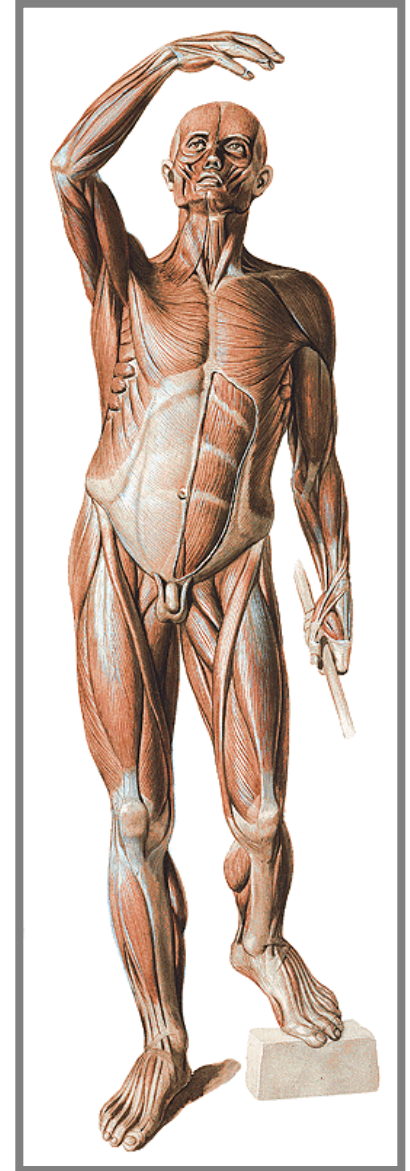


# **GENERAL MYOLOGY**

**(Muscles - an active part of the locomotor system)**

# General function of muscles

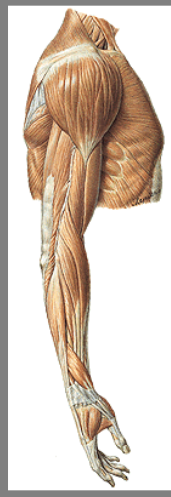
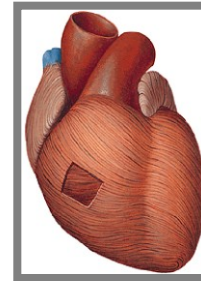
- \* produce **movement** in sites of skeletal junctions
- \* **change shapes** of various body cavities and openings
- \* give information about the **body position** in 3D space
- \* important role during **thermoregulation**
- \* help to **blood and lymph circulation**
- \* **verbal and non verbal communication**
- \* about 600 muscles (♂ 35%, ♀ 32% of weight)
- \* **logistic system** (supports respiration, digestion...)



On the basis of **structure** and **physiological** characteristics we distinguish:

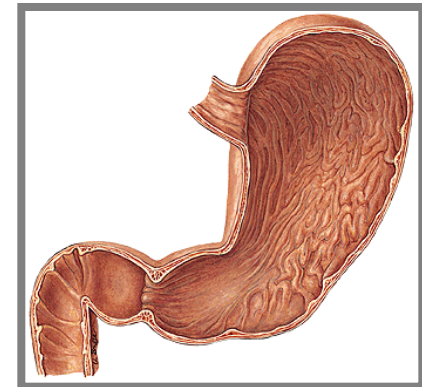
**1) Striated (skeleton) muscles – muscoli sceleti**

(form muscles of limbs, work under control of our will, easy fatigued, spend a lot of energy, produce heat)  
+ skin muscles (*musculi cutanei*)

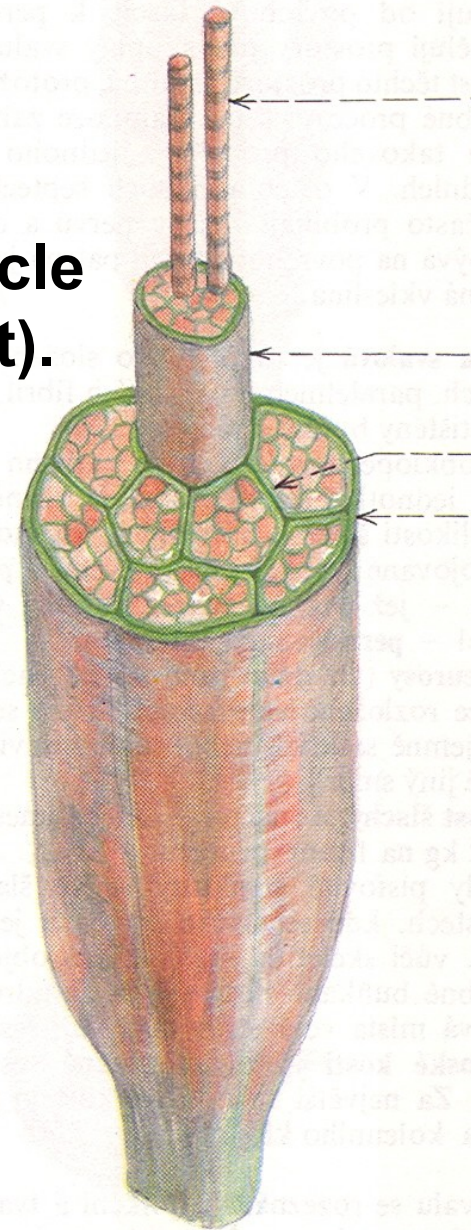


**2) Cardiac muscles (myocardium)**

**3) Non-striated visceral (smooth) muscles** – form an integral part of some hollow organs and cavities - work without our will, without fatigue).



The main of the mechanical function of muscle fibers is **shortening - contraction** (movement).

