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АНАТОМИЯ ОПОРНО-ДВИГАТЕЛЬНОГО АППАРАТА

ANATOMY OF LOCOMOTOR SYSTEM

Учебно-методическое пособие



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Introduction

In the «Anatomy of locomotor system» for the practical classes in Human Anatomy for the 1st year students of the medical faculty for foreign students the following topics are presented in English: «Skeletal System», «System of Joints», «Muscular System».

In the publication the most difficult points for students understanding are given. It expands the representations about these themes. In each of considered lesson the practical recommendations facilitating mastering of the material are given. Questions for control do possible to use of the recommendations for independent preparation.

The maintenance of this work corresponds with the program and the curriculum in Human Anatomy.

The edition is possible to use by the English-speaking students and is valuable addition to the textbook.

The «Anatomy of locomotor system» for the practical classes in Human Anatomy for the 1st year students of the medical faculty for foreign students is composed on the basis of the «Methodical recommendations to the practical training course», 2006 (authors: S. D. Denisov, P. I. Lobko, P. G. Pivchenko, V. V. Rudenok, M. I. Bogdanova, L. A. Davydova, G. P. Dorohovich, G. E. Konopelko, L. D. Chayka, S. P. Jaroshevich). The literacy of the English text is edited under the Head of the Foreign Languages Department M. N. Petrova.

Bones. Skeletal system

Development and age features of the skull.

The basis of a skull passes 3 stages (mesenchymal, cartilaginous and osteal) in its development. The facial (visceral) part of a skull and separate bones of its cerebral part develop on the basis of the webby skeleton.

The cerebral part of a skull develops from the mesenchyma surrounding quickly growing brain. The internal relief of a skull is caused by the mesenchyma, which is located around of the brain, sense organs, nerves and vessels. The cartilaginous tissue appears in the skull basis, near the anterior department of a chorda. Further cartilages in the skull basis are replaced with the osteal tissue.

Bones of the facial part of a skull develop from the mesenchyma, located near the initial part of a primary intestine. The cartilaginous branchiate arches are formed in the mesenchyma between the branchiate pockets. Derivatives of the first branchiate arch are the upper and lower jaws, a malleus and an incus. The following formations are developed from the second branchiate arch: a stapes and a styloid process of a temporal bone, small horns of a hyoid bone. The big horns of a hyoid bone and its body are formed from the third branchiate arch.

Skull of the newborn has the following features. The volume of the cerebral part is larger than the facial part. Bones are bridged with each other by the cartilaginous and connective tissue layers. The tubers of frontal and parietal bones are well expressed. The frontal bone and the lower jaw consist of two parts. The parts of a temporal bone are separated from each other by the wide fissuras filled with the cartilaginous or connective tissue layers.

Orbits of newborns are wide. They have the form of a trihedral prism. Definitive formation of an orbit occurs by 18–20 years.

Nasal cavity of the newborn has small sizes. Nasal ways are weakly developed. The paranasal sinuses of newborns are absent, except weakly developed maxillar sinus. Frontal and sphenoid sinuses are formed definitively from 1 till 3 years, cells of a ethmoid bone — from 1 till 3–6 years.

The pterygopalatine fossa of newborns is short and deep. Its apertures are well developed. Its development comes to the end by 7 years.

There are fontanels in the skull of a newborn. They are the rests of a webby stage of the development. The anterior fontanel is closed on the 2nd year of a life; posterior — on the 2nd month; sphenoid and mastoid — on the 2–3rd months after a birth.

It is possible to allocate three stages in the skull development after a birth. The first one — is from a birth till 7 years. The second stage proceeds from 7 till 13–14 years and is characterised by sharp retardation of the skull growth as a whole. The third stage (till 25 years) of a skull growth is characterized by

the accelerated, enlarged the sizes of the frontal part of a roof, extending and deepening of the basis, extending of the facial skull.

Development and age features of the skeleton of the trunk.

Bones of a skeleton of a trunk pass three stages of development: connective tissue, cartilaginous and osteal. Trunk bones develop from primary segments (somites) — derivatives of dorsal part of a mesoderm. The mesenchyma moved from a sclerotome of each somite, gradually expanding, envelops a chorda and a nervous tube. Therefore the primary connective tissue vertebrae are formed. On the 5th week of development in the beginning of bodies, ventral and dorsal arches there are the centres of a cartilaginous tissue merging further with each other. The chorda surrounded with a cartilaginous tissue disappears in the bodies of the vertebrae, but remains in the intervertebral disks as a pulposus nucleus. Dorsal arches of vertebrae form the transverse and articulate processes. Ventral arches form beginnings of ribs. The anterior ends of 9 upper pairs of ribs extend and form the cartilaginous strias on each of them. At 3 months the strias merge, forming the sternum. There are nuclei of ossification in the sternum. In the xiphoid process the nuclei of ossification appear at 2–6 years.

At 8 week the replacement of the cartilaginous skeleton with the osteal skeleton begins. In each vertebra there are 3 ossification centres: 1 — in a body and 2 — in a vertebra arch. The bodies and processes of vertebrae merge with the main nuclei by 20–25 years.

The vertebral canal of the newborn is rather wide. The vertebral column is almost direct, only insignificant kyphosis and a lordosis in the thoracic and lumbar departments are observed. All subsequent changes in curvature of a spine occur in connection with development of the basic functions of a locomotorium of the child (in 2 months the cervical lordosis is formed; in 6 — a thoracic kyphosis; at 1 year — a lumbar lordosis).

The vertebra body of newborns has oval form. The transverse and spinal processus are weakly developed. A vertebra is cartilaginous structure. In its body there is only one nucleus of ossification, in arches there are two nuclei of ossification. The synostosis of a body and arches occurs at 3 years of a life.

The sacrum of newborns is cartilaginous. In the first three vertebrae five nuclei of ossification are distinguished, in the others — three. The synostosis of bodies of vertebrae with arches begins with the inferior sacral vertebrae and comes to the end by 4–7 years. The definitive synostosis comes by 25 years.

Ribs of newborns have no grooves. Costal angles are smoothed. Ossification of ribs is carried out from three nuclei of ossification. Heads and tubercles of ribs are cartilaginous. The nuclei of ossification appear in them at 8–15 years, and they merge among themselves by 18–25 years.

The anterior-posterior size of a thorax of newborns is larger than transverse size. Ribs have almost horizontal direction. Cartilages of the 6–8th ribs are bounded among themselves by connective tissue layers, and the 10–12th ribs usually terminate freely.

Lesson 1

Theme: Subject of Anatomy. Anatomical Terminology. Axes and Planes used in Anatomy. Skeleton and its parts. Development of Skeleton. Vertebral Column. Parts of Vertebral Column. Structure of Thoracic Vertebra.

Purpose of the lesson:

- to make concept of Human Anatomy as a science and academic discipline;
- to learn the ethical standards of handling anatomic preparations;
- to acquire the general terms of Latin anatomic terminology;
- to be able to characterize the axes and the planes;
- to formulate the concept of the skeleton and its parts;
- to study the structure of a thoracic vertebra: to understand its arrangement in the human body, to be able to name and show the structural formations on the preparations.

Equipment of the lesson: a skeleton, the complete set of vertebrae, a sacrum, a spinal column, museum preparations, tables, the atlas, the textbook.

Recommendations. When you study this theme, you should examine the spinal column on the skeleton, pay attention to its parts, the arrangement of bodies and processes of vertebrae, and attachment of ribs to vertebrae in the thoracic part. You should pay attention to signs: the vertebral body is situated anteriorly, and spinal process extends backwards. It will help you to define the position of a vertebra concerning to the body. Pay attention to the presence of costal facets on the body and transverse processes of thoracic vertebrae.

QUESTIONS FOR CONTROL

1. What does the human anatomy study? Characterise the basic methods of studying the structure of a human body.
2. What norms of biomedical ethics is it necessary to know, studying the human anatomy?
3. What planes and axes are accepted in anatomy?
4. Can you name the basic general anatomical terms?
5. Can you name the anatomic formations, that make an axial skeleton, an additional skeleton?

6. Name the departments of vertebral column and name the number of vertebrae making each department.
7. Name the parts of a typical vertebra.
8. Name the features of thoracic vertebrae.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On preparations of the vertebral column and the skeleton: 1) parts of the spinal column: cervical, thoracic, lumbar, sacral, coccygeal.

On the thoracic vertebrae preparations: 1) a vertebral body; 2) a vertebral arch; 3) a vertebral foramen; 4) a spinal process; 5) a transverse process; 6) the superior and inferior articular processes; 7) the superior and inferior vertebral notches; 8) the superior and inferior costal facets; 9) the costal facets of the transverse processes.

Lesson 2

Theme: Structure of Cervical and Lumbar Vertebrae. Sacrum, Coccyx. Ribs, Sternum. Variants and Anomalies of their Development.

Purpose of the lesson:

- to study the structure of cervical and lumbar vertebrae, sacrum, coccyx, ribs, sternum;
- to be able to distinguish vertebrae of various parts of the spinal column, to name their structure, to name and show their anatomic formations on the preparations;
- to learn how to palpate the spinal process of the 7th cervical vertebra, the ribs, parts of the sternum, the angle of the sternum, the jugular notch.

Equipment of the lesson: a skeleton, the complete set of vertebrae, a sacrum, a spinal column, the set of ribs, a sternum, museum preparations, textbooks, the atlas, tables.

Recommendations. It is necessary to study the structure of cervical vertebrae (the typical, I, II, VII). The basic distinctive sign of the cervical vertebrae — is the foramen in the transverse process. The body of the vertebra is situated anteriorly and spinous process extends backwards. It will help you to define the position of the vertebra concerning your own body. The short anterior arch of the first cervical vertebra (atlant) is situated anteriorly and superior articular fovea is extended upwards. The superior articular fovea has the oval form and it is more profound than lower. The body vertebra of the II cervical vertebra (axis) is situated anteriorly and the tooth is extended upwards. The base of the sacrum is extended upwards. Convex pelvic surface is extended forward. It is necessary to know, that on the preparations only osteal

parts of ribs are represented. The head of the rib is situated behind, the groove of rib passes along the bottom edge on the internal surface of its body. The first rib has superior and inferior surfaces, lateral and medial edges. The scalene tubercle is situated on the superior surface. The subclavian artery and vein are located anteriorly and posteriorly of the scalene tubercle. The manubrium of the sternum is situated up and the angle of the sternum is directed forward.

QUESTIONS FOR CONTROL

1. Name the basic distinctive signs of cervical vertebrae.
2. Describe the structure of a «typical» cervical vertebra. Name the structural feature of the 7th cervical vertebra.
3. Describe the structure of the Ist cervical vertebra.
4. Describe the feature of a structure of the 2nd cervical vertebra. Why the 1st and the 2nd cervical vertebrae have particularities of the structure?
5. Name distinctive structural features of the lumbar vertebrae.
6. Describe the structure of the sacrum.
7. Describe the structure of the coccyx.
8. Name the groups of ribs.
9. Name the parts of the rib.
10. Name the basic structural elements of the bone part of the rib.
11. Where is the groove of the rib situated? What is located in the groove of the rib?
12. What structural features does the Ist rib have?
13. Name the parts and notches of the sternum. How many rib notches does the sternum have?
14. What parts of the sternum form the angle? What rib attaches at the angle of the sternum?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On the cervical vertebrae preparations: 1) a vertebral body; 2) a vertebral arch; 3) a vertebral foramen; 4) a spinous process; 5) transverse processes; 6) the foramen of a transverse process; 7) the superior (upper) and inferior (lower) articular processes; 8) the superior vertebral notches; 9) the inferior vertebral notches; 10) the lateral masses of the atlas; 11) an anterior arch of the atlas; 12) an anterior (frontal) tubercle of the atlas; 13) a fovea of the tooth; 14) a vertebral arch of the atlas; 15) a groove of the vertebral artery; 16) a posterior (back) tubercle of the atlas; 17) a tooth; 18) an anterior and posterior articulate surfaces of a tooth; 19) a prominent vertebra.

On the lumbar vertebrae preparations: 1) a vertebral body; 2) a vertebral arch; 3) a vertebral foramen; 4) a spinous process; 5) transverse processes;

6) the superior (upper) and inferior (lower) articular processes; 7) the superior and inferior vertebral notches.

On the preparation of the sacrum: 1) sacral vertebrae; 2) the base of the sacrum; 3) the superior articular processes; 4) a promontory; 5) the apex of the sacrum; 6) an auricular surface; 7) a sacral tuberosity; 8) a pelvic surface; 9) transversal lines; 10) pelvic sacral foramens; 11) intermediate, median and lateral sacral crests; 12) dorsal sacral foramens; 13) a sacral canal.

On the preparations of ribs: 1) the head of the rib, articular surfaces of the head of the rib, the crest of the head of the rib; 2) the neck of the rib; 3) tubercle of the rib; 4) articulate surface of the tubercle of the rib; 5) the angle of the rib; 6) a costal groove; 7) the tubercle of the anterior scalene muscle; 8) the groove for the subclavian artery; 9) the groove for the subclavian vein.

On the preparations of the sternum: 1) the manubrium of the sternum; 2) the body of the sternum; 3) a xyphoid process; 4) a jugular notch; 5) a clavicular notch; 6) costal cuttings (measures); 7) a costal notch.

Practical skills: to be able to palpate ribs, the manubrium, the body, the xyphoid process, the angle, the jugular notch of the sternum, the spinous process of the 7th cervical vertebra on your own body.

Lesson 3

Theme: Skeleton of Head. Cerebral and Facial Skull. Skull Bones: Frontal, Parietal, Occipital.

Purpose of the lesson:

- to generate the representation about the cerebral and facial skull;
- to be able to show on the skull its cerebral and facial parts, the frontal, the parietal and the occipital bones;
- to know and to be able to tell the frontal, parietal and occipital bones structure;
- to name and show their anatomic formations;
- to be able to palpate on the own body the frontal and parietal tubers, the external occipital prominence, the supraorbital edge, the glabella.

Equipment of the lesson: a skull (the whole and its sagittal and horizontal cuts), a frontal bone, a parietal bone, an occipital bone, museum preparations, the textbook, the atlas, tables, roentgenograms.

Recommendations. On the skull it is necessary to define position of the frontal, the parietal and the occipital bones. The frontal bone preparation is located so that orbital and nasal parts are turned downward, and the squama — upward. It is necessary to pay attention to the participation of the frontal bone in the formation of a temporal fossa, a nasal cavity, an orbit and an anterior cranial fossa. The parietal bone is located so that its sphenoidal angle is

directed anteriorly and inferiorly, and the arterial grooves on its internal surface are directed superiorly and posteriorly. The squama of the occipital bone is located posteriorly, and the foramen magnum is directed inferiorly.

QUESTIONS FOR CONTROL

1. What parts is the skull divided into?
2. Name the frontal bone parts.
3. What formations are located on the external surface of the frontal squama and on its supraorbital edge?
4. What osteal prominence and what sulcus are located on the internal surface of the frontal squama?
5. Name the surfaces of the frontal bone orbital part. What fossas are located on its orbital surface?
6. What is the frontal sinus? Where its apertures are located?
7. Name the edges and angles of the parietal bone.
8. What sulci of venous sinuses pass on the internal surface of the parietal bone?
9. Name parts of the occipital bone and the foramen limited by them.
10. What formations of the occipital bone serve for the connection with the atlas? What canal passes through them?
11. Name osteal prominences on the external surface of the occipital squama.
12. What osteal eminences are located on the internal surface of the occipital bone?
13. What grooves of venous sinuses pass on the internal surface of the occipital bone?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On skull preparations: 1) the facial and cerebral parts of the skull; 2) the neurocranium; 3) the frontal, the parietal and the occipital bones.

On the frontal bone preparation: 1) the frontal bone parts: the frontal squama, the nasal part, the orbital parts; 2) a frontal tuber; 3) the superciliary arch; 4) glabella; 5) the supraorbital edge; 6) the supraorbital notch; 7) the frontal notch; 8) the superior/inferior temporal line; 9) the zygomatic process; 10) the groove of the superior sagittal sinus; 11) the nasal spine; 12) the frontal sinus aperture; 13) the ethmoidal notch; 14) the lacrimal gland fossa; 15) the trochlear fossa.

