

"A Manual and Guide for the Practical Anatomy Laboratory"

By H.V. Halladay, D.O.

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"Harold I. Magoun Sr., A. S. O. Jan. 29, Dissection."

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EAGLE NOTE BOOK



School _____

Subject _____

EAGLE
LOOSE LEAF NOTE COVERS



Gray Imitation Duck
FITTED WITH $\frac{3}{4}$ " RINGS

Number	STYLE	SHEET SIZE
4000	End Opening	3 $\frac{3}{8}$ × 5 $\frac{3}{8}$
4001	End Opening	4 $\frac{1}{2}$ × 7 $\frac{1}{4}$
4003	End Opening	5 $\frac{1}{2}$ × 8 $\frac{1}{2}$
4009	End Opening	8 × 10 $\frac{1}{4}$
4002	Side Opening	8 $\frac{1}{4}$ × 6 $\frac{3}{8}$
4004	Side Opening	9 $\frac{1}{2}$ × 7 $\frac{1}{2}$
4006	Side Opening	10 $\frac{1}{2}$ × 8
4008 *	Side Opening	8 $\frac{1}{2}$ × 5 $\frac{1}{2}$

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A
MANUAL AND GUIDE
for the
PRACTICAL ANATOMY
LABORATORY

By H. V. HALLADAY, D. O.

Property of

HAROLD I. MAGOUN JAN. '24

~~702 East Harrison Street~~

Kirksville

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TABLE 21

DATE Fall 21

PRO.

	STUDENT	M	T	W	T	F	S
U	Helen Couse						
U	Marguerite Fuller						
U	B. W. Clayton						
U	'ed' Scarlett						
L	Mrs Kelly						
L	Walt Kelly						
L	Floyd Freeman						
L	R. S. McBride						

Realizing the importance of the Practical Anatomy Laboratory and its close relation to many other studies in our college, the author has attempted to improve the former methods of conducting this work.

Our dissection should aim to instruct not only in Anatomy but in Osteopathy and it was with this idea foremost that the Manual was written. Being a loose-leaf book the student has ample opportunity to write each day's work in detail and add a great deal of information that will prove valuable later.

He does not claim this outline as perfect, but has made close inquiry into similar work in other colleges, referred to the highest authorities on Anatomy and Dissection, and has been guided by his own experience.

The abbreviation "O. I. B. & N. S." refers to Origin, Insertion, Blood and Nerve Supply. "Discuss Osteopathically" we have put in to increase your working knowledge of the structure and to determine your idea of its application as a unit in the body structure. In applying this to a muscle discuss its (a) Action, (b) Results if it were contracted and (c) the use it may be put to in Technique. Contractured muscles often cause lesions. Study them from this standpoint.

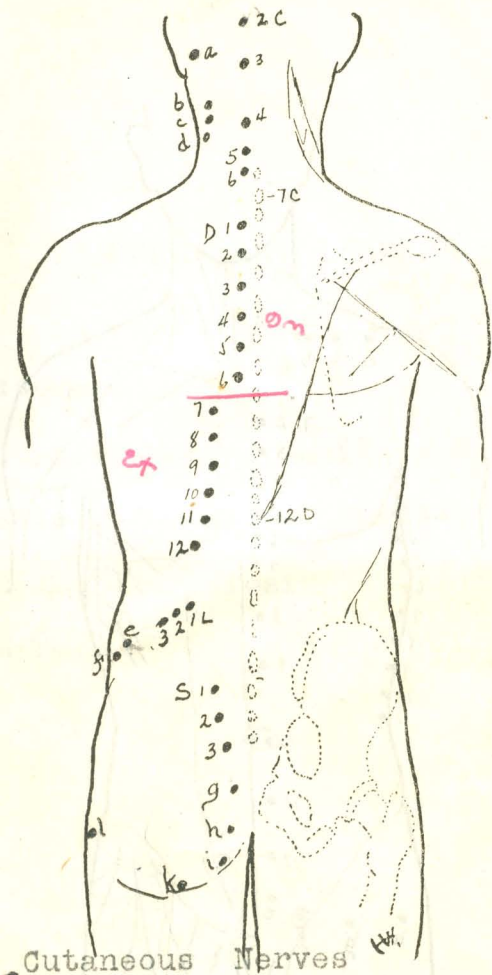
H. V. H.

OUTLINE

This guide is to be used in conjunction with the dissection of the cadaver and covers 288 hours work or 144 days of 2 hours each.

The following table indicates the time required on the different regions.

UPPERS		LOWERS	
Days	Region	7Days	Region
	1-3 Preparatory	1-3	Preparatory
	4-13 Back	4-13	Back
14-15-	Scalp and Brain	14-17-	Glutreal Region
16-34-	{ Shoulder Upper Extremity	18-32-	Lower Extremity
35-63-	{ Head Neck Thorax	33-51-	Abdomen
		52-63-	Pelvis
64-69-	{ Diaphragm Vertebrae Spinal Cord	64-69-	{ Diaphrahm Vertebrae Spinal Cord
70-72-	Brain	70-72-	Brain

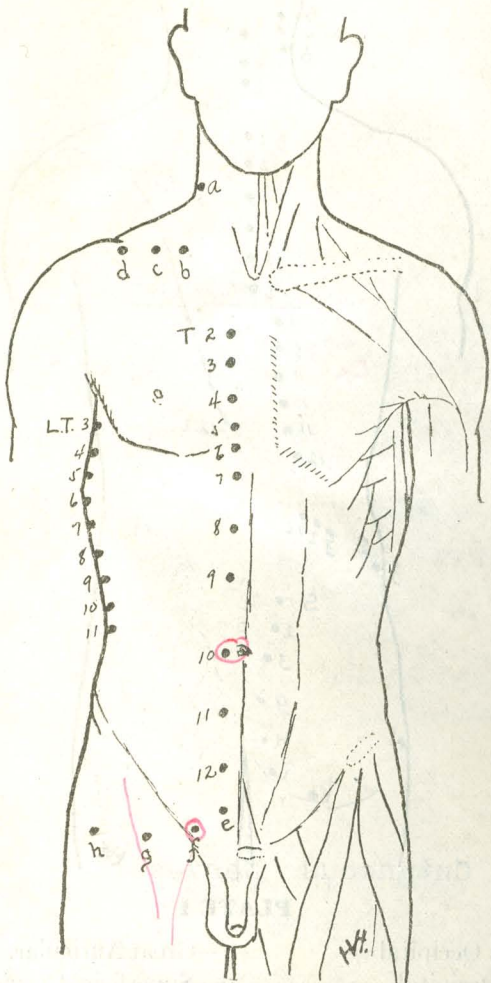


Cutaneous Nerves

PLATE I

- C2—Great Occipital
- 3—Third Occipital
- 4-5-6 Posterior Primary divisions. Cervical.
- D 1-12 Posterior Primary divisions. Thoracic.
- L 1-2-3-Posterior Primary divisions. Lumbar
- S 1-2-3—Posterior Primary divisions. Sacral.
- a—Posterior Auricular. *✓*
- b—Small Occipital. *Cerv. P.*

- c—Great Auricular. *Cerv. P.*
- d—Superficial Cervical. *Cerv. P.*
- e—Lateral Branch of Ilio-Hypogastric. *L2-1*
- f—Lateral Branch of 12th Thoracic.
- g—Ano-Coccygeal. *Pud. 34*
- h—Perineal Branch, 4th Sacral. *Pud. 34*
- i—Perforating Cutaneous. *Pud. 33*
- k—Small Sciatica. *L2-3 S*
- l—Lateral Cutaneous. *L2-3 L*



Cutaneous Nerves
PLATE II

- a—Superficial Cervical *3-5C*
 - b—Sternal
 - c—Clavicular Supra-Clavicular
 - d—Acromion
 - e—Ilio-Hypogastric. *12-1L*
 - f—Ilio Inguinal. *12-1L*
 - g—Genito-Crural. *1-2L*
 - h—Lateral Cutaneous. *2-3L*
 - LT 3-11 Thoracic. Lateral Cutaneous.
 - T 2-12 Thoracic. Anterior Primary Divisions.
- Important in case of referred pains, hot and cold spots, etc..

UPPERS AND LOWERS

DAY 1

2/7/21

Record of Subject.

Name Mrs. Carolina Buckmeyers

Sex Female

Race White

Age 74

Cause of Death Tuberculosis

Osteopathic Theory

General condition. Comparison between Age, Weight, Height and other items having a bearing on the present condition. Cadaver to be thoroly cleaned and shaved.

General condition good. Hands and lips eaten by rats. Somewhat shrunken and wasted with age. Weight normal for height. Black hair unusual in one so old.

DAY 1 5/17/21

Record of Subject.

Name **August Williams**

Sex **Male** Race **White** Age **51**
Female **White** **90**

Cause of Death **Tuberculosis**
Arterial Sclerosis

Osteopathic Theory

Tubercle bacillus always present. Lesion result of lowered resistance. Predisposing cause may have been due to, 1 Environment, mine worker or the like; 2 Lesions in the upper dorsal affecting the blood supply to the lungs.

General condition. Comparison between Age, Weight, Height and other items having a bearing on the present condition. Cadaver to be thoroly cleaned and shaved.

DAY 2 2/8/21 5/17/21

Posterior Examination.

Turn cadaver on face. Dot as in Plate I indicating all points. Study their position. Note position of scapula, 12th rib, Crest of Ilium, Spines of 2nd C., 7th C., 12th D., 5th L. Examine skin for scars, moles, etc. Mark out Kidneys.

Anterior Examination.

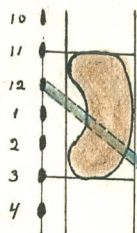
Turn cadaver on back. Dot as in Plate II. Note carefully each landmark. Examine skin for scars etc.

Questions:—

- (1) What abnormalities do you find in (a) Head and Neck, (b) Trunk, (c) Extremities?
- (2) Give directions for marking out the Kidneys.

Day 2(H.I.M.)

Abnormalities



Marking out Kidneys

Parallelogram of Morris:

Two vertical lines,

One inch from mid line

Three and three quarters from mid line

Two horizontal lines,

Tip spinous process of 11th thoracic

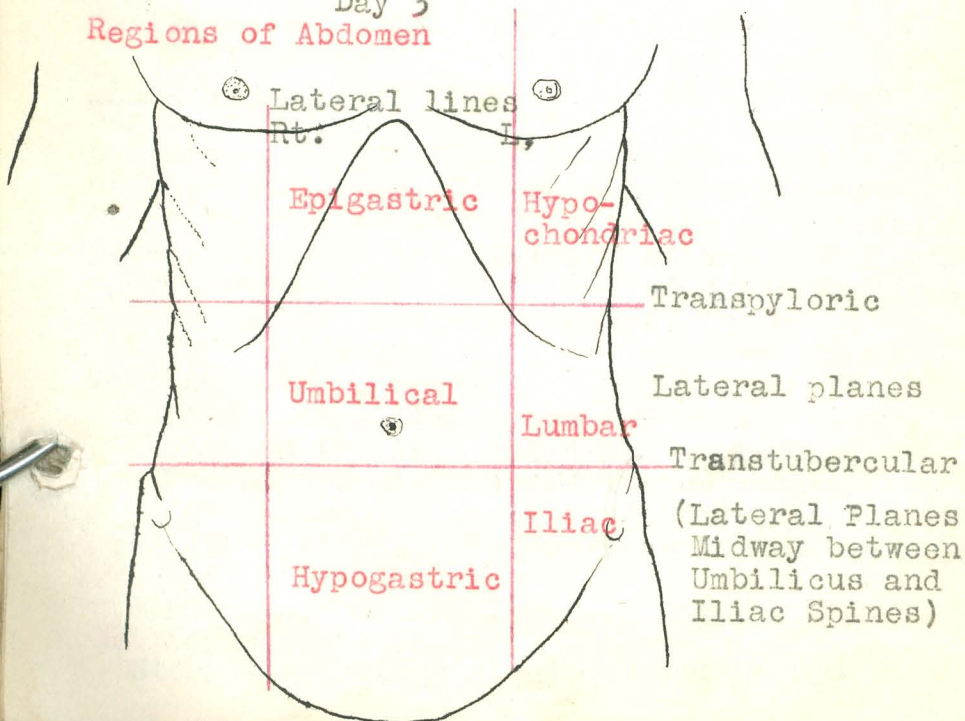
Lower border sp. pr. of 3rd lumbar

Hilum two inches in at sp. pr. of 1st lumbar

Right kidney half inch lower than left.

Day 3

Regions of Abdomen



Addenda

DAY 1

H.I.M.

MALE General condition excellent. Body somewhat wasted with disease but free from scars and deformities. Chest somewhat flattened antero-posteriorly. Height about five feet, eight.

Female Rather fat with barrel chest and badly curved spine, both posteriorly and to the left. Bed sores about hips.

DAY 2

MALE Great occipital nerve seat of headache.

Ilio-hypogastric, ilio-inguinal, and 12th thoracic have typical lateral cutaneous branch.

Scapula Superior angle opposite 2nd rib.

Inferior angle opposite 7th rib.

Tenth thoracic A.P.D. at umbilicus

Ilio inguinal at external abdominal ring.

Genito-crural in Scarpa's Triangle.

Linea Semilunaris corresponds to the outer border of the sheath of the rectus and curves outward external to the linea alba at the level of the umbilicus. It extends from the tip of the ninth costal cartilage to the spine of the pubes. It marks the division of the abdominal aponeuroses and so the limit of extravasations in the lateral muscular spaces.

DAY 3

Marking out the heart

Second intercostal space for base

High on the left 1 3/4 inches out.

Low on the right 1 1/4 inches out.

Fifth interspace on the left 3 1/2 inches out.

Junction of sixth and seventh costal cartilage

Join points by lines convex outward.

Marking out the lungs

Sterno-mastoid muscle 1 1/2 inches up.

DAY 3

2/9/21

5/17/21

Regions of Abdomen.**Heart and Lungs.**

Mark out the 9 regions of abdomen and learn contents of each. Mark out heart and lungs on thoracic wall. Wrap extremities, top of head and face and external genitals with cotton and gauze furnished and turn cadaver on face with a block under the Sternum and another under the anterior superior spines of ilium.

Questions:—

- (1) Name the regions of Abdomen and give contents of each.
- (2) Where is the Sub-Costal Plane? the Intertubercular Plane?
- (3) Give directions for marking out the Heart and Lungs.
- (4) Where are the different Heart sounds heard best?

DAY 4

2/10/21

5/18/21

The Skin and Superficial Fascia.

Make skin incision from External Occipital Protuberance to tip of Coccyx in Midline. From tip of Coccyx along Crest of Ilium and from 12th Dorsal Spine outward to Mid-axillary line. From 7th Cervical to tip of Acromion Process. From External Occipital Protuberance to a point $\frac{1}{2}$ in. above each ear. Reflect skin leaving it attached to cover structures being dissected.

Note:—Cutaneous Nerves and Arteries. (See Plate I).

Questions:—

- (1) Describe the Superficial fascia.
- (2) What is the cutaneous nerve supply to the back?

