

Sobotta

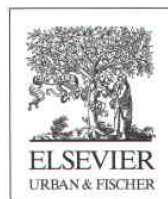
Atlas of Human Anatomy

Tables of Muscles, Joints and Nerves

Edited by R. Putz and R. Pabst

In collaboration with Renate Putz

Translation by S. Bedoui



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Abbreviations: O = Origin; I = Insertion; F = Function.

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1 Facial muscles [Fig. 119–122, 247, 253, 627]

Only parts of the facial muscles actually originate from bony structures. All of them insert into the skin.

a Forehead, top of the head, temple

M. occipitofrontalis

[Together, the M. occipitofrontalis and the M. temporoparietalis are referred to as M. epicranius.]

N. facialis [VII]



O: **Venter frontalis:** skin of the eyebrow and the Glabella, forms a common muscular layer with the Mm. procerus, corrugator supercilii, depressor supercilii et orbicularis oculi
Venter occipitalis: Linea nuchalis suprema

I: Galea aponeurotica

F: Moves the scalp, creates oblique wrinkle at the forehead

M. temporoparietalis

N. facialis [VII]



O: Temporal skin, Fascia temporalis

I: Galea aponeurotica

F: Moves the scalp

b Auricle

M. auricularis anterior

N. facialis [VII]



O: Fascia temporalis

I: Spina helix

F: Moves the auricle forwards and upwards

M. auricularis superior

N. facialis [VII]



O: Galea aponeurotica

I: Dorsocranial part of the auricular root

F: Moves the auricle backwards and upwards

M. auricularis posterior

N. facialis [VII]



O: Proc. mastoideus, tendon of the M. sternocleidomastoideus

I: Dorsal part of the auricular root

F: Moves the auricle backwards

1 Facial muscles (continuation)

c Palpebral fissure

M. orbicularis oculi (located around the Aditus orbitae in a sphincter-like fashion)

N. facialis [VII]



O: Pars orbitalis: Pars nasalis of the Os frontale, Proc. frontalis of the Maxilla, Os lacrimale, Lig. palpebrale mediale
Pars palpebralis: Lig. palpebrale mediale, Saccus lacrimalis
Pars lacrimalis: Crista lacrimalis posterior of the Os lacrimale, Saccus lacrimalis

I: Pars orbitalis: Lig. palpebrale laterale, lateral transition into a circular ring-shaped muscle
Pars palpebralis: Lig. palpebrale laterale
Pars lacrimalis: Canaliculi lacrimales, edges of the eyelids

F: Closes the eyelids, compresses the lacrimal sac, moves the eyebrows

M. depressor supercilii (branch of the Pars orbitalis of the M. orbicularis oculi)

N. facialis [VII]



O: Pars nasalis of the Os frontale, back of the nose

I: Medial third of the skin of the eyebrow

F: Lowers the skin of the forehead and of the eyebrows, creates an oblique wrinkle just above the root of the nose

M. corrugator supercilii

N. facialis [VII]



O: Pars nasalis of the Os frontale

I: Middle (lateral) third of the skin of the eyebrow, Galea aponeurotica

F: Moves the skin of the forehead and of the eyebrows towards the root of the nose, creates a vertical wrinkle just above the root of the nose

M. procerus

N. facialis [VII]



O: Os nasale, Cartilago nasi lateralis

I: Skin of the Glabella

F: Lowers the skin of the forehead and of the eyebrows

1 Facial muscles (continuation)

d Nose

M. nasalis

N. facialis [VII]



O: Pars alaris: Jugum alveolare of the lateral incisor tooth

Pars transversa: Jugum alveolare of the canine tooth

I: Pars alaris: nose wings, border of the nostril

Pars transversa: Cartilago nasi lateralis, tendinous membrane of the back of the nose

F: Moves the nose wings and thus the nose itself

Pars alaris: dilates the nostrils

Pars transversa: narrows the nostrils

M. depressor septi nasi

N. facialis [VII]



O: Jugum alveolare of the medial incisor tooth

I: Cartilago alaris major, Cartilago septi nasi

F: Moves the nose wings and thus the nose itself

e Mouth

M. orbicularis oris

N. facialis [VII]



O: Pars marginalis and **Pars labialis:** lateral to the Angulus oris

I: Skin of the lips

F: Closes the lips, thereby also moving the nose wings, cheeks and the skin of chin

M. buccinator

N. facialis [VII]



O: Posterior part of the Proc. alveolaris of the Maxilla, Raphe pterygomandibularis, posterior part of the Proc. alveolaris of the Mandibula

I: Angulus oris, upper and lower lip

F: Tenses the lips, increases the intraoral pressure (as in blowing and chewing)

M. levator labii superioris

N. facialis [VII]



O: Margo infraorbitalis and adjacent part of the Proc. zygomaticus of the Maxilla; originates from the muscle mass of the M. orbicularis oculi

I: Upper lip

F: Draws the upper lip laterally and upwards

1 Facial muscles (continuation)

M. depressor labii inferioris

N. facialis [VII]



O: Basis mandibulae medial to the Foramen mentale

I: Lower lip, chin, deep fibres to the mucosa

F: Draws the lower lip laterally and downwards

M. mentalis

N. facialis [VII]



O: Jugum alveolare of the lower, lateral incisor tooth

I: Skin of the chin

F: Creates the chin's dimple, everts the lower lip (together with the M. orbicularis oris)

M. transversus menti

N. facialis [VII]



O: Oblique branch from the M. mentalis

I: Skin of the chin

F: Moves the skin of the chin

M. depressor anguli oris

N. facialis [VII]



O: Basis mandibulae, just below the Foramen mentale

I: Lower lip, cheek lateral to the Angulus oris, upper lip

F: Pulls the angle of mouth downwards

M. risorius (frequently a part of the Platysma or the M. depressor anguli oris)

N. facialis [VII]



O: Fascia parotidea, Fascia masseterica

I: Upper lip, Angulus oris

F: Pulls the angle of mouth laterally and upwards, creates the cheek's dimple

1 Facial muscles (continuation)

M. levator anguli oris

N. facialis [VII]



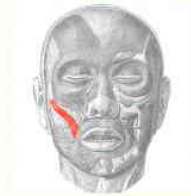
O: Fossa canina of the Maxilla

I: Angulus oris

F: Draws the angle of mouth medially and upwards

M. zygomaticus major

N. facialis [VII]



O: Os zygomaticum adjacent to the Sutura zygomaticotemporalis

I: Upper lip, Angulus oris

F: Draws the angle of mouth laterally and upwards

M. zygomaticus minor

N. facialis [VII]



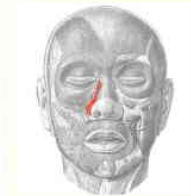
O: Os zygomaticum adjacent to the Sutura zygomaticomaxillaris

I: Upper lip, Angulus oris

F: Moves the lips, the nose wings, the cheeks and the skin of the chin, increases the nasolabial sulcus

M. levator labii superioris alaeque nasi

N. facialis [VII]



O: Proc. frontalis of the Maxilla; originates from the muscle mass of the M. orbicularis oculi

I: Nose wings, angle of mouth, upper lip, deep fibres: lateral and posterior parts of the nostril

F: Moves the lips, the nose wings, the cheeks and the skin of the chin

f Neck (Fig. 253)

Platysma

N. facialis [VII]



O: Basis mandibulae, Fascia parotidea

I: Skin below the Clavicula, Fascia pectoralis

F: Tenses the skin of the neck, creates vertical wrinkles

2 Muscles of the tongue (Fig. 178–180, 186–189)

a Internal muscles of the tongue

M. longitudinalis superior

N. hypoglossus [XII]



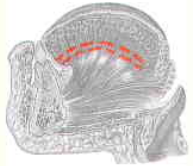
O: Radix linguae

I: Apex linguae

F: Retracts and broadens the tongue, elevates the apex of the tongue

M. longitudinalis inferior

N. hypoglossus [XII]



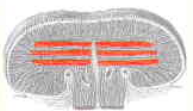
O: Radix linguae

I: Apex linguae

F: Retracts and broadens the tongue, lowers the apex of the tongue

M. transversus linguae

N. hypoglossus [XII]



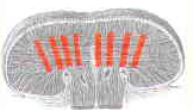
O: Lateral margin of the tongue, Septum linguae

I: Lateral margin of the tongue, Aponeurosis linguae

F: Narrows the tongue, elongates the tongue together with the M. verticalis linguae

M. verticalis linguae

N. hypoglossus [XII]



O: Radix linguae; originates from the M. genioglossus

I: Aponeurosis linguae

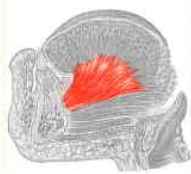
F: Broadens the tongue

2 Muscles of the tongue (continuation)

b External muscles of the tongue

M. genioglossus

N. hypoglossus [XII]



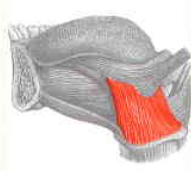
O: Spina mentalis of the Mandibula

I: Aponeurosis linguae

F: Protrudes and depresses the tongue

M. hyoglossus

N. hypoglossus [XII]



O: Cornu majus and Corpus ossis hyoidei

I: Lateral parts of the Aponeurosis linguae

F: Retracts and depresses the tongue

M. chondroglossus (variably formed)

N. hypoglossus [XII]



O: Cornu minus ossis hyoidei

I: Lateral parts of the Aponeurosis linguae

F: Retracts the tongue, depresses the root and the back of the tongue

M. styloglossus

N. hypoglossus [XII]



O: Anterior margin of the Proc. styloideus of the Os temporale, Lig. stylomandibulare

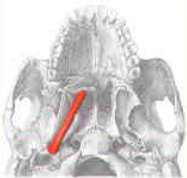
I: Enters lateral parts of the tongue from above and behind

F: Retracts and elevates the tongue

3 Muscles of the palate (Fig. 174, 701)

M. levator veli palatini

Rr. pharyngeales of the N. glossopharyngeus [IX] and the N. vagus [X] (= Plexus pharyngeus)



O: Inferior surface of the Pars petrosa of the Os temporale, Cartilago tubae auditivae

I: Aponeurosis palatina

F: Tenses and elevates the soft palate, expands the lumen of the auditory tube

M. tensor veli palatini (surrounds the Hamulus ossis pterygoidei as hypomochlion)

N. musculi tensoris veli palatini of the N. mandibularis [V/3]



O: Fossa scaphoidea at the base of the Lamina medialis of the Proc. pterygoideus, Spina ossis sphenoidalis, membranous part of the Tuba auditiva

I: Aponeurosis palatina

F: Tenses (and elevates) the soft palate, expands the lumen of the auditory tube

M. palatoglossus

N. glossopharyngeus [IX]



O: Aponeurosis palatina

I: Enters the internal muscles of the tongue, in particular the M. transversus linguae

F: Depresses the soft palate, elevates the root of the tongue in order to narrow the pharynx

M. uvulae (solitary muscle)

Rr. pharyngeales of the N. glossopharyngeus [IX] and the N. vagus [X] (= Plexus pharyngeus)



O: Aponeurosis linguae

I: Stroma of the Uvula

F: Shortens and thus thickens the uvula

4 Masticatory muscles (Fig. 111, 114–119, 121, 122)

The course of the M. masseter from the zygomatic arch to the mandibular angle may well be palpated through the skin. When clenching the teeth, the M. temporalis can be felt in the temporal fossa. The M. pterygoideus medialis inserts at the inner surface of the mandibular angle. The M. pterygoideus lateralis extends interiorly from the temporomandibular joint.

M. temporalis

Nn. temporales profundi (N. mandibularis [V/3])



O: Os temporale below the Linea temporalis inferior, deep layer of the Fascia temporalis

I: Apex and medial surface of the Proc. coronoideus of the Mandibula

F: Anterior fibres close the jaws, posterior fibres retract the mandible (= retrusion)

M. masseter

N. massetericus (N. mandibularis [V/3])



O: Pars superficialis: anterior two thirds of the inferior margin of the Arcus zygomaticus (tendinous)

Pars profunda: posterior third of the inner surface of the Arcus zygomaticus

I: Pars superficialis: Angulus mandibulae, Tuberositas masseterica
Pars profunda: inferior margin of the Mandibula

F: Closes the jaws

M. pterygoideus medialis

N. pterygoideus medialis (N. mandibularis [V/3])



O: Fossa pterygoidea, medial surface of the Lamina lateralis of the Proc. pterygoideus, Proc. pyramidalis of the Os palatinum

I: Inferior margin of the Mandibula, Tuberositas pterygoidea

F: Closes the jaws

M. pterygoideus lateralis

N. pterygoideus lateralis (N. mandibularis [V/3])



O: Caput superius: outer surface of the Lamina lateralis of the Proc. pterygoideus, Tuber maxillae (accessory)
Caput inferius: Facies temporalis of the Ala major of the Os sphenoidale

I: Caput superius: disc and capsule of the Articulatio temporo-mandibularis
Caput inferius: Fovea pterygoidea of the Proc. condylaris of the Mandibula

F: Caput inferius: draws the mandible interiorly (=protrusion)

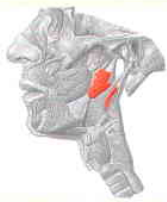
5 Muscles of the pharynx (Fig. 189, 247, 248, 252)

The pharyngeal muscles are divided into the pharyngeal constrictors (Mm. constrictores pharyngis superior, medius and inferior) and the pharyngeal levator muscles (M. stylopharyngeus, M. salpingopharyngeus and M. palatopharyngeus).

a Pharyngeal constrictors

M. constrictor pharyngis superior

Rr. pharyngeales of the N. glossopharyngeus [IX] (= Plexus pharyngeus)



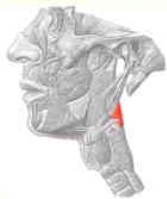
O: Pars pterygopharyngea: posterior margin of the Lamina medialis of the Proc. pterygoideus, Hamulus ossis pterygoidei
Pars buccopharyngea: Raphe pterygomandibularis
Pars mylopharyngea: Linea mylohyoidea of the Mandibula
Pars glossopharyngea: M. transversus linguae

I: Membrana pharyngobasilaris, superior third of the Raphe pharyngis

F: Constricts the pharynx, separates the Epipharynx from the Mesopharynx (together with the M. palatopharyngeus), promotes transport of food into the oesophagus by wave-like contractions (peristaltic wave)

M. constrictor pharyngis medius

Rr. pharyngeales of the N. glossopharyngeus [IX] and the N. vagus [X] (= Plexus pharyngeus)



O: Pars chondropharyngea: Cornu minus ossis hyoidei
Pars ceratopharyngea: Cornu majus ossis hyoidei

I: Middle third of the Raphe pharyngis, overlaps the M. constrictor pharyngis superior

F: Constricts the pharynx from behind, promotes transport of food into the oesophagus by wave-like contractions (peristaltic wave)

M. constrictor pharyngis inferior

Rr. pharyngeales of the N. vagus [X] (= Plexus pharyngeus)



O: Pars thyropharyngea: outer surface of the Cartilago thyroidea behind the Linea obliqua
Pars cricopharyngea: lateral surface of the Cartilago cricoidea
Pars tracheopharyngea: lateral surface of the Cartilago trachealis I

I: Middle and inferior third of the Raphe pharyngis, overlaps the M. constrictor pharyngis medius

F: Constricts the pharynx from behind, promotes transport of food into the oesophagus by wave-like contractions (peristaltic wave)

b Pharyngeal levator muscles

M. palatopharyngeus (Functionally, this muscle also belongs to the muscles of the palate.)

Rr. pharyngeales of the N. glossopharyngeus [IX] (= Plexus pharyngeus)



O: Aponeurosis palatina, Hamulus ossis pterygoidei

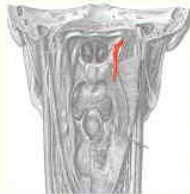
I: Cartilago thyroidea, inserts into the lateral and the posterior wall of the Pharynx

F: Constricts the isthmus of fauces, depresses the soft palate, elevates the pharyngeal wall towards the soft palate

5 Muscles of the pharynx (continuation)

M. salpingopharyngeus

Rr. pharyngeales of the N. glossopharyngeus [IX] (= Plexus pharyngeus)



O: Free margin and inferior surface of the Cartilago tubae auditivae

I: Inserts into the lateral wall of the Pharynx

F: Elevates the pharynx

M. stylopharyngeus

R. musculi stylopharyngei of the N. glossopharyngeus [IX]



O: Proc. styloideus of the Os temporale

I: Cartilago thyroidea, inserts into the lateral wall of the Pharynx between the M. constrictor superior and the M. constrictor medius

F: Elevates the pharynx

Muscles of the larynx (Fig. 224–227)

M. cricothyroideus (Pars recta: superficial, Pars obliqua: deep)

R. externus of the N. laryngeus superior of the N. vagus [X]



O: Outer surface of the Arcus of the Cartilago cricoidea

I: Inferior margin of the Lamina of the Cartilago thyroidea

F: Tenses the vocal cords by tilting the cricoid cartilage around a transverse axis

M. cricoarytenoideus posterior

N. laryngeus recurrens of the N. vagus [X]



O: Posterior surface of the Lamina of the Cartilago cricoidea

I: Proc. muscularis of the Cartilago arytenoidea

F: Opens the rima glottidis by rotating the vocal process of the arytenoid cartilage outwards around a longitudinal axis, as well as by tilting the arytenoid cartilage sideways

M. cricoarytenoideus lateralis

N. laryngeus recurrens of the N. vagus [X]



O: Lateral upper margin of the Arcus of the Cartilago cricoidea

I: Proc. muscularis of the Cartilago arytenoidea

F: Closes the intermembranous part of the rima glottidis by rotating the arytenoid cartilage inwards around a longitudinal axis

M. arytenoideus transversus

N. laryngeus recurrens of the N. vagus [X]



O: Lateral edge and posterior surface of the Cartilago arytenoidea

I: Lateral edge and posterior surface of the contralateral Cartilago arytenoidea

F: Closes the intercartilagenous part of the rima glottidis by approximating both arytenoid cartilages

M. arytenoideus obliquus

N. laryngeus recurrens of the N. vagus [X]



O: Base of the posterior surface of the Cartilago arytenoidea

Pars aryepiglottica: apex of the Cartilago arytenoidea

I: Apex and posterior surface of the contralateral Proc. muscularis

Pars aryepiglottica: lateral margin of the Cartilago epiglottica

F: Draws the arytenoid cartilage medially and narrows the intercartilagenous part of the rima glottidis by tilting the arytenoid cartilages inwards

6 Muscles of the larynx (continuation)

M. vocalis

N. laryngeus recurrens of the N. vagus [X]



O: Inner surface of the "bow" of the Cartilago thyroidea

I: Proc. vocalis and Fovea oblonga of the Cartilago arytenoidea

F: Tenses the vocal cord and forms the edge of the rima glottidis, regulates the ability of the vocal fold to vibrate

M. thyroarytenoideus

N. laryngeus recurrens of the N. vagus [X]



O: Inner surface of the Lamina of the Cartilago thyroidea in close proximity to the origin of the M. vocalis

Pars thyroepiglottica: Inner surface of the Lamina of the Cartilago thyroidea in close proximity to the origin of the M. thyroarytenoideus

I: Proc. muscularis and anterior surface of the Cartilago arytenoidea

Pars thyroepiglottica: lateral margin of the Cartilago epiglottica

F: Narrows the inter of the rima glottidis by rotating the arytenoid cartilage inwards around a longitudinal axis

Pars thyroepiglottica: narrows the laryngeal orifice

7 Branches and supplying areas of the cervical plexus (Fig. 253–258)

	Motor function	Sensory function
Ansa cervicalis Radix superior (= Radix anterior) Radix inferior (= Radix posterior)	Mm. infrahyoidei	
Rr. musculares	M. longus colli M. longus capitis M. rectus capitis anterior Mm. intertransversarii anteriores cervicis M. trapezius M. levator scapulae M. scalenus medius M. geniohyoideus	
Branches of the so-called Punctum nervosum		
N. auricularis magnus		Skin of the upper neck, the area of the mandibular angle, the anterior and posterior areas surrounding the auricle, and most of the auricle itself
N. transversus colli		Skin of the upper anterior neck
N. occipitalis minor		Skin of the occipital region
Nn. supraclaviculares mediales, intermedii, laterales		A strip of skin below the clavicle
N. phrenicus	Diaphragm	Parietal pleura, pericard, peritoneum

8 Lateral muscle of the neck (Fig. 204, 208)

The M. sternocleidomastoideus develops from the same embryonic anlage as the M. trapezius (same innervation). It traverses obliquely from the Proc. mastoideus in an anterior mediocaudal direction and is integrated in the Lamina superficialis of the Fascia cervicalis.