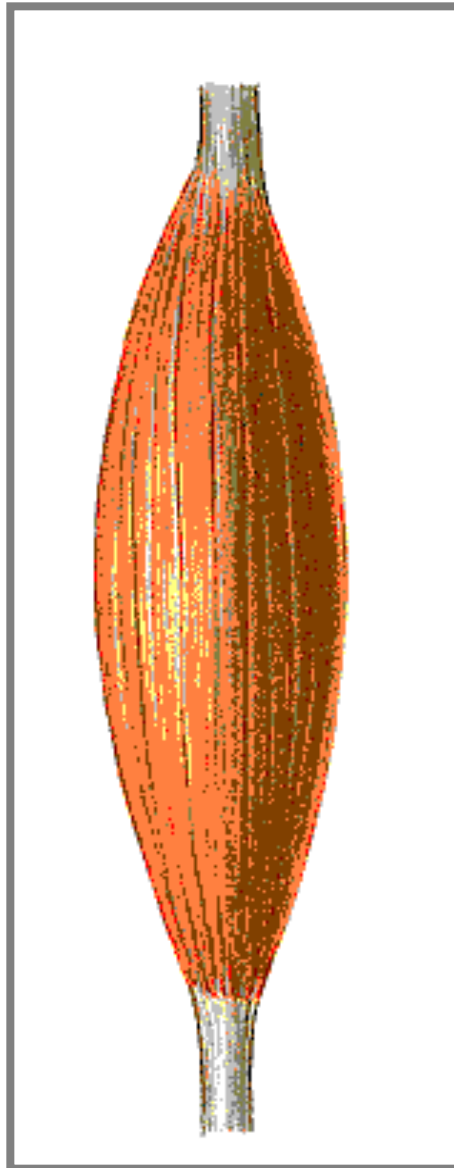


# Common structure of muscle

**Origo (*origin*)**

**Fascia (cover)**

**Tendo, aponeurosis  
Insertio (*insertion*)**

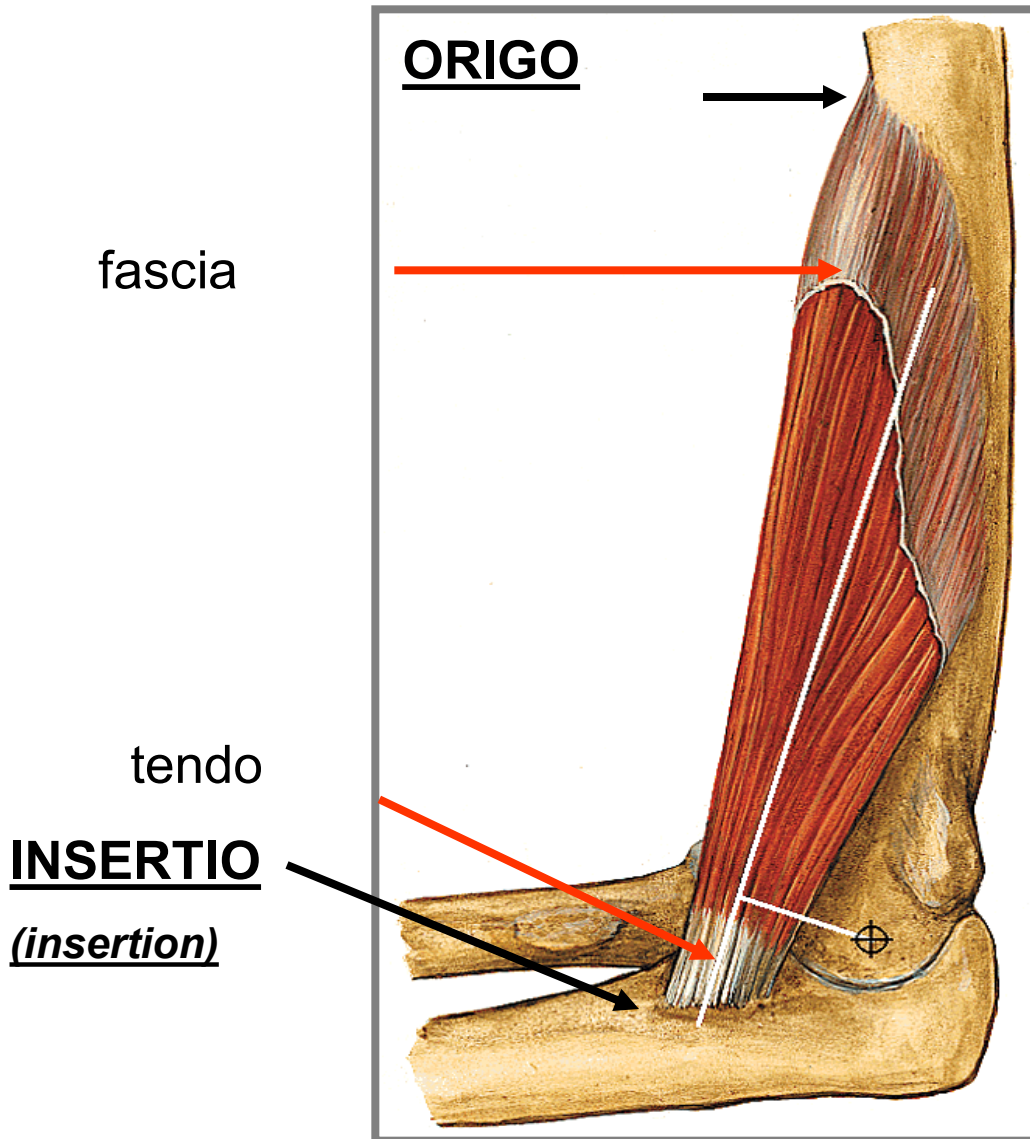


**Caput (*head*)**

**Venter (*belly*)**

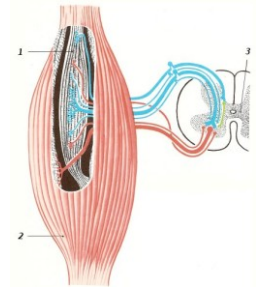
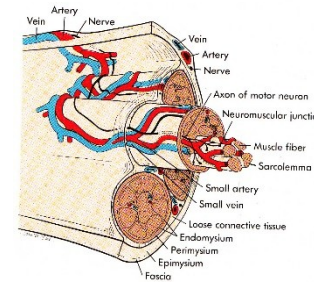
**Cauda (*tail*)**

# Structure of muscle



fibrous membrane – *fascia* – separates the muscles (or groups) from adjacent structures

**Vessels and nerves** enter into muscle by its hilus (rich ramification)



**Tendons are attached to the bones by Sharpey's fibres**

# Auxiliary facilities of muscles

**1. Fasciae** – allow to move one muscle against the other

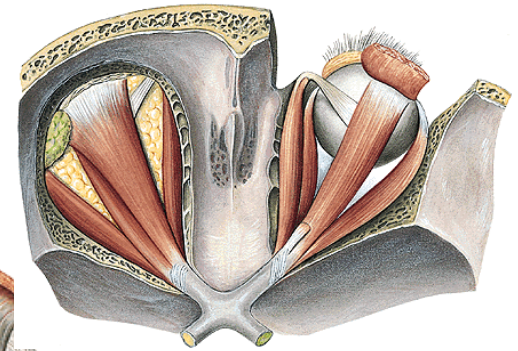
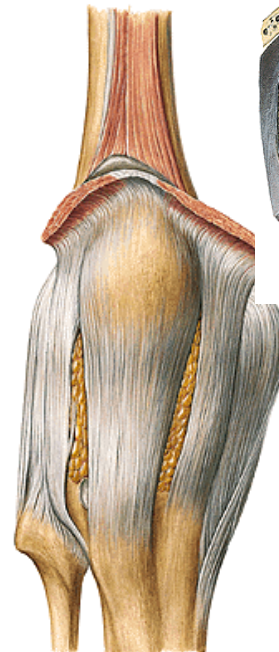
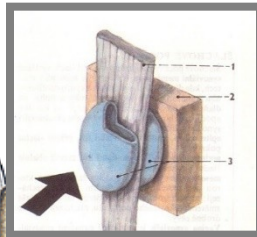
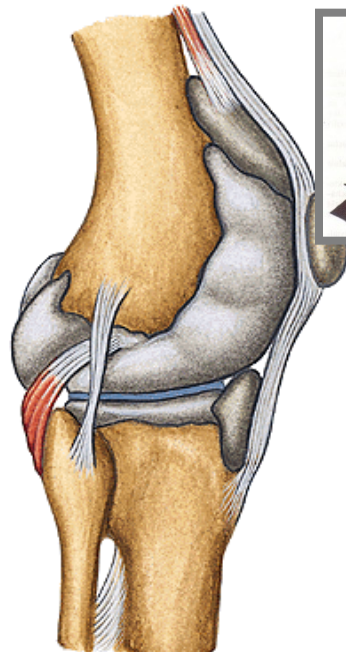
**2. Bursae synoviales** (*synovial bursae*) – protect muscle tendons against friction

**3. Tendo, aponeurosis**=tendon of flat muscles

**4. Trochleae musculares** (*muscular trochleae*) – fibrous loops keeping tendon to a bone, permit change of direction of muscle pulling

**5. Ossa sesamoidea** (*sesamoid bones*) – at the places of pressure

**6. Vaginae tendinum** (*tendon sheaths*)



# Auxiliary facilities – **vaginae tendinum and vaginae synoviales** (*tendon and synovial sheaths*)

A space along tendons, closed, increasing sliding capacity of tendons

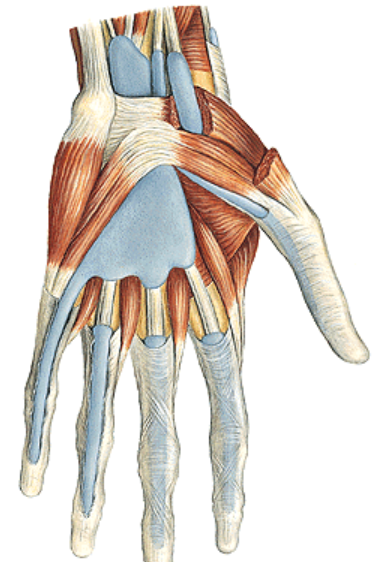
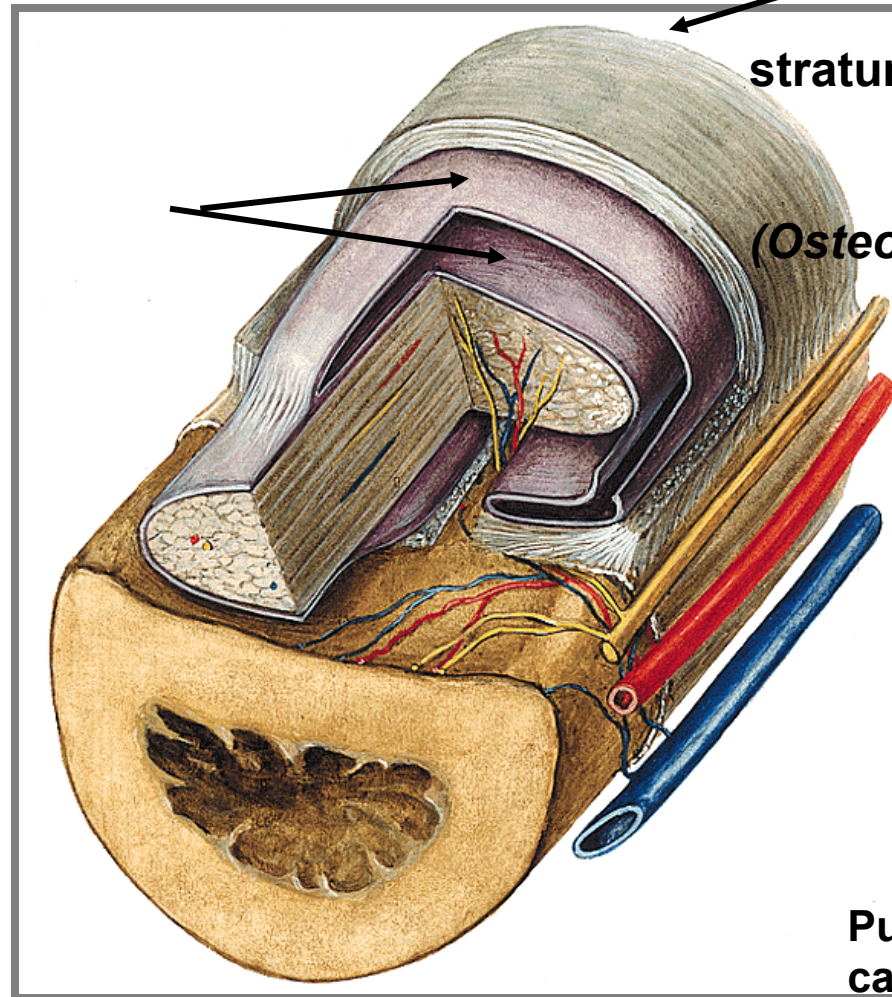
**Fibrous layer** =

