State University of Medicine and Pharmacy “Nicolae Testemitanu“
Republic of Moldova

Functional Anatomy of the muscles of the head and neck

Human Anatomy Department

Dr. Angela Babuci

Plan of the lecture

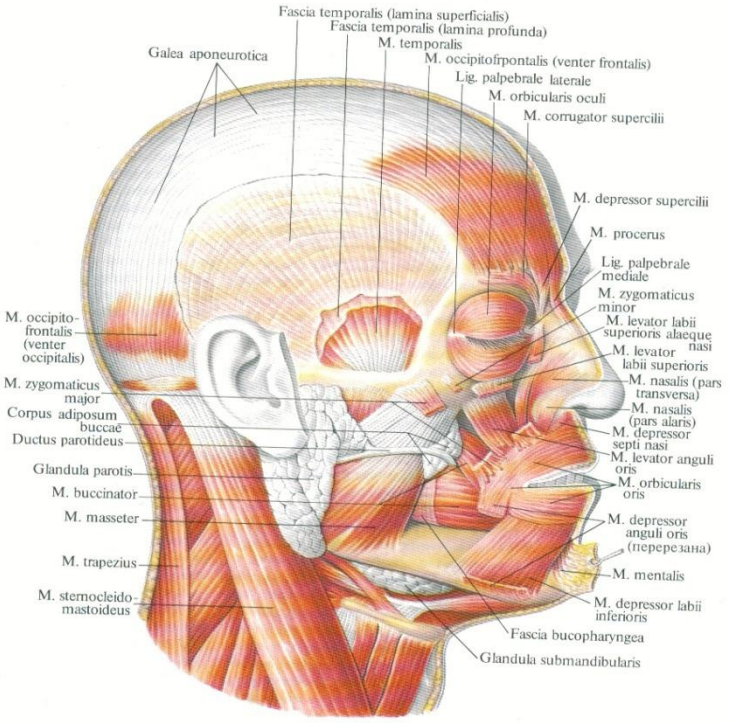
1. Classification of the muscles of the head.
2. Muscles of mastication.
3. Mimicry and physiognomy.
4. Muscles of facial expression.
5. Fascia of the head.
6. Osteo-fascial and intermuscular spaces of the head.
7. Muscles of the neck.
8. Topography of the neck.
9. The fasciae and interfacial spaces of the neck.

Classification of the muscles of the head

- Muscles of mastication
- Muscles of facial expression
- Muscles of the organs of sense

NB: The mentioned above groups of muscles are distinguished by:

a) Anatomical features
b) Action
c) Development
d) Innervation

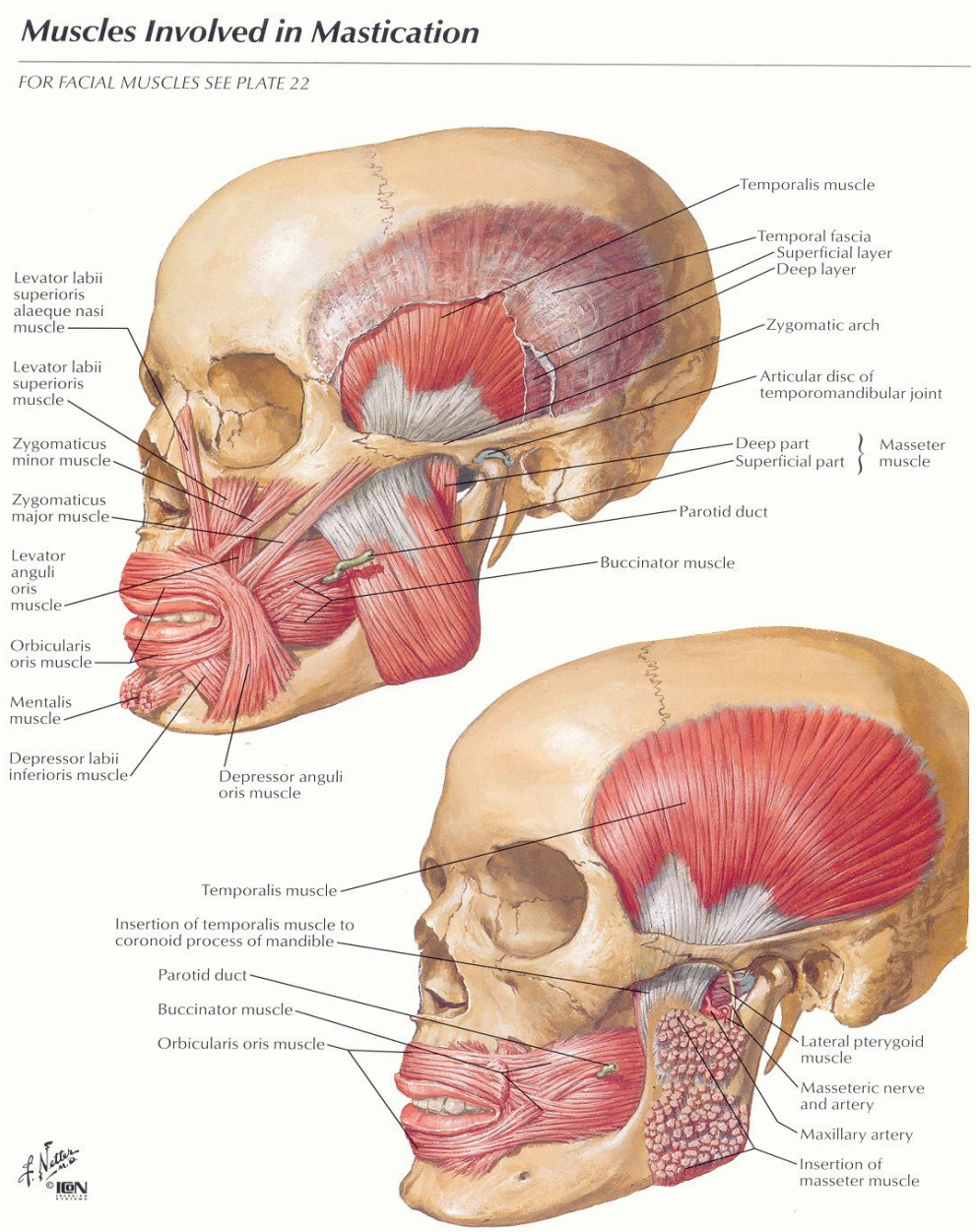


Muscles of mastication

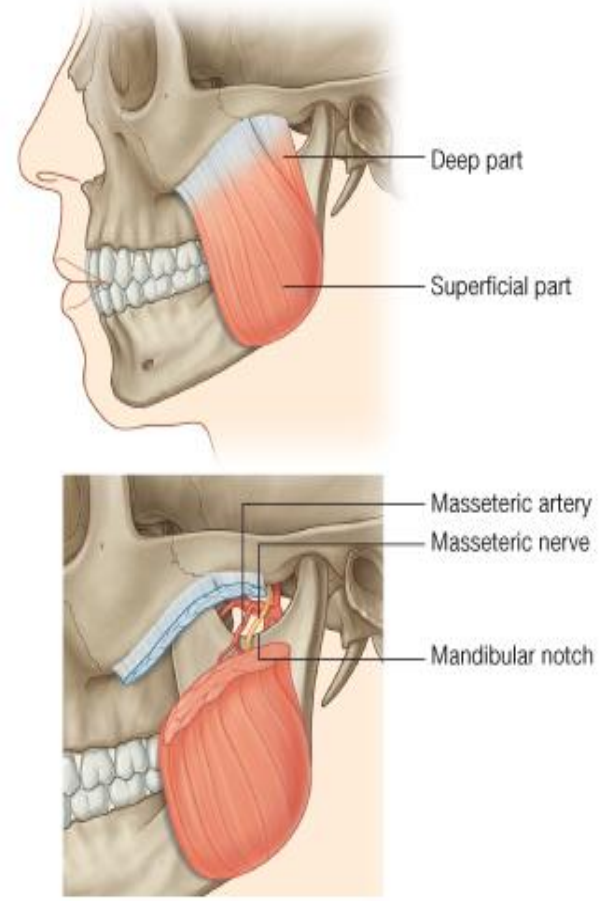
- Muscles of mastication have common anatomical features with other skeletal muscles.
- They have two bony points of insertion, one located on the mandible.
- They assure process of mastication, participate in deglutition and in articulated speech.
- The muscles of mastication develop from the mandibular arch (first visceral arch).

Muscles of mastication

- The **temporal muscle** is the strongest one, among the muscles of mastication and it is located in the temporal fossa.
- Externally it is covered by the <u>temporal fascia</u>.

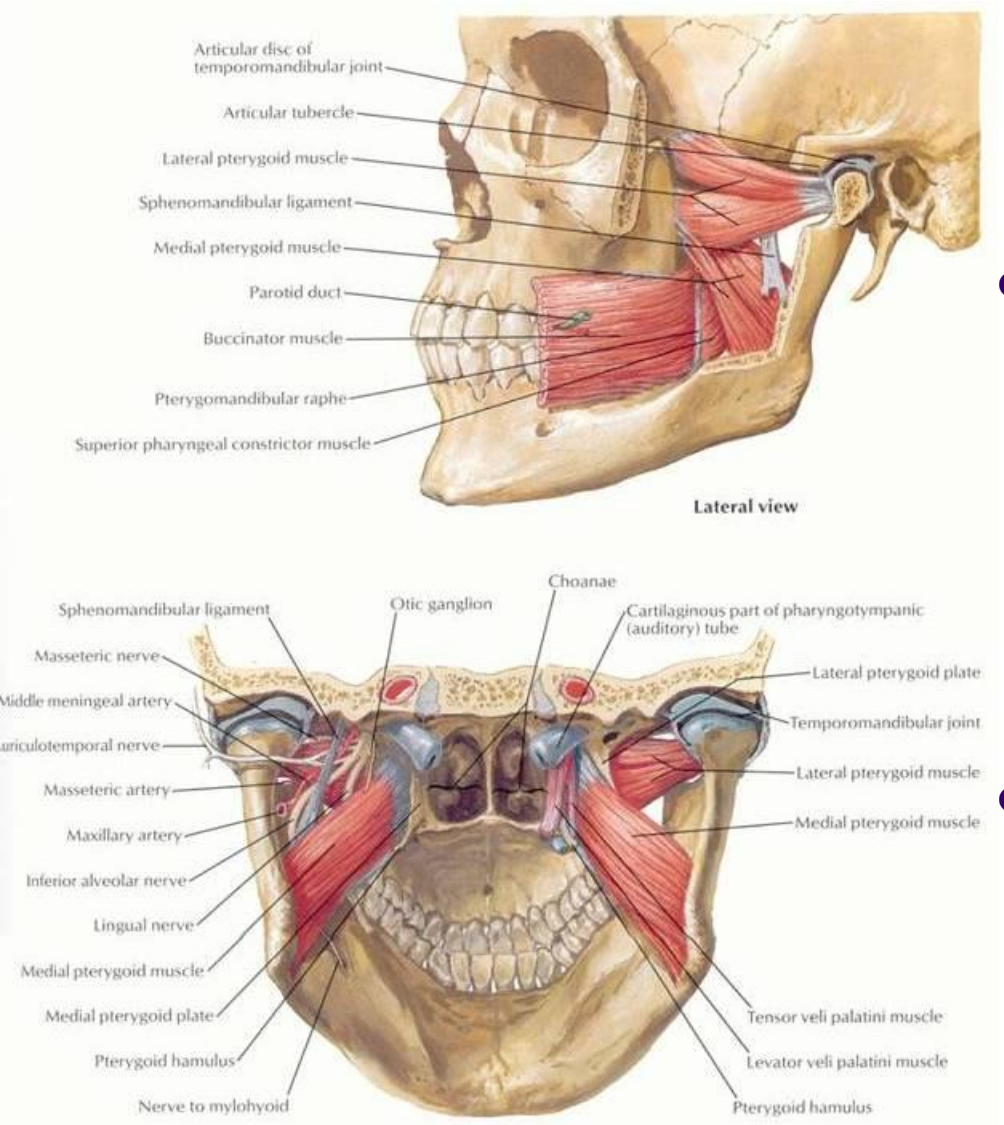


Muscles of mastication



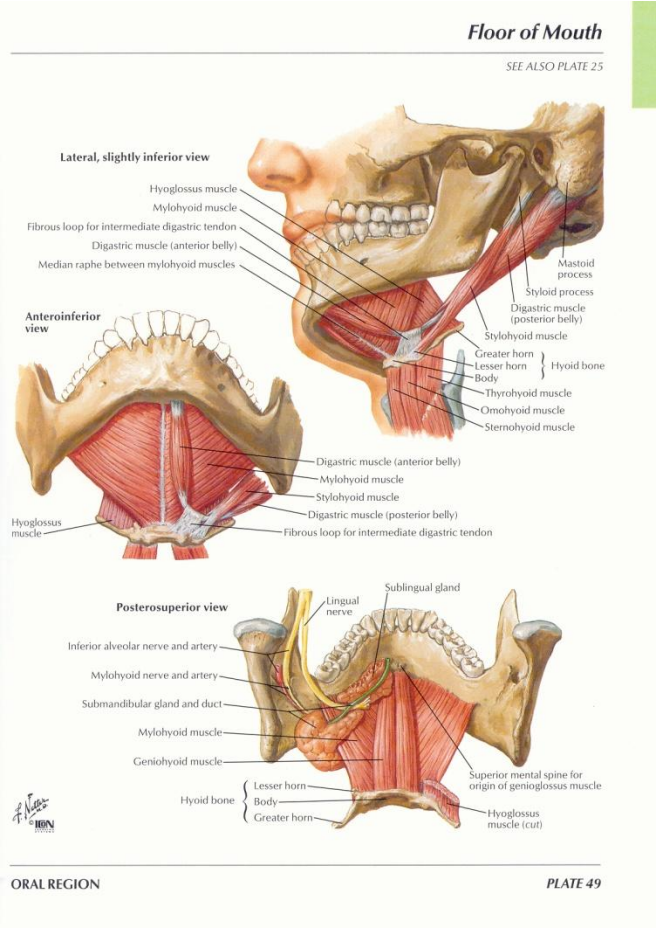
- Masseter muscle consists of two parts: superficial and deep one, and their fibers form a muscular crossing.
- The muscle is of quadrangular shape and it is located on the lateral surface of the mandible.
- Externally it is covered by masseteric fascia.

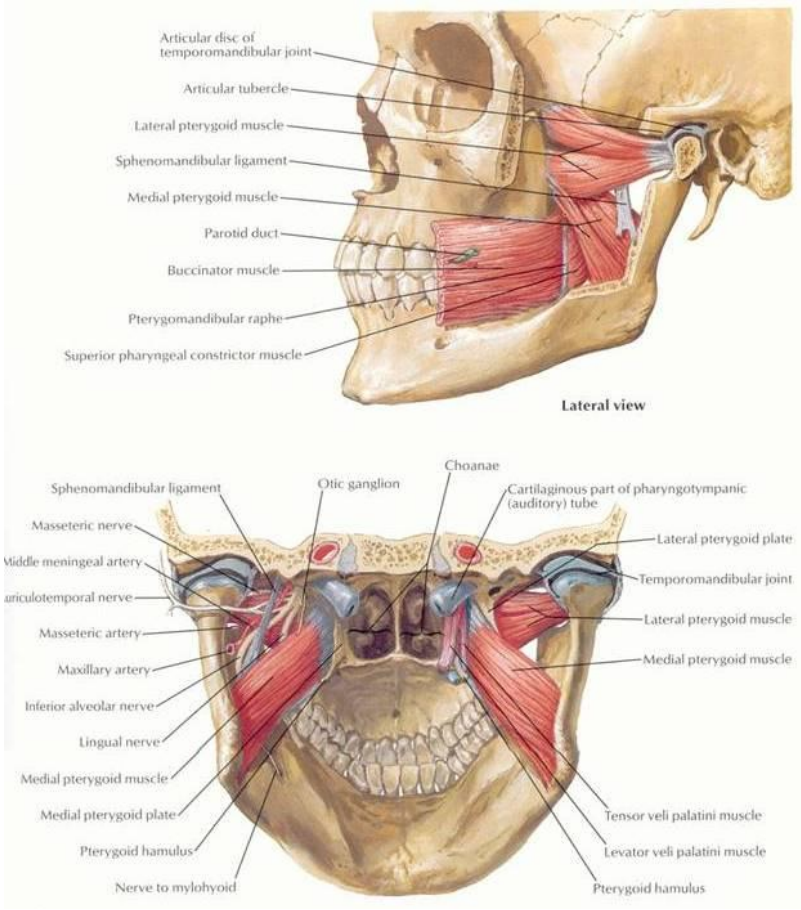
Muscles of mastication



- The lateral pterygoid muscle consists of two parts: the upper and lower one, and it is located above the medial pterygoid muscle.
- The medial pterygoid muscle is of quadrangular shape and it is located on the inner surface of the mandibule.