M. sternocleidomastoideus

N. accessorius (XI); Plexus cervicalis



O: Caput sternale: with a long tendon from the ventral surface of the Sternum

Caput claviculare: with a short tendon from the sternal third of the Clavicula

I: Posterior area of the Proc. mastoideus, lateral margin of the Linea nuchalis superior

F: Unilateral innervation: rotates the head contralaterally, bilateral innervation: elevates the head and draws the head anteriorly, flexes the caudal cervical vertebrae and stretches both the cranial cervical vertebrae as well as the cranio-cervical joints

9 Suprahyoid muscles (Fig. 183–187, 204, 208)

The suprahyoid muscles form the floor of the oral cavity and function as antagonists to the infrahyoid muscles. The anterior belly of the M. digastricus is located most superficially. The next layer consists of the M. mylohyoideus, which forms a broad plate. The M. geniohyoideus is located adjacently to the interior surface of the M. mylohyoideus as a round strand. The posterior belly of the M. digastricus and the M. stylohyoideus are located dorsally.

M. mylohyoideus (The right and the left muscle together, secure the floor of the mouth in a plate-like shape.)

N. mylohyoideus [N. mandibularis [V/3]]



O: With a short tendon from the Linea mylohyoidea of the Mandibula

I: Raphe mylohyoidea, upper margin of the Corpus ossis hyoidei

F: Elevates the floor of the mouth and the tongue (as in swallowing), depresses the mandible, also elevates the hyoid bone, forms the muscular support for the tongue

M. digastricus (Venter posterior and Venter anterior are connected by an intertendon attached to the Cornu minus of the Os hyoideum. Venter posterior: from the origin to the intertendon; Venter anterior: from the intertendon to the insertion.)

Venter anterior: *N. mylohyoideus [N. mandibularis [V/3]]*;

Venter posterior: *R. digastricus [N. facialis [VII]]*



O: Incisura mastoidea of the Os temporale

I: Fossa digastrica of the Mandibula

F: Supports the M. mylohyoideus

M. stylohyoideus

R. stylohyoideus [N. facialis [VII]]



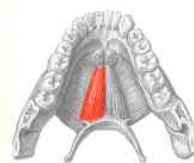
O: Proc. styloideus of the Os temporale

I: Lateral margin of the Corpus ossis hyoidei with two parts surrounding the intertendon of the M. digastricus

F: Draws the hyoid bone dorsocranially

M. geniohyoideus (The right and the left muscle are closely juxtaposed, only separated by a thin septum of connective tissue.)

Rr. ventrales from C1–C2



O: With a short tendon from the Spina mentalis of the Mandibula

I: Anterior surface of the Corpus ossis hyoidei

F: Supports the M. mylohyoideus in elevating the tongue, depresses the mandible, elevates the hyoid bone

10 Infrahyoid muscles (Fig. 183, 204, 208)

The infrahyoid muscles function as antagonists to the suprahyoid muscles.

The M. sternohyoideus is located superficially and is followed below by the M. sternothyroideus and the M. thyrohyoideus. The M. omohyoideus stretches most laterally.

M. sternohyoideus

Ansa cervicalis (Plexus cervicalis)



O: Cranial margin of the Cartilago costae I, inner surface of the Manubrium sterni and the capsule of the sternoclavicular joint

I: Inferior margin of the Corpus ossis hyoidei

F: Draws the hyoid bone caudally

M. sternothyroideus

Ansa cervicalis (Plexus cervicalis)



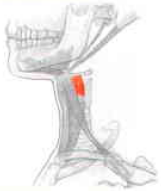
O: Inner surface of the Cartilago costae I, inner surface of the Manubrium sterni caudal to the M. sternohyoideus

I: Outer surface, Linea obliqua, of the Lamina of the Cartilago thyroidea

F: Depresses the larynx, regulates the position of the larynx between the hyoid bone and the sternum together with the M. thyrohyoideus

M. thyrohyoideus

Ansa cervicalis (Plexus cervicalis)



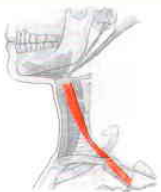
O: Outer surface, Linea obliqua, of the Lamina of the Cartilago thyroidea

I: Lateral third of the Corpus and the root of the Cornu majus of the Os hyoideum

F: Approximates the hyoid bone and the larynx, regulates the position of the larynx between the hyoid bone and the sternum together with the M. sternothyroideus

M. omohyoideus [Venter inferior and Venter superior are connected by an intertendon, which is attached to the Vagina carotica.]

Ansa cervicalis (Plexus cervicalis)



O: Venter inferior: Margo superior of the Scapula medial to the Incisura scapulae

I: Venter superior: caudal margin of the lateral outer surface of the Corpus ossis hyoidei

F: Tenses the cervical fascia due to its attachment to the carotid sheath, prevents the collapse of the V. jugularis interna

11 Scalenus muscles (Fig. 204, 208, 209, 841)

The three scalenus muscles, M. scalenus anterior, M. scalenus medius and M. scalenus posterior, traverse to the upper ribs and form a three sided muscle layer laterally of the cervical part of the vertebral column.

M. scalenus anterior

Direct branches of the Plexus cervicalis and the Plexus brachialis



O: Tubercula anteriora of the Procc. transversi of the 3. (4.)–6. cervical vertebra

I: With a short tendon at the Tuberculum musculi scaleni anterioris of the 1. rib

F: Vertebral column: flexes the cervical part of the vertebral column laterally
Thorax: elevates the first rib, thereby elevating the thorax (muscle of inspiration)

M. scalenus medius

Direct branches of the Plexus cervicalis and the Plexus brachialis



O: Tubercula of the Procc. transversi of the 3.–7. cervical vertebra

I: With a short tendon at the 1. rib, just behind the Sulcus arteriae subclaviae

F: Vertebral column: flexes the cervical part of the vertebral column laterally
Thorax: elevates the first rib, thereby elevating the thorax (muscle of inspiration)

M. scalenus posterior

Direct branches of the Plexus cervicalis and the Plexus brachialis



O: Tubercula posteriora of the Procc. transversi of the 5. and 6. cervical vertebra

I: With a short and flat tendon at the upper margin of the 2. (3.) rib

F: Vertebral column: flexes the cervical part of the vertebral column laterally
Thorax: elevates the second (and third) rib, thereby elevating the thorax (muscle of inspiration)

12 Prevertebral muscles (Fig. 209, 841)

The prevertebral muscles are located to the both sides of the bodies of the cervical and upper thoracic vertebrae, and are ensheathed by the Lamina prevertebralis of the Fascia cervicalis. The anterolateral part of the Atlas and Axis are connected by the short M. rectus capitis anterior.

M. rectus capitis anterior

Rr. ventrales of the Plexus cervicalis



O: Proc. transversus and Massa lateralis of the Atlas

I: Pars basilaris of the Os occipitale

F: Flexes the head lateroventrally, (rotates the head ipsilaterally)

M. longus capitis

Direct branches of the Plexus cervicalis



O: Tubercula anteriora of the Procc. transversi of the 3.-6. cervical vertebra

I: Outer surface of the Pars basilaris of the Os occipitale

F: Flexes the head ventrally, (rotates the head ipsilaterally)

M. longus colli

Direct branches of the Plexus cervicalis



O: Bodies of the 5. cervical – 3. thoracic vertebra, Tubercula anteriora of the Procc. transversi of the 2.-5. cervical vertebra

I: Procc. transversi of the 5.-7. cervical vertebra, bodies of the 2.-4. cervical vertebra, Tuberculum anterius of the Atlas

F: Flexes the head ventrally, (rotates the head ipsilaterally)

13 Muscles of the thoracic wall [Fig. 839–845]

The M. pectoralis major moulds the surface anatomy of the anterior upper thoracic wall. The M. pectoralis minor is situated just below. Together with the M. subclavius, these muscles belong to the group of the ventral muscles of the shoulder (see Tab. 26).

The Mm. intercostales externi and interni fill the intercostal space. The Mm. subcostales and the M. transversus thoracis are located at the inner surface of the thoracic wall. Sometimes a superficially located M. sternalis can be found.

M. sternalis (inconstant muscle, in approx. 5% of the cases located on the Fascia pectoralis)

Branches of the Nn. pectorales (Plexus brachialis, Pars supraclavicularis) or Nn. intercostales (Nn. thoracici)



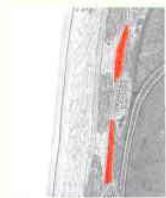
O: Edge of the Manubrium sterni

I: Inserts into the rectus sheath

F: Contracts the pectoral skin

Mm. intercostales externi

Nn. intercostales (Nn. thoracici)



O: Inferior margin of the 1.–11. rib from the Tuberculum costae to the junction between cartilage and bone

I: Superior margin of the corresponding lower rib

F: Elevate the ribs, reinforce the intercostal space in deep inspiration

Mm. intercostales interni (Interiorly, the Vasa intercostalia posteriora and the N. intercostalis delineate the Mm. intercostales interni.)

Nn. intercostales (Nn. thoracici)



O: Superior margin of the 2.–12. rib from the sternal end of the Cartilago costalis to the Angulus costae

I: Inferior margin of the corresponding upper rib

F: Depress the ribs, reinforce the intercostal space in deep expiration

Mm. subcostales (inconstant muscles)

Nn. intercostales (Nn. thoracici)

O: Superior margin of the lower ribs between the Tuberculum and Angulus costae

I: Inferior margin of the lower ribs, always skipping one rib

F: Reinforce the thoracic wall, depress the ribs in deep expiration

M. transversus thoracis (inconstant muscle)

Nn. intercostales (Nn. thoracici)



O: Corpus sterni, dorsolateral margin of the Proc. xiphoideus, Cartilago costalis of the {6.} 7. rib

I: Cartilago costalis of the 2.–6. rib close to the junction between cartilage and bone

F: Reinforces the thoracic wall in deep expiration

14 Ventral muscles of the abdominal wall (Fig. 843–846, 869)

The ventral muscles of the abdominal wall, the M. rectus abdominis and the M. pyramidalis, are located within the rectus sheath.

M. rectus abdominis

Nn. intercostales (Nn. thoracici); less frequently ventral branches of the upper Nn. lumbales



O: Outer surface of the Cartilago costalis of the 5.–7. rib, Proc. xiphoideus, Ligg. costoxiphoidea

I: Crista pubica of the Os coxae, Symphysis pubica

F: Flexes the trunk, compresses the abdomen, expiration

M. pyramidalis (inconstant muscle)

Caudal Nn. intercostales (Nn. thoracici)



O: Crista pubica of the Os coxae, Symphysis pubica ventral to the M. rectus abdominis

I: Linea alba

F: "Tenses" the linea alba

15 Lateral muscles of the abdominal wall (Fig. 837–839, 843–846, 851, 869)

Together, the M. obliquus externus abdominis, the M. obliquus internus abdominis and the M. transversus abdominis are referred to as lateral muscles of the abdominal wall. Their tendinous layers together form the rectus sheath. In the male, parts of the M. obliquus internus abdominis and the M. transversus abdominis branch off to form the M. cremaster.

M. obliquus externus abdominis

Caudal Nn. intercostales (Nn. thoracici); N. iliohypogastricus; N. ilioinguinalis (Plexus lumbalis)



O: Outer surface of the 5.–12. rib, indented by fleshy digitations with the M. serratus anterior

I: Labium externum of the Crista iliaca, Lig. inguinale, Tuberculum pubicum, Crista pubica, Linea alba, participates in the formation of the anterior layer of the rectus sheath

F: Unilateral innervation: rotates the thorax contralaterally, flexes the vertebral column ipsilaterally, bilateral innervation: flexes the trunk, compresses the abdomen, expiration

M. obliquus internus abdominis (In the male, the most caudal fibres branch off as M. cremaster and traverse into the spermatic cord.)

Caudal Nn. intercostales (Nn. thoracici); N. iliohypogastricus; N. ilioinguinalis (Plexus lumbalis)



O: Superficial layer of the Fascia thoracolumbalis, Linea intermedia of the Crista iliaca, lateral two thirds of the Lig. inguinale

I: Inferior margin of the Cartilago costalis of the (9.) 10.–12. rib, Linea alba, superior to the Linea arcuata the muscle participates in the formation of both layers of the rectus sheath, whereas inferior to it all fibres insert into the anterior layer only

F: Unilateral innervation: rotates the thorax ipsilaterally, flexes the vertebral column ipsilaterally, bilateral innervation: flexes the trunk, compresses the abdomen, expiration, M. cremaster elevates the testis

15 Lateral muscles of the abdominal wall (continuation)

M. transversus abdominis (In the male, the most caudal fibres branch off as M. cremaster and traverse into the spermatic cord.)
Caudal Nn. intercostales (Nn. thoracici); N. iliohypogastricus; N. ilioinguinalis (Plexus lumbalis); N. genitofemoralis



O: Inner surface of the Cartilago costalis of the (5., 6.) 7.–12. rib, Procc. costales of the lumbar vertebrae via the deep layer of the Fascia thoracolumbalis, Labium internum of the Crista iliaca, lateral third of the Lig. inguinale

I: Linea alba, superior to the Linea arcuata the muscle participates in the formation of the posterior layer of the rectus sheath, whereas inferior to it all fibres insert into the anterior layer

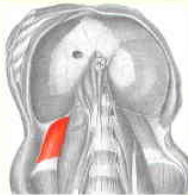
F: Compresses the abdomen, expiration, M. cremaster elevates the testis

16 Dorsal muscles of the abdominal wall (Fig. 851, 869)

The M. quadratus lumborum constitutes the muscular fundament of the posterior abdominal wall. Medially, this muscle is juxtaposed to the M. psoas major (see Tab. 42).

M. quadratus lumborum

N. intercostalis (N. thoracicus [T12]); Rr. musculares (Plexus lumbalis)



O: Posterior third of the Labium internum of the Crista iliaca, Lig. iliolumbale

I: Medial part of the 12. rib, Proc. costalis of the 4.–1. lumbar vertebra

F: Draws the ribs downwards in expiration, flexes the vertebral column ipsilaterally

17 Trunk - shoulder girdle muscles (Fig. 795, 796, 837, 838, 843, 844)

The dorsal muscles of this group, the M. trapezius, M. levator scapulae, M. rhomboideus major and M. rhomboideus minor, belong to the superficial layer according to their position. However, according to their origin and innervation they are referred to as immigrated muscles of the back. The M. serratus anterior is located at the lateral thoracic wall and traverses dorsally underneath the scapula.

The M. pectoralis minor and the M. subclavius originate from the anterior thoracic wall. They are discussed in the section of the ventral muscles of the shoulder (see Tab. 26).

M. trapezius (At the origin between the middle and lower thoracic vertebrae and at the Spina scapulae, a characteristically shaped aponeurosis is found.)
N. accessorius (XI) and branches of the Plexus cervicalis



O: Pars descendens: Squama ossis occipitalis between the Linea nuchalis suprema and the Linea nuchalis superior, Procc. spinosi of the upper cervical vertebrae via the Lig. nuchae

Pars transversa: Procc. spinosi of the lower cervical and upper thoracic vertebrae

Pars ascendens: Procc. spinosi of the middle and lower thoracic vertebrae

I: Pars descendens: acromial third of the Clavicula

Pars transversa: Acromion

Pars ascendens: Spina scapulae

F: Shoulder girdle:

Pars descendens: prevents the drop of the shoulder girdle and the arm, elevates the scapula and rotates the inferior angle outwards together with the M. serratus anterior to allow for the arm to be raised over the horizontal, rotates the head contralaterally when shoulders are fixed, extends the cervical part of the vertebral column when both sides are innervated

Pars transversa: draws the scapula medially

Pars ascendens: depresses the scapula and rotates it caudally

Vertebral column:
 upon bilateral innervation, flattens the kyphosis of the thoracic part of the vertebral column

M. levator scapulae

Direct branches of the Plexus cervicalis and N. dorsalis scapulae (Plexus brachialis, Pars supraclavicularis)



O: Tubercula posteriora of the Procc. transversi of the 1.-4. cervical vertebra

I: Angulus superior and adjacent parts of the Scapula

F: Shoulder girdle:

elevates the scapula and rotates it cranially

Vertebral column:
 extends the cervical part of the vertebral column when shoulders are fixed

M. rhomboideus minor

N. dorsalis scapulae (Plexus brachialis, Pars supraclavicularis)



O: Proc. spinosus of the 6. and 7. cervical vertebra

I: Margo medialis of the Scapula cranially to the Spina scapulae

F: Draws the scapula medially and upwards, holds the scapula to the trunk together with the M. serratus anterior

M. rhomboideus major

N. dorsalis scapulae (Plexus brachialis, Pars supraclavicularis)



O: Proc. spinosus of the four upper thoracic vertebrae

I: Margo medialis of the Scapula caudally to the Spina scapulae

F: Draws the scapula medially and upwards, holds the scapula to the trunk together with the M. serratus anterior

17 Trunk-shoulder girdle muscles (continuation)

M. serratus anterior (Palsy of the M. serratus anterior or the Mm. rhomboidei results in Scapula alata.)

N. thoracicus longus (Plexus brachialis, Pars supraclavicularis)



O: Pars superior: 1. and 2. rib (reasonably convergent)
Pars media: 2.–4. rib (divergent)
Pars inferior: 5.–(8.) 9. rib (strongly convergent), indented with the origin of the M. obliquus externus abdominis

I: Pars superior: Angulus superior of the Scapula
Pars media: Margo medialis of the Scapula
Pars inferior: Angulus inferior of the Scapula

F: Shoulder girdle: draws the scapula medially, presses the scapula onto the thorax together with the Mm. rhomboidei
Pars superior: elevates the scapula
Pars media: depresses the scapula
Pars inferior: depresses the scapula and rotates the inferior angle outwards to allow for the arm to be raised over the horizontal together with the M. trapezius
Thorax: elevates the ribs when scapula is fixed (inspiration)

18 Trunk-arm muscles (Fig. 795, 796, 837, 838)

The M. latissimus dorsi and the M. pectoralis major belong to this group. Both muscles originate from the trunk and traverse to the arm. Due to the position of its muscular belly, and the fact that it also migrated to the back from ventrally, the M. latissimus dorsi is grouped with the superficial muscles of the back.