DAY 5

5/18/21

The Deep Fascia and Muscles.

2/11/21

Palpate Scapula, 12th Rib, 7th Cervical Spine, Atlas and Axis. Remove the Superficial Fascia keeping nerves intact. Clean deep Fascia and note outlines of Trapezius and Latissimus Dorsi, Triangles of Auscultation and Petit. Remove the Deep Fascia.

Questions:—

- (1) Describe the Deep Fascia.
- (2) Bound the Triangles of Auscultation and Petit.

DAY 6

2/12/21 5/19/21

Trapezius.

Remove muscle beginning $\frac{1}{2}$ in. from origin and gradually working outward saving Blood and Nerve supply.

Note:—

Origin and insertion. Direction of fibers. Relation to Latissimus Dorsi. Relation to Posterior Triangle of Neck. Great Occipital Nerve. Occipital Artery. Spinal Accessory Nerve. Small Occipital Nerve.

Latissimus Dorsi.

Make an incision thru the muscle obliquely about half the distance from the origin to insertion. Reflect from the incision and note carefully the structures underneath.

Questions:—

- (1) Give O. I. B. & N. S. of the above muscles.
- (2) Give the relations of each muscle.
- (3) Discuss Osteopathically.

DAY 7

2/14/21 5/20/21

Rhomboideus Major.

Rhomboideus Minor.

Levator Anguli Scapuli.

Clean the above muscles thoroly. Detach at origin and trace nerve supply. Examine other cadavers for variations.

Note:—

Origin and insertion, Relations, Transverse cervical Artery and branches, Omo-Hyoid Muscle.

Questions:—

- (1) Give O. I. B. & N. S. of each.
- (2) Discuss Osteopathically.
- (3) Give relations.

DAY 8

2/15/21 5/21/21

Serratus Posticus Superior.

Serratus Posticus Inferior.

Splenius Cervicis.

Splenius Capitis.

Clean the above muscles noting attachments. Separate each distinctly before removing. In removing use care so as not to disturb the underlying structures.

The Lumbar Aponeurosis or Fascia.

Pull the Erector Spinae Mass inward and note 3 layers of the posterior portion of fascia.

Right Hypochondriac

Liver (Gall Bl)
Kidney Colon(h.f.)

Epigastric

Liver Aorta
Stomach Inf. Vena
Pancreas Cava
Suprarenal Duodenum
Kidney Jejunum Colon

Right Lumbar

(Liver)
Kidney
Ascending Colon
Ileum

Hypogastric

Pelvic Colon
Small Intestine
(Ureters)
Distended Bladder
Pregnant Uterus

Right Iliac

Cecum
Ileum
Appendix

Left Hypochondriac

Stomach (Liver)
Spleen Pancreas
Kidney
Splenic flexure

Umbilical

(Stomach) (Aortic bifur.)
Transverse Colon
Duodenum (Thoracic
Jejunum Duct)
(Pancreas) (Solar plexus)
(Kidney) (Inf. Vena
Ureters Cava)

Left Lumbar

(Kidney)
Descending Colon
Jejunum

Left Iliac

Jejunum
Iliac Colon

The Subcostal Plane

Halfway between the jugular notch and the upper border of the symphysis pubis. Cuts thru Pylorus, tips of ninth costal cartilages, and lower border of first lumbar vertebra.

The Intertubercular Plane

Mid way between the Subcostal and the upper border of the symphysis pubis. Cuts iliac tubercles and body of fifth lumbar vertebra.

Marking out the heart

Four points:

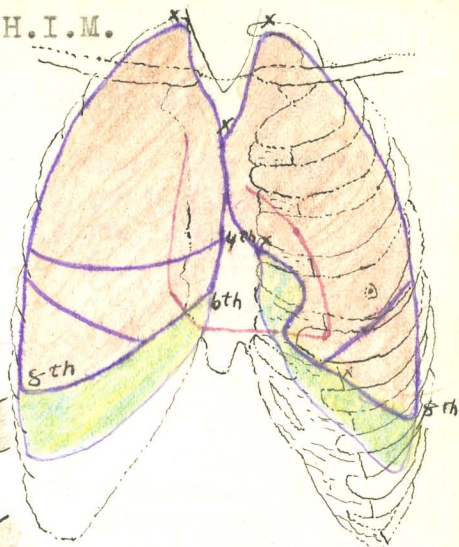
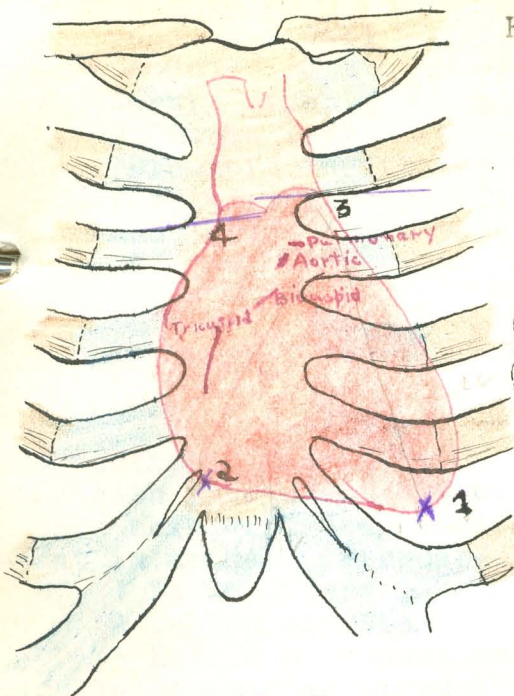
1 Apex left ventricular
Left; 5th interspace; middle; 3 1/4' out.

2 Apex right ventricular
Right; 7th sterno-costal articulation

Base

3 Left; 2nd costal cartilage; lower border
1 3/4' out

4 Right; 3rd costal cartilage; upper border
1 1/4' out.



P- 3rd sterno chond
 A- ditto down + in
 M- 4th ditto high
 -apex -
 T- 4th space middle

Marking out the Lungs

Apex 1 inch above clavicle

Down centrally to meet fellow at mid point of manubrio-sternal junction.

Down mid sternal line to 4th costal cartilage.

Right

Down to 6th costal cartilage

Down and lateral to 8th at mid axillary line.

Around to 10th thoracic spinous process.

Left

Lateral and down across 4th sternocostal artic.

Parasternal line at 5th costal cartilage

Medial and downward to 6th sternocostal artic.

Mid clavicular line at 6th

Mid axillary line at 8th

Around to tenth thoracic spine

Posteriorly

From level of spinous process of 7th cervical

Down costovertebral joints

To 10th thoracic spine

Oblique fissures

From spine of 2nd thoracic to 6th rib in mid clavicular line.

Horizontal fissure in right lung.

From point where former cuts mid axillary line to mid sternal line at level of 4th costal cartilage.

Heart Sounds

Aortic right (Intercostal spaces)
 Pulmonic left
 Tricuspid 'neath the sternum (to right)
 The apex gets the mitral beat
 And that's the way we learn 'um.

-- DAY 4 --

Superficial fascia

Beneath integument almost everywhere. Connects skin with deep fascia. Fibroareolar tissue. Fat in meshes. Fibroareolar tissue composed

- of { 1 White fibers
 2 Yellow elastic
 3 Matrix of cement substance.

Cells of areolar tissue:

- 1 Lamellar cells, flat, branched, or unbr.
 Branched, in network
 Unbranched, in epitheloid formation
- 2 Clasmatocytes, large irregular, granulated, with vacuoles
- 3 Granule Cells, ovoid and basophilic
- 4 Plasma cells, vacuolated protoplasm
- 5 Also wandering leucocytes.

Cells lie in amongst fibers. No fat in eyelids or external genitals.

Beneath fatty layer is vasculo-nervous layer. Also muscle as Platysma and orbicularis oculi. Fascia thin where muscle inserted into integument (Neck, face). Most distinct on perineum and extremities. Dense in scalp, palms, soles, etc.

Function

- Connects skin to subjacent parts.
- Facilitates movement of skin.
- Safe passage for vessels and nerves to skin.
- Retains body warmth by virtue of fat.

Addenda

Loose areolar tissue, one layer thick on the back.

Cutaneous Nerve Supply to the Back

Great occipital	- - - - -	2 cervical, P.P.D.	
Third occipital	- - - - -	3 cervical, P.P.D.	
4-5-6 cervical	- - - - -	from segments, P.P.D.	
1-12 dorsal	- - - - -	" " " "	(See rule)
1-2-3 lumbar	- - - - -	" " " "	" "
1-2-3 sacral	- - - - -	" " " "	" "
Posterior auricular	- - - - -	mandibular division of V	
Small occipital	- - - - -	2-3 cervical, (cervical plexus),	A.P.D.
Great auricular	- - - - -	" " " "	" " " "
Superficial cervical	- - - - -	" " " "	" " " "
Lateral branch of ilio-hypogastric	- - - - -	12 dorsal-1 lumbar (lumbar plexus)	A.P.D.
" " 12th dorsal	- - - - -	12 dorsal, P.P.D.	
Ano-coccygeal	- - - - -	3-4-sacral (pudendal plexus)	A.P.D.
Perineal branch of int. pudic	- - - - -	2-3-4 sacral (pudendal plexus)	" " " "
Perforating cutaneous	- - - - -	2-3 sacral	" " " "
Small sciatic	- - - - -	1-2-3 sacral (sacral plexus)	" " " "
Lateral cutaneous	- - - - -	2-3 lumbar (lumbar plexus)	" " " "

Abbreviations: P.P.D. = posterior primary division
 A.P.D. = anterior primary division

Rule:
Above the sixth dorsal the internal branch of the posterior primary division is cutaneous.
Below the sixth dorsal the external branch of the posterior primary division is cutaneous.

SKIN IN ABOVE * SKIN OUT BELOW

(Opposite for muscles except for two upper layers which have own innervation)

Deep Fascia

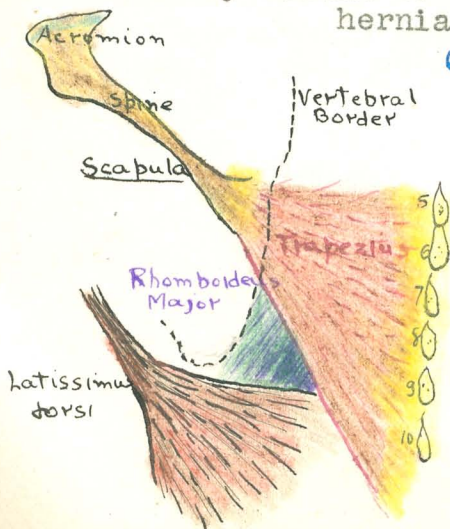
Dense, inelastic, fibrous membrane, forming sheath for muscles. Sometimes afford broad surfaces for attachment to muscles. Consists of shining tendinous fibers, parallel to one another, and connected by other fibers placed in a rectangular manner. Also sheaths vessels and nerves. Thick on unprotected surfaces as side of thigh. Assist muscles in action, by degree of tension and pressure on surfaces. Septa separate the various muscles and are attached to the periosteum. (Intermuscular septa)

Triangle of Auscultation

Behind the scapula and bounded
 Above by the Trapezius
 Below by the Latissimus dorsi
 Laterally by the vertebral border of scapula
 Floored by Rhomboideus major
 Called triangle of Auscultation because auscultation possible when arms folded across chest and trunk bent forward so that 6th & 7th ribs and interspace become subcutaneous.

Triangle of Petit

Lateral lumbar triangle bounded by
 Posteriorly by the Latissimus dorsi
 Anteriorly by the Obliquus externus abdominis
 Below by iliac crest
 Floored by Obliquus internus abdominis
 Occasionally absent or seat of lumbar hernia.



Trapezius

Origin: External occipital protuberance
 Ligamentum nuchae
 Spinous process of 7th vertebra
 Spinous processes of all thoracic and
 supraspinal ligament.

Curved line of occiput.

Insertion: Fibers converge towards acromion
 Superior fibers to posterior border of
 lateral third of clavicle.

Middle fibers into medial margin of
 acromion and posterior border of
 scapular spine.

Inferior fibers converge into an apo-
 neurosis at medial end of spine and
 are inserted at apex of end of spine.

Relations: Thin fibrous lamina connects it to
 occiput

Broad semi-elliptical aponeurosis to
 spinous processes from 6th cervical
 to 3rd thoracic.

The two muscles form a diamond with
 angles at shoulders, occiput, and
 12th dorsal.

Overlaps Latissimus dorsi at latter's
 origin at spinous processes of lower
 six thoracic vertebrae. Triangle of
auscultation

Forms posterior wall of posterior tri-
angle of neck.

Pierced by great occipital nerve near
 attachment to occipital bone. (Medial
 branch of posterior division of 2nd
 cervical supplying scalp to vertex)

Occipital artery pierces fascia between
 attachment of Trapezius and Sterno-
 cleidomastoideus. (Branch of external
 carotid to scalp to vertex)

Spinal portion of Spinal Accessory
 nerve supplies deep surface of muscle
 from plexus with 3rd & 4th cervical.

Filaments from small occipital nerve
 on adjacent border of Sternocleido-
 mastoid.

Nerves: Spinal accessory, 2, 3rd & 4th cervical.

occipital art. between trap & stern mast.
great occ. nerve internal.