On the parietal bone preparation: 1) the frontal, the occipital, the sagittal and the squamous edges; 2) the frontal, sphenoidal, occipital and mastoid

angles; 3) the parietal tuber; 4) the superior/inferior temporal line; 5) the groove of the superior sagittal sinus; 6) the groove of the sigmoid sinus; 7) the pits of granulations.

On the occipital bone preparation: 1) parts of the occipital bone: its basilar part, lateral parts, the occipital squama; 2) the foramen magnum; 3) the clivus; 4) the pharyngeal tubercle; 5) the groove of the inferior petrous sinus; 6) the occipital condyle; 7) the hypoglossal canal; 8) the condylar fossa, the condylar canal; 9) the jugular notch; 10) the jugular process; 11) the groove of the sigmoid sinus; 12) the external occipital prominence; 13) the internal occipital crest; 14) the superior and inferior nuchal lines; 15) the cruciform eminence; 16) the internal occipital prominence; 17) the groove of the transverse sinus; 18) the groove of the sagittal sinus; 19) the internal occipital crest; 20) the pharyngeal tubercle.

Practical skills: to be able to palpate on your own body the frontal and parietal tubers, the external occipital prominence, the supraorbital edge, the glabella.

Lesson 4

Theme: Ethmoid and Sphenoid Bones.

Purpose of the lesson:

- to know and to be able to tell the ethmoid and sphenoid bones structure;
- to be able to name and show their anatomic formations in the skull;
- to know their participation in the nasal cavity and cranial fossas formation.

Equipment of the lesson: a skull, ethmoid and sphenoid bones, museum preparations, the atlas, the textbook, tables.

Recommendations. It is necessary to determine the ethmoid and sphenoid bones position in the skull. When you study the ethmoid bone topography — to pay attention to its participation in the orbit (an orbital plate) formation and nasal cavities: septum (a perpendicular plate), nasal meatuses (the upper and medial nasal conchas), the paranasal sinuses (cellulae ethmoidales). It is necessary also to pay attention on the cribriform plate participation in the nasal cavity upper wall and anterior cranial fossa formation. When you study the sphenoid bone — to pay attention to its participation in the formation of the skull cerebral and facial parts cavitas and fossas, to the fissuras and canals for the vessels and nerves transition, to the connection of the sphenoid sinus with the nasal cavity.

QUESTIONS FOR CONTROL

1. Describe the ethmoid bone locating in the skull.
2. What parts does the ethmoid bone consist of?
3. Name the ethmoid bone parts participating in the orbit, the nasal cavitas and the anterior cranial fossa formation.
4. Describe the locating of the sphenoid bone in the skull.
5. What parts does the sphenoid bone consist of?
6. What surfaces does the sphenoid bone body have?
7. Name the surfaces of the greater wings of the sphenoid bone. What skull formations do they participate?
8. What foramens transit at the basis of the sphenoid bone greater wings?
9. What foramen and fissure formation does the lesser wing participate?
10. What are the names of the pterygoid processes plates, the excavation between them and the formation dividing their inferior part?
11. What is the name of the canal transiting through the basis of the pterygoid processes?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On the skull preparation: 1) a cribriform plate; 2) a crista galli; 3) a perpendicular plate; 4) a ethmoidal labyrinth; 5) ethmoidal cells; 6) the upper nasal concha; 7) a medial nasal concha; 8) an orbital plate.

On the skull and on the sphenoid bone: 1) parts of the sphenoidal bone: a body, lesser wings, greater wings, pterygoid processes; 2) a Turkish saddle and a pituitary fossa; 3) the tubercle and the dorsum of the saddle; 4) a carotid groove; 5) a sphenoidal crest and a sphenoidal bill; 6) the sphenoidal sinus aperture; 7) an optic canal; 8) a prechiasmatic groove; 9) the superior orbital fissura; 10) surfaces of the greater wing: the cerebral, the orbital, the maxillary, the temporal; 11) a round, an oval and an awned foramens; 12) an infratemporal crest; 13) a pterygoid process; 14) the medial and lateral plates of the pterygoid process; 15) a pterygoid fossa; 16) a pterygoid notch; 17) a pterygoid hook; 18) a pterygoid canal.

Lesson 5

Theme: Temporal Bone.

Purpose of the lesson: to learn how to:

- place correctly the temporal bone towards your own body;
- determine its right and left side;
- show its parts and structures;
- find the mastoid process on the alive human body.

Equipment of the lesson: a skull, a temporal bone (the whole and its parts), models, tables, museum preparations, the atlas, the textbook.

Recommendations. It is recommended to observe temporal bone topography on the horizontal section of the skull. To determine the position of the temporal bone, it is necessary to place it in the following way: the squamous part — in the sagittal plane, the zygomatic process — forward, the mastoid process — backward, and the apex of the petrous part (pyramid) — forward and medially to the sphenoidal bone. Pay attention to the fact that the squamous part participates in the process of the skull wall formation. Especially focus on the mandibular fossa and the articulate tubercle, protecting the mandibular head dislocation forward in the process of mouth opening.

In the tympanic part it is necessary to mark the bone part of the external auditory meatus, its form and length in adults and newborns.

The tympanic part in newborns has the form of a bone ring.

Emphasize that the tympanic cavity and the internal ear (labyrinth) are settled under the temporal bone pyramid.

Pay attention to the mastoid process structure, note, that its cells are connected with the tympanic cavity, which can be the entrance gate for infections.

Show the canals of the temporal bone and assess their practical value.

QUESTIONS FOR CONTROL

1. Describe the location of the temporal bone in the skull.
2. Name the parts of the temporal bone.
3. Describe the structure of the temporal bone squamous part.
4. Describe the structure of the temporal bone tympanic part.
5. Name surfaces and edges of the temporal bone petrous part.
6. What anatomic structures are located on the anterior, posterior and inferior surfaces of the pyramid?
7. Where are the superior, inferior petrosal and sigmoid sinus grooves located?
8. Describe the route of the carotid, musculotubal and facial nerve canal.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

1) the temporal bone parts: squamous, tympanic, petrous; 2) a zygomatic process; 3) a mandibular fossa and an articulate tubercle; 4) a tympanosquamous fissure, a petrosquamous fissure and a petrotympanic fissure; 5) an external acoustic pore and an external acoustic meatus; 6) the anterior, posterior and inferior surfaces of the pyramid; 7) the anterior, superior and posterior edges of the pyramid; 8) a roof of the tympanic cavity; 9) an arcuate eminence; 10) a trigeminal impression; 11) the sulcus of the greater petrosal nerve (groove)

of the greater stony nerve), the sulcus of the lesser petrosal nerve (groove of the lesser stony nerve), the opening of the greater petrosal nerve canal, the opening of the lesser petrosal nerve canal; 12) an internal acoustic pore and an internal acoustic meatus; 13) the groove for the superior petrosal sinus and the groove for the inferior petrosal sinus; 14) the groove for the sigmoid sinus (sigmoid groove); 15) a mastoidal process and its cells; 16) a mastoidal notch; 17) an occipital groove (groove for the occipital artery); 18) a styloid (peg-shaped) process; 19) a stylomastoid foramen; 20) a jugular fossa (hollow) and a jugular foramen; 21) the external and internal openings of the carotid canal; 22) a carotid canal (canal for the carotid artery); 23) a facial canal (canal for the facial nerve); 24) a musculotubal canal.

Lesson 6

Theme: Bones of Facial Skull: Maxilla, Palatine bone, Vomer, Zygomatic Bone, Inferior Nasal Concha, Nasal Bone, Lacrymal Bone, Mandible, Hyoid Bone.

Purpose of the lesson:

- to learn to show the upper jaw and its parts on the skull (the body, its surfaces and process), to find the maxillary sinus and its hole on the lateral wall of the nasal cavity;
- to learn to show and to describe the small bones of the facial skull, their topography and participation in the formation of the nose, mouth, orbits and pterygo-palatine fossa walls;
- to learn to describe the mandible and its parts (the body, branch), the hyoid bone and its parts on the skull.

Equipment of the lesson: a skull, a maxilla, a mandible, a hyoid bone, small bones of the facial skull, models, tables, museum preparations, the atlas, the textbook.

Recommendations. The paired upper jaw forms the anteriorolateral part of the facial skull. There are four surfaces on the corpus of the upper jaw and they participate in the formation of the lateral walls of the nasal cavity (the nasal surface), lower wall of the orbit (the orbital surface), the anterior surface of the face (the anterior surface) and the tuber of the upper jaw — the infratemporal surface. There are also 4 processes: upwards — the frontal, downwards — the alveolar, laterally — the zygomatic, medially — the palatine. The mandible consists of the body and ramus which is directed upwards. The palatine bone has two plates: horizontal and perpendicular. The palatine bone is situated so as horizontal plate complemented the palatine process of the upper jaw and is located behind of it. The perpendicular plate adjoins to the nose's surface of the upper jaw and pterygoid process of

sphenoid bone, and is situated between them. Vomer together with the perpendicular plate of the ethmoidal bone forms the bone portion of the nose and provides full division of choanae, which are the posterior hole of the nose cavities. The lacrimal bone takes part in the formation of the medial wall of the orbit and the nasolacrimal canal and simultaneously — the lateral wall of the nose. It lies between frontal process of the maxilla and its orbital plate. The zygomatic bone closes to the zygomatic processes of the frontal, temporal and maxillary bones. The inferior nasal concha is situated on the lateral wall of the nasal cavity, under the middle nasal conch, it closes the big part of the maxillary sinuses hole and separates the middle nasal meatus from the inferior one. The nasal bone is connected with the similar bone of the other side and forms the bone back of the nose. The hyoid bone is located on the neck between the mandible and the larynx, near the basis of the tongue.

QUESTIONS FOR CONTROL

1. Describe the location of the upper jaw in the skull.
2. What surfaces are distinguished on the body of the upper jaw?
3. Enumerate the anatomical formation, located on the anterior, orbital, infratemporal and nasal surfaces of the upper jaw.
4. Name processes of the upper jaw and anatomical structures, located on them.
5. How is the sinus, located in the maxillary body named? Where is its fissure situated?
6. Describe the construction of the palatine bone.
7. Name the parts of the mandible. Enumerate the anatomical structures of the mandible body.
8. Enumerate the anatomical structures of the mandible ramus.
9. Describe the construction of the zygomatic bone.
10. Describe the construction of the hyoid bone.
11. Describe the location of the nasal, the lacrimal bones, the inferior nasal concha, the vomer and their participation in forming of the cavities of the skull.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

- 1) the body of the upper jaw and its surfaces: the anterior, orbital, nasal, infratemporal; 2) the canine fossa; 3) the infraorbital edge and foramen; 4) the tuber of the upper jaw; 5) a lacrimal groove; 6) the nasolacrimal canal; 7) the maxillary fissure; 8) the processes of the maxilla: frontal, alveolar, zygomatic, the palatine foramen and incisor foramen; 9) the palatine bone, its horizontal and perpendicular plates; 10) the pterygopalatine foramen; 11) the greater palatine foramen and canal; 12) the vomer; 13) the zygomatic

bone, its surfaces and processes; 14) the zygomatic arch; 15) the inferior nasal concha; 16) the nasal bone; 17) the lacrimal bone; 18) the crest of the lacrimal bone; 19) the fossa of the lacrimal sac; 20) the body of the mandible; 21) the ramus of the mandible; 22) the pterygoid and the masseteric tuberosity; 23) the alveolar arch; 24) the mental protuberance; 25) the mental tubercle; 26) the mental foramen; 27) the mental spine; 28) the mylohyoid line and groove; 29) the mandibular foramen and canal; 30) the angle of the mandible; 31) the coronoid and condylar process; 32) the crest of the buccinator muscle, the pterygoid fossa; 33) the hyoid bone: its body, greater and lesser horn.

Lesson 7

Theme: Skull as a whole: Cranial and Facial Divisions of Skull. Development of Skull. X-ray Anatomy of Skull. Skull of the Newborn. Age and Sexual Features of Skull. Variants and Anomalies of Skull Bones Development.

Purpose of the lesson:

- to study the structures of the cerebral and facial skull;
- to pay attention to particularities of the skull bones, external and internal base of the skull, material diploe;
 - to study the orbit, its walls; the nasal cavity, its walls, nasal meatuses; the temporal, infratemporal, pterygoid palatine fossas; the external surface of the base of the skull, its parts, the internal surface of the base of the skull: anterior, middle and posterior cranial fosses, foramens, canals, fissuras;
- to study the skull of the newborn, its particularities, topography of the fonticuls; the sexual differences of the skull;
 - to know the peculiarities of the development of the bones of the vault of the skull and skull basis and some abnormalities of its development;
 - to know how to find the supraorbital edge, the supraciliary arch, the zygomatic arch, the frontal and parietal tubers on the alive person;
 - to know how to show the fonticuls on the skull of newborn and to know their clinical importance.

Equipment of the lesson: a skull (the whole and its saggital, horizontal and frontal sections), tables, museum preparations, the atlas, the textbook.

Recommendations. When you study the facial skull on the anterior side — to pay attention to the orbit, its walls, connection with the middle cranial fossa, nasal cavity, pterygopalatine and infratemporal fossa. It is necessary to study the nasal cavity, its walls, nasal meatuses and its formation, sinuses which are opened in the meatuses (the air containing sinus of the frontal, maxillary, sphenoid bones and cells of the ethmoid bones). When you study the skull on the lateral side — to study the temporal, infratemporal

and pterygopalatine fossas, their walls, as well as their connection with the other formations of the skull. When you study the skull on the inferior side — to study the hard (bony) palate, sutures and foramina on it. There is the external basis of the skull. It is necessary to study formations of the middle and posterior divisions: the choanas, the jugular foramen and others. On horizontal section of the skull — to study the internal surface of the basis of the skull, on which there are anterior, middle and posterior cranial fossas with the foramina, canals, grooves, fissuras on them. When you study the skull of an adult in the x-ray scene — to pay attention on the air containing sinuses in the frontal, maxillary, sphenoid bone, as well as air-containing cell of the ethmoid bone. When you study the skull of the newborn — to pay attention to presence of the big, small and lateral fontanelles, as well as on prevalence of the cerebral skull and particularities of sutures. When you study the development of the skull — to pay attention to the particularities of development of the bones of the skull vault and skull basis, anomalies of the development.

QUESTIONS FOR CONTROL

1. Enumerate the functions of the skull.
2. What the construction of the bones of the skull vault differs from its basis?
3. What importance does diploë have?
4. Enumerate the formations, located on the frontal skull (the facial rate).
5. Name walls of the orbit and anatomical structures which form them.
6. Enumerate the canals, fissuras and foramina of the orbit.
7. What anatomical structures connect the orbit, the nasal cavity, the infratemporal fossa, the pterygopalatine fossa?
8. Name the walls of the nasal cavity and structures which are formed it?
9. Enumerate the nasal meatus of the nose cavities and structures which are formed them.
10. Enumerate the structures, which are opened in each nasal meatus.
11. Enumerate the foramina, canals of the nasal cavity and tell where they are opened.
12. What structures are the temporal fossa formed by?
13. Name the walls, foramina, canals, fissuras of the infratemporal fossa.
14. Name the walls, foramina, canals, fissuras of the pterygopalatine fossa.
15. Name the foramina, canals, fissuras and processus on the external surface of the skull basis.
16. What structures is the bony palatine formed?
17. What is the choanae formed? What cavities are connected by them?
18. What is the explanation of the significant crests, fossas, processus of the external base of the skull?