Common action of the muscles of mastication

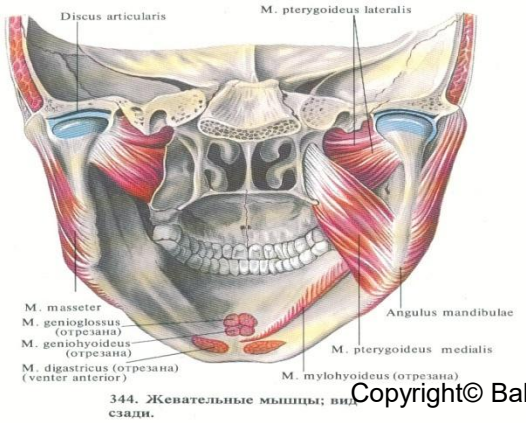




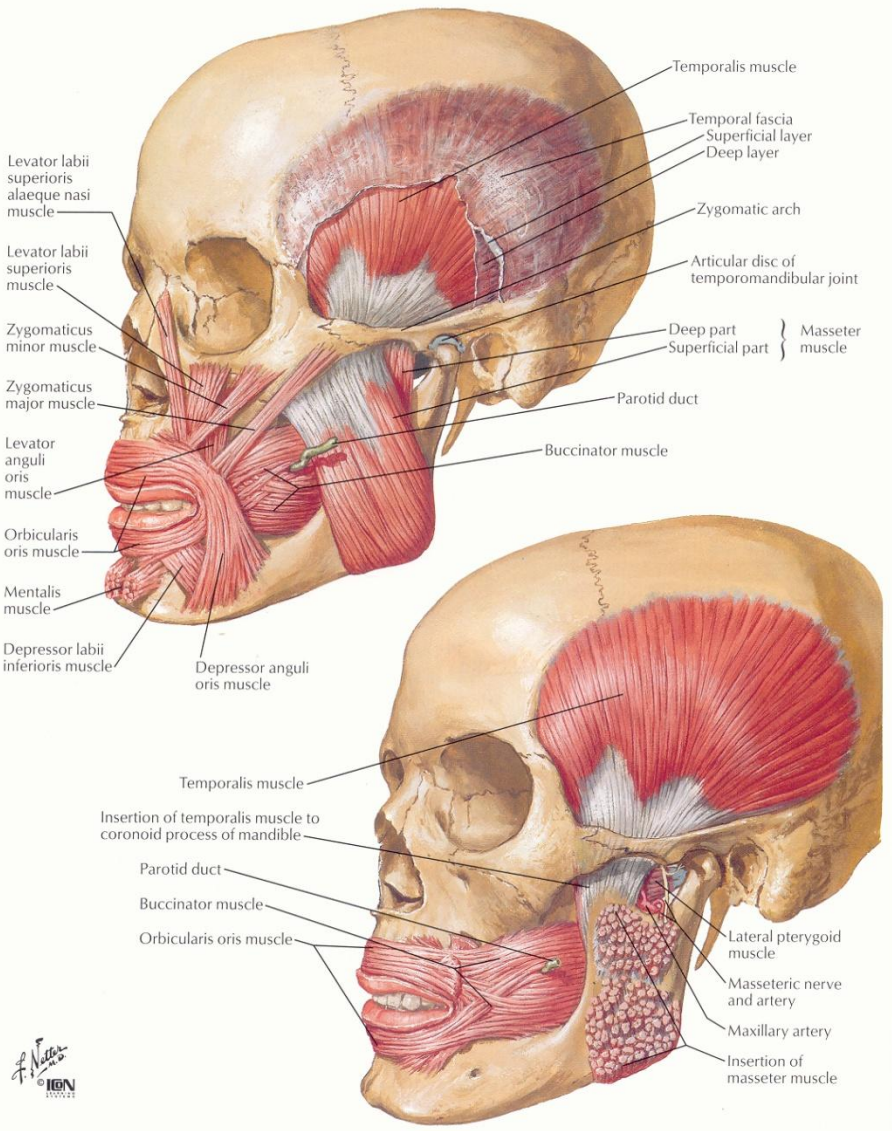
- **Lowering of the mandible** is initiated by bilateral contraction of the lateral pterygoid muscles and followed contraction of the suprahyoid muscles.

Common action of the muscles of mastication

- ***Arising of the mandible*** during mastication occurs due to the simultaneous action of the:
- temporal muscle
- masseter muscle
- and medial pterygoid mascles.

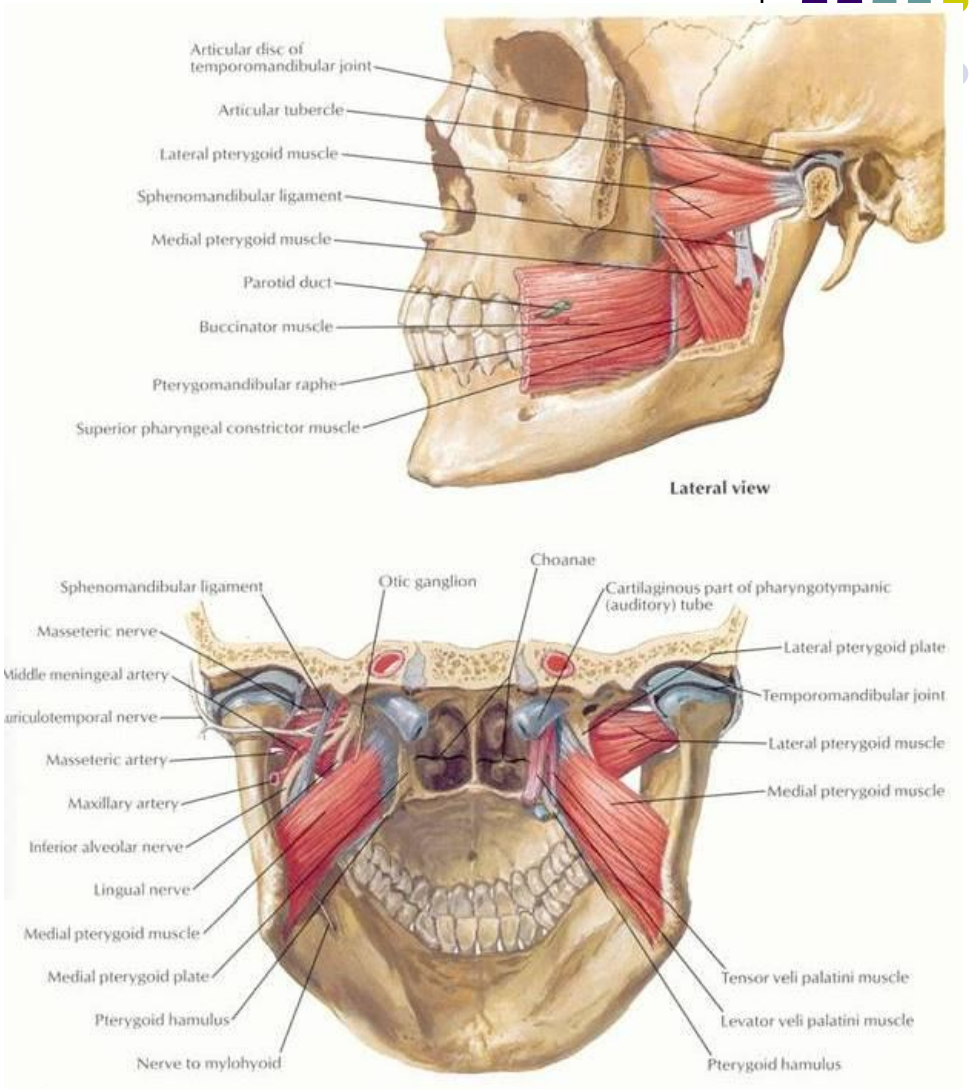


344. Жевательные мышцы; вид сзади.



Common action of the muscles of mastication

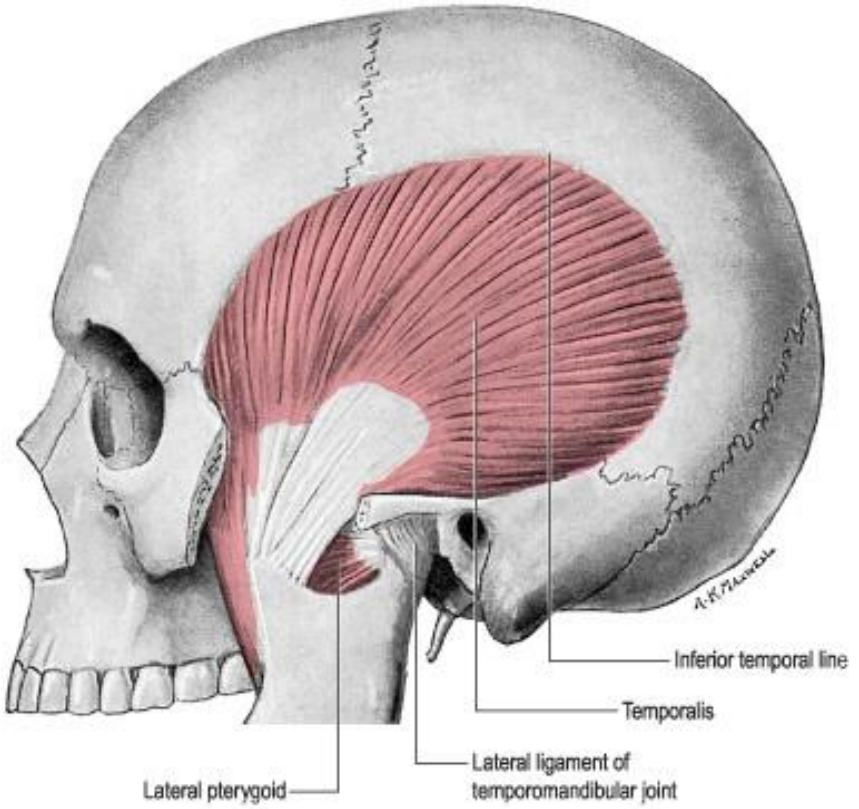
- Under simultaneous contraction of the lateral pterygoid muscles **propulsion** of the mandible occurs**.**



Common action of the muscles of mastication

- **On contraction of the posterior fascicles of the temporal muscle the retropulsion of the mandible occurs.**

- **The lateral movements of the mandible occur asymmetrically and successively in mastication.**



Mimicry

- **Mimicry** is the dynamic aspect of the face that expresses the affective (psychic) status of a person.
- In man the mimicry attains the highest level of development.
- The mimicry is an auxilliary way of communication
- It contributes to expressivity of speech, pantomime and together with gesticulation substitutes partially the articulated speech.

Mimicry

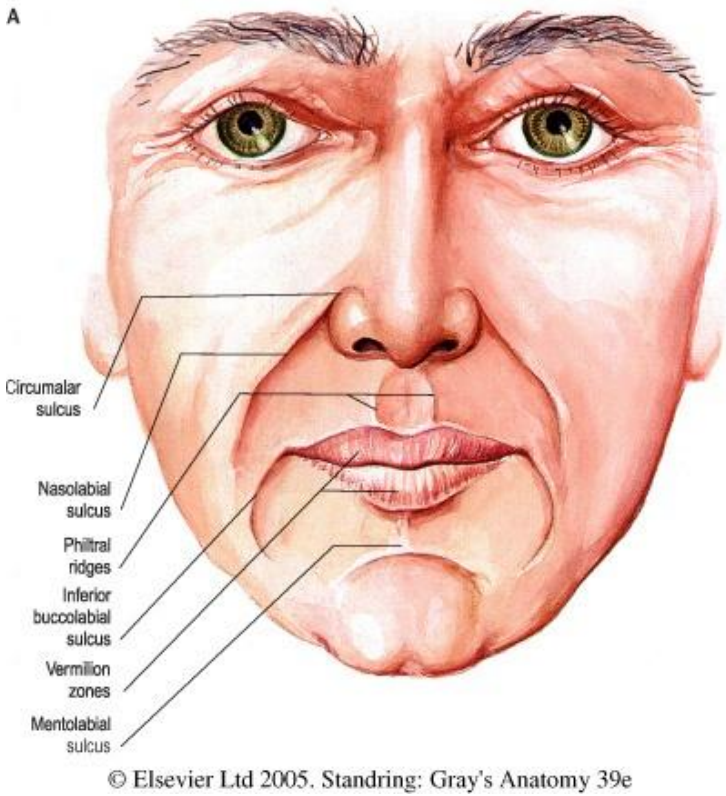
- In a calm status the lines of the face are horizontal.
- When a person is cheery the lines are laterally ascendant.
- Under intellectual activity appear wrinkles on the forehead and on the skin around the orbit.
- With ages the wrinkles became permanent because the skin looses its elasticity and the muscular fibers shorten.

Physiognomy

- In time the wrinkles become more visible and deep, and are seen on the skin even when the muscles are relaxed.
- Thus the shape of the skull, shape of the nose, the thickness of the subcutaneous tissue determines the physiognomy of an individual.
- The **physiognomy** changes in tuberculosis, peritonitis, typhoid fever, Parkinson disease – for those patients is characteristic *facies hippocratica*.

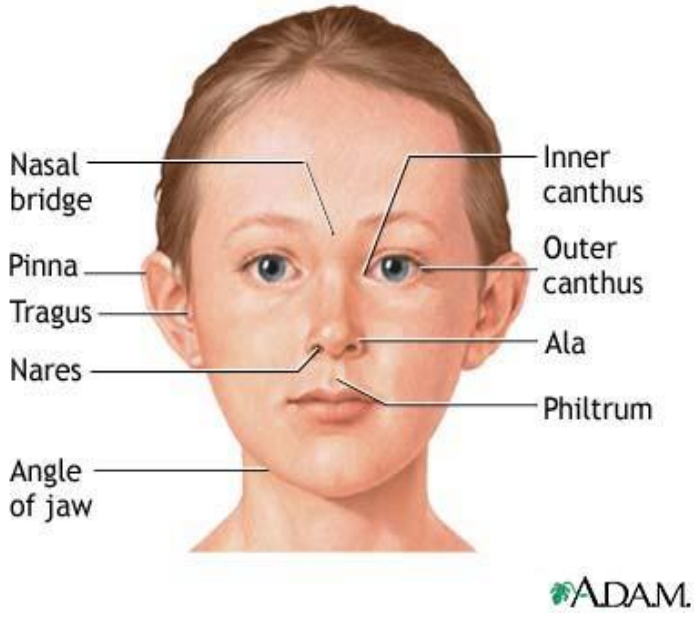
The main wrinkles and grooves of the face

- The **nasolabial groove** is the most constant and it is inherited. It descends from the wing of the nose toward the labial commissure.
- The **mentolabial groove** separates the chin from the inferior lip.
- The **jugal groove (mentomallar)** descends from the mallar region towards the chin.
- The **submental groove** separates the proper chin from the double one.

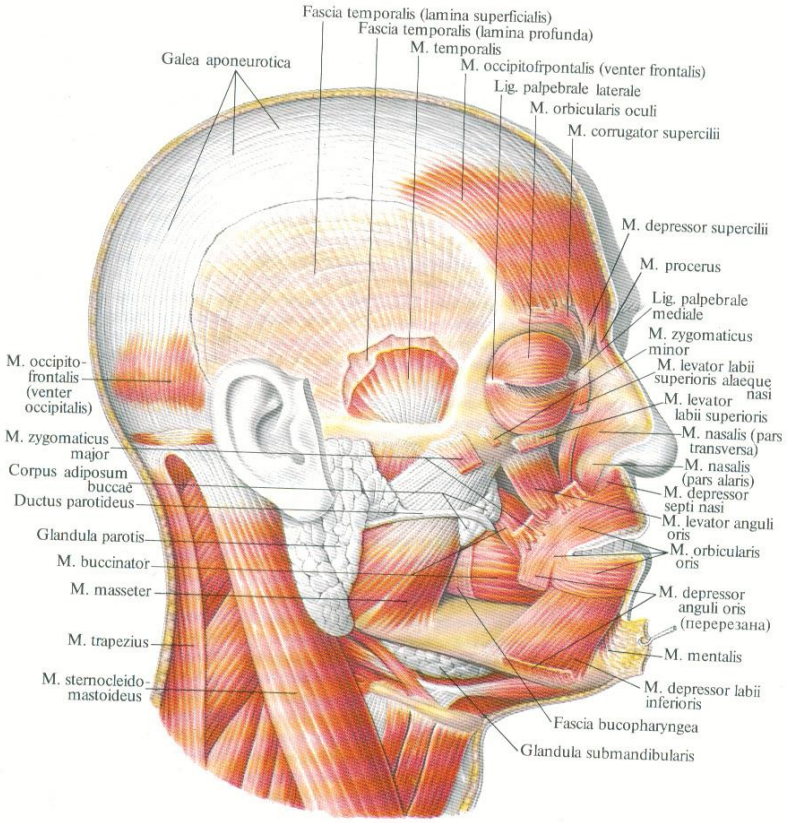


The main grooves and wrinkles of the face

- The **superior palpebral** and **inferior palpebral** grooves separate the eyelids from neighbour regions.
- **Radial wrinkles** in the lateral angle of the eye.