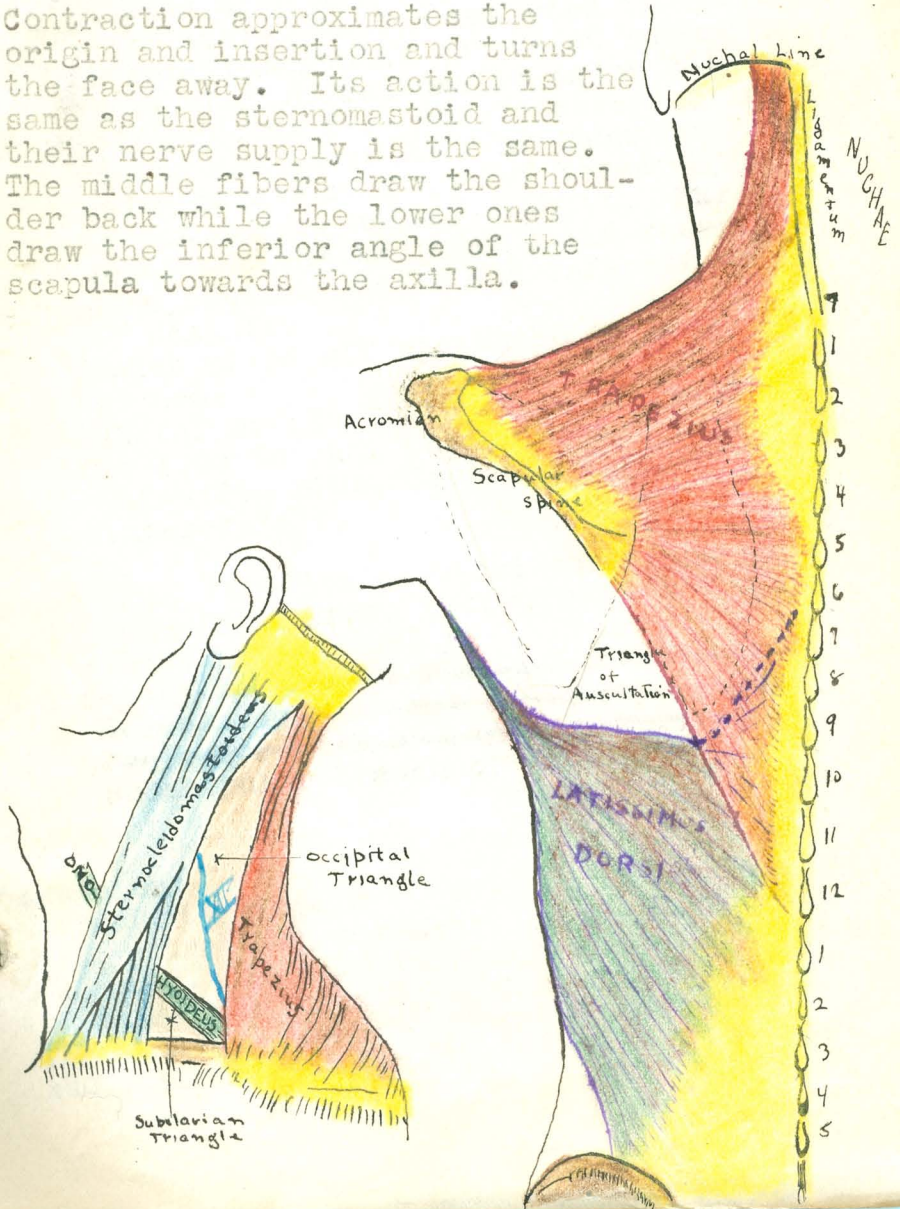
Sustains it upper extremity
Paralysis = fallen shoulder

Blood: princeps cervicis of occipital Ext. Car.
 vertebral *Subclavian*
 ascending deep cervical - *Trans. Cerv*
 suprascapular *Thyroid Axis - Subcl*
 transverse cervical - *Subclavian*

Discussion

Contraction might affect any of the bones to which it is attached and cause a slight dislocation. Affected in torticollis.

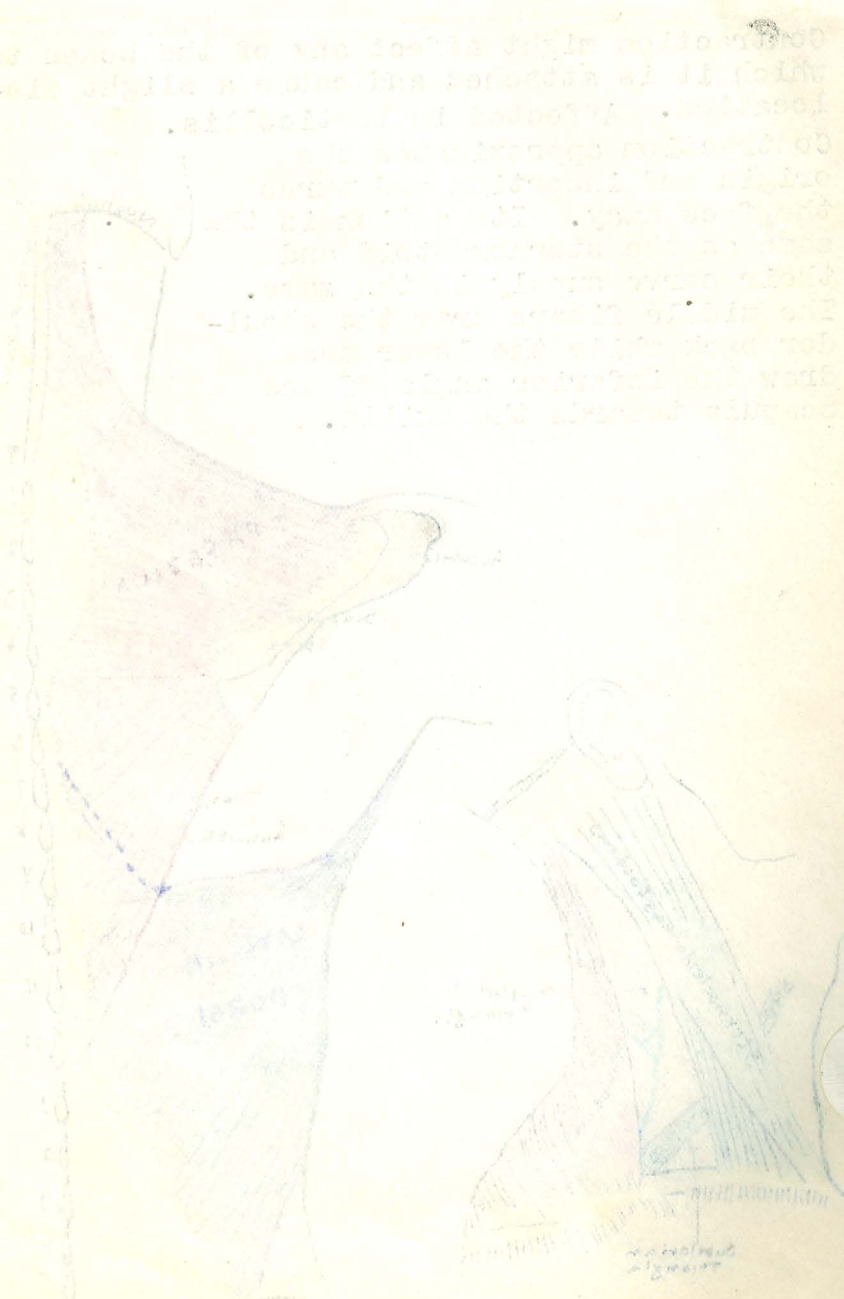
Contraction approximates the origin and insertion and turns the face away. Its action is the same as the sternomastoid and their nerve supply is the same. The middle fibers draw the shoulder back while the lower ones draw the inferior angle of the scapula towards the axilla.



Bursitis - inf & reop.

Post. ax. fold (+ thro mya)

Inward rotation + add.



Latissimus dorsi

Origin: Spinous processes of lower six thoracic
 Posterior layer lumbosacral fascia to
 lumbar and sacral vertebrae, to supra-
 spinal ligament, and posterior part of
 crest of ilium.

From four lower ribs by fleshy digitations

Insertion: Fibers converge to form fasciculus.
 Around lower border of Teres major and
 twisted upon itself. (Bicipital groove)
 Quadrilateral tendon inserted in bottom
 of intertubercular groove of humerus,
 above that of Pectoralis major tendon.

Relations: Triangular flat muscle covering lumbar
 region and lower half of thoracic region
 Tendon passes in front of Teres major
 tendon and is united with it. Bursa
 separates the two near their insertion.
Bursa between muscle and inferior angle
 of scapula.

Tendon gives off expansion to deep fascia
 of arm.

Lateral margin to triangle of Petit
 Overlies Serrati posterior and inferior,
 9th-12th ribs, Serratus anterior,
 intercostals,

Nerves: ^{5th} 6th, 7th, 8th cervical thru long sub-
 scapular nerve. (Posterior cord of
 brachial plexus)

Blood supply: ~~posterior rami of intercostals,~~
~~Transverse cervical of thyroid axis,~~
~~Posterior rami of lumbar arteries,~~
 Subscapular branch of Axillary

Discussion:

It adducts the arm (down) and is used in
 such retractory movements as climbing and
 swimming. It also raises the last four ribs.
 It moves the inferior angle of the scapula
 (if attached thereto) forward or backward
 and assists in holding it down to the ribs.

Rhomboideus Major 2-5 aponeurotic

Origin: A quadrilateral sheet arising from spinous processes of four upper thoracic vertebrae and from the intervening interspinous ligaments.

Insertion: It is directed downward and laterally into the lower two thirds of the vertebral border of the scapula, below the spine.

Nerve supply: dorsal scapula nerve from the fifth cervical. (Nerve to rhomboids 3-4-5)

Blood supply: ~~superior cervical~~, posterior scapular of trans. cervical of thyroid axis.

Relations: underlies Trapezius, caudad to Rhomboideus minor, floors triangle of auscultation draws scapula upward and medially, overlies ribs, serratus posticus sup. & erector spinae

Discussion: mass.
Approximate origin and insertion. Draw inf. angle of scapula away from axilla. Oppose pectoralis major and serratus magnus. Helps hold down scapula.

Rhomboideus Minor 7-1 aponeurosis

Origin: a band like muscle from the lower part of the ligamentum nuchae and from the spinous process of the last cervical vertebrae

Insertion: passes laterally to be inserted into the vertebral border of the scapula at the base of the spine.

Nerves: dorsal scapula of the fifth cervical.

Blood: ~~superior cervical~~, posterior scapular

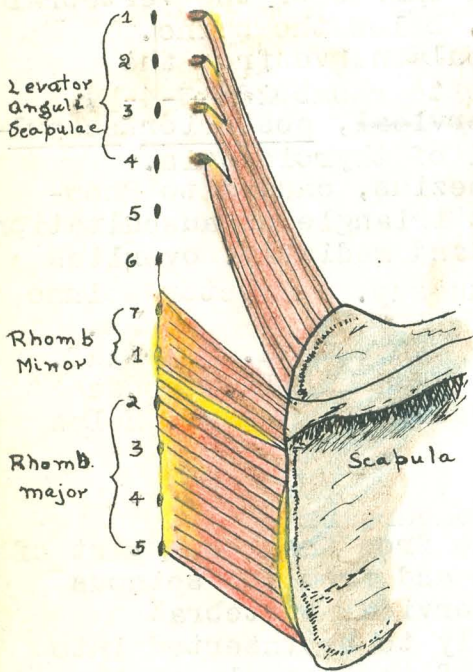
Relations: cephalad to Rhomboideus major, caudad to Levator anguli scapuli, under trapezius, action same as Rhomboideus major,

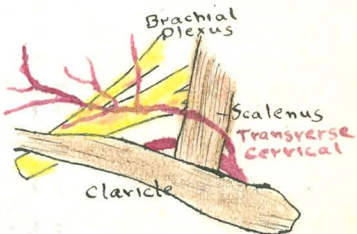
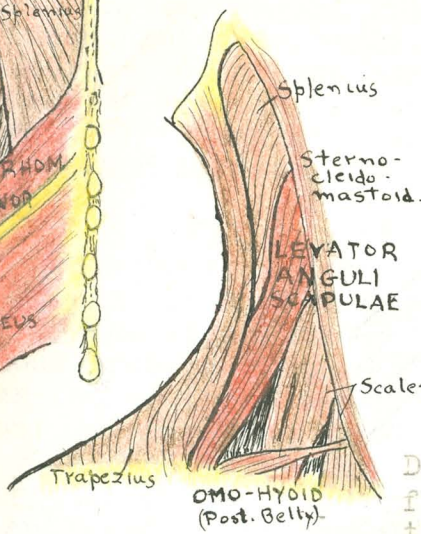
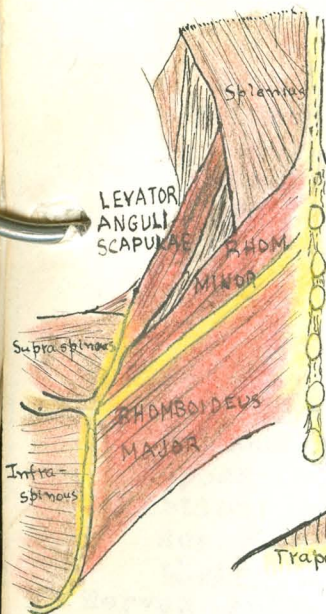
Discussion:

Same action as above.

Nerve from 3-4-5 cervical, principally thru nerve to the rhomboids, which passes down the border of the scapula. The blood supply accompanies it from the posterior scapular branch of the transverse cervical of the thyroid axis of the subclavian.

Diagram 2nd layer





Main relation:
 Splenius cervicis
 Splenius capitis
 Sterno-mastoid

Draws neck back and face and neck to the same side.

Levator anguli scapulae elongated, on side of neck
 Origin: from transverse processes of upper four cervical vertebrae by fasciculi from tubercles

Insertion: downward, forward, and laterally to medial angle and outer surface of vertebral border of scapula as far down as base of spine.

Nerve supply: dorsal scapula from fifth cervical

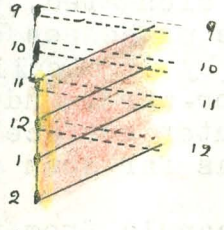
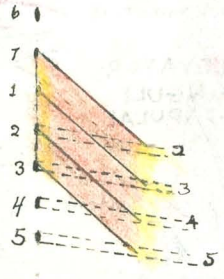
Blood supply: superficial cervical, transverse cervical, *posterior scapular, vertebral*

Relations: cephalad to Rhomboideus minor, overlies Serratus posticus superior, insertion under Splenius capitis and colli, draws medial angle of scapula upward producing rotation contrary to that of Serratus anterior

Discussion: With scapula fixed, it bends cervical portion of spinal column laterally, rotating it slightly to the opposite side.

Transverse cervical artery from 3rd portion of subclavian. Runs laterally and deeply, on anterior surface of Splenius medius and on trunks of brachial plexus, beneath posterior belly of Omo-hyoid, to lower portion of Levator anguli scapulae. Branches:

- Ascending terminal to splenius muscles
- Posterior scapula down vertebral border of scapula under rhomboid muscles which it supplies.



Origin: from transverse
 cervical vertebrae
 Insertion: downward
 medial angle and out
 border of scapula as
 spine.
 nerve supply: dorsal scapular
 Blood supply: superficial cervical
 cervical.
 Relations: cephalad to Rhomboid minor, over-
 lies Serratus posterior superior, insertion
 under Spineus cervicis and scapular spine.
 at angle of scapula near posterior angle.
 tion contrary to that of Serratus posterior
 inferior: With scapula fixed, it elevates
 portion of scapula anteriorly, rotating
 it slightly to the opposite side.
 Transverse cervical artery from the anterior
 subclavian. From lateral side, it gives off
 anterior branch of Scapular artery and the
 trunk of cervical artery, which anastomoses
 with the artery of the neck.
 or small scapular branch.
 According to Gray's, it is a small muscle
 posterior to the scapular spine.
 -scapula and cervical vertebrae with its
 origin.

DAY 7

H.I.M.

Also branches to Trapezius, Supraspinatus, and Levator anguli scapulae muscles
Omo-hyoideus, inferior belly from lateral portion of superior border and superior transverse ligament of scapula, forward, medially, and upward to intermediate tendon, in deep fascia on posterior surface of clavicle and 1st rib.

DAY 8

Serratus posticus superior quadrangular flat

Origin: arising by a flat tendon from the lower part of the ligamentum nuchae and from the spinous process of the 7th cervical and the upper two or three thoracic vertebrae.

Insertion: Downward and laterally to outer surface of second to fifth ribs, lateral to their angles.

Nerves: **anterior** divisions of 1st to 4th thoracic nerves

Intercostals

Blood: ~~posterior scapular of transverse cervical~~

Discussion: Raises ribs and helps in inspiration.