The M. pectoralis major originates from the thoracic wall and, accordingly, is discussed with the ventral muscles of the shoulder (see Tab. 26).

M. latissimus dorsi (Bursa subtendinea musculi latissimi dorsi at the contact area with the M. teres major)

N. thoracodorsalis (Plexus brachialis, Pars supraclavicularis)



O: Proc. spinosus of the six lower thoracic and lumbar vertebrae (via Fascia thoracolumbalis), Facies dorsalis of the Os sacrum, dorsal third of the Labium externum of the Crista iliaca, (9.) 10.–12. rib, frequently with an additional indentation from the Angulus inferior of the Scapula

I: With a flat tendon surrounding the M. teres major at the Crista tuberculi minoris

F: Shoulder joint: adduction, medial rotation, retroversion
Shoulder girdle: draws the scapula and the arm medially and downwards

19 Spinocostal muscles (Fig. 796)

The spinocostal muscles, M. serratus posterior superior and M. serratus posterior inferior, are slim muscles with minor functional relevance, located in the depth of the muscles of the back on top of the autochthonous muscles of the back.

M. serratus posterior superior

Ventral branches of the N. cervicalis [C8] and the Nn. thoracici [T1–T4]



O: Proc. spinosus of the 6., 7. cervical and the 1., 2. thoracic vertebra

I: 1.–4. rib laterally to the Angulus costae

F: Elevates the 1.–4. rib (inspiration)

M. serratus posterior inferior

Ventral branches of the Nn. thoracici [T9–T12]



O: Proc. spinosus of the 11., 12. thoracic and 1., 2. lumbar vertebra

I: Caudal margin of the 9.–12. rib

F: Draws the 9.–12. rib downwards (expiration), with its possible antagonism to the diaphragm, it may also support forced inspiration

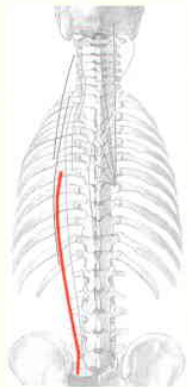
20 Autochthonous muscles of the back (Fig. 797, 800–806, 869)

a Autochthonous lateral muscles of the back (Fig. 797, 800, 802, 805, 869)

The lateral tract of the autochthonous muscles of the back covers the medial tract in the neck and lumbar region and is therefore also referred to as superficial part of the autochthonous muscles of the back. The following muscles with longitudinal fibres belong to this tract: M. iliocostalis, M. longissimus, Mm. intertransversarii. The oblique Mm. splenici diverge cranially (spinotransversal). The Mm. levatores costarum traverse obliquely with laterocaudal direction to the ribs.

M. iliocostalis lumborum

Rr. posteriores of the Nn. lumbales



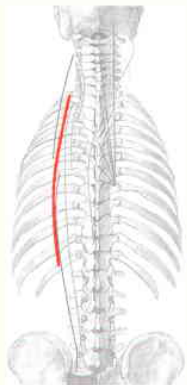
O: Together with the M. longissimus thoracis from: Procc. spinosi of the lumbar vertebrae, Facies dorsalis of the Os sacrum, dorsal third of the Crista iliaca, Fascia thoracolumbalis

I: Angulus costae of the 12.–5. rib

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

M. iliocostalis thoracis

Rr. posteriores of the Nn. thoracici



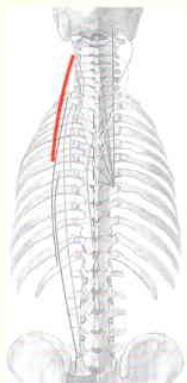
O: 12.–7. rib medially to the Angulus costae

I: Angulus costae of the (6.) 7.–1. rib

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

M. iliocostalis cervicis

Rr. posteriores of the Nn. cervicales



O: 7.–4. (3.) rib medially to the Angulus costae

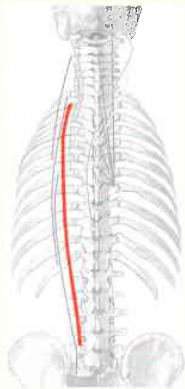
I: Tuberculum posterius of the Proc. transversus of the 6.–(4.) 3. cervical vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

20 Autochthonous muscles of the back (continuation)

M. longissimus thoracis (It is closely attached to the M. longissimus cervicis and the M. spinalis.)

Rr. posteriores of the Nn. spinales



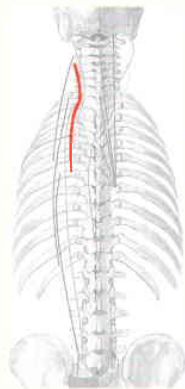
O: Together with the M. iliocostalis lumborum from: Procc. spinosi of the lumbar vertebrae, Facies dorsalis of the Os sacrum, frequently from the Proc. mamillaris of the 2. and the 1. lumbar vertebra, as well as from the Proc. transversus of the 12.-6. thoracic vertebra

I: Medial part: Proc. mamillaris of the 5. lumbar vertebra, Proc. accessorius of the 4.-1. lumbar vertebra, Procc. transversi of the thoracic vertebrae; Lateral part: Proc. costalis of the 4.-1. lumbar vertebra, deep layer of the Fascia thoracolumbalis, 12.-2. rib medially to the Angulus costae

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

M. longissimus cervicis

Rr. posteriores of the Nn. spinales



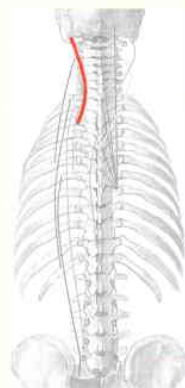
O: Proc. transversus of the 6.-1. thoracic and 7.-3. cervical vertebra

I: Tuberculum posterius of the Proc. transversus of the 5.-2. cervical vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

M. longissimus capitis

Rr. posteriores of the Nn. spinales



O: Proc. transversus of the 3. thoracic-3. cervical vertebra

I: Posterior margin of the Proc. mastoideus

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

20 Autochthonous muscles of the back (continuation)

Mm. intertransversarii laterales lumborum (Strictly speaking, these muscles are of ventral descent and can therefore not be referred to as autochthonous muscles of the back.) *Rr. posteriores and anteriores of the Nn. spinales*



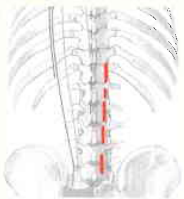
O: Tuberositas iliaca, Proc. costalis and Proc. accessorius of the 5.–1. lumbar vertebra, Proc. transversus of the 12. thoracic vertebra

I: Proc. costalis of the 5.–1. lumbar vertebra, Tuberositas iliaca

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

Mm. intertransversarii mediales lumborum

Rr. posteriores and anteriores of the Nn. spinales



O: Proc. accessorius of the 4.–1. lumbar vertebra

I: Proc. mamillaris of the 5.–2. lumbar vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

Mm. intertransversarii thoracis

Rr. posteriores and anteriores of the Nn. spinales



O: Proc. transversus of the 12.–10. thoracic vertebra

I: Proc. accessorius and Proc. mamillaris of the 1. lumbar vertebra up to the Proc. transversus of the 11. thoracic vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

Mm. intertransversarii posteriores cervicis (Strictly speaking, these muscles are of ventral descent and can therefore not be referred to as autochthonous muscles of the back.) *Rr. posteriores and anteriores of the Nn. spinales*



O: Tuberculum posterius of the Proc. transversus of the 6.–1. cervical vertebra

I: Tuberculum posterius of the Proc. transversus of the 7.–2. cervical vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

Mm. intertransversarii anteriores cervicis (Strictly speaking, these muscles are of ventral descent and can therefore not be referred to as autochthonous muscles of the back.) *Rr. posteriores and anteriores of the Nn. spinales*



O: Tuberculum anterius of the Proc. transversus of the 6.–1. cervical vertebra

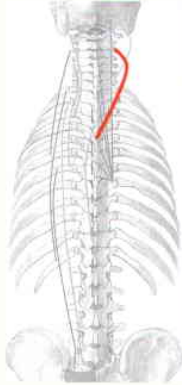
I: Tuberculum anterius of the Proc. transversus of the 7.–2. cervical vertebra

F: Unilateral innervation: lateral flexion, bilateral innervation: extension

20 Autochthonous muscles of the back [continuation]

M. splenius cervicis

Rr. posteriores of the Nn. cervicales



O: Proc. spinosus of the 3. thoracic – 6. cervical vertebra, Lig. supraspinale

I: Tuberculum posterius of the Proc. transversus of the (3.) 2.–4. cervical vertebra

F: Unilateral innervation: lateral flexion, rotates the cervical part of the vertebral column and the head ipsilaterally, bilateral innervation: extends the cervical part of the vertebral column

M. splenius capitis

Rr. posteriores of the Nn. cervicales



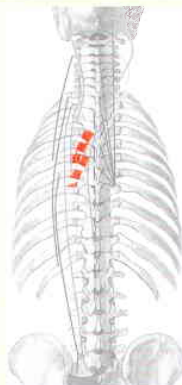
O: Proc. spinosus of the 3.–7. cervical vertebra, Lig. nuchae

I: Proc. mastoideus, (Linea nuchalis superior)

F: Unilateral innervation: lateral flexion, rotates the cervical part of the vertebral column and the head ipsilaterally, bilateral innervation: extends the cervical part of the vertebral column

Mm. levatores costarum [The Mm. levatores costarum longi skip one rib, whereas the Mm. levatores costarum breves traverse to the adjacent caudal rib. There are no Mm. levatores costarum longi in the mid-thoracic part.]

Rr. posteriores of the N. cervicalis [C8] and the Nn. thoracici [T1–T10]



O: Proc. transversus of the 11. thoracic – 7. cervical vertebra

I: 12.–1. rib laterally to the Angulus costae

F: Elevate the ribs, lateral flexion and rotation of the vertebral column

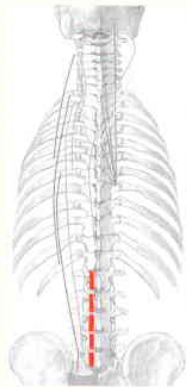
20 Autochthonous muscles of the back (continuation)

b Autochthonous medial muscles of the back [Fig. 797, 800–803, 805, 869]

The medial tract of the autochthonous muscles is located below the lateral tract in the neck and lumbar region and is therefore also referred to as deep part of the autochthonous muscles of the back. The following muscles with longitudinal fibres belong to this tract: The Mm. interspinales and the M. spinalis. The Mm. rotatores, the Mm. multifidi and the M. semispinalis traverse obliquely converging mediocranially (transversospinal).

Mm. interspinales lumborum

Rr. posteriores of the Nn. spinales



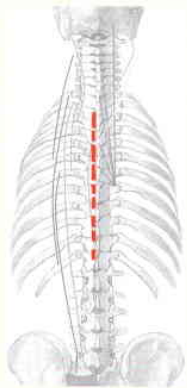
O: Proc. spinosus of the 5.–1. lumbar vertebra

I: Upper margin of the Crista sacralis mediana, Proc. spinosus of the 5.–2. lumbar vertebra

F: Segmental extension

Mm. interspinales thoracis

Rr. posteriores of the Nn. spinales



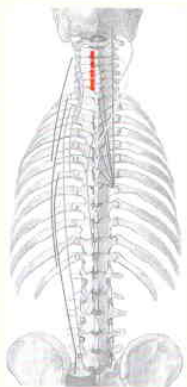
O: Proc. spinosus of the (12.) 11.–2. (1.) thoracic vertebra

I: Proc. spinosus of the (1. lumbar) 12.–3. (2.) thoracic vertebra

F: Segmental extension

Mm. interspinales cervicis

Rr. posteriores of the Nn. spinales



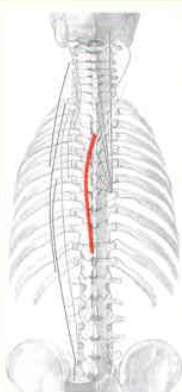
O: Proc. spinosus of the 7.–2. cervical vertebra

I: Proc. spinosus of the 1. thoracic–3. cervical vertebra

F: Segmental extension

20 Autochthonous muscles of the back (continuation)

M. spinalis thoracis (The muscle is tightly attached to the M. longissimus thoracis at its origin, and to the Mm. multifidi at its insertion.)
Rr. posteriores of the Nn. spinales



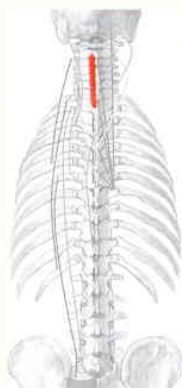
O: Proc. spinosus of the (3.) 2., 1. lumbar and the 12.–10. thoracic vertebra

I: Proc. spinosus of the (10.) 9.–2. thoracic vertebra

F: Unilateral innervation: lateral flexion,
 bilateral innervation: extension

M. spinalis cervicis

Rr. posteriores of the Nn. spinales



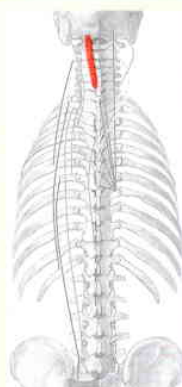
O: Proc. spinosus of the (4.) 3.–1. thoracic and the 7.–6. cervical vertebra

I: Proc. spinosus of the (6.) 5.–2. cervical vertebra

F: Unilateral innervation: lateral flexion,
 bilateral innervation: extension

M. spinalis capitis (inconstant muscle, tightly attached to the M. semispinalis capitis at its insertion)

Rr. posteriores of the Nn. spinales



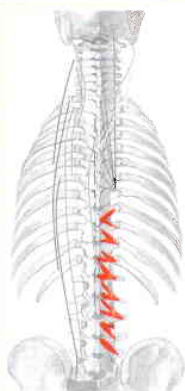
O: Proc. spinosus of the 3.–1. thoracic and the 7.–6. cervical vertebra

I: Squama ossis occipitalis between the Linea nuchalis suprema and the Linea nuchalis superior adjacent to the Protuberantia occipitalis externa

F: Unilateral innervation: lateral flexion,
 bilateral innervation: extension

20 Autochthonous muscles of the back (continuation)

Mm. rotatores (They are subdivided into Mm. rotatores cervicis, Mm. rotatores thoracis and the inconstant Mm. rotatores lumborum. The Mm. rotatores breves traverse to the adjacent upper vertebra, whereas the Mm. rotatores longi extend to the second next vertebra.)
Rr. posteriores of the Nn. spinales

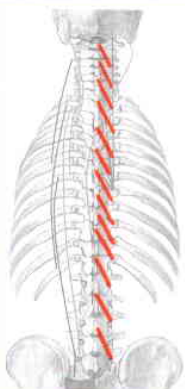


O: Procc. mamillares of the lumbar vertebrae,
 Procc. transversi of the thoracic vertebrae,
 Procc. articulares inferiores of the cervical vertebrae

I: Root of the Proc. spinosus of the 3.-1. lumbar, 12.-1. thoracic and 7.-2. cervical vertebra

F: Unilateral innervation: segmental lateral flexion, rotation,
 bilateral innervation: segmental extension

Mm. multifidi (They are particularly well developed in the lumbar part of the vertebral column and skip two to four vertebrae.)
Rr. posteriores of the Nn. spinales

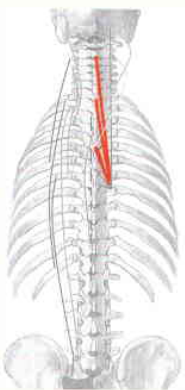


O: Facies dorsalis of the Os sacrum,
 Lig. sacroiliacum posterius,
 dorsal part of the Crista iliaca,
 Procc. mamillares of the lumbar vertebrae,
 Procc. transversi of the thoracic vertebrae,
 Proc. articularis inferior of the 7.-4. cervical vertebra

I: Proc. spinosus of the 5.-1. lumbar vertebra, 12.-1. thoracic and 7.-2. cervical vertebra

F: Unilateral innervation: segmental lateral flexion, rotation,
 bilateral innervation: segmental extension

M. semispinalis thoracis (Its fibres skip five to seven vertebrae.)
Rr. posteriores of the Nn. spinales

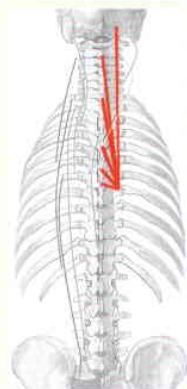
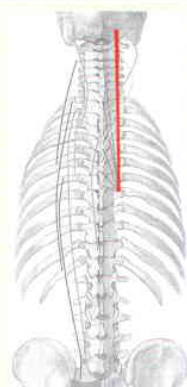


O: Proc. transversus of the (12.) 11.-7. (6.) thoracic vertebra

I: Proc. spinosus of the (4.) 3. thoracic -6. cervical vertebra

F: Unilateral innervation: rotates the vertebral column and the head contralaterally,
 bilateral innervation: extension

20 Autochthonous muscles of the back (continuation)

M. semispinalis cervicis*Rr. posteriores of the Nn. spinales***O:** Proc. transversus of the (7.) 6. thoracic – 7. cervical vertebra**I:** Proc. spinosus of the 6.–3. cervical vertebra**F:** Unilateral innervation: rotates the vertebral column and the head contralaterally, lateral flexion
bilateral innervation: extension**M. semispinalis capitis***Rr. posteriores of the Nn. spinales***O:** Proc. transversus of the (8.) 7. thoracic – 3. cervical vertebra**I:** Squama ossis occipitalis between Linea nuchalis suprema and Linea nuchalis superior, medial area**F:** Unilateral innervation: rotates the vertebral column and the head contralaterally, lateral flexion
bilateral innervation: extension**c Autochthonous deep muscles of the neck (Fig. 800, 801, 803, 804, 806)**

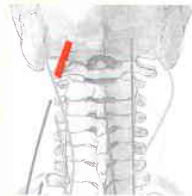
The Mm. recti capitis posterior minor et major and the Mm. obliqui capitis superior et inferior belong to the medial tract of the autochthonous muscles of the back, whereas the M. rectus capitis lateralis belongs to the lateral tract.