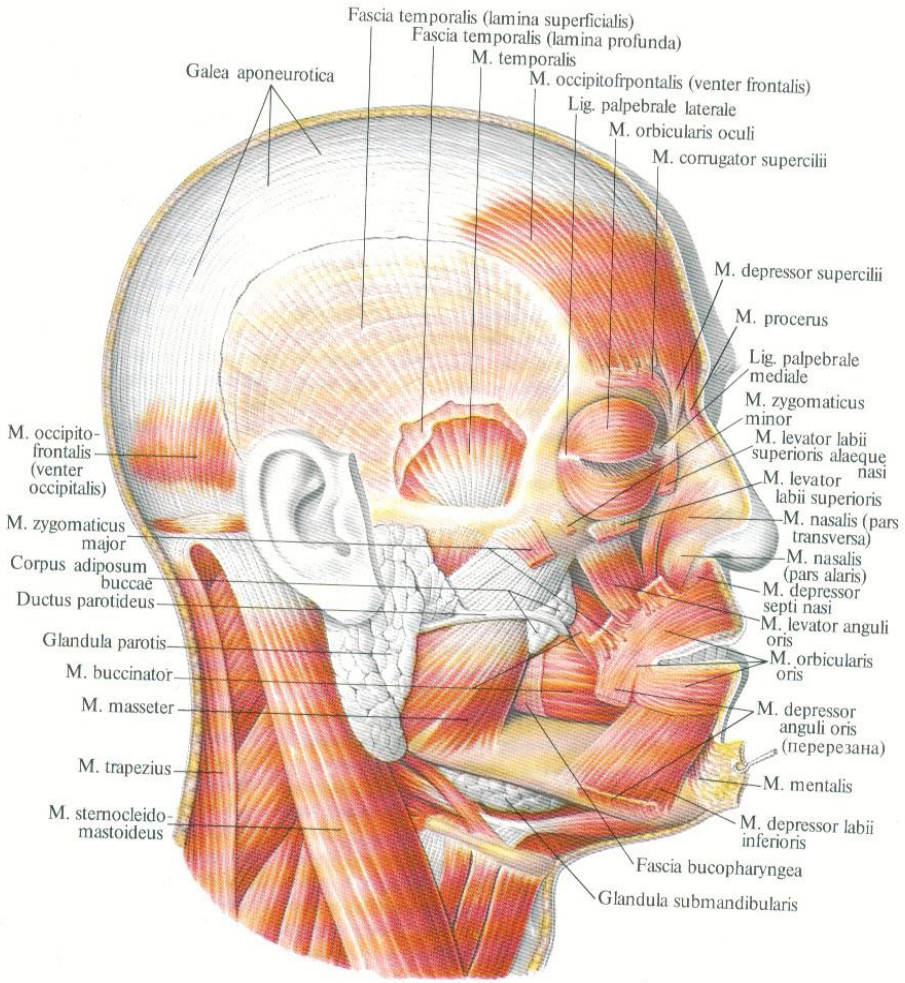


Muscles of mimicry



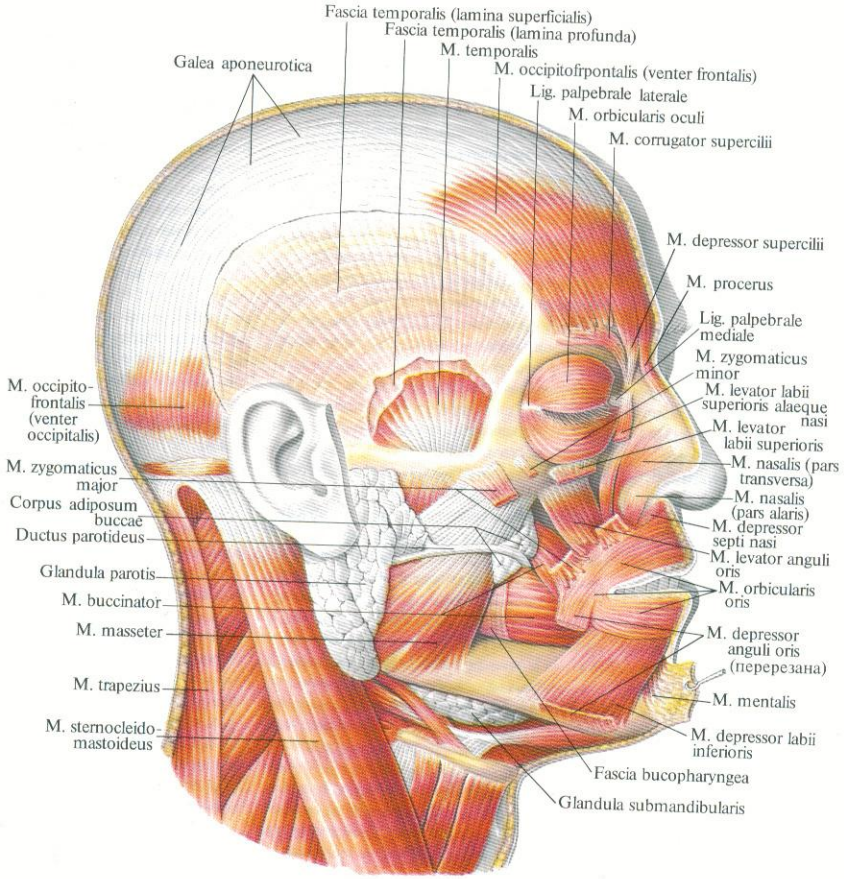
- The **mimicry muscles** are named as well cutaneous muscles due to their connection with the skin.
- They have a superficial location and one of their ends is inserted into the skin.
- Muscles of facial expression are thin and it is difficult to dissect them.
- The muscles of mimicry are devoid of fasciae, excepting buccinator muscle.

The muscles of facial expression



- The muscular fibers of the mimicry muscles are oriented into different directions and when they contract the skin moves together with them.
- The volume and force of that muscles are reduced.
- The mimicry muscles are located around the natural orifices of the face and they do not move any joints.

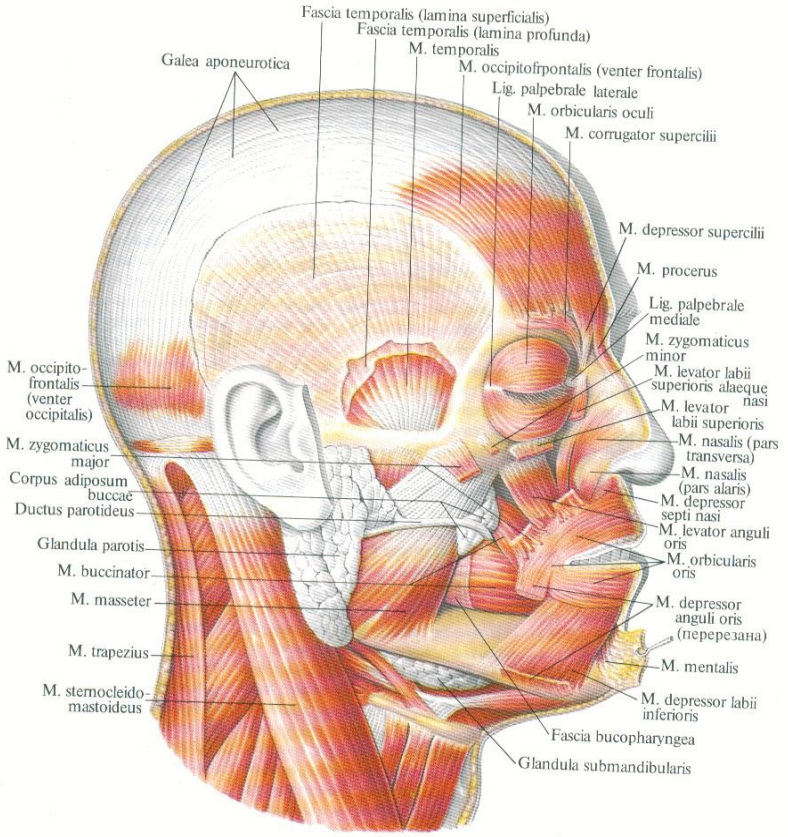
Functions of the mimicry muscles



- They determine the expressivity of mimicry and physiognomy.
- They contribute to food prehension and mastication.
- When contracting they modify the shape of the natural orifices the of the face.
- Participate in articulated speech and in respiration.

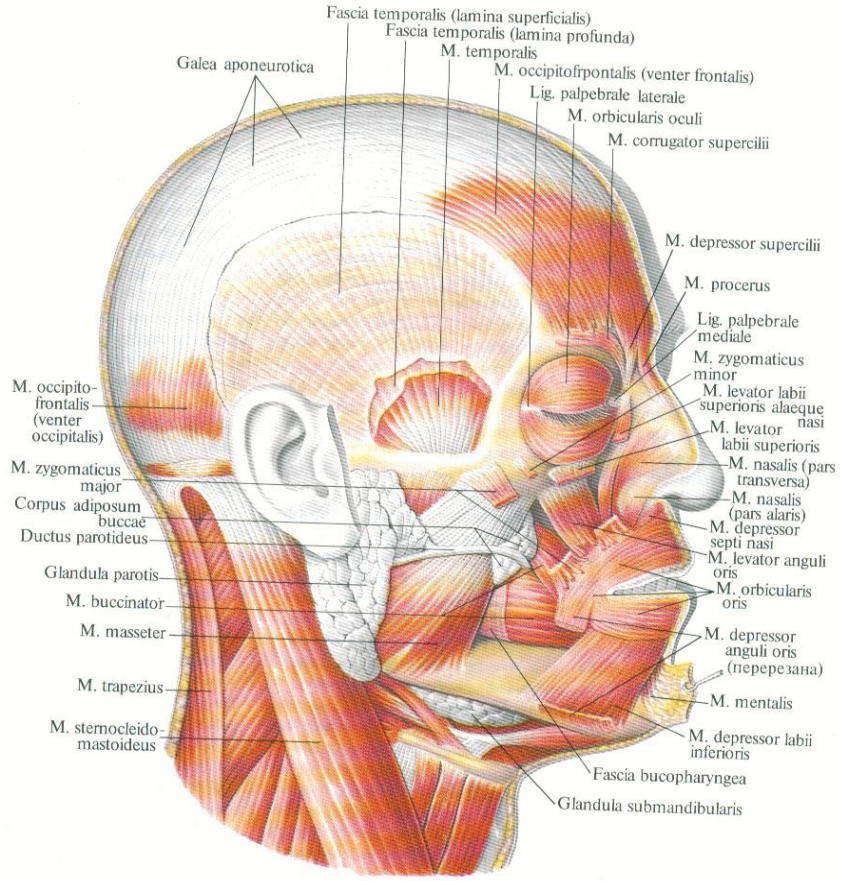
The groups of mimicry muscles

- Muscles of the vault of the skull.
- Muscles located around the external auditory meatus.
- Muscles located around the orbit, or muscles of the eyelids.
- Muscles located around the nasal orifice.
- Muscles located around the buccal orifice.
- The **mimicry muscles** derive from the second visceral arch or hyoid one.

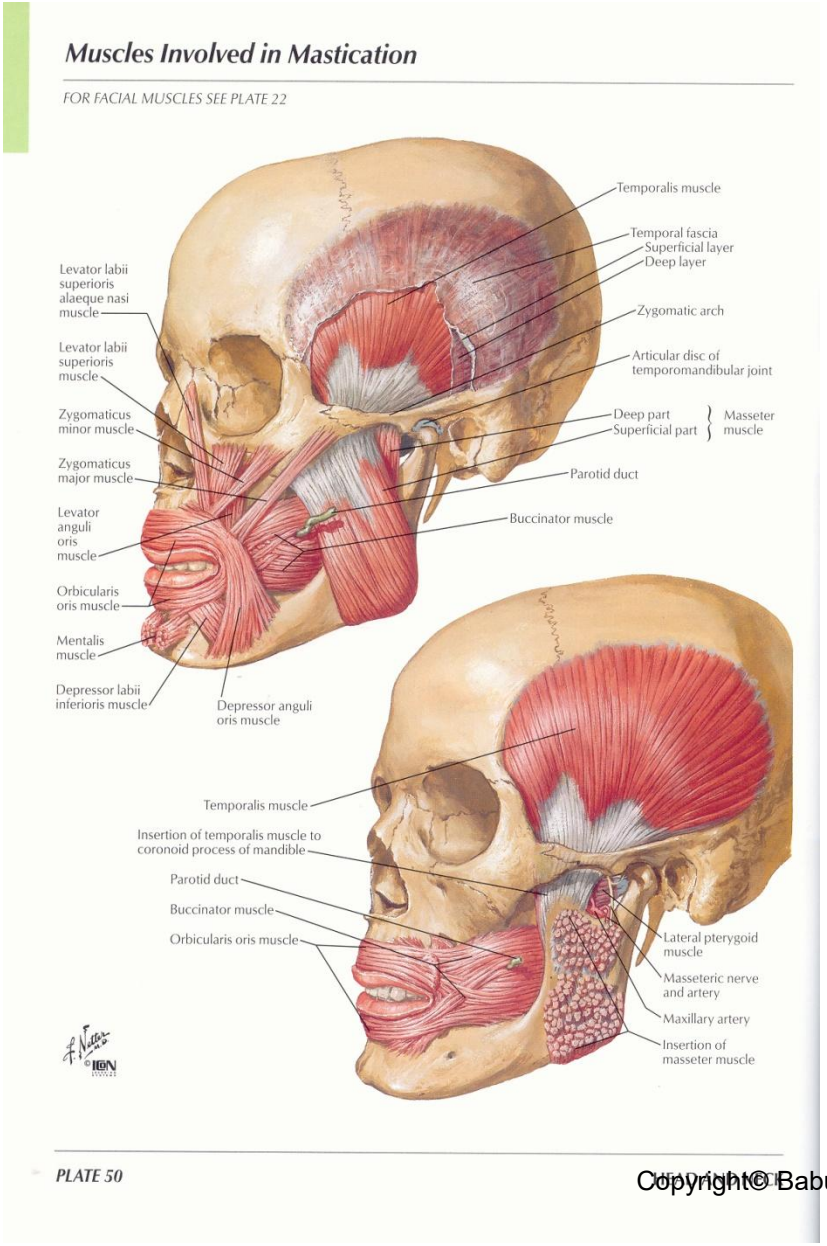


Fasciae of the head

- **The epicranial aponeurosis** – covers the vault of the skull.
- In the lateral regions of the skull it becomes thinner and it forms a loose fibrous plate beneath the skin, under which the temporal fascia is located.



The temporal fascia



- **The temporal fascia** is strong and it ccovers the homonimous muscle. It originates from the superior temporal line and the bifurcates into:

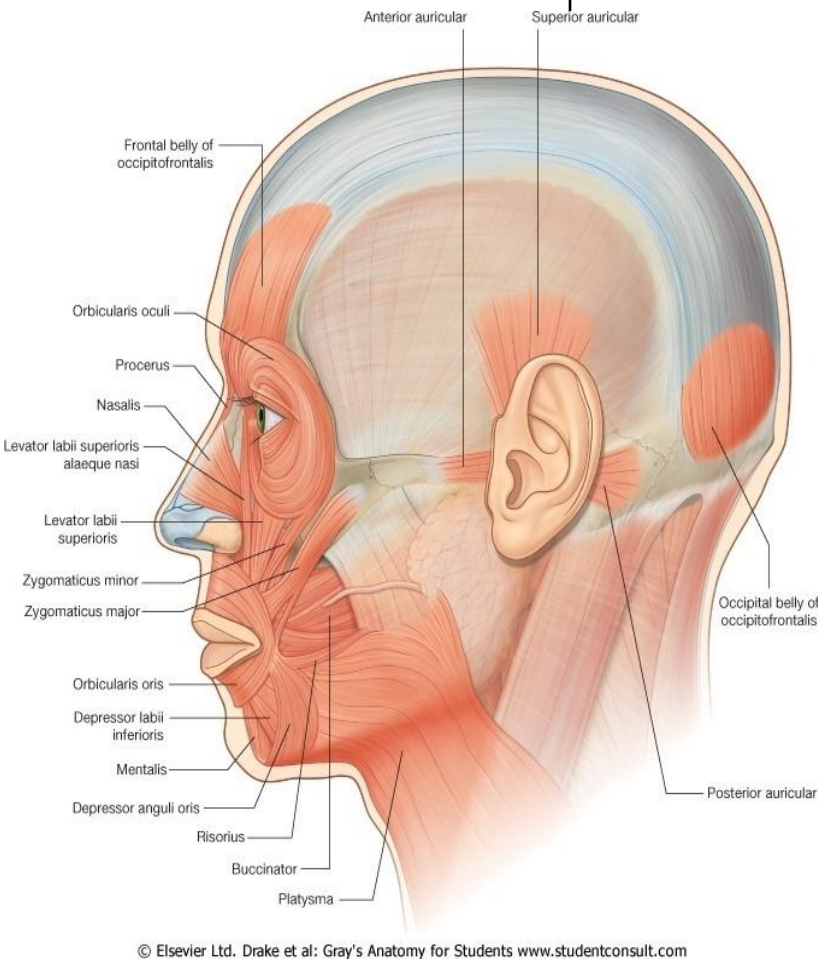
a) <u>Superficial plate</u> – inserts on the external surface of the zygomatic arch.

b) <u>Deep plate</u> –inserts on the internal surface of the zygomatic arch.

the temporal fascia closes the temporal fossa and transforms it into a osteo-fibrous space that lodges the temporal muscles and the adipose tissue.