Serratus posticus inferior

Origin: by a broad thin tendon from the posterior layer of the lumbo-dorsal fascia about the level of the second lumbar to the tenth or eleventh thoracic.

Insertion: upward and laterally to outer surfaces of lower four ribs.

Nerves: **anterior** divisions of ninth to twelfth thoracic.

Intercostals

Blood: ~~posterior scapula of transverse cervical~~

Discussion: draws ribs downward and outward, thus preventing diaphragm from drawing lower ribs inward and upward.

Splenius Cervicis and Capitis

Origin: from the spinous processes of upper four or six thoracic and the seventh cervical vertebrae and from the lower half of the ligamentum nuchae. It passes upward and laterally and divides:



Insertion: (**cervicis**) lower curves around upper portion of upper to posterior tubercles of upper three cervical vertebrae.

(**capitis**) upper continues upward to posterior border of mastoid process of temporal bone and outer part of superior nuchal line.

Nerves: posterior divisions of second to eighth cervical nerves.

Blood: ~~superior cervical, ascending branch of transverse cervical~~, ^{ascending branch of} occipital ^{vertebral}.

Discussion: (**cervicis**) draws upper cervical vertebrae backward and rotates atlas towards itself. **Capitis** acts similarly on head. head bent backward by simultaneous action of both sides. Rotation neutralized.

Neck and face turned towards the same side by both.

Blood: also ascending deep cervical of vertebral
Lumbar Aponeurosis or Fascia

is considerably thicker than the upper dorsal especially that portion which invests the sacro-spinalis, forming a strong rhomboidal sheet extending from about the level of the sixth thoracic to the tip of the sacrum, its anterior borders giving attachment to various muscles, while the posterior ones are attached to the posterior portions of the iliac crests. The two lateral portions are practically united in the mid-dorsal line by their common attachment to the spinous processes of the vertebrae. Each lateral portion consists of two layers which together invest the sacro-spinalis. The anterior layer is attached medially to the tips of the transverse processes of the lumbar vertebrae, above to the lower border of the twelfth rib, and below to the crest of the ilium. It passes out beneath the sacro-spinalis, separating it from the quadratus lumborum, and at the outer border of the former muscle it fuses with the posterior layer to form a strong aponeurotic band, from which the latissimus dorsi and the internal oblique and transverse abdominal muscles take partial origin, and which is continued ventrally over the inner surface of the transversus abdominis as the fascia transversalis.

Innervation: (nerve) lower ...
border of ...
line.

nerve: anterior division of ...
nerve: ...
nerve: ...

nerve: ...
nerve: ...
nerve: ...

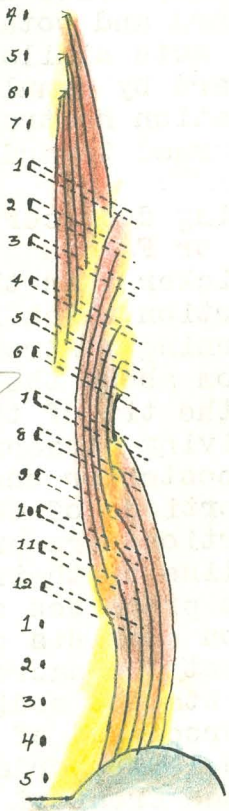
nerve: ...
nerve: ...
nerve: ...

nerve: ...
nerve: ...
nerve: ...

nerve: ...
nerve: ...
nerve: ...

nerve: ...
nerve: ...
nerve: ...

nerve: ...
nerve: ...
nerve: ...



Questions:—

- (1) Give O. I. B. & N. S. of each of above muscles.
- (2) Discuss Osteopathically.
- (3) Describe the Lumbar Fascia.

DAY 9

2/16/21 5/23/21

Transverse-Costal Group.

Ilio-Costalis (a) Lumborum (b) Dorsi (c) Cervices.

Dissect out carefully each division of this muscle. Note its general direction of attachment, the slips of origin and insertion. Clean each slip and define the muscle perfectly. After defining it remove from above downward leaving origin attached.

Question:—

- (1) Give O. I. B. & N. S. of muscle.
- (2) Give its relations.

DAY 10

2/17/21 5/23/21

Longissimus (a) Dorsi (b) Cervices (c) Capitus.

Spinalis (a) Dorsi (b) Cervicus (c) Capitus.

Dissect out each muscle complete noting attachments and relations. The Spinalis is hard to define on account of blending with Longissimus and Semi-Spinalis. Remove from above downward. Before removing review the grouping and arrangement of the Erector Spinae Mass.

Questions:—

- (1) Give O. I. B. & N. S. of above muscles.
- (2) Discuss the group Osteopathically.
- (3) Give the relations of this Group of muscles.

DAY 11

2/18/21 5/24/21

Ligamentum Nuchae.

Semi-Spinalis (a) Dorsi (b) Cervices (c) Capitus.

Multifidus.

Note extent and attachments of Ligament. Examine nerves of back and identify the external and internal divisions. Clean the muscles carefully noting the amount of development in each region. Remove and clean the group below.

Questions:—

- (1) Describe the Ligamentum Nuchae.
- (2) Give O. I. B. & N. S. of muscles.
- (3) Give relations of muscles.

DAY 12 2/19/21 5/24/21

Rotatores.

Intertransversales.

Interspinalls.

Levatores Costarum.

Define and remove carefully so as not to injure the ligaments of the spine. Clean off all muscle tissue from dorsal aspect of trunk except Sub-Occipital Group. Look for Dorsal Spinal Venous Plexus.

Questions:—

- (1) Give O. I. B. & N. S. of above muscles.
- (2) Give relations.

DAY 13 2/21/21 5/24/21

Sub-Occipital Group.

Rectus Capitus Posticus Major.

Rectus Capitus Posticus Minor.

Superior Oblique.

Inferior Oblique.

Note attachments, relations, Sub-Occipital Triangle and contents. Remove and clean vertebrae keeping ligaments intact. Clean up. Turn back flaps of skin and superficial fascia and place body on back preparatory to dissection of Head and Abdomen.

Questions:—

- (1) Give O. I. B. & N. S. of the muscles.
- (2) Discuss Osteopathically.
- (3) Bound Sub-Occipital Triangle and name structures in relation to it.
- (4) What abnormalities have you found to date in Muscle tissue only.

NOTE

This completes the first division of the work of the Uppers and Lower together. The Lowers will turn to Page 33 and commence the dissection of the Gluteal Region, Day 14. After working thru Day 63 the Uppers and Lowers work together for 9 days, the work commencing on Page 29.

Transverse Costal Group

Ilio-Costalis (Sacro-lumbalis) Relations:
 The most lateral of the three muscles into which the sacro-spinalis divides and is the forward continuation of the portion of the muscle which arises from the crest of the ilium. The muscle is continued up in the vertebral groove immediately internal to the angle of the ribs as far as the fourth cervical vertebra, receiving accessions from the ribs as it passes over them.

" **lumborum**

Origin: from the iliac crest

Insertion: into the lower six or seven ribs.

" **dorsi** (accessorius)

Origin: with the remainder of the iliac fibers bundles arising from the lower five, six, or seven ribs

Insertion: into the upper five or six ribs.

" **cervicis** (ascendens)

Origin: formed by union of bundles from upper six or seven ribs

Insertion: into posterior tubercles of the transverse processes of fourth, fifth, and sixth cervical vertebrae.

Nerves: posterior divisions of spinal nerves from lower cervical to first lumbar. See rule.

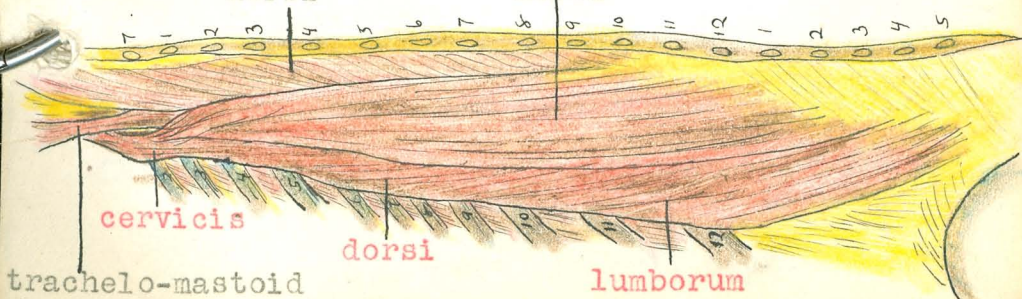
Blood supply: posterior rami of aortic intercostals, lumbar, sacral.

Relations: deep muscles of back overlying intercostals. Underlies serratus muscles. See above also. Contraction causes some rotation. Influential in rib lesions.

Ilio-Costalis Group

semispinalis longissimus

dorsi dorsi

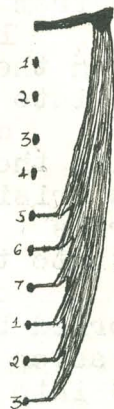
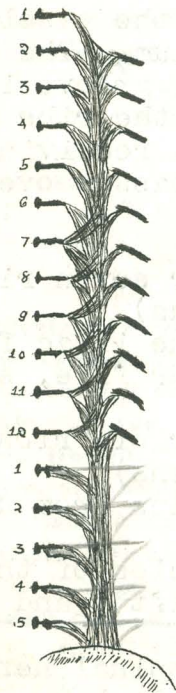


cervicis

dorsi

lumborum

trachelo-mastoid



*Trachele
marmorata*

⇒ allow aponeurotic sheath
 Notice depth 1-2 ribs

Longissimus

Relations: the longissimus represents the upward prolongation of that portion of the sacro-spinalis which arises from the dorso-lumbar fascia and the lumbar vertebrae. It is continued upward immediately medial to the ilio-costalis to be inserted into the mastoid process of the temporal bone, but, like the ilio-costalis, it receives in its course accessory bundles and also gives off bundles which are inserted into the skeletal parts over which it passes. .

Longissimusdorsi: the fibers which represent the direct continuation of the sacro-spinalis are continued as far upward as the first thoracic vertebra, and are reinforced by short accessory bundles from the transverse processes of the lower six thoracic vertebrae to form the longissimus dorsi.

Insertion along two lines lumbar &
 Medial, along the accessory processes of \wedge
 all the thoracic vertebrae (trans. processes)
 Lateral, along the transverse processes of
 the lumbar vertebrae and the angles of the
 ribs as far as the second.

Longissimus cervicis: (transversalis cervicis)

Origin: from the transverse processes of the upper six thoracic vertebrae

Insertion: line of the longissimus continued into the posterior tubercles of the transverse processes of the second to the sixth cervical vertebrae. (See ilio-costalis cerv.)

Longissimus capitis: (trachelo-mastoid)

Origin by bundles from the transverse processes of the three upper thoracic vertebrae and the articular processes of the three lower cervical

Insertion: mastoid process of temporal.

Nerve supply: posterior divisions of spinal nerves from third cervical to second sacral.

Blood: from posterior rami of lumbar and inter-costals.

Discussion: dorsi holds vertebral column erect and counteracts weight in front of body as in pregnancy. Cervicis and capitis steady and hold head erect and pull neck backward.

Biventer Cervicis



Parallel to spinis
as opposed to
transverse-spinal

Spinalis

Relations: in lower portion continuation of deeper and innermost fibers of sacro-spinalis. Thoracic, cervical, and cranial portion.

Spinalis dorsi 2-2/10

Origin: from the spinous processes of the upper two lumbar and lower two or three thoracic vertebrae by tendons common to it and the longissimus dorsi.

Insertion: thin flat muscle passing upward to spinous processes of thoracic vertebrae from second to eighth or ninth, but one vertebra intervening between its uppermost tendon of origin and its lowermost tendon of insertion.

Spinalis cervicis 2-4/5

Origin: from spinous processes of upper two or four thoracic and lower two cervical vertebrae

Insertion: ascends alongside spinous processes of soft cervical vertebrae to spinous processes of second, third, and fourth vertebrae.

Spinalis capitis

Origin: bundles from spinous processes of upper thoracic and last cervical vertebrae

Insertion: with semispinalis capitis into under surface of squamous portion of occipital bone between inferior and superior nuchal lines

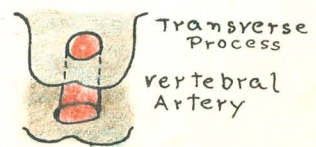
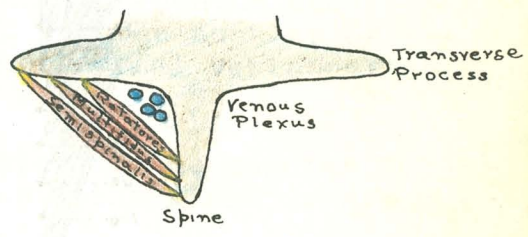
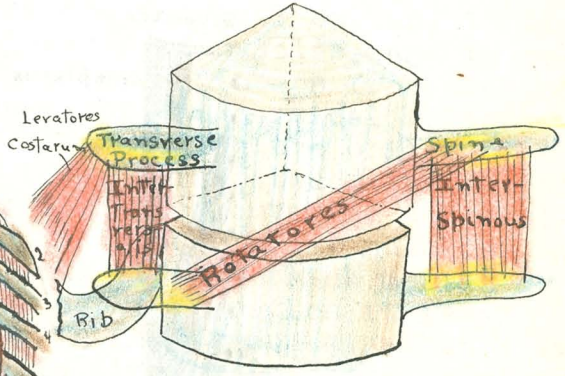
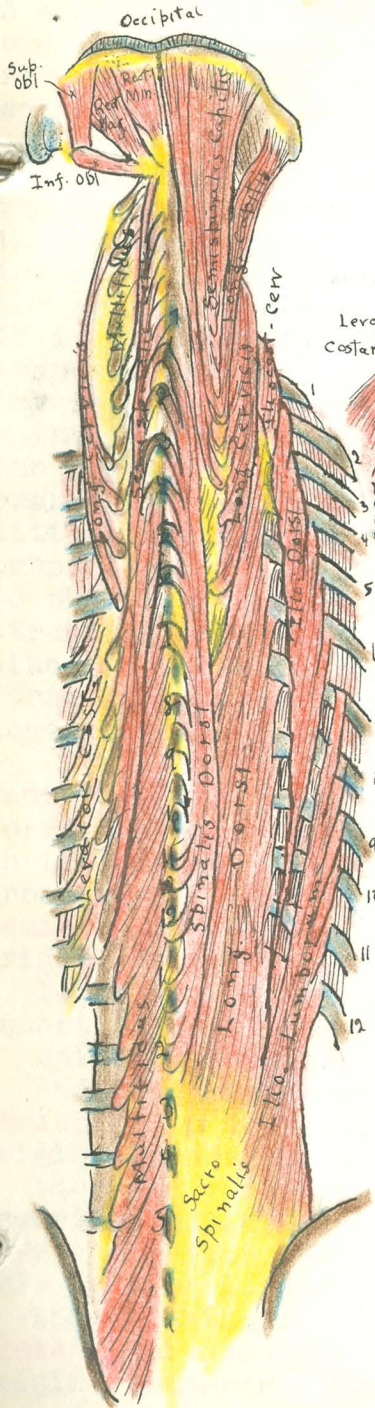
Nerves: posterior divisions of spinal nerves from third cervical to last thoracic.