19. Enumerate the grooves, foramens and canals on the internal surface of the skull basis.
20. Name the age particularities of the skull.
21. What stages do the skull vault bones and skull basis bones pass in their development?
22. Enumerate the fonticuls of the newborn skull. What importance do they have.
23. Enumerate the sexual particularities of the skull.
24. Name the anomalies of the skull development.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

1) borders between the cerebral and facial skull; 2) sutures: coronary, saggital, liambdoid, squamous; 3) a sphenoidoccipital synhondrosis; 4) an orbit; 5) the inferior orbital fissura; 6) the superior orbital fissura; 7) an optic canal; 8) the anterior and posterior ethmoidal foramens; 9) a nasolacrimal canal; 10) the temporal and the infratemporal fossa; 11) the pterigopalatine fossa; 12) a sphenopalatine foramen; 13) a round foramen; 14) a pterygoid canal; 15) the greater palatine canal; 16) the external surface of the cranium skull; 17) the bony palate; 18) choanae; 19) the bony part of nose; 20) the jugular foramen; 21) the lacerum foramen; 22) the musculotubal canal; 23) the external carotid foramen; 24) the stylomastoid foramen; 25) the foramen magnum; 26) the hypoglossal canal; 27) the condylar canal or fossa; 28) the internal surface of the cranium skull; 29) the anterior, middle and posterior cranial fossas; 30) the crista galli; 31) the cribriform plate of the ethmoid bone; 32) the internal acoustic pore; 33) the internal acoustic meatus; 34) the grooves of the upper saggital, transverse, occipital, sigmoid, upper and lower petrosus sinuses; 35) the nasal cavity; 36) the superior nasal meatus; 37) the middle nasal meatus; 38) the inferior nasal meatus; 39) the frontal, maxillary, sphenoid sinuses; 40) the mastoid process; 41) the fonticuls: the anterior, posterior, sphenoid, mastoid.

Lesson 8

Theme: Bones of Upper Limb. Bones of Pectoral Girdle and Free Upper Limb. X-ray Anatomy of Upper Limb Skeleton. Age Features of Upper Limb Bones. Development of Upper Limb Skeleton. Variants and Anomalies of Upper Limb Bones Development.

Purpose of the lesson:

- to study and be able to show the upper limb bones, locating and their basic anatomic formations on the separate anatomic preparations, on a skeleton, on a corpse, on the alive person and on roentgenograms;
- to know development of the upper limb bones, some anomalies of their development.

Equipment of the lesson: a skeleton, a scapula, a clavicle, a humerus, an ulna, a radius, bones of a brush, the table, museum preparations, roentgenograms, the atlas, the textbook.

Recommendations. To study position of the upper extremities bones on the skeleton.

When you study bones of the upper extremities it is important to take them correctly: a scapula — an articulate surface is on the lateral angle, the costal surface (an infrascapular fossa) — is directed anteriorly; a clavicle — the sternal extremity is thickened, its flexure is turned anteriorly, the superior surface is smooth; a humerus — a head is on a proximal epiphysis, its articulate surface is turned medially, on a distal epiphysis — the condyle of a humerus is directed anteriorly, a fossa of the ulnar process — posteriorly, the medial epicondyle is expressed more, than lateral; the radius — the distal epiphysis is thickened, the anterior surface of the distal epiphysis is smooth and concave, ulnar notch is turned medially; the ulna — the proximal epiphysis is thickened, the trochlear notch is directed anteriorly, the radial notch — laterally; Brush bones — on the palmar surface there is a groove of a wrist, phalanxes of the big finger are directed laterally, bones of a wrist of the first and the second row are examined from the big finger.

It is necessary to study bones of the upper extremities and their anatomic frames on roentgenograms; to pay attention to the upper extremities bones development, the ossification terms, some anomalies of development; to study roentgenograms of the upper extremities.

Anatomic formations which the student should be able to palpate on the upper extremity of the alive person: a scapula, a scapula spine, an acromion, a medial edge of a scapula, an inferior angle of a scapula, a clavicle, the sternal extremity of a clavicle, the acromial extremity of a clavicle, a body of the humerus, a surgical neck of a humerus, epicondyles of a humerus, a radius, a distal epiphysis of a radius, a styloid process of a radius, an ulna, an ulnar process, a posterior edge of an ulna, an ulna head, a styloid process of an ulna, a wrist bone, metacarpal bones, heads and the bases of the metacarpus bones, a phalanx of finger, heads and the bases of the fingers phalanxes.

QUESTIONS FOR CONTROL

1. What bones are the parts of the upper extremities?
2. What basic anatomic formations are located on a clavicle?
3. What basic formations are located on a scapula?

4. List bones of the free upper extremities.
5. What anatomic formations are located on a humerus?
6. What anatomic formations are located on a radius?
7. What anatomic formations are located on an ulna?
8. What bones are the wrist parts?
9. What bones are the wrist parts, their features and the locating order?
10. Name sequence of appearance of ossification centres in the wrist bones after birth.
11. What stages of the bone formation do bones of the upper extremities pass?
12. In what terms and where do the primary ossification centres of the upper extremity bones appear? At what age does the upper extremity bones ossification come to the end?
13. Name the age features of the upper extremity bones.
14. Name variants and anomalies of the upper extremity bones development.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

Pectoral girdle:

Scapula: 1) a costal surface (an infrascapular fossa); 2) a posterior surface of a scapula; 3) a scapula spine; 4) a supraspinal fossa; 5) an infraspinal fossa; 6) a medial edge of a scapula; 7) a lateral edge of a scapula; 8) a scapula upper edge; 9) the superior angle of a scapula; 10) the inferior angle of a scapula; 11) the lateral angle of a scapula; 12) an articular recess; 13) a supraglenoid tubercle; 14) an infraglenoid tubercle; 15) a scapula neck; 16) a humeral process (акромион); 17) a coracoid.

Clavicle: 1) a clavicle body; 2) the sternal extremity; 3) the acromial extremity; 4) a sternal articulate surface; 5) an acromial articulate surface; 6) the superior surface of a clavicle; 7) the inferior surface of a clavicle; 8) a conoid tubercle; 9) a trapezoid line; 10) the costoclavicular ligament impression.

Free upper extremities:

Humerus: 1) a body of the humerus; 2) a head of the humerus; 3) a condyle of the humerus; 4) an anatomical neck; 5) a surgical neck; 6) a lesser and greater tubercles; 7) crests of the greater and lesser tubercles; 8) the intertubercular groove; 9) a deltoid tuberosity; 10) a groove of a radial nerve; 11) a medial and a lateral picondyles; 12) a medial and a lateral epicondylic crests; 13) a groove of an ulnar nerve; 14) the block of a humerus; 15) a head of a condyle of a humerus; 16) a coronal fossa; 17) a fossa of the ulnar process.

Radius: 1) a body of the radius; 2) a proximal epiphysis; 3) a distal epiphysis; 4) a head of a radius; 5) an articulate fossa; 6) an articulate surface; 7) a neck of a radius; 8) a styloid process; 9) an ulnar notch; 10) a carpal articulate surface; 11) an anterior surface; 12) a posterior surface; 13) an interosseous edge of the radius.

Ulna: 1) a body; 2) a proximal epiphysis; 3) a distal epiphysis; 4) a block notch; 5) an ulnar process; 6) a coronal process; 7) a radial notch; 8) an ulnar tuberosity; 9) an ulna head; 10) a styloid process; 11) an articulate surface; 12) an interosseous edge; 13) an anterior surface of the ulna; 14) a posterior surface of the ulna.

Lesson 9

Theme: Bones of Lower Limb. Pelvic Girdle and Free Lower Limb. Development of Lower Limb Skeleton. Age Features of Lower Limb Bones. Variants and Abnormalities of Lower Limb Bone Development.

Purpose of the lesson:

- to study and be able to show the bones of the lower limb on separate anatomic preparations, skeleton, corpse, roentgenograms and on the human body;
- to mark their arrangement and basic anatomic formations;
- to study the process and abnormalities of the lower limb bone development.

Equipment of the lesson: the hip bone, the femur, the patella, the tibia, the fibula, the bones of the foot, the tables, the museum preparations, the roentgenograms, the atlas, the textbook.

Recommendations. It is necessary to study the position of the lower limb bones on the skeleton.

Remember: the correct arrangement of the lower limb bones towards the own body is very important!

Hip bone: All parts of the hip bone are arranged in the following way: the iliac crest — upwards and laterally, acetabulum/cotyloid cavity — externally, pubic bone — forward, its symphyseal surface — medially, the ischial — downwards, the obturator foramen — forward, the auricular surface and iliac tuberosity — downwards, behind and inside.

Femur: the head is inverted upwards and medially, condyles — behind, medial condyle is located lower than the lateral condyle.

Patella: the top end is wide, the posterior articular surface is smooth.

Tibia: is settled medially, the proximal end (condyles) is thickened, on the anterior surface the tuberosity of the tibia is observed, the malleolus (ankle-bone) on the lower end is inverted medially.

Fibula: is located laterally, the upper end (head) is thickened, the articulate surface of the lateral malleolus (ankle bone) is inverted medially and located anteriorly from the malleolar fossa.

Bones of the foot: the dorsal surface of the foot is convex, the plantar is concave, the talus/anklebone is settled above the calcaneus/heel bone; the calcaneus is settled in the lower posterior part.

Pay attention to the fact, that the foot plays the role of the spring; while walking the person uses not the whole surface of the foot, but only the calcaneus and the heads of the metatarsal bones.

Emphasize the calcanean tuber role, as it is one of the main support points while standing on the foot.

Draw a special attention to the foot vaults (longitudinal and cross-section) which are characteristic only for the humans.

It is a strengthening device of the foot vaults (active and passive inhalings (prolongations)).

Compare the structure of the foot and hand bones.

Study the roentgenograms of the lower limb bones.

Pay attention to the development of the lower limb bones, the terms of the ossification, age features and some abnormalities of the development.

Anatomic formations which the student should be able to palpate on the lower limb of the human body: iliac crest, iliac spine anterior superior, greater trochanter of the femur, lateral/medial condyle of the femur, medial epicondyle of the femur, lateral epicondyle of the femur, the patella, lateral/medial condyle of the tibia, the medial surface of the tibia, the anterior border of the tibia, the head of the fibula, the medial anklebone, the lateral anklebone, the bones of the tarsus/sole of the foot, metatarsal bones, phalanges of the toes.

QUESTIONS FOR CONTROL

1. Name the parts of the lower limb.
2. What bones form the hip bone?
3. At what age are the bodies of the iliac, pubic and ischial bones incorporated forming acetabulum?
4. What anatomic formations are there on flank bones?
5. What anatomic formations are there on the pubic bone?
6. What anatomic formations are there on the ischial bone?
7. List the skeleton bones of the free lower limb.
8. What anatomic formations are there on the femur and patella?
9. What anatomic formations are there on the tibia?

10. What anatomic formations are there on the fibula?
11. Name the surfaces and parts of the foot. List the tarsus bones.
12. List anatomic formations on the tarsal bones.
13. What anatomic formations are there on the metatarsal bones?
14. What anatomic formations are there on the phalanges of the toes?
15. Name the stages of the lower limb bone development.
16. Specify, at what stage of the lower limb bone embryogenesis the primary points of the ossification appear in the lower limb bones. At what age does the ossification of the lower limb bones end?
17. List the anatomic distinctions between the lower and upper limb bones connected with their function.
18. Name the age features of the lower limb bones and the abnormalities of their development.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

a) pelvic girdle of the lower limb:

hip bone: 1) acetabulum/cotyloid cavity; 2) semilunar surface; 3) acetabular fossa; 4) acetabular notch; 5) obturator foramen; 6) iliac bone; 7) pubic bone; 8) ischial bone;

iliac bone: 1) iliac body; 2) wing of the ilium; 3) iliac crest; 4) iliac spine anterior superior/inferior; 5) iliac spine posterior superior/inferior; 6) gluteal line anterior; 7) gluteal line posterior; 8) gluteal line inferior; 9) iliac fossa (pit); 10) auricular surface; 11) iliac tuberosity; 12) arcuate line; 13) greater sciatic notch;

pubic bone, pubes: 1) pubical body; 2) superior pubic ramus (upper pubic branch); 3) inferior pubic ramus (lower pubic branch); 4) iliopubic eminence; 5) symphyseal surface; 6) pectineal line of the pubis; 7) obturator groove;

ischial bone: 1) ischial body, ischial ramus (branch); 2) tuber of the ischium; 3) ischial spine; 4) lesser sciatic notch.

б) skeleton of the free lower limb:

Femur: 1) body of the femur; 2) proximal end; 3) distal end; 4) head of the femur; 5) fovea of the head of the femur; 6) greater trochanter; 7) lesser trochanter; 8) trochanteric fossa; 9) intertrochanteric line; 10) intertrochanteric crest; 11) medial/lateral condyle; 12) medial/lateral epicondyle; 13) rough line; 14) medial and lateral lips; 15) gluteal tuberosity; 16) pectineal line, popliteal surface;

patella (kneecap): 1) base of the kneecap, inferior end or apex of the kneecap; 2) anterior articulate surface;

tibia: 1) body of the tibia; 2) proximal and distal ends; 3) medial/lateral condyle; 4) intercondylar eminence; 5) medial and lateral intercondylar tubercles; 6) anterior and posterior intercondylar area; 7) superior articulate

surface; 8) anterior, medial and interosseous border (edge); 9) posterior, medial and lateral surface; 10) tuberosity of the tibia; 11) medial malleolus (ankle-bone); 12) fibular notch; 13) articular surface of a malleolus; 14) lower articular surface;

fibula: 1) a body; 2) proximal and distal ends; 3) head of the fibula; 4) articular surface of the fibular head; 5) collum of the fibula; 6) anterior, posterior and interosseous border (edge); 7) lateral, medial and posterior surfaces; 8) lateral malleolus (ankle bone); 9) articular surface of the lateral malleolus; 10) lateral malleolar fossa;

Bones of the foot: bones of the tarsus/sole of the foot:

talus/anklebone: 1) body, head, neck and the pulley of the talus; 2) superior (articular) surface; 3) medial and lateral malleolar surface; 4) lateral and posterior process of the talus; 5) anterior, medial and posterior articulate calcanean surfaces; 6) groove of the talus;

calcaneus/heel bone: 1) calcanean tuber; 2) anterior, medial and posterior articulate surfaces of the talus; 3) groove of the heel bone; 4) tarsal sinus; 5) support of the talus; 6) cuboid articular surface;

Bones of the **tarsus/sole of the foot** (anterior row): navicular (bootlike) bone, medial, intermedial and lateral cuneiform bones;

metatarsal bones: 1) body; 2) head; 3) basis;

phalanges of the toes: 1) proximal phalanx; 2) medial phalanx; 3) distal phalanx; 4) body of the phalanx; 5) head of the phalanx; 6) basis of the phalanx, pulley of the phalanx.

Joints. System of joints

Classification of joints.

All joints are subdivided into three large groups: continuous articulations, symphyses and discontinuous (synovial) joints. Continuous articulations can be formed by different kinds of connective tissue: fibrous — sutures, gomphoses, ligaments, interosseous membranes; cartilaginous (synchondroses) and bony (synostoses).

The bones of the skull articulate mainly by **syndesmosis**: the **suturae** on the skulls of adults and **fontanels (fonticulus)** on the skull of the newborn. Almost all bones forming the vault of the skull, with the exception of the squama of the temporal bone, articulate by the **sutura serrata**. The squama of the temporal bone joins with the squamous border of the parietal bone by the **sutura squamosa**. The bones of the visceral skull are connected with each other by the **sutura plana**. The basis of the skull has **synchondroses** (cartilaginous joints): **synchondrosis petrooccipitalis** in the petrooccipital fissure between the pyramis of the temporal bone and the basilar part of

the occipital bone; **synchondrosis sphenopetrosa** is the sphenopetrosal fissure. The **synchondrosis sphenoccipitalis** is between the body of the sphenoid bone and the basilar part of the occipital bone and the synchondroses between the four parts of the occipital bone are encountered at the early age. Besides the sutures and synchondroses, some persons have accessory sutures: a **sutura metopica** of the frontal bone; sagittal and transverse sutures in the squama of the occipital bone etc.