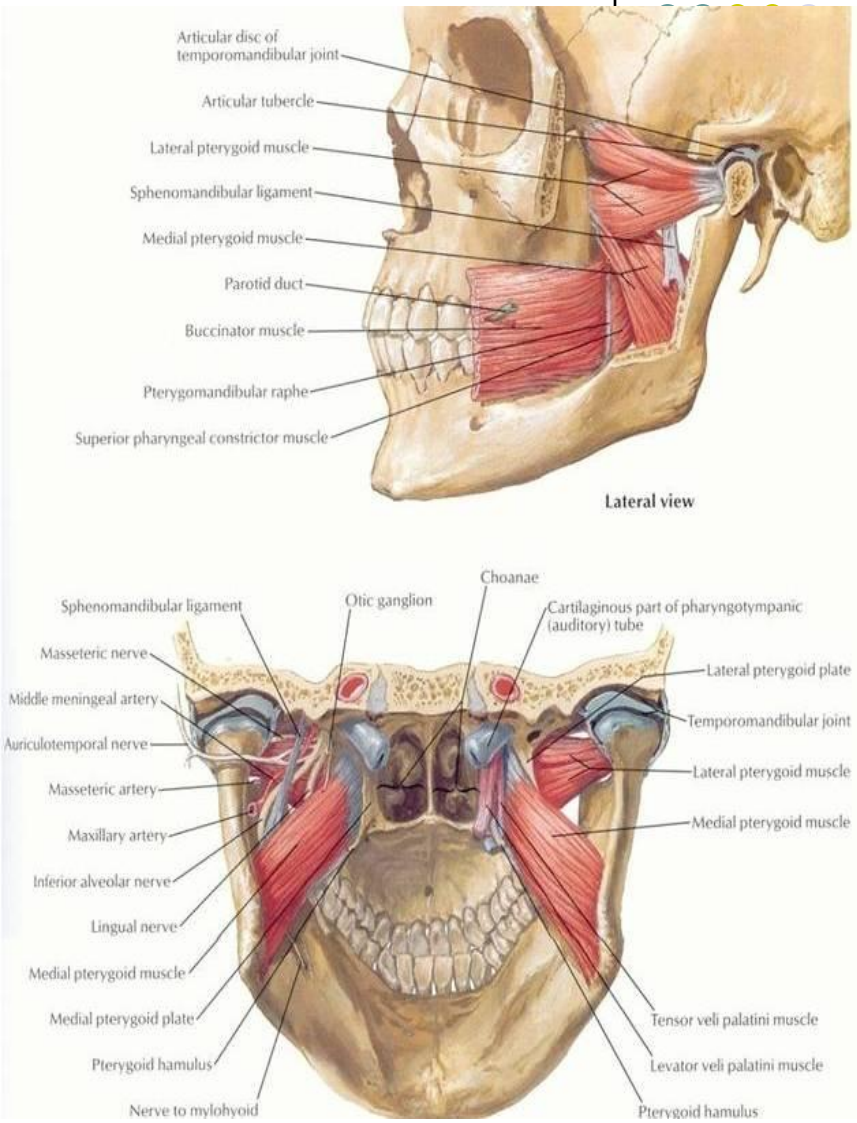
Fasciae of the head

- The masseteric fascia – invests the homonimous muscle. It inserts on the zygomatic arch, on the branch and mardin of the manbdibule.
- The masseteric fascia adheres to the parotid fascia, that covers the parotid gland.
- Those two fascia fussion and form the parorideo-masseteric fascia.



Fasciae of the head

- **The pterygoid fascia** invests the medial surface of the medial pterygoid muscles.
- **The pterygoid fascia** invests the medial surface of the medial pterygiod muscle.
- **The interpterygoid fascia** is located between the medial and lateral pterygoid muscles. The posterior margin of this fascia forms the spheno-madndibular ligament

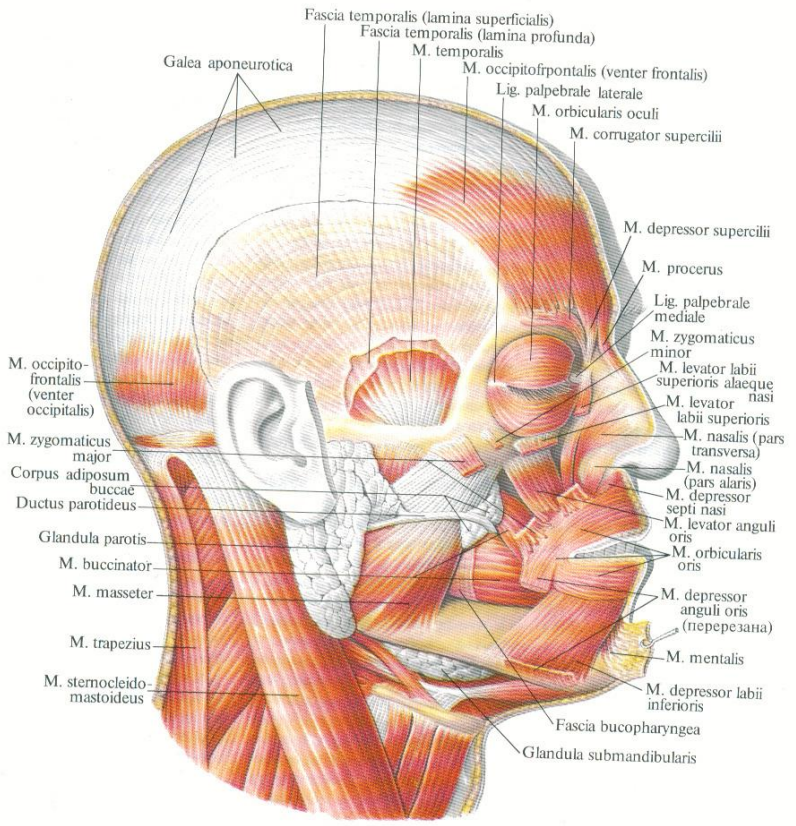


The fasciae of the head

- The bucopharyngeal fascia covers the buccinator muscle, and then continues on the lateral surface of the superior contrctor muscle of the pharynx.

a) In front it ends in the cutaneous tissue of the cheeks.

b) Posteroinferiorlly it continues with the adventitia of the pharynx and with the plates of the fasciae of the neck.

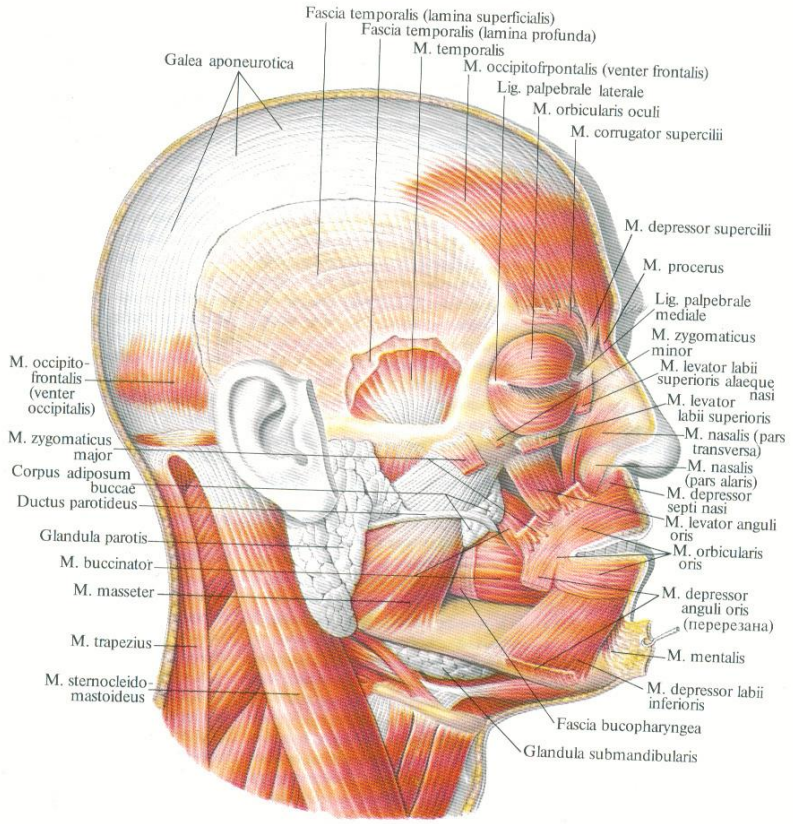


The osteo-fascial and intermuscular space of the head

a) OFS of the vault of the skull
b) OFS of the temporal region
c) OFS of the lateral surface of the face

The osteo-fascial and intermuscular spaces of the vault of the skull

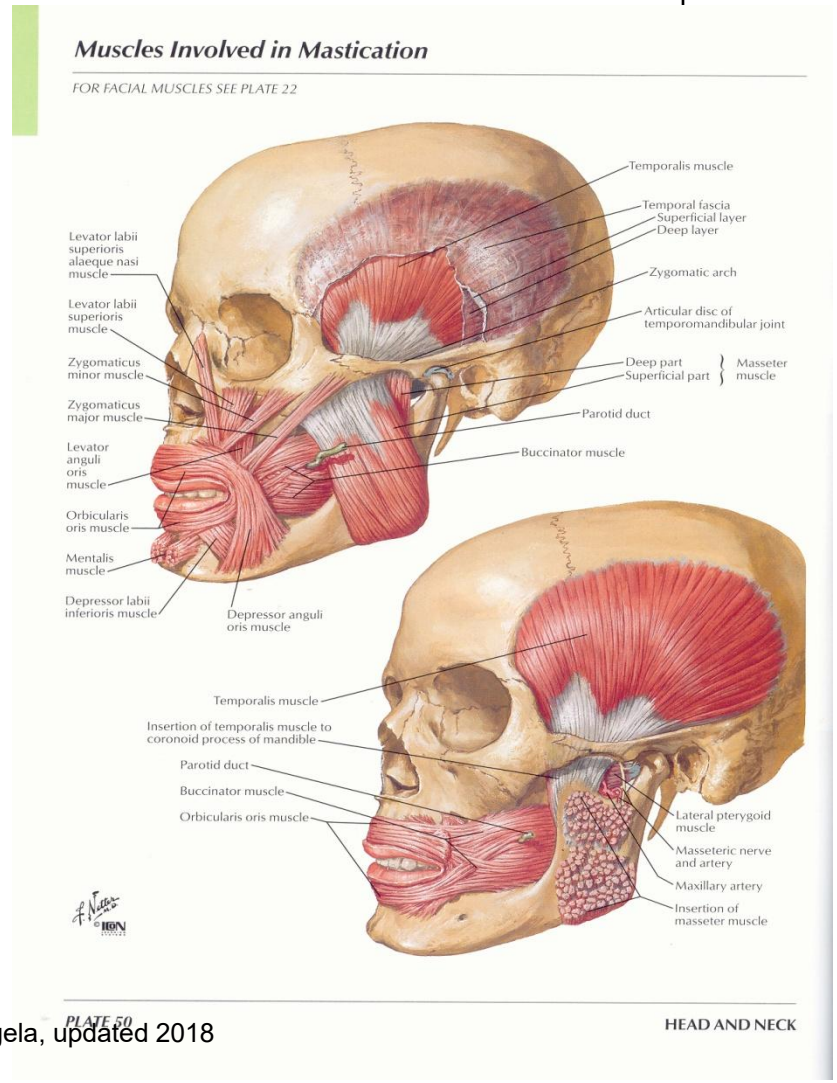
- **The superficial space** – between the skin and superficranial aponeurosis (it contains the superficial blood vessels).
- **The subapponeurotic space** – between the epicranial aponeurosis and temporal aponeurosis.
- **The subperiosteal aponeurosis** – between the periosteum and external plate of the vault of the skull.



The osteo-fascial and intermuscular spaces of the temporal region

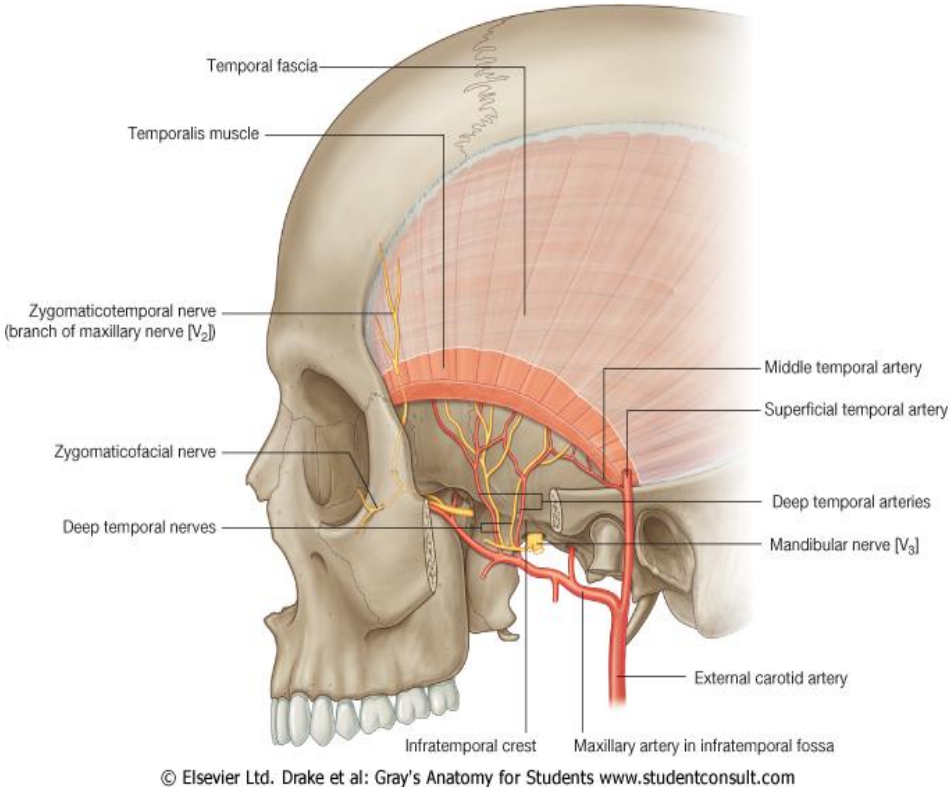
- Between the superficial and deep plates of the temporal fascia forms an interapponeurotic space that contains the temporal muscle, an the adipose tissue and the meddle temporal artery and veins.

- Between then temporal fascia and the temporal muscle is located the subapponeurotic space that contains a part of the adipose body of the cheeks.



The osteo-fascial and intermuscular spaces of the temporal region

- **The deep temporal space** is located between the deep fascicles of the temporal muscle and the periosteum and it contains the deep temporal vessels and nerves and communicates with the neighboring spaces.