Blood: posterior rami of intercostals, lumbar, etc

Discussion: extends spinal column. Contraction in disease would cause spinal lesion

Blood in the cervical region also from the vertebral, ascending deep cervical, and princeps cervicis of the occipital.

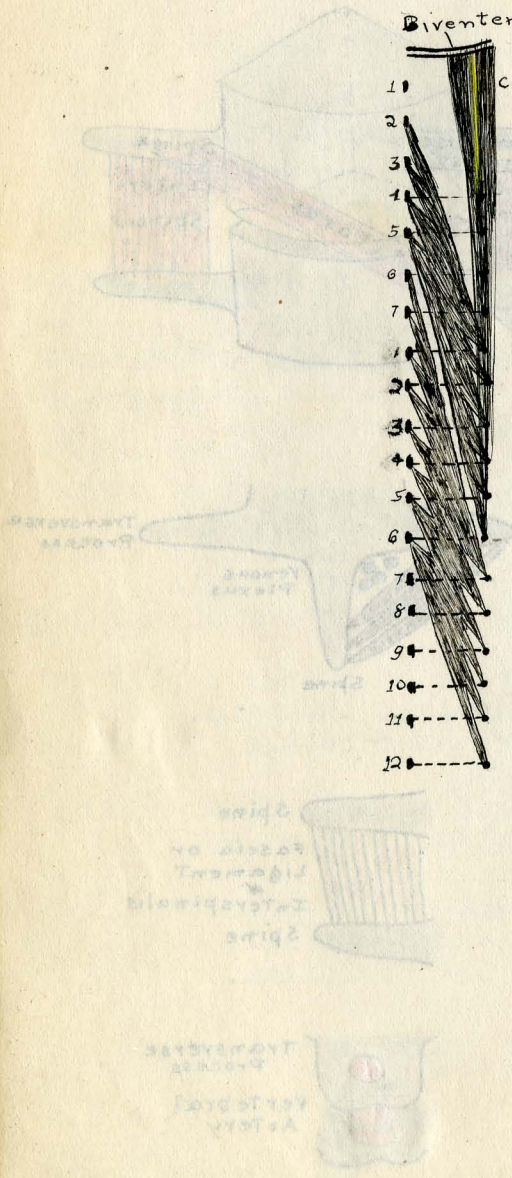
Deep Muscles of the Back



Biventer



Complexus



Ligamentum Nuchae

A modification of the interspinous and supraspinous ligaments. It is a vertical curtain reaching from the external occipital protuberance to the spine of the seventh cervical, separating the muscles of the two sides. The free border is continuous with the supraspinous ligament, but, instead of touching the cervical spines, it lies in the superficial layer of muscles, and is reinforced below by radiating fibers from each of the spinous processes of the cervical region. It is inseparably blended with the origin of the trapezii and with the fascia between the muscular layers, especially with that covering the semispinalis and the short suboccipital muscles. In the region of the axis it is a thick median membrane; in the lower cervical region it is of little importance. In man it contains but a small proportion of elastic fibers, in marked contrast to what is found in many quadrupeds in which the structure consists principally of elastic tissue, since in these animals the ligamentum nuchae forms an important organ for the support of the head at the end of the horizontal vertebral axis.

Semi-Spinalis (6)

Forms the superficial layer of the muscles lying in the groove between the spinous and transverse processes of the vertebrae.

Semispinalis dorsi 6-6-L

Origin: from the transverse processes of the lower six or seven thoracic vertebrae.

Insertion: obliquely upward and medially into spinous processes of five or six upper thoracic and last two cervical vertebrae.

Semispinalis cervicis 6-(5)

Origin: transverse processes of upper five or six thoracic vertebrae.

Insertion: spinous processes of 2nd, 3rd, 4th, 5th, and sometimes 6th cervical vertebrae.

This portion is almost concealed beneath the upper portion:

Semispinalis capitis 6+4

Origin: transverse processes of upper six thoracic and the articular and transverse processes of lower three of four cervical vertebrae.

Insertion: the fibers are directed almost vertically upward, and are joined by the spinalis capitis to form a broad muscle sheet which is inserted into the under surface of the squamous portion of the occipital bone between the superior and inferior nuchal lines.

An intermediate tendinous intersection usually divides the semispinalis capitis into an upper and a lower portion, and is much more distinct in the more medial bundles than in the lateral ones. Frequently these more medial bundles are separated somewhat from the others, and they have been considered a distinct muscle and termed the **biventer**, the lateral portion of the muscle being termed the **complexus**.

Nerves: posterior divisions of spinal nerves from second cervical to last thoracic.

Blood: aortic intercostals, occipital.

Action: extension of vertebral column and rotation towards opposite side.

Capitis draws head backward and rotates it to opposite side. Contraction may cause torticollis. Produces concavity on opposite side.

Multifidus (4) Strongest in dorsal region.

Middle layer of muscles occupying groove between transverse and spinous processes of vertebrae and is covered in the thoracic and cervical regions, by semispinalis.

Origin: dorsal surface of sacrum and transverse or articular processes of all vertebrae up to fourth cervical.

Insertion: fibers from each vertebra pass over from two to four succeeding vertebrae to spinous processes of the third to the fifth, the entire insertion of the muscle extending from the spinous process of the last lumbar vertebra to that of the axis.

Nerve: posterior divisions of spinals from third cervical to last lumbar.

Blood: aortic intercostals and lumbar.

Action: bend spine backward and towards opposite

Rotatores (2) Especially in the dorsal.

Relations: the deepest layer of the muscles occupying the spino-transverse groove, being a small series beneath the multifidus, and hardly distinguishable from them. They are to be found along the entire length of the spinal column from sacrum to axis. *but sparse in cervical + lumbar.*

Origin: from the transverse process of one vertebra

Insertion: some of the fibers to the base of the spinous process of the next succeeding vertebra (brevès) and the rest to the corresponding point of the second vertebra above (longi).

Nerve supply: posterior divisions of cervical and lumbar spinals, third cervical to last lumbar.

Blood supply: occipital, vertebral, intercostal lumbar.

Intertransversales

Relations: a series of small muscles occurring in the cervical and lumbar regions and ~~extending~~ and extending between the transverse or mammillary processes of successive vertebrae. In each of the above regions two sets of intertransversales are recognized, but it seems probable that only one set in each region belongs to the dorsal group.

Intertransversarii posteriores

In the cervical region between posterior tubercles of transverse processes of succeeding vertebrae.

Intertransversales medialis

In the lumbar region between mammillary processes of succeeding vertebrae.

Nerve supply: posterior divisions of cervical and lumbar nerves (?)

Blood: occipital, vertebral, intercostal, lumbar.

Action: bends vertebral column laterally.

Interspinalis not constant.

Relations: between spinous processes of succeeding vertebrae. Present in following regions: Thoracic, first and last two spines.

Lumbar, well developed.

Cervical, paired, stop at axis.

Nerve supply: posterior divisions of spinal nerves from third cervical to fifth lumbar.

Blood supply: occipital, vertebral, intercostal, lumbar.

Action: bend spine backward in regions.

Levatores Costarum

Thin triangular muscles

Origin: from transverse processes of seventh cervical and all thoracic vertebrae except the twelfth.

Insertion: directed downward and laterally to posterior surface of next succeeding rib between the tubercle and the angle, some of the fibers of the lower muscles passing over a rib to be inserted into the next but one below (breves & longi)

Nerve supply: anterior divisions of eighth cervical and first to eleventh thoracic.

Blood supply: intercostals.

Action: help draw ribs upward.

Dorsal spinal venous plexus

Posterior external

Lies on posterior lamina of vertebrae and in deeper muscles. More complicated in cervical than lower regions.

Lumbar region: long meshes communicating with internal plexuses at intervertebral foramina and with intercostal and lumbar veins.

Cervical: several layers as with musculature. dense network of suboccipital plexus connects with occipital, vertebral, deep cervical, and posterior external jugular veins. Also all of cervical portion communicates with internal and anterior external plexuses and with vertebral vein.

2/19/21
M. L. L.

Sub-Occipital Group**Rectus Capitus Posticus Major**

Origin: apex of spinous process of axis

Insertion: upward and outward, broadening,
to middle portion of inferior nuchal line.

Nerve supply: posterior division of suboccipital nerve.

Blood: occipital, vertebral.

Discussion: draws head backward and rotates it towards same side. Contraction associated with frequent atlas lesion. Cold draft causative. Rotates skull and atlas on odontoid process.

Rectus Capitus Posticus Minor

Origin: posterior tubercle of atlas

Insertion: passes upward, broadening, to inner portion of inferior nuchal line.

Nerve: posterior division suboccipital nerve.

Blood: occipital, vertebral.

Discussion: draws head backward. Atlas lesion as above.

Superior Oblique

Origin: transverse process of atlas

Insertion: passes upward into squamous portion of occipital immediately above outer part of inferior nuchal line.

Nerve: posterior division suboccipital nerve.

Blood: occipital, vertebral, first intercostal.

Action: draws head backward. Stabilizes occipito-atlantal articulation.

Inferior oblique

Origin: tip of spinous process of axis

Insertion: outward and upward to transverse process of atlas.

Nerve: posterior division of suboccipital.

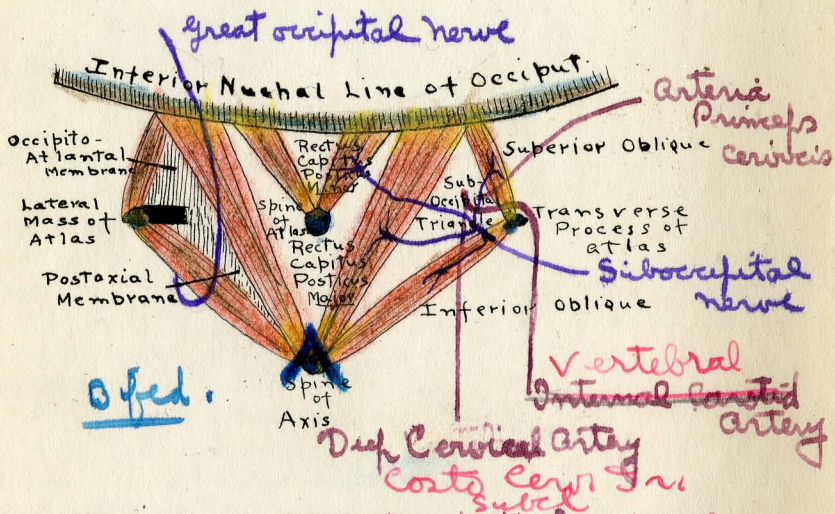
Blood: occipital, vertebral, first intercostal.

Discussion: rotates axis towards same side and so concerned in axis lesions. Rotates skull and atlas around odontoid.

Sub-occipital triangle.

Bounded by rectus capitus posticus major, obliquus superior, obliquus inferior.

Covered by a layer of dense fibro-fatty tissue beneath the semispinalis capitis. The floor is formed by the posterior occipito-atlantal membrane, and the posterior arch of the atlas. In the deep groove on the upper surface of the posterior arch of the atlas are the vertebral artery and the first cervical or sub-occipital nerve. Congestion very common.



Contraction of muscles leads to head ache or eye ache. Remedied by direct manipulation or exaggerated movement.

UPPERS

DAY 14

2/22/21

Head.

Make incision from root of nose to External Occipital Protuberance over Skull in mid-line. Make lateral incision $\frac{1}{2}$ in. above Superciliary ridges from first incision to meet incision above ear. Remove layer of scalp and define each. Clean origin of Temporal muscle and remove down to incision. Note the vessels and nerves found in scalp and piercing the skull.

Questions:—

- (1) Name the layers of the scalp and describe each.
- (2) What arteries and nerves are found in the scalp?
- (3) Describe the Occipito-Frontalis Muscle.

DAY 15

2/23/21

Removal of the Brain.

With saw make incision from External Occipital Protuberance around line of incision to root of Nose. Do not saw all the way thru as you will injure the tissues underneath. Remove cap with chisel after partly sawed. Split Dura Mater in Mid-line remove brain commencing to dislodge from before backwards. Place in skullcap and in solution to harden for future study.

Note:—

Coverings of brain. Sinuses. Meningeal Arteries. Entrance of Vertebral and Carotid Arteries. Exit of Cranial Nerves.

Questions:—

- (1) Name coverings of brain and describe.
- (2) Name sinuses and make diagram.
- (3) Name cranial nerves and exit of each.
- (4) What are the Pacchonian Bodies?
- (5) What is the Diploe?

DAY 16

2/24/21

Upper Extremity.

Identify and revise the various muscles, vessels and nerves related to the limbs. Remove skin and superficial fascia. Identify cutaneous veins and nerves of arm, hand and fingers. Note deep fascia and compartments formed by it. Dissect out Superficial Veins of arm and forearm.

Questions:—

- (1) Give the Cutaneous nerve supply to the upper extremity.

- (2) Describe the Superficial Venous drainage of the Arm and Forearm.
- (3) Describe the Deep fascia of the Arm.

DAY 17 2/25/21

Deltoid Muscle.

Clean and define the cutaneous nerves over the Deltoid. Note arrangement of muscle fibers. Detach muscle from origin and turn down to expose Coracoid Process with its ligaments, Muscle underneath, Subdeltoid Bursa, Capsule of Joint, Shaft of Humerus with Circumflex Vessels and nerve.

Questions:—

- (1) Give O. I. N. & B. S. of Deltoid.
- (2) Discuss Osteopathically.
- (3) What structures are found under this muscle?

DAY 18 2/26/21

Teres Major and Minor.

Infraspinatus.

Triceps.

Dissect out these muscles noting attachments and relations, Nerve and Blood supply. Remove and clean their origin and insertion.

Questions:—

- (1) Give O. I. B. & N. S. of the above muscles.
- (2) Discuss Osteopathically.

DAY 19 2/28/21

Subscapularis.

Omo Hyoid.

Supraspinatus.

Dissect out these muscles defining their attachments, nerve and blood supply. Define the Anastomosis around the Scapula. Note Suprascapular artery and nerve. Remove the muscles and clean origin and insertion.

Questions:—

- (1) Give O. I. B. & N. S. of above muscles.
- (2) Discuss Osteopathically
- (3) Describe the Anastomosis around the Scapula.
- (4) Give the course and distribution of the Suprascapular Artery and Nerve.
- (5) Name the muscles attached to the Scapula.

Head**Layers of scalp.**

In the occipito-frontalis region.

I Skin -- thickest in the body.

II Superficial fascia -- dense, inelastic, perpendicular and oblique fibers with fat inclusions. Very vascular. The vessel walls adhere strongly to the tissues.

III Occipito-frontalis muscle and aponeurosis

IV Subaponeurotic Connective Tissue -- loose thin, elastic, allowing motion. Carries few small vessels. Motility differentiates deep and superficial growths.

