing the practical work guide is taken into account when giving final grades on the sections of the discipline under study.
5. Constructive suggestions of students on the content and design of the practical work guide can be taken into account when it is reissued.

**LABORATORY SESSION № 1**  
**ANATOMY AS AN ACADEMIC DISCIPLINE. THE AXIAL SKELETON.**  
**VERTEBRAL COLUMN. THORAX SKELETON**

**Control questions:**

1. Methods of studying the structure of the human body.
2. The concept of planes and axes.
3. Anatomical terminology.
4. Classification of bones.
5. The axial skeleton. The vertebral column: departments, functions. Formation of the spinal column curvatures.
6. The general structure of a vertebra.
7. The structure of the cervical vertebrae. The structural features of the first, second and seventh cervical vertebrae.
8. The structure of the thoracic, lumbar and sacral vertebrae.
9. Sternum: position, structure.
10. Classification of ribs. The structure of the ribs. The structural features of the first rib.
11. The skeleton of thorax. The boundaries of the upper and lower apertures, costal margin, infrasternal angle. Age and individual differences of thorax.

**At the session students should learn how to find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Spine.** 1. *Spinal canal*. 2. *Cervical vertebra*. 3. *Thoracic vertebra*. 4. *Lumbar vertebra*. 5. *Sacral vertebrae (sacrum)*. 6. *Coccygeal vertebrae (coccyx)*. 7. *Vertebral body*. 8. *Vertebral arch*. 9. *Intervertebral foramen*. 10. Superior (inferior) vertebral notch. 11. *Transverse process*. 12. *Superior (inferior) articular process*. 13. *Spinous process*. 14. *Foramen transversarium*. 15. *Atlas*. 16. Lateral mass of atlas. 17. Superior (inferior) articular surface of atlas. 18. Anterior (posterior) arch of atlas. 19. *Dens of axis*.

**Skeleton of thorax.** 1. *Thorax*. 2. Superior (inferior) aperture of thorax. 3. Costal edge. 4. Infrasternal angle. 5. *Sternum*. 6. *Manubrium, body of sternum*. 7. *Xiphoid process*. 8. Jugular, clavicular notch. 9. Sternal angle. 10. Costal notches. 11. *Rib*. 12. Head of rib. 13. Neck of rib. 14. Body of rib. 15. Tubercle of rib. 16. Angle of rib. 17. Costal groove.

**GLOSSARY**

**Skeleton** is a set of bones and cartilages that forms the solid core of the human body. It performs a supporting, protecting and locomotor function and participates in mineral metabolism. There is an axial and additional skeleton.

**Axial skeleton** is represented by the spine, thoracic skeleton and skull.

**Additional skeleton** is constituted by the skeleton of bones of the upper and lower extremities that form the girdle and the free part of the limbs.

**Vertebral column** (*columna vertebralis*) is a constituent element of the axial skeleton. It consists of interconnected vertebrae, the vertebral foramina of which form a vertebral canal containing the spinal cord. 31 pairs of spinal nerves extend from the vertebral canal through the intervertebral foramen.

**Vertebra** (*vertebra*) has a body and an arch, located respectively in front and behind the vertebral aperture. The spinous (unpaired), transverse, superior and inferior articular processes go from the arch.

**Cervical vertebrae** (*vertebrae cervicales*,  $C_1-C_7$ ) are the smallest in size; have transverse foramen and a bifurcated spinous process. In the first cervical vertebra a spinous process is absent, in the seventh it is the longest and not bifurcated. On the body of the second cervical vertebra there is an appendage — a dens, with which it joins with the first vertebra.

**Thoracic vertebrae** (*vertebrae thoracicae*,  $Th_1-Th_{12}$ ) have on the body and transverse processes the costal facet for articulation with the head and tubercle of the rib. The spinous processes of the vertebrae are directed back and down and the articular processes are oriented in the frontal plane.

**Lumbar vertebrae** (*vertebrae lumbales*,  $L_1-L_5$ ) have a massive body. Their spinous process is located horizontally, articular processes lie in the sagittal plane.

**Sacral vertebrae** (*vertebrae sacrales*,  $S_1-S_5$ ) of an adult man fuse into a single bone (sacrum), which participates together with the pelvic bones in the formation of the skeleton of the pelvic girdle.

**Coccygeal vertebrae** (*vertebrae coccigeae*) in an amount of 3–5 are fused into a single bone (coccyx) after birth.

**Kyphosis** is the curvature of the spinal column directed by the bulge back. It is found in the thoracic and sacral parts of the spine.

**Lordosis** is the curvature of the spinal column directed by a bulge forward. It is present in the cervical and lumbar spine. Kyphosis and lordosis are formed in postnatal ontogenesis. They impart elasticity to the spine and promote a uniform distribution of loads to all its departments.

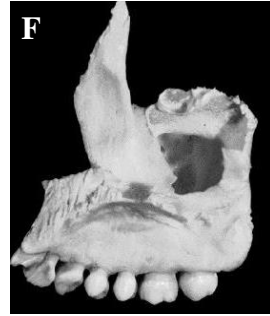
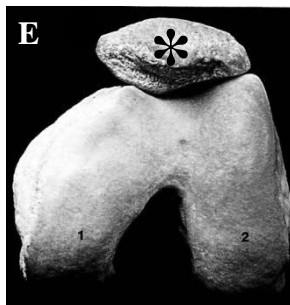
**Scoliosis** is the curvature of the vertebral column in the frontal plane. Expressed scoliosis refers to pathological curvatures.

**Thorax** (*cavea thoracis*) forms the bone base of the walls of the thoracic cavity. It is composed of sternum, thoracic vertebrae and the ribs connected with them. It has upper and lower apertures.

**Sternum** (*sternum*) is an unpaired flat bone that forms part of the anterior wall of the thorax. It has a manubrium, a body and a xiphoid process. It is connected with the clavicles and the first seven pairs of ribs.

**Rib** (*costa*) consists of the bone part and costal cartilage. Cartilages of the true ribs (1st–7th pair) from the front articulate directly to the sternum. Cartilages of false ribs (8th–10th pair) are attached to the overlying rib and form a costal arch. The anterior ends of the floating ribs (11th–12th pair) lie freely in the muscle mass.

**CLASSIFICATION OF BONES**

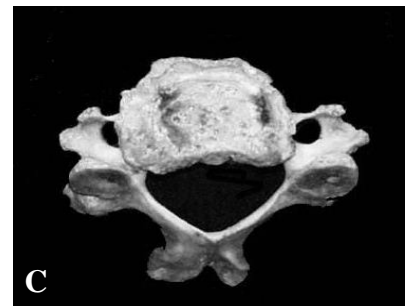
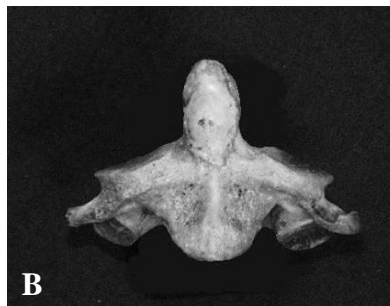


Name the types of bones, presented in the figures:

- A — \_\_\_\_\_  
 B — 1. \_\_\_\_\_  
 2. \_\_\_\_\_  
 C — \_\_\_\_\_  
 D — \_\_\_\_\_  
 E — \_\_\_\_\_  
 (marked \*)  
 F — \_\_\_\_\_

**Cervical vertebrae:**

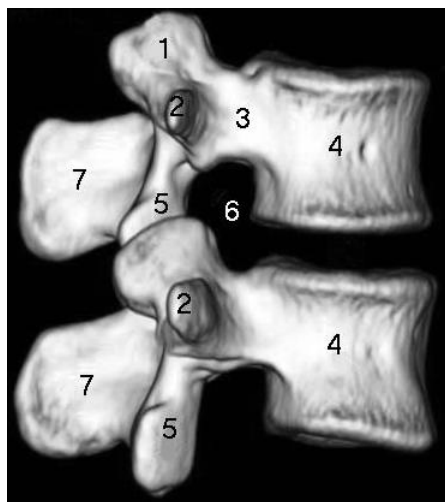
Under Figures A, B and C write the names of the vertebrae.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

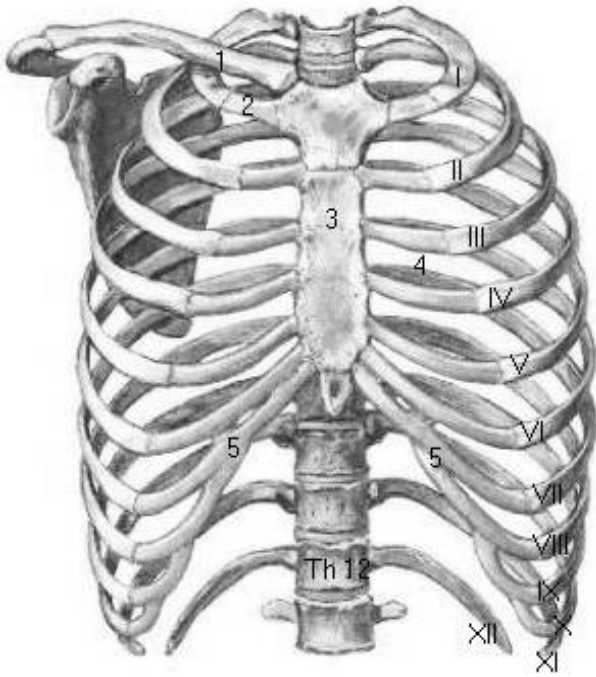


**Lumbar vertebrae (lateral view)**

Name the anatomical structures marked by the numbers:

1. \_\_\_\_\_  
 2. Transverse process  
 3. \_\_\_\_\_  
 4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_

### Thorax anterior view



Name the structures marked by the numbers:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

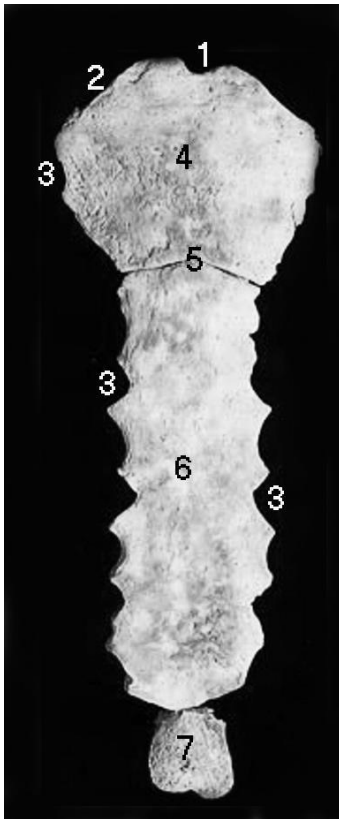
5. \_\_\_\_\_

I-VII – \_\_\_\_\_ ribs

VIII-X – \_\_\_\_\_ ribs

XI-XII – \_\_\_\_\_ ribs

### Sternum



Name the structures marked by the numbers:

1. \_\_\_\_\_

2. \_\_\_\_\_

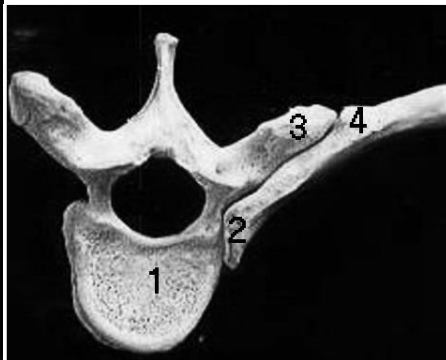
3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_



### Connecting the rib with the vertebra

Name the anatomical structures marked by the numbers:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

## LABORATORY SESSION № 2 SKULL. NEUROCRANIUM

### Control questions:

1. Skull: division into the cerebral and facial sections, the name and location of bones.
2. Structure of the occipital bone: parts, the relief of the outer and inner surfaces. Canals, apertures and grooves of the occipital bone.
3. Structure of the parietal bone: edges, angles, the relief of the outer and inner surfaces.
4. Structure of the frontal bone: parts, the relief of the outer and inner surfaces, frontal sinus.
5. Structure of the sphenoid bone: parts, canals, foramens, sphenoid sinus.
6. Structure of the ethmoid bone. Ethmoidal labyrinth.
7. Structure of the temporal bone: parts, their mutual location. The relief of the outer and inner surfaces. Tympanic cavity. Structure of the mastoid process.
8. Canals and canaliculi of the temporal bone: foramens, direction of motion, bends, contents.

**At the session students should learn how to: 1) find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Occipital bone.** 1. *Foramen magnum*. 2. *Occipital condyle*. 3. Condylar canal. 4. *Hypoglossal canal*. 5. *Jugular notch*. 6. *External (internal) occipital protuberance*. 7. External (internal) occipital crest. 8. Superior (inferior) nuchal line. 9. Cruciform eminence. 10. Groove for the superior sagittal (transversal, sigmoid, superior petrosal, inferior petrosal) sinus.

**Parietal bone.** 1. Superior (inferior) temporal line. 2. Parietal tuber. 3. Parietal foramen.

**Frontal bone.** 1. Squamous part. 2. Nasal part. 3. Orbital part. 4. Frontal tuber. 5. *Superciliary arch*. 6. *Glabella*. 7. *Supraorbital margin, notch, foramen*. 8. *Zygomatic process*.

**Sphenoid bone.** 1. *Body*. 2. *Greater (lesser) wing*. 3. *Pterygoid process*. 4. Pterygoid notch. 5. Pterygoid canal. 6. *Sella turcica*. 7. *Hypophysial fossa*. 8. *Dorsum sellae*. 9. Prechiasmatic sulcus. 10. *Optic canal*. 11. Carotid groove. 12. *Superior orbital fissure*. 13. *Rotundum, ovale, spinous foramen*. 14. Infratemporal crest.

**Ethmoid bone.** 1. Cribriform (perpendicular, orbital) plate. 2. *Crista galli*. 3. Ethmoidal labyrinth. 4. *Superior, middle nasal concha*.

**Temporal bone.** 1. Pyramid. 2. *Petrous, tympanic, squamous parts*. 3. *Zygomatic, styloid, mastoid processes*. 4. *Mandibular fossa*. 5. *Articular tubercle*. 6. Petrotympanic fissure. 7. *External, internal acoustic opening*. 8. External acoustic meatus. 9. Arcuate eminence. 10. Groove for greater (lesser) petrosal nerve. 11. Hiatus for greater (lesser) petrosal nerve. 12. Tegmen tympani. 13. *Trigeminal impression*. 14. Groove for superior (inferior) petrosal sinus. 15. *Stylomastoid foramen*. 16. Jugular fossa. 17. *Mastoid foramen*. 18. Groove for sigmoid sinus. 19. *Tympanic cavity*.

**2) palpate a living person's:** external occipital protuberance; parietal tuber; frontal tuber; supraorbital edge (notch); mastoid process.