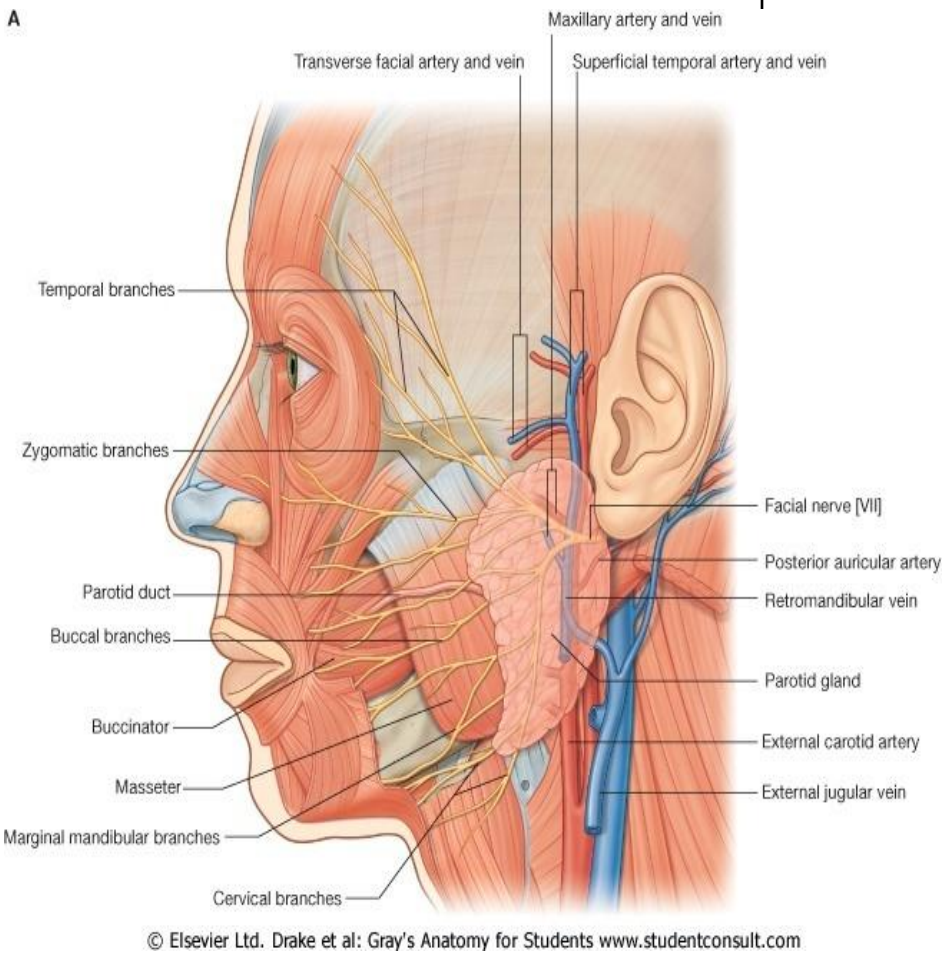


The osteo-fascial and intermuscular spaces of the lateral region of the face

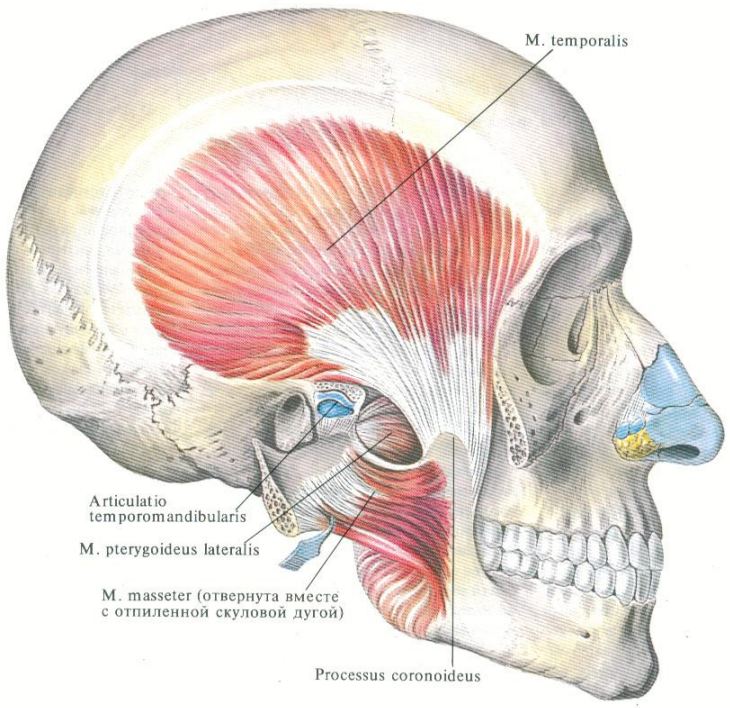
- The **adipose body** of the cheeks (Bichat) is located between the skin and buccinator muscle, being adjacent to the anterior margin of the masseter muscle. It is well developed in infants, and it minimize the effect of atmospheric pressure on the oral cavity of infant during feeding.
- The processes of that body enter the adjacent osteo-fibrous spaces.

The osteo-fascial and intermuscular spaces of the lateral region of the face

- **The space of the parotid gland –** contains the parotid gland, the blood vessels and nerves:
- The external carotid artery and its branches
- The retromandibular vein
- The parotid lymph nodes
- The facial nerve and the auriculo-temporal nerve

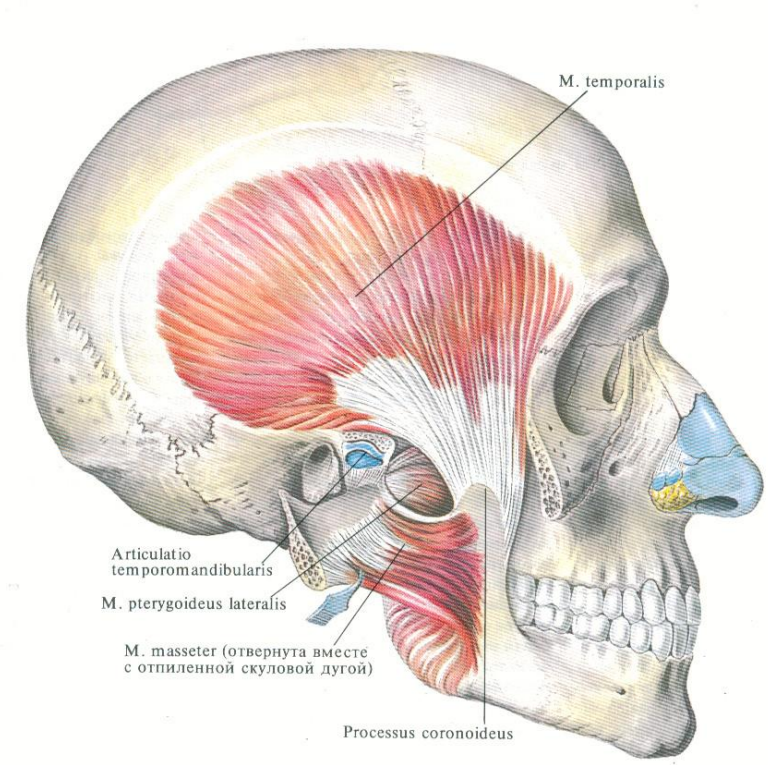


The osteo-fascial and intermuscular spaces of the lateral region of the face



- **The masseteric-mandibular space** is located between the masseter muscle and the ramus of the mandible.
- It contains adipose tissue, blood vessels and nerves.
- Superiorly it connects with the temporo-pterygoid space.

The osteo-fascial and intermuscular spaces of the lateral region of the face



- **The temporo-pterigoid space** is located between the temporal and lateral pterygoid muscle and it communicates with:

a) orbit

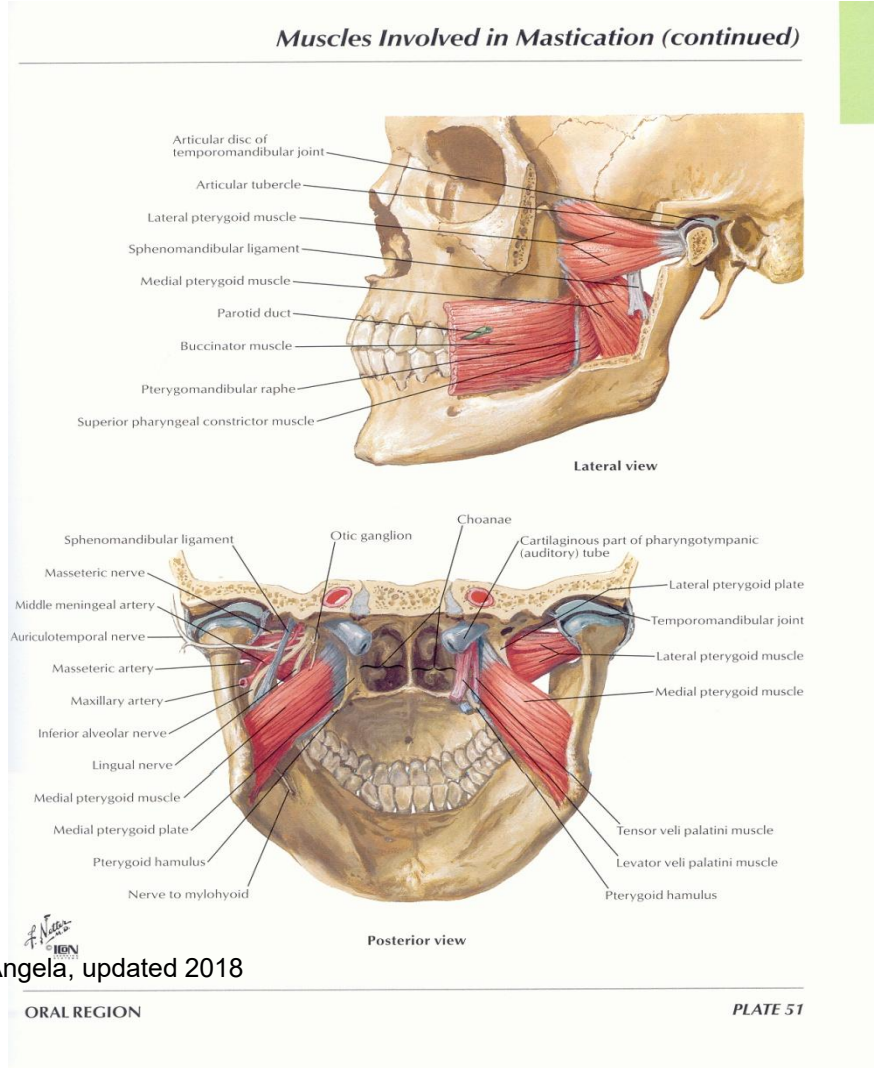
b) nasal cavity

c) oral cavity

- It contains the maxillary artery and the pterygoid venous plexus.

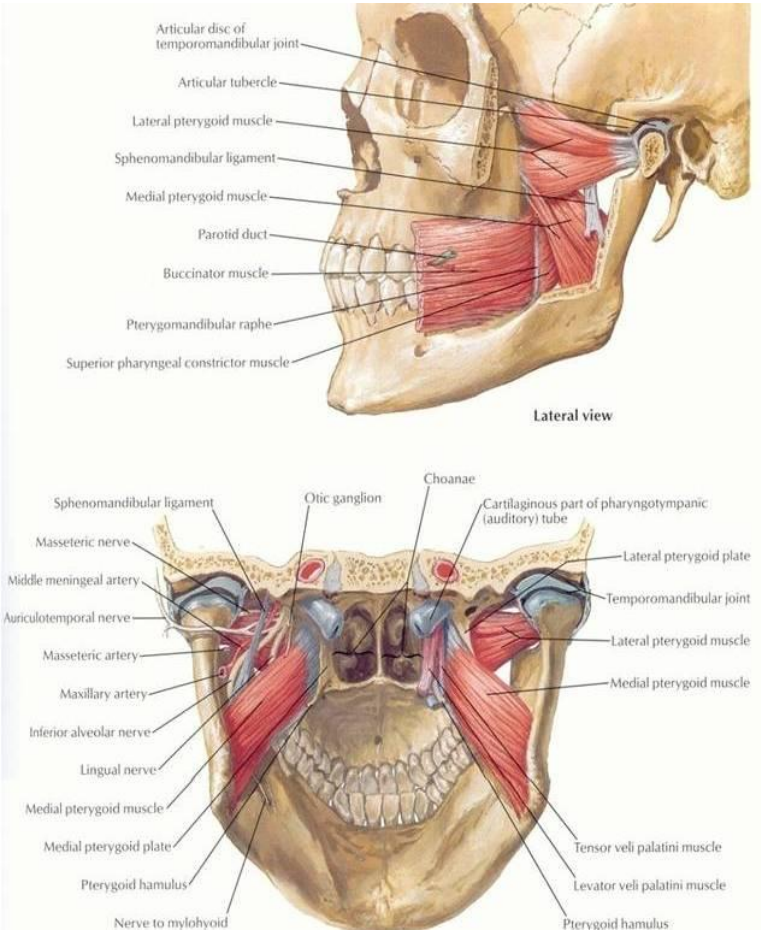
The osteo-fascial and intermuscular spaces of the lateral region of the face

- The interpterygois space is located between the medial and lateral pterygoid muscles.
- It contains the inferior alveolar nerve, the maxillary artery and the pterygoid venous plexus.



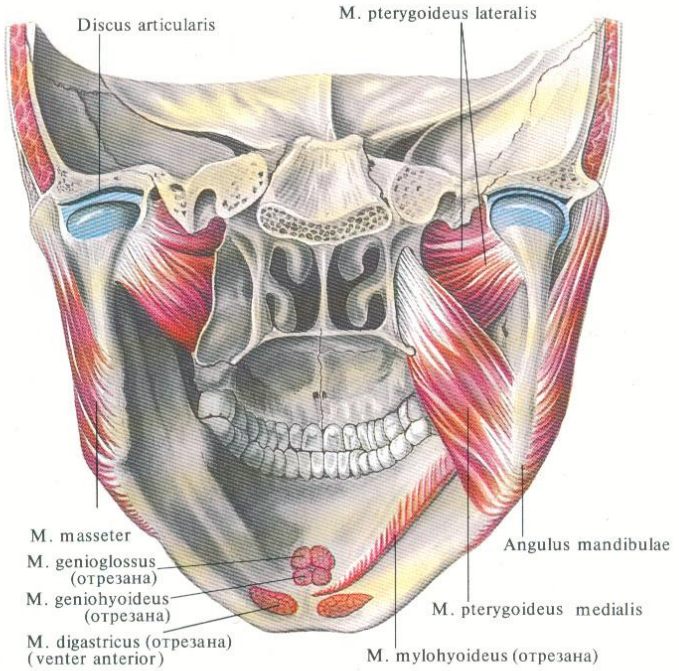
The osteo-fascial and intermuscular spaces of the lateral region of the face

- The **suprapterygoid space** is bounded by the superior head of the lateral pterygoid muscle and by the infratemporal surface of the greater wing of the temporal bone.
- It contains blood vessels and nerve and it connects with the neighboring spaces.



The osteo-fascial and intermuscular spaces of the lateral region of the face

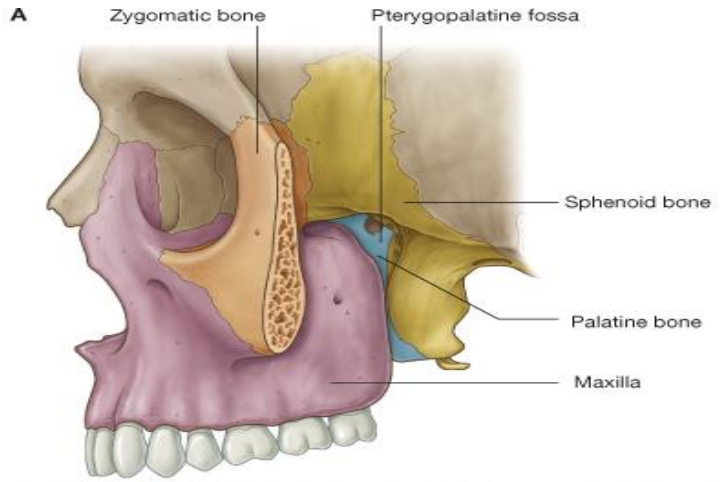
- The **temporo-mandibular space** is bounded by the medial pterygoid muscle and by the ramus of the mandibule.
- It connects with the neighboring spaces and it contains the inferior alveolar nerve and the homonimous blood vessels.

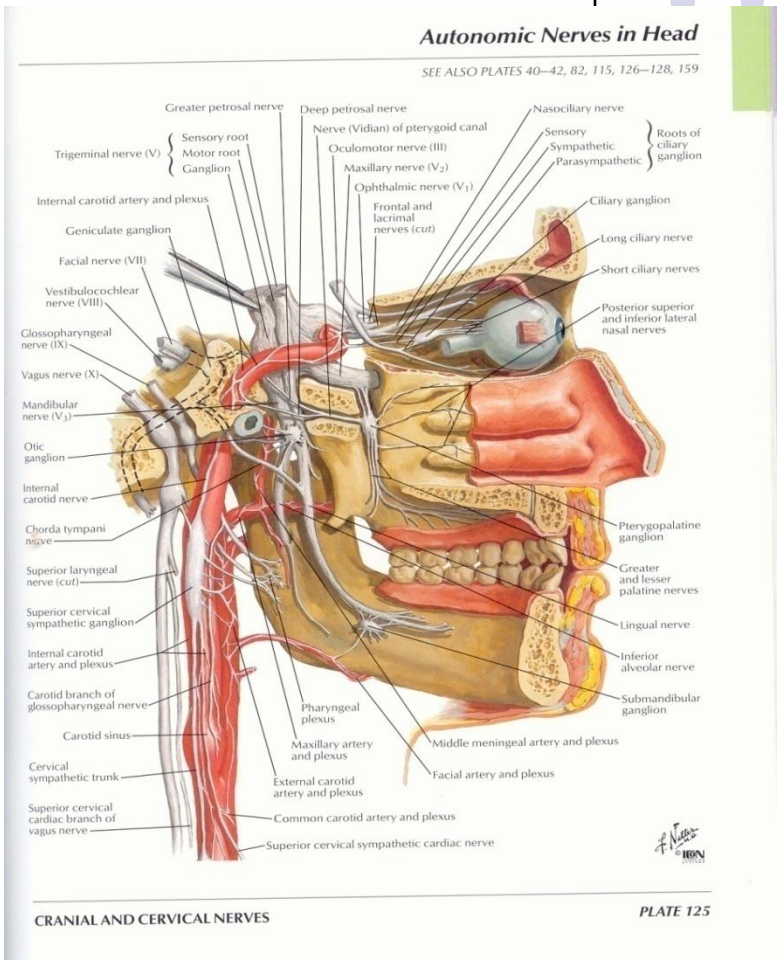


344. Жевательные мышцы; вид сзади.