The paired temporomandibular articulation joining the mandible with the basis of the skull is only one diarthrosis of the skull.

Lesson 10

Theme: Types of Bones Joints. Classification of Joints. Joints of Vertebral Column. Vertebral Column as a whole. Age Features of Vertebral Column and its Joints. Joints of Thorax: Syndesmoses, Synchondroses, Articulations. Thorax as a whole. Age Particularities of Thorax. X-ray Anatomy of Vertebral Column and Thorax. Variants and Anomalies of Vertebral Column and Thorax Development.

Purpose of the lesson:

- to know the classification of the bones joints;
- to know the order of the joint description;
- to know how to describe the vertebral column joints and to characterize the vertebral column as a whole;
- to know the vertebral column curvatures, the sequence and time of their appearance;
- to know how to demonstrate the movements of the vertebral column and explain them accordantly with the axes of the motion;
- to study the thorax joints;
- to know how to describe and show joints of the ribs with the vertebral column and sternum, characterize the thorax as a whole.

Equipment of the lesson: a skeleton, a vertebral column, the sets of the ribs, sternum and preparations of the ribs and sternum joints; ribs and vertebral column joints, museum preparations, the atlas, the textbook, tables.

Recommendations. Using material of the lecture and textbook, form clear understanding of the bones joints types. Pay attention on the main discriminating particularity of the fibrous and cartilaginous joints — continuity between the uniting bones, and on the typical particularity of the synovial joints — the presence of the articular cavity between the connective bones.

It is recommended to keep the following order of the joint description:

1. Give the name of the joint.

2. Name and show the articular surfaces on the bony and humid preparations.

3. Name and show the auxiliary anatomical formations of the joint.

4. Describe the particularities of the capsule attachment.

5. Name and show the ligaments.

6. Give the general description of the joint in accordance with its classification.

7. Characterize the motions in the joint around of the axes and demonstrate them on your own body.

When you study the joints of the vertebrae — to pay attention to the fact that all main parts of the vertebra connects between themselves (the body, arch and processes) with formation of the continuous and discontinuous joints. When you study the vertebral column as a whole — to pay attention to the vertebral canal, intravertebral foramens, curvatures of the vertebral column formation.

When you study the thorax — to pay attention to the long-lasting existence of synchondrosis between the sternum parts (before 30 years and later) and to the following particularities of the rib joints: 1) the cartilagineous joint of the 1st rib with the sternum (synchondrosis), 2) the joints of the true ribs (II–VII) with sternum and formation of articulations, 3) the joints of the false ribs (VIII, IX, X) with the lower edge of the upper rib and forming the rib arch, 4) the connections between the VI, VII and VIII ribs and formation of the interchondral joints.

QUESTIONS FOR CONTROL

1. Give the classification and description of the continuous joints of bones.

2. Name main and auxiliary structures of the articulations.

3. What signs are the joints classified? What joints are the simple, complex, combined and multifunctional joints?

4. Describe the joints between the body, arches and transverse processes of the vertebra.

5. Name the joints, which are formed by the vertebral processes connections.

6. What types of the motion are made in the vertebral column? Name the most rolling parts of the vertebral column.

7. Describe the curvatures of the vertebral column, periods of their formation and their importance.

8. What are the ribs and vertebral column types connections?

9. What are the differences of the joints, which are formed by the anterior ends of the I–VII and VIII–XII ribs?

10. What joints are identified between sternum and ribs? Describe their ligaments.
11. What bones form the thorax?
12. Name anatomical formations, which limit upper and lower aperture of the thorax
13. What ribs form the arch of ribs?
14. What is formed the infrasternal angle by? What are its personal differences?
15. Where are the pulmonary furrows located?
16. What factors define the form of the thorax?
17. Describe moving of the thorax at breathing.
18. Describe the X-ray anatomy of the vertebral column.
19. Characterize the age particularities of the vertebral column and thorax.
20. Name the variants and anomalies of the vertebra, ribs and sternum development.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On the humid preparations of the vertebral column fragments: 1) a intervertebral disk; 2) a fibrous ring; 3) a gelatinous nucleus; 4) an anterior longitudinal ligament; 5) a posterior longitudinal ligament; 6) an interspinous ligaments; 7) a nuchal ligament:t (on the table); 8) an intertransverse ligament; 9) zygapophyseal joints; 10) sacrococcygeal joints; 11) a lumbococcygeal joint.

On the humid preparations of the ribs with sternum and vertebral column joints: 1) synchondrosis of the I rib; 2) joints of the heads of ribs; 3) radiate ligaments of the head of the rib; 4) a membrane of a sternum; 5) joints of the ribs and vertebrae; 6) costotransverse joints.

On the preparations of the vertebral column and on the skeleton: 1) the parts of the vertebral column; 2) a vertebral canal; 3) an intervertebral foramen; 4) the cervical and lumbar lordosis; 5) the thoracic and sacral kyphosis; 6) the upper and lower aperture of the thorax and the formations, which limit them; 7) a rib arc; 8) an infrasternal angle; 9) intercostal spaces; 10) pulmonary furrows.

The Practical skills: to demonstrate and name moving in the vertebral column, to palpate the spinous process of the VII cervical vertebra, to palpate the right and left rib archs, the sternum angle, the infrasternal angle, intercostal spaces, place of the II rib and sternum connection.

Lesson 11

Theme: Joints between Vertebral Column and Skull. Joints of Skull Bones. Temporomandibular Joint. Age-related Features of Skull Bones Joints.

Purpose of the lesson:

- to learn to describe the structure of joints between the vertebral column and the skull, joints of the bones of the skull;
- to name and to show the anatomic structures on the bony preparations and on the corpse.

Equipment of the lesson: a skull, an occipital bone, the 1th and 2nd cervical vertebrae, the mandible, the joints of the skull with the vertebral column, the temporomandibular joint, museum preparations, tables, roentgenograms, the atlas, the textbook.

Recommendations. Studying of the vertebral column and the skull joints should be begun with the construction of model of studied joints on bones. Looking at the lateral parts of the atlant (the posterior arch is absent, and the anterior arch of the atlas is covered by a tooth of an axial vertebra on a damp preparation), find an articulate cavity of atlanto-occipital, lateral atlanto-axial and median atlanto-axial joints and strengthening ligaments. Pay attention that except temporomandibular joint, bones of the skull are connected by the continuous joints: fonticules, sutures, synchondroses, synostoses. Pay attention to the presence of intraarticular disc of the temporomandibular joint, which attaches to the capsule of the joint. Pay attention to the attachment features of the capsule in the mandibular fossa that is important for understanding of the biomechanics of the joint.

QUESTIONS FOR CONTROL

1. Describe the structure of the temporomandibular joint.
2. Name articular surfaces of the median and lateral atlanto-axial joints.
3. Name the ligaments strengthening the atlanto-axial joints.
4. Name the places of an attachment of the transverse ligament of the atlas and alar ligaments.
5. Name the formations making the atlantal cruciform ligament. What is the role of the atlantal cruciform ligament?
6. What movements are made in the atlanto-occipital and in the atlanto-axial joints? Round what axes are they made?
7. What way are facial skull bones and vault skull bones connected with each other? Name the sutures of the skull, their age-related features.
8. What way are bones of the basis of a skull connected with each other? Name the age-related features of these connections?
9. Name age-related changes of joints between the bones of the cranial part of the skull.

10. What are the features of the structure of the skull in newborns?
11. Describe the structure of the temporomandibular joint. Name the type of this joint.
12. What features of the structure of the temporomandibular joint define its biomechanics?
13. Describe the movements in the temporomandibular joint.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

On preparations of an occipital bone, the Ist and IInd cervical vertebrae and a damp preparation: 1) the articular surface of the occipital condyle; 2) the superior articular surface of the atlas; 3) the atlanto-occipital joint; 4) the anterior and posterior atlantooccipital membranes; 5) the anterior and posterior articular surfaces of a tooth; 6) the median atlanto-axial joint; 7) the inferior articular surface of the atlas; 8) the superior articular surface of the axial vertebra; 9) the lateral atlanto-axial joint; 10) the atlantal cruciform ligament; 11) the transverse ligament of the atlas; 12) the longitudinal fascicles; 13) alar ligaments; 14) the tectorial membrane.

On skull preparations: 1) a sagittal suture; 2) a coronal suture; 3) a lambdoid suture; 4) a squamosus suture; 5) a plane suture; 6) a sphenoccipital synostosis.

On bony preparations, damp preparations of the temporomandibular joint and on the tables: 1) a temporomandibular joint; 2) the head of the mandible; 3) a mandibular fossa; 4) an articular disc; 5) a lateral ligament; 6) a sphenomandibular ligament; 7) a stylomandibular ligament.

On roentgenograms and computer tomograms: 1) an atlanto-occipital joint; 2) a median atlanto-axial joint and lateral atlanto-axial joint; 3) a temporomandibular joint.

Practical skills: to be able to show the movements of the atlanto-occipital joint, median and lateral atlanto-axial and temporomandibular joints on your own body.

Lesson 12

Theme: Joints of Upper Limb Bones. Joints of Pectoral Girdle. Joints of Free Upper Limb: Shoulder Joint.

Purpose of the lesson:

- to study the structure and functions of the upper limb bones joints;
- to be able to show their locating and anatomic frames on separate preparations, on a corpse, on the alive person and on roentgenograms;
- to be able to show movements in the upper limb joints.

Equipment of the lesson: a skeleton, wet preparations of the upper limb joints: a sternoclavicular joint, an acromioclavicular joint, a shoulder joint; roentgenograms of the upper limb, tables, the atlas, the textbook.

Recommendations. When you study the upper limb joints the student first of all should have correctly preparations of joints concerning to his own body, to be able to demonstrate the movements in the joints. It is necessary:

- to pay attention on the sternoclavicular joint, on the presence of a disk which is attached to a capsule of the joint and divides a lumen on two chambers;

- to underline, that this joint is a ball-shaped articulation by the character of movements in it;

- especially to pay attention to a shoulder joint — it is a multiaxial ball-shaped joint differing by the big motility;

- to underline, that this joint has no expressed ligaments, and is strengthened by shoulder girdle muscles. It promotes the extensive movements of a shoulder joint which are necessary for functions of an arm as a organ of a work. Weak fixation in this joint is the cause of frequent dislocations.

When you study the upper limb joints roentgenograms it is necessary to have them before yourself as if the patient is turned faced to the doctor; to show the articular and X-ray cleft on roentgenograms.

QUESTIONS FOR CONTROL

1. What is the type of connection of the pectoral girdle and the thorax? What anatomic formations form the sternoclavicular joint?

2. What role is the sternoclavicular joint disk carried out?

3. What is the sternoclavicular joint form and what movements are possible in the sternoclavicular joint?

4. What ligaments strengthen the sternoclavicular joint?

5. What are the types of the shoulder girdle bones (a scapula and a clavicle) connections? What anatomic formations form the acromioclavicular joint?

6. What form does the acromioclavicular joint have? What movements are possible in this joint?

7. What ligaments strengthen the acromioclavicular joint?

8. What anatomic formations form a shoulder joint?

9. What form does the shoulder joint have? What movements are possible in this joint?

10. What anatomo-functional features does the shoulder joint have?

11. What anatomic formations and from what side strengthen the shoulder joint? In what direction are dislocations of a humerus more probable?

List of anatomic formations that student should name and show on preparations and visual aids:

On the pectoral girdle bones joints:

on a sternoclavicular joint: 1) an articular disk; 2) an anterior sternoclavicular ligament; 3) a posterior sternoclavicular ligament; 4) an interclavicular ligament; 5) a costoclavicular ligament;

on an acromioclavicular joint: 1) an articular disk; 2) an acromioclavicular ligament; 3) a coracoclavicular ligament;

scapula ligaments: 1) the superior transverse scapular ligament; 2) the inferior transverse scapular ligament; 3) the coracoacromial ligament.

On the free upper limb bones joints:

on a shoulder joint: 1) an articular labium; 2) the tendon of the long head of the biceps muscle; 3) a coracohumeral ligament.

The student should be able:

1. To show a locating of joints of a pectoral girdle and a shoulder joint on a human body.

2. To palpate the bony fragments forming joints of a pectoral girdle and a shoulder joint.

3. To show movements in the pectoral girdle joints and in the shoulder joint.

4. To name axes of movements in the pectoral girdle joints and in the shoulder joint.

5. To show visible elements of the pectoral girdle joints and the shoulder joint (a bone, an articular and x-ray clefts) on the roentgenograms.

Lesson 13

Theme: Elbow Joint, Forearm Joints, Radiocarpal Joint, Junctions between Wrist Bones. X-Ray Anatomy of Skeleton and Joints of Upper Limb. Age Features of Upper Limb Joints.

Purpose of the lesson:

– to study the structure and functions of the upper limb bone free part joints, including the elbow joint, the forearm bone joints and the hand bones;

– to be able to show them and their anatomic structures and movements on separate preparations, a corpse, roentgenograms and on a human body.

Equipment of the lesson: a skeleton, damp preparations of the upper limb bone joints: the elbow joint, joints of the forearm bones, roentgenograms of the upper limb, the tables.

Recommendations. While studying the upper limb joints the student first of all should correctly place joint preparations relating them to his (her) own body; show precisely their structure and movements.

To memorize the material better the student is recommended to adhere to the following scheme:

- 1) Name: the bones and their anatomic structures participating in the formation of the joints;
- 2) kind of the joint according to the geometrical form of the joint surfaces;
- 3) kind of the joint according to biomechanics (i. e. the joint functional classification on the number of axes);
- 4) movements within the joint; name the axes around which the movement is carried out;
- 5) joint sheaves;
- 6) features of the joint.

While studying roentgenograms of the upper limb it is necessary to place them in such a position as if the patient is facing the doctor. Be able to demonstrate on roentgenograms the joint anatomic structures, X-ray and joint cracks.

QUESTIONS FOR CONTROL

1. What anatomic structures form elbow joints?
2. Name three separate elbow joint structures indicating their form and possible movements.
3. What sheaves strengthen the elbow joint?
4. In what way are the forearm bones interconnected? What anatomic structures form proximal and distal radioulnar joints?
5. What is the form of the proximal and distal radioulnar joints and what movements are possible within them?
6. What anatomic structures form the radiocarpeal joint?
7. What is the shape of the radiocarpeal joint and what movements are possible within this joint?
8. What sheaves strengthen the radiocarpeal joint?
9. What anatomic structures form the mediocarpeal joint?
10. What shape has the mediocarpeal joint and what movements are possible within this joint?
11. What are intercarpal joints formed by?
12. What is the form of intercarpal joints and what movements are possible within them?
13. What sheaves strengthen intercarpal joints?
14. What anatomic structures form the carpometacarpal and intermetacarpal joints? What is the shape of the carpometacarpal and intermetacarpal joints and what movements are possible within them?

15. What sheaves strengthen these joints?
16. What is the anatomy and functional features of the pollex (thumb) carpometacarpal joint?
17. What anatomic structures form metacarpophalangeal and interphalanx joints?
18. What is the shape of metacarpophalangeal and interphalanx joints, what movements are possible within them?
19. What sheaves strengthen metacarpophalangeal and interphalanx joints?

The list of anatomic formations which the student should name and show on anatomic preparations and visual aids:

On the elbow joint: 1) humeroradial articulation; 2) humeroulnar articulation; 3) proximal radioulnar articulation; 4) ulnar collateral (medial) ligament; 5) radial collateral (lateral) ligament; 6) annular ligament of the radius.

On the forearm: 1) interosseous membrane; 2) distal radioulnar articulation.

On the radiocarpal joint: 1) articular disk; 2) radial collateral carpal ligament; 3) ulnar collateral carpal ligament; 4) palmar radiocarpal ligament; 5) dorsal radiocarpal ligament.

On the hand joints: 1) mediocarpal or midcarpal joint; 2) intercarpal joints; 3) palmar intercarpal ligaments; 4) dorsal intercarpal ligaments; 5) carpometacarpal joints; 6) dorsal carpometacarpal ligaments; 7) palmar carpometacarpal ligaments; 8) carpometacarpal joint of the pollex (thumb); 9) metacarpophalangeal joints; 10) interphalanx joints; 11) collateral ligaments of the metacarpophalangeal joints and of the interphalanx joints.