M. rectus capitis posterior major*N. suboccipitalis (dorsal branch of the N. cervicalis [C1])***O:** Proc spinosus of the Axis**I:** Middle third of the Linea nuchalis inferior**F:** Unilateral innervation: rotates and flexes the head ipsilaterally, bilateral innervation: participates in the fine tuning of the position and the movement in the craniocervical joints, extension**M. rectus capitis posterior minor***N. suboccipitalis (dorsal branch of the N. cervicalis [C1])***O:** Tuberculum posterius of the Arcus posterior of the Atlas**I:** Medial third of the Linea nuchalis inferior**F:** Unilateral innervation: flexes the head ipsilaterally, bilateral innervation: participates in the fine tuning of the position and the movement in the craniocervical joints, extension

20 Autochthonous muscles of the back (continuation)

M. obliquus capitis superior

N. suboccipitalis (dorsal branch of the N. cervicalis [C1])



O: Tuberculum posterius of the Proc. transversus of the Atlas

I: Lateral third of the Linea nuchalis inferior

F: Unilateral innervation: flexes the head ipsilaterally, bilateral innervation: participates in the fine tuning of the position and the movement in the craniocervical joints, extension

M. obliquus capitis inferior

N. suboccipitalis (dorsal branch of the N. cervicalis [C1])



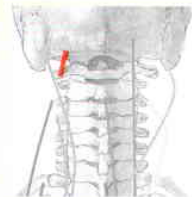
O: Proc. spinosus of the Axis

I: Posterior margin of the Proc. transversus of the Atlas

F: Unilateral innervation: rotates the Atlas (and the head) ipsilaterally, bilateral innervation: participates in the fine tuning of the position and the movement in the craniocervical joints, extension

M. rectus capitis lateralis

Ventral branches of the N. cervicalis [C1]



O: Anterior margin of the Proc. transversus of the Atlas

I: Proc. jugularis of the Os occipitale

F: Unilateral innervation: flexes the head ipsilaterally, bilateral innervation: participates in the fine tuning of the position and the movement in the craniocervical joints

21 Diaphragm (Fig. 846, 851–853)

The diaphragm divides the thoracic and the abdominal cavity. Its “domes” form the floor of the right and left pleural cavity. The Pars lumbalis delineates the retroperitoneal space dorsally and constitutes a part of the dorsal abdominal wall.

Diaphragma

N. phrenicus (Plexus cervicalis)



O: Pars sternalis: inner surface of the Proc. xiphoideus, rectus sheath

Pars costalis: inner surface of the Cartilago costalis of the 12.–6. rib, serrated with indentations of the M. transversus abdominis

Pars lumbalis, Crus dextrum,

– Pars medialis: Corpus of the 3.–1. lumbar vertebra, Disci intervertebrales

– Pars lateralis: Ligg. arcuata mediale (psoas arcade) and laterale (quadratus arcade)

Pars lumbalis, Crus sinistrum,

– Pars medialis: Corpus of the 4.–1. lumbar vertebra, Disci intervertebrales

– Pars lateralis: Ligg. arcuata mediale (psoas arcade) and laterale (quadratus arcade)

I: All parts merge in the Centrum tendineum.

F: Diaphragmatic breathing (Inspiration), compresses the abdomen

Passages and weak points in the diaphragm

Name	Location	Structures
Hiatus aorticus	Pars lumbalis, between Crus dextrum/sinistrum and vertebral column	Aorta; Ductus thoracicus
Hiatus oesophageus	Pars lumbalis, Crus sinistrum near the midline	Oesophagus; Nn. vagi; R. phrenicoabdominalis sinister
Foramen venae cavae	Centrum tendineum	V. cava inferior; N. phrenicus dexter, R. phrenicoabdominalis dexter
Trigonum sternocostale [LARREY's cleft]	Between Pars costalis and Pars lumbalis	A.; V. epigastrica superior
Trigonum lumbocostale	Between Pars sternalis and Pars costalis	
Unnamed	Pars lumbalis, Crus dextrum/sinistrum, (Pars medialis)	N. splanchnicus major and minor; V. azygos; V. hemiazygos
Unnamed	Pars lumbalis, between (Pars medialis) and Pars lateralis	Truncus sympathicus
Unnamed	Centrum tendineum	N. phrenicus sinister, R. phrenicoabdominalis sinister

22 Pelvic and urogenital diaphragm (Fig. 1169–1176, 1333)

Two partially overlapping muscle layers form the floor of the pelvic cavity. The M. levator ani, the M. ischiococcygeus and the M. sphincter ani externus, form the Diaphragma pelvis.

The Diaphragma urogenitale stretches as a triangular plate between both lower rami of the pubic bone. Its fibres are transversally orientated and support the urogenital hiatus. Among others the M. transversus perinei profundus, the M. sphincter urethrae (together they are referred to as M. compressor urethrae) and the M. transversus perinei superficialis belong to the Diaphragma urogenitale.

In the male, the Diaphragma urogenitale is only passed by the urethra, whereas in the female, both the vagina and the urethra pass through.

a Pelvic diaphragm

M. levator ani (It consists of the M. pubococcygeus and the M. iliococcygeus. The fibres of the Mm. levator prostatae, pubovaginalis and puborectalis originate from the M. pubococcygeus.)

Branches of the N. sacralis [S3 and S4]



O: M. pubococcygeus: inner surface of the Os pubis near the symphysis, anterior two thirds of the Arcus tendineus muscoli levatoris ani, Spina ischiadica

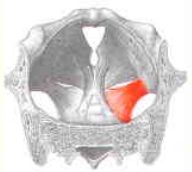
M. iliococcygeus: posterior third of the Arcus tendineus muscoli levatoris ani

I: Centrum perinei (prerectal fibres), in the male the fascia of the Prostata (M. levator prostatae), in the female the wall of the Vagina (M. pubovaginalis), radiates into the M. sphincter ani externus, forms a loop with the contralateral fibres just behind the Anus (M. puborectalis), Corpus anococcygeum, Os coccygis

F: Spans around the rectum from posterior, supports the M. sphincter ani externus to close the rectum, the medial free margin forms the urogenital hiatus, which allows the urethra in the male and both the urethra and the vagina in the female to pass through

M. ischiococcygeus

Branches of the N. sacralis [S4 and S5]



O: Inner surface of the Spina ischiadica, predominantly attached to the Lig. sacrospinale

I: Lateral margin of the lower segments of the Os sacrum, Os coccygis

F: Supports the pelvic diaphragm

M. sphincter ani externus (muscular loop with a ring-like shape up to the M. levator ani)

N. pudendus [Plexus sacralis]



O: Pars subcutanea: Dermis and subcutaneous tissues surrounding the Anus

Pars superficialis: Centrum perinei

Pars profunda: ring-like muscle

I: Dermis and subcutaneous tissues surrounding the Anus, Lig. anococcygeum

F: Closure of the anus

22 Pelvic and urogenital diaphragm (continuation)

b Urogenital diaphragm

M. transversus perinei profundus (It is a triangular supportive muscular layer interwoven with connective tissue with openings for the urethra in the male and for both the urethra and the vagina in the female. It spans obliquely over the Arcus pubis and Angulus subpubicus, respectively, and is supplemented by the Lig. pubicum inferius and the Lig. transversum perinei profundum.)
N. pudendus (Plexus sacralis)



O: Ramus inferior ossis pubis, Ramus ossis ischii, connective tissue envelop of the Vasa pudenda interna

I: Centrum perinei, fasciae of the prostate and the vaginal wall

F: Supports the urogenital hiatus, seals the urethra (and the urinary bladder)

M. sphincter urethrae (muscular traction enveloping the Pars membranacea urethrae in a ring-like fashion)
N. pudendus (Plexus sacralis)

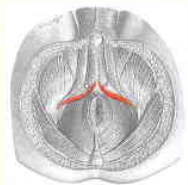
see Fig. 1174, 1175

O: Ring-like muscle, Lig. transversum perinei, fibres from the M. transversus perinei profundus

I: Connective tissue surrounding the Urethra (Pars membranacea), contralateral M. transversus perinei profundus, vaginal wall (M. sphincter urethrovaginalis)

F: Supports the urogenital hiatus, part of the continence organ of the Vesica urinaria, seals the urinary bladder during ejaculation

M. transversus perinei superficialis (inconstant muscle)
N. pudendus (Plexus sacralis)

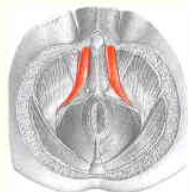


O: Superficial division of the M. transversus perinei profundus, Tuber ischiadicum

I: Centrum perinei

F: Supports the M. transversus perinei profundus

M. ischiocavernosus
N. pudendus (Plexus sacralis)

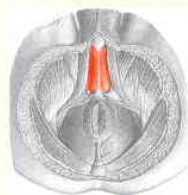


O: Ramus ossis ischii

I: Tunica albuginea corporum cavernosorum

F: Fixes the crura of penis in the male, and the crura of clitoris in the female to the inferior pubic ramus, as well as to the ramus of the ischium and the urogenital diaphragm, supports the ejaculation and the orgasm, respectively

M. bulbospongiosus (spans around the Bulbus penis in the male, and around the Bulbus vestibuli in the female)
N. pudendus (Plexus sacralis)



O: Centrum perinei, in the male additional origin from the Raphe penis at the lower surface of the Corpus spongiosum penis

I: In the male, it inserts laterally to the Corpus spongiosum penis into the Fascia urogenitalis inferior and the back of the Penis; in the female, the fibres are attached to the Corpus cavernosum clitoridis and the Fascia dia-phragmatis urogenitalis inferior

F: In the male, it fixes the bulb of penis to the urogenital diaphragm, and is involved in the ejaculation; in the female, it fixes the bulb of vestibule to the urogenital diaphragm and supports the orgasm

23 Joints of the upper limb, *Articulationes membri superioris* (Fig. 276)

a Joints of the shoulder girdle, *Articulationes cinguli pectoralis*

Name of the joint	Type of the joint	Movements
Sternoclavicular joint, <i>Articulatio sternoclavicularis</i>	Irregular joint surface, <i>Articulatio irregularis</i> functionally: spheroidal joint (distinct feature: <i>Discus articularis</i>)	Rotation along a sagittal axis (as in raising the shoulder), rotation along a longitudinal axis (as in protraction and retraction of the shoulder), rotation along the longitudinal axis of the clavicle (as in swinging the arm)
Acromioclavicular joint, <i>Articulatio acromioclavicularis</i>	Plane joint, <i>Articulatio plana</i> functionally: spheroidal joint (distinct feature: variable, frequently incomplete <i>Discus articularis</i>)	Rotation along a sagittal axis (as in raising the shoulder), rotation along a transverse axis (as in swinging the arm), rotation along a longitudinal axis (as in protraction and retraction of the shoulder)

b Joints of the free part of the upper limb, *Articulationes membri superioris liberi*

Name of the joint	Type of the joint	Movements
Shoulder joint, <i>Articulatio humeri</i>	Spheroidal joint, <i>Articulatio spheroidea</i>	Protraction (flexion, anteversion) Retraction (extension, retroversion) Abduction Adduction Medial rotation Lateral rotation (Circumduction: combining flexion, abduction, extension, adduction)
Elbow joint, <i>Articulatio cubiti</i>		
a) <i>Articulatio humeroulnaris</i>	Hinge joint, <i>Ginglymus</i>	Flexion Extension
b) <i>Articulatio humeroradialis</i>	Spheroidal joint, <i>Articulatio spheroidea</i> (with functional restriction: no abduction)	Flexion Extension Rotation
c) <i>Articulatio radioulnaris proximalis</i>	Pivot joint, <i>Articulatio trochoidea</i>	} Pronation and supination of the hand
Distal radioulnar joint, <i>Articulatio radioulnaris distalis</i>	Pivot joint, <i>Articulatio trochoidea</i>	
Wrist joints		
a) <i>Articulatio radiocarpalis</i>	Ellipsoid joint, <i>Articulatio ellipsoidea</i>	} Lateral movements of the hand (ulnar and radial abduction) Flexion Extension
b) <i>Articulatio mediocarpalis</i>	Hinge joint, <i>Ginglymus</i>	
Carpometacarpal joint of the thumb, <i>Articulatio carpometacarpalis pollicis</i>	Sellar joint, <i>Articulatio sellaris</i>	Abduction Adduction Opposition Reposition
Carpometacarpal joints (II–V), <i>Articulationes carpometacarpales (II–V)</i>	Plane joints, <i>Articulationes planae</i>	Various distinct movements
Metacarpophalangeal joints, <i>Articulationes metacarpophalangeae</i>	Spheroidal joints, <i>Articulationes spheroideae</i> (with functional restrictions)	Flexion Extension Abduction* Adduction* (*with regard to the middle finger)
Interphalangeal joints of the fingers, <i>Articulationes interphalangeae manus</i>	Hinge joints, <i>Ginglymi</i>	Flexion Extension

23 Joints of the upper limb, Articulationes membri superioris (continuation)

c Planes and axes of the movements of the joints of the upper limb

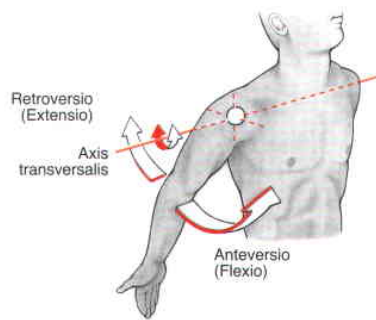


Fig. 1 Shoulder joint; movements in the sagittal plane.

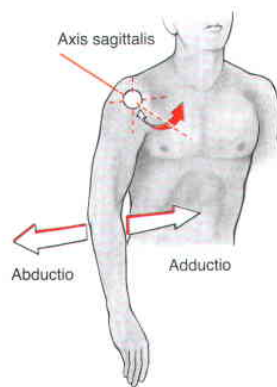


Fig. 2 Shoulder joint; movements in the frontal plane.

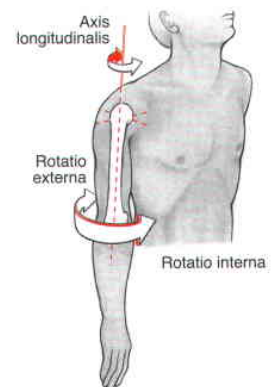


Fig. 3 Shoulder joint; movements in the transverse plane.

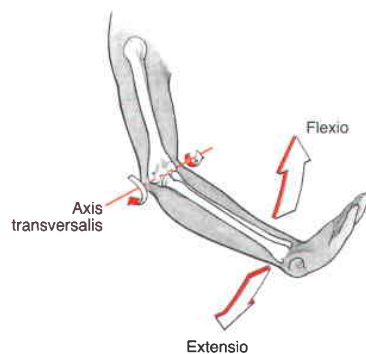


Fig. 4 Elbow joint; movements in the sagittal plane.

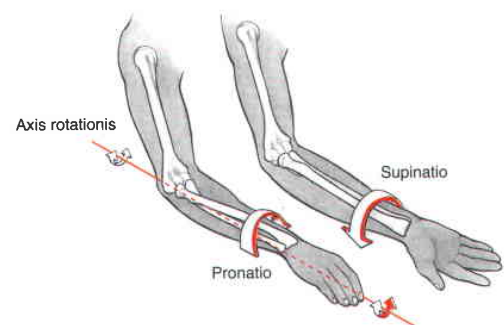


Fig. 5 Elbow joint; pronation and supination of the hand.

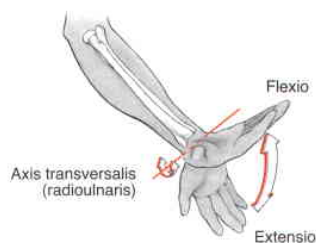


Fig. 6 Wrist joints; movements in the sagittal plane.



Fig. 7 Wrist joints; movements in the frontal plane.

With regard to the wrist joints, palmar flexion is also referred to as flexion and dorsal flexion as extension.

24 Branches and supplying areas of the brachial plexus (Fig. 386–395, 397, 398, 400, 401, 403, 404)

	Motor function	Sensory function
Plexus brachialis (C5) C4–T1 (T2)		
N. dorsalis scapulae (C3) C4, C5	M. levator scapulae, Mm. rhomboidei	
N. suprascapularis C4–C6	M. supraspinatus, M. infraspinatus	
Nn. subscapulares C5–C7	M. subscapularis, (M. teres major)	
N. subclavius (C4) C5, C6	M. subclavius	
N. thoracicus longus C5–C7 (C8)	M. serratus anterior	
Nn. pectorales C8–T1	M. pectoralis major, M. pectoralis minor	
N. thoracodorsalis C6–C8	M. latissimus dorsi, M. teres major	
Rr. musculares	M. longus colli, M. longus capitis	
N. musculocutaneus C5–C7	M. coracobrachialis, M. biceps brachii, M. brachialis	Skin of the radiopalmar side of the forearm
N. medianus C6–T1	M. pronator teres, M. flexor carpi radialis, M. palmaris longus, M. flexor digitorum superficialis, M. flexor pollicis longus, M. flexor digitorum profundus (radial portion), M. pronator quadratus, M. flexor pollicis brevis (Caput superficiale), M. opponens pollicis, Mm. lumbricales I, II	Skin of the radial part of the palm (3½ fingers), skin of the dorsal side of the distal phalanx (3½ fingers)
N. ulnaris C6–T1	M. flexor carpi ulnaris, M. flexor digitorum profundus (ulnar portion), M. palmaris brevis, M. flexor digiti minimi, M. opponens digiti minimi, M. abductor digiti minimi, M. flexor pollicis brevis (Caput profundum), M. adductor pollicis, Mm. lumbricales III, IV, Mm. interossei	Skin of the ulnar side of the hand (palmar: 1½ fingers, dorsal 2½ fingers), skin of the dorsal side of the distal phalanx (1½ fingers)
N. cutaneus brachii medialis C8–T1 (T2)		Skin of the mediopalmar side of the arm
N. cutaneus antebrachii medialis C8–T1		Skin of the ulnopalmar side of the forearm
N. axillaris C5–C7	M. deltoideus, M. teres minor	Skin of the shoulder
N. radialis C5–T1	M. triceps brachii, M. anconeus, M. brachioradialis, M. extensor carpi radialis longus, M. extensor carpi radialis brevis, M. supinator, M. extensor digitorum, M. extensor pollicis longus, M. abductor pollicis longus, M. extensor pollicis brevis, M. extensor indicis, M. extensor carpi ulnaris	Skin of the dorsal side of the arm, forearm and hand (2½ radial fingers with the exception of the distal phalanges)

25 Segmental innervation of the muscles of the upper limb, muscles of diagnostic importance

(According to MUMENTHALER and SCHLIACK; the indicator muscle of each segment is printed in bold.)