## GLOSSARY

**Skeleton of the head (skull)** (*cranium*) is formed from the paired (parietal, temporal) and unpaired (occipital, frontal, sphenoid, ethmoid) bones. The skull is divided into the cranial and facial sections. The cranial skull forms a cavity for the brain, some sense organs and is divided into a base and a calvaria. The facial skull forms the bone base of the face, the receptacle for the sensory organs and the initial parts of the digestive and respiratory systems.

**Occipital bone** (*os occipitale*) is unpaired, forms the posterior part of the base and calvaria. It consists of squama, basilar and paired lateral parts. Connected together, these parts limit the foramen magnum.

**Parietal bone** (*os parietale*) is paired, forms the cranial vault. It has 4 margins and 4 corners.



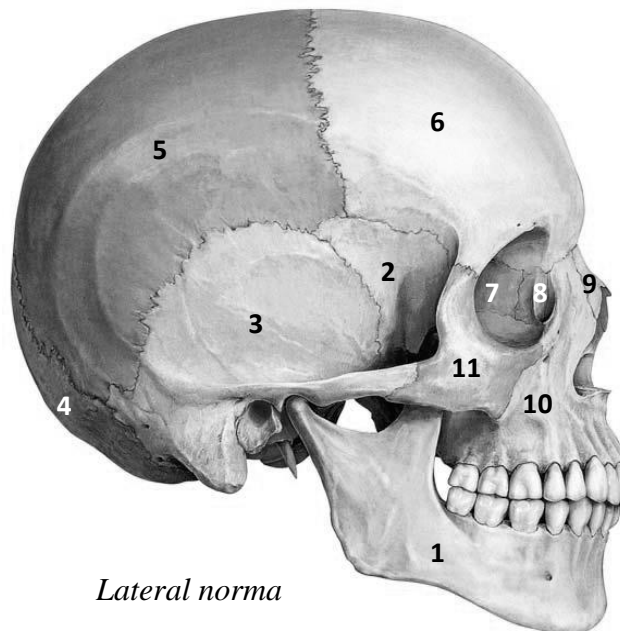
**Frontal bone** (*os frontale*) is unpaired pneumatic bone. It forms part of the calvaria and base of the skull, the walls of the orbit and the nasal cavity. It has squama, nasal and 2 orbital parts.

**Sphenoid bone** (*os sphenoidale*) is an unpaired bone located in the center of the skull base. It has a body, greater and lesser wings, pterygoid processes and contain sphenoid sinus.

**Ethmoid bone** (*os ethmoidale*) is an unpaired pneumatic bone, participates in the formation of the anterior cranial fossa, the walls of the nasal cavity and orbit. The bone consists of a horizontally located cribriform and perpendicular plate. Along the sides of the latter there is a ethmoid labyrinth, in which the front, middle and posterior cells are distinguished.

**Temporal bone** (*os temporale*) is paired, forms the base and the calvaria. It has petrosal, tympanic, squamous parts located around the external acoustic aperture. The organ of hearing and balance is located in the petrosal part (pyramid). The bone contains canals (carotid, facial, muscular-tubular) and canaliculi (caroticotympanic, tympanic, mastoid, chorda tympani).

## SKULL

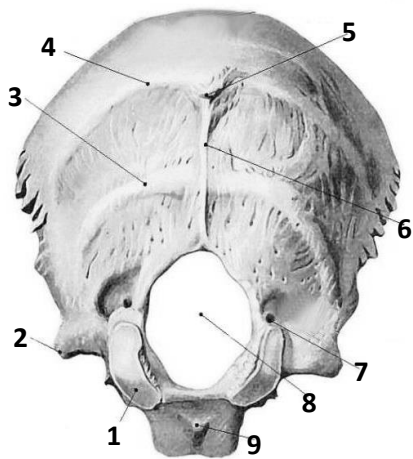


*Lateral norma*

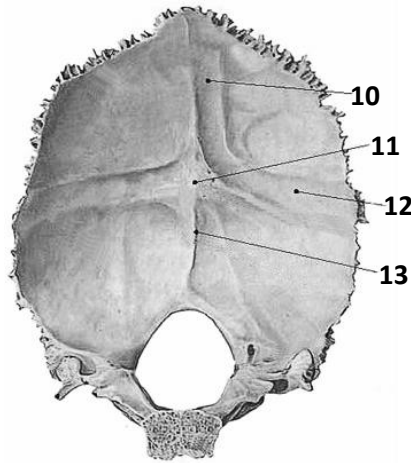
Name the bones of the skull marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_

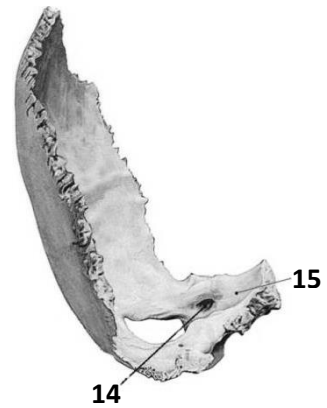
## OCCIPITAL BONE



*External surface*



*Internal surface*

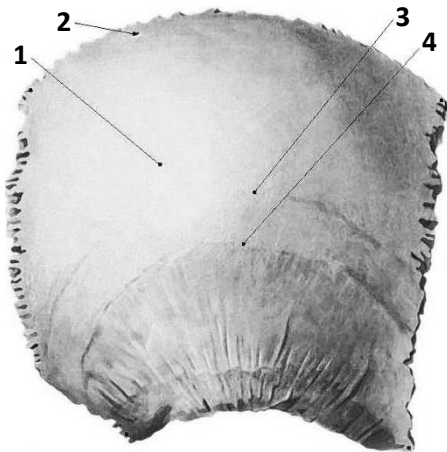


*Lateral view*

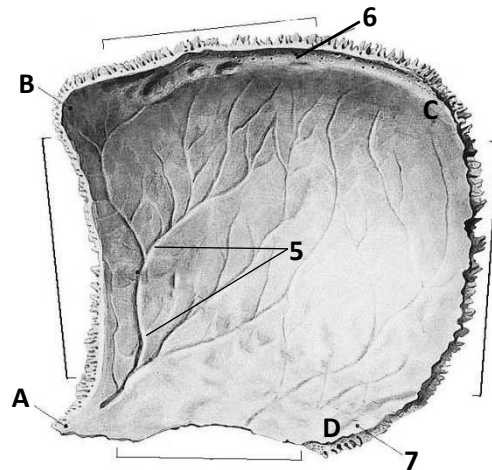
Name the anatomical structures marked by the numbers:

- |                    |                    |
|--------------------|--------------------|
| 1 — _____          | 9 — _____ tubercle |
| 2 — _____          | 10 — _____         |
| 3, 4 — _____ lines | 11 — _____         |
| 5 — _____          | 12 — _____         |
| 6 — _____          | 13 — _____         |
| 7 — _____ canal    | 14 — _____ canal   |
| 8 — _____          | 15 — _____         |

## PARIETAL BONE



*External surface*

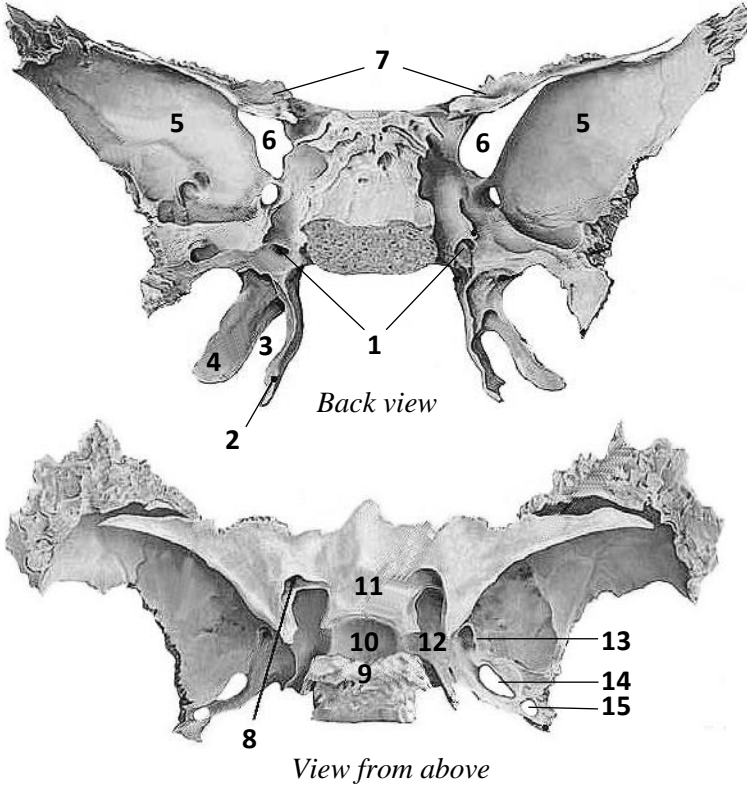


*Internal surface*

Name the anatomical structures marked by letters and numbers. Sign the names of the edges of the parietal bone marked in the figure with square brackets.

- |                 |                  |
|-----------------|------------------|
| A — _____ angle | 3 — _____        |
| B — _____ angle | 4 — _____        |
| C — _____ angle | 5 — _____        |
| D — _____ angle | 6 — _____        |
| 1 — _____       | 7 — groove _____ |
| 2 — _____       |                  |

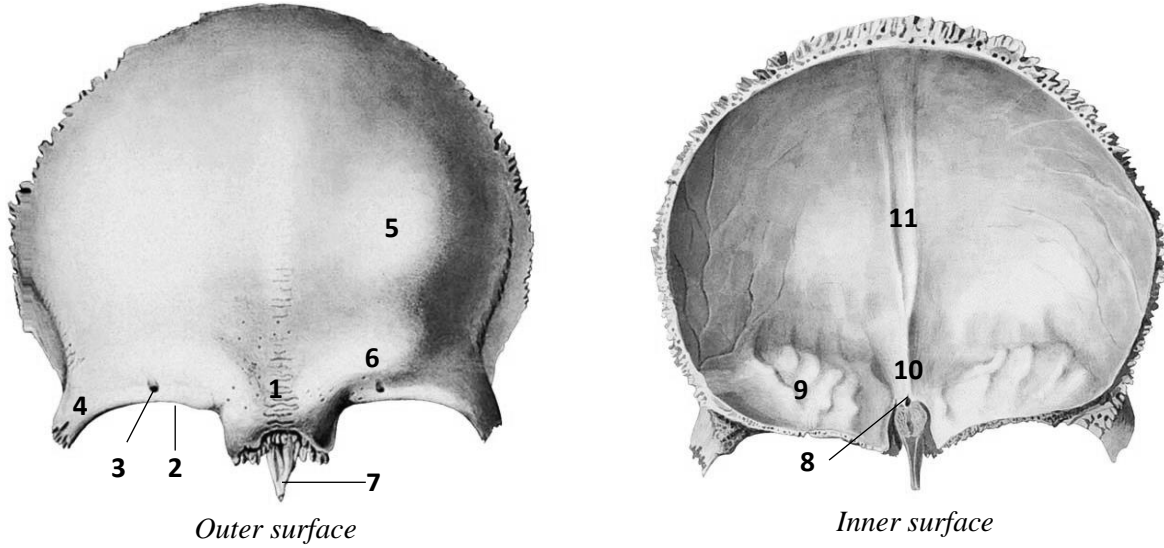
**SPHENOID BONE**



Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_ canal
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_ notch
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_ canal
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_ groove
- 12 — \_\_\_\_\_ groove
- 13 — \_\_\_\_\_
- 14 — \_\_\_\_\_
- 15 — \_\_\_\_\_

**FRONTAL BONE**

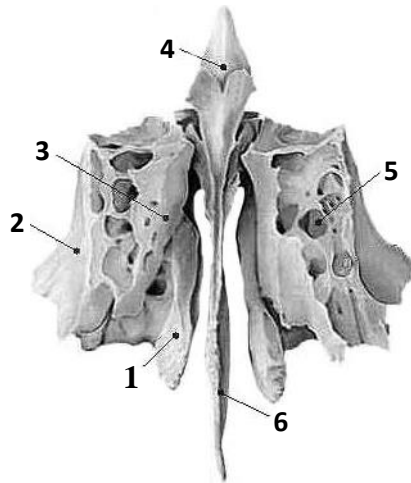


Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_

### ETHMOID BONE

Name the anatomical structures marked by the numbers:

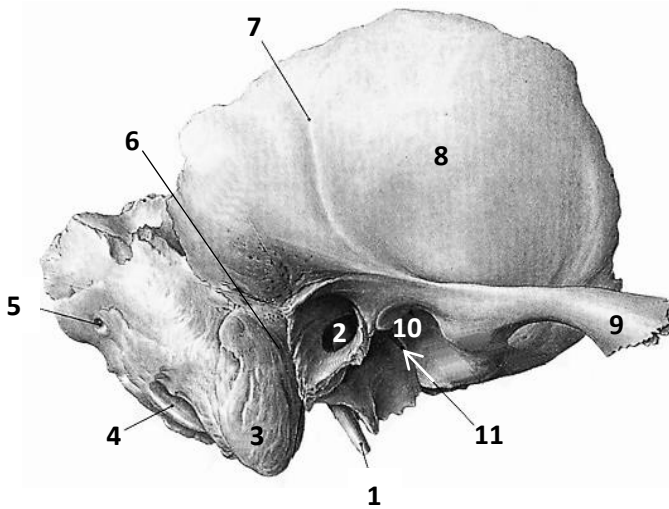


*Frontal view*

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_

### TEMPORAL BONE (RIGHT)

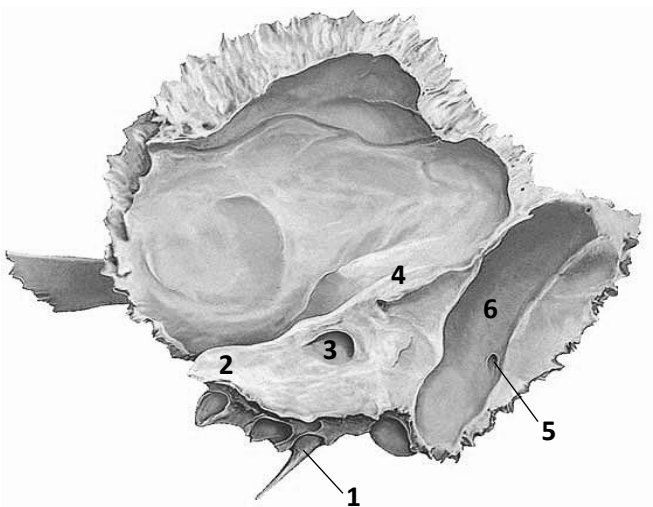
Name the anatomical structures marked by the numbers in Figure A:



*A. External view*

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_ fissure
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_ fissure

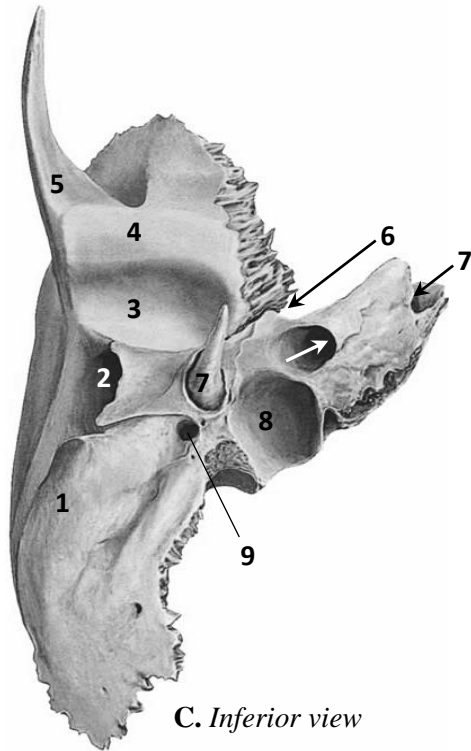
Name the anatomical structures marked by the numbers in Figure B:



*B. Internal view*

- 1 — \_\_\_\_\_
- 2 — tip of the pyramid
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_ eminence
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_

### TEMPORAL BONE (RIGHT)



Name the anatomical structures marked by the numbers in Figure C:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_ canal
- 7 — \_\_\_\_\_ canal
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_

Fill the table:

N <sup>o</sup>	Parts of the temporal bone	Processes	Fissures	Grooves for sinus
1.				
2.				
3.				