The student should be able:

- to show the location of the upper limb joints on a human body.
- to palpate the bone fragments forming the upper limb joints.
- to show movements within the upper limb joints.
- to show the visual elements of the upper limb joints on roentgenograms (bones, articular cracks).

Lesson 14

Theme: Connections of Lower Limb Bones. Joints of Pelvic Bones. Pelvis as a Whole. Joints of Free Lower Limb. Hip Joint. Age Features of Pelvis and Hip Joint.

Purpose of the lesson:

- to study the connections of pelvic bones, the hip joint, and the structure of the pelvis as a whole;

- to be able to show their arrangement and anatomic structures on separate preparations, on a corpse, roentgenograms and on a human body;
- to be able to show movements within the hip joint.

Equipment of the lesson: the skeleton, damp preparations of the pelvis as a whole and the hip joint, the pelvis hip joint roentgenograms, the table, the atlas, the textbook.

Recommendations. While studying the connections of the lower limb the student first of all should place correctly the preparation towards his own body.

To memorize the material it is recommended to observe the following scheme:

- 1 — list the bones and their anatomic structures, participating in the formation of the joint;
- 2 — determine the kind of the joint according to the geometrical form of the jointed surfaces;
- 3 — determine the kind of the joint on biomechanical (functional) classification on the number of axes;
- 4 — demonstrate the movements within the joint and name axes around of which they are carried out;
- 5 — show the ligaments of the joint;
- 6 — name the features of the joint.

It is necessary to pay attention to the inactive flat sacroiliac joint, the with strongly tense articulate capsule and the interosseous sacroiliac ligament. Show the pubic symphysis — as the intermediate form between continuous and discontinuous connections. Show the obturator membrane and the obturator canal. Note the border between the cavity of a big and small pelvis, indicate the sizes of a female pelvis. Note the form of the articulate surfaces in the hip joint, the fibrocartilaginous ring, ligaments (intraarticulate and notintraarticulate), axes of the movement. Note the limitation of movements within the hip joint. While studying roentgenograms it is necessary to place them in front of the student as if the patient is facing the doctor.

Show the articulate and X-ray cracks on the roentgenograms.

QUESTIONS FOR CONTROL

1. How are the pelvic bones connected with each other and with the sacrum?
2. How is the pelvis connected with the axial skeleton?
3. What anatomic structures does the sacroiliac joint form?
4. What is the form of the sacroiliac joint and what movements are possible within this joint?
5. What ligaments strengthen the sacroiliac joint?
6. What is the pelvis as a whole formed by?

7. What divisions, apertures, canals does the pelvis as a whole have?
8. What are the pelvis age features?
9. What are the pelvis sexual distinctions?
10. What basic parameters are determined while measuring a big and a small pelvis in the obstetrics?
11. What anatomic structures form the hip joint?
12. What is the form of the hip joint and what movements are possible within this joint?
13. What ligaments strengthen the hip joint?
14. What are the characteristic features of the hip joint?

The list of the anatomic formations which the student should know and be able to show on anatomic preparations and visual aids:

a) on the preparations of pelvic bones: 1) pubic symphysis; 2) interpubic disc; 3) subpubic angle; 4) superior pubic ligament; 5) arcuate pubic ligament.

sacroiliac joint: 1) ventral sacroiliac ligaments; 2) dorsal sacroiliac ligaments; 3) interosseous sacroiliac ligaments; 4) iliolumbar ligament; 5) sacrotuberous ligament; 6) sacrospinous ligament; 7) obturator membrane.

Pelvis as a whole: 1) small pelvis; 2) big pelvis; 3) terminal line; 4) sacrum promontorium; 5) arcuate line of the iliac bones; 6) iliac crest; 7) symphysis; 8) pelvic inlet; 9) pelvic outlet; 10) greater sciatic foramen; 11) lesser sciatic foramen; 12) obturator canal;

The sizes of the female pelvis: 13) anatomic conjugate; 14) obstetric conjugate; 15) cross-section diameter of the entrance in the small pelvis; 16) the direct size of the exit from the small pelvis; 17) the cross-section size of the exit from the small pelvis; 18) interspinous diameter; 19) intercrystal diameter; 20) intertrochanteric diameter; 21) the external direct size of the pelvis.

6) On the preparations of connections of the free lower limb:

hip joint: 1) fibrocartilaginous ring; 2) transverse ligament of the acetabulum; 3) ligament of the femoral head; 4) iliofemoral ligament; 5) pubofemoral ligament; 6) ischiofemoral ligament.

The student should be able: to palpate (where possible) on the human body the points of the pelvis used for external measurements; to show the site of the hip joint location; to demonstrate the movements within the hip joint and to name axes around which these movements are carried out; to show the visible elements of the pelvis as a whole, the sacroiliac and hip joints on roentgenograms, to know the age features of the pelvis and hip joint.

Lesson 15

Theme: Knee Joint, Articulations of Leg Bones, Ankle Joint, Joints of Foot. Age Features of Lower Limb Joints. X-ray Anatomy of Skeleton and Joints of Lower Limb.

Purpose of the lesson:

- to study the construction and functions of the knee joint, articulations of the leg bones, the ankle joint and joints of the foot;
- to know how to show their location and anatomical structures on separate preparations, on a corpse, on x-ray and on the human body;
- to know how to demonstrate movements in the knee joint, ankle joint and joints of the foot.

Equipment of the lesson: a skeleton, humid preparations of joints, a knee joint, an ankle joint and joints of the foot, tables, the atlas, the textbook.

Recommendations. When you study the preparations you have to imagine the location of a joint and apply it concerning your own body. For fastening and interpreting of the material it is necessary to keep to the following scheme:

- 1) to name the bones, forming joints;
- 2) to define the geometric form of the joints surfaces;
- 3) to define the type of the joint (by its functions);
- 4) to name and demonstrate movements in the joint;
- 5) to name the ligaments of the joint;
- 6) to name and show the auxiliary apparatus of the joint;
- 7) to enumerate the particularities of the joint in connection with its function.

It is necessary to pay attention to the construction of the knee condylar joint, its form and block-rotate function. Note meniscus and intrajoint ligaments. Emphasize the importance of the fastening of the articular bag of the joint for practical medicine. Demonstrate the synovial bags of the knee joint. Pay attention to the joining of the leg bones in the proximal part where the joint is formed, but in the distal part — where the syndesmosis is formed. Note that an ankle joint is the block joint. Demonstrate the joints of the tarsus, select the transverse joint of the foot (Choparts joint) and the key of this joint (a bifurcate ligament). Pay attention to the tarsometatarsal joints (Lisfrancs joint). Note the intermetatarsal, metatarsophalangeal, interphalangeal joints of the foot. Show the longitudinal ligament of the foot. Study the arches of the foot.

QUESTIONS FOR CONTROL

1. What anatomical structures form the knee joint?

2. What form does a knee joint have? What movements are possible in this joint?
3. What ligaments consolidate the knee joint?
4. What ligaments limit the movements in the knee joint?
5. What morphofunctional particularities characterize the knee joint?
6. What joints are there between the leg bones?
7. What anatomical structures form the joint between the leg bones?
8. What anatomical structures form the ankle joint?
9. What form does the ankle joint have? What movements are possible in this joint?
10. What ligaments consolidate the ankle joint?
11. What anatomical structures form the joints between the tarsus bones?
12. What main ligaments consolidate the joints between tarsus bones?
13. What movements are possible in the joints between the tarsus bones?
14. What anatomical structures form the transverse joint of the tarsus (Choparts joint)?
15. Name the ligaments, forming the key of the transverse joint of the tarsus.
16. What anatomical structures form the tarsometatarsal, intermetatarsal, metatarsophalangeal, interphalangeal joints? What movements are possible in these joints?
17. What main ligaments consolidate the joints of the tarsus bones, intermetatarsal, metatarsophalangeal and interphalangeal joints?
18. What morphofunctional particularities does a foot have as a whole?
19. What archs does a foot have? What are the archs of the foot consolidated by? What are the passive and active «delays» of the foot?
20. What are the age particularities of the joints of the lower limb?

The list of the anatomic formations which the student should know and be able to show on anatomic preparations and visual aids:

a) on the knee joint and leg: 1) the knee (genual) joint; 2) the lateral meniscus; 3) the medial meniscus; 4) the transverse ligament of the knee; 5) the suprapatellar bursa; 6) the tibial collateral ligament; 7) the fibular collateral ligament; 8) the arcuate ligament of the knee (arcuate popliteal ligament); 9) the oblique ligament of the knee (oblique popliteal ligament); 10) the patellar ligament; 11) the alar folds; 12) the anterior cruciate ligament; 13) the posterior cruciate ligament; 14) the infrapatellar synovial fold; 15) the subcutaneous prepatellar bursa; 16) the subfascial prepatellar bursa; 17) the subtendineous prepatellar bursa; 18) the deep infrapatellar bursa; 19) the joints between the leg bones; 20) the proximal tibiofibular articulation; 21) the anterior ligament of the head of the fibula; 22) the posterior ligament of the head of the fibula; 23) the crural interosseous membrane; 24) the distal

tibiofibular joint (syndesmosis); 25) the anterior tibiofibular ligament; 26) the posterior tibiofibular ligament

b) on the ankle joint: 1) the medial (deltoid) ligament; 2) the anterior talofibular ligament; 3) the posterior talofibular ligament; 4) the calcaneofibular ligament;

c) on the joints of the foot: 1) the subtalar joint; 2) the talocalcaneonavicular joint; 3) the plantar calcaneonavicular ligament; 4) the talonavicular ligament; 5) the calcaneocuboid joint; 6) the transverse tarsus joint; 7) the bifurcate ligament; 8) the cuneonavicular joint; 9) the plantar ligaments of the tarsus; 10) the tarsometatarsal joints; 11) dorsal and plantar tarsometatarsal ligaments; 12) intermetatarsal joints; 13) dorsal metatarsal ligaments; 14) plantar metatarsal ligaments; 15) metatarsophalangeal joints and their collateral and plantar ligaments; 16) interphalangeal joints and their collateral and plantar ligaments.

The student must know how:

- to show a knee area, ankle, intertarsal, metatarsophalangeal, interphalangeal joints on a human body,
- to palpate (as far as possible) the anatomical formations of the bones, which form the joints of the lower limb,
- to demonstrate the movements in the knee, intermetatarsal, metatarsophalangeal, interphalangeal joints,
- to name the axis, around which the movements of the joint are done,
- to show on the X-ray the visible elements of the joints of the lower limb.
- to know the age particularities of the lower limb joints.

Lesson 16

Theme: «Bones. Skeletal System», «System of Joints». The Final Lesson.

Purpose of the lesson: to consolidate and correct the knowledge of the studied material.

Equipment of the lesson: a skeleton, complete set of bony preparations, preparations of joints, tables.

POINTS FOR DISCUSSION

Introduction in Human Anatomy

1. Subject and contents of Human Anatomy. Significance of Human Anatomy for the medicobiological and clinical disciplines studying.
2. Methods of research in Anatomy.
3. Structural organisation of the human body: cells, tissues, bodies, systems of the organs; the body as a whole.

4. Concept about the norm and normal variants in the structure of organs and the human body as a whole. Constitution types. Anomalies of development.

5. Ethical standards, obligatory for the human body studying.

Bones. Skeletal system

1. Skeleton and its parts. The soft skeleton, functions of the skeleton.
2. Bone as an organ. Classification of bones. The structure of bones.
3. Development, growth and age-related changes of bones.
4. Red bony brain in bones of axial skeleton.
5. Significance of skull fornx structure.
6. Anatomic features of facial and cranial bones of skull, contributing to fractures.
7. Development stages of fornx and basis of skull bones. Significance of fonticulies. Ontogenesis of sutures.
8. Age-related and sex-related features of the skull as a whole.
9. Development anomalies of skull.
10. Form of skull. Anomalies of its form.
11. Development of skeleton of upper and lower limbs. Anomalies of development of limbs skeleton.
12. Vertebral column and its departments.
13. Structure of typical cervical vertebrae, atlas and axial vertebrae.
14. Structure of thoracic and lumbar vertebrae.
15. Structure of sacrum and coccyx.
16. Thoracic bones. Classification and structure of ribs. Features of structure of the 1st rib.
17. Structure of thorax.
18. Cranial and visceral parts of skull.
19. Frontal bone.
20. Parietal bone.
21. Occipital bone.
22. Ethmoid bone.
23. Sphenoid bone.
24. Temporal bone.
25. Upper jaw.
26. Palatine bone.
27. Lower jaw.
28. Nasal, zygomatic and lacrimal bones. Vomer and inferior nasal concha.
29. Skull: vault and basis of skull. Internal basis of skull: anterior, middle and posterior cranial fossae.
30. External basis of skull. Osseous basis of bony palate.
31. Orbit.

32. Nasal cavity.
33. Temporal and infratemporal fossae.
34. Pterygopalatine fossa.
35. Skull of the newborn. Rentgenoanatomy of skull.
36. Bones of upper limb. Bones of upper girdle: clavicle, scapula.
37. Bones of free part of upper girdle: humerus.
38. Forearm bones.
39. Bones of hand, terms of ossification of wrist bones.
40. Rentgenoanatomy of bones of upper limb. Age-related features of upper limbs bones.
41. Bones of lower limbs. Bones of lower girdle: hip bone.
42. Bones of free part of lower limb: femur.
43. Bones of leg.
44. Bones of foot.
45. Foot as a whole. Arches of foot.
46. Similarity and distinctions in structure of skeleton of upper and lower girdles in connection with their functions.
47. Age-related features of bones of lower limbs.
48. Rentgenoanatomy of lower limb bones.

System of joints

1. Development of bones joints. Classification of joints.
2. Fibrous connections: syndesmoses, sutures, synchondroses, symphysis, bony connections (synostoses).
3. Synovial joints (articulations). The structure of an articulation: the basic and auxiliary elements of a joint.
4. Classification of joints.
5. Connections of vertebrae: intervertebral disks, ligaments, zygapophyseal joints.
6. Atlantooccipital and atlantoaxial joints.
7. Vertebral column as a whole: bends, age and sexual features.
8. X-ray anatomy of vertebral column.
9. Thorax connections: the sternocostal and costovertebral joints.
10. Thorax as a whole. Forms of thorax. X-ray anatomy of thorax.
11. Structure of thorax in connection with the constitution types.
12. Joints of skull bones: suturas, synchondroses, temporomandibular joint.
13. Skull of the newborn.
14. Joints of pectoral girdle: acromioclavicular and sternoclavicular joints.
15. Joints of free upper limb. Shoulder joint.
16. Elbow joint.
17. Joints of forearm bones.
18. Radiocarpal joint.

19. Brush joints: intercarpal, mediocarpal, carpometacarpal, metacarpophalangeal, interphalangeal joints.
20. Carpometacarpal joint of the thumb.
21. Joints of lower limb. Joints of pelvic girdle, pubic symphysis, sacroiliac joint.
22. Pelvis as a whole. The greater and lesser pelvis. Sexual distinctions in a pelvis structure. Sizes of a female pelvis.
23. Joints of free lower limb: hip joint.
24. Knee joint.
25. Joints of leg bones. Ankle joint.
26. Foot joints: articulations of tarsus bones, tarsometatarsal, intertarsal, metatarsophalangeal and interphalangeal joints.
27. Arches of foot and their sheaf strengthening.
28. Similarity and distinctions in structure of upper and lower limbs joints.