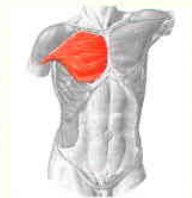
M. supraspinatus	C4–C5	M. abductor pollicis longus	C6–C8
M. teres minor	C4–C5	M. extensor pollicis brevis	C7–T1
M. deltoideus: C5	C5–C6	M. extensor pollicis longus	C6–C8
M. infraspinatus	C4–C6	M. extensor digitorum	C6–C8
M. subscapularis	C5–C6	M. extensor indicis	C6–C8
M. teres major	C5–C7	M. extensor carpi ulnaris	C6–C8
M. biceps brachii: C6	C5–C6	M. extensor digiti minimi	C6–C8
M. brachialis	C5–C6	M. flexor digitorum superficialis	C7–T1
M. coracobrachialis	C5–C7	M. flexor digitorum profundus	C7–T1
M. triceps brachii: C7	C6–C8	M. flexor carpi ulnaris	C7–T1
M. brachioradialis	C5–C6	M. abductor pollicis brevis	C7–T1
M. extensor carpi radialis longus	C5–C7	M. flexor pollicis brevis	C7–T1
M. extensor carpi radialis brevis	C5–C7	M. opponens pollicis	C6–C7
M. supinator	C5–C6	M. flexor digiti minimi	C7–T1
M. pronator teres	C6–C7	M. adductor pollicis	C8–T1
M. flexor carpi radialis	C6–C7	M. abductor digiti minimi: C8	C8–T1
M. flexor pollicis longus	C6–C8	Mm. interossei: C8	C8–T1

26 Ventral muscles of the shoulder [Fig. 338, 340, 341, 343, 344, 837–839]

The M. pectoralis major spans from the trunk to the upper limb and moulds the surface anatomy of the anterior upper thoracic wall. Below, the M. pectoralis minor can be found, which together with the M. subclavius belongs to the muscles spanning from the trunk to the shoulder girdle. Only the M. subscapularis is located in direct contact to the shoulder joint, spanning from the anterior surface of the scapula to the humerus.

M. pectoralis major (Its fibres converge laterally into a broad, flat tendon shaped like a bag with its opening to the top.)

Nn. pectorales medialis et lateralis [Plexus brachialis, Pars infra-/supraclavicularis]



O: Pars clavicularis: sternal half of the Clavicula

Pars sternocostalis: Manubrium and Corpus sterni,

Cartilago costalis of the 1.–7. rib
Pars abdominalis: anterior layer of the rectus sheath

I: Crista tuberculi majoris of the Humerus

F: Shoulder joint:
adduction, particularly effective when the arm is elevated,
medial rotation,
Pars clavicularis: anteversion
Shoulder girdle:
depression,
anteversion
Thorax:
elevates the sternum and the upper ribs when the shoulders are fixed (supports inspiration)

M. pectoralis minor

Nn. pectorales medialis et lateralis [Plexus brachialis, Pars infra-/supraclavicularis]



O: (2.) 3.–5. rib close to the junction between cartilage and bone

I: Tip of the Proc. coracoideus

F: Shoulder girdle:
depression
Thorax:
elevates the sternum and the upper ribs (supports inspiration)

M. subclavius (The fascia of the M. subclavius is attached to the Adventitia of the V. subclavia, thus preventing collapse of its lumen.)

N. subclavius [Plexus brachialis, Pars supraclavicularis]



O: Junction between cartilage and bone of the 1. rib

I: Lateral third of the Clavicula

F: Shoulder girdle:
depression (with low effectiveness),
antagonizes laterally-directed traction on the clavicle

26 Ventral muscles of the shoulder (continuation)

M. subscapularis (The Bursa subtendinea musculi subscapularis lies below the muscle close to its insertion.)

Nn. subscapulares (Plexus brachialis, Pars infraclavicularis)



O: Fossa subscapularis

I: Tuberculum minus and adjacent part of the Crista tuberculi minoris

F: Shoulder joint:
medial rotation,
abduction in the scapular plane (cranial portion),
adduction in the scapular plane (caudal portion)

27 Lateral muscles of the shoulder (Fig. 337, 340–345)

The M. deltoideus plays a major role in determining the surface contour of the shoulder. Divided by the Bursa subdeltoidea, the tendon of the M. supraspinatus is located directly below the M. deltoideus.

M. deltoideus

N. axillaris (Plexus brachialis, Pars infraclavicularis)



O: **Pars clavicularis:** acromial third of the Clavicula
Pars acromialis: Acromion
Pars spinalis: lower margin of the Spina scapulae

I: Tuberositas deltoidea

F: Shoulder joint:
Pars clavicularis: adduction (from about 60° increasing abduction), medial rotation, anteversion
Pars acromialis: abduction up to the horizontal plane
Pars spinalis: adduction (from about 60° increasing abduction), lateral rotation, retroversion
All parts: carry the weight of the arm

M. supraspinatus

N. suprascapularis (Plexus brachialis, Pars supraclavicularis)



O: Fossa supraspinata, Fascia supraspinata

I: Proximal facet of the Tuberculum majus

F: Shoulder joint:
abduction in the scapular plane up to the horizontal plane, lateral rotation

28 Dorsal muscles of the shoulder (Fig. 339–341, 343, 344)

The M. infraspinatus is located most cranially. More caudally are the M. teres minor and the M. teres major.

The M. latissimus dorsi comes from the back (see Tab. 18, trunk-arm muscles) and runs along with the M. teres major.

M. infraspinatus

N. suprascapularis (Plexus brachialis, Pars supraclavicularis)



O: Caudal margin of the Spina scapulae, Fossa infraspinata, Fascia infraspinata

I: Middle facet of the Tuberculum majus

F: Shoulder joint:
cranial portion: lateral rotation,
abduction in the scapular plane
caudal portion: lateral rotation,
adduction in the scapular plane

28 Dorsal muscles of the shoulder (continuation)

M. teres minor

N. axillaris (Plexus brachialis, Pars infraclavicularis)



O: Caudal portion of the Fossa infraspinata, medial third of the Margo lateralis

I: Distal posterior facet of the Tuberculum majus

F: Shoulder joint: lateral rotation, adduction in the scapular plane

M. teres major (At the insertion, the M. teres major and the M. latissimus dorsi are separated by the Bursa subtendinea musculi latissimi dorsi.)
Nn. subscapulares or N. thoracodorsalis (Plexus brachialis, Pars infraclavicularis)



O: Margo lateralis, Angulus inferior

I: Crista tuberculi minoris medially to the M. latissimus dorsi

F: Shoulder joint: medial rotation, adduction in the scapular plane

29 Ventral muscles of the arm (Fig. 343, 344, 347–350)

The M. biceps brachii determines the surface anatomy of the ventral arm. The M. coracobrachialis is directly attached to the Caput breve of the M. biceps brachii. The M. brachialis is located most deeply.

M. biceps brachii (The tendon of the Caput longum traverses directly the shoulder joint. The Bursa bicipitoradialis is located at its insertion at the Tuberositas radii.)

N. musculocutaneus (Plexus brachialis, Pars infraclavicularis)



O: **Caput longum:** Tuberculum supraglenoidale, Labrum glenoidale
Caput breve: Tip of the Proc. coracoideus lateral to the M. coracobrachialis

I: Tuberositas radii, via the Aponeurosis musculi bicipitis brachii at the Fascia antebrachii

F: Shoulder joint:
Caput longum: abduction, anteversion, medial rotation
Caput breve: adduction, anteversion, medial rotation
Both parts: carry the weight of the arm
Elbow joint:
flexion, supination

M. coracobrachialis (Normally this muscle is penetrated by the N. musculocutaneus.)

N. musculocutaneus (Plexus brachialis, Pars infraclavicularis)



O: Tip of the Proc. coracoideus medial to the Caput breve of the M. biceps brachii

I: Facies anterior of the Humerus mediodistal to the Crista tuberculi minoris

F: Shoulder joint: medial rotation, adduction, anteversion

M. brachialis

N. musculocutaneus (Plexus brachialis, Pars infraclavicularis)



O: Facies anterior of the Humerus distal to the Tuberositas deltoidea

I: Tuberositas ulnae

F: Elbow joint: flexion

30 Dorsal muscles of the arm (Fig. 342–344, 346, 351)

The three heads of the *M. triceps brachii* determine the surface anatomy of the dorsal arm. The *M. anconeus* can be considered as a continuation of the *Caput mediale* of the *M. triceps brachii* to the forearm.

M. triceps brachii (The fibres of the *Caput longum* traverse in longitudinal direction, and those of the *Caput mediale* and *Caput laterale* in an oblique direction; a common broad aponeurosis is found at the insertion.)

N. radialis (*Plexus brachialis, Pars infraclavicularis*)



O: Caput longum: Tuberculum infraglenoidale, lower margin of the Labrum glenoidale

I: Olecranon

F: Shoulder joint:

Caput longum: adduction, support of the weight of the arm

Elbow joint:
extension

Caput mediale: Facies posterior of the Humerus mediodistal to the Sulcus nervi radialis, Septum intermusculare brachii mediale

Caput laterale: Facies posterior of the Humerus lateroproximal to the Sulcus nervi radialis, proximal two thirds of the Septum intermusculare brachii laterale

M. anconeus (It is closely positioned to the *Caput mediale* of the *M. triceps brachii*.)

N. radialis (*Plexus brachialis, Pars infraclavicularis*)



O: Epicondylus lateralis of the Humerus, capsule of the elbow joint, Lig. collaterale radiale

I: Facies posterior of the Ulna just distal to the Olecranon

F: Elbow joint:
extension

31 Superficial ventral muscles of the forearm [Fig. 352, 353, 355–359, 373]

The group of the superficial ventral muscles of the forearm consists of the following muscles in the order from radial to ulnar: M. pronator teres, M. flexor carpi radialis, M. palmaris longus, M. flexor digitorum superficialis and M. flexor carpi ulnaris.

M. pronator teres

N. medianus (Plexus brachialis, Pars infraclavicularis)



O: Caput humerale: Epicondylus medialis of the Humerus, Septum intermusculare brachii mediale

Caput ulnare: Facies medialis of the Ulna distal to the Proc. coronoideus

I: Middle third of the Facies lateralis of the Radius

F: Elbow joint:

Caput humerale: pronation, flexion

Caput ulnare: pronation

M. flexor carpi radialis

N. medianus (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus medialis of the Humerus, Fascia antebrachii

I: Palmar surface of the base of the Os metacarpi II (frequently also III)

F: Elbow joint:

flexion,

pronation

Wrist joint:

palmar flexion,

radial abduction

M. palmaris longus (inconstant muscle)

N. medianus (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus medialis of the Humerus, Fascia antebrachii

I: Aponeurosis palmaris

F: Elbow joint:

flexion

Wrist joint:

palmar flexion,

tension of the palmar aponeurosis

M. flexor digitorum superficialis [The tendons of this muscle are perforated by the tendons of the M. flexor digitorum profundus just before their insertion.]

N. medianus (Plexus brachialis, Pars infraclavicularis)



O: Caput humeroulnare: Epicondylus medialis of the Humerus, Proc. coronoideus

Caput radiale: Facies anterior of the Radius distal to the M. pronator teres

I: With four long tendons at the base of the Phalanx media of the 2.–5. finger

F: Elbow joint:

flexion

Wrist joint:

palmar flexion,

ulnar abduction

Metacarpophalangeal joints (II–V):

flexion,

adduction

Proximal finger joints (II–V):

flexion

M. flexor carpi ulnaris

N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Caput humerale: Epicondylus medialis of the Humerus; Septum intermusculare brachii mediale

Caput ulnare: Olecranon, upper two thirds of the Margo posterior of the Ulna, Fascia antebrachii

I: Via the Os pisiforme and the Ligg. pisometacarpale and pisohamatum at the base of the Os metacarpi V and the Os hamatum

F: Elbow joint:

flexion

Wrist joint:

palmar flexion,

ulnar abduction

32 Deep ventral muscles of the forearm (Fig. 352, 354, 355, 359, 360, 370, 371, 374)

The M. flexor digitorum profundus is located medially with the M. flexor pollicis longus being located laterally. The M. pronator quadratus covers the distal quarter of the bones of the forearm.

M. flexor digitorum profundus

N. ulnaris for the ulnar portion, N. interosseus antebrachii anterior of the N. medianus for the radial portion (Plexus brachialis, Pars infraclavicularis)



O: Proximal two thirds of the Facies anterior of the Ulna, Membrana interossea

I: Base of the Phalanx distalis of the 2.-5. finger

F: Wrist joint:
palmar flexion
Metacarpophalangeal joints (II-V):
flexion,
(adduction)
Finger joints (II-V):
flexion

M. flexor pollicis longus

N. interosseus antebrachii anterior of the N. medianus (Plexus brachialis, Pars infraclavicularis)



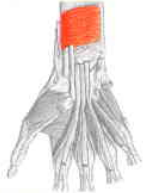
O: Facies anterior of the Radius distal to the Tuberositas radii

I: Base of the Phalanx distalis of the thumb

F: Wrist joint:
palmar flexion
Carpometacarpal joint of the thumb:
adduction,
opposition
Thumb joints:
flexion

M. pronator quadratus

N. interosseus antebrachii anterior (N. medianus, Plexus brachialis, Pars infraclavicularis)



O: Distal quarter of the Margo anterior of the Ulna

I: Margo and Facies anterior of the Radius

F: Radioulnar joints:
pronation

33 Lateral (radial) muscles of the forearm (Fig. 352, 362, 366, 370, 371)

The group of the radial muscles of the forearm consists of the following muscles in the order from lateral to medial: M. brachioradialis, M. extensor carpi radialis longus and M. extensor carpi radialis brevis.

M. brachioradialis

N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Margo lateralis of the Humerus,
Septum intermusculare brachii laterale

I: Proc. styloideus of the Radius

F: Elbow joint:
flexion (particularly strong when forearm is in semipronated position),
pronation or supination (from the corresponding extreme position to an intermediate one)

M. extensor carpi radialis longus

N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Distal end of the Margo lateralis of the Humerus,
Epicondylus lateralis of the Humerus,
Septum intermusculare brachii laterale

I: Dorsal surface of the base of the Os metacarpi II

F: Elbow joint:
flexion,
pronation or supination (from the corresponding extreme position to an intermediate one)
Wrist joint:
dorsal flexion,
radial abduction

M. extensor carpi radialis brevis

N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus lateralis of the Humerus,
Lig. anulare radii

I: Dorsal surface of the base of the Os metacarpi III

F: Elbow joint:
flexion,
pronation or supination (from the corresponding extreme position to an intermediate one)
Wrist joint:
dorsal flexion,
radial abduction

34 Superficial dorsal muscles of the forearm [Fig. 361, 363, 367, 368, 379]

The group of the superficial dorsal muscles of the forearm consists of the following muscles in the order from radial to ulnar: M. extensor digitorum, M. extensor digiti minimi and M. extensor carpi ulnaris.

M. extensor digitorum

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus lateralis of the Humerus,
Ligg. collaterale radiale and
anulare radii,
Fascia antebrachii

I: So-called dorsal aponeuroses
of the 2.–5. finger

F: Elbow joint:
extension
Wrist joint:
dorsal flexion
Metacarpophalangeal (II–V)/
finger joints (III–V):
extension

M. extensor digiti minimi

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus lateralis of the
Humerus,
Ligg. collaterale radiale and
anulare radii,
Fascia antebrachii

I: So-called dorsal aponeurosis of
the 5. finger

F: Elbow joint:
extension
Wrist joint:
dorsal flexion,
ulnar abduction
Metacarpophalangeal (V)/
finger joints (V):
extension

M. extensor carpi ulnaris (This muscle is frequently separated from the M. extensor digitorum and the M. extensor digiti minimi by a distinct Septum intermusculare.)

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: **Caput humerale:** Epicondylus
lateralis of the Humerus,
Lig. collaterale radiale
Caput ulnare: proximal two thirds
of the Facies posterior of the
Ulna,
Fascia antebrachii

I: Dorsal surface of the base of
the Os metacarpi V

F: Elbow joint:
extension
Wrist joint:
dorsal flexion,
ulnar abduction

35 Deep dorsal muscles of the forearm (Fig. 356, 361, 364, 365, 368–371, 379)

The M. supinator enwraps the upper third of the radius laterally. Distally, the M. extensor pollicis longus, the M. extensor indicis, the M. abductor pollicis longus and the M. extensor pollicis brevis follow from lateral to medial.

M. supinator (This muscle is perforated by the R. profundus of the N. radialis in a longitudinal direction. A small tendinous arch frames the opening of the supinator canal.)

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Epicondylus lateralis of the Humerus,
Crista musculi supinatoris of the Ulna,
Ligg. collaterale radiale and anulare radii

I: Facies anterior of the Radius between the Tuberositas radii and the insertion of the M. pronator teres

F: Radioulnar joints:
supination

M. extensor pollicis longus

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Distal quarter of the Facies posterior of the Ulna,
Membrana interossea

I: Phalanx distalis of the thumb

F: Wrist joint:
dorsal flexion,
radial abduction
Carpometacarpal joint of the thumb:
adduction,
reposition
Metacarpophalangeal joint of the thumb and thumb joint:
extension

M. extensor indicis

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Distal quarter of the Facies posterior of the Ulna,
Membrana interossea

I: So-called dorsal aponeurosis of the index finger

F: Wrist joint:
dorsal flexion,
radial abduction
Metacarpophalangeal joint (III):
extension,
adduction
Finger joints (III):
extension

M. abductor pollicis longus

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Facies posterior of the Ulna,
Membrana interossea,
Facies posterior of the Radius

I: Base of the Os metacarpi I

F: Radioulnar joints:
supination
Wrist joint:
dorsal flexion,
radial abduction
Carpometacarpal joint of the thumb:
extension,
reposition

M. extensor pollicis brevis

R. profundus of the N. radialis (Plexus brachialis, Pars infraclavicularis)



O: Facies posterior of the Radius,
Membrana interossea

I: Base of the Phalanx proximalis of the thumb

F: Wrist joint:
palmar flexion,
radial abduction
Carpometacarpal joint of the thumb:
abduction, reposition
Metacarpophalangeal joint of the thumb:
extension

36 Muscles of the thenar eminence (Fig. 372–374, 377, 378)

From superficial to deep the M. abductor pollicis brevis, the M. flexor pollicis brevis, the M. opponens pollicis and the M. adductor pollicis form the thenar eminence.

M. abductor pollicis brevis

N. medianus (Plexus brachialis, Pars infraclavicularis)



O: Retinaculum musculorum flexorum, Tuberculum ossis scaphoidei

I: Radial sesamoid bone of the metacarpophalangeal joint of the thumb, radial margin of the base of the Phalanx proximalis of the thumb, inserts into the dorsal aponeurosis of the thumb

F: Carpometacarpal joint of the thumb: abduction, opposition
Metacarpophalangeal joint of the thumb: flexion

M. flexor pollicis brevis

Caput superficiale: *N. medianus*; Caput profundum: *R. profundus of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)*



O: Caput superficiale: Retinaculum musculorum flexorum
Caput profundum: Ossa capitatum, trapezium, trapezoideum, base of the Os metacarpi I

I: Radial sesamoid bone of the metacarpophalangeal joint of the thumb, radial margin of the base of the Phalanx proximalis of the thumb, inserts into the dorsal aponeurosis of the thumb

F: Carpometacarpal joint of the thumb: opposition, adduction
Metacarpophalangeal joint of the thumb: flexion

M. opponens pollicis

N. medianus and N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Retinaculum musculorum flexorum, Tuberculum ossis trapezii

I: Entire radial margin of the Os metacarpi I

F: Carpometacarpal joint of the thumb: opposition, adduction

M. adductor pollicis

R. profundus of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Caput obliquum: Os capitatum, base of the Os metacarpi II, Lig. carpi radiatum
Caput transversum: palmar surface of the Os metacarpi III

I: Ulnar sesamoid bone of the metacarpophalangeal joint of the thumb, ulnar margin of the base of the Phalanx proximalis of the thumb, inserts into the dorsal aponeurosis of the thumb

F: Carpometacarpal joint of the thumb: adduction, opposition
Metacarpophalangeal joint of the thumb: flexion

37 Muscles of the palm (Fig. 372–374, 377–379, 382–384)

The muscles of the palm comprise a heterogeneous group. The Mm. lumbricales are tightly connected to the tendons of the M. flexor digitorum profundus. The Mm. interossei palmares and the Mm. interossei dorsales fill the spaces between the Ossa metacarpi.