stratum fibrosum

(*Osteofibrous canal*)

**stratum synoviale**=  
(*synovial layer*)

ext. and int. layer with  
mesotenonium for  
penetration of vessels  
into tendon)



Purulent inflammation  
can spread here



# Division of muscles according to the shape

- *long type* (predominantly limb muscles)

- *flat type of muscles* (abdominal wall muscles)

- *short type of muscles* (circumarticular muscles)

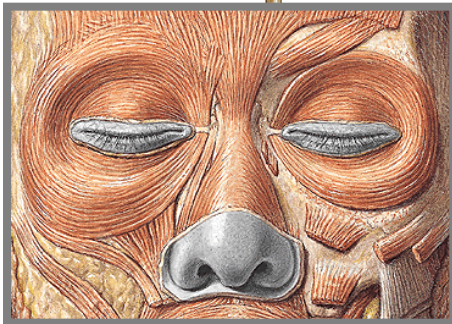
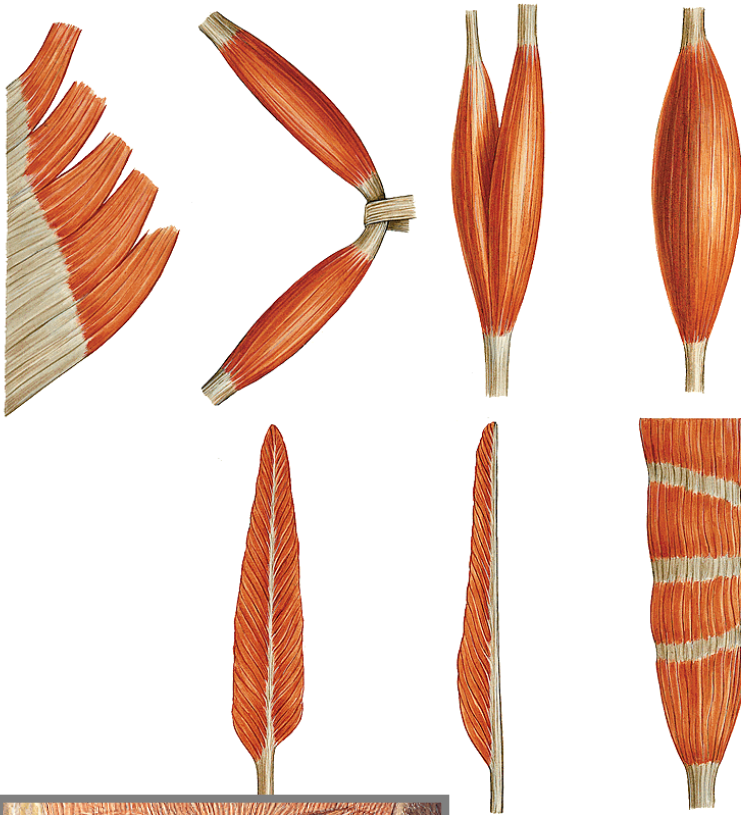
- **Composed:**

- *biceps*, begins with two heads (triceps, quadriceps)

- *digastric muscle* – musculus digastricus (multi-bellied muscle)

- *orbicular muscles*, *mm. orbiculares* (various types of sphincters)

- *unipennate muscles* or *multipennate muscles*



# Division of muscles according to the function

**synergists x antagonists**

**flexors x extensors**

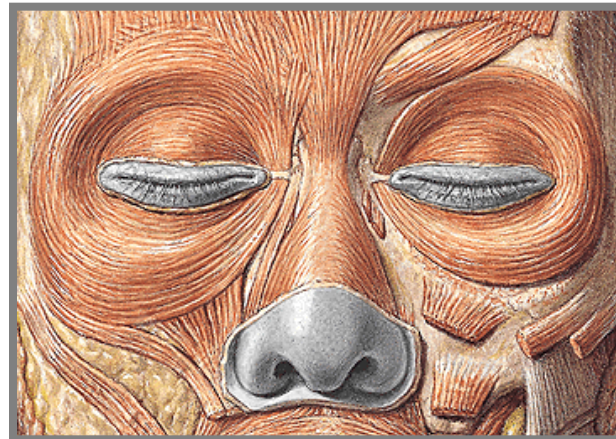
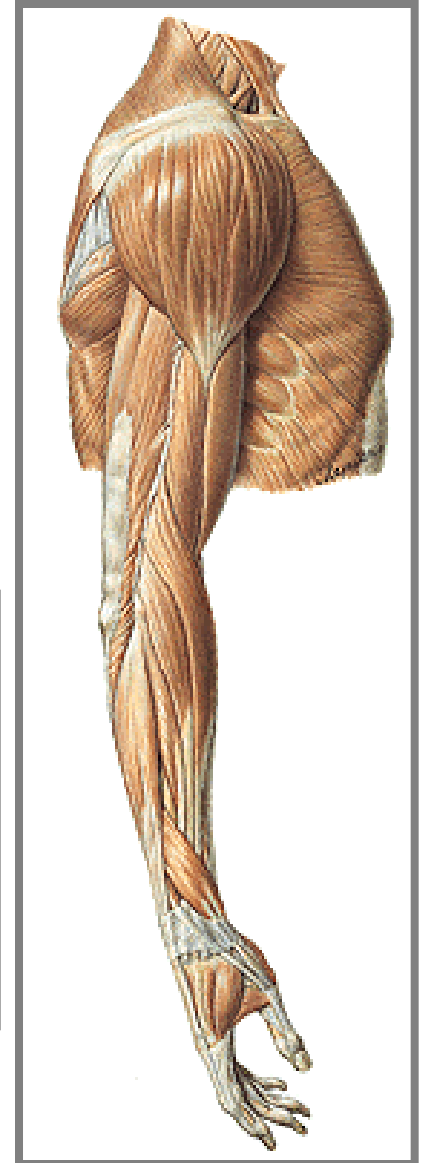
Example: biceps of brachium x  
triceps of brachium