Fill the table:

N <sup>o</sup>	The name of the canals (tubules) of the temporal bone	Content
1.	Carotid canal	
2.	Facial canal	
3.	Muscular-tubular canal	
4.	Caroticotympanic canaliculus	
5.	Chorda tympani canaliculus	
6.	Tympanic canaliculus	
7.	Mastoid canaliculus	

## LABORATORY SESSION № 3 BONES OF THE FACIAL SKULL

### Control questions:

1. Structure of maxilla: parts, their processes. Surface relief of the body and processes of the maxilla.
2. Maxillary sinus: localization, walls, communication with the nasal cavity.
3. Palatine bone: parts, its interposition, relief.
4. Structure of the hard palate.
5. Mandible: parts, relief of the body and processes. Mandibular canal: foramina, contents.
6. Small bones of the facial skull: zygomatic, lacrimal, nasal, inferior nasal concha, vomer. Location and structure.
7. Hyoid bone: topography, structure.
8. Development of the hard palate, maxilla and mandible.

### At the session students should learn how to:

**1) find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Maxilla.** 1. *Infraorbital margin, foramen.* 2. Canine fossa. 3. *Tuber of the maxilla.* 4. Alveolar foramina. 5. *Infraorbital groove, canal.* 6. *Maxillary sinus.* 7. Lacrimal groove. 8. Greater palatine groove. 9. *Frontal, zygomatic, palatine, alveolar processes.* 10. Anterior nasal spine. 11. Palatine torus. 12. *Incisive foramen, canal.* 13. *Dental alveolus.* 14. Alveolar yokes. 15. Inter-alveolar, interradicular septa.

**Palatine bone.** 1. *Perpendicular, horizontal plate.* 2. Greater palatine groove. 3. *Lesser palatine foramina.* 4. Pyramidal, orbital, sphenoidal process. 5. Sphenopalatine notch.

**Mandible.** 1. *Body, base of mandible.* 2. *Mental foramen.* 3. Mental tubercle, protuberance. 4. Oblique line. 5. Digastric fossa. 6. Superior, inferior mental spine. 7. Mylohyoid line, groove. 8. *Sublingual, submandibular fossa.* 9. Alveolar part. 10. *Ramus of mandible.* 11. *Angle of mandible.* 12. Masseteric, pterygoid tuberosity. 13. *Mandibular foramen.* 14. Lingula of mandible. 15. *Mandibular canal.* 16. *Coronoid, condylar process.* 17. Mandibular notch. 18. *Head, neck of mandible.* 19. Pterygoid fossa.

**Zygomatic bone.** Zygomatico-orbital, zygomaticofacial, zygomaticotemporal foramina.

**Lacrimal bone. Nasal bone. Inferior nasal concha. Vomer. Hyoid bone.**

**2) palpate a living person's:** infraorbital edge, zygomatic arch, zygomatic bone, base of mandible, the angle of mandible.

## GLOSSARY

**Maxilla** (*maxilla*) is a paired bone, located in the center of the face and joins with all bones of the facial skull, as well as with the ethmoid, frontal and sphenoid. It takes part in the formation of the walls of the orbit, the nasal and oral cavity, infratemporal and pterygoid fossas. It consists of the body and 4 processes (palatine, zygomatic, frontal, alveolar). In the body of the maxilla there is the largest paranasal sinus, which communicates with the middle nasal meatus through semilunar hiatus. On the anterior surface of the body there is an infraorbital foramen, which ends with the canal, having the same name. Infratemporal surface has an elevation — tuber of maxilla. The alveolar process contains 8 dental alveoli separated by interalveolar septa. In multi-root teeth alveoli contain interroot septa. The shape and size of the alveoli correspond to the shape and size of the roots of the teeth. Alveola of canine is the deepest (up to 19 mm). At the bottom of the alveoli there is one or several holes that lead to the corresponding tubules and serve as the vessels and nerves passages.

**Maxillary sinus** (*sinus maxillaris*) has a superior, inferior, medial, anteriolateral and posteriolateral walls. In the superior wall there is an infraorbital canal, the roots of molars and the 2nd premolar may adjoin the inferior wall. On the medial wall there is a semilunar hiatus that opens into the middle nasal passage. On the anterolateral wall a canine fossa is projected. The tuber of maxilla, which perforates the alveolar tubules, forms the posteriolateral wall.

**Palatine bone** (*os palatinum*) is a paired bone, consisting of perpendicular and horizontal plates, connected at the 90° degree. The perpendicular plate is part of the lateral wall of the nasal cavity. The horizontal plate together with the palatine process of maxilla forms the hard palate.

**Mandible** (*mandibula*) is an unpaired bone, consisting of two symmetrical halves synostosed to the end of the first year of life with the formation of the mental protuberance. In the mandible a body and two ramus are distinguished, which are connected at an angle, the size of which depends on the age. The branch of the lower jaw ends with the coronoid and condylar processes. The condylar process has a mandibular head for articulation with the mandibular fossa of the temporal bone. The body of mandible has a thickened base and an alveolar part that contains 16 dental alveoli. The alveoli are separated from each other by interalveolar septa, the molar alveoli have inter-root septa. The thickness of the mandibular body is the largest in the molar region, the smallest in the premolar region. In the thickness of the jaw there is a canal, which starts with foramen on the inner surface of the ramus and ends with the mental foramen.

**Zygomatic bone** (*os zygomaticum*) is paired, by means of the frontal, temporal and maxillary processes it is connected with the bones of the skull of the same name. The temporal process together with the zygomatic process of the temporal bone form the zygomatic arch. In the thickness of the zygomatic bone there is a canal, which begins with a zygomaticoorbital foramen and ends with zygomaticofacial and zygomaticotemporal foramens.

**Lacrimal bone** (*os lacrimale*) is paired, thin, forms part of the medial wall of the orbit.

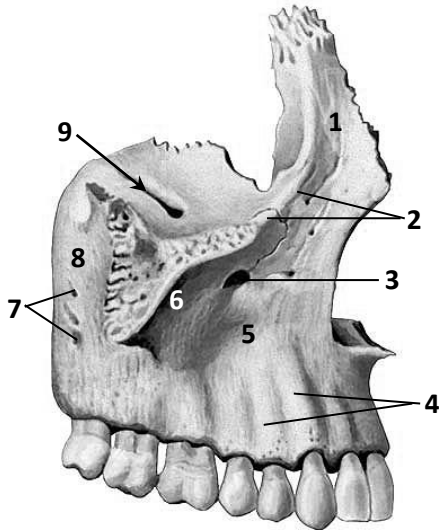
**Nasal bone** (*os nasale*) is paired, forms a skeleton of the external nose.

**Vomer** (*vomer*) is an unpaired bone, forms the posterior part of the septum of the nose.

**Inferior nasal concha** (*concha nasalis inferior*) is paired, located on the lateral wall of the nasal cavity.

**Hyoid bone** (*os hyoideum*) is located in the neck, consists of a body, greater and lesser horns, serves as a place of attachment of the supra and infrahyoid muscles.

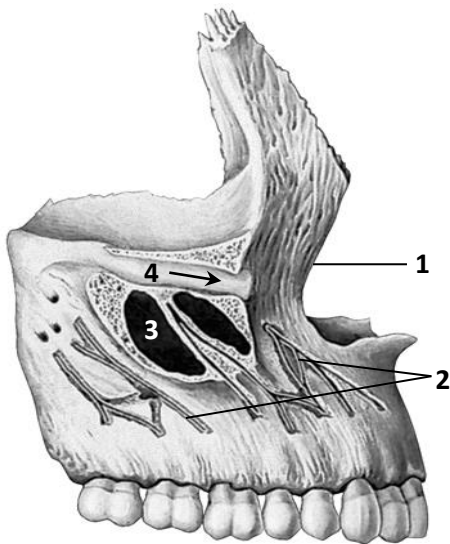
## MAXILLA (RIGHT)



*Lateral view*

Name the anatomical structures marked by the numbers:

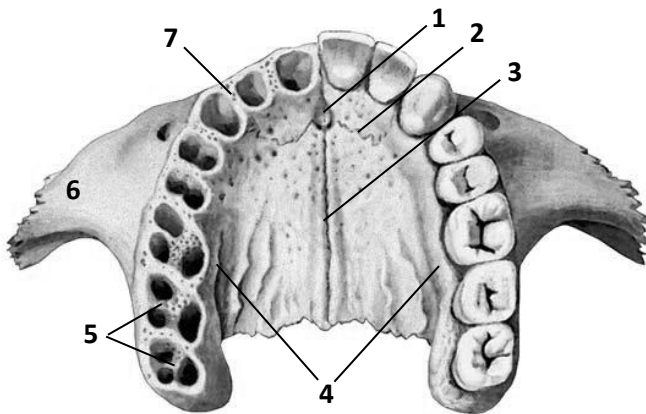
- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_



*Lateral view, zygomatic process*

Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_



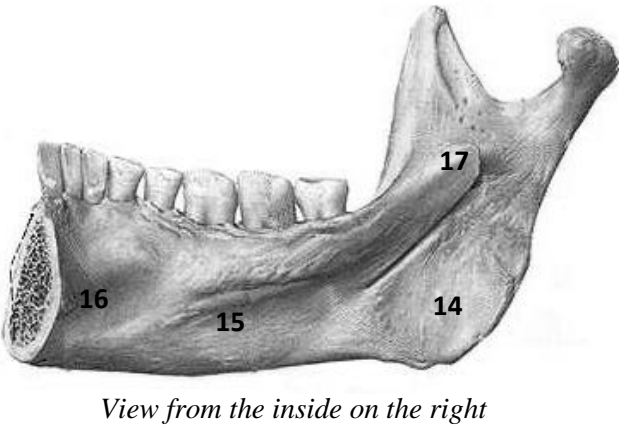
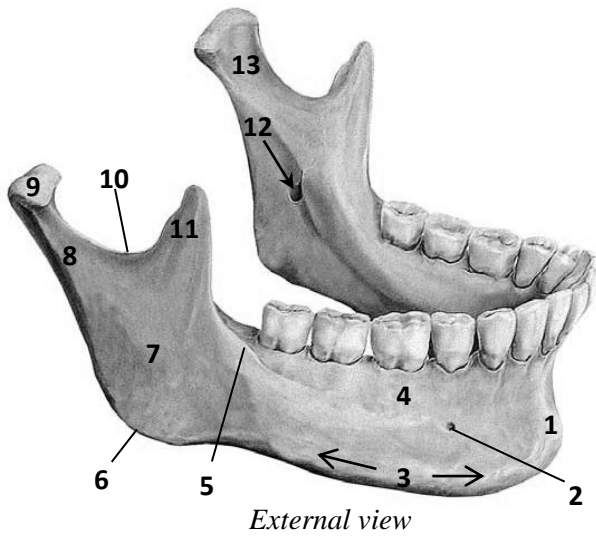
*Maxillae. Inferior view*

Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_



## MANDIBLE

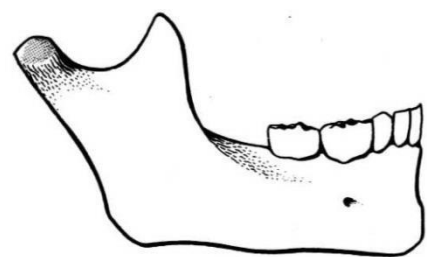
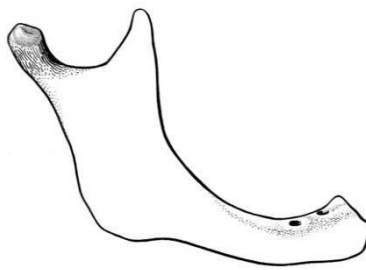
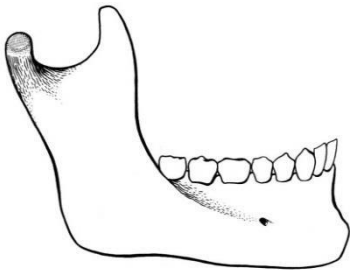


Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_ part
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_
- 12 — \_\_\_\_\_
- 13 — \_\_\_\_\_ fossa
- 14 — \_\_\_\_\_
- 15 — \_\_\_\_\_
- 16 — \_\_\_\_\_
- 17 — \_\_\_\_\_

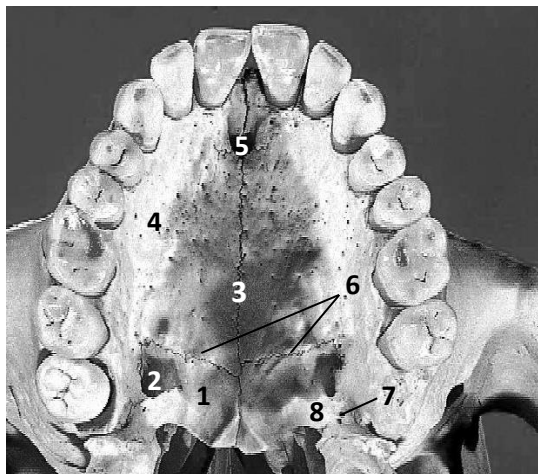
### AGE FEATURES OF THE STRUCTURE OF MANDIBLE

Structure	Human age		
	Newborn	18–60 years	60–80 years
Angle of mandible	140–150°	110–130°	140–150°
Mental foramen	Closer to the base of the jaw	In the middle of the height of the jaw	Closer to the upper margin of the jaw
Alveolar part	Not developed	Present	Atrophy
Mental symphysis	Ossified at the 2nd year of life	–	–



In the box mark the age of the person, whose mandible is shown in the figure:  
 A — child 3 years old; B — man 30 years old; C — man 80 years old