Muscular system

Development of muscles. Muscles develop from mesoderm. Muscles of the trunk — mainly from myotomes of the somites — the pair primary segments located on the longitudinal axis of the body on the both sides from the notochord and neural tube. In everyone somites the sclerotome, dermatome and myotome are distinguished. Muscles of the trunk develop from dorsal part of the mesoderm (segmented), but visceral, mimic, chewing and some muscles of the neck, and also muscles of perineum are developed from not segmented ventral part of mesoderm, located accordingly in the head or tail ends of the body. The autochthonous muscles are formed from mesoderm rudiments of limbs. A number of muscles also is pawned in rudiments of limbs, but subsequently their proximal ends are attached to the bones of the trunk. They are truncipetal muscles, for example major and minor pectoral muscles. There are also truncifugal muscles. They are developed from myotomes of the trunk, but their distal ends are attached to the bones of limbs, for example, major and minor rhomboid muscles.

There are two types of the muscular tissue: smooth (unstriped) and cross-section — striped. Muscular bundles form belly of the muscles, passing in the tendinous part. Proximal part of the muscle — its head — begins from one bone, distal one — the tendon (tail) — is attached to the other bone. The beginning of the muscle is more proximally, than the point of its attachment which is located distally. Tendons of various muscles differ among themselves. So, muscles of limbs have narrow and long tendon. The wide and

flat tendon — aponeurosis, is typical for the muscles participating in formation of walls of cavities of the body.

Classification of muscles.

Muscles are classified to various attributes: to the form, function, an arrangement, etc. (table).

Table

Classification of muscles

Division	A kind
By the form	Wide, square, triangular, round, pyramidal, serratus, long, short, broad & etc.
By quantity of heads	Biceps, triceps, quadriceps
By quantity of belly	One-belly, two-belly, multibelly
On a direction of fibres	Rectus, obliquus, transversus, orbicularis
On function	Flexors, extensors, adductors, abductors, pronators, supinators, rotators, dilatators, constrictors
On an arrangement	Superficial, deep, external, internal, medial, lateral, superior, inferior, dorsal, ventral
On development	Visceral, autochthonous, truncipetal, truncifugal
By quantity of myotomes	Monomeric, polymeric
In relation to joints	Uniarticulate, biarticulate, multiarticulate

The auxillary apparatus of muscles.

The groups of muscles are invested into membranes of fibrous connective tissue — **fasciae**. The fasciae increase the side resistance during muscular contraction and prevent displacement of the muscle to the side. By surrounding the muscles and separating one muscle from another, the fasciae promote their isolated contraction. Fasciae, therefore, cover either one muscle (fascia proper of the given muscle) or a group of synergic muscles, i. e. muscles performing a similar function (deep fascia or fascia proper of a region, fascia propria). Fasciae separating one group of muscles from another give off processes, *intermuscular septa (septa intermuscularia)*, which penetrate between the neighbouring groups of muscles and attach to the bones. Above the deep fasciae there are also superficial fasciae which invest all the muscles of a given region and are founded under the skin. There are the *subcutaneous* or *superficial, fasciae (fascia subcutanea s. superficialis)* (thickened subcutaneous fat). Thus, the fasciae not only separate the muscles but also join them.

Thickenings in the form of ligaments are founded in the fasciae in the region of some limb joints. They form the fibrous and osteofibrous canals, or sheaths (*vaginae fibrosae tendinum*) transmitting tendons of muscles. They also prevent the tendons displacement to the sides and as a result they help more direct muscle traction.

Synovial bursae (bursae synoviales) are located in different parts under the muscles and tendons, mainly near the sites of attachment. Some bursae communicate with the joint cavity. A *pulley-shaped structure (trochlea)* is

usually formed in the places where the tendon of a muscle changes its direction; the tendon passes over the trochleae like a belt over a pulley. There are bony and fibrous trochleas.

Sesamoid bones (*ossa sesamoidea*) are also related to the auxiliary structures of a muscle. They occur in the thickness of a tendon at the site of their attachment to the bone. The sesamoid bones are located in the places where it is necessary to increase the angle of the muscle attachment to the bone in order to increase its force.

Lesson 17

Theme: Structure and Classification of Muscles. Development of Muscles. Age-related Features of Muscles. Variants and Anomalies of Muscle Development. Muscles and Fasciae of Back.

Purpose of the lesson:

- to generate the concept of the structure and function of skeletal muscles and their auxiliary apparatus; about the sources of development, classification and function of skeletal muscles;
- to study anatomic-topographical relations, origin, attachment and function of muscles of the back, fasciae of the back;
- to learn with preparation skills;
- to learn to prepare and show the muscle of the back on the corpse.

Equipment of the lesson: a muscular corpse, a skeleton, a humerus, a scapula, museum preparations, tables, the atlas, the textbook.

Recommendations. When you start to study myology, it is necessary to understand the structure and classification of skeletal muscles, sources of development of various muscular groups, to understand the significance of fasciae and their derivatives, synovial vaginas and sacs, sesamoidal bones. To study the functions of skeletal muscles, to pay attention to dependence of muscular movements, on its location related to the joint, directions of its muscular fibres, positions of points of origin and muscle attachment.

While studying the body muscles it is necessary to pay attention to their division into groups depending on their arrangement and origin, then to study each muscle, taking into consideration its topography, origin and attachment place, the direction of muscular fibres and function. Thus it is recommended to revise the corresponding bone formations, the structure and function of the joints which the muscle activates. It is also necessary to pay attention to topography of the corresponding areas and fasciae: an arrangement of their layers, fixation sites places on the skeleton, fascial and osseous-fascial vaginas.

Back muscles should be studied, using the corpse, museum preparations and tables describing the corresponding groups of muscles. Muscles of

the given areas are subdivided into superficial and deep, and it is necessary to note, that superficial muscles of the back and the breast activate not only the bones the upper and the humeral bone, but also the ribs, being mainly auxiliary respiratory muscles. Deep muscles of the back mainly activate the intervertebral joints, junctions of the backbone with the skull and, partially, connections of the ribs.

Studying the muscles of the back should be begun with superficial muscles. It is necessary to show the muscles of the 1st layer lying directly under the skin: the trapezoid muscle and the widest muscle of the back; muscles of 2nd layer: the muscle lifting the scapula, maior and minor rhomboid muscles, and, back top and latissimus dorsi muscle.

Studying deep muscles of the back, it is necessary to pay attention to the presence of several layers. In the superficial layer (lateral tract) it is necessary to show the muscle straightening the backbone, and the three muscles composing it: ilio-costal, the longissimus and spinalis. In the cervical department and the top part of the chest there are belt muscles of the head and the neck. On the middle and deep layers of the back (dorsal) muscles (a medial tract) it is necessary to show, the parts of the transversospinal, interspinal and intertransversal muscles.

To demonstrate suboccipital muscles it is necessary to use a table and a museum preparation. These muscles are located deeply, in the area of connection of the backbone with the skull and activate the atlanto-occipital and atlanto-axial joints.

When studying the fasciae it is necessary to pay attention of a back to the thin surface of the fascia, location of the proper, lumbar-thoracis fasciae; the features of the vagina structure of deep muscles of the back in the thoracic and lumbar areas.

QUESTIONS FOR CONTROL

1. What functions do out skeletal muscles have? What are age-related features of the muscles?
2. Describe the structure of the skeletal muscle: the muscular paunch, the tendon.
3. Why are skeletal muscles called striated?
4. Name connective tissue elements of the muscular paunch: endomisium, perimisium.
5. Classification of skeletal muscles.
6. What structures compose the auxiliary apparatus of muscles?
7. Explain the concepts: «muscle antagonists» and «muscle synergists». Why is such a division of muscles conventional?

8. What do the concepts: «anatomic diameter of a muscle», «the physiological diameter of a muscle mean»? What does the force of the muscle depend on?

9. Specify the source of development of skeletal muscles.

10. Make definition of the concepts: somite, myotome. Into what parts is somite divided? What muscles develop from the dorsal and ventral parts of myotome?

11. Why one muscle can be innervated by several nerves?

12. Specify the variants and anomalies of skeletal muscle development.

13. Into what groups are back muscles subdivided?

14. Name sources of development of dorsal muscles.

15. Name the superficial muscles of the back, their structure and functions.

16. Name the deep muscles of the back, their structure and functions.

17. Name the muscles forming the uniform muscle, straightening the backbone?

18. Name suboccipital muscles, and their functions. What joints do they activate?

19. The damage of what muscle of the back makes the pronation of the hand and its movement behind the back impossible?

20. While examining a patient with a trauma of the lumbar area a restricted bending of the spine is revealed. What muscles have suffered during the trauma?

21. Name the fascia of the backs; superficial and deep plates of lumbar-thoracic fascia, ligamentum nuchae.

List of anatomic formations which the student should name and show on anatomic preparations and visual aids:

1) a trapezoid muscle; 2) the broadest (latissimus dorsi) muscle of the back; 3) the muscle lifting scapula (levator scapulae muscle); 4) major and minor rhomboid muscles; 5) the serratus posterior superior and inferior muscles; 6) the splenius capitis and cervicis muscles; 7) the erector spinae muscle, and its parts; 8) the transversospinalis muscle: m. semispinalis, m. multifidi and m. rotatores; 9) the interspinalis muscles; 10) the intertransversal muscles; 11) suboccipital muscles: the greater and lesser rectus capitis posterior muscles, the obliquus capitis superior and inferior muscles; 12) the thoracolumbal fascia; 13) the ligamentum nuchae.

Lesson 18

Theme: Chest Muscles and Fasciae. Diaphragm and its development. Age Features and Diaphragm Development Abnormalities.

Purpose of the lesson: to know:

- anatomic and topographic relations, places of the origin, attachments and functions of the chest muscles and fasciae;
- the structure and functions of the diaphragm;
- how to make preparations;
- how to prepare and show the muscles of the chest on the corpse;
- the location of the diaphragm and be able to show its parts.

Equipment of the lesson: a muscular corpse, a skeleton, a humeral bone, scapula, museum preparations, a model of the diaphragm, the tablets, the atlas, the textbook.

recommendations. Its advisable to begin the process of chest muscles studying with superficial muscles; to show the pectoralis major muscle and its parts; then to study the pectoralis minor muscle, the subclavius muscle and the serratus anterior muscle.

Pay attention to the significant area of the attachment of the latter on the anterior, lateral and posterior surfaces of the thorax and its role in the free upper limb fixation.

Specify, that deep muscles of the chest act only on the ribs and participate in respiratory movements of the thorax.

While studying deep or own muscles of the chest, attention should be paid to the direction of the muscular fibres to understand their function.

The transverse thoracic muscle is vividly seen on the corpse with the opened thorax on the internal surface of its anterior wall.

To study the diaphragm, we use the corpse and museum preparations, the model on which it is possible to show all formations of the diaphragm.

It is recommended to pay attention to the openings of the diaphragm: the oesophageal hiatus is surrounded by muscular bunches. Due to that fact it can change the gleam in case of the diaphragm sphincter reduction. At the same time, openings of the vessels (the aorta and the inferior vena cava) are limited only to fibrous fibres.

It is necessary to pay attention to the weak places of the diaphragm with lack of muscular fibres, i. e. a lumbocostal triangle and a sternocostal triangles which can serve as the places of diaphragma hernia formation.

QUESTIONS FOR CONTROL

1. Name the sources of the chest, abdomen and diaphragm muscle development.

2. Name the parts of the pectoralis major muscle, the place of its origin, attachment and functions.
3. Name the origin places, attachment and the functions of the pectoralis minor, the subclavius, and the serratus anterior muscles.
4. Why does the patient with bronchial asthma attack fix the upper limbs to simplify the process of breathing? In case of fixed upper limbs what muscles can improve breathing?
5. What muscles are paralysed if a patient cannot move the right hand above the horizontal level?
6. List the own (autochthonous) muscles of the chest. What parts of the intercostal intervals do the internal and external muscles occupy?
7. Where are the external and internal intercostal membranes located?
8. What cavities are divided by the diaphragm? Describe its shape and name the functions of the diaphragm.
9. Name the parts of the diaphragm. Where do the muscular bunches of each part begin and end?
10. Name the openings of the diaphragm, specify their localization. What anatomical structures pass through them? State whether the size of these apertures changes in case of the diaphragm contraction?
11. Name the triangles of the diaphragm. Why may the diaphragm hernias be formed within these triangles?
12. List the «weak» sites of the diaphragm.

The list of the anatomic formations which the student should know and be able to show on the anatomic preparations and visual aids:

- 1) the pectoralis major muscle and its parts; 2) the pectoralis minor muscle; 3) the subclavius muscle; 4) the serratus anterior muscle; 5) external and internal intercostal muscles and membranes; 6) subcostalis muscles; 7) the transversus thoracic muscle; 8) fascia of the chest; 9) clavipectoralis fascia; 10) own pectoralis fascia; 11) intrathoracic fascia; 12) diaphragm and its parts: costal, sternal, lumbar; 13) the right and left legs, medial and lateral arcuate ligaments; 14) oesophageal hiatus; 15) aortic hiatus; 16) central tendon; 17) the inferior vena cava foramen; 18) the lumbocostal triangle and the sternocostal triangles.

Lesson 19

Theme: Muscles and Fasciae of Abdomen, their Classification. White Line of Abdomen. Rectus Abdominis Muscle. Inguinal Canal. Features of Inguinal Canal. Vulnerable spots of the Abdominal Wall as Anatomic Preconditions for Hernias Formation.

Purpose of the lesson:

- to study anatomo-topographical relations, places of the beginning, affixion and function of the abdominal muscles; abdominal fasciae; the structure of the rectus abdominis muscle vagina walls, the white line of the abdomen;
- to study topography of the inguinal canal, the deep and superficial inguinal rings, walls of the inguinal canal, contents of the inguinal canal of men and women;
- to study weak places of the abdominal wall and their value for clinic.

Equipment of the lesson: a muscular corpse, a skeleton, museum preparations, moulages, the atlas, the textbook.

Recommendations. When you study the muscles of the abdomen it is necessary to pay attention that they according to classification form the muscular basis of the lateral, anterior and posterior walls of the abdomen, participate in the movements of the vertebral column, ribs, pelvis, and also are the prelum abdominale constituent. When you demonstrate the lateral muscles it is necessary to consider, that they are located layer by layer, and their fascicles transit in various directions, according to the external and internal intercostal muscles and transversal thoracic muscle direction. Hence, it is possible to show the internal oblique muscle of the abdomen only having slited the external oblique muscle of the abdomen; and the transversal muscle of the abdomen — through the slit of the external and internal oblique muscles of the abdomen, and also — on the internal lateral side of the abdomen.

It is necessary to pay attention that muscles of this group have wide tendons — aponeurosis, which, being referred to the medial line, form the walls of the rectus abdominis muscle vagina and shape the white line, growing together with the aponeurosis of the opposite side muscles. Besides, the inferior edge of the aponeurosis of the external oblique muscle of the abdomen is turned inside, forming the inguinal ligament. When you study the muscles of the anterior wall of the abdomen it is necessary to pay attention to the features of the constitution of the rectus abdominis muscle, and to consider, that it is possible to show these muscles, having the dissected anterior wall of the rectus abdominis muscle vagina. It is possible to show the quadratus lumborum muscle which participats in the posterior abdominal wall formation from the side of the abdominal cavity. It is necessary to pay attention to the fasciae of the abdomen also: the superficial fascia, the proper fascia, the transversal fascia.

It is necessary to study the constitution of the white line of the abdomen above and below of the umbilical ring; features of the constitution of the anterior and posterior walls of the rectus abdominis muscle vagina in the upper and lower parts. It is necessary to study contents of the inguinal canal of men and women, its topography, walls, foramens, the attitude of the superficial and deep inguinal rings to the inguinal fossas of the peritoneum

on the anterior side of the abdomen. It is necessary to pay attention to weak places of the abdominal wall which can serve as places of hernias formation, lateral inguinal fossa and medial inguinal fossa, femoral fossa of the peritoneum, the white line, the umbilical ring, the lumbar triangle. It is necessary to know the age features of the inguinal canal.