**abductors x adductors**

Example: abductor pollicis brevis x  
adductor pollicis

**dilatators x sphincters**

Example: dilatator pupillae x  
sphincter pupillae



# Division of muscles according to regions of the body

**Muscles of the head**

**Muscles of the neck**

**Muscles of the thorax**

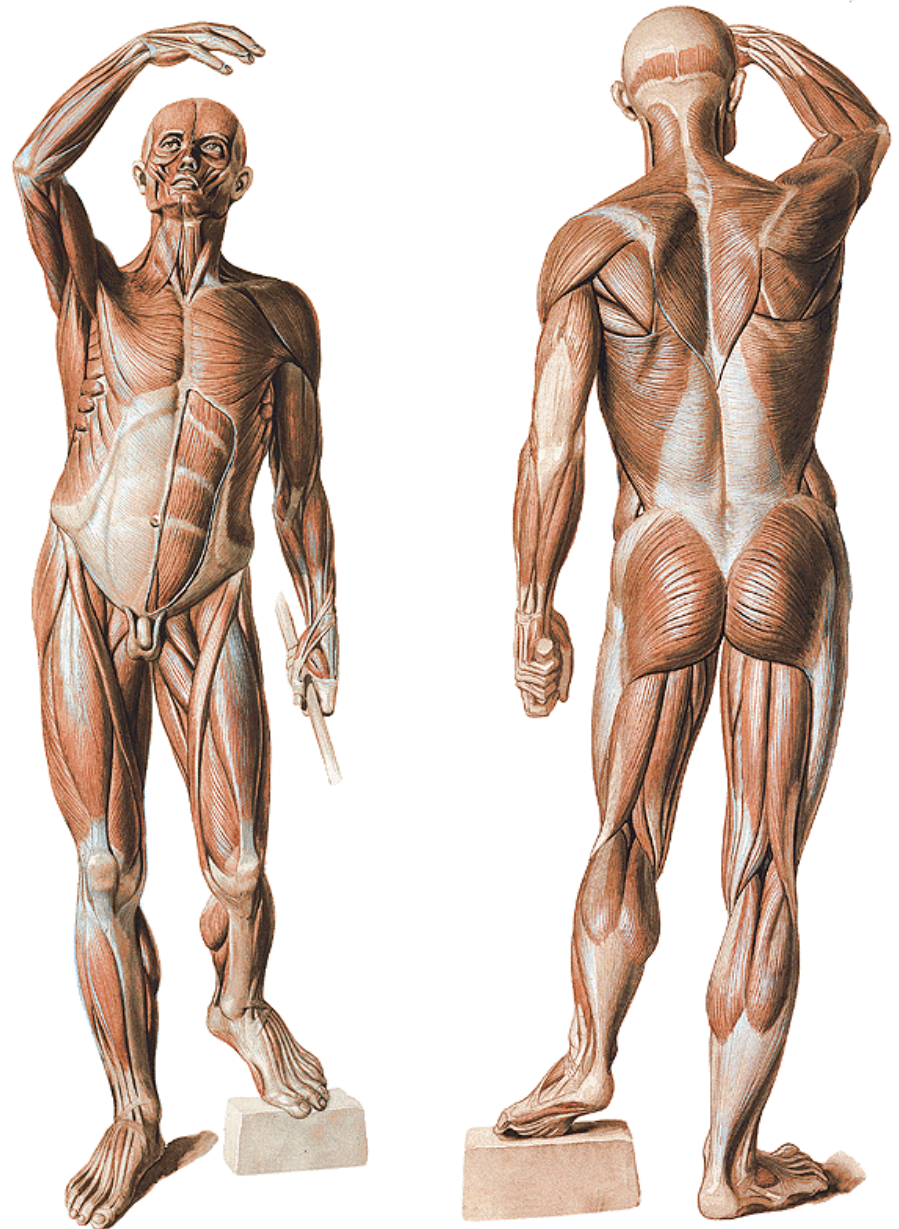
**Muscles of the abdomen**

**Muscles of the diaphragm  
pelvis**

**Muscles of the back**

**Muscles of the upper limb**

**Muscles of the lower limb**



# SPECIAL MYOLOGY

## Description of the muscle:

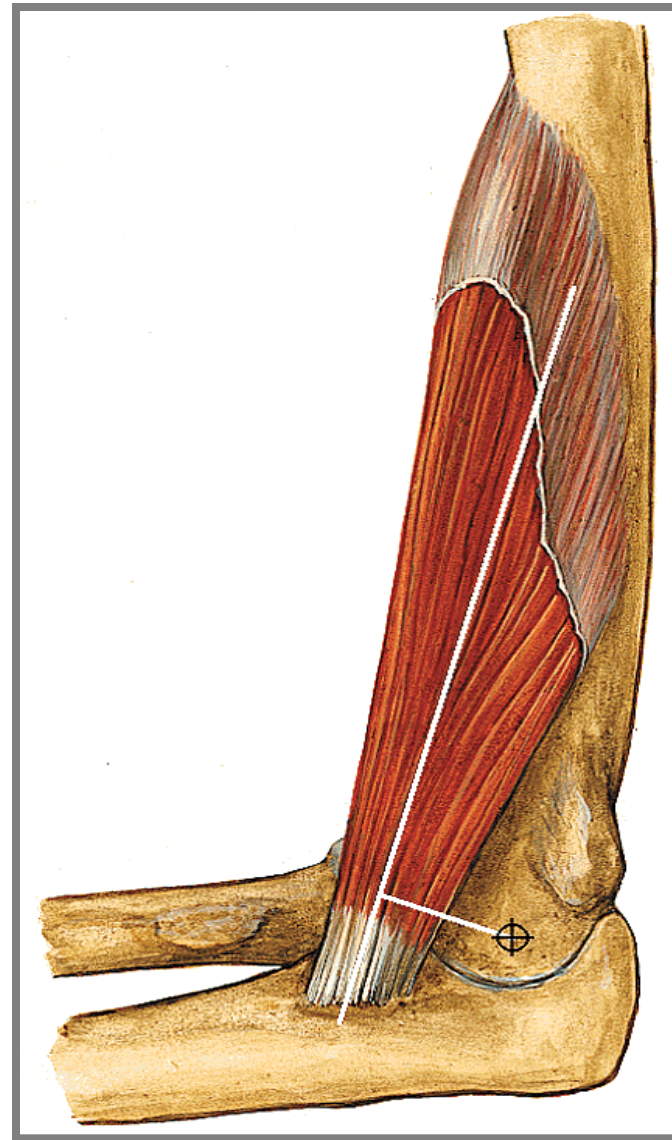
1. name of muscle
2. group (a part of body)

**Origo** - *origin*

**Insertio** - *insertion*

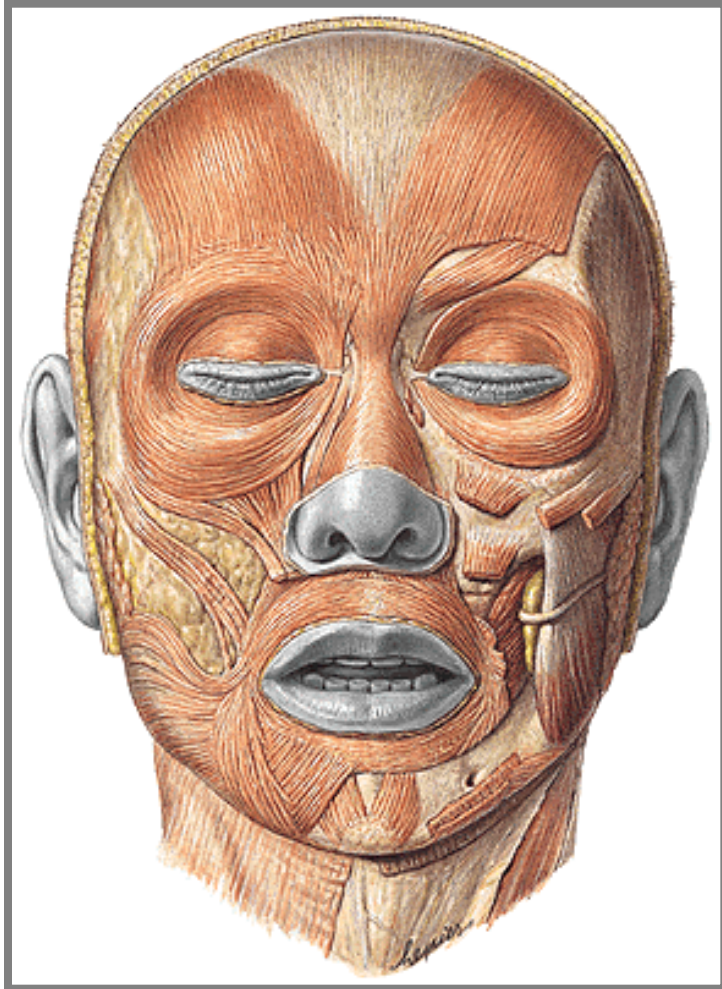
**Functio** – *function/action*

**Innervatio** - *innervation*



# SPECIAL MYOLOGY

## Mm. capitis (Muscles of the head)



### 1) MUSCULI MASTICATORII

(MASTICATORY MUSCLES)