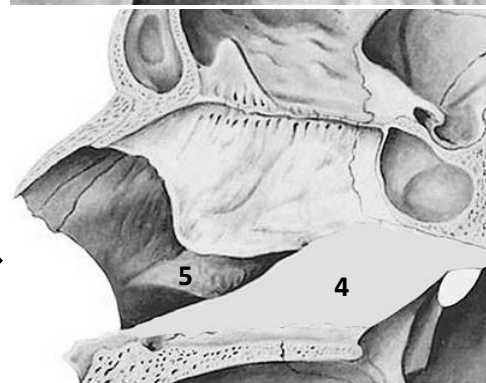
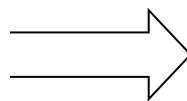
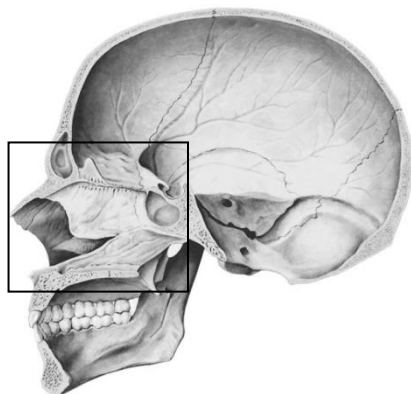
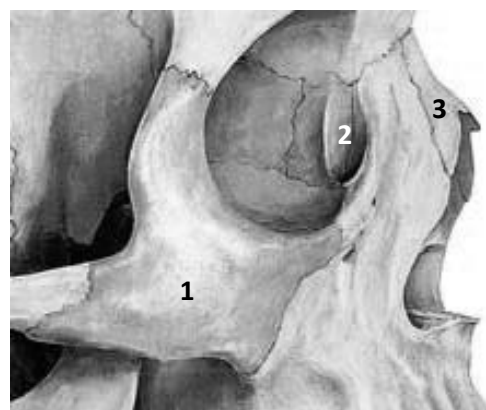
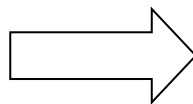
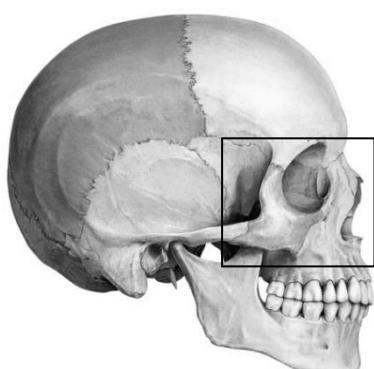
## HARD PALATE



Name structures of the bony palate:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_ foramens
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_ foramens
- 8 — \_\_\_\_\_ process

## SMALL BONES OF THE FACIAL SKULL



Name small bones of the facial skull:

Nº	English name	Latin name
1.		
2.		
3.		
4.		
5.		

**LABORATORY SESSION № 4**  
**SKULL AS A WHOLE. FACIAL, LATERAL, BASILAR, VERTICAL NORMA.**  
**AGE ANATOMY OF THE SKULL**

**Control questions:**

1. Orbit: structure of the walls. Foramens, fissures and canals of the orbit, communication with other cavities of the skull.
2. Bony nasal cavity: structure of the lateral, medial, superior and inferior walls.
3. Nasal meatuses: borders, communication with other cavities of the skull
4. Fossas of the lateral norma of the skull. Borders, the name of the bones that make up the bone base of the temporal and infratemporal fossas. Fissures and foramens, communication of fossas with other cavities of the skull.
5. Pterygopalatine fossa: walls, communication with other cavities of the skull.
6. Inner base of skull. Anterior, middle and posterior cranial fossas; foramens, canals, fissures.
7. Grooves for the sinuses of the dura mater.
8. External skull base; foramens, canals.
9. Calvaria; features of the structure and development of bones. Sutures of the skull.
10. Age anatomy of the facial and cranial skull.

**Student should learn how to:**

**1) find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Orbit.** 1. Anterior, posterior ethmoid foramen. 2. *Superior, inferior orbital fissure.* 3. *Nasolacrimal canal.* 4. Fossa of the lacrimal sac. 5. *Supraorbital margine.* 6. *Infraorbital edge.*

**Bone nasal cavity.** 1. Piriforme aperture. 2. Choanae. 3. *Superior, middle, inferior nasal meatus.* 4. Sphenopalatine foramen. 5. Foramen of the nasolacrimal canal.

**Lateral norm.** 1. *Zygomatic arch.* 2. *Temporal fossa.* 3. *Infratemporal fossa.* 4. *Pterygopalatine fossa.* 5. Pterygomaxillary fissure.

**Base of the skull.** 1. *Hard palate.* 2. *Middle suture of the palate.* 3. *Transverse suture of the palate.* 4. *Greater palatine canal.* 5. *Greater, lesser palatine foramen.* 6. *Lacerum foramen.* 7. *Jugular foramen.* 8. Anterior, middle, posterior cranial fossa. 9. Clivus. 10. Groove for the superior, inferior petrosal sinus. 11. Groove for the sigmoidal, transverse sinus. 12. Groove of the superior sagittal sinus.

**Calvaria.** 1. Coronal suture. 2. Sagittal suture. 3. Lambdoid suture. 4. Metopic suture. 5. Squamous suture.

**2) palpate a living person's:** supraorbital and infraorbital edges, zygomatic arch, base of mandible, angle of mandible, zygomatic bone, mastoid process, external occipital protuberance.

**GLOSSARY**

**The facial norma** of the skull includes the orbit, the nasal cavity, the oral cavity.

**Orbit** (*orbita*) is a cavity in the form of a quadrilateral pyramid, has superior, inferior, medial and lateral walls. The base of the pyramid is facing forward and called the entrance to the orbit. Nasolacrimal, infraorbital and optic canals, as well as anterior and posterior zygomaticoorbital foramens, superior and inferior orbital fissures open into the orbit.

**Nasal cavity** (*cavum nasi*) opens in front with a piriforme aperture, behind — with two choanae. It has an superior, inferior, lateral and medial walls and is divided into the right and left halves by a bony septum. On the lateral wall of the nasal cavity there are superior, middle and inferior nasal conches, under which the same nasal meatuses pass. Superior nasal meatus

communicates with the sphenoid sinus and the posterior cells of the ethmoid labyrinth. The middle nasal pass communicates with the frontal and maxillary sinuses, anterior and middle cells of the ethmoid labyrinth. The nasolacrimal canal opens into the inferior nasal meatus.

**Bone nasal septum** (*septum nasi osseum*) is formed by a perpendicular plate of the ethmoid bone and vomer. It is asymmetrical, more often deviates to the right.

**The lateral norma** of the skull includes the temporal, infratemporal and pterygopalatine fossas.

**Temporal fossa** (*fossa temporalis*) is bounded from above by the superior temporal line, from below — by the infratemporal crest of the greater wing of the sphenoid bone, from the outside — by the zygomatic arch. The temporal muscle originates from the bones of the temporal fossa.

**Infratemporal fossa** (*fossa infratemporalis*) is bounded from the top by a greater wing of the sphenoid bone, in front — by a tuber of maxilla, posteriorly — by a styloid process, medially — by lateral plate of the pterygoid process of the sphenoid bone, laterally — by the branch of mandible. In the fossa there are lateral and medial pterygoid muscles, vessels and nerves. Medially infratemporal fossa continues into the pterygopalatine fossa.

**Pterygopalatine fossa** (*fossa pterygopalatina*) is bounded in front by the tuber of maxilla, posteriorly — by the pterygoid process of the sphenoid bone, medially — by perpendicular plate of the palatine bone. Through the inferior orbital fissure the fossa communicates with the orbit, through the pterygopalatine foramen — with the nasal cavity, a rotundum foramen leads to the skull cavity, the pterygoid canal appears on the external base of the skull, and the greater palatine canal goes into the oral cavity.

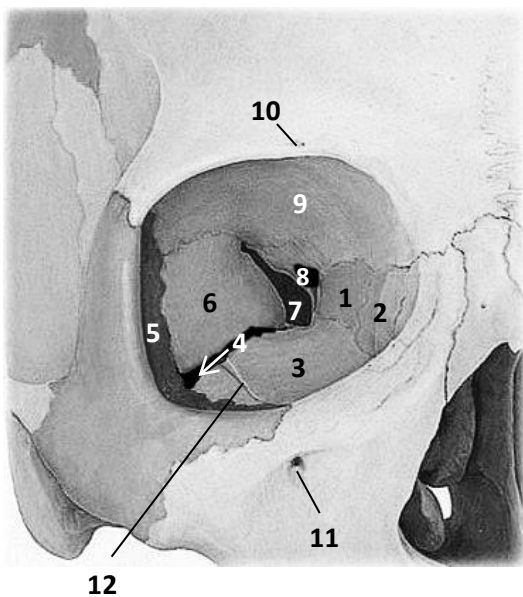
**The basilar norma** of the skull consists of the external and internal base of the skull.

**The external base of the skull** is formed by the skeleton of the hard palate in front, posteriorly — by the inferior surfaces of the sphenoid, temporal and occipital bones. When the bones are joined at the base, lacerum and jugular foramens are formed, all the other foramens and canals belong to the corresponding bones.

**The inner base of the skull** is divided into the anterior, middle and posterior cranial fossas. The anterior cranial fossa lies on the top of the orbit and nasal cavity. The middle cranial fossa is formed by the sphenoid and temporal bones, the posterior one — by the body of the sphenoid bone, the petrosal part of the temporal bone and the occipital bone. In the center of the posterior cranial fossa there is foramen magnum, anterior to which lies the *clivus*.

**The skull (vertical norma)** is formed by the occipital squama, twin parietal bones and frontal squama. Bones of the calvaria are formed by the outer and inner compact plates, between which there is a thin layer of diploe. The inner plate is thinner than the outer one and is called vitreous. Outside the bones are covered with the periosteum, from the inside — with a dura mater.

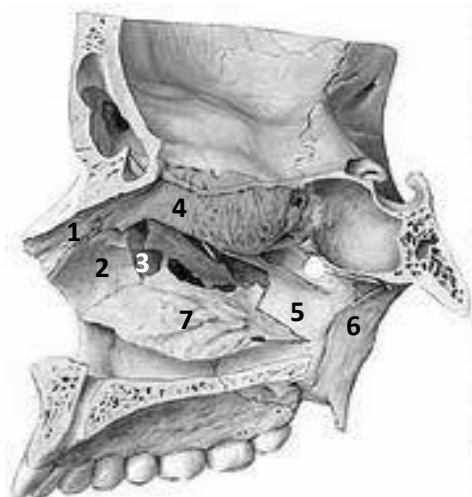
### ORBIT (RIGHT)



Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_
- 12 — \_\_\_\_\_

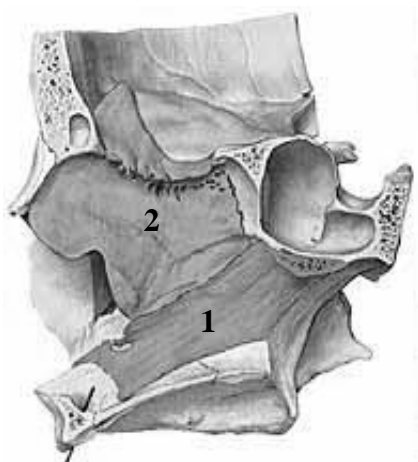
### LATERAL WALL OF THE NASAL CAVITY



List the bones that form the lateral wall of the nasal cavity:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_

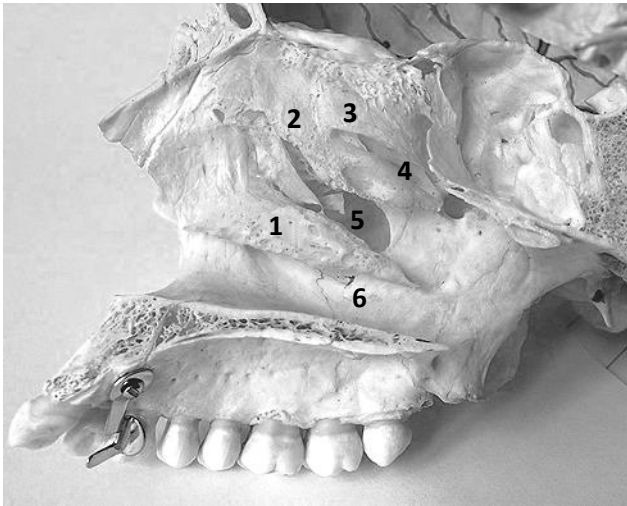
### MEDIAL WALL OF THE NASAL CAVITY



Name the bones that form the nasal septum:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_

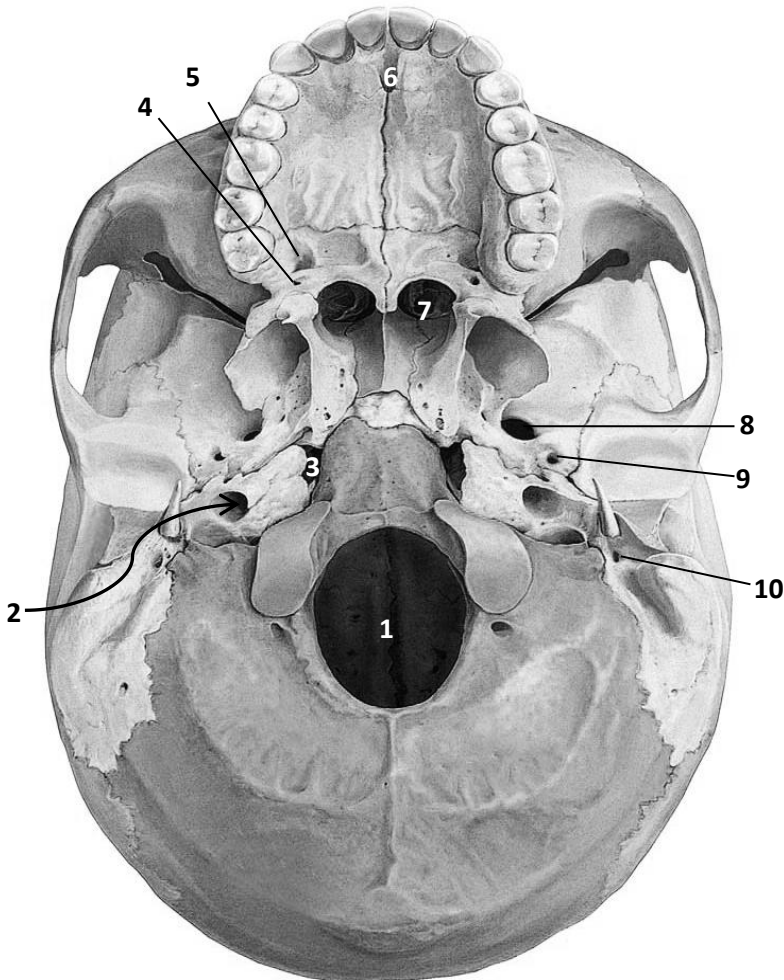
## NASAL CONCHAES AND NASAL MEATUSES



Name the nasal conchaes and nasal meatuses marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_