The osteo-fascial and intermuscular spaces of the lateral region of the face

- **The pterygoid fossa** contains the pterygopalatine ganglion, the maxillary nerve, the maxillary artery and the pterygoid venous plexus.





Muscles of the neck

- The neck is a part of the body which connects the head with the trunk.

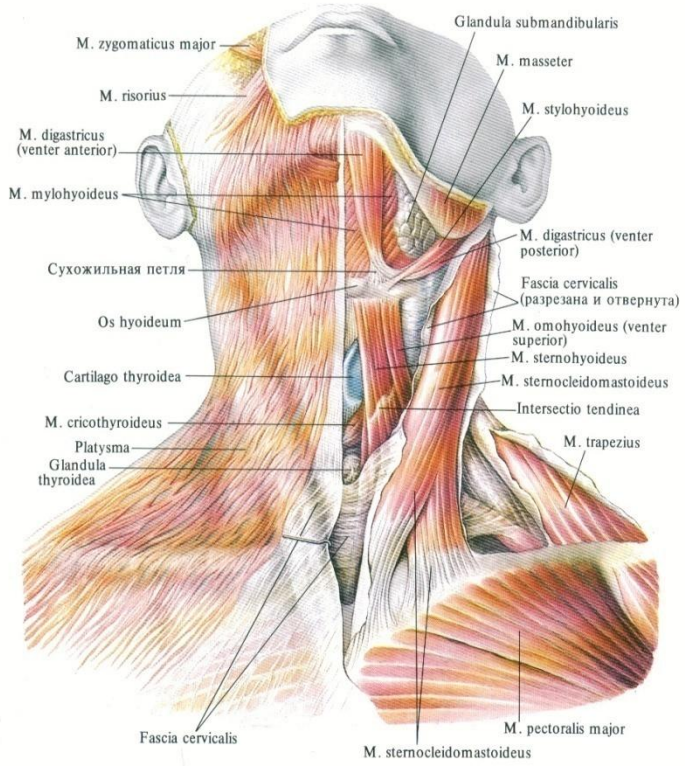
- Some specific features are encountered in the muscles of the neck according to their topography, structure, function and ontogenesis.

Muscles of the neck

- **According to their topography muscles of the neck are divided into following groups:**
- Superficial muscles of the neck
- Muscles inserted on the hyoid bone
- Deep muscles of the neck

Muscles of the neck

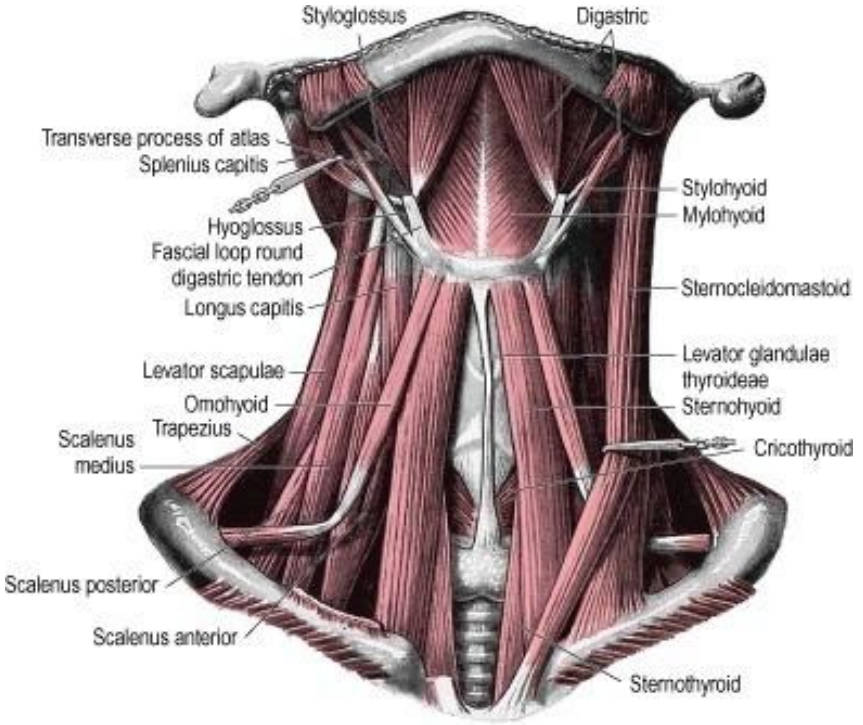
- **Superficial muscles of the neck:**
- m. platysma
- m. sternocleidomastoideus



Muscles of the neck

- **Muscles inserted on the hyoid bone:**
- Suprahyoid muscles: m. digastricus, m. stylohyoideus, m. mylohyoideus, m. geniohyoideus.
- Infrahyoid muscles: m. omohyoideus, m. strenohyoideus, m. sternothyroideus, m. thyrohyoideus.

NB: The suprahyoid muscles build on the floor of the mouth, participate in mastication, deglutition and speech.



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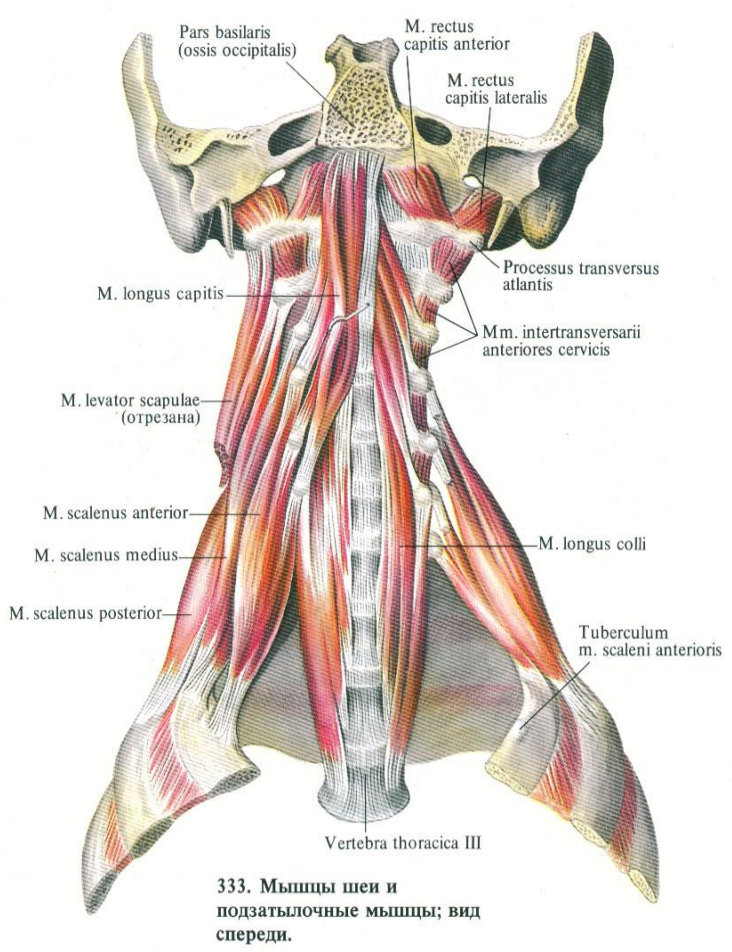
Muscles of the neck

- **Deep muscles of the neck:**

a) Lateral group of muscles: anterior, middle and posterior scalen muscles.

b) The prevertebral group of muscles: m. longus coli, m. longus capitis, m. rectus capitis anterior and m. rectus capitis lateralis.



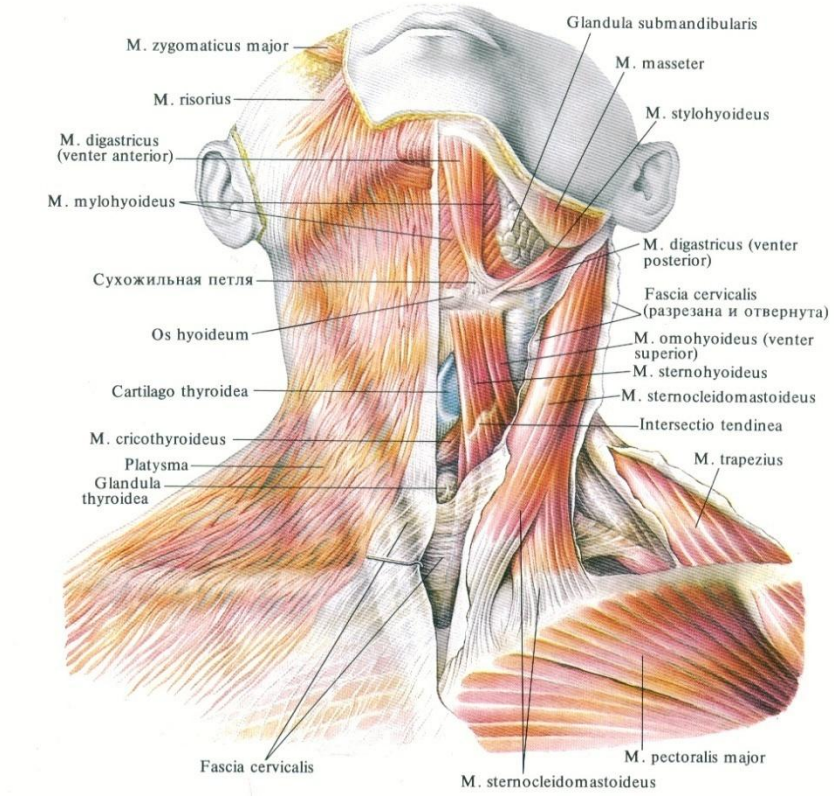
333. Мышцы шеи и подзатылочные мышцы; вид спереди.

Functions of the muscles of the neck:

- They action the movements of the head and of the cervical segment of the vertebral column.
- They action the mandibule, the hyoid bone and the first two ribs.
- During contraction of some muscles of the neck changes the position of the tong, pharynx and larynx.

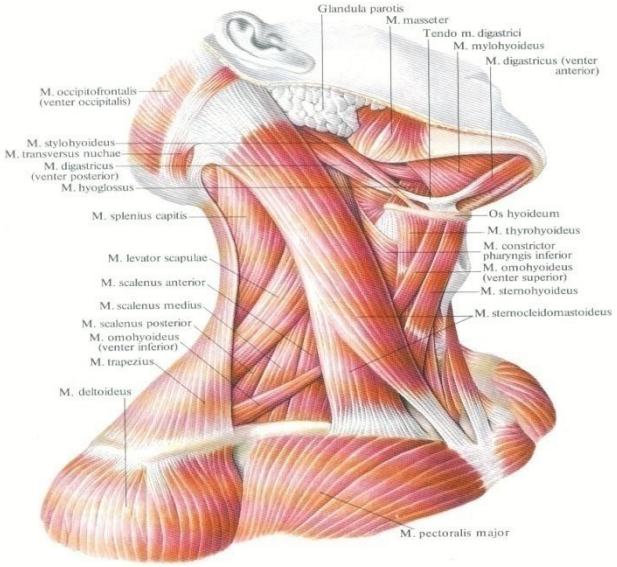
Development of the muscles of the neck

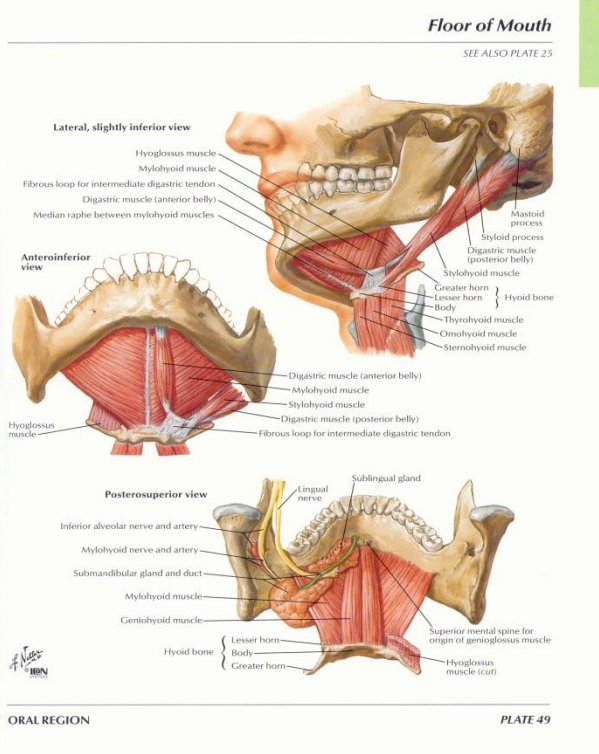
- From the first visceral arch develops the anterior belly of the digastric muscle and the mylohyoid muscle.
- From the second visceral arch develop: the posterior belly of the digastric muscle, the stylohyoid and platysma muscle.

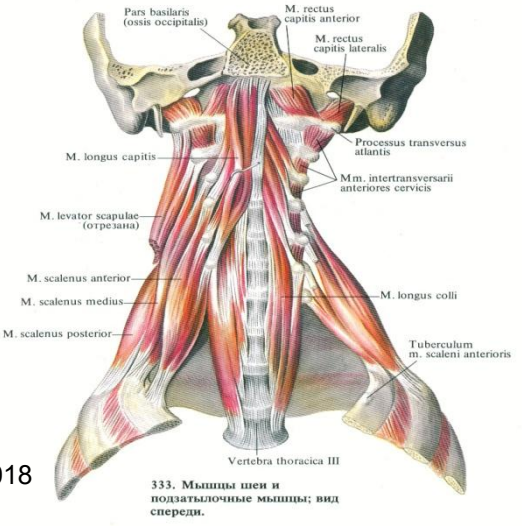


Development of the muscles of the neck

- From the branchial arches derive the m. sternocleidomastoideus and m. trapezius.
- The autochtonous muscles of the neck are: the infrahyoid muscles, m. geniohyoideus and the deep muscles of the neck.







333. Мышцы шеи и подзатылочные мышцы; вид спереди.

Topography of the neck

- The anterior margin of the trapezius muscle serves as a referent point for divisions of the regions of the neck.
- The neck is divided into:
- **Posterior cervical region, or nuchal one.**
- **Anterior cervical region.**

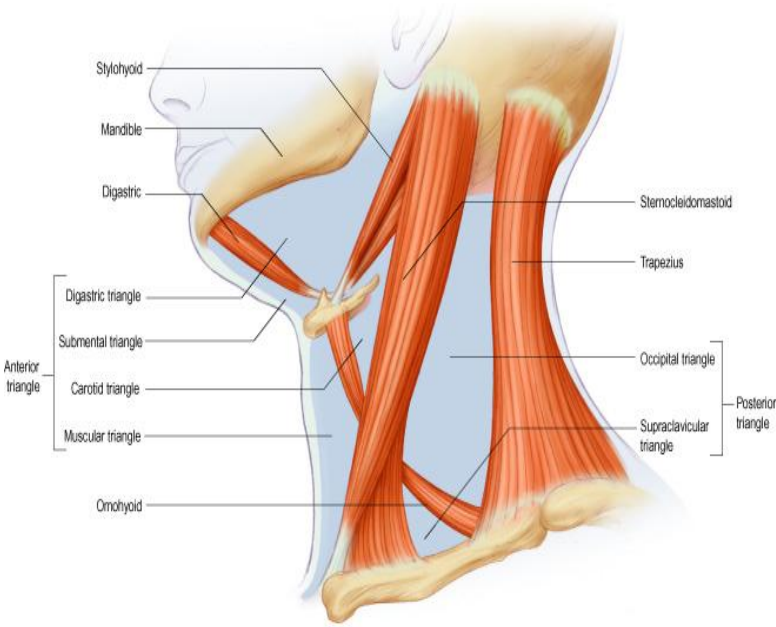
Triangles of the neck

- The sternocleidomastoid muscle separates the anterior cervical region into:

a) **The sternocleidomastoid region,** corresponds to the projection of the homonimous muscle.

b) **The medial cervical triangle**

c) **The lateral cervical triangle**



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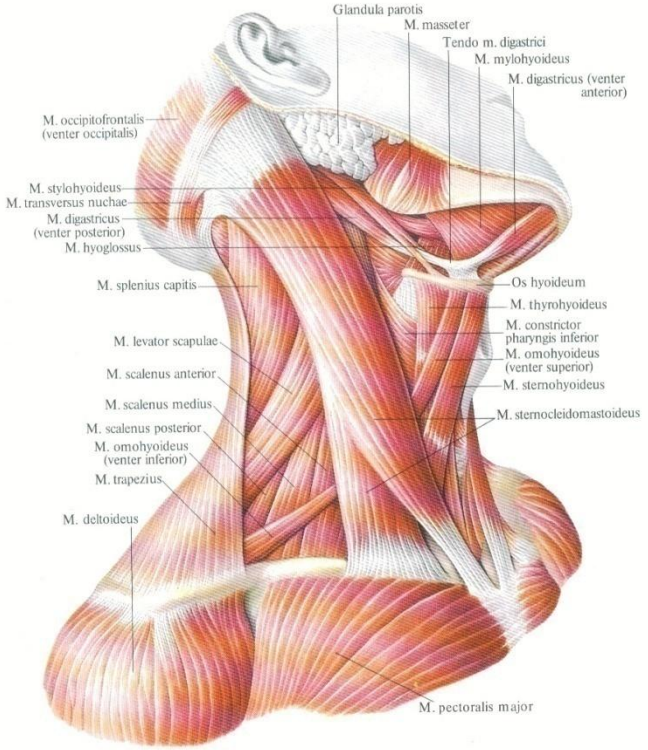
Medial triangle of the neck