Innervation - **n. trigeminus** = V. cranial nerve

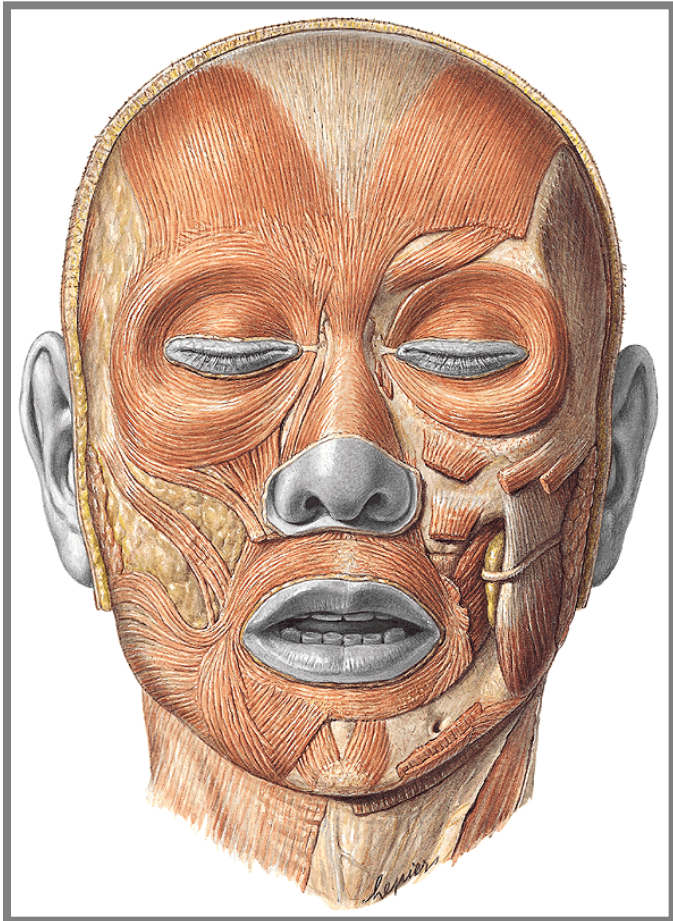
### 2) MUSCULI FACIALES

(MUSCLES of FACIAL EXPRESSION)

Innervation - **n. facialis** = VII. cranial nerve

**NO FASCIA!** – skin muscles

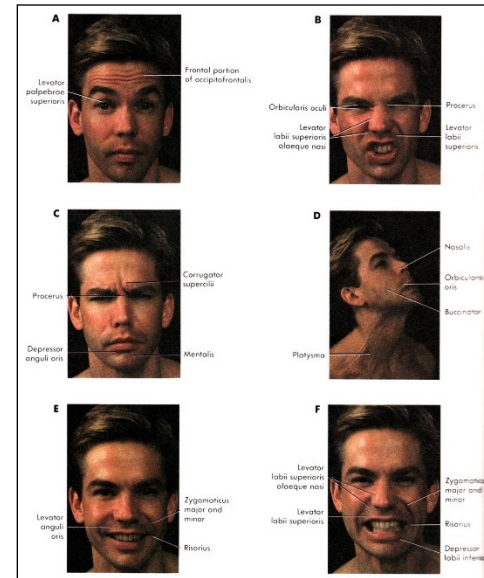
# Mm. faciales (mimic muscles) (facial nerve – n.VII.)



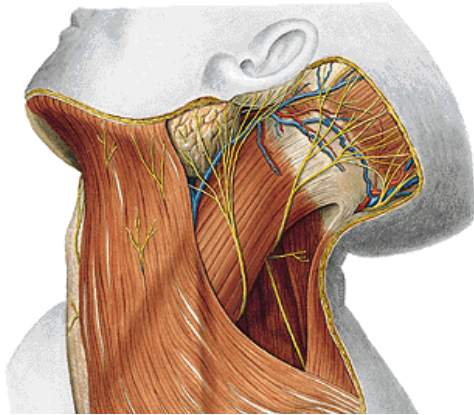
Muscles of the scalp  
Muscles of the orbit region  
Muscles of the nasal region  
Muscles of the mouth region

Their contraction causes shift of the skin (folds or wrinkles) – it is the basis of the facial expression.

They **have no fascias!**



# Muscles of the neck (mm. colli)



## Superficial layer

m. platysma

m. sternocleidomastoideus

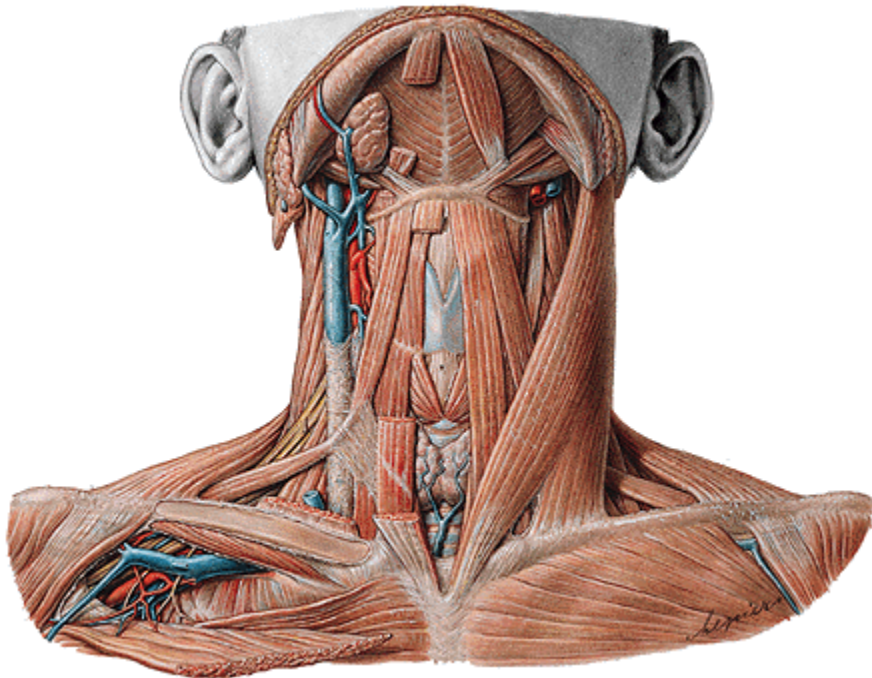
mm. suprahyoidei (depression of mandible)

mm. infrahyoidei - mainly fixation of os hyoideum (*hyoid bone*)

**Deep layer** - mainly flexion of the neck (and head)

mm. scaleni

mm. prae- and intervertebrales



# **Musculi thoracis, abdominis et dorsi**

*(Muscles of the chest, abdomen and back)*



# Musculi thoracis *(thoracic muscles)*

## 1. Thoracohumeral muscles

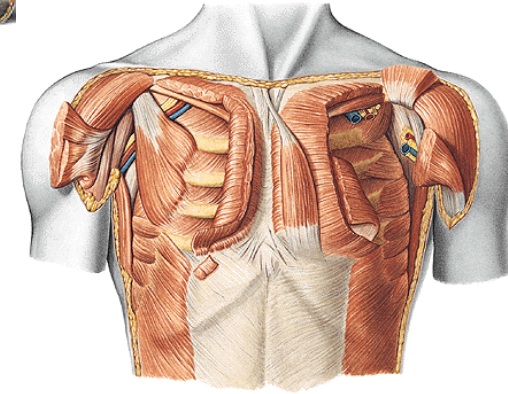
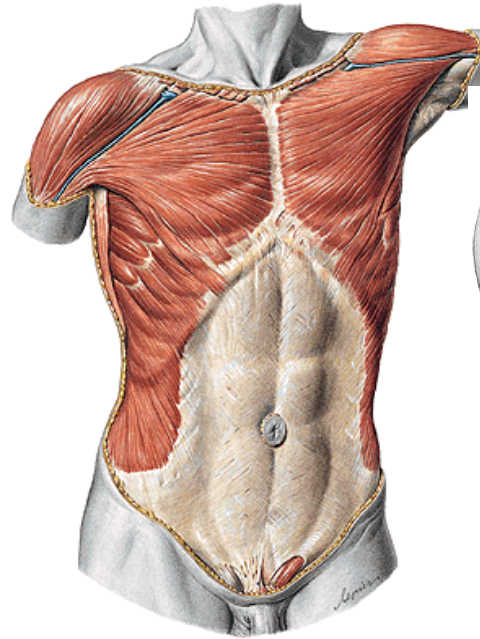
mainly ventral flexion and abduction of the upper limb