QUESTIONS FOR CONTROL

1. Name the muscles of lateral sides of the abdomen, their beginning and affixion, direction.
2. What is the lumbar triangle limited?
3. What is the inguinal ligament? Specify points of its affixion to the bones.
4. List the muscles of the anterior, lateral and posterior walls of the abdomen. Name their beginning, affixion and functions.
5. What is the rectus abdominal muscle vagina formed by?
6. What is the white line of the abdomen? Why hernias are more often formed in its upper part, than in the lower part?
7. It is necessary for surgeon to dissect the anterior abdominal wall to examine the organs of the abdominal cavity. In what place it is possible to effect the bloodless slit?
8. In what range is the inguinal canal located? Specify its direction, length and contents (at men, at women).
9. What are the walls of the inguinal canal formed?
10. What is the deep and superficial inguinal rings? In what walls of the inguinal canal are they located?
11. Why inguinal hernias happen more often at men, than at women?
12. What inguinal hernias are oblique, what — are straight?
13. List the weak places of the abdominal wall and specify their clinical value.
14. List the abdominal fasciae.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

1) the external oblique, the internal oblique, the transversal muscles of the abdomen; 2) the cremaster muscle; 3) the inguinal ligament, its medial and lateral legs, intercrural fibers; 4) the rectus muscle of the abdomen and its tendinous intersections; 5) the pyramidal muscle; 6) the quadratus lumborum muscle; 7) the vagina of the rectus abdominis muscle, the arcuate line; 8) the white line; 9) the proper fascia of the abdomen; 10) the intercrural fibers; 11) the fascia of the cremaster muscle; 12) the transversal fascia; 13) the inguinal canal; 14) the deep and superficial inguinal rings; 15) the lumbar triangle.

Lesson 20

Theme: Muscles and Fasciae of Neck. Topography of Neck. Anomalies of Development of Neck Muscles.

Purpose of the lesson:

- to study the construction, location and functions of the muscles of the neck;
- to know how to show them on the corpse and visual aids;
- to study the fasciae and topographical formations of the neck;
- to know how to show (as far as possible) relief of muscles and borders of the topographical formations of the neck on the surface of the body.

Equipment of the lesson: a corpse, moulages, tablets of the neck, visual aids, the atlas, the textbook.

Recommendations. The student must get acquainted with:

- the topographical location of the muscles of the neck according to their categories;
- the landmarks on the surface of the body: a clavicle, a jugular incisura of the sternum, a thyroid cartilage, a hyoid bone, a lower edge of the lower jaw, a mastoid process of the temporal bone, a sternocleidomastoid muscle.

The student must learn well that these landmarks are used for indication of the topographical regions and location of the anatomical formations when he performs different manipulations (the cut, puncture and others.).

The knowledge of the fascial case and space in the field of the neck is necessary for the future physician for prognosis of the purulent processes spreading. Besides, the student must know that muscles located in the posterior region of the neck (in nuchal region): suboccipital group, belt muscles of the head and the neck, the longest muscle of the head, are not considered in this subject, since they were studied on the subject «Muscles and fasciae of the back».

QUESTIONS FOR CONTROL

1. Enumerate the muscles of the neck.
2. What muscles of the neck are the superficial muscles? What are their location and function?
3. What muscles of the neck are located above of the hyoid bone? What are their location and function?
4. What muscles are the muscles located below of the hyoid bone? What are their location and function?
5. Enumerate the deep muscles of the neck. What are their location and function?
6. Name the fasciae of the neck, their location and topography.
7. What spaces are in the field of the neck? What are they limited by and what are they connected with?

8. What interfascial spaces are closed? Where are they located?
9. Name the regions, the triangles of the neck and their borders.

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

The muscles of the neck:

the superficial muscles of the neck: 1) the platysma muscle; 2) the sternocleidomastoid muscle;

the middle muscles of the neck: 1) the digastric muscle; 2) the stylohyoid muscle; 3) the mylohyoid muscle; 4) the geniohyoid muscle; 5) the omohyoid muscle; 6) the sternohyoid muscle; 7) the sternothyroid muscle; 8) the thyrohyoid muscle;

the deep muscles of the neck: 1) the scalenus anterior muscle; 2) the scalenus medius muscle; 3) the scalenus posterior muscle; 4) the longus cervicis muscle; 5) the longus capitis muscle; 6) the rectus capitis anterior muscle; 7) the rectus capitis lateralis muscles.

Fasciae of the neck:

a) *Paris anatomical nomenclature (PNA)* — 3 layers of the cervical fascia: 1) a superficial layer; 2) a pretracheal layer; 3) a prevertebral layer;

b) *V. N. Shevkunenko* — 5 fasciae of the neck: 1) a superficial cervical fascia; 2) a superficial layer of the proper fasciae of the neck; 3) a deep layer of the proper fasciae of the neck; 4) a splanchnic (endocervical) fasciae of the neck (visceral and parietal slip) 5) a prevertebral fasciae.

The topographical formation of the neck:

the spaces of the neck: 1) a suprasternal interaponeuroticum space; 2) a previsceral space; 3) a retrovisceral space; 4) an interscalenum space; 5) a prescalenum space (to know the main ways of the infections spreading);

regions and triangles of the neck:

a) *the anterior region of the neck:* 1) a medial triangle of the neck; 2) a carotid triangle; 3) a omotracheal triangle; 4) a submandibular triangle; 5) a submental triangle; 6) a fossa retromandibularis;

b) *the sternocleidomastoid region;*

c) *the lateral region of the neck:* 1) a omotrapezoid triangle; 2) a omoclavicular triangle.

d) *the posterior region of the neck* (the nuchal region).

The student must know how to show on the surface of the body:
 1) the anterior region of the neck; 2) the sternocleidomastoid region;
 3) the lateral region of the neck; 4) the posterior region of the neck;
 5) the supraclavicular fossas; 6) the retromandibular fossa.

Lesson 21

Theme: Head Muscles: Muscles of Facial Expression (Mimic) and Masticatory Muscles. Fasciae of Head. Anatomic Preconditions of the Scalped Wounds.

Purpose of the lesson:

- to study anatomy, topography and function of the mimic and masticatory muscles;
- to be able to show their relief and the arrangement on the body surface.

Equipment of the lesson: a skull, a corpse, preparations, models, tablets, visual aids, the textbook.

Recommendations. When you study the head muscles you should remember their following features:

1. Mimic muscles are located round of the natural apertures of the head (eyes, a nose, a mouth, an auricular concha).
2. Mimic muscles having the circular course of fibres carry out the role of sphincters, and muscles having the radial direction — of dilators.
3. Mimic muscles begin from bones of the facial skull and are attached in a skin and hypodermic tissue.
4. Function of mimic muscles reflects the stereotypic picture of a physical condition (illnesses), expression of the attitude to the surrounding validity or to other person (mimicry).
5. Mimic muscles have no fascia.
6. Mimic muscles play the important role in a speech articulation, chewing and swallowing.
7. Masticatory muscles operate on the temporomandibular joint, therefore by one end are attached to the lower jaw.
8. In the mastification not only head muscles participate, but also the neck muscles.
9. Masticatory muscles also, as well as mimic, take part in swallowing and in a speech articulation.

QUESTIONS FOR CONTROL

1. Name groups of muscles of a head.
2. List features of a structure and function of mimic muscles.
3. Mimic muscles are subdivided into what groups?
4. What muscles concern muscles of the vault of a skull and of an auricle? What are their arrangement and function?
5. What muscles concern group of the muscles surrounding the eyelid and the orbit? What are their arrangement and function?
6. Name the muscles surrounding the nose and the mouth. What are their arrangement, function?

7. Name features of a structure and function of the masticatory muscles.
8. List the muscles participating in the mastication.
9. What fasciae are distinguished on a head?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

Mimic muscles:

muscles of the roof of the skull: 1) an epicranium muscle; 2) an occipitofrontal muscle; 3) a galea aponeurotica (tendinous aponeurosis);

muscles of the auricular concha: 1) an anterior auricular muscle; 2) a superior auricular muscle; 3) a posterior auricular muscle;

muscles of the eyelid and the orbit: 1) an orbicular muscle of the eye (a palpebral part, an orbital part, a lacrimal part);

muscles of the nose: 1) a nasal muscle; 2) a depressor septi nasi muscle;

muscles of the mouth: 1) an orbicularis oris muscle (a peripheral part, a labial part); 2) a levator labii superioris muscle; 3) a levator anguli oris muscle; 4) a zygomatic minor muscle; 5) a zygomatic major muscle; 6) a risorius muscle; 7) a cheek muscle; 8) a depressor anguli oris muscle; 9) a depressor labii inferioris muscle; 10) a submental muscle.

Masticatory muscles:

1) a masseter muscle; 2) a temporal muscle; 3) a medial and a lateral pterygoid muscles;

fasciae of the head: a temporal fascia (superficial and deep layers), a masseter fascia, a buccopharyngeal fascia, pterygomandibular seam.

The muscles which relief the student should be able to show on the body surface: an orbicularis oculi muscle; an orbicularis oris muscle; a temporal and masseter muscles.

Lesson 22

Theme: Muscles and Fasciae of Upper Limb: Muscles and Fasciae of Shoulder Girdle and Brachium. Topography of Upper Limb: Axillary Fossa and Axillary Cavity. Topography of Brachium. Development of Upper Limb Muscles. Variants and Abnormalities of Upper Limb Muscle Development.

Purpose of the lesson:

- to study the structure, topography and functions of the shoulder girdle and the brachium muscles;
- to be able to show them on the separate preparations and on a corpse, indicating the features of their relief on the surface of the body (if possible);
- to know and be able to demonstrate the functions of the upper limb muscles;

– to study and be able to show on separate preparations and on a corpse the topographical formations of the upper limb; be able to show their relief and the projection on the human body surface.

Equipment of the lesson: a skeleton, bones of the upper limb, the corpse, separate muscular preparations of the upper limb, the table, the tablets, the atlas, the textbook.

Recommendations.

General recommendations:

The student should precisely show the location of the muscle, know its origin and the attachment to the limb bones.

It is necessary to keep in mind that the muscle, as a rule, crosses perpendicularly the axis around which the movements are carried out in case of its contraction.

To demonstrate the muscle function more vividly, it can be compared with the stretched spring, aspiring to approach the point of the attachment to the point of the beginning in case of its compression. Thus it results in a certain movement of one of the limb divisions relating to another.

Private recommendations on studying muscles of the upper limb.

The student should know that the anterior group of the shoulder and forearm muscles are flexors by function. The posterior group of muscles of the shoulder and the forearm are extensors. While studying the upper limb topography, the student should understand precisely, that this knowledge is necessary for the clinic practice (to define the projection of vessels and nerves, ways of purulent processes distribution) and for making incisions and punctures (in case of surgery).

QUESTIONS FOR CONTROL

1. Name the groups of the upper limb muscles.
2. What muscles of the trunk set the upper limb in motion?
3. What muscles can be referred to the muscles of the shoulder girdle?

Indicate their location and function.

4. What muscles make the shoulder move upwards to the level of the horizontal plane?

5. What muscles make the shoulder move above the horizontal plane?

6. Into what groups are the muscles of the shoulder divided?

7. What muscles are referred to the anterior group of the shoulder muscles? Indicate their structure and function.

8. What muscles are referred to the posterior group of the shoulder? Indicate their structure and function.

9. What fasciae can be distinguished in the shoulder girdle and the shoulder? Name their derivatives.

10. What grooves are located on the anterior surface of the shoulder?

11. What canal is located on the posterior surface of the shoulder? Specify their direction, entrance and target apertures. By what are its walls formed?
12. Name the borders of the axillary fossa.
13. List the walls of the axillary cavity. What anatomic structures form them?
14. Into what triangles is the anterior wall of the axillary cavity divided?
15. Specify the apertures on the posterior wall of the axillary cavity. By what is each of them limited?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

Muscles of the shoulder girdle: 1) a deltoid muscle; 2) a supraspinatus muscle; 3) an infraspinatus muscle; 4) a subscapular muscle; 5) a teres major muscle; 6) a teres minor muscle.

Muscles of the free upper limb:

muscles of the shoulder: 1) a coracobrachial muscle; 2) a biceps brachii muscle; 3) a brachialis muscle; 4) a triceps brachii muscle; 5) an anconeus muscle.

fasciae of the upper limb and their derivatives: 1) a deltoid fascia; 2) a supraspinatus fascia; 3) an axillary fascia; 4) a brachial fascia; 5) a medial septum (septum intermusculare brachii mediale); 6) a lateral septum (septum intermusculare brachii laterale); 7) an axillary fossa; 8) an axillary cavity, the superior and inferior apertures of the axillary cavity, the upper triangle (trigonum clavipectorale), the middle triangle (trigonum pectorale), the lower triangle (trigonum subpectorale), a triangular opening, a quadrangular opening, a canal (canalis humeromuscularis, s. canalis n. radialis, s. canalis spiralis), 9) a medial bicipital groove and lateral bicipital groove.

Muscles, groups of muscles and sinews of the upper limb which relief the student should be able to show on the surface of the body: a deltoid muscle, a biceps brachii muscle, a triceps brachii muscle, a deltoid area, an axillary fossa and its borders, an area of the shoulder, the medial bicipital groove, the lateral bicipital groove.

Lesson 23

Theme: Muscles and Fasciae of Forearm and Hand. Forearm and Hand Topography. Age Features of Upper Limb Muscles.

Purpose of the lesson:

– to study the constitution, topography and functions of the forearm and hand muscles;

- to be able to show them on separate preparations, on a corpse, and also their relief on the body surface (if possible);
- to know and to be able to show functions of muscles of the forearm and hand;
- to study and be able to show on the separate preparations and on a corpse topographical formations of the forearm and hand;
- to be able to show their relief and projections on the human body surface.

Equipment of the lesson: the muscular preparations of the upper limb, a muscular corpse, tables, moulages, bones of the upper limb, the atlas, the textbook.

Recommendations. The student should represent accurately the locating of the forearm and hand muscles, know their beginning and affixion on the extremity bones. It is necessary to remember, that a muscle, as a rule, intercrosse perpendicularly of the axis round which movements are carried out at contraction of the given muscle. For demonstration of the muscle function the muscle can be compared with the stretched spring which at compression aspires to approach the affixion point to the point of the beginning of the given muscle and leads to certain movement of one part of the limb concerning another. It is necessary to pay attention on the forearm and hand fasciae, to know their derivatives. It is necessary to pay attention to formation of the osteofibrous vaginas of the forearm muscles; to pay attention on the synovial vaginas of the hand.

QUESTIONS FOR CONTROL

1. List the groups of the forearm muscles.
2. Name the muscles of the anterior group of the forearm muscles, specify their functions.
3. Name the muscles of the posterior group of the forearm muscles, specify their functions.
4. What groups are the hand muscles divided?
5. List the muscles providing the thumb movements.
6. Name the muscles limiting the ulnar fossa.
7. What sulcuses are located in the anterior field of the forearm? What muscles limit them?
8. List the fasciae of the forearm, the flexors and extensors retinaculums.
9. What canals are located on the ventral side of the wrist? What are they formed by and what muscles transit in them?
10. List the canals on the dorsal side of the wrist. What muscles transit in each canal?
11. Name the hand fasciae, palmar aponeurosis.
12. List the synovial vaginas of tendons in the field of the hand.
13. What synovial vaginas are located in the carpal canal.