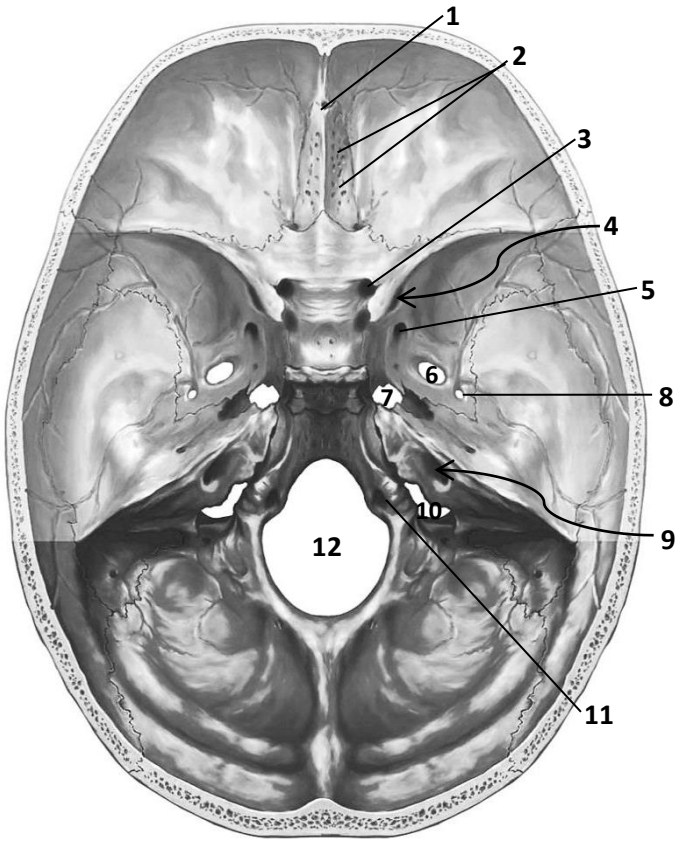
## EXTERNAL BASE OF THE SKULL



Name the foramens and canals marked with numbers:

- 1 — \_\_\_\_\_
- \_\_\_\_\_
- 2 — \_\_\_\_\_
- \_\_\_\_\_
- 3 — \_\_\_\_\_
- \_\_\_\_\_
- 4 — \_\_\_\_\_
- \_\_\_\_\_
- 5 — \_\_\_\_\_
- \_\_\_\_\_
- 6 — \_\_\_\_\_
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- 7 — \_\_\_\_\_
- \_\_\_\_\_
- 8 — \_\_\_\_\_
- \_\_\_\_\_
- 9 — \_\_\_\_\_
- \_\_\_\_\_
- 10 — \_\_\_\_\_
- \_\_\_\_\_

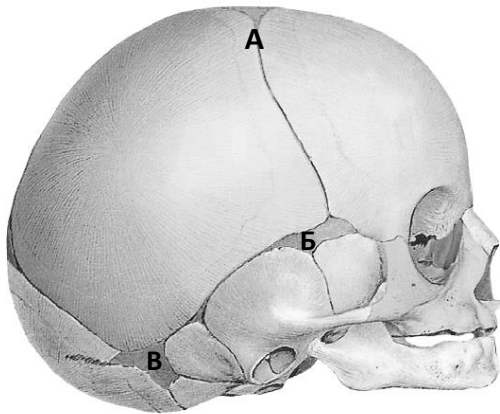
**INTERNAL BASE OF THE SKULL**



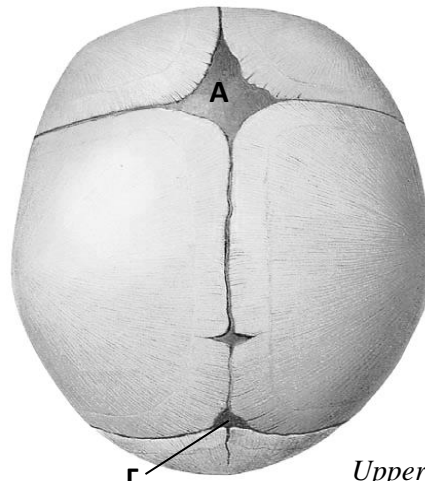
Name the foramens and canals marked with numbers:

- 1 — \_\_\_\_\_
- \_\_\_\_\_
- 2 — \_\_\_\_\_
- \_\_\_\_\_
- 3 — \_\_\_\_\_
- \_\_\_\_\_
- 4 — \_\_\_\_\_
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- 5 — \_\_\_\_\_
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- 7 — \_\_\_\_\_
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- 8 — \_\_\_\_\_
- \_\_\_\_\_
- 9 — \_\_\_\_\_
- \_\_\_\_\_
- 10 — \_\_\_\_\_
- \_\_\_\_\_
- 11 — \_\_\_\_\_
- \_\_\_\_\_
- 12 — \_\_\_\_\_

**SKULL OF THE NEWBORN**



*Internal view*



*Upper view*

Name the fontanelles and indicate the time of their closure:

№	Name	Before birth	2–3 months	1 year
A				
B				
B				
Г				

## LABORATORY SESSION № 5

### THE APPENDICULAR SKELETON. SKELETON OF UPPER AND LOWER LIMBS

#### **Control questions:**

1. Structure of the bones of the pectoral girdle.
2. Skeleton of the free part of the upper limb: arm, forearm, hand.
3. Pelvic girdle; structure of the hip bone.
4. The pelvis as a whole. Sex differences in the pelvis.
5. Skeleton of the free part of the lower limb: thigh, leg, foot.
6. Similarity and differences in the structure of the skeleton of the upper and lower limbs.

**Student should learn how to: 1) find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Bones of upper and lower limbs.** 1. Scapula. 2. Clavicle. 3. Humerus. 4. Radius. 5. Ulna. 6. Bones of the hand. 7. Metacarpal bones. 8. Phalanges. 9. Hip bone. 10. Ilium. 11. Ischium. 12. Pubic bone. 13. Femur. 14. Tibia. 15. Fibula. 16. Tarsus bones. 17. Metatarsus bones.

**palpate living person's:** epicondyles of the humerus, ulnar process of the ulna, styloid process (radial and ulnar bones), patella, tuberosity of the tibia, lateral and medial malleolus.

#### **GLOSSARY**

**Diaphysis** is the middle part (body) of the tubular bone, formed by a compact bone substance surrounding the medullary cavity. The primary point of ossification appears in the diaphysis.

**Epiphysis** is the rounded, often widened end of the tubular bone on which the joint surface is located, covered with cartilage, intended for articulation with the adjacent bone. In the long tubular bones there are two epiphyses, in short tubular bones there is one epiphysis. Epiphysis is the place where the second point of ossification appears. Epiphysis of an adult is mainly a spongy bone substance that contains red bone marrow.

**Metaphysis** is a narrow part of the tubular bone located between the epiphysis and diaphysis. It consists of a growth plate (epiphyseal cartilage), as well as bone and fibrous components surrounding the cartilage around the periphery. The growth zone provides an increase in length of the tubular bone during the first 18–25 years of life.

**Shoulder girdle** consists of the clavicle and scapula. It is fixed to the axial skeleton in only one place (sternoclavicular joint). This provides a large amount of movement of the free upper limb.

**The skeleton of the free part of the upper limb** is divided into the arm (humerus), the forearm (ulna and radius) and the hand (wrist bones, metacarpal bones and phalanges).

**Pelvic girdle** consists of the hip bone, which is formed as a result of the fusion of the pubic, ischium and iliac bones. Both hip bones in front are connected with each other using the pubic symphysis, from the back they are articulated with the sacrum. As a result, a closed bone ring is formed, which ensures the strength of this design, but limits the amount of movement of the free lower limb.

**The skeleton of the free part of the lower limb** is formed by the femur, patella, tibia and fibula bones, as well as by the bones of the foot (tarsus, metatarsus and phalanges).

**The free part of the upper limb** is formed by the humerus (part of the shoulder), the ulna and radius (forearm skeleton), and the skeleton of the hand. The **humerus** on the proximal epiphysis has the head of the humerus, separated from the diaphysis by the anatomical neck. The head articulates with the glenoid cavity of the scapula, forming the **shoulder joint**. Behind the neck are greater and small tubercles, separated by an intertubercular groove — the site of the tendon of the long head of the biceps brachii muscle. Below the tubercles, on the border with

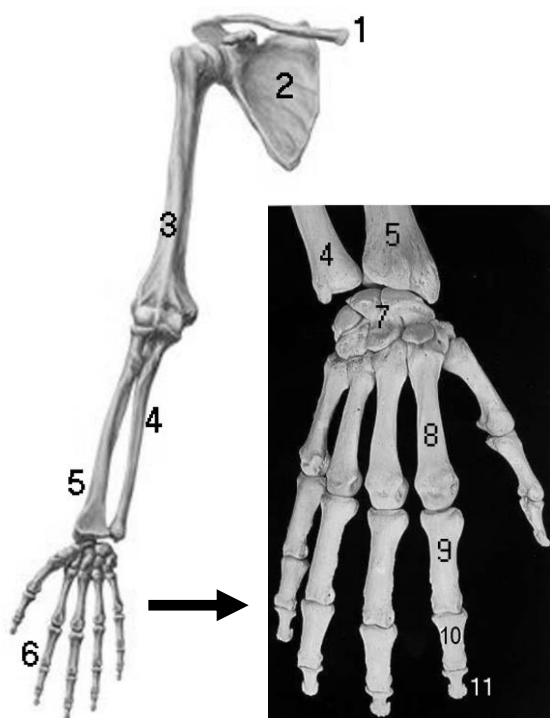


the diaphysis, there is a surgical neck — the site of the most frequent fractures of the humerus. The **condyle** is located on the distal epiphysis and on the sides of it are the medial and lateral epicondyles, between which there are surfaces for articulation with the bones of the forearm, the trochlear of the humerus and the head of the condyle of the humerus. The coronal and radial fossae are upper and anteriorly, and behind the cubital fossa locates.

**The skeleton of the forearm** consists of the radius and ulna. The radius is located on the side of the thumb, the ulna is located on the side of the little toe. The bones articulate at the proximal and distal radioulnar joints, the diaphyses are connected by an interosseous membrane. This anatomical structure of the forearm makes it possible to move the radius around the ulna outward (*supination*) and inwards (*pronation*). The diaphyses of both bones are trihedral in shape. The proximal epiphyses articulate with the humerus. The distal epiphysis of the radius bears the articular surface for the carpal bones.

**The skeleton of the hand** has three sections: the wrist, the metacarpus and the fingers (digitus mani). The wrist (carpus) consists of eight short spongy bones arranged in two rows, four in each row. Superior row: scaphoid, lunate, triquetral, pisiform bones; inferior row: trapezium, trapezoid, capitate, hamate bones. Metacarpal bones — five short tubular bones. Each finger has three phalanges: proximal, middle and distal (nail). The thumb is formed by two phalanges — proximal and distal.

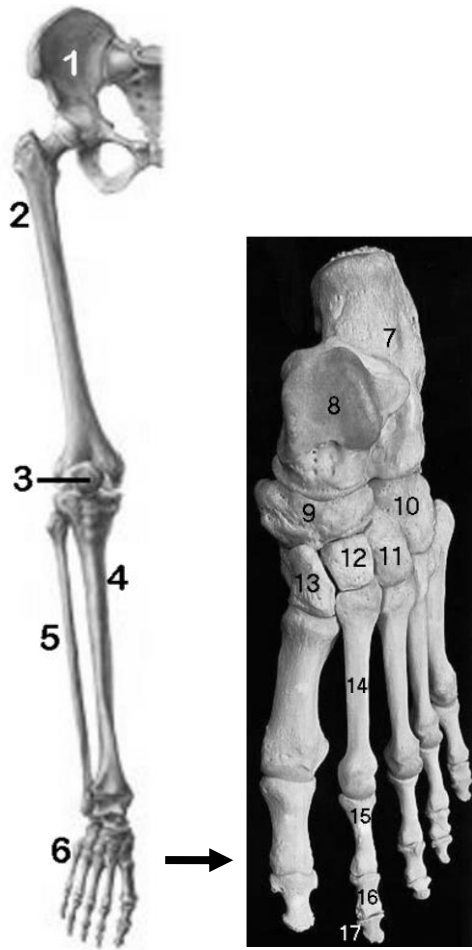
**Skeleton of the upper limb**



Name the bones marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_

# Skeleton of the lower limb



Name the bones marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_
- 11 — \_\_\_\_\_
- 12 — \_\_\_\_\_
- 13 — \_\_\_\_\_
- 14 — \_\_\_\_\_
- 15 — \_\_\_\_\_
- 16 — \_\_\_\_\_
- 17 — \_\_\_\_\_

**LABORATORY SESSION № 6**  
**CLASSIFICATION OF BONE CONNECTION. CONNECTION OF CRANIUM BONES,**  
**TRUNK, UPPER AND LOWER LIMBS. FINAL CONTROL OF THE SECTION**  
**«OSTEOLOGY. ARTHROLOGY»**

1. Classification of bone connections.
2. Morphofunctional characteristics of continuous and discontinuous (synovial) connections. Connections of the spine: syndesmosis, structure of the intervertebral symphysis.
3. Joints of the spinal column: structure of the middle and lateral atlanto-axial joints. Atlanto-occipital joint: articular surfaces, ligaments, movements.
4. Joints of thorax: costal-transverse and sternal-rib: structure, types of movements.
5. Temporomandibular joint: morphofunctional characteristics.
6. Names and general morphofunctional characteristics of the joints of the upper and lower limbs.

**Student should learn how to: 1) find the listed structures on anatomical preparations and visual aids, know the Latin names:**

**Connections of bones.** 1. Intervertebral disc. 2. Intervertebral joint. 3. Atlanto-occipital joint. 4. Median atlanto-axial joint. 5. Lateral atlanto-axial joint. 6. Shoulder joint. 7. Elbow joint. 8. Hand joint. 9. Hip joint. 10. Knee-joint. 11. Ankle joint. 12. *Temporomandibular joint* (articular disc, lateral ligament, sphenomandibular ligament, stylomandibular ligament).

**GLOSSARY**

**Continuous joints of bones** are joints in which there is no direct contact of bones and the space between them is filled with connective tissue (fibrous joints) or cartilage (cartilage connections). Fibrous joints include sutures, schindylesis, syndesmosis and dental alveolar connection. Cartilage compounds are represented by synchondrosis and symphysis.

**Discontinuous (synovial) joints of the bones** are formed by articular surfaces of adjacent bones that are separated by the joint cavity. The joint capsule covering them is internally lined with a synovial membrane that produces a liquid. Depending on the number of articulating bones simple (two articular surfaces) and compound joints are distinguished. Depending on the shape of the articular surfaces they can be pivot, hinge, saddle, ellipsoid, plane (gliding), ball and socket. Movements in the joints are carried out around one, two or three axes (respectively uniaxial, biaxial and multiaxial joints). Anatomically disconnected joints, in which movements occur simultaneously are called combined. Complex joint is characterized by the presence of an articular disc or meniscus between the articulating surfaces.