V Pericranial periosteum -- closely invests underlying bone.

(I, II, III closely blended)

In the temporal region.

Skin thinner and less adherent to the fascia.

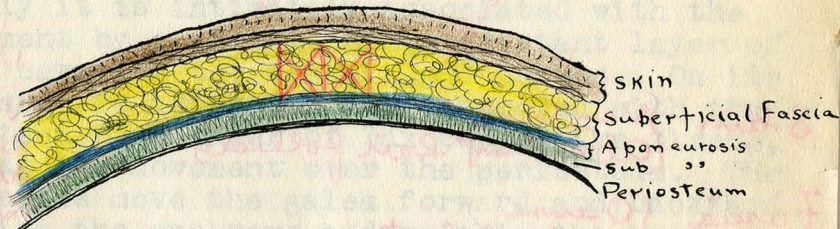
Fascia less adherent to the aponeurosis;

Vessel walls freer.

Fat abundant in the subcutaneous fascia of the temporal fossa.

Periosteum thinner and more adherent.

A rich network of lymph vessels permeates all, especially at the vertex.

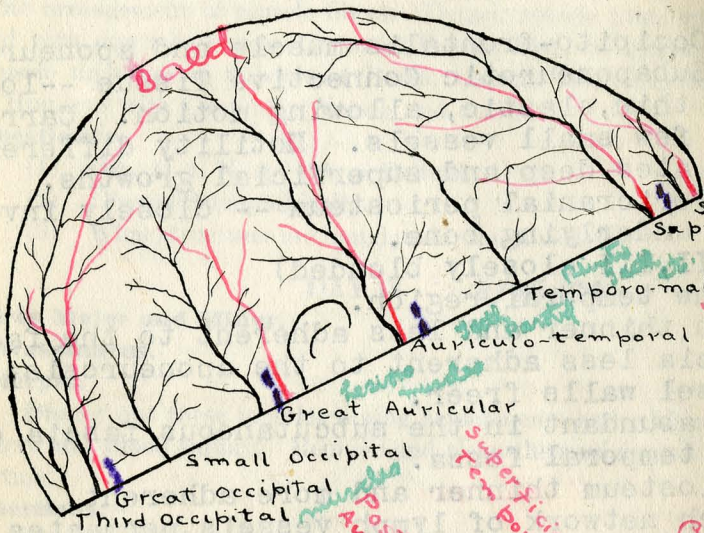
**Arteries found in the scalp.**

Occipital of external carotid from region of occipital triangle and trapezius.

Superficial temporal of external carotid from region of parotid gland and temporal muscle.

Posterior auricular of external carotid from angle between pinna and mastoid process.

Supraorbital from ophthalmic of internal carotid



Arteries
retract
in scalp
wounds.
Know location

Veins come
emissary &
diploic
meninges

Skin { Very thick
abundant hair follicles

Fascia { Dense
constant fat
hair bulbs

Pericranium continuous with dura

Contraction occip frontals & levator spreads

Lymph - Parotid - facial - Post aur - occip
neck boils : infection

Pull of fibers opens or closes cut of pneumatic
Subpneumatic dangerous - lymph only
Superficial healing - floating scalp.

Nerves found in the scalp

Supraorbital of Frontal of Ophthalmic of Fifth.

Supratrochlear " " " " " "

Superficial Temporal of Auriculo-temporal of

Mandibular of Fifth. Also temporomalar

Great Auricular from 2,3 cervical

Great Occipital from 2nd cervical, P.P.D.

3rd-Occipital from 3rd " "

Occipito-frontalis Muscle. Also small occipital muscle and aponeurotic sheet covering the entire vertex of the scalp from the occiput to the root of the nose. The two muscular portions are: the Occipital;

Origin: Superior nuchal line.

Insertion: posterior border of the epicranial aponeurosis.

the Frontalis;

Origin: anterior border of the galea (aponeu.)

Insertion: skin above the eyebrows, glabella, and superciliary arches.

Part may be prolonged downward upon the nasal bone as the pyramidalis nasi.

Epicranial Aponeurosis

A dense sheet covering the vertex of the cranium. It is prolonged laterally over the temporal fascia as a thin layer almost to the zygoma. Superficially it is intimately associated with the integument by a close, thin, resistant layer of fascia carrying the vessels and nerves. On its inner side it is smooth and connected with the periosteum by a layer of lax connective tissue, allowing for movement over the periosteum. The two muscles move the galea forward and backward and raise the eyebrows and wrinkle the brow. Baldness is said to be due to lack of motion and free circulation to the scalp in this region.

Nerve supply: Occipital from the posterior auricular branch of the facial.

Frontalis from the rami temporales of the facial.

Blood supply: supraorbital, frontal, temporal, occipital, and posterior auricular.

Coverings of Brain

Dura Mater, closely applied to the inner surface of the cranium, being the perisosteum, and serving as a support for and a guard against pressure on the enclosed mass of nervous tissue. It consists of a dense, inelastic, fibrous membrane lining the cavity and sending partitions between the main divisions of the brain. It carries the blood to the bone and is continuous with the pericranium outside along the ununited sutures and the foramina. When separated from the bone its outer surface is conspicuously marked with ridges caused by the superficial meningeal vessels, which also indent the bone. Fine fibrous processes and minute blood vessels roughen the surface. The inner side is smooth and shining, being lined with endothelium. The dural sheath accompanies the nerve trunks for a short distance to join the epineurium, while the subdural space connects with the lymph clefts in the connective tissue envelopes of the nerves. That surrounding the optic nerve is unusually thick all the way. The two layers of the dura are hardly demonstrable except in the middle fossa where the cavernous sinus intervenes, within the sella turcica where lies the pituitary body, and over the apex of the petrous portion of the temporal bone where the Gasserian ganglion is enclosed. Also there are numerous sinuses where the septa project inward and imperfectly divide the cranial cavity into compartments for the larger divisions of the brain. The blood to the meningeal arteries comes from the ophthalmic, internal maxillary, vertebral, ascending pharyngeal, and occipital. The innervation is from the fifth, tenth and cervical spinal nerves.

Subdural Space, a capillary cleft with a little clear lymph like fluid.

Arachnoid, the thinnest and most delicate connective tissue envelope. It is free from blood vessels but is intimately connected with the intercranial lymph paths. It does not follow the fissures but hits the high spots only. The triangles thus left at the fissures form part of the subarachnoid space. The largest of these are the cisternae. Included in nerve sheath.

Subarachnoid Space, is capacious but is crossed by many trabeculae of arachnoid tissue till it assumed a sponge like nature. It contains the cerebro-spinal fluid which acts as a cushion against concussion. The drainage of the fluid is along the nerve trunk sheaths and from the Pacchionian bodies into the venous sinuses.

Pia Mater, a very thin connective tissue envelope of white fibrous and elastic tissue carrying the blood vessels for the nutrition of the brain and so adhering very closely to all inequalities of the brain surface. It forms the invagination in the choroid plexuses and sheaths the nerves. Its vasomotor nerves come from the plexuses around the carotid and vertebral arteries.

The Sinuses of the Brain.

Superior Longitudinal, lying in falx cerebri, a sickle shaped veil of dura between the cerebral hemispheres from the crista galli to the internal occipital protuberance and tentorium.

Inferior Longitudinal, in the posterior half of the above.

Straight, along the attachment to the tentorium.

Lateral, from internal occipital protuberance to parietal bone and then down to the jugular foramen, lying in the tentorium cerebelli, a crescentic dural sheath roofing in the cerebellum.

Superior Petrosal, lying in the further attachment of the above, along the parietal bone.

Occipital, at the posterior attachment of the falx cerebelli, a small sickle shaped veil extending downward in the mid line from the tentorium to the internal occipital crest.

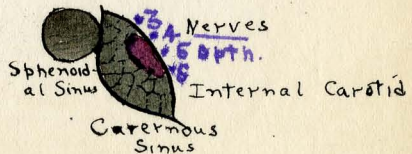
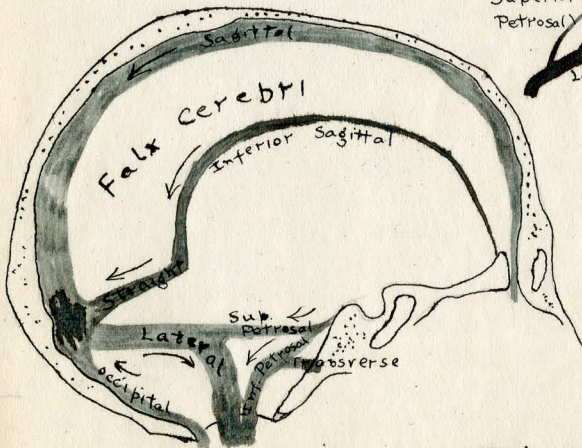
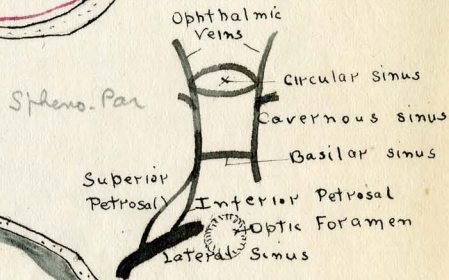
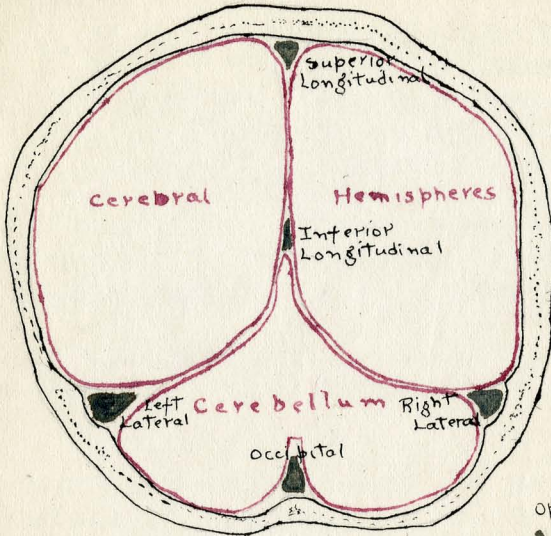
Cavernous, alongside the body of the sphenoid from the sphenoid fissure to the apex of the petrous portion of the temporal bone.

Spheno-Parietal, along posterior border of lesser wing of sphenoid.

Inferior Petrosal, from posterior extremity of cavernous sinus along petro-occipital suture to jugular vein in foramen.

Basilar, in basilar process of occipital bone.

These sinuses occupy clefts in the dura mater and receive the cerebral, meningeal, and diploic veins. They communicate with extracranial veins such as the ophthalmic and are drained mainly by the internal jugular.



Cranial Nerves and Exit

I	Olfactory	Cribriform Plate of Ethmoid
II	Optic	Optic Foramen
III	Oculomotor	Sphenoidal Fissure
IV	Trochlear	Sphenoidal Fissure
V	Trifacial	
	Ophthalmic	Sphenoidal Fissure
	Maxillary	Foramen Rotundum
	Mandibular	Foramen Ovale
VI	Abducent	Sphenoidal Fissure
VII	Facial	Internal Auditory Meatus, Facial Canal, Stylo-Mas- toid Foramen
VIII	Auditory	Internal Auditory Meatus
IX	Glossopharyngeal	Jugular Foramen
X	Vagus	" "
XI	Spinal Accessory	" "
XII	Hypogastric	Anterior Condyloid

Pacchionian Bodies

Cauliflower-like excrescences of arachnoid on the outer surface of the membrane along the course of the dural venous sinuses, especially the superior longitudinal sinus. The dural wall is very thin so that the passage of the cerebro-spinal fluid is easy.



Diploe.

The osseous tissue of bone is arranged as a peripheral zone of compact bone enclosing a variable amount of spongy bone. This enclosed cancellated tissue or diploe in the skull consists of delicate bars and lamellae forming an intricate reticulum of osseous tissue, which insures strength without undue weight. The spaces are filled with rich venous plexuses abundantly connected with the scapular veins, the middle meningeal veins, and the cranial sinuses.

Cutaneous Nerve Supply to Upper Extremity

Brachial Plexus

Infraclavicular Branches

- I Musculo-Cutaneous from 5-6-7
To antero- & postero-lateral forearm.
- II Median from 6-7-8-1
To palmar cutaneous and digitals.
- III Lesser Internal Cutaneous from 8-1
To inner aspect of arm above elbow.
- IV Internal Cutaneous 8-1
Anterior to ulnar half of wrist.
Posterior to inner half of wrist.
- V Ulnar from 8-1
To forearm, dorsum of hand, and fingers.
- VI Circumflex from 5-6
To skin over deltoid.
- VII Musculo-Spiral from 5-6-7-8
To skin over triceps, back of arm and forearm
- VIII Radial from 5-6-7
To radial side of thumb and dorsal side.

Superficial venous drainage to Arm and Forearm

The Basilic Vein from the ulnar side of the dorsal network of the hand, passes obliquely up and in to anterior surface of forearm. Above the elbow it ascends along the inner border of the biceps to the upper third of the brachium, where it pierces the fascia to empty into the internal brachial vein. It is the largest superficial vein and has from ten to fifteen pair of valves. It receives branches from the anterior and posterior surfaces of the arm. Near the elbow it receives the median vein from the cephalic. It also communicates with the brachial veins.