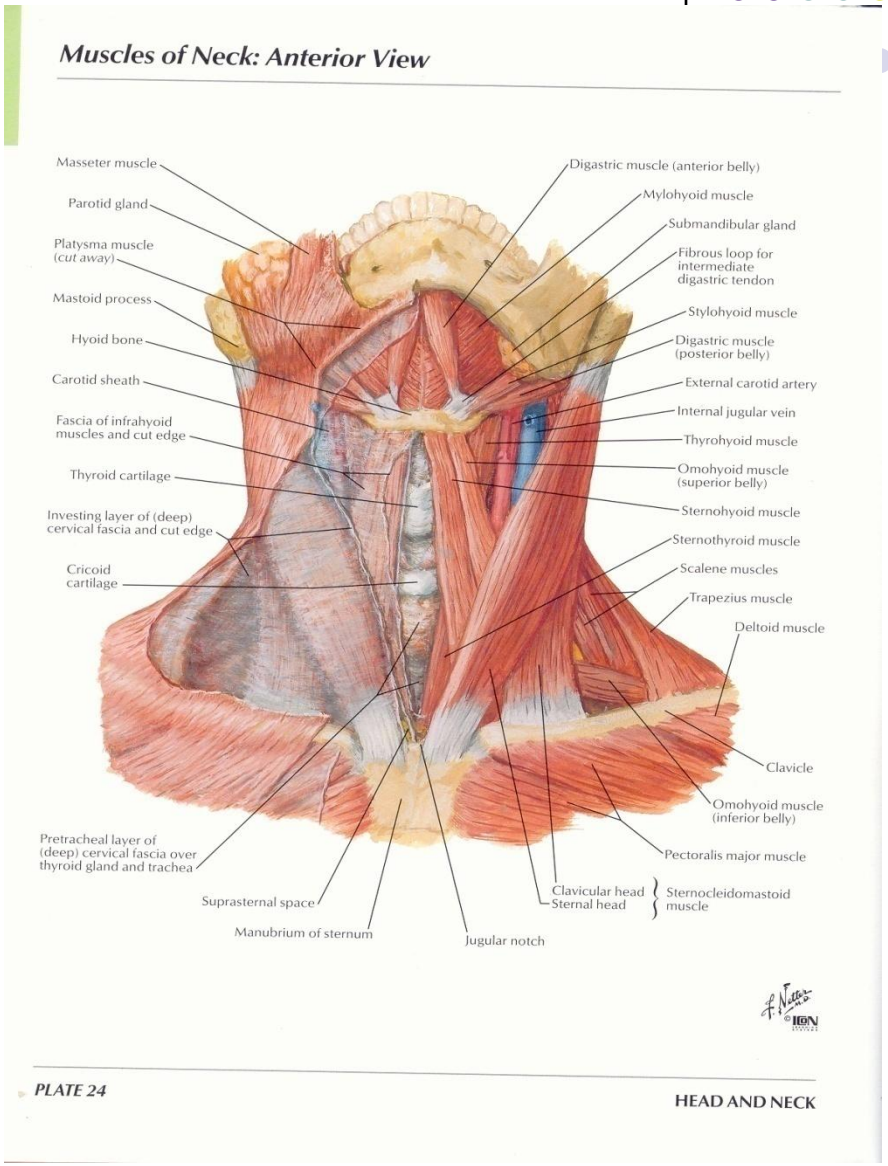
- In front is bounded by the anterior median line.
- Behind by the sternocleidomastoid muscle
- Superior by the inferior margin of the mandible.

  The superior belly of the omohyoid muscle and the digastric muscle divide the medial cervical triangle into three smaller triangles:

1. The omotracheal triangle
2. The carotid triangle
3. The submandibular triangle

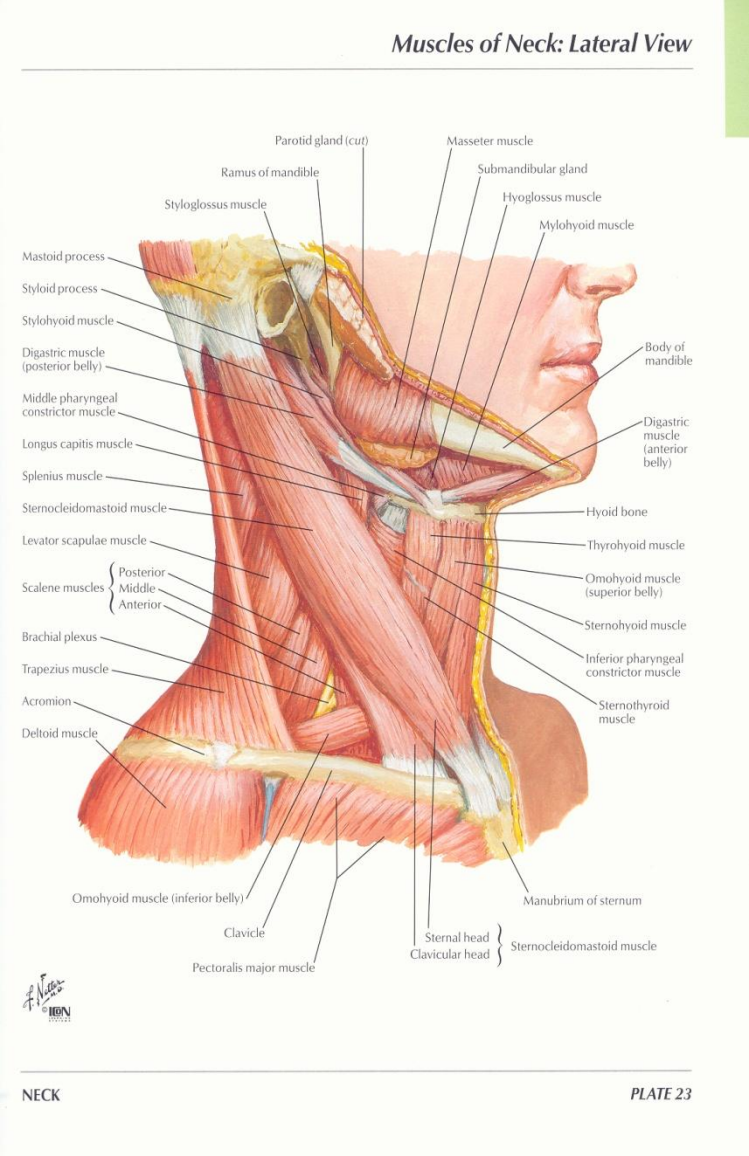


- The carotid triangle (through it passes the neuro-vascular patch of the neck: the common carotid artery, the internal jugular vein and the vagus nerve).
- The submandibular triangle (through it passes the the submandibular salivary gland, the blood vessels and nerves).
- The submental triangle
- The triangle of the lingual artery, or Pirogov‘s triangle (trough it passes the lingual artery).

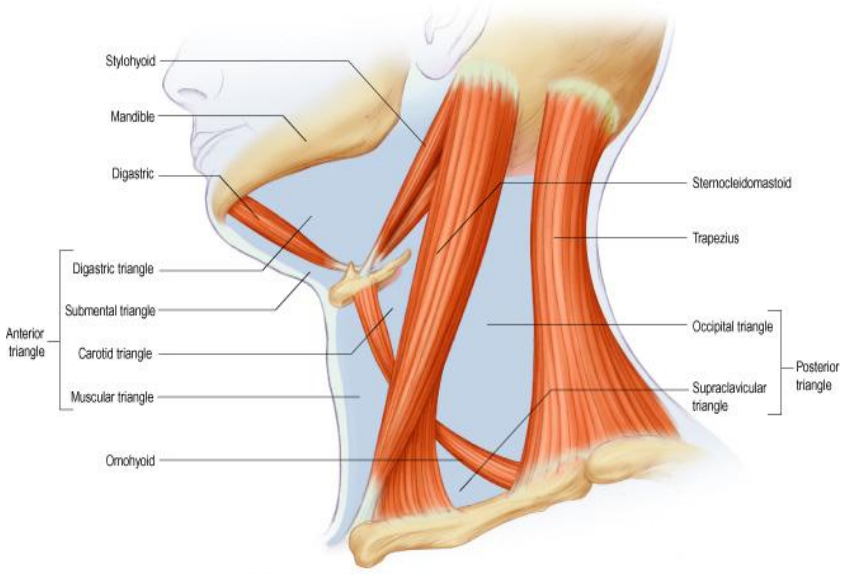


The retromandibular fossa

- The retromandibular fossa is a depression located between the mandibular angle, external auditory meatus, mastoid process, SCM muscle, styloid process and muscles inserted on it.
- The retromandibular fossa contains blood vessels, nerves and posterior part of the parotid gland.



Lateral cervical triangle



The lateral cervical triangle is **bounded**:

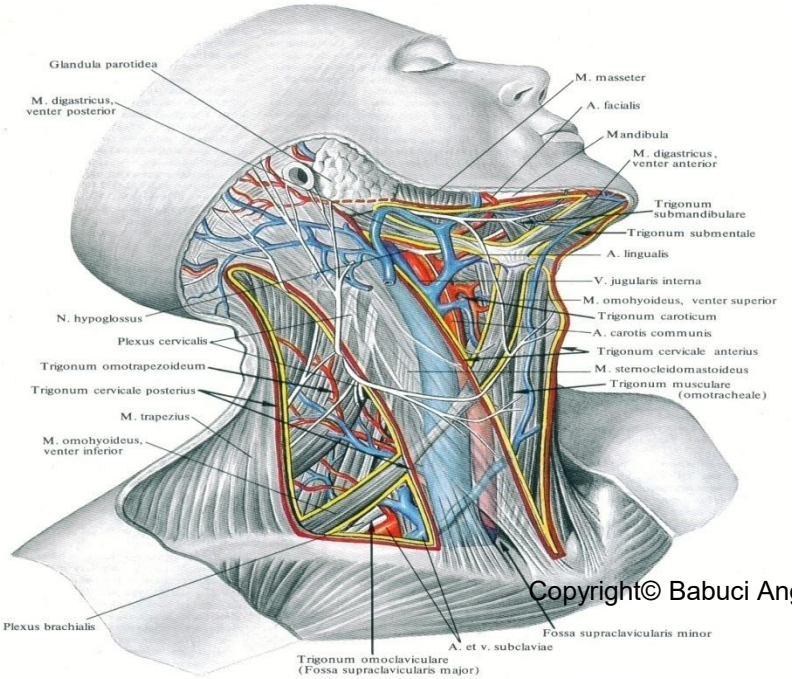
- In front by the SCM muscle
- Behind by the trapezius m.
- Below by the clavicle

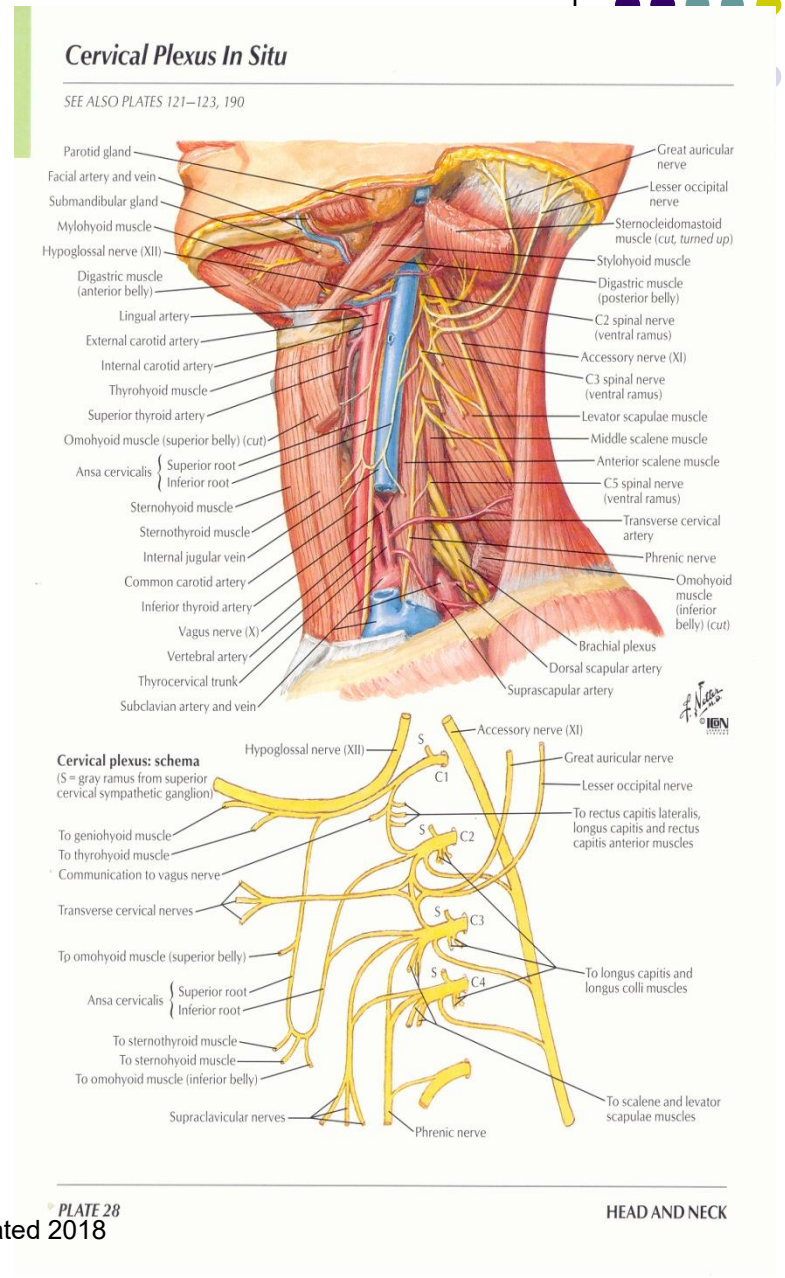
Within this triangle are encountered:

The omotrapezoid triangle

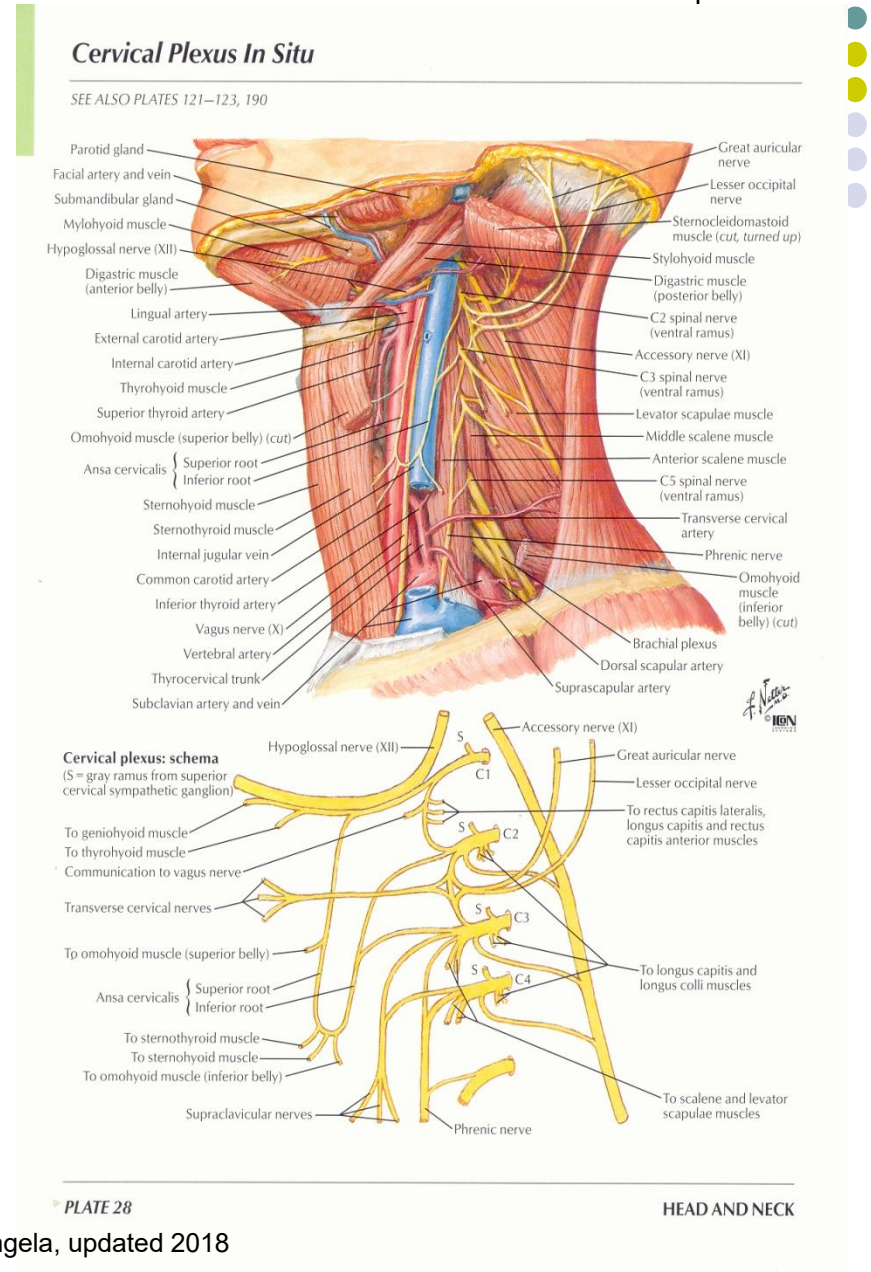
The omoclavicular triangle, that are separated between each other by the inferior belly of the omohyoid muscle.