**Temporomandibular joint** is combined, ellipsoidal, complex joint, formed by the head of the mandible, mandibular fossa and articular tubercle of the temporal bone. Inside there is a cartilage disc that separates the joint cavity into the upper and lower floors. The movements of the mandible are carried out around the frontal (depression and elevation) and the sagittal axis (displacement to the side). The discrepancy between the shape and size of the articular surfaces causes the incongruity of the joint. The articular disc corrects this discrepancy, which is adapted to both articular surfaces and divides the articular cavity into two floors. It distinguishes the anterior section — the place of attachment of the lateral pterygoid muscle, the middle — avascular and the thinnest section and the posterior, connected by ligaments to both articular surfaces. In the space between the ligaments, the disc and the joint capsule, there is a posterior cushion, which consists of loose fibrous connective tissue, vessels and nerves.

## CLASSIFICATION OF BONE CONNECTIONS

### Continuous connections of bones

Name the types of continuous bone connections marked by numbers:

**Fibrous connections:**

**Cartilage connections:**

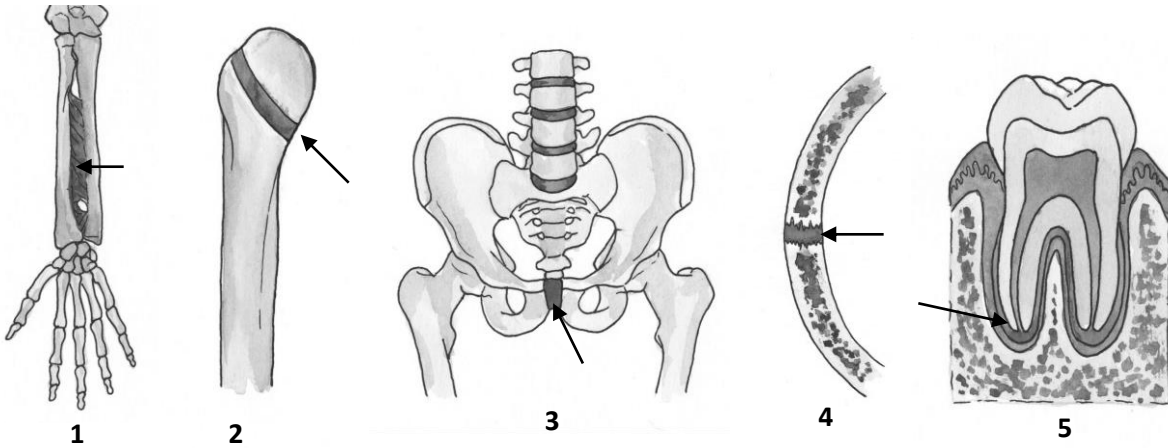
1- \_\_\_\_\_

4- \_\_\_\_\_

2- \_\_\_\_\_

5- \_\_\_\_\_

3- \_\_\_\_\_



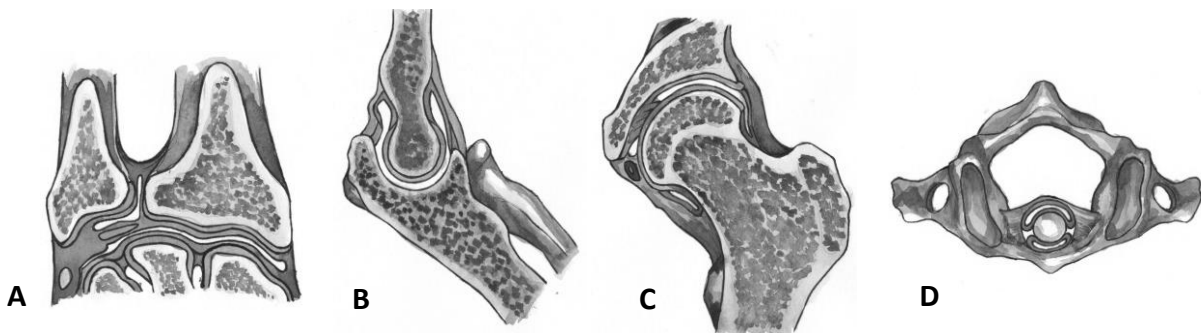
### Discontinuous connections of bones (joints)

Name three basic structural components of the joint:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_



According to the shape of articular surfaces the joints listed below are:

A — radiocarpal joint \_\_\_\_\_

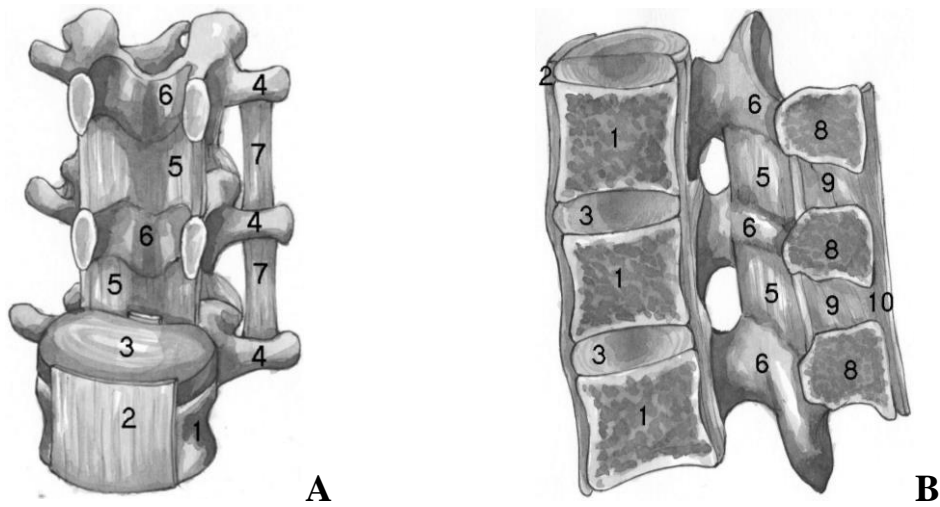
B — humeroulnar joint \_\_\_\_\_

C — hip joint \_\_\_\_\_

D — median atlanto-axial joint \_\_\_\_\_

**Connections of the vertebral column**

(A — frontal, B — sagittal view)



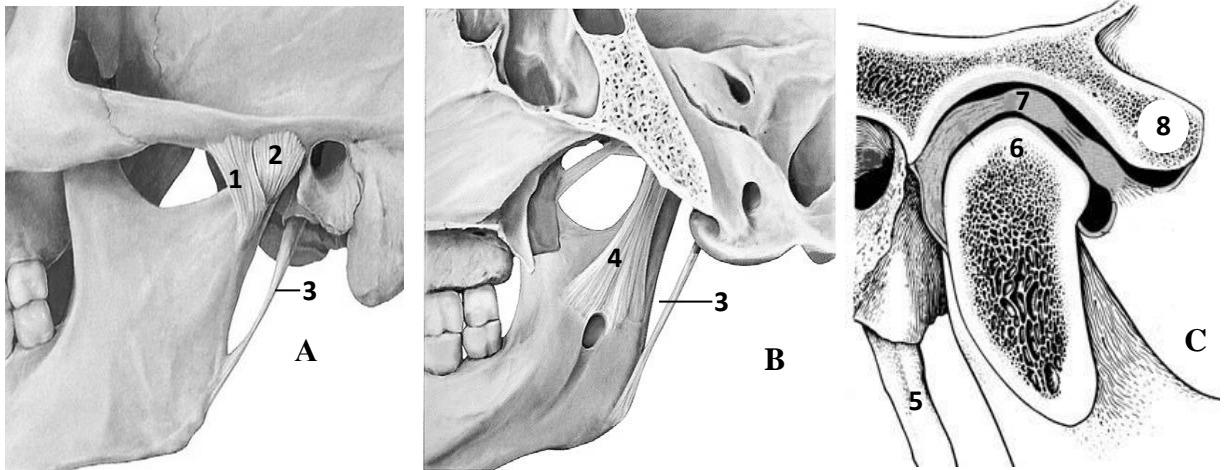
Name the anatomical structures marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_

- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_
- 9 — \_\_\_\_\_
- 10 — \_\_\_\_\_

**Temporomandibular joint**

(A — external view, B — internal view, C — sagittal cut)



Name the anatomical structures marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_

- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_
- 8 — \_\_\_\_\_

## FINAL CONTROL OF THE SECTION «OSTEOLOGY. ARTHROLOGY»

### Control questions:

1. Classification of bones.
2. Structure of the cervical vertebrae. Characteristic features of the structure of atlas and axis vertebra.
3. Structure of thoracic vertebrae.
4. Spinal column.
5. Ribs and sternum: structure, classification of ribs.
6. Thoracic cage.
7. Skull: bone names, division into the brain and facial sections.
8. Structure of the skull bones: frontal, occipital, parietal, sphenoid, ethmoid, temporal.
9. Structure of maxilla and mandible.
10. Nasal cavity: bone walls, nasal meatuses and their communication with the paranasal sinuses.
11. Orbit: bone walls, foramens, fissures and canals of the orbit.
12. Calvaria bones; characteristic features of structure and development. Sutures of calvaria.
13. External and internal base of the skull; topography of surfaces.
14. Structure of the hard palate.
15. Lateral norm of the skull: bone walls of the temporal and infratemporal fossas.
16. Pterygopalatine fossa. Connection with other skull cavities.
17. Specific features of the structure of the newborn's skull.
18. Skeleton of the upper limb: departments, interposition of bones, general plan of the structure.
19. Skeleton of the lower limb: departments, interposition of bones, general plan of the structure.
20. Classification of bone connections.
21. Connections of the spinal column: ligaments, intervertebral symphysis, intervertebral joints. Connections of thorax.
22. Atlanto-axial joints: articular surfaces, ligaments, movements.
23. Atlanto-occipital joint: articular surfaces, ligaments, movements.
24. Temporomandibular joint: characteristic, structure, types of movements.
25. Names and general characteristics of the joints of the upper and lower limbs.

Final mark \_\_\_\_\_

Date « \_\_\_ » \_\_\_\_\_ 20 \_\_\_\_

\_\_\_\_\_  
Tutor's signature and name

**LABORATORY SESSION № 7**  
**GENERAL CHARACTERISTICS OF MUSCLES. NECK MUSCLES. NECK FASCIA**

**Control questions:**

1. Structure of the muscle as an organ. Classification and functions of skeletal muscles.
2. Accessorius apparatus of muscles: fascias, synovial sheath and bags, osteo-fibrous canals, sesamoid bones
3. Classification of the neck muscles: genetic and topographic.
4. Superficial neck muscles: origin and insertion, functions.
5. Middle neck muscles: origin and insertion, functions.
6. Deep neck muscles: origin and insertion, functions.
7. Structure of the neck fascia and topography of its plates. Spaces.
8. Neck topography, division into regions. Anterior, lateral, sternocleidomastoid neck regions.
9. Triangles of neck.

**Students should learn how to find the listed structures on anatomical preparations and visual aids:**

**Muscles and fascias of the neck.** 1. *Platysma*. 2. *Sternocleidomastoid muscle*. 3. *Digastric muscle*. 4. *Stylohyoid muscle*. 5. *Mylohyoid muscle*. 6. *Geniohyoid muscle*. 7. *Sternohyoid muscle*. 8. *Omothyoid muscle*. 9. *Sternothyroid muscle*. 10. *Thyrohyoid muscle*. 11. *Anterior, middle, posterior scalenus muscles* 12. *Longus colli muscle*. 13. *Longus capitis muscle*. 14. Superficial, pretracheal, prevertebral plates of neck fascia. 15. Suprasternal space. 16. Previsceral space. 17. Retrovisceral space. 18. Carotid sheath. 19. Interscalene space. 18. Anterior triangle of the neck. 19. Lateral triangle of the neck. 20. Omo-trapezoid triangle. 21. Omo-clavicular triangle. 22. Carotid triangle. 23. Omotracheal triangle. 24. Submandibular triangle. 25. Submental triangle.

**GLOSSARY**

**Skeletal muscles** are formed by transversal striated muscle tissue and are an active element of the musculoskeletal system: they move body in the space, keep it in balance, form the walls of the body cavities, participate in respiration and voice formation. They are classified according to the shape, position, direction of the fibers and the function to be performed.

**Fascia** is a thin connective tissue plate that surrounds the muscle from all sides.

**Bone-fibrous (fibrous) canal** exists between the bone and the fibrous bridge formed by the thickening of the fascia. The canal contains the tendon of the muscle, surrounded by the sheath. Sheath consists of two plates of the synovial membrane, one of which fuses with the tendon. The presence of fluid between the sheets reduces friction when the muscle contracts.

**Synovial bursa** is a protuberance of the synovial capsule shell of the joint that comes between the bone and the tendon of the muscle. The bag is designed to reduce friction when the muscle contracts.

**Trochlea** — bone protuberance through which the tendon of the muscle is tossed.

**Anatomical diameter of muscle** — the area of the cross section of the muscles in its widest part.

**Physiological diameter of muscle** is the sum of the cross-sectional areas of all muscle fibers that are part of the muscular belly.

**Neck muscles** are divided according to the topographic-anatomical sign into superficial, suprahyoid, infrahyoid and deep. According to the genetic sign the muscles are classified as separate derivatives of the first or second branchial arch or cervical myotomes and also as derivatives of both the branchial arch and myotomes simultaneously.

**Superficial muscles:** platysma, sternocleidomastoid muscles. The platysma stretches the skin of the neck, facilitating the outflow of venous blood from the head and neck, and also lowers the corner of the mouth downwards. The sternocleidomastoid muscle tilts the head in the direction of contraction and tilts his head back.

**Suprahyoid muscles** form the lower wall of the oral cavity — the diaphragm of the mouth: digastric muscle, the mylohyoid muscle, the geniohyoid muscle, which depress the mandible, and the stylohyoid muscle, which pulls the hyoid bone up and back.

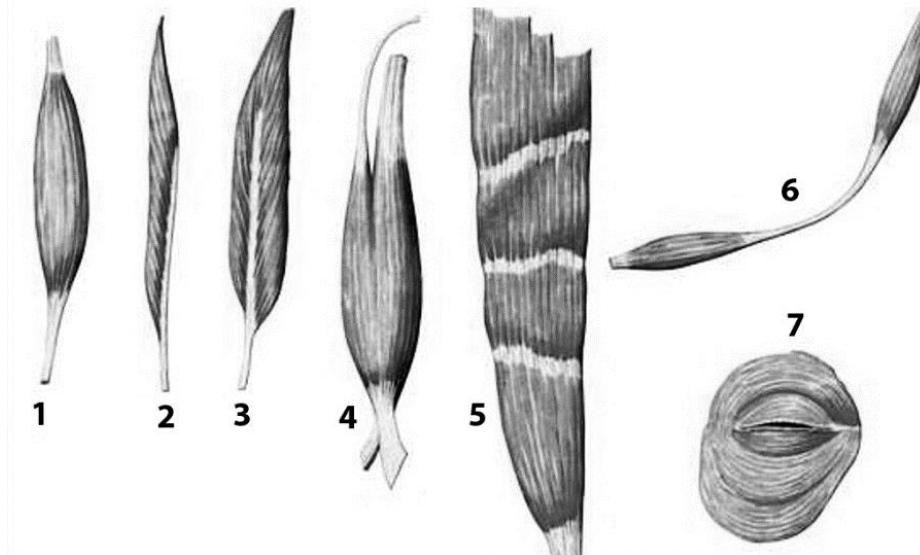
**Infrahyoid muscles:** omohyoid muscle, sternohyoid muscle, sternothyroid muscle and thyrohyoid muscle, which fix and pull down the hyoid bone.