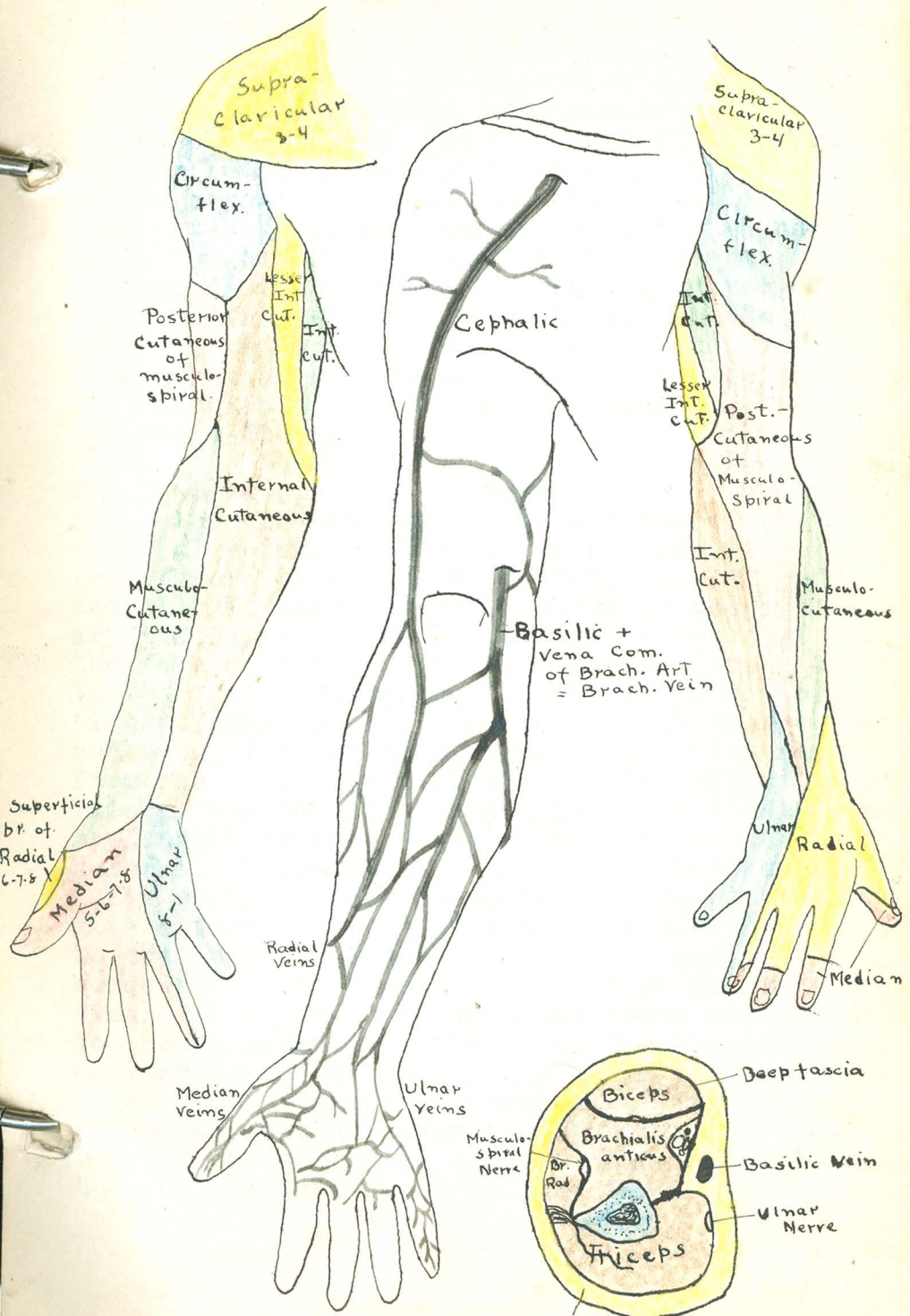
The Cephalic Vein arises from the radial portion of the dorsal network of the hand. It passes up over the brachio-radialis muscle to the anterior surface of the forearm. Above the elbow it ascends along the outer border of the biceps and then between the deltoid and pectoralis major, to pass between the latter and the clavicle, perforating the costo-coracoid

Skin washes = - new irritation

- I Muscular - lateral
- II Medical from 7-8-1
- III Lateral Epicondylar Nerve from 6-1
- IV Internal Epicondylar 5-1
- V Ulnar from 1
- VI Circumflex from 5-6
- VII Musculo-Epicondylar 5-6-7
- VIII Radial from 5-6-7

Superficial venous drainage of the hand
 The Basilic Vein from the ulnar side of the dorsal network of the hand, passes obliquely up and in to a deep anastomosis of forearm. Above the elbow it ascends along the inner border of the brachial vein and the upper third of the brachium where it enlarges the fascia to empty into the internal brachial vein. It is the largest superficial vein and has two to fifteen pairs of valves. It receives branches from the anterior and posterior surfaces of the arm. Near the elbow it receives the cephalic vein from the radial side. It also anastomoses with the brachial veins.

The Cephalic Vein arises from the radial portion of the dorsal network of the hand. It passes up over the brachio-radialis muscle to the anterior surface of the forearm. Above the elbow it ascends along the outer border of the brachialis and then between the deltoid and pectoralis major, to pass between the latter and the clavicle, perforating the costo-cervical

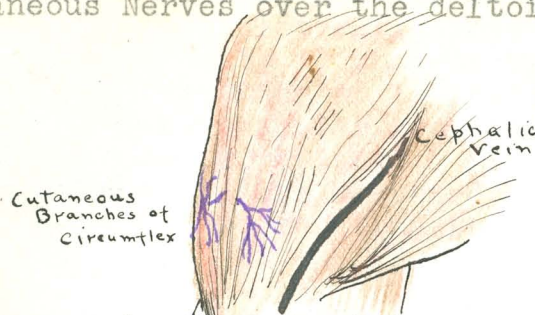


membrane, and crossing in front of the axillary artery to empty into the axillary vein. It receives branches from the superficial network on the posterior surface of the forearm. It is often accompanied by an accessory cephalic vein arising from the posterior superficial network and emptying into the main cephalic vein at the elbow. It also receives branches from the superficial network on the anterior surface of the forearm. A short distance below the elbow it gives off the median vein to the basilic. In the upper arm it is connected with the basilic by branches across the biceps and just before opening into the axillary it receives the acromio-Thoracic vein.

The Deep Fascia of the Arm

A complete investment of the muscles of the brachial region. Above it passes over the thin fascia covering the deltoid muscle, and medially it becomes continuous with the axillary fascia, while below it is continuous with the fascia of the forearm, adhering firmly to the periosteum covering the subcutaneous portions of the humerus and the olecranon process, and being reinforced by tendinous prolongations from the biceps and triceps muscle. From its lateral and medial surfaces it sends sheet-like prolongations inward to be attached to the humerus. These sheets, termed the intermuscular septa, are of considerable strength and give attachment to adjacent muscles. They pass to the humerus between the lateral and medial borders of the triceps and the remaining muscles of the arm. Low down the septa are attached to the supracondylar ridges of the humerus and terminate at the condyles. In those areas in which the fascia is adherent to the adjacent periosteum, over the subcutaneous portions of the skeleton, occur a number of bursae between the integument and the fascia.

Deltoid Muscle: triangle covering shoulder.
Cutaneous Nerves over the deltoid.



- 1 Int. rotator
Abd. & add.
- 2 Abd. & add.
- 3 Opposite of
first portion

Arrangement of muscle fibers.

Vertically, in spinal, acromial and clavicular portions.

Coracoid Process and ligaments. See below.

Origin: ventral border of outer third of clavicle and from the acromion process and lower border of spine of scapula.

Insertion: fibers down converging into deltoid tubercle of humerus.

Nerve: circumflex from fifth and sixth cervical.

Blood: posterior circumflex, 7-8

Discussion: abducts the arm to a position at right angles to the body. Further abduction accomplished by rotation of scapula by contraction of trapezius and serratus anterior. Crutch paralysis is due to pressure on the circumflex and the resultant atrophy gives the appearance of a dislocated humerus.

Structures under it: subscapularis,

Muscles: coraco-brachialis, triceps (long head)

Infraspinous, supraspinous, teres minor,

biceps, pectoralis major, teres major, Lat. dor

Nerves: musculo-spiral, circumflex,

Arteries: posterior circumflex, humeral
branch of acromio-thoracic

Veins: cephalic,

Bones: coracoid process, head of humerus,
acromion,

Bursae: subdeltoid, capsule of joint, acromial.

Ligaments: coraco-clavicular, glenoid, long
head of biceps, etc. coraco-humeral, coraco-
acromial,

Teres Major

Origin: dorsal surface of the scapula, along the lower third of its axillary border.

Insertion: passes laterally into crest of lesser tuberosity of humerus immediately dorsal to insertion of latissimus dorsi.

Nerve: lower-subscapular from 5th & 6th cervical.

Blood: subscapular artery.

Discussion: draws arm backward and medially, at the same time rotating it inwardly.

Teres minor

Origin: from the upper two thirds of the dorsal surface of the scapula, close to the axillary border, and from the infraspinous fascia.

Insertion: passes laterally along the lower border of the infraspinatus into the capsule of the shoulder joint and into the lower facet of the great tuberosity of the humerus.

Nerve: circumflex from the 5th & 6th cervical.

Blood: dorsal scapular and the circumflex.

Discussion: with arm vertical it rotates the humerus outward; horizontal, draws it backward.

Infraspinatus

Origin: from entire extent of the fossa with the exception of a portion towards the axillary border of the bone. Also from the infraspinous fascia.

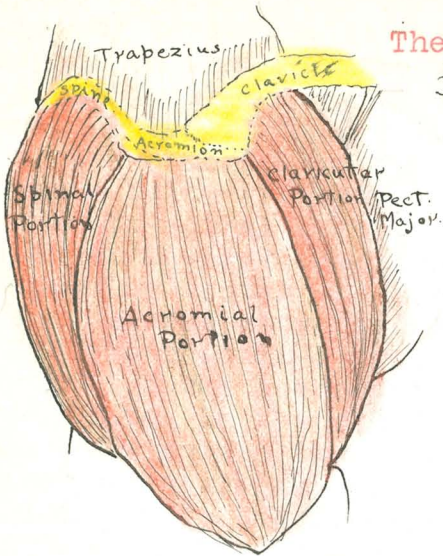
Insertion: fibers pass laterally and converge to a strong tendon, which is separated from the capsule of the shoulder joint by a small bursa, into middle facet of greater tuberosity of humerus.

Nerve: suprascapula from 5th & 6th cervical.

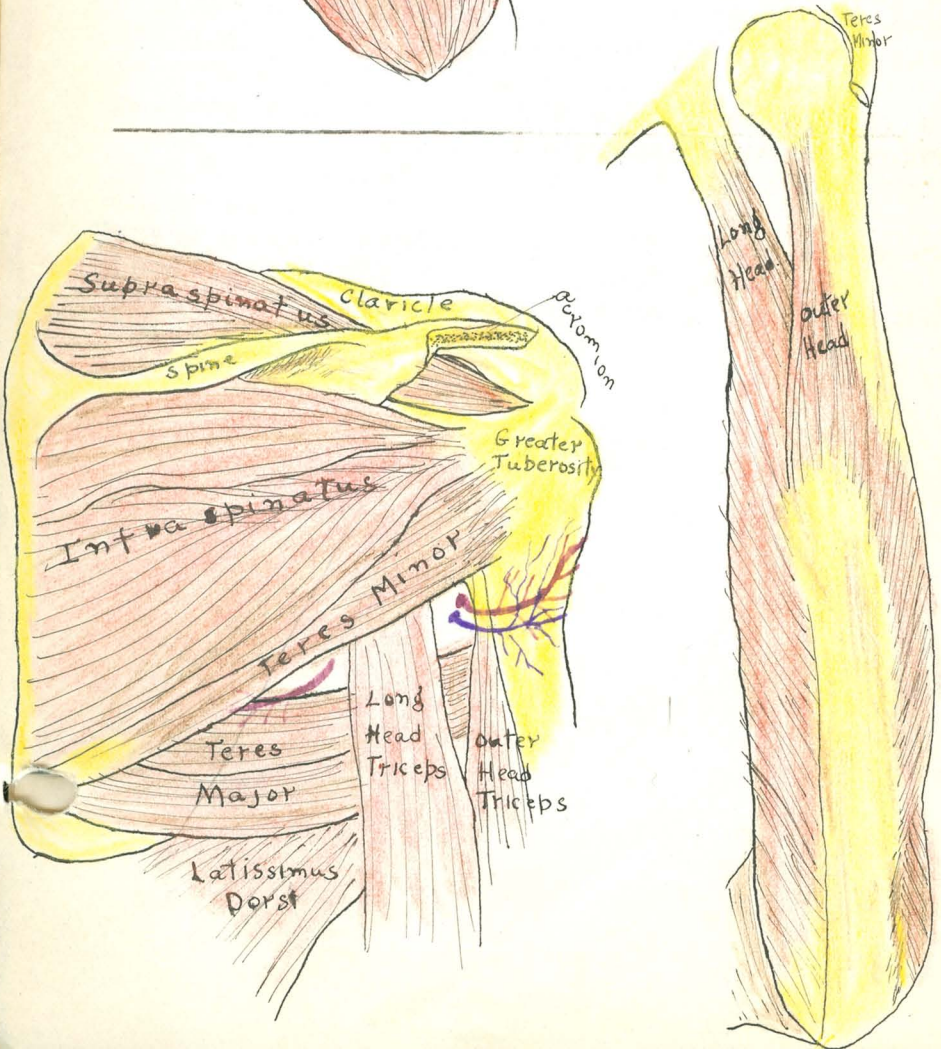
Blood: suprascapula artery.

Discussion: vertical arm rotated outward; horizontal arm drawn backward.

The Deltoid Deltoid



A cut to remove adhesions would be made in the junction of the spinal and acromioclavicular portion.



Triceps

Occupies entire dorsal surface of the arm.

Origin: by three heads:

- 1 Scapula or long head by a tendon from the infra-glenoid tuberosity of the scapula.
- 2 Inner or medial head from the posterior surface of the humerus and from both intermuscular septa below and medial to the groove for the musculo-spiral nerve.
- 3 Outer or lateral head from the external inter-muscular septum and the posterior surface of the humerus above and lateral to the groove for the musculo-spiral nerve.

Insertion: three heads united into a strong broad tendon in the olecranon process of the ulna. The common tendon of insertion begins as a broad aponeurosis upon the anter. surface of the long head, the fibers of which are attached to the upper border and the upper part of the posterior surface of the aponeurosis, while those of the medial head, which is much stronger than the lateral one, pass to its anterior surface.

Nerve: musculo-spiral from 6th, 7th, & 8th cerv.

Blood: brachial, superior profound.

Discussion: extends forearm on upper arm and draws entire arm backward.

2/26/21
M.L.L.

Subscapularis

A powerful muscle occupying the costal surface of the scapula.

Origin: from the whole surface of the scapula except for a small portion near the neck of the bone. Also from subscapula fascia.

Insertion: converge laterally into a strong tendon to lesser tuberosity of humerus and capsule of shoulder joint.

Nerve: upper and lower subscapular nerves from fifth and sixth cervical.

Blood: subscapular artery.

Discussion: arm vertical, inward rotator of humerus; arm horizontal, drawn forward.

Forms a considerable part of wall of axilla, dorsally. Close relation to axillary vessels and cords of brachial plexus and dorsal scapular vessels and circumflex nerve.

Omo Hyoid

A long flat muscle consisting of two bellies united by an intermediate tendon.

The inferior belly

Origin: lateral portion of superior border and superior transverse ligament of scapula.

Insertion: directed forward, medially, and slightly upward to intermediate tendon, which lies behind clavicular portion of sterno-cleido-mastoid, and is enclosed by the middle layer of the deep cervical fascia, binding it down to the posterior surface of the clavicle and first rib.

The superior belly

Origin: medial end of intermediate tendon

Insertion: upward and slightly medially to lower border of hyoid bone, lateral to sterno-hyoid.

Nerve: 1st, 2nd, & 3rd cervical through ansa hypoglossi.

Blood: superior thyroid, inferior thyroid, lingual

Discussion: draws bone down. Tensor of cervical fascia, preventing undue pressure on great vessels of neck. In relation posteriorly

with roots of brachial plexus and third portion of subclavian artery and supra-scapula arteries and suprascapula nerve. The superior belly crosses the common carotid and internal jugular vein at the level of the cricoid cartilage.

Supraspinatus

Origin: inner two thirds of fossa and from supra spinous fascia.

Insertion: converges laterally to a tendon to the upper facet upon the greater tuberosity of the humerus and into the capsule of the shoulder joint.