**Musculus pectoralis major**

**Musculus pectoralis minor**

**Musculus subclavius**

**Musculus serratus anterior**

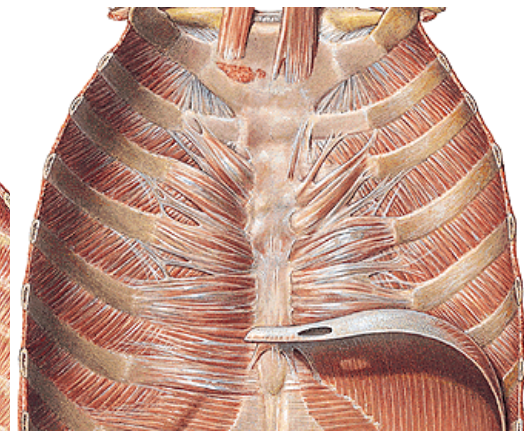
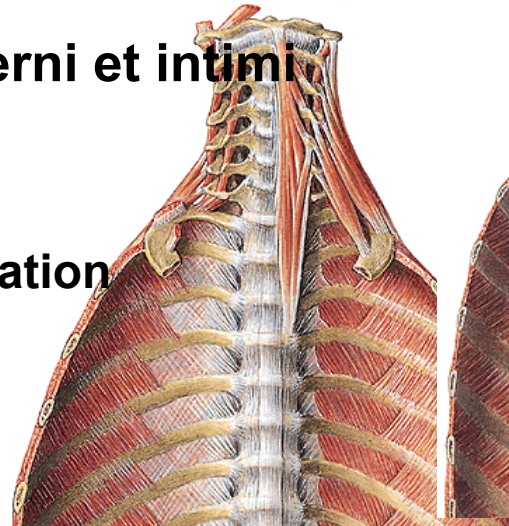


## 2. True (original) thoracic muscles

muscles for respiratory movements

**Musculi intercostales externi, interni et intimi**

**Musculus transversus thoracis**



## 3. Diaphragma main muscle for inspiration

## **Musculi abdominis** (*abdominal muscles*)

**antagonists of the dorsal muscles, regulate the volume of the abdominal cavity**

# **Musculi abdominis** (*muscles of the abdomen*)

antagonists of the dorsal muscles, regulate the volume of the abdominal cavity

## **Ventral group**

**musculus rectus abdominis** (+ its sheath=vagina mm. recti abdominis)

**musculus pyramidalis**

## **Lateral group**

**musculus obliquus externus abdominis**

**musculus obliquus internus abdominis**

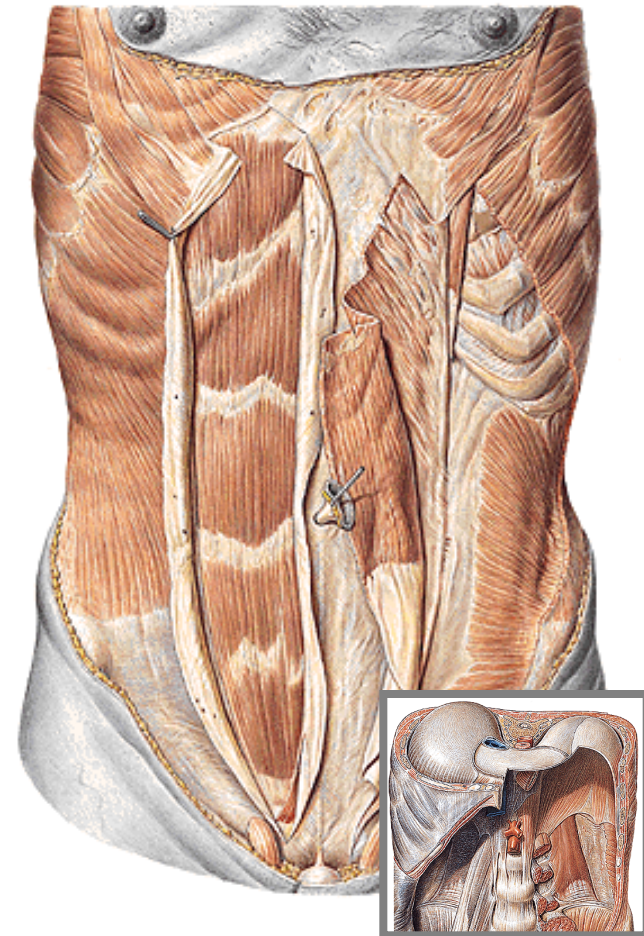
**musculus transversus abdominis**

**musculus cremaster**

## **Dorsal group**

**musculus quadratus lumborum**

**Canalis inguinalis** (*inguinal canal*)!!!



# Musculi dorsi (*muscles of the back*)

I. Extrinsic muscles of the back

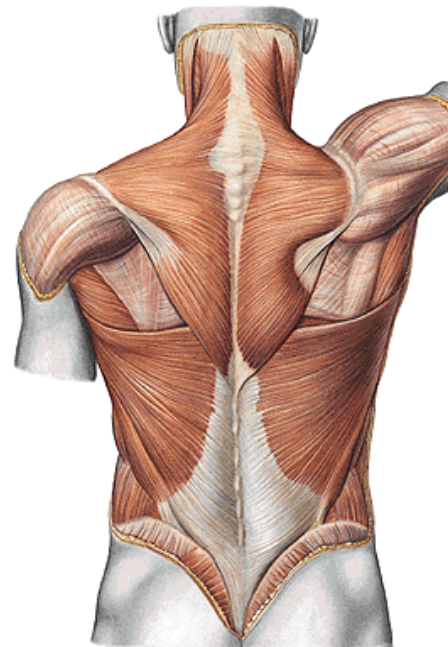
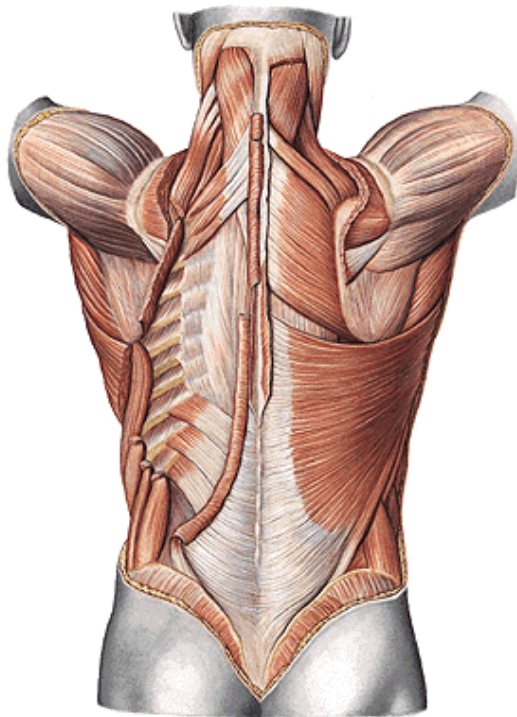
II. Intrinsic muscles of the back (located deeper, innervation by dorsal rami of spinal nerves)