Mm. lumbricales I–IV

N. medianus (I, II); N. ulnaris (III, IV) (Plexus brachialis, Pars infraclavicularis)



O: Radial side of the tendons I and II, as well as the facing sides of the tendons II–IV of the M. flexor digitorum profundus

I: Insert radially into the dorsal aponeurosis of the fingers II–V

F: Metacarpophalangeal joints (II–V): flexion, radial abduction
Finger joints (II–V): extension

Mm. interossei palmares I–III

N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Ulnar side of the Os metacarpi II, radial side of the Ossa metacarpi IV and V

I: Radiate into the dorsal aponeurosis of the fingers II, IV and V

F: Metacarpophalangeal joints (II, IV, V): flexion, adduction (with respect to the axis of the middle finger)
Finger joints (II, IV, V): extension

Mm. interossei dorsales I–IV (double headed)

N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Facing sides of the Ossa metacarpi I–V

I: Radiate into the dorsal aponeurosis of the fingers II–IV

F: Metacarpophalangeal joints (III–IV): flexion, abduction (with respect to the axis of the middle finger)
Finger joints (II–IV): extension

38 Muscles of the hypothenar eminence (Fig. 372–374, 377)

From lateral to medial, the hypothenar eminence consists of the M. abductor digiti minimi, the M. flexor digiti minimi brevis and the M. opponens digiti minimi. The M. palmaris brevis also belongs to this group as a skin muscle.

M. palmaris brevis (consists of several separated bundles)

R. superficialis of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Medial margin of the Aponeurosis palmaris, rarely Os trapezium

I: Skin of the Hypothenar eminence

F: Tenses the skin at the hypothenar eminence

M. abductor digiti minimi

R. profundus of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Os pisiforme, Lig. pisohamatum, Retinaculum musculorum flexorum

I: Ulnar margin of the Phalanx proximalis, dorsal aponeurosis of the 5. finger

F: Carpometacarpal joint (V): opposition
Metacarpophalangeal joint (V): abduction, flexion
Finger joints (V): extension

M. flexor digiti minimi brevis (inconstant muscle)

R. profundus of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Retinaculum musculorum flexorum, Hamulus ossis hamati

F: Base of the Phalanx proximalis of the 5. finger, dorsal aponeurosis of the 5. finger

F: Carpometacarpal joint (V): opposition
Metacarpophalangeal joint (V): flexion, abduction
Finger joints (V): extension

M. opponens digiti minimi

R. profundus of the N. ulnaris (Plexus brachialis, Pars infraclavicularis)



O: Retinaculum musculorum flexorum, Hamulus ossis hamati

I: Ulnar surface of the Os metacarpi V

F: Carpometacarpal joint (V): opposition

39 Joints of the lower limb, Articulationes membri inferioris (Fig. 1217)**a Joints of the pelvic girdle, Juncturae cinguli pelvici**

Name of the joint	Type of the joint	Movements
Sacroiliac joint, Articulatio sacroiliaca	Rigid joint, Amphiarthrosis	Limited displacement and rotation (only a few millimetres); as a consequence of the deformation of the pelvis during gait or weight-bearing
Ligg. sacroiliaca anteriora Ligg. sacroiliaca posteriora Ligg. sacroiliaca interossea Lig. sacrotuberale Lig. sacrospinale	Syndesmoses, fibrous joints, Articulationes fibrosae	
Pubic symphysis, Symphysis pubica	Cartilaginous joint, synchondrosis with interpubic disc	
Lig. pubicum superius Lig. pubicum inferius		

b Joints of the free part of the lower limb, Articulationes membri inferioris liberi

Name of the joint	Type of the joint	Movements
Hip joint, Articulatio coxae	Spheroideal joint, Articulatio spheroidea	Flexion (anteversion) extension (retroversion) adduction abduction medial and lateral rotation
Knee joint, Articulatio genus	Pivot-hinge joint, Trochoginglymus	Flexion extension medial and lateral rotation (only in flexed position)
Superior tibiofibular joint, Articulatio tibiofibularis	Rigid joint, Amphiarthrosis	Limited displacements in transverse and vertical direction, limited rotation
Inferior tibiofibular joint, Syndesmosis tibiofibularis	Syndesmosis, fibrous joint, Articulatio fibrosa	Support of the malleolar brace, which diverges slightly during dorsal extension in the ankle joint
Ankle joint, Articulatio talocruralis	Hinge joint, Ginglymus	Plantar flexion dorsal flexion
Talotarsal joint, Articulatio talotarsalis	Compound spheroideal and conoid joint	Lifting of the medial (supination) and lateral (pronation) margin of the foot
a) Articulatio talocalcaneonavicularis (= anterior part)	Spheroideal joint	Minimal plantar and dorsal movements and rotation support of the longitudinal arch of the foot
b) Articulatio subtalaris (= posterior part)	Conoid joint	
Transverse tarsal joint, Articulatio tarsi transversa (CHOPART's joint)	Rigid joints, Amphiarthroses	Minimal plantar and dorsal movements and rotation of the forefoot
a) Articulatio talocalcaneonavicularis b) Articulatio calcaneocuboidea		
Intertarsal joints a) Articulatio cuneonavicularis b) Articulationes intercuneiformes c) Articulatio cuneocuboidea	Rigid joints, Amphiarthroses	Minimal movements in the deformation of the foot during adjustment to the ground
Tarsometatarsal joints, Articulatio tarsometatarsales (LISFRANC's joint)	Rigid joints, Amphiarthroses	Minimal plantar and dorsal movements and rotation of the forefoot
Intermetatarsal joints, Articulationes intermetatarsales	Rigid joints, Amphiarthroses	Minimal movements during rotation of the forefoot
Metatarsophalangeal joints, Articulationes metatarsophalangeae	Functionally limited spheroideal joints	Flexion, extension abduction, adduction
Interphalangeal joints, Articulatio interphalangeae pedis	Hinge joints, Ginglymi	Flexion extension of the toes

39 Joints of the lower limb, Articulationes membri inferioris (continuation)

c Planes and axes of the movements of the joints of the lower limb

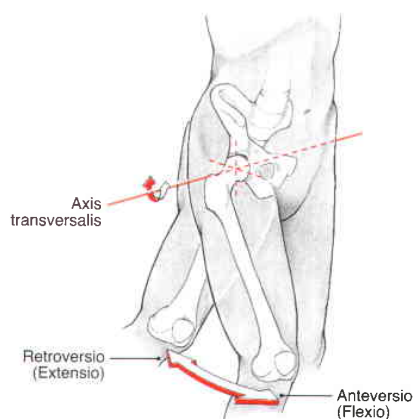


Fig. 8 Hip joint; movement in the sagittal plane.

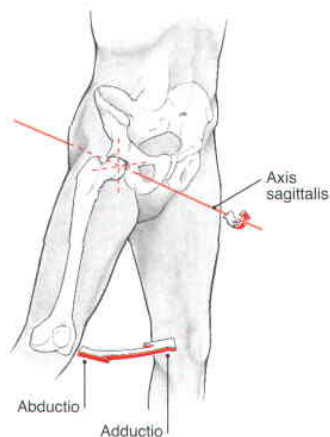


Fig. 9 Hip joint; movement in the frontal plane.

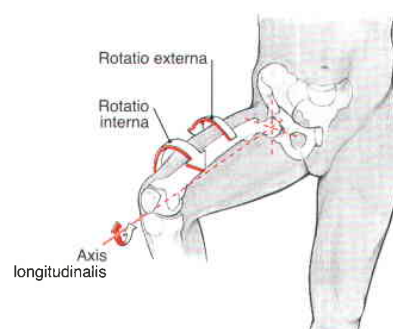


Fig. 10 Hip joint; movement in the transverse plane.

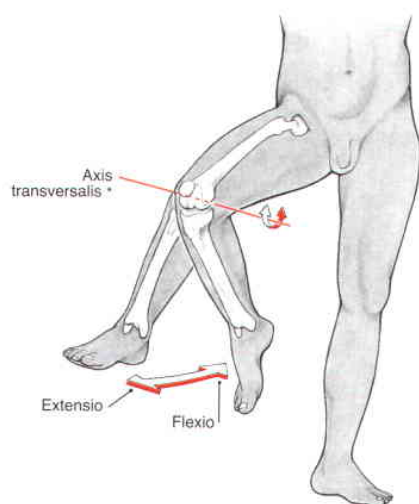


Fig. 11 Knee joint; movement in the sagittal plane.

* As a consequence of the asymmetric curvature of the femoral condyles this axis, in particular, changes during the movement (inconstant axis).

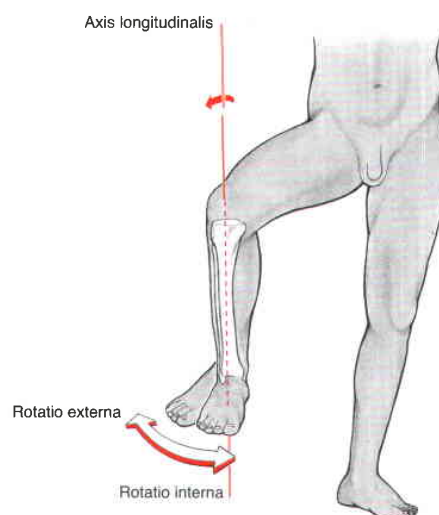


Fig. 12 Knee joint; movement in the transverse plane.

39 Joints of the lower limb, Articulationes membri inferioris (continuation)

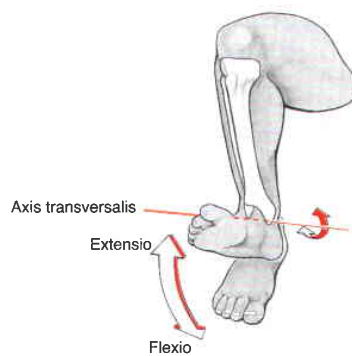


Fig. 13 Ankle joint; movement in the sagittal plane. Flexion and extension take place almost exclusively in the ankle joint.

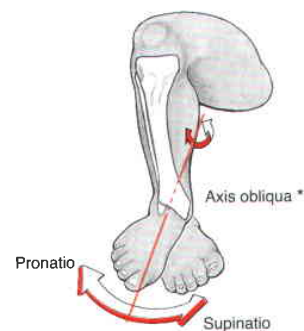


Fig. 14 Talotarsal joint; supination and pronation movements of the foot. In extreme plantar flexion, pronation is also referred to as lateral abduction, and supination as medial abduction.

* The axis runs from the inner part of the neck of the talus in a posterior and inferior direction to the Proc. lateralis of the Tuber calcanei and is actually steeper as illustrated in this figure for didactical reasons.

In the ankle joint, plantar flexion is also referred to as flexion, and dorsal flexion as extension.

40 Branches and supplying areas of the lumbosacral plexus (Fig. 863, 1373–1376)

	Motor function	Sensory function
Plexus lumbalis (T12) L1–L3 (L4)		
N. iliohypogastricus [N. iliopubicus] T12, L1 R. cutaneus lateralis R. cutaneus anterior	Mm. rectus abdominis, obliquus externus abdominis, obliquus internus abdominis, transversus abdominis, pyramidalis, cremaster	Skin covering the hip Skin above the iliac crest, the Lig. inguinale and the Mons pubis
N. ilioinguinalis (T12) L1 (L2) Nn. scrotales anteriores/ Nn. labiales anteriores	Mm. rectus abdominis, obliquus externus abdominis, obliquus internus abdominis, transversus abdominis, pyramidalis, cremaster	Skin of the inguinal region, the root of the penis, and the scrotum and the labia majora, respectively
N. genitofemoralis L 1, L 2 R. genitalis R. femoralis		Scrotal coats (including the dartos fascia) Skin at the Hiatus saphenus
N. cutaneus femoris lateralis L2, L3		Skin of the lateral and anterior side of the thigh up to the knee
N. obturatorius L2–L4 R. anterior R. cutaneus R. posterior Rr. musculares	Mm. pectineus, adductor brevis, adductor longus, gracilis M. obturatorius externus, M. adductor magnus, (M. adductor brevis), M. adductor minimus	Capsule of the hip joint Skin of the medial side of the thigh superior to the knee Capsule of the hip joint, periosteum of the posterior side of the femur
N. obturatorius accessorius L3, L4	M. pectineus	Capsule of the hip joint
N. femoralis L2–L4 Rr. musculares R. cutanei anteriores N. saphenus R. infrapatellaris Rr. cutanei cruris mediales	Mm. iliopsoas, pectineus, sartorius, quadriceps femoris	Capsule of the hip joint Skin of the anterior and medial side of the thigh up to the knee, periosteum of the anterior side of the femur Skin of the anterior and medial side of the knee and the medial side of the leg as well as the foot
Plexus sacralis (L4) L5–S3 (S4)		
N. m. obturatorii interni L5–S2	M. obturatorius internus	
N. m. piriformis S1, S2	M. piriformis	
N. m. quadrati femoris L5–S1 (S2)	M. quadratus femoris	
N. gluteus superior L4–S1	Mm. glutei medius and minimus, tensor fasciae latae	
N. gluteus inferior L5–S2	M. gluteus maximus	
N. cutaneus femoris posterior S1–S3 Nn. clunium inferiores Nn. perineales		Skin of the posterior side of the thigh and the proximal leg Skin of the gluteal region Perineum, scrotal skin or skin of the Labia majora, resp.
N. ischiadicus L4–S3	Ischiocrural muscles, all muscles of the leg and the foot	
N. fibularis communis L4–S2 N. cutaneus surae lateralis R. communicans fibularis	M. biceps femoris, Caput breve	Capsule of the knee joint Skin of the calf up to the lateral malleolus Connecting branch to the N. suralis

40 Branches and supplying areas of the lumbosacral plexus (continuation)

	Motor function	Sensory function
N. fibularis superficialis L4–S2 Rr. musculares N. cutaneus dorsalis medialis N. cutaneus dorsalis intermedius Nn. digitales dorsales pedis	Mm. fibulares [peronei] longus and brevis	Skin of the leg and the back of the foot up to the 1.–3. toe Skin of the lateral margin of the foot Skin of the back of the toes except for the 1. interdigital space and the lateral side of the 5. toe
N. fibularis profundus L4–S2 Rr. musculares Nn. digitales dorsales pedis	Mm. tibialis anterior, extensor digitorum longus, extensor hallucis longus, extensor digitorum brevis and extensor hallucis brevis	Periosteum of the bones of the leg and the capsule of the ankle joint Skin of the 1. interdigital space
N. tibialis L4–S3 Rr. musculares N. interosseus cruris N. cutaneus surae medialis N. suralis N. cutaneus dorsalis lateralis Rr. calcanei laterales Rr. calcanei mediales N. plantaris medialis	Mm. triceps surae, plantaris, popliteus, tibialis posterior, flexor digitorum longus, flexor hallucis longus Mm. abductor hallucis and flexor digitorum brevis, flexor hallucis brevis (medial head), lumbricales pedis I (II)	Capsule of the knee joint Periosteum of the bones of the leg and the capsule of the ankle joint Skin of the calf up to the medial malleolus, merges with the N. cutaneus surae lateralis to form the N. suralis Skin of the lateral margin of the foot up to the 5. toe Skin of the lateral heel Skin of the medial heel Skin of the medial sole
Nn. digitales plantares communes Nn. digitales plantares proprii N. plantaris lateralis R. superficialis Nn. digitales plantares communes Nn. digitales plantares proprii R. profundus	Mm. abductor digiti minimi, quadratus plantae, Mm. flexor digiti minimi brevis, opponens digiti minimi, interossei of the 4. intermetatarsal space Mm. lumbricales pedis II–IV, adductor hallucis [Caput transversum], interossei of the 1.–4. intermetatarsal space	Skin of the sole side of the medial 3½ toes and the nail areas Skin of the plantar side of the lateral 1½ toes and the nail areas
N. pudendus [S1] S2–S4 Nn. rectales [anales] inferiores S3, S4 Nn. perineales Nn. scrotales posteriores/ Nn. labiales posteriores Rr. musculares N. dorsalis penis/ N. dorsalis clitoridis	Mm. transversi perinei superficialis and profundus, bulbospongiosus and ischiocavernosus, sphincter ani externus M. transversus perinei profundus, M. sphincter urethrae	Skin of the anal region and the perineum M. sphincter urethrae, urethral mucosa, dorsal skin of the scrotum or the Labia majora and minora, respectively, Vestibulum vaginae Skin of the penis, glans/clitoris, prepuce
N. coccygeus S4, S5 [Co1] Plexus coccygeus S4, S5 [Co1] N. anococcygeus	M. ischiococcygeus [coccygeus], M. levator ani	Skin of the coccygeal region, as well as the skin between the coccyx and the anus

41 Segmental innervation of the muscles of the lower limb, muscles of diagnostic importance

(According to MUMENTHALER and SCHLIACK; the indicator muscle of each segment is printed in bold.)

M. iliopsoas: L1, L2	T12–L3	M. tibialis anterior: L4	L4–L5
M. tensor fasciae latae	L4–L5	M. extensor hallucis longus	L4–S1
M. gluteus medius	L4–S1	M. popliteus	L4–S1
M. gluteus minimus	L4–S1	M. extensor digitorum longus	L4–S1
M. gluteus maximus	L4–S2	M. soleus	L4–S2
M. obturatorius internus	L5–S1	M. gastrocnemius } L5	
M. piriformis	L5–S1	M. fibularis longus	L5–S1
M. sartorius	L2–L3	M. fibularis brevis	L5–S1
M. pectineus	L2–L3	M. tibialis posterior: S1	L5–S2
M. adductor longus	L2–L3	M. flexor digitorum longus	L5–S3
M. quadriceps femoris: L3	L2–L4	M. flexor hallucis longus	L5–S3
M. gracilis	L2–L4	M. extensor hallucis brevis	L4–S1
M. adductor brevis	L2–L4	M. extensor digitorum brevis	L4–S1
M. obturatorius externus	L3–L4	M. flexor digitorum brevis	L5–S1
M. adductor magnus	L3–L4	M. abductor hallucis	L5–S1
M. semitendinosus	L4–S1	M. flexor hallucis brevis	L5–S3
M. semimembranosus	L4–S1	M. adductor hallucis	S1–S2
M. biceps femoris	L4–S2		

42 Ventral muscles of the hip (Fig. 851, 869, 1321, 1323, 1328–1333)

This group only comprises the M. iliacus and the M. psoas major, which together form the M. iliopsoas. These are the only ventral muscles of the hip joint, as all other ventral muscles in front of the hip joint also overstretch the knee joint and are therefore referred to as ventral muscles of the thigh.