**Deep muscles of the neck** are divided into lateral and medial groups. The lateral group includes the anterior, middle and posterior scalene muscles; with bilateral contraction, the cervical spine is bent. The medial group are longus colli et capitis muscles, tilting the neck and head forward, respectively. Between the atlas and the occipital bone are the anterior and lateral rectus muscles, which provide head tilts.

**Deep cervical fascia** consists of three layers. *Investing layer* covers sternocleidomastoid and trapezius muscles and is fixed to the spinous and transverse processes of the vertebrae, the body of mandible, the sternum and clavicle. *Pretracheal layer* extends from the posterior surface of the sternum and clavicle to the hyoid bone and forms the fascial sheath for the infrahyoid muscles. *Prevertebral layer* surrounds the deep muscles of the neck and is fixed to the transverse processes of the vertebrae.

**Neck spaces** are gaps between fascias, filled with loose fiber, which contain vessels, nerves, lymph nodes. Some of the spaces are closed on all sides, others communicate with the spaces of neighboring regions.

### CLASSIFICATION OF MUSCLE



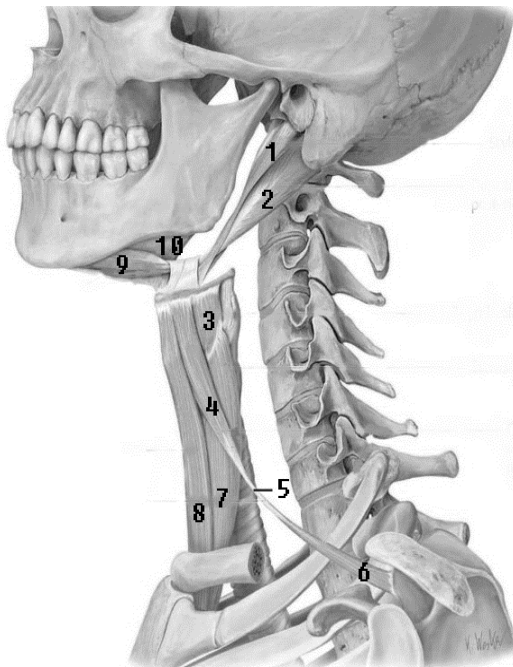
What muscles are indicated by numbers in the figure according to the shape and direction of the fibers?

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_

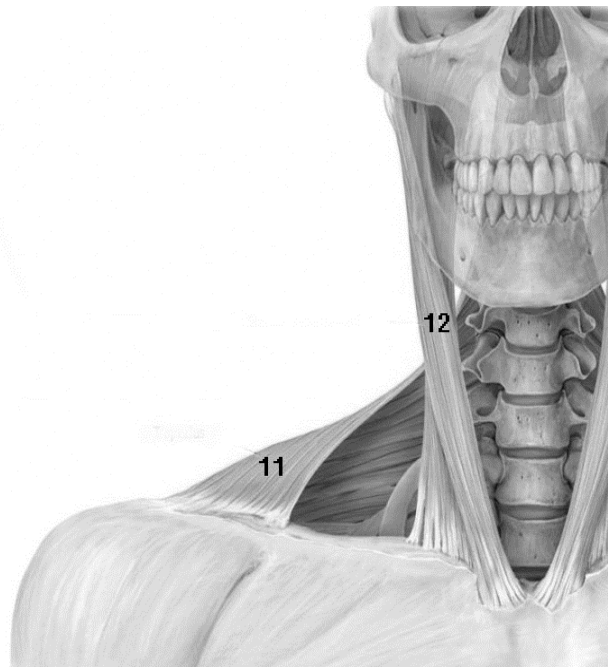
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_



**NECK MUSCLES**



*Lateral view*



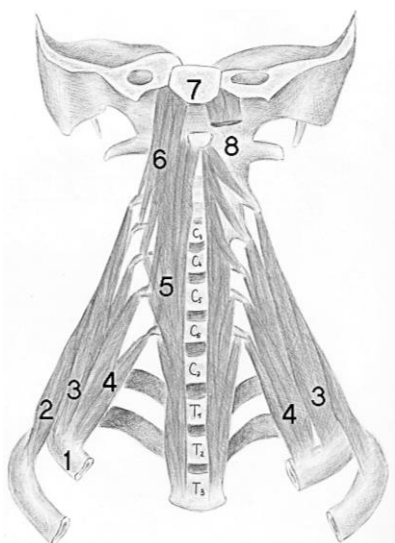
*Anterior view*

Name the anatomical structures marked by the numbers:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. Intermediate tendon
- 6. \_\_\_\_\_

- 7. \_\_\_\_\_
- 8. \_\_\_\_\_
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_

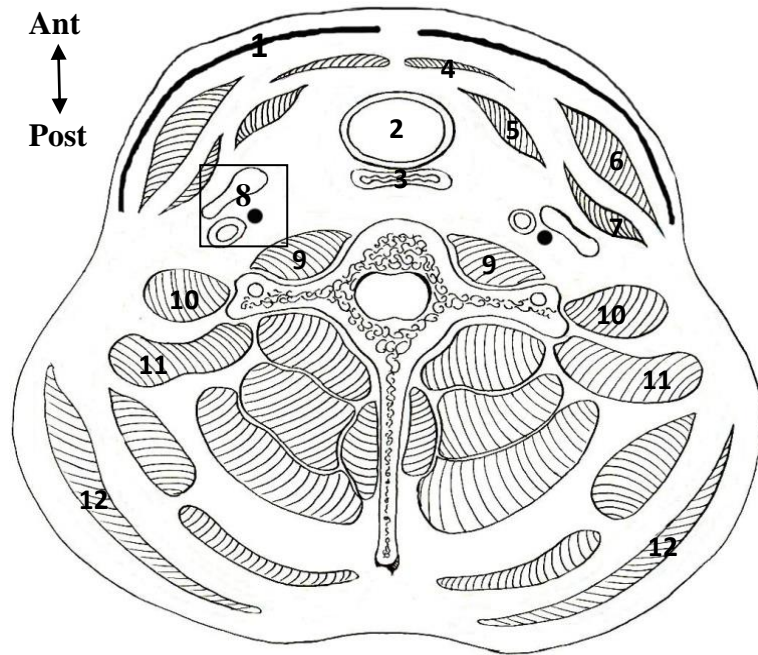
**DEEP NECK MUSCLES**



Name the anatomical structures marked by the numbers:

- 1. First rib
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_
- 6. \_\_\_\_\_
- 7. \_\_\_\_\_
- 8. Atlas

# NECK FASCIAS



Draw in different colors:

- superficial (subcutaneous) neck fascia
- investing layer of the deep cervical fascia
- pretracheal layer of the deep cervical fascia
- prevertebral layer of the deep cervical fascia
- carotid sheath
- visceral fascia

Name the anatomical structures marked by the numbers:

- |           |            |
|-----------|------------|
| 1 — _____ | 7 — _____  |
| 2 — _____ | 8 — _____  |
| 3 — _____ | 9 — _____  |
| 4 — _____ | 10 — _____ |
| 5 — _____ | 11 — _____ |
| 6 — _____ | 12 — _____ |

## LABORATORY SESSION № 8 MUSCLES AND FASCIAS OF THE HEAD

### Control questions:

1. Classification of the muscles of the head.
2. Masticatory muscles: sources of development, general characteristics.
3. Parts, origin and insertion of the masseter muscle, functions.
4. Temporal muscle: origin and insertion, functions.
5. Medial pterygoid muscle: origin and insertion, functions.
6. Origin and insertion of the lateral pterygoid muscle, functions.
7. Sources of development, general characteristics and classification of facial muscles. Origin and insertion, functions.
8. Fascia of the head: masseter, temporal, buccal-pharyngeal. Pterygomandibular suture.

**At the session students should learn how to find the listed structures on anatomical preparations and visual aids, know the latin names:**

**Muscles and fascias of the head.** 1. *Masticatory muscles*. 2. *Temporal muscle*. 3. *Lateral, medial, pterygoid muscles*. 4. Occipitofrontalis muscle. 5. Nasal muscle. 6. Orbicularis oculi muscle. 7. Orbicularis oris muscle. 8. Major (minor) zygomatic muscle. 9. Levator labii superioris muscle. 10. Depressor labii inferioris muscle. 11. Levator labii inferioris muscle. 12. Depressor anguli oris muscle. 13. Mentalis muscle. 14. Buccinator muscle. 15. Temporal, masseter, buccopharyngeal fascia. 16. Pterygomandibular raphe.

### GLOSSARY

**The masticatory muscles** develop from the first pharyngeal arch and are innervated by the trigeminal nerve. It originate on the bones of the skull and are attached to the lower jaw, ensuring its movement in the temporomandibular joint.

**Masseter muscle** has superficial and deep parts. The superficial part starts from the anterior 2/3 of the zygomatic arch, the deep part — from the posterior 2/3 of the zygomatic arch. Both parts of the masseter are attached to the masticatory tuberosity of the lower jaw. Function: raises the lower jaw, with unilateral contraction, shifts the jaw to its side. The superficial part of masseter pushes the lower jaw forward.

**Temporal muscle** is the greatest masticatory muscle, its belly originates from the bones of the temporal fossa and is attached to the coronoid process of the mandible. Function: closes the mouth, raising the lower jaw; the posterior muscle fibers pull the protruding lower jaw backward.

**Medial pterygoid muscle** originates in the pterygoid fossa of the pterygoid process of the sphenoid bone and is attached to the pterygoid tuberosity of the mandible. Function: raises the lower jaw, with one-sided contraction, shifts it to the opposite side.

**Lateral pterygoid muscle** has two heads — upper and lower. The superior head originates from the infratemporal crest of the greater wing of the sphenoid bone; attached to the capsule of the temporomandibular joint and the articular disc. The lower head starts from the lateral plate of the pterygoid process of the sphenoid bone, attaches to the pterygoid fossa (on the neck of the mandible). With bilateral muscle contraction, the lower jaw moves forward, with unilateral contraction, it shifts in the opposite direction.

**Facial muscles** develop from the second branchial arch, have one source of innervation — the facial nerve and blood supply — branches of the external carotid artery. These muscles do not

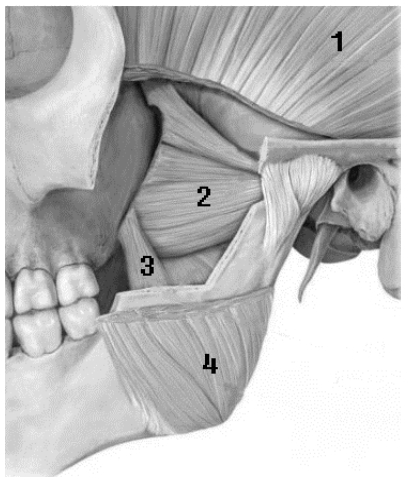
have a double attachment to the bones, with two or one end they are fixed to the skin or mucous membranes. Subdivided into muscles of the cranial vault; muscles surrounding the palpebral fissure; muscles surrounding the nasal openings (nostrils); muscles surrounding the oral fissure and the muscles of the auricle. When contracting, the muscles of the face change the depth of skin folds (facial expressions), narrow or expand the oral and palpebral fissures, take part in chewing and speech.

**Masseter fascia** covers the muscle of the same name. From above it is attached to the zygomatic arch, below — to the base of the lower jaw. Posteriorly, it is connected with the fascia of the parotid gland, anteriorly continues into the buccal-pharyngeal fascia, downwards it passes into the superficial plate of the cervical fascia.

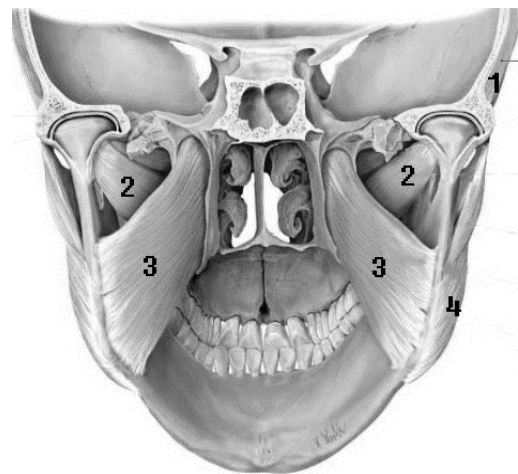
**Temporal fascia** covers the temporalis muscle. It starts from the superior temporal line of the parietal bone, near the zygomatic arch it splits into superficial and deep plates, between which there is a space.

**Buccopharyngeal fascia** covers the buccinator and continues to the constrictors of the pharynx. Densified fascia section between the pterygoid process of the sphenoid bone and the lingula of the mandible is called the pterygomandibular raphe.