III. Short muscles of the back

**Ad I. Extrinsic muscles of the back**

**A) Mm. spinohumerales (*spinohumeral group*)** movements of the upper limb

**B) Mm. spinocostales (*spinocostal group*)** help respiratory movements

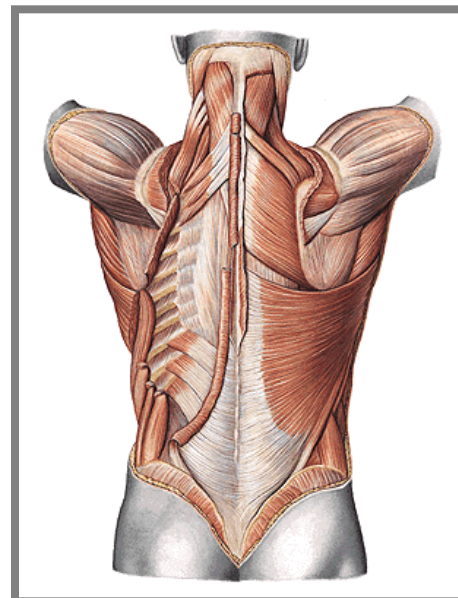
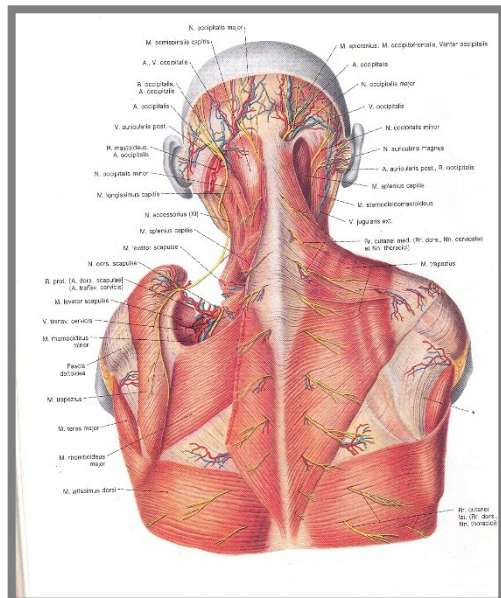
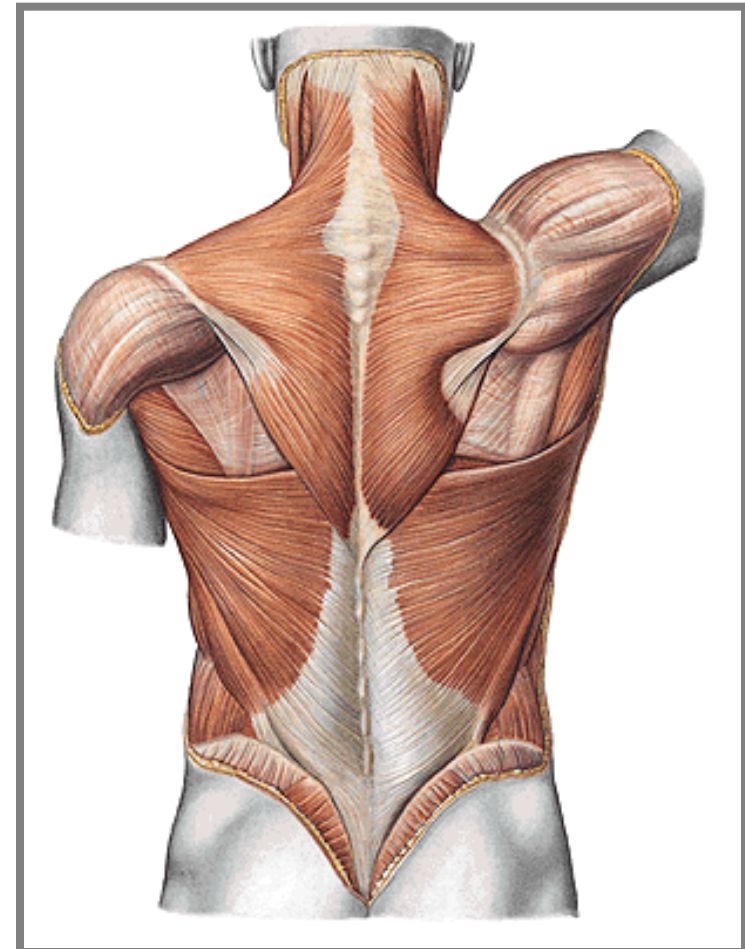
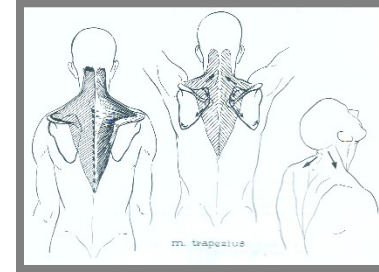


# I. EXTRINSIC BACK MUSCLES

## A. Mm. spinohumerales

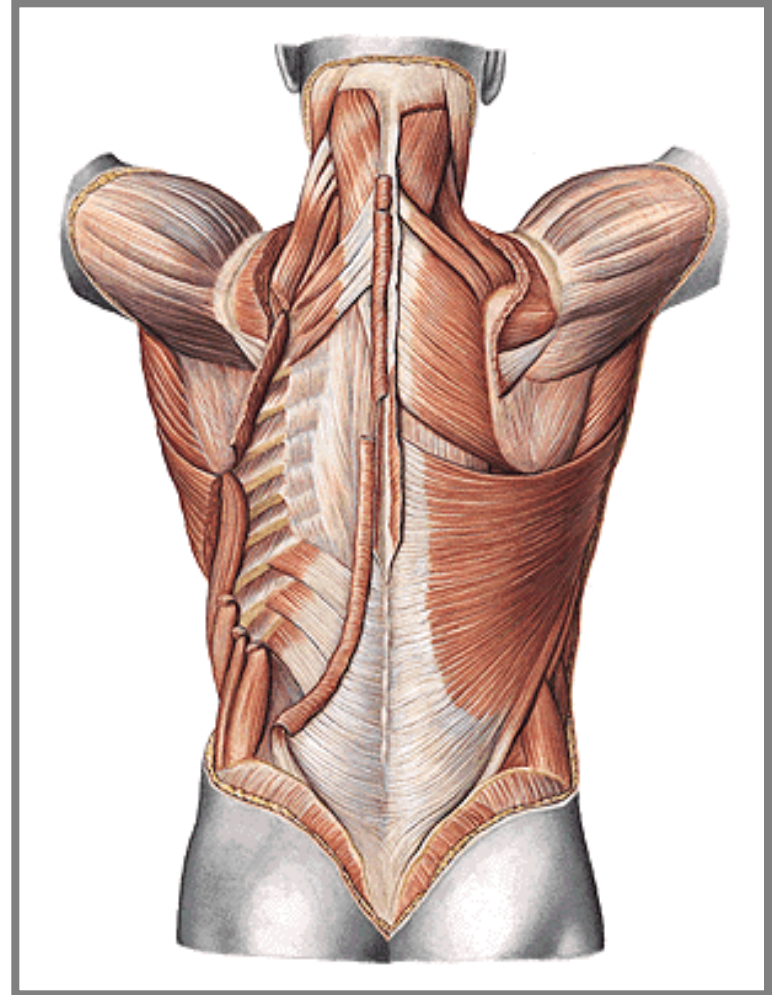
(*spinohumeral group*)

1. m. trapezius
2. m. latissimus dorsi
3. m. levator scapulae
4. m. rhomboideus minor
5. m. rhomboideus major



**B) Spinocostal group of muscles** help respiratory movements

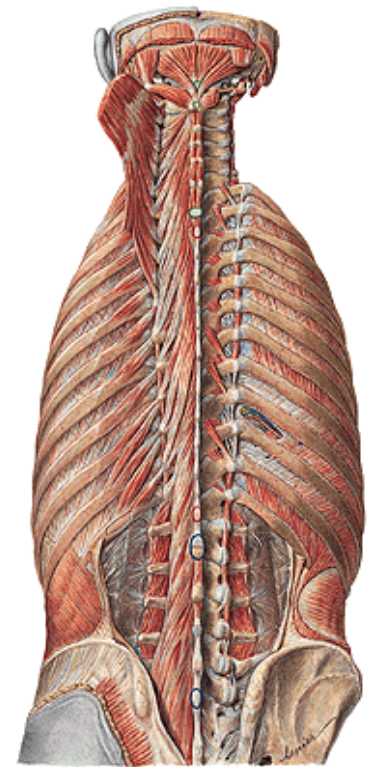
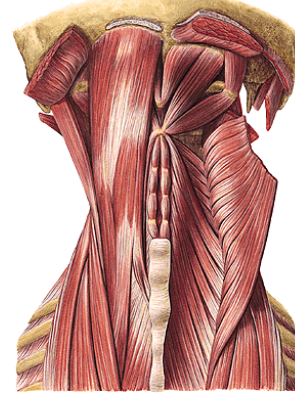
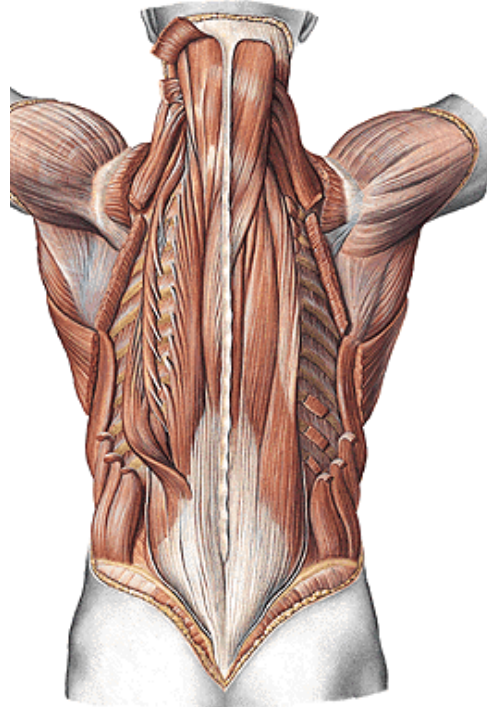
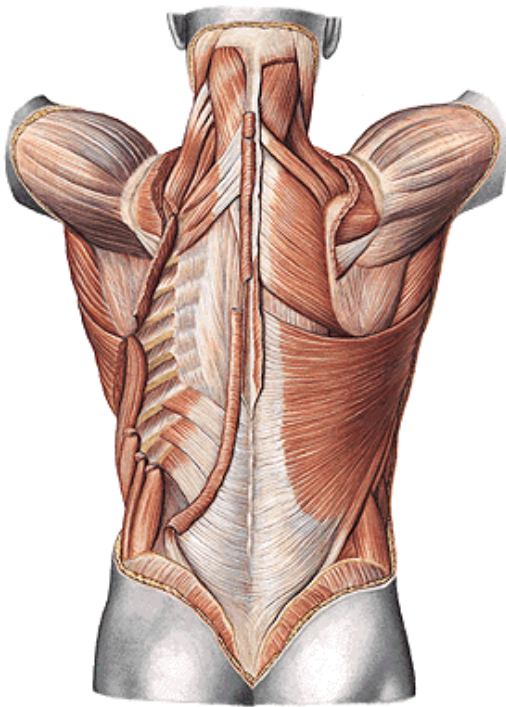
1. **m. serratus posterior superior**
2. **m. serratus posterior inferior**