M. iliacus

Rr. musculares (Plexus lumbalis)



O: Fossa iliaca, Spina iliaca anterior inferior, anterior portion of the capsule of the hip joint

I: Trochanter minor and adjacent area of the Labium mediale of the Linea aspera

F: Lumbar vertebral column: lateral flexion, extension (hyperlordosis)
Hip joint: flexion, medial rotation, (lateral rotation only when the Mm. glutei are contracted as well)

M. psoas major

Rr. musculares (Plexus lumbalis)



O: Superficial layer: lateral surface of the body of the 12. thoracic – 4. lumbar vertebra, Disci intervertebrales
Deep layer: Proc. costalis of the 1.–4. lumbar vertebra

I: Trochanter minor and adjacent area of the Labium mediale of the Linea aspera

F: Lumbar vertebral column: lateral flexion, extension (hyperlordosis)
Hip joint: flexion, medial rotation, (lateral rotation only when the Mm. glutei are contracted as well)

M. psoas minor (inconstant muscle; often featuring a long tendinous plate at its insertion)

Rr. musculares (Plexus lumbalis)



O: Lateral surface of the body of the 12. thoracic and the 1. lumbar vertebra

I: Fascia of the M. iliopsoas, Arcus iliopectineus

F: Lumbar vertebral column: lateral flexion, extension (hyperlordosis)
Hip joint: flexion, medial rotation, (lateral rotation only when the Mm. glutei are contracted as well)

43 Dorsal muscles of the hip [Fig. 1322–1324, 1333, 1335–1342]

The M. gluteus maximus predominantly shapes the surface anatomy of the gluteal region and nearly covers all other muscles of this group. At the ventral and cranial edge, parts of the M. gluteus medius are visible, which in turn covers the M. gluteus minimus. Caudally in the deeper layer the following muscles are found: the M. piriformis, the M. gemellus superior, the M. obturatorius internus, the M. gemellus inferior and the M. quadratus femoris. The M. obturatorius internus and the Mm. gemelli superior et inferior are also called M. triceps coxae.

M. gluteus maximus (The Bursa trochanterica muscoli glutei maximi is located between the Trochanter major and the Tractus iliotibialis.)
N. gluteus inferior (Plexus sacralis)



O: Facies glutea of the Ala ossis ilium dorsal to the Linea glutea posterior, Facies posterior of the Os sacrum, Fascia thoracolumbalis, Lig. sacrotuberale

I: Cranial portion via the Tractus iliotibialis: Tibia just below the Condylus lateralis, caudal portion: Tuberositas glutea, Septum intermusculare femoris laterale

F: Hip joint:
cranial portion: extension, lateral rotation, abduction;
caudal portion: extension, lateral rotation, adduction
Knee joint:
cranial portion via Tractus iliotibialis, stabilization when the knee is extended

M. gluteus medius

N. gluteus superior (Plexus sacralis)



O: Facies glutea of the Ala ossis ilium between Lineae gluteae anterior and posterior

I: Tip and lateral margin of the Trochanter major

F: Hip joint:
ventral portion: abduction, flexion, medial rotation;
dorsal portion: abduction, extension, lateral rotation

M. gluteus minimus

N. gluteus superior (Plexus sacralis)



O: Facies glutea of the Ala ossis ilium between Lineae gluteae anterior and inferior

I: Tip and lateral margin of the Trochanter major

F: Hip joint:
ventral portion: abduction, flexion, medial rotation;
dorsal portion: abduction, extension, lateral rotation

M. piriformis

N. ischiadicus and/or N. musculi piriformis (Plexus sacralis)



O: Laterally and between the Foramina sacralia pelvica (3.–5. sacral segment) of the Facies pelvica of the Os sacrum, Incisura ischiadica major close to the Os sacrum

I: Inner surface of the tip of the Trochanter major

F: Hip joint:
lateral rotation, extension, abduction

43 Dorsal muscles of the hip (continuation)

M. obturatorius internus

N. musculi obturatorii interni and Rr. musculares (Plexus sacralis)



O: Circumference of the Foramen obturatum, medial surface of the Membrana obturatoria

I: Fossa trochanterica

F: Hip joint:
lateral rotation,
extension,
adduction

M. gemellus superior

N. musculi obturatorii interni and Rr. musculares (Plexus sacralis)



O: Spina ischiadica

I: Fossa trochanterica

F: Hip joint:
lateral rotation,
extension,
adduction

M. gemellus inferior

N. musculi obturatorii interni and Rr. musculares (Plexus sacralis)



O: Tuber ischiadicum

I: Fossa trochanterica

F: Hip joint:
lateral rotation,
extension,
adduction

M. quadratus femoris

N. musculi quadrati femoris (Plexus sacralis)



O: Lateral margin of the Tuber ischiadicum

I: Crista intertrochanterica

F: Hip joint:
lateral rotation,
adduction

44 Ventral muscles of the thigh [Fig. 1321, 1323–1326, 1329–1333, 1343–1345]

The M. sartorius stretches in a spiral-like fashion along the thigh from lateroproximal to mediodistal. With its short muscle belly, the M. tensor fasciae latae is located most laterally and passes into the Tractus iliotibialis. The major part of the ventral muscle mass of the thigh is formed by the M. quadriceps femoris.

M. quadriceps femoris

N. femoralis (Plexus lumbalis)



O: M. rectus femoris, Caput rectum: Spina iliaca anterior inferior

M. rectus femoris, Caput reflexum: cranial margin of the Acetabulum

M. vastus medialis: inferior two thirds of the Labium mediale of the Linea aspera

M. vastus lateralis: distal circumference of the Trochanter major, Labium laterale of the Linea aspera

M. vastus intermedius: upper two thirds of the Facies anterior and lateral aspects of the Femur

M. articularis genus: distal quarter of the Facies anterior of the Femur

I: Proximal, lateral and medial margins of the Patella, Tuberositas tibiae via the Lig. patellae, areas lateral to the Tuberositas tibiae via the Retinacula patellae

F: Hip joint (only M. rectus femoris): flexion
Knee joint: extension

M. sartorius

N. femoralis (Plexus lumbalis)



O: Spina iliaca anterior superior

I: Medial surface of the Tuberositas tibiae

F: Hip joint: flexion, lateral rotation, abduction
Knee joint: flexion, medial rotation

M. tensor fasciae latae

N. gluteus superior (Plexus lumbosacralis)



O: Spina iliaca anterior superior

I: Tibia below the Condylus lateralis (via Tractus iliotibialis)

F: Hip joint: flexion, abduction, medial rotation
Knee joint: stabilization when the knee is extended

45 Medial muscles of the thigh (adductors)

[Fig. 1321, 1323, 1324, 1327, 1329–1333, 1339–1345]

Due to their predominant function, the muscles located at the medial side of the thigh are commonly referred to as adductors. In the ventral view, this group appears like a triangular block. The M. gracilis lies most medially. From proximal to distal follow the M. pectineus, M. adductor brevis, M. adductor longus and the M. adductor magnus. The M. obturatorius externus is covered by the M. pectineus and is juxtaposed to the neck of the femur from inferior.

M. pectineus

N. femoralis and N. obturatorius (Plexus lumbalis)



O: Pecten ossis pubis

I: Linea pectinea of the Femur

F: Hip joint:
adduction,
lateral rotation,
(flexion)

M. gracilis

N. obturatorius (Plexus lumbalis)



O: Medial edge of the Ramus inferior ossis pubis along the symphysis

I: Proximal end of the Tibia medial to the Tuberositas tibiae

F: Hip joint:
adduction,
flexion,
lateral rotation
Knee joint:
flexion,
medial rotation

M. adductor brevis

N. obturatorius (Plexus lumbalis)



O: Ramus inferior ossis pubis closer to the Foramen obturatum than the M. adductor longus

I: Proximal third of the Labium mediale of the Linea aspera

F: Hip joint:
adduction,
lateral rotation,
flexion

M. adductor longus

N. obturatorius (Plexus lumbalis)



O: Os pubis below the Crista pubica up to the symphysis

I: Middle third of the Labium mediale of the Linea aspera

F: Hip joint:
adduction,
flexion,
lateral rotation,
(most anterior portion: medial rotation)

M. adductor magnus (An incomplete proximal part of the M. adductor magnus is known as M. adductor minimus.

The opening of the adductor canal is located between the distal insertions of both muscles.)

N. obturatorius (Plexus lumbalis) and tibial part of the N. ischiadicus (Plexus sacralis)



O: Medial margin of the Ramus inferior ossis pubis, Ramus and Tuber ossis ischii

I: Proximal two thirds of the Labium mediale of the Linea aspera, Tuberositas, Tuberculum adductorium, M. adductor minimus: Tuberositas glutea

F: Hip joint:
adduction,
lateral rotation
(anterior portion: flexion,
posterior portion: extension)

45 Medial muscles of the thigh (adductors) (continuation)

M. obturatorius externus

N. obturatorius (Plexus lumbalis)



O: Circumference of the Foramen obturatum, lateral surface of the Membrana obturatoria

I: Fossa trochanterica

F: Hip joint:
lateral rotation,
adduction

46 Dorsal muscles of the thigh (ischiocrural muscles)

(Fig. 1322–1324, 1333, 1334, 1339–1346)

The ischiocrural muscles consist of the M. biceps femoris, the M. semitendinosus and the M. semimembranosus from lateral to medial.

M. biceps femoris (The Caput longum stretches over two joints, whereas the Caput breve only spans over one joint.)

Caput longum: *N. ischiadicus, tibial part (Plexus sacralis)*

Caput breve: *N. ischiadicus, fibular part (Plexus sacralis)*



O: Caput longum: Tuber ischiadicum together with the M. semitendinosus
Caput breve: middle third of the Labium laterale of the Linea aspera

I: Caput fibulae (ensheaths the Lig. collaterale fibulare), radiates into the Fascia cruris

F: Hip joint:
extension,
adduction,
(lateral rotation)
Knee joint:
flexion,
lateral rotation

M. semitendinosus

N. ischiadicus, tibial part (Plexus sacralis)



O: Tuber ischiadicum together with the Caput longum of the M. biceps femoris

I: Medial surface of the Tuberositas tibiae

F: Hip joint:
extension,
(adduction),
(medial rotation)
Knee joint:
flexion,
medial rotation

M. semimembranosus (The insertion of the M. semimembranosus is also referred to as Pes anserinus profundus.)

N. ischiadicus, tibial part (Plexus sacralis)



O: Tuber ischiadicum

I: Proximal end of the Tibia below the Condylus medialis, posterior capsule of the knee joint, Lig. popliteum obliquum, fascia of the M. popliteus

F: Hip joint:
extension,
(adduction),
(medial rotation)
Knee joint:
flexion,
medial rotation

47 Ventral muscles of the leg (Fig. 1321, 1345, 1347, 1351, 1356)

The ventral superficial and medial muscle is the M. tibialis anterior. It is followed by the M. extensor digitorum longus, from whose lateral margin the M. fibularis tertius often originates. The M. extensor hallucis longus is located most deeply.

M. tibialis anterior

N. fibularis profundus (N. ischiadicus)



O: Proximal end of the Tibia just below the Condylus lateralis, upper two thirds of the Facies lateralis of the Tibia, Fascia cruris, [Membrana interossea]

I: Medial margin of the base of the Os metatarsi I, plantar surface of the Os cuneiforme mediale

F: Ankle joint: dorsal flexion
Talotarsal joint: supination

M. extensor hallucis longus

N. fibularis profundus (N. ischiadicus)



O: Distal two thirds of the Facies medialis of the Fibula, Membrana interossea, Fascia cruris

I: Base of the Phalanx distalis and the Phalanx proximalis of the Hallux

F: Ankle joint: dorsal flexion
Talotarsal joint: (supination)
Joints of the great toe: extension

M. extensor digitorum longus

N. fibularis profundus (N. ischiadicus)



O: Proximal end of the Tibia just below the Condylus lateralis, Margo anterior of the Fibula, Membrana interossea cruris, Septum intermusculare cruris anterius, Fascia cruris

I: Dorsal aponeuroses of the 2.–5. toe

F: Ankle joint: dorsal flexion
Talotarsal joint: (pronation)
Joints of the toes: extension

M. fibularis [peroneus] tertius (inconstant muscle)

N. fibularis profundus (N. ischiadicus)

O: Distal part of the M. extensor digitorum longus

I: Base of the Os metatarsi V

F: Ankle joint: dorsal flexion
Talotarsal joint: (pronation)

See Fig. 1351

48 Lateral (fibular) muscles of the leg (Fig. 1321, 1346, 1348, 1351, 1356)

The lateral superficial muscle is the M. fibularis longus, with the M. fibularis brevis following in the next deeper layer.

M. fibularis [peroneus] longus

N. fibularis superficialis (N. ischiadicus)



O: Caput fibulae, proximal two thirds of the Facies lateralis and the Margo posterior of the Fibula, Septa intermuscularia cruris anterior et posterior, Fascia cruris

I: Tuberositas ossis metatarsi I (II), plantar surface of the Os cuneiforme intermedium

F: Ankle joint: plantar flexion
Talotarsal joint: pronation

M. fibularis [peroneus] brevis

N. fibularis superficialis (N. ischiadicus)



O: Distal half of the Facies lateralis and the Margo anterior of the Fibula, Septa intermuscularia cruris anterior et posterior

I: Tuberositas ossis metatarsi V, tendon strips to the little toe

F: Ankle joint: plantar flexion
Talotarsal joint: pronation

49 Superficial dorsal muscles of the leg (Fig. 1322, 1346, 1349, 1352, 1353)

The heads of the M. gastrocnemius determine the shape of the calf. It is located above the M. soleus and together these muscles form the M. triceps surae. The very small M. plantaris can be considered as a fourth head of this muscle.

M. triceps surae (Its broad tendon is also known as Achilles tendon.)

N. tibialis (N. ischiadicus)



O: M. gastrocnemius, Caput mediale: Facies poplitea of the Femur proximal to the Condylus medialis
M. gastrocnemius, Caput laterale: Facies poplitea of the Femur proximal to the Condylus lateralis
M. soleus: Caput fibulae, proximal third of the Facies posterior and the Margo posterior of the Fibula, Facies posterior of the Tibia at and just below the Linea musculi solei, Arcus tendineus musculi solei
M. plantaris: Facies poplitea of the Femur proximal to the Condylus lateralis

I: Tuber calcanei (via Tendo calcaneus)

F: Knee joint: (only M. gastrocnemius and M. plantaris): flexion
Ankle joint: plantar flexion
Talotarsal joint: supination

50 Deep dorsal muscles of the leg [Fig. 1346, 1350, 1354, 1355]

The M. popliteus traverses obliquely in a lateral direction towards the knee joint. Of the muscles running towards the foot, the M. tibialis posterior is located most superficially. The muscle is followed medially by the M. flexor digitorum longus and laterally by the M. flexor hallucis longus.

M. popliteus

N. tibialis (N. ischiadicus)



O: Epicondylus lateralis of the Femur

I: Facies posterior of the Tibia just above the Linea musculi solei

F: Knee joint:
medial rotation,
flexion

M. tibialis posterior

N. tibialis (N. ischiadicus)



O: Upper three quarters of the Membrana interossea, adjacent areas of the Tibia and the Fibula

I: Tuberositas ossis navicularis, plantar surface of the Ossa cuneiformia I–III, base of the Ossa metatarsi II–IV

F: Ankle joint:
plantar flexion
Talotarsal joint:
supination

M. flexor digitorum longus

N. tibialis (N. ischiadicus)



O: Facies posterior of the Tibia distal to the Linea musculi solei, tendon arcade between the Tibia and the Fibula proximal to the Chiasma crurale

I: Phalanx distalis of the 2.–5. toe

F: Ankle joint:
plantar flexion
Talotarsal joint:
supination
Joints of the toes:
flexion

M. flexor hallucis longus

N. tibialis (N. ischiadicus)



O: Distal two thirds of the Facies posterior of the Fibula, Membrana interossea, Septum intermusculare cruris posterius

I: Phalanx distalis of the great toe

F: Ankle joint:
plantar flexion
Talotarsal joint:
supination
Joints of the great toe:
flexion

51 Muscles of the back of the foot (Fig. 1356, 1357, 1361, 1362)

Both muscles of the back of the foot only contribute insignificantly to the surface anatomy. The M. extensor hallucis brevis traverses towards the great toe, whereas the M. extensor digitorum brevis inserts at the remaining toes.

M. extensor digitorum brevis

N. fibularis profundus (N. fibularis communis)



O: Dorsal and lateral surface of the Calcaneus

I: Dorsal aponeurosis of the 2.–4. toe

F: Joints of the toes:
extension

M. extensor hallucis brevis

N. fibularis profundus (N. fibularis communis)



O: Dorsal surface of the Calcaneus, Sinus tarsi

I: Phalanx proximalis of the great toe

F: Metatarsophalangeal joint of the great toe:
extension

52 Medial muscles of the sole (Fig. 1364–1367)

The shape of the medial margin of the foot, Eminentia plantaris medialis, is predominantly formed by the M. abductor hallucis. The M. flexor hallucis brevis is juxtaposed just lateral to the former muscle, and is followed laterally by the M. adductor hallucis.

M. abductor hallucis

N. plantaris medialis (N. tibialis)



O: Proc. medialis of the Tuber calcanei, Aponeurosis plantaris, Retinaculum musculorum flexorum

I: Medial sesamoid bone of the capsule of the metatarsophalangeal joint of the great toe, medial side of the base of the Phalanx proximalis of the great toe

F: Metatarsophalangeal joint of the great toe:
abduction,
flexion,
opposition

M. flexor hallucis brevis

Medial part (Caput mediale): *N. plantaris medialis (N. tibialis)*

Lateral part (Caput laterale): *N. plantaris lateralis (N. tibialis)*



O: Plantar surface of the Ossa cuneiformia, Lig. calcaneocuboideum plantare, Lig. plantare longum, tendon of the M. tibialis posterior

I: **Medial portion:** medial sesamoid bone of the metatarsophalangeal joint of the great toe, base of the Phalanx proximalis I
Lateral portion: lateral sesamoid bone of the metatarsophalangeal joint of the great toe, base of the Phalanx proximalis I

F: Metatarsophalangeal joint of the great toe:
flexion

52 Medial muscles of the sole (continuation)

M. adductor hallucis

N. plantaris lateralis (N. tibialis)



O: Caput obliquum: Os cuboideum, Os cuneiforme laterale, Lig. plantare longum, Lig. calcaneocuboideum plantare

Caput transversum: Capsules of the metatarsophalangeal joints of the toes III–V, Lig. metatarsale transversum profundum

I: Lateral sesamoid bone of the capsule of the metatarsophalangeal joint of the great toe, base of the Phalanx proximalis of the great toe

F: Metatarsophalangeal joint of the great toe: adduction towards the 2. toe, flexion

53 Muscles of the middle of the sole [Fig. 1357, 1361, 1362, 1364–1369]

Several small muscles are located deep within the plantar arch. The M. flexor digitorum brevis proximally adheres to the plantar aponeurosis. Below this muscle, the M. quadratus plantae is connected to the main tendon of the M. flexor digitorum longus, of whose four branching tendons the Mm. lumbricales pedis I–IV originate. The Mm. interossei plantares I–III and the Mm. interossei dorsales pedis I–IV fill the spaces between the Ossa metatarsi.