14. What muscles tendons are located in the common synovial vagina of flexors?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

Forearm muscles:

anterior group: 1) a pronator teres muscle; 2) a flexor carpi radialis muscle; 3) a long palmar muscle; 4) a flexor digitorum superficial muscle; 5) a flexor carpi ulnaris muscle; 6) a flexor pollicis longus muscle; 7) a flexor digitorum profundus muscle; 8) a pronator quadratus muscle;

posterior group: 1) a brachioradial muscle; 2) an extensor carpi radialis longus muscle; 3) an extensor carpi radialis brevis muscle; 4) an extensor digitorum muscle; 5) an extensor digiti minimi muscle; 6) an extensor carpi ulnaris muscle; 7) a supinator muscle; 8) an abductor pollicis longus muscle; 9) an extensor pollicis brevis muscle; 10) an extensor pollicis longus muscle; 11) an extensor indicis muscle;

Hand muscles:

muscles of the thenar eminence: 1) an abductor pollicis brevis muscle; 2) a flexor pollicis brevis muscle; 3) an opponens pollicis muscle; 4) an adductor pollicis muscle;

muscles of the hypothenar eminence: 1) a short palmar muscle; 2) an abductor digiti minimi muscle; 3) a flexor digiti minimi muscle; 4) an opponens digiti minimi muscle;

medial group: 1) lumbrical muscles; 2) palmar interosseous muscles; 3) dorsal interosseous muscles;

Topographical formations and fasciae:

1) an ulnar fossa; 2) lateral (radial) and medial (ulnar) sulcuses — in the ulnar fossa; 3) radial, median and ulnar sulcuses — on a forearm; 4) the carpal canal, the carpal radial and carpal ulnar canals; 5) canals under the extensors retinaculum; 6) a forearm fascia; 7) a flexors retinaculum; 8) an extensors retinaculum; 9) a palmar aponeurosis; 10) fibrous vaginas of the hand fingers.

The anatomic and topographical formations, which relief the student should name and show on the human body surface:

an elbow area, an ulnar fossa, an ulnar sulcus, a radial sulcus; a forearm area, a wrist area; a metacarpus area; areas of the thenar and hypothenar eminences; the anterior group of the forearm muscles, the posterior group of the forearm muscles; a brachioradial muscle, tendons of superficial flexor digitorum muscle, a tendon of the radial and ulnar flexors digitorum muscles, tendons of the abductor pollicis longus muscle and a extensor pollicis brevis muscle, a tendon of the extensor pollicis longus muscle, a tendon of the extensor digitorum muscle, muscles of the thenar eminence, muscles of the hypothenar eminence, muscles of the medial group of the hand.

Synovial vaginas: 1) the common synovial vagina of flexors; 2) the vagina of the flexor pollicis longus muscle; 3) the synovial vaginas of the hand fingers tendons; 4) the synovial vaginas of the hand and fingers extensors tendons.

Lesson 24

Theme: Muscles and Fasciae of Lower Limb: Muscles and Fasciae of Pelvic Girdle and Thigh. Topography of Lower Limb. Femoral Canal.

Purpose of the lesson:

- to study the construction, topography and functions of the pelvic girdle and thigh muscles;
- to know how to show them on the separate preparations, on the corpse, as well as their relief (as far as possible) on the surfaces of the body;
- to know and to demonstrate the functions of the muscles of the pelvic girdle and thigh;
- to study and to know how to show fasciae and topographical formations of the lower limb on the separate preparations and on the corpse;
- to know how to demonstrate their projections and relief on the surface of the human body.

Equipment of the lesson: a skeleton, bones of the lower limb, muscular preparations of the lower limb, a muscular corpse, tables, the atlas, the textbook.

Recommendations. When the student studies the pelvic girdle and thigh muscles he must fulfill requirements, specified in the general recommendation on study of the limbs muscles (Lesson 22). When you study the muscles of the pelvis, pay attention to the absence of the muscles, providing movements of the lower limb girdle bones. The muscles of the pelvis act on the hip joint. The anterior group of the thigh muscles acts on the hip joint, as flexors, but on the knee joint — as extensors; the thigh muscles of the posterior group act on the hip joint are extensors, but act on the knee joint — as flexors. The thigh muscles of the medial group act on the hip joint, bringing and rotating the thigh outward. Studying this subject student should know the topography of the muscles of the pelvis and thigh, fasciae of these regions and their derivatives. Studying the topography of the lower limb student must understand that knowledge of the lower limb topography will be necessary for them in clinic for determination of the projections of vessels and nerves, ways of the spreading of the purulent processes.

QUESTIONS FOR CONTROL

1. Name the groups of the muscles of the lower limb.
2. What muscles are the external group of the pelvic muscles? What are their location, construction and functions.

3. What muscles are the internal group of the pelvic muscles? What are their location, construction and functions.
4. List the groups of the thigh muscles, their construction and functions.
5. What muscles are the anterior group of the thigh muscles? What are their construction, and function?
6. What muscles are the posterior group of the thigh muscles? What are their construction and functions?
7. What muscles are the medial group of the thigh muscles? What are their location and functions?
8. Name the fasciae, covering internal and external muscles of the pelvis.
9. Name the fasciae of the thigh and their derivatures.
10. Name the topographical regions of the lower limb.
11. What are the supra- and a infrapiriforme holes limited by?
12. What lacunas are located behind of the inguinal ligament? What are they limited by? Where are they situated?
13. The femoral canal, its walls and holes.
14. What canal is situated on the anterior thigh region and connected with popliteal fossa? Name the walls of the canal.
15. What formations is the popliteal fossa limited by? What is its contents?

The list of the anatomic formations which the student should know and be able to show on preparations and visual aids:

The muscles of the pelvis:

a) *the internal group:* 1) a psoas major muscle, an iliacus muscle, an iliopsoas muscle; 2) a psoas minor muscle; 3) an obturator internus muscle; 4) an upper and lower gemellus muscle; 5) a piriformis muscle;

b) *the external group:* 1) a gluteus maximus muscle; 2) a gluteus medius muscle; 3) a gluteus minimus muscle; 4) a tensor fasciae latae muscle; 5) a quadrates femoris muscle; 6) an external obturator muscle.

The thigh muscles:

a) *the anterior group:* 1) a sartorius muscle; 2) a quadriceps femoris muscle: a rectus femoris muscle, a vastus lateralis muscle, a vastus medialis muscle, a vastus intermedius muscle;

b) *the posterior group:* 1) a biceps femoris muscle: the long head, the short head; 2) a semitendinosus muscle; 3) a semimembranosus muscle;

c) *the medial group:* 1) a gracilis muscle; 2) a pectineus muscle; 3) an adductor longus muscle; 4) an adductor brevis muscle; 5) an adductor magnus muscle.

The fasciae of the pelvis and hip and their derivatives: 1) a lumbar fasciae; 2) an iliac fascia; 3) a gluteus fascia; 4) a fasciae lata: a deep layer, a superficial layer, a cribriform fascia, a falciform margin (the upper horn,

lower horn), a lateral intermuscular septum, an iliotibial tract; 5) a suprapiriforme and infrapiriforme hole, an obturator canal; 6) a muscular and vascular lacunas, a femoral ring, a femoral triangle; 7) an iliopectineus fossa, a femoral sulcus; 8) a femoral canal, a hiatus saphenus, an internal femoral ring; 9) an adductor canal, a popliteal fossa.

The muscles, groups of the muscles of the lower limb or their tendons, of which relief student must know how to show on the surface of the body: a gluteus maximus muscle, a quadriceps femoris muscle, the medial group of the thigh muscles, the posterior group of the thigh muscles, the tendon of the biceps femoris muscle, the tendon of the semitendinosus muscle.

Lesson 25

Theme: Muscles and Fasciae of Leg and Foot. Topography of Leg and Foot.

Purpose of the lesson: to study the structure, topography, functions and fasciae of the muscles of the leg and foot; to be able to show them on separate preparations and on a corpse indicating their relief (if possible) on the surface of the body; to know and be able to show the functions of the leg and foot muscles.

Equipment of the lesson: a muscular preparation of the lower limb, a muscular corpse, models, tablets, tables, a foot skeleton, the atlas, the textbook.

Recommendations. While studying the muscles of the leg, the student should follow the general requirements specified in methodical indications to Lesson 22.

The student should keep in mind, that muscles of the leg are multiarticulate.

Muscles of the anterior group of the leg carry out extension (back bending) in the ankle joint, in the metatarsophalangeal and interphalanx joints.

Muscles of the posterior group of the leg act as flexors both on the knee joint and (plantar bending) on the ankle joint.

Deep muscles of the posterior group of the leg at contraction also provide plantar bending in the metatarsophalangeal and interphalanx joints of the foot.

On the foot, as well as on the hand, there are own groups of muscles for the big and little toe and middle group of muscles for 2–4 fingers.

Besides, on the dorsal surface of the foot there is the extensor digitorum brevis muscle and the extensor hallucis brevis muscle, while on the plantar surface of the flexor digitorum brevis muscle and additional flexor — the square muscle of the plantum is located.

It is necessary to pay attention to fact that the number of leg and foot muscles plays the role of the active retinaculum, strengthening cross-section and longitudinal foot vaults.

QUESTIONS FOR CONTROL

1. List the leg muscles groups.
2. What muscles are referred to the anterior group of the leg muscles? Indicate their structure and functions.
3. What muscles are referred to the posterior group of the leg muscles? Indicate their structure and functions.
4. What muscles are referred to the lateral group of the leg muscles? Indicate their structure and functions.
5. List the groups of the foot muscles. Indicate their structure and functions.
6. Name the foot fasciae and their derivatives.
7. What is the cruropopliteus canal formed by? What does this canal include?
8. What are the inferior and superior musculoperoneus canals formed by? What do these canals include?
9. How many canals are under retinaculum extensorum located and what do they contain?
10. How many canals are under retinaculum flexorum located and what do they contain?
11. How many canals are under retinaculum peroneorum located and what do they contain?
12. List the groups of the foot muscles. Indicate their location and functions.
13. What sinovial vaginas of tendons are available in the foot area?
14. What fasciae and their derivatives can be distinguished in the foot area?
15. What is the «passive» and «active» foot retinaculum?
16. List the grooves on the plantum of the foot. What are they limited by?

The list of the anatomic formations which the students should know and be able to show on the anatomic preparations and visual aids:

Muscles of the leg:

a) anterior group: 1) tibialis anterior muscle; 2) extensor digitorum longus muscle; 3) extensor hallucis longus muscle;

b) lateral group: 1) peroneus longus muscle; 2) peroneus brevis muscle;

в) posterior group: 1) triceps surae muscle: gastrocnemius muscle, soleus muscle; 2) plantaris muscle; 3) popliteal muscle; 4) flexor digitorum longus muscle; 5) flexor hallucis longus muscle; 6) tibialis posterior muscle;

Fasciae of the leg: septum intermusculare anterius cruris, septum intermusculare posterius cruris, superior extensor retinaculum of the foot, inferior extensor retinaculum, flexor retinaculum of the foot, superior peroneal retinaculum, inferior peroneal retinaculum. Fasciae of the foot: dorsal fascia of the foot, plantar aponeurosis, cruropopliteal canal, superior and inferior muscular-fibular canals; canals under flexor retinaculum of the foot and extensor retinaculum of the foot; canals under peroneal retinaculum.

Muscles, groups of muscles and tendons of the leg, which relief the student should be able to show on the surface of the body: gastrocnemius muscle, calcaneal (Achilles) tendon, anterior group of muscles of the leg, the tendons of the anterior group of the leg muscles, lateral group of the leg muscles.

Muscles of the foot:

a) dorsal muscles of the foot: 1) extensor digitorum brevis muscle; 2) extensor hallucis brevis muscle;

b) plantar muscles of the foot:

Medial group: 1) abductor hallucis muscle; 2) flexor hallucis brevis muscle; 3) adductor hallucis muscle;

lateral group: 1) abductor digiti minimi muscle; 2) flexor digiti minimi muscle;

middle group: 1) flexor digitorum brevis muscle; 2) flexor digitorum accessorius muscle; 3) lumbrical muscles; 4) plantar interossei muscles; 5) dorsal interossei muscles;

Fasciae of the foot: dorsal fascia of the foot; plantar aponeurosis.

Muscles, groups of muscles and tendons, which relief the student should be able to show on the surface of the body:

Medial group of the foot muscles, lateral group of the foot muscles, middle group of the foot muscles, area of the ankle joint, area of the tarsus, calcaneal area, metatarsal area.

Lesson 26–27

Theme: Muscles. Muscular System. The Final Lesson.

The purpose of the lesson: to check the obtained knowledge.

Equipment of the lesson: a skeleton, a skull, a lower jaw, bones of the upper and lower limb, a muscular corpse, an upper and lower limb with prepared muscles, models of the head and neck muscles, a diaphragm, tablets, tables.

Points for discussion:

1. Describe the general anatomy of muscles: the development, the structure and functions of the skeletal muscles.

2. Give the classification of the skeletal muscles.
3. Indicate the auxiliary devices of muscles.
4. Describe the superficial muscles of the back: the topography, the structure and functions.
5. Describe the deep muscles of the back: the topography, the structure and functions.
6. Describe the suboccipital muscles: the topography, the structure and functions.
7. State the fasciae of the back: the topography, the structure and functions.
8. State the muscles of the thorax operating on the shoulder girdle joints: the topography, the structure and functions.
9. Describe the muscles of the thorax: the topography, the structure and functions. Fasciae of the thorax: the topography and the structure.
10. Describe the diaphragm: the topography, the structure and functions.
11. State the muscles of the abdomen: the topography, the structure and functions.
12. Describe the rectus abdominis muscle vagina. State the white line of the abdomen.
13. State the inguinal canal: topography, structure, contents. Indicate the "weak" places of the abdominal cavity walls.
14. Describe the muscles providing movements of the spine column: extension, flexion, bending aside, rotation.
15. Describe the muscles participating in breathing (the basic and auxiliary).
16. State the muscles providing the scapula and clavicle movements upwards, downwards, forward and laterally, backwards and medially, rotation.
17. Describe the neck muscles: the structure, topography, functions.
18. Describe the neck fasciae, interfascial spaces of the neck, their passages.
19. State the neck areas and the triangles.
20. Describe the muscles providing movements of the head in the atlanto-occipital and the atlantoaxial joints.
21. Indicate mimic muscles: the structure, topography, functions.
22. Describe muscles of mastication: the structure, topography, functions.
23. Describe the muscles participating in movements within the temporomandibular joints: upwards, downwards, forward, backwards, aside.
24. Describe muscles and fasciae of the shoulder girdle: the structure, topography, functions.
25. State the muscles and fasciae of the forearm: the structure, topography, functions.

26. Describe the muscles and fasciae of the hand: the structure, topography, functions.
27. Indicate the fibrous canals and synovial vaginas of the hand.
28. Describe the axillary fossa. State the axillary cavity: the walls, holes, triangles.
29. Describe the topography of the shoulder, forearm and the hand.
30. Indicate the muscles, providing movements of the arm in the shoulder joint: abduction, adduction, flexion, extension, internal rotation and rotation outward.
31. Describe the muscles, producing movements of the forearm in the elbow joint: flexion, extension, pronation, supination.
32. State the muscles, providing movements of the hand in the radiocarpal joint: flexion, extension, abduction, adduction.
33. Describe the muscles, producing movements of the fingers of the hand: flexion, extension, abduction, adduction.
34. Indicate the muscles of the pelvic girdle: the structure, topography, functions. Describe the obturator canal, suprapiriform and infrapiriform foramen.
35. Describe the anterior group of the thigh muscles: the structure, topography, functions.
36. State the fasciae of the thigh. Muscular and vascular lacunas. The femoral canal.
37. Indicate the medial group of the thigh muscles: the structure, topography, functions. Describe the adductor canal.
38. Describe the posterior group of the thigh muscles: the structure, topography, functions.
39. State the muscles and fasciae of the leg. Popliteal fossa.
40. List the muscles and fasciae of the foot: the structure, topography, functions.
41. Describe the topography of the leg and foot.
42. Indicate the muscles, providing movements of the thigh in the hip joint: flexion, extension, adduction, abduction, rotation inside, rotation outward.
43. Describe the muscles, producing movements of the leg in the knee joint: flexion, extension, rotation inside, rotation outward.
44. Indicate the muscles, providing movements in the talocrural (ankle) joint and in the talocalcaneonavicular joint: flexion, extension, adduction, abduction, pronation, supination.
45. Describe the muscles, producing movements of the foot fingers.
46. Describe the muscles, participating in the fortification of the foot arches.

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АНАТОМИЯ ОПОРНО-ДВИГАТЕЛЬНОГО АППАРАТА

ANATOMY OF LOCOMOTOR SYSTEM

Учебно-методическое пособие на английском языке

Ответственный за выпуск П. Г. Пивченко
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