### MASTICATORY MUSCLES



*Lateral view (a fragment of the mandible branch removed)*

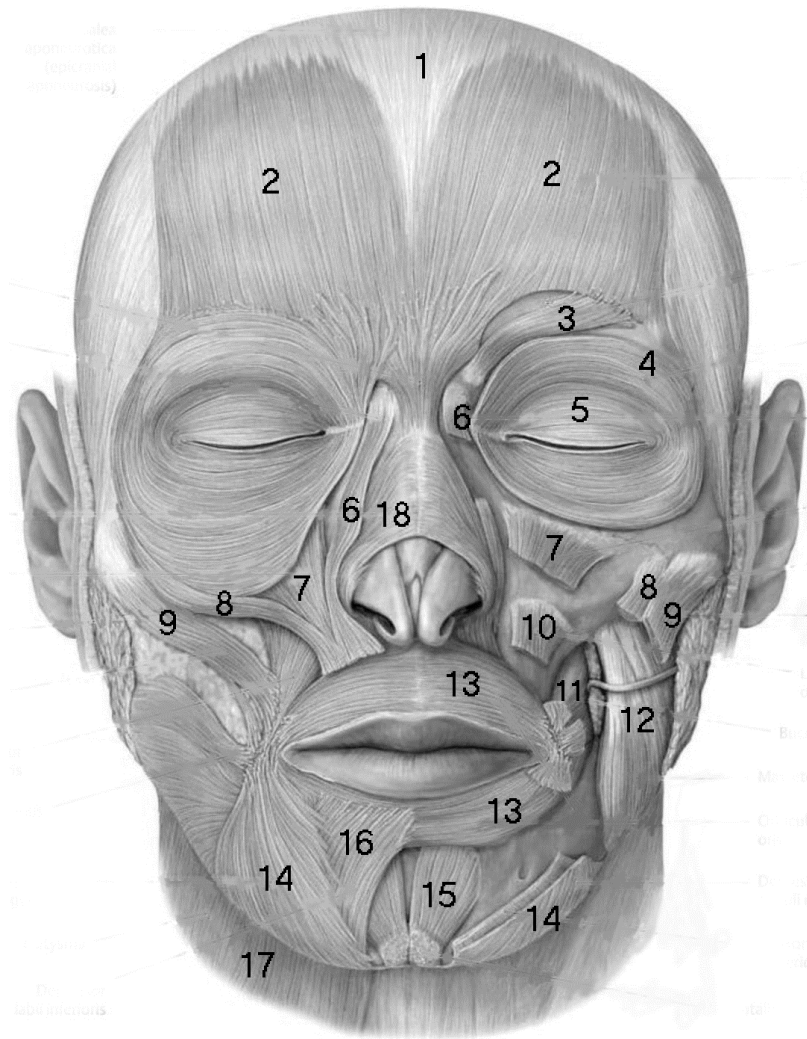


*Posterior view (frontal cutting of head)*

Name the anatomical structures marked by the numbers:

- 1 — \_\_\_\_\_ 3 — \_\_\_\_\_  
 2 — \_\_\_\_\_ 4 — \_\_\_\_\_

# FACIAL MUSCLES



Name the muscles marked by numbers:

- |           |            |
|-----------|------------|
| 1 — _____ | 10 — _____ |
| 2 — _____ | 11 — _____ |
| 3 — _____ | 12 — _____ |
| 4 — _____ | 13 — _____ |
| 5 — _____ | 14 — _____ |
| 6 — _____ | 15 — _____ |
| 7 — _____ | 16 — _____ |
| 8 — _____ | 17 — _____ |
| 9 — _____ |            |

**LABORATORY SESSION № 9**  
**MUSCLES OF TRUNK, UPPER AND LOWER LIMBS.**  
**FINAL CONTROL OF THE SECTION «MYOLOGY»**

**Control questions:**

1. Muscles of back: superficial and deep, general characteristics, functions.
2. Muscles of thorax superficial and deep, general characteristics, functions.
3. Diaphragm: topography, structure, functions.
4. Muscles of abdomen: general morphofunctional characteristics.
5. Topography of the anterior abdominal wall: linea alba, umbilical ring, inguinal canal.
6. Muscles of the girdle and free part of the upper limb: general morphofunctional characteristics.
7. Muscles of the girdle and free part of the lower limb: general morphofunctional characteristics.

**GLOSSARY**

**Muscles of back.** 1. Trapezius muscle. 2. Latissimus dorsi muscle. 3. Rhomboid muscles. 4. Serratus posterior superior and inferior muscle.

Muscles of thorax are divided into superficial and deep. Superficial muscles are pectoralis major and minor muscles and serratus anterior, which originate from the bones of the thorax and insert to the upper limb. Deep thorax muscles, external and internal intercostal, transverse breast muscle and diaphragm participate in the act of breathing.

**Muscles of abdomen.** 1. External and internal oblique abdominal muscles. 2. Transverse abdominal muscle. 3. Rectus abdominis muscle. 4. Linea alba. 5. Umbilical ring. 6. Inguinal canal.

**Muscles of the upper limb.** 1. Muscles of the shoulder girdle: deltoid, supraspinatus, infraspinatus and subscapularis muscles; teres minor and major muscles. 2. Muscles of the arm: biceps, triceps, coracobrachialis and brachial muscles. 3. Anterior muscles of the forearm: flexor carpi radialis and flexor carpi ulnaris; flexor digitorum superficialis and profundus; brachioradialis muscle; pronator quadratus and teres. 4. Posterior muscles of the forearm: extensor carpi radialis longus; extensor carpi ulnaris; extensor digitorum; supinator. 5. Muscles of the hand: extensor pollicis longus and brevis, opponens pollicis and digiti minimi.

**Muscles of the lower limb.** 1. Muscles of the pelvic girdle: gluteus maximus, medius, minimus. 2. Muscles of the thigh: quadriceps femoris; sartorius muscle; biceps, semitendinosus and semimembranosus muscles; brevis, longus magnus adductor. 3. Muscles of leg: anterior and posterior tibialis muscles; extensor digitorum longus; triceps surae; flexor digitorum longus; fibularis longus and brevis. 4. Dorsal and plantar interossei muscles.

**Diaphragm** is formed by the diaphragmatic muscle (*m. phrenicus*). There are lumbar, costal and sternal parts of the diaphragm, which converge in the tendon center. In the diaphragm there is an aperture of the inferior vena cava, aortic and esophageal apertures.

**Muscles of back** are divided into superficial and deep. Superficial muscles are attached to the bones and the free zone of the upper limb. Deep muscles are located along the spine, connecting its processes.

**Muscles of abdomen** form the walls of the abdominal cavity, filling the space between the sternum and pelvis. There are external and internal oblique muscles, rectus and transverse muscles.

**Linea alba** extends from the xiphoid process of the sternum to the pubic symphysis and is formed by intertwining bundles of aponeuroses of oblique and transverse abdominal muscles. Approximately in the middle of the alba line there is **an umbilical ring**.

**Inguinal canal** (*canalis inguinalis*) is a slanting slit in the lower median abdomen above the inguinal ligament, 4–5 cm long. The male canal contains the spermatic cord, the female canal

contains the round ligament of the uterus. It has an anterior, posterior, upper and lower walls, a superficial and deep inguinal ring.

**Muscles of the upper limb** are divided into the muscles of the girdle and the free part of the upper limb. The latter are divided into the muscles of the arm, forearm and hand.

**Muscles of the shoulder girdle** perform movements in the shoulder joint. These include the deltoid, subscapularis, supraspinatus and infraspinatus muscles, teres minor and major muscles.

**Muscles of the arm** are divided into the anterior and posterior groups. Anterior group: biceps, coracobrachialis and brachial muscles, perform flexion in the shoulder and elbow joints. Posterior group — triceps and elbow muscles, perform extension in these joints.

**Forearm muscles** are divided into anterior and posterior groups, arranged in several layers. Anterior group muscles are pronators and flexors of the hand and fingers. Posterior group muscles are supinators and extensors of the hand and fingers.

**Muscles of the hand** are placed on the palm side, forming the elevation of the thumb (thenar), elevation of the digiti minimi (hypothenar) and muscles of the palm cavity.

**Muscles of the lower limb** keep the body in a vertical position and carry out movements in the hip, knee, ankle and foot joints. The muscles of the lower limb are divided into the muscles of the lower limb girdle and the muscles of the free lower limb. The latter are divided into hip muscles, leg muscles and foot muscles.

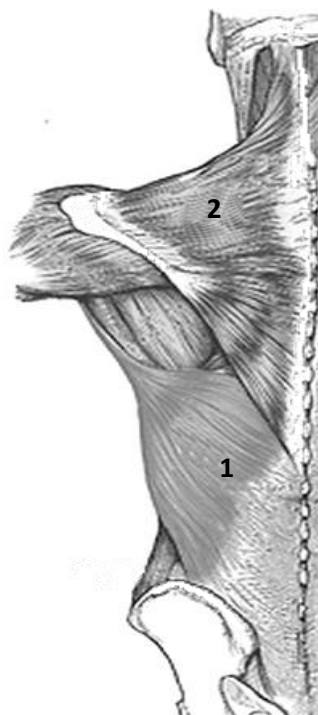
**Muscles of the pelvic girdle** surround the hip joint, stabilize it and set it in motion.

**Hip muscles** are divided into anterior (extensor), medial (adductors) and posterior (flexor) groups.

**Leg muscles** are located on the anterior, lateral and posterior surfaces, they carry out movement of the foot in the ankle joint.

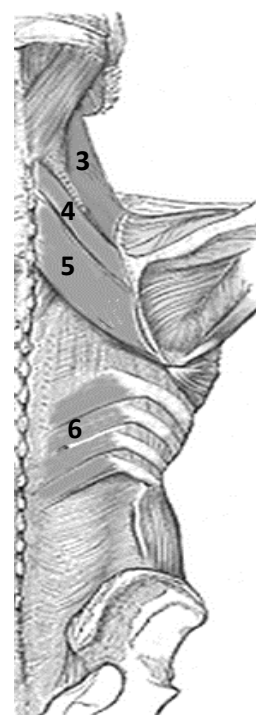
**Foot muscles** lie on its back and plantar surfaces. Back muscles are mainly extensors of the fingers, plantar muscles — flexors.

## MUCLES OF BACK



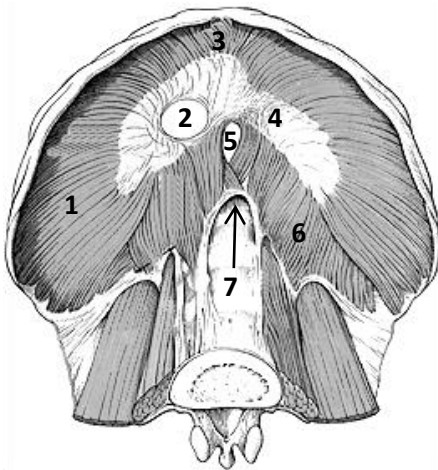
Name the muscles marked by numbers:

- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — \_\_\_\_\_



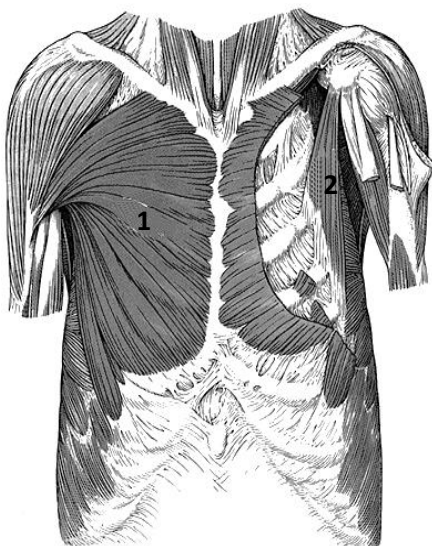
# MUSCLES OF THORAX

## DIAPHRAGM



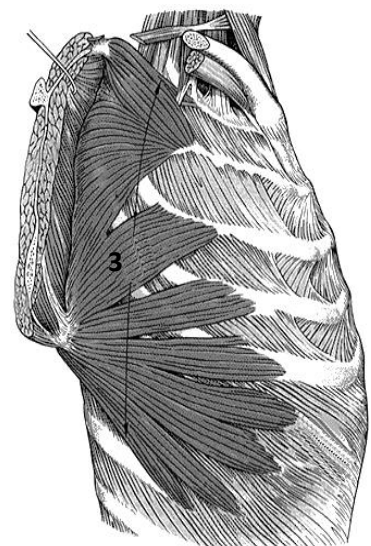
Name the parts and apertures of the diaphragm:

- 1 — \_\_\_\_\_
- 2 — opening \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_ hiatus
- 6 — \_\_\_\_\_
- 7 — \_\_\_\_\_ hiatus



Name the muscles marked by numbers:

- 1 — \_\_\_\_\_
- \_\_\_\_\_
- 2 — \_\_\_\_\_
- \_\_\_\_\_
- 3 — \_\_\_\_\_
- \_\_\_\_\_

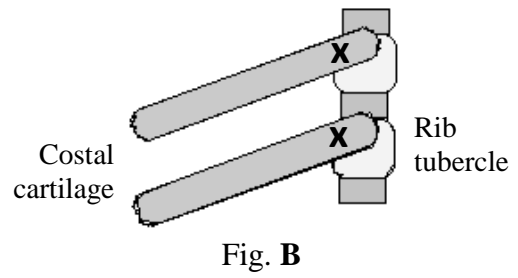
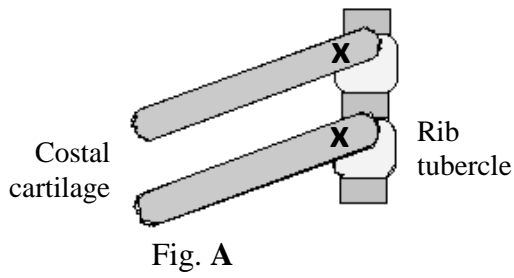


Mark the phases in which the listed muscles participate:

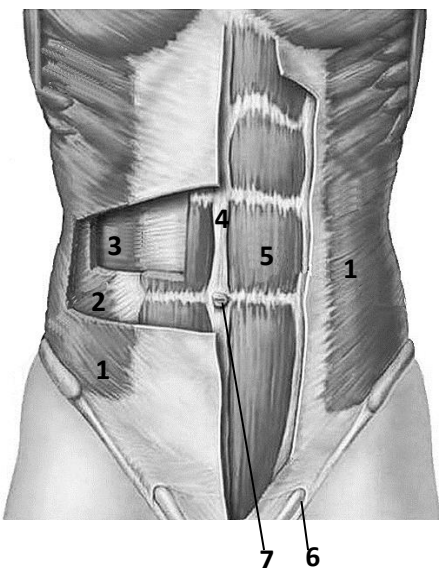
Name of the muscle	Inhalation	Exhalation
Diaphragm		
External intercostal muscles		
Internal intercostal muscles		
Muscles of the abdominal press		



Draw the direction of the motion of the external muscle fibers (Figure A) and internal (Figure B) intercostal muscles



### MUSCLES OF ABDOMEN



- 1 — \_\_\_\_\_
- 2 — \_\_\_\_\_
- 3 — \_\_\_\_\_
- 4 — \_\_\_\_\_
- 5 — \_\_\_\_\_
- 6 — spermatic cord
- 7 — aponeurosis of \_\_\_\_\_

List the “weak” sites of the anterior abdominal wall:

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

## FINAL CONTROL OF THE SECTION «MYOLOGY»

### Control questions:

1. Classification, structure of skeletal muscles.
2. Accessorius apparatus of muscles.
3. Classification of the neck muscles. Superficial muscles of the neck: origin and insertion, functions.
4. Suprahyoid neck muscles: origin and insertion, functions.
5. Infrahyoid neck muscles: origin and insertion, functions.
6. Deep neck muscles: origin and insertion, functions.
7. Structure of the cervical fascia and the topography of its layers.
8. Topography of the neck: division into areas. Triangles of anterior and lateral regions of the neck.
9. Lateral region of neck: borders, triangles.
10. Masticatory muscles: sources of development, structure, function.
11. Facial muscles sources of development, classification, structure, functions.
12. Muscles of the trunk; classification. General morphofunctional characteristics of the muscles of back.
13. Muscles of thorax: classification, general description.
14. Diaphragm: structure, functions.
15. Muscles of abdomen; general characteristics.
16. Topography of the anterior abdominal wall: alba line umbilical ring, inguinal canal.
17. Muscles of the girdle and free part of the upper limb: general morphofunctional characteristics.
18. Muscles of the girdle and free part of the lower limb: general morphofunctional characteristics.

Final mark \_\_\_\_\_

Date «\_\_\_» \_\_\_\_\_ 20\_\_\_\_

\_\_\_\_\_  
Tutor's signature and name

## LITERATURE

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