M. flexor digitorum brevis [Just before the insertion, its tendons are perforated by the tendons of the M. flexor digitorum longus.]

N. plantaris medialis (N. tibialis)



O: Plantar surface of the Tuber calcanei, Aponeurosis plantaris

I: Phalanx media of the 2.–5. toe

F: Metatarsophalangeal joints: flexion
Joints of the toes: flexion

M. quadratus plantae [This muscle is also referred to as M. flexor accessorius.]

N. plantaris lateralis (N. tibialis)



O: Plantar surface of the Calcaneus, Lig. plantare longum

I: Lateral margin of the tendon of the M. flexor digitorum longus just before its division

F: Shifts the direction of force generated by the M. flexor digitorum longus towards the longitudinal axis of the foot

Mm. lumbricales pedis I–IV

Nn. plantares medialis (I) and lateralis (II–IV) (N. tibialis)



O: M. lumbricales pedis I: medial side of the tendon of the M. flexor digitorum longus to the 2. toe

Mm. lumbricales pedis II–IV: facing sides of the tendons of the M. flexor digitorum longus to the 3.–5. toe

I: Medial side of the Phalanx proximalis of the 2.–5. toe, sometimes it radiates into the dorsal aponeurosis

F: Metatarsophalangeal joints: flexion

Mm. interossei plantares pedis I–III

N. plantaris lateralis (N. tibialis)



O: Plantar surface of the Ossa metatarsi III–V, Lig. plantare longum

I: Medial side of the base of the Phalanx proximalis of the 3.–5. toe

F: Metatarsophalangeal joints: flexion, adduction towards the 2. toe

53 Muscles of the middle of the sole (continuation)

Mm. interossei dorsales pedis I–IV (double headed muscles)

N. plantaris lateralis (N. tibialis)



O: Facing sides of the Ossa metatarsi I–V,
Lig. plantare longum

I: **M. interosseus dorsalis I:**
medial side of the base of the
Phalanx proximalis of the 2. toe
Mm. interossei dorsales II–IV:
lateral side of the base of
the Phalanx proximalis of the
2.–4. toe,
insert into extensor aponeuroses

F: Metatarsophalangeal joints:
flexion,
medial abduction of the 2. toe, as well
as lateral abduction of the 3. and
4. toe
Joints of the toes:
(extension)

54 Lateral muscles of the sole (Fig. 1357, 1364–1367)

The M. abductor digiti minimi is located along the lateral margin of the foot, Eminentia plantaris lateralis. The M. flexor digiti minimi brevis and the M. opponens digiti minimi are situated below its plantar aspect.

M. abductor digiti minimi

N. plantaris lateralis (N. tibialis)



O: Proc. lateralis of the Tuber calcanei,
Aponeurosis plantaris,
Tuberositas ossis metatarsi V

I: Base of the Phalanx proximalis
of the 5. toe

F: Metatarsophalangeal joint of the 5. toe:
abduction,
flexion,
opposition

M. flexor digiti minimi brevis

N. plantaris lateralis (N. tibialis)



O: Base of the Os metatarsi V,
Lig. plantare longum,
tendon sheath of the M. fibularis
longus

I: Phalanx proximalis of the 5. toe

F: Metatarsophalangeal joint of the 5. toe:
abduction,
flexion,
(opposition)

M. opponens digiti minimi (inconstant muscle)

N. plantaris lateralis (N. tibialis)



O: Lig. plantare longum,
tendon sheath of the M. fibularis
longus

I: Lateral margin of the
Os metatarsi V

F: Metatarsophalangeal joint of the 5. toe:
abduction,
flexion,
(opposition)

55 Cranial nerves, overview (Fig. 469)

- a **N. olfactorius [I]**
- b **N. opticus [II]**
- c **N. oculomotorius [III]**
- d **N. trochlearis [IV]**
- e **N. trigeminus [V]**
 - N. ophthalmicus [V/1]
 - N. maxillaris [V/2]
 - N. mandibularis [V/3]
- f **N. abducens [VI]**
- g **N. facialis [VII]**
- h **N. vestibulocochlearis [VIII]**
- i **N. glossopharyngeus [IX]**
- j **N. vagus [X]**
- k **N. accessorius [XI]**
- l **N. hypoglossus [XII]**

56 Cranial nerves, functions (different fibre qualities) (Fig. 483–486, 531, 533)

- GSE** General somatic efference: innervation of the skeletal muscles (**III, IV, VI, XII**)
- GVE** General visceral efference: innervation of the muscles of the viscera and vessels, and of the glands (**III, VII, IX, X**)
- SVE** Specific visceral efference: innervation of the facial muscles, the masticatory muscles, the larynx, the pharynx, the oesophagus, as well as the M. sternocleidomastoideus and M. trapezius (**V, VII, IX, X, XI**)
- GVA** General visceral afference: information from the internal organs and the blood vessels (**IX, X**)
- SVA** Specific visceral afference: sense of taste (**VII, IX, X**)
- GSA** General somatic afference: pain, temperature, info. from proprioceptive receptors in the skin and the locomotor system (**V, VII, IX, X**)
- SSA** Specific somatic afference: sense of smell, vision, hearing, sense of balance (**I, II, VIII**)

57 Cranial nerves [Fig. 469–489, 531, 533]**a N. olfactorius [I]** [Fig. 144, 469]

All Fila olfactoria together are referred to as N. olfactorius, representing the peripheral neuron of the olfactory pathway.

Outset	Olfactory cells in the Regio olfactoria
Passage through the base of skull	Lamina cribrosa
Passage through the dura mater	Lamina cribrosa
Entry into the brain	Bulbus olfactorius
Supplying area	Mucosa (=olfactory mucosa) at the uppermost parts of the nasal cavity, the upper nasal concha and the most cranial parts of the nasal septum

b N. opticus [II] [Fig. 469, 663, 664]

The N. opticus belongs to the diencephalon and is therefore not really a peripheral nerve.

Outset	Ganglion opticum of the Retina
Course within the dura mater	Vagina nervi optici
Passage through the base of skull	Canalis opticus
Further visible course	Chiasma opticum with the continuation of its fibres via the Tractus opticus to the Corpus geniculatum laterale
Supplying area	Retina

c N. oculomotorius [III] [Fig. 470, 471, 531, 533]

Nuclei (fibre quality)	• Nucleus nervi oculomotorii (double main and single accessory nucleus) (GSE) • Nucleus accessorius nervi oculomotorii (GVE) → Ganglion ciliare
Exit from the brain	Inner surface of the Pedunculus cerebri (Sulcus nervi oculomotorii)
Location in the subarachnoid space	Cisterna basalis, Cisterna interpeduncularis
Entry into the dura mater	Roof of the Sinus cavernosus
Exit from the dura mater	Fissura orbitalis superior
Passage through the base of skull	Fissura orbitalis superior (medial portion, within the Anulus tendineus)
Supplying areas	motor: M. levator palpebrae superioris, Mm. recti superior, medialis and inferior, M. obliquus inferior parasympathetic: M. ciliaris, M. sphincter pupillae (via Ganglion ciliare)
Attachment of other nerves	Sensible fibres from the N. nasociliaris (V/1) Sympathetic fibres from the Plexus ophthalmicus

d N. trochlearis [IV] [Fig. 470, 471, 531, 533]

Nuclei (fibre quality)	• Nucleus nervi trochlearis (GSE)
Exit from the brain	Dorsal/caudal of the Colliculus inferior (Tectum mesencephali)
Location in the subarachnoid space	Cisterna ambiens, Cisterna basalis
Entry into the dura mater	Between the Plica petroclinioidea anterior and posterior
Course within the dura mater	Lateral wall of the Sinus cavernosus
Exit from the dura mater	Fissura orbitalis superior
Passage through the base of skull	Fissura orbitalis superior (lateral portion)
Supplying area	motor: M. obliquus superior

e N. trigeminus [V] (Fig. 472–475, 531, 533)

Nuclei (fibre quality)	• Nucleus mesencephalicus nervi trigemini (GSA and GVA) • Nucleus spinalis nervi trigemini (GSA and GVA) • Nucleus motorius nervi trigemini (SVE)
Exit from the brain	Lateral margin of the Pons
Location in the subarachnoid space	Cisterna basalis, Cavum trigeminale
Entry into the dura mater	Lateral wall of the Sinus cavernosus as Ganglion trigeminale
Division into three branches	– N. ophthalmicus [V/1] – N. maxillaris [V/2] – N. mandibularis [V/3]

– N. ophthalmicus [V/1]

Course within the dura mater	Lateral wall of the Sinus cavernosus
Exit from the dura mater	Fissura orbitalis superior
Exit from the base of skull	Fissura orbitalis superior – N. nasociliaris: medial portion – N. frontalis: lateral portion – N. lacrimalis: lateral portion
Supplying areas	Sensible: Dura mater of the anterior cranial fossa, Falx cerebri, Tentorium cerebelli, forehead, upper eyelid, back of the nose, Sclera, Cornea, Cellulae ethmoidales anteriores, Sinus sphenoidales, nasal cavity (anterior part)
Attachment of other nerves	Parasympathetic (secretory) fibres to the N. lacrimalis for the <u>Glandula lacrimalis</u> (from the Nucleus salivatorius superior via the N. facialis, N. petrosus major to the Ganglion pterygopalatinum and further on to the N. zygomaticus and R. communicans cum nervo zygomatico)

– N. maxillaris [V/2]

Course within the dura mater	Lateral wall of the Sinus cavernosus
Exit from the dura mater	Foramen rotundum
Exit from the base of skull	Foramen rotundum
Supplying areas	Sensible: Dura mater of the middle cranial fossa, cheek, lower eyelid, lateral parts of the nose, upper lip, teeth and gingiva of the maxilla, Cellulae ethmoidales posteriores, Sinus sphenoidalis, Sinus maxillaris, Conchae nasales superior and media, Palatum, Tonsilla palatina, Pharynx (roof)
Attachment of other nerves	Parasympathetic (secretory) fibres to the diverse Rr. nasales for the <u>Glandulae nasales</u> , to the Nn. palatini for the <u>Glandulae palatinae</u> as well as to the N. zygomaticus for the <u>Glandula lacrimalis</u> (from the Nucleus salivatorius superior via the N. facialis, N. petrosus major and the Rr. ganglionares to the Ganglion pterygopalatinum)

– N. mandibularis [V/3]

Course within the dura mater	Lateral wall of the Sinus cavernosus
Exit from the dura mater	Foramen ovale
Exit from the base of skull	Foramen ovale
Supplying areas	Motor: masticatory muscles, M. tensor veli palatini, M. mylohyoideus, M. digastricus (Venter anterior), M. tensor tympani Sensible: Dura mater of the middle cranial fossa, Cellulae mastoideae, skin of the mandible, temple, cheek, auricle (upper parts), external acoustic meatus, tympanic membrane (externally), teeth and gingiva of the mandible, anterior 2/3 of the tongue, Isthmus faucium, temporomandibular joint
Attachment of other nerves	Sensory: anterior 2/3 of the tongue (N. facialis [VII] via Chorda tympani to the N. lingualis) Parasympathetic (secretory) fibres a) to the N. lingualis for the <u>Glandulae submandibularis</u> and <u>sublingualis</u> (Nucleus salivatorius superior via the N. facialis and the Chorda tympani to the Ganglion submandibulare) b) to the N. auriculotemporalis for the <u>Glandula parotidea</u> (Nucleus salivatorius inferior via the N. glossopharyngeus, N. tympanicus and the N. petrosus minor to the Ganglion oticum)

f N. abducens [VI] (Fig. 470, 471, 531, 533)

Nuclei (fibre quality)	• Nucleus nervi abducentis (GSE)
Exit from the brain	Between Pons and Pyramis
Location in the subarachnoid space	Cisterna basalis
Entry into the dura mater	Upper third of the Clivus
Course within the dura mater	Via Apex partis petrosae, freely through the Sinus cavernosus, lateral to the A. carotis interna
Exit from the dura mater	Fissura orbitalis superior
Passage through the base of skull	Fissura orbitalis superior, medial portion (within the Anulus tendineus)
Supplying area	Motor: M. rectus lateralis

g N. facialis [VII] (Fig. 476, 477, 531, 533)

Nuclei (fibre quality)	• Nucleus nervi facialis (SVE) • Nucleus salivatorius superior (GVE) → Ganglion pterygopalatinum → Ganglion submandibulare • Nucleus solitarius (SVA)
Exit from the brain	Cerebellopontine angle
Location in the subarachnoid space	Cisterna basalis, Cisterna pontocerebellaris
Entry into the base of skull	Porus → Meatus acusticus internus
Passage through the dura mater	Fundus meatus acustici interni
Course within the base of skull	Canalis nervi facialis
Exit from the base of skull	Foramen stylomastoideum
Supplying areas	Motor: facial muscles, Mm. auriculares, M. digastricus (Venter posterior), M. stylohyoideus, M. stapedius Sensory: anterior 2/3 of the tongue (via Chorda tympani to the N. lingualis) Parasympathetic: Glandula lacrimalis, Glandulae nasales, Glandulae palatinae (via Ganglion pterygopalatinum), Glandula submandibularis, Glandula sublingualis (via Ganglion submandibulare)
Attachment of other nerves	Sensible fibres from the N. trigeminus to the facial branches of the N. facialis

h N. vestibulocochlearis [VIII] (Fig. 478, 531, 533)

Nuclei (fibre quality)	• Nuclei cochleares anterior and posterior (SSA) • Nuclei vestibulares medialis, lateralis, superior and inferior (SSA)
Exit from the brain	Cerebellopontine angle
Location in the subarachnoid space	Cisterna basalis, Cisterna pontocerebellaris
Entry into the base of skull	Porus → Meatus acusticus internus
Exit from the dura mater	Fundus meatus acustici interni
Course within the base of skull	Directly to the labyrinth of the petrous part of the temporal bone
Supplying areas	Sensory: N. cochlearis: organ of hearing (= organ of CORTI) Sensory: N. vestibularis: organ of balance

i N. glossopharyngeus [IX] (Fig. 479, 531, 533)

Nuclei (fibre quality)	• Nucleus ambiguus (SVE) • Nucleus spinalis nervi trigemini (GVA) • Nucleus solitarius (SVA) • Nucleus salivatorius inferior (GVE) → Ganglion oticum
Exit from the brain	Medulla oblongata, Sulcus posterolateralis (between the olive and the Tuberculum cuneatum)
Location in the subarachnoid space	Cisterna basalis
Passage through the dura mater	Foramen jugulare
Passage through the base of skull	Foramen jugulare
Supplying area	Motor: pharyngeal muscles (cranial parts), M. levator veli palatini, M. palatoglossus, M. palatopharyngeus, M. stylopharyngeus Sensible: pharyngeal mucosa (cranial parts), Tonsilla palatina, posterior third of the tongue, Plexus tympanicus, Membrana tympani (internally), Sinus caroticus Sensory: tongue (posterior third) Parasympathetic: Glandula parotidea (via Ganglion oticum), Glandulae linguales (posteriores)

j N. vagus [X] (Fig. 480, 531, 533)

Nuclei (fibre quality)	• Nucleus ambiguus (SVE) • Nucleus spinalis nervi vagi (GVA) • Nucleus solitarius (SVA) • Nucleus dorsalis nervi vagi (GVE)
Exit from the brain	Medulla oblongata, Sulcus posterolateralis (dorsal to the olive)
Location in the subarachnoid space	Cisterna basalis
Passage through the dura mater	Foramen jugulare
Passage through the base of skull	Foramen jugulare
Supplying areas	Motor: pharyngeal muscles (caudal parts), M. levator veli palatini, M. uvulae, laryngeal muscles Sensible: Dura mater of the posterior cranial fossa, deep parts of the Meatus acusticus externus, Membrana tympani (externally) Sensory: root of the tongue Parasympathetic: organs of the neck, thorax and abdomen up to the point of CANNON-BÖHM

k N. accessorius [XI] (Fig. 481, 531, 533)

Nuclei (fibre quality)	• Nucleus ambiguus (SVE) • Nucleus nervi accessorii (SVE)
Exit from the brain	Radices craniales: Medulla oblongata, Sulcus posterolateralis (retroolivaris) Radices spinales: Medulla cervicalis (lateral)
Location in the subarachnoid space	Cisterna basalis
Entry into the base of skull	Foramen magnum (Radices spinales)
Passage through the dura mater	Foramen jugulare
Passage through the base of skull	Foramen jugulare
Supplying area	Motor: M. sternocleidomastoideus, M. trapezius (together with the Plexus cervicalis)

l N. hypoglossus [XII] (Fig. 482, 531, 533)

Nuclei (fibre quality)	• Nucleus nervi hypoglossi (GSE)
Exit from the brain	Medulla oblongata, Sulcus anterolateralis
Location in the subarachnoid space	Cisterna basalis
Passage through the dura mater	Canalis nervi hypoglossi
Passage through the base of skull	Canalis nervi hypoglossi
Supplying area	Motor: Inner muscles of the tongue, M. styloglossus, M. hyoglossus, M. genioglossus

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- [Articulatio humeri] 23

Rotatio

- externa [Articulatio coxae] 39
- - [Articulatio genus] 39
- - [Articulatio humeri] 23
- interna [Articulatio coxae] 39
- - [Articulatio genus] 39
- - [Articulatio humeri] 23

S*Scalenus muscles* 11*Sclera* 57*Shoulder joint s. Articulatio humeri**Sinus*

- caroticus 57
- cavernosus 57
- maxillaris 57
- sphenoidalis 57

Sole of the foot, muscles, lateral 54*Spinocostal muscles* 19*SSA (specific somatic afference)* 56*Sternoclavicular joint s. Articulatio sternoclavicularis**Sulcus*

- anterolateralis 57
- nervi oculomotorii 57
- posterolateralis (retroolivaris) 57

Supinatio

- [Articulatio cubiti] 23
- [Articulatio talotarsalis] 39

Suprahyoid muscles

- inferior 10
- superior 9

SVA (specific visceral afference) 56*SVE (specific visceral efference)* 56*Symphysis pubica* 39*Syndesmosis tibiofibularis* 39**T***Tectum mesencephali* 57*Tentorium cerebelli* 57*Thenar eminence, muscles* 36*Thigh, muscles, ventral* 44*Tonsilla palatina* 57*Tractus opticus* 57*Trigonum*

- lumbocostale 21
- sternocostale 21

Trunk- arm muscles 18*Trunk-shoulder girdle muscles* 17*Tuberculum cuneatum* 57**V***Vagina nervi optici* 57*Venter*

- anterior [M. digastricus] 9, 57
- frontalis 1
- inferior [M. omohyoideus] 10
- occipitalis 1
- posterior [M. digastricus] 9, 57
- superior [M. omohyoideus] 10

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- axes 23
- distal s. Articulatio mediocarpalis
- planes of movements 23
- proximal s. Articulatio radiocarpalis