- **The interscalenic space** is located between the anterior and middle scalen muscles, inferiorlly it is bounded by the first rib.
- Through this space pass the subclavian artery and the brachial plexus.



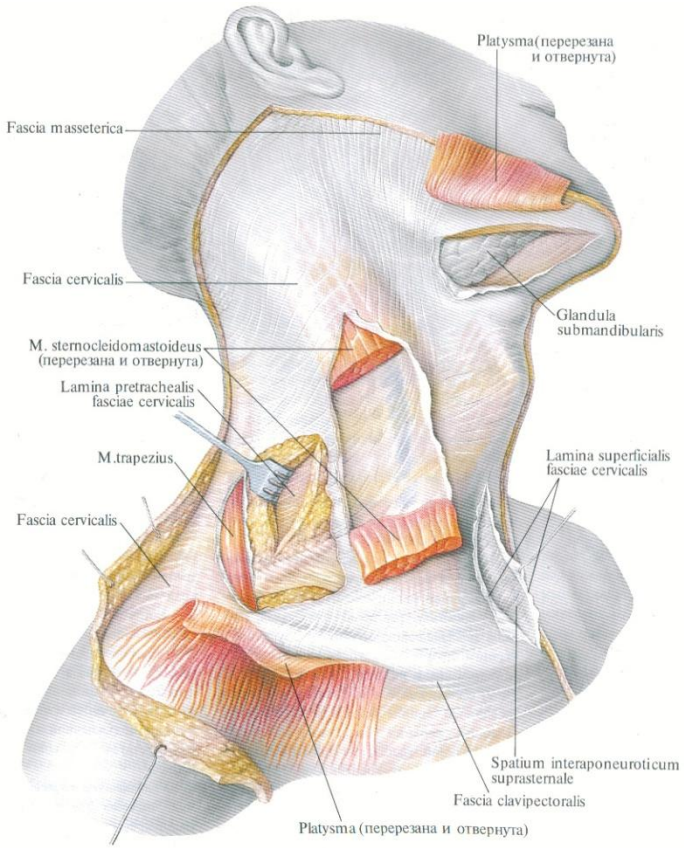


- **The interscalenic space** is located in front of the anterior scalen muscle.
- Through this space pass the subclavian vein and the frenic nerve.



Fascia of the neck

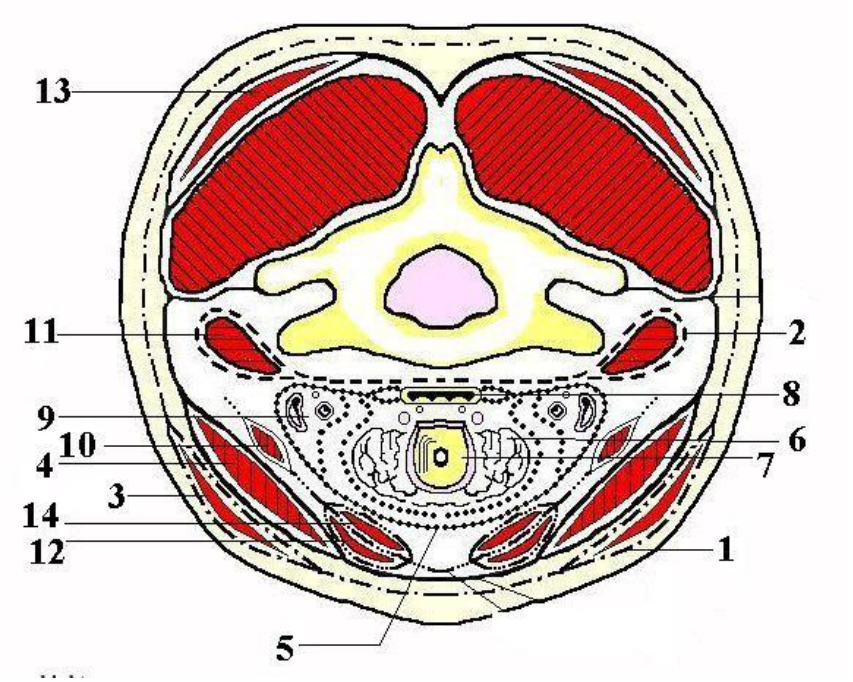
- The cervical fascia consists of three plates:
- The superficial fascia of the neck
- The proper fascia
- The endocervical fascia



335. Фасции шеи; вид справа.

The fasciae of the neck

- **The superficial fascia** of the neck differs from all the other fascia, because it contains the platysma muscle.



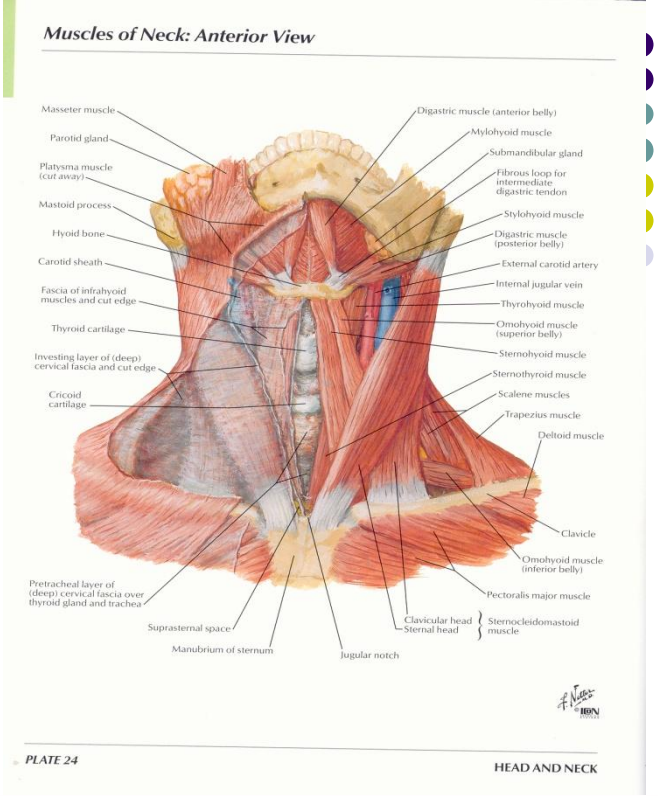
The proper fascia consisits if two parts:

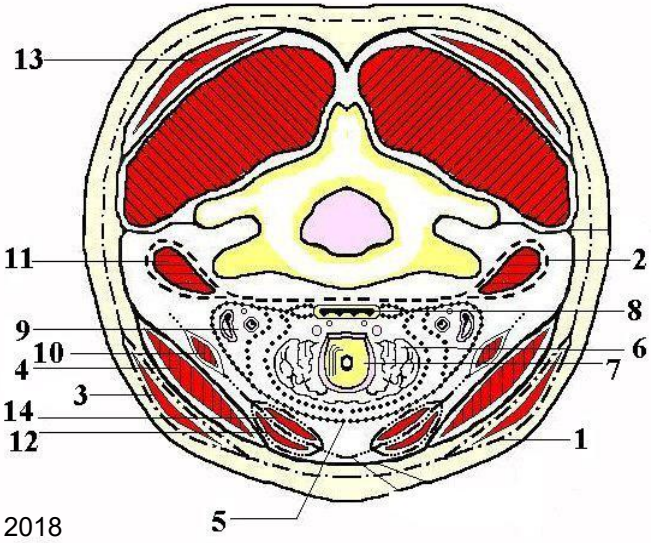
- **The suprahyoid part** with two plates:

1. The superficial plate
2. The deep plate

- **The infrahyoid part with three plates**:

1. **The superficial plate of the proper** fascia forms sheath for the SCM and trapezius muscles. This fascia gives of a transverse septum that separates the anterior region of the neck from the posterior one and localizes the inflamatory processes.
2. **The pretracheal plate** forms sheath for infrahyoid muscles.
3. **The prevertebral plate** forms sheaths for the deep muscles of the neck.

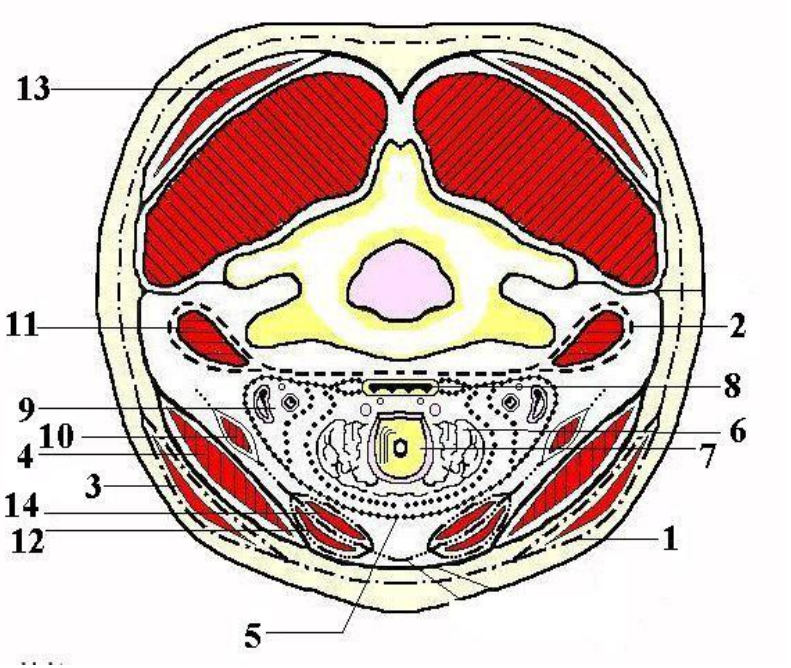




Fasciae of the neck

- Between the pretracheal and prevertebral fascia is located the endocervical fascia with two plates:

1. **The visceral plate invests** each organ of the region of the neck.
2. **The parietal plate invests** totally the organs of the neck and forms sheaths for the neuro-vasclar patch of the neck.

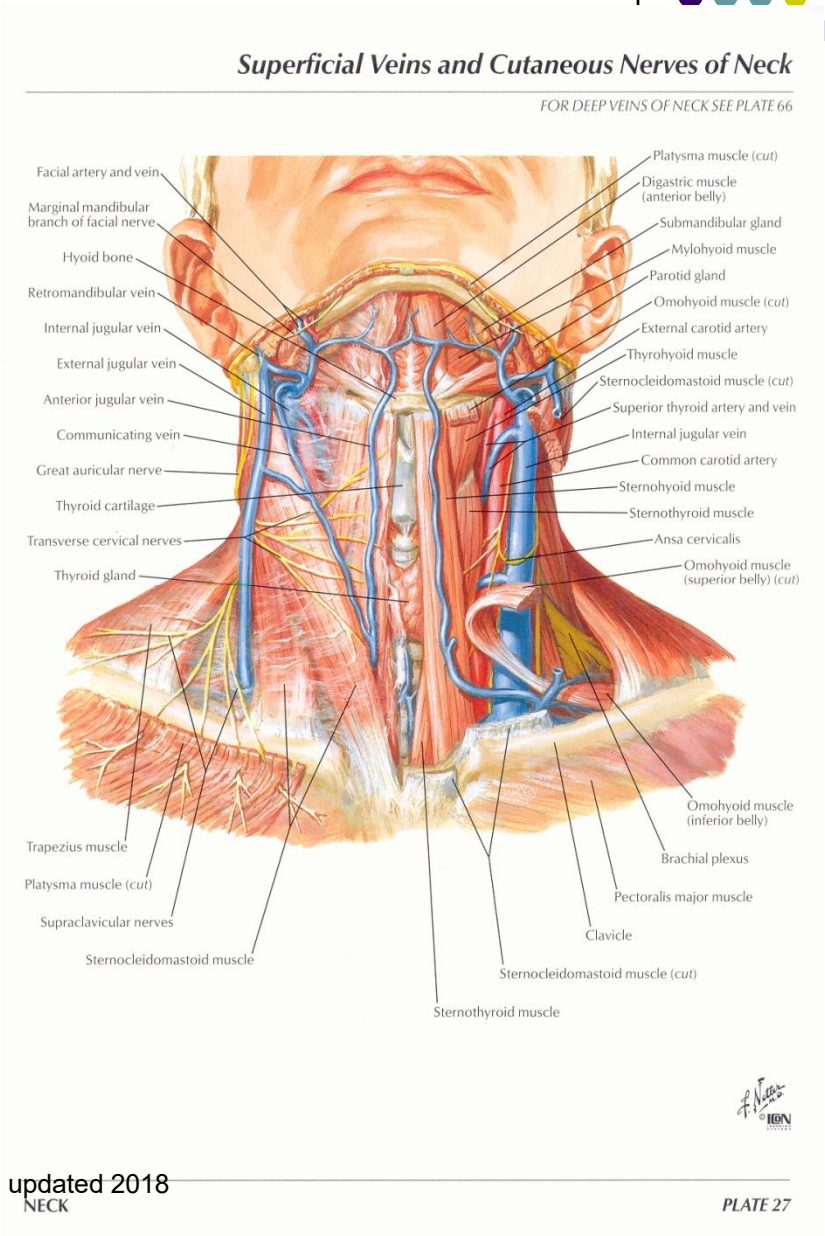


The interfascial spaces of the neck

- **The interaponeurotic suprasternal space** is located above the jugular notch of the sternum and it is bounded by the superficial plate of the proper fascia of the neck and pretracheal plate (superficial and deep plates of the proper fascia of the neck)

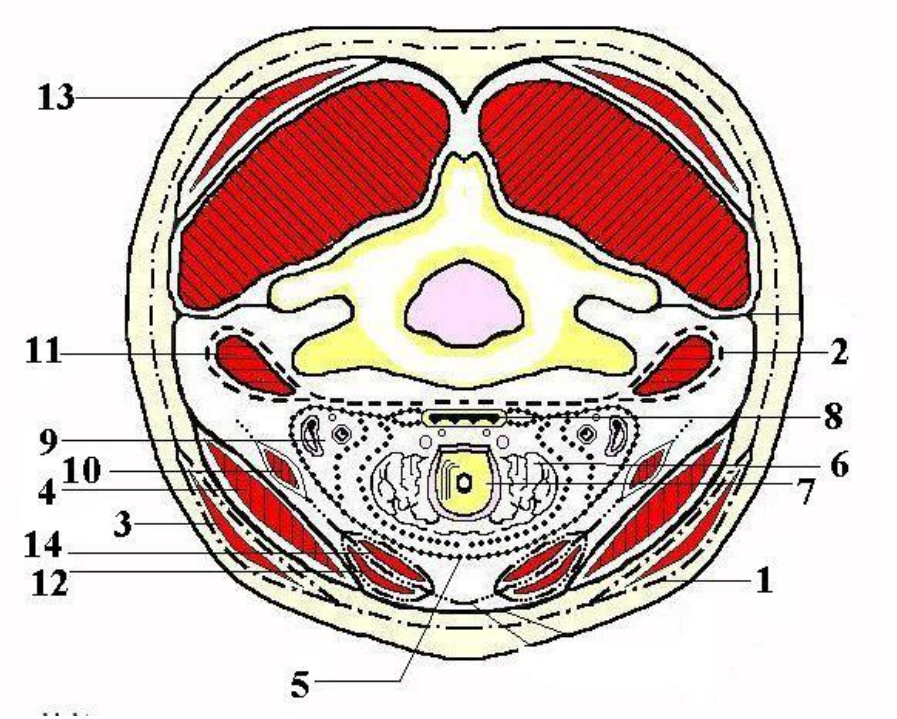
- This space contains the venous jugular arch, formed by anastomosis between the anterior jugular veins.

- Laterally this space dilates and form the sternoclaidomastoid recess.



The interfascial spaces of the neck

- The **previsceral** space forms between the parietal and visceral plates of the endocervical fascia.
- This space communicates with the anterior mediastinum (BNA) or middle one by (PNA).



The interfascial spaces of the neck

- **The retrovisceral space is located** behind the pharynx and esophagus.
- It is bounded by the endocervical fascia and prevertebral fascia.
- This space communicates with the posterior mediastinum.