# Ad II. Intrinsic muscles of the back

mainly extensors of the back and the head, innervation rami dorsales of spinal nerves

- 1) **Spinotransversal system** (m. splenius capitis and cervicis)
- 2) **Sacrospinal system** (m. erector spinae, longissimus and iliocostalis)
- 3) **Spinospinal system** (m. spinalis thoracis)
- 4) **Transversospinal system** (m. semispinalis capitis and cervicis)



## Ad III. Short muscles of the back

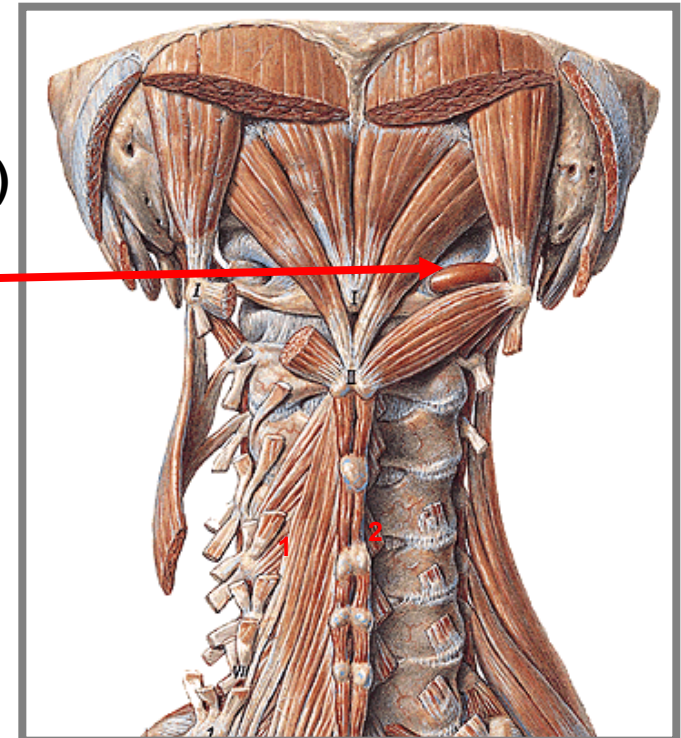
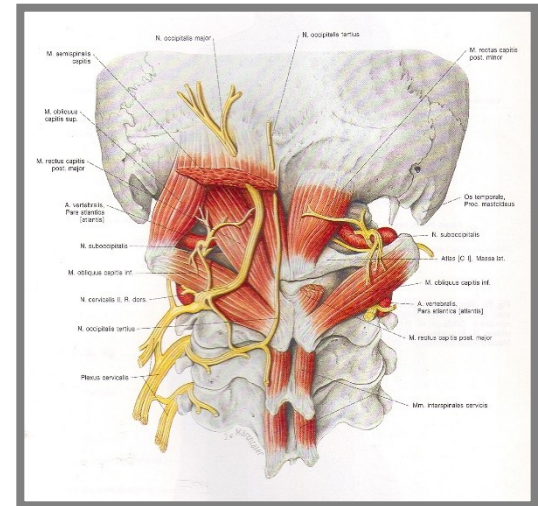
### Mm. nuchae profundae

- a) m. rectus capitis posterior minor (*lesser*)
- b) m. rectus capitis posterior major (*greater*)
- c) m. obliquus capitis superior
- d) m. obliquus capitis inferior

**Trigonum suboccipitale** (bordered by b, c, d)

#### Content:

- a. vertebralis
- a. cervicalis profunda
- n. suboccipitalis
- dorsal arch of the atlas





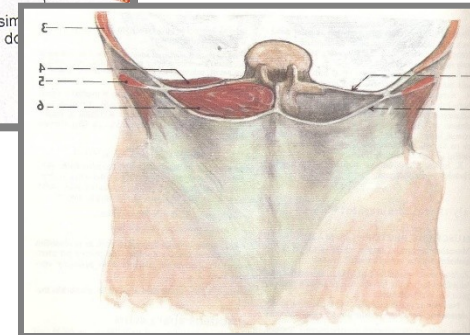
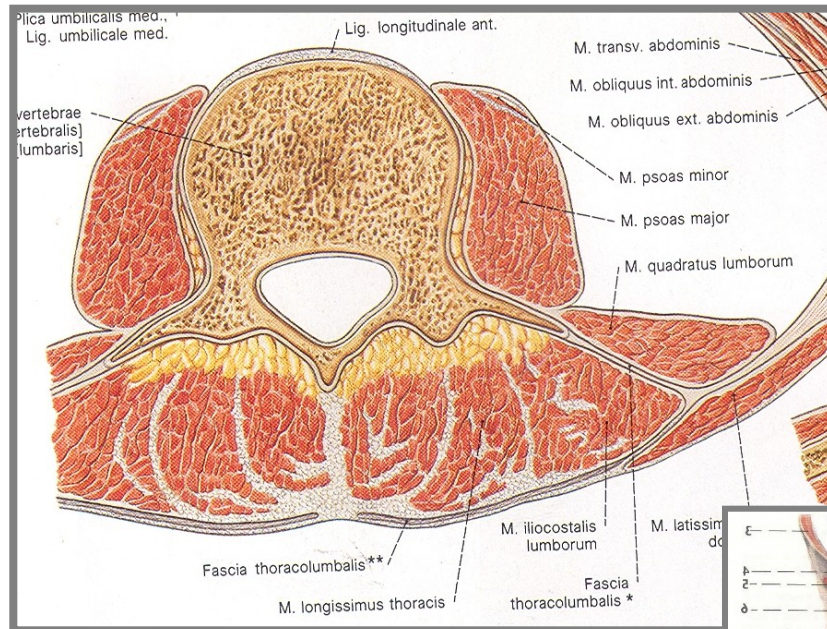
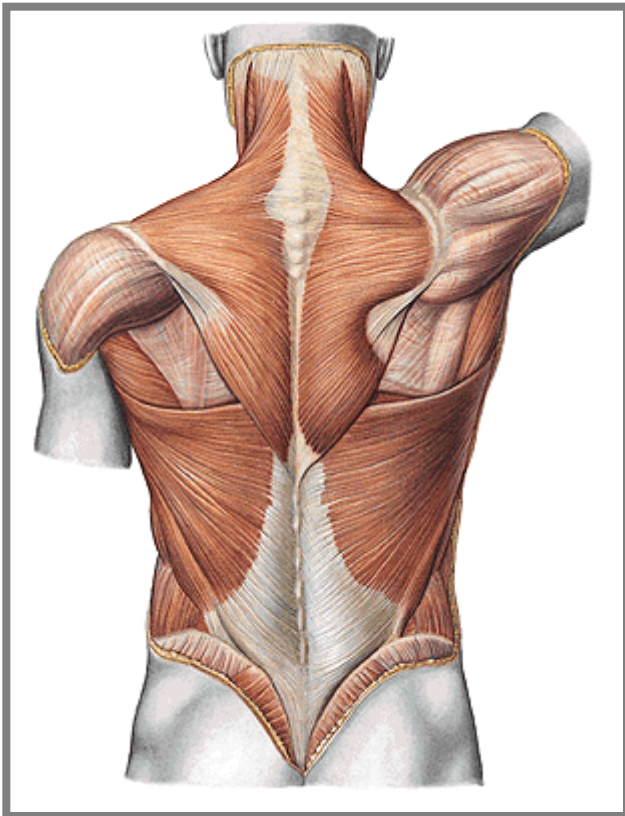
# Fasciae of dorsal muscles

Fascia dorsi superficialis

Fascia nuchae

Fascia thoracolumbalis (actually aponeurosis of m. latissimus dorsi – its lamina superficialis)

Aponeurosis lumbalis (lamina profunda of fascia thoracolumbalis, separates m. quadratus lumborum from m. erector spinae)



**Used pictures come from:**

**Moore, K. L. (1992):** Clinical oriented anatomy. Third edition.  
Williams&Wilkins, A Waverly Company.

**Gilroy, A. M. et all. (2009):** Atlas of Anatomy. Thieme New York, Stuttgart.

**Putz, R. (2008):**  
**Atlas of Human Anatomy Sobotta. Elsevier Books.**

**Platzer, W., Kahle, W., Leonhardt H. (1992):**  
**Locomotor system. Georg Thieme Verlag, Stuttgart,  
New York, 4th edition.**