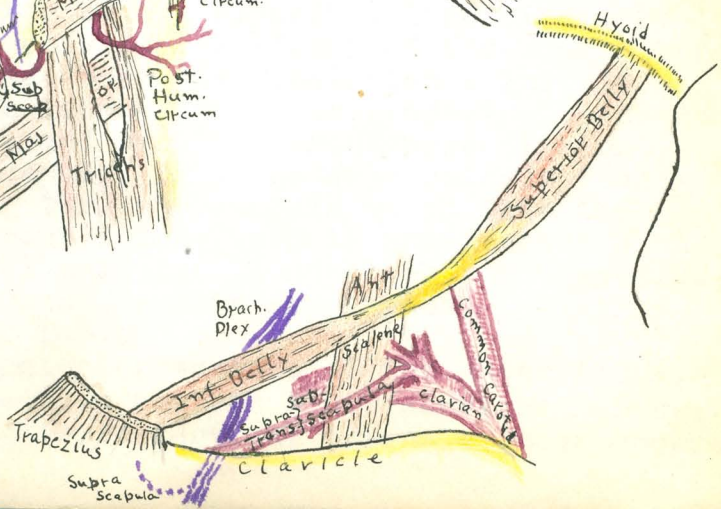
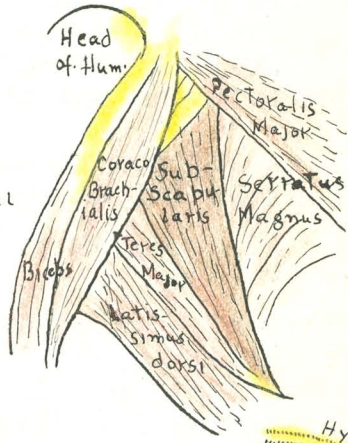
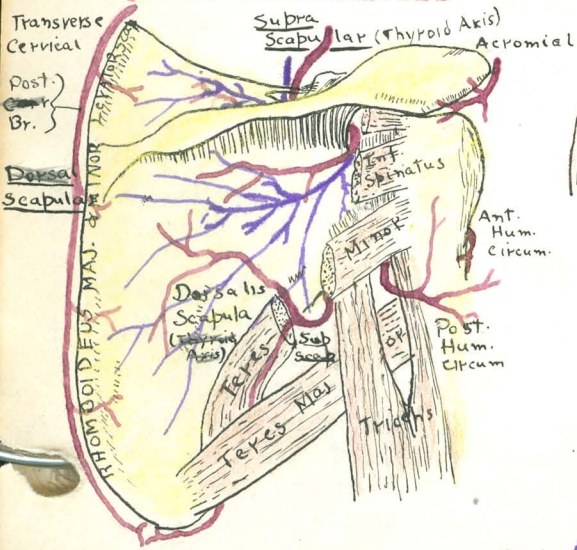
Nerve: suprascapula nerve from 5th & 6th cervical

Blood: suprascapula.

Discussion: abducts arm.

Important in maintaining position of humerus.

Scapular Anastomosis



Scapula Anastomosis

Transverse Cervical gives off a branch to the Posterior Scapula region. This descends along the whole length of the vertebral border of the scapula beneath the Rhomboidei. It supplies the latter as well as the Serratus posticus superior and sends lateral branches on the dorsal and ventral surfaces of the scapula to the infraspinatus and subscapularis muscle and anastomoses with the dorsal scapula and subscapula arteries.

The anastomosis of the Suprascapula and the Transverse Cervical with the Subscapular from the axillary artery forms the important path for collateral circulation after ligation of the third part of the subclavian.

The anterior circumflex anastomoses with the posterior Circumflex and the Humeral branch of the Acromio-Thoracic.

The Posterior Circumflex anastomoses with the acromial branch of the Acromio-Thoracic and with the Anterior Circumflex.

The Acromio-Thoracic sends the Acromial branch to the deltoid.

The Dorsal Scapular curves around the axillary border of the scapula to the Infraspinous and Teres Major.

Suprascapular Artery

It leaves the thyroid axis to pass laterally across the lower part of the posterior triangle of the neck. It lies a bit lower than and anterior to the superficial cervical, behind the clavicle, in front of the subclavian artery and above the subclavian vein. It continues laterally to the trapezius, passes under it, and over the transverse ligament of the scapula, into the suprascapular fossa. It passes thru the scapula notch into the infraspinous fossa where it anastomoses with the dorsal scapula. It supplies the trapezius, suprascapularis, and infraspinatus.

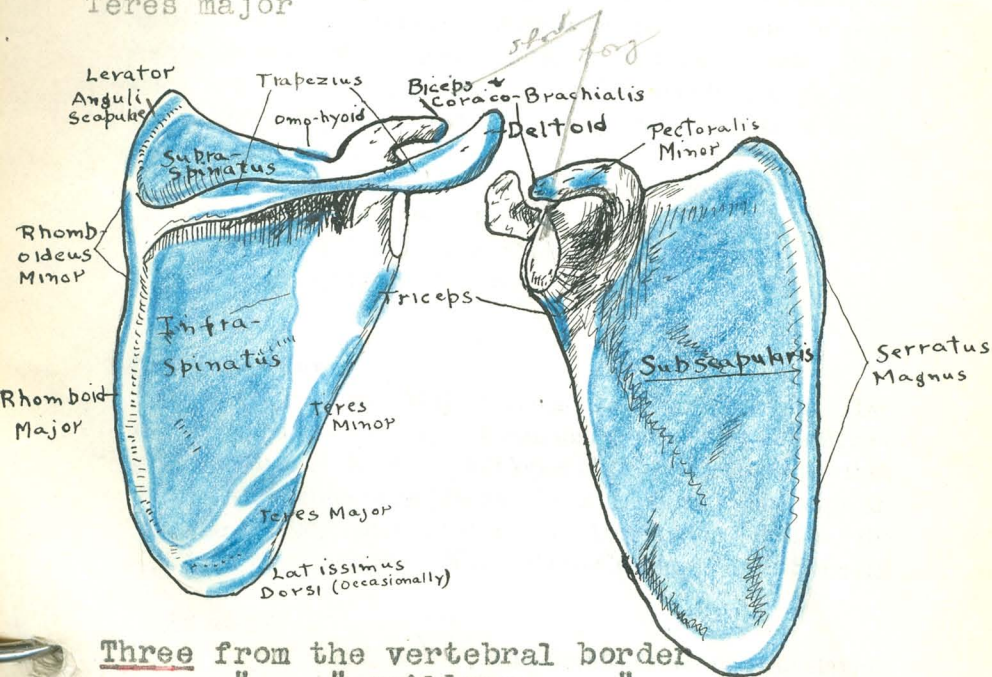
Subscapular Nerve

From the posterior surface of the outer trunk, which comes from the 5th & 6th cervical nerves. Crosses posterior cervical triangle above upper

border of plexus and under cover of the omohyoid and trapezius muscles. On reaching superior margin of scapula it passes through the suprascapula notch, under the ligament into the fossa. Supplies supraspinatus and passes thru great scapula notch with the artery and vein. Supplies infraspinatus and shoulder joint.

Muscles attached to the scapula.

- | | |
|-------------------|-------------------|
| Deltoideus | Teres minor |
| Trapezius | Pectoralis minor |
| Serratus anterior | Coraco-brachialis |
| Subscapularis | Biceps |
| Supraspinatus | Triceps |
| Infraspinatus | Omo-hyoideus |
| Rhomboideus major | Levator scapulae |
| Rhomboideus minor | Latissimus dorsi |
| Teres major | |



Three from the vertebral border
 " " axillary

*Coraco*id acromion process
 in the fossa
 irregularly

Two from the spine

DAY 20 3/1/21

Biceps.

Coraco-Brachialis.

Brachialis Anticus.

Clean and define the above muscles. Note nerve and blood supply, direction of fibers, relations, sheath of long head of Biceps, relations of all great nerve trunks. Preserve all Nerves and Vessels. Remove muscles after a thoro study.

Questions:—

- (1) Give O. I. B. & N. S. of above muscles.
- (2) Discuss Osteopathically.
- (3) Give the relations of the great nerve trunks in the Arm.

DAY 21 3/2/21

Thorax.

Make incision in Mid-line from Sternum to Ensiform Cartilage. Reflect skin and superficial Fascia. In the Female make crucial incision in Mammary region and remove gland to show form, structure and extent. Look for Sternalis Muscle. Note cutaneous nerves (See Plate II) and Thoracio-Epigastriac Vein. Clean Pectoralis Major and note origin and direction of fibers.

Questions:—

- (1) Locate and describe the Mammary Gland.
- (2) What cutaneous nerves are found?
- (3) Give O. I. B. & N. S. of Pectoralis Major.
- (4) Discull Osteopathically.

DAY 22 3/3/21

Pectoral Region.

Remove Pectoralis Major leaving about 2" of insertion. Define nerve and blood supply. Clean and remove Pectoralis Minor and Subclavius. Note Costo-Coracoid Membrane. Saw thru Clavicle at junction of middle and distal thirds and remove proximal end. Study Sterno-Clavicular Articulation. Define the capsule and ligaments. Note Fibro-Cartilage and Synovial Membrane.

Questions:—

- (1) Give O. I. B. & N. S. of Pectoralis Minor and Subclavius.
- (2) Discuss each Osteopathically.
- (3) Describe the Sterno-Clavicular Articulation.
- (4) What structures would be affected by a dislocation of this joint?

DAY 23 3/4/21

Axilla.

Turn back flaps of skin and proceed with dissection of Axilla. Clean out all Lymphatics and fat carefully so as not to injure the lateral branches of Thoracic nerves and small arteries and veins. Define Serratus Magnus. Note: Nerves, Lateral branches of Thoracic, Long Thoracic, External Mammary (if present), Subscapular. Note muscles forming the posterior wall.

Questions:—

- (1) Give the shape and boundaries of the space.
- (2) Give O. I. B. & N. S. of Serratus Magnus.
- (3) Discuss Osteopathically.
- (4) Palpate your own Axillary space and state structures you recognize.

DAY 24 3/5/21

Axilla.

Define:—Subscapularis, Teres Major, Latissimus Dorsi, Short, Long and Lower Subscapular Nerves, Subscapular Artery and Dorsalis Scapula Branch. Coraco-Brachialis and Biceps Muscles. Note relations of Axillary artery and cords of Brachial Plexus. Dissect out roots of plexus and tie to notched stick so as to preserve the origin. Sever with stick attached to peripheral ends. Dissect off origin of Serratus Magnus and sever Omo-Hyoid. Sever Subclavian Artery and Vein near border of Scalenus Anticus and tie to stick. Remove arm, tie flaps of skin around end to protect and place in preserving tank marked for identification.

Questions:—

- (1) Name branches of Axillary Artery.
- (2) What nerves are found in the Axillary space?
- (3) What structures are frequently injured in this space and why?

DAY 25 3/7/21

Brachial Plexus

Dissect out the Infraclavicular branches of the plexus defining the large trunks, their branches and relations to the Axillary vessels. Define the Quadrilateral and Triangular spaces. Trace the Circumflex Vessels and Nerve also Dorsalis Scapulae Artery from origin to termination.

Questions:—

- (1) Describe the Infraclavicular part of the Brachial Plexus.
- (2) Bound and give contents of the Quadrilateral and Triangular Spaces.

Biceps

Long head origin: from the upper border of the glenoid cavity of the scapula by a slender round tendon, which traverses the cavity of the shoulder joint invested by the synovium and then bends downward into the bicipital groove on the humerus, accompanied by a prolongation of the joint capsule, and then, becoming muscular joins with the short head.

Short head origin: from the tip of the coracoid process of the scapula in common with the coraco-brachialis.

Insertion: muscle descends in front of the humerus and becomes a flat tendon just above the elbow which is inserted into the tuberosity of the radius, a mucous bursa being interposed between the anterior surface of the tuberosity and the tendon. Some of the fibers are continued to be lost in the fascia of the arm.

Nerve: musculo-cutaneous from the 5th & 6th cerv.

Blood: brachial artery.

Discussion: flexes forearm on brachium and supinates it.

Coraco-Brachialis

Origin: tip of coracoid process of scapula by common tendon with short head of biceps.

Insertion: extends downward along humerus to middle medial border

Nerve: musculo-cutaneous from 7th cerv.

Blood: brachial.

Discussion: draws arm upward. Pierces by musculo-cutaneous nerve and is in relation medially with axillary artery and median and ulnar nerves.

Brachialis Anticus

Occupies anterior surface of lower part of humerus and is almost wholly covered by biceps.

Origin: from intermuscular septa and anterior surface of humerus immediately below insertion of deltoid, which it partly surrounds.

Insertion: fibers pass down and converge into short tendon to enter anterior surface of coronoid process of ulnar.

Nerve supply: musculo-cutaneous mostly. Also musculo-spiral. Both from 5th & 6th cervical.

Blood: brachial

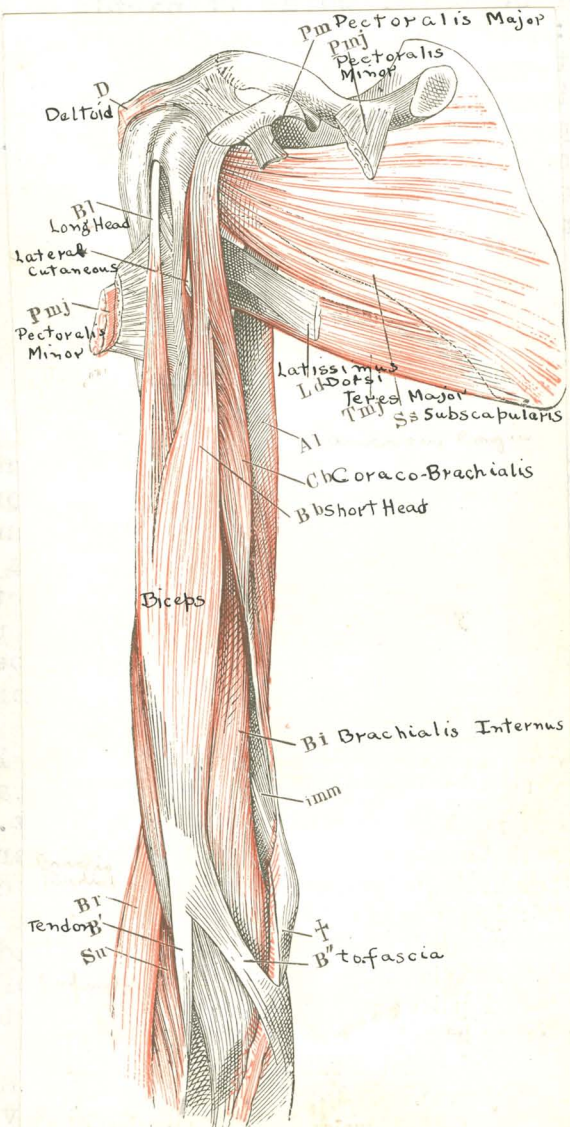
Discussion: flexes forearm.

Relations of nerve trunks.

Musculo-cutaneous (5,6,7) leaves outer cord under cover of pectoralis minor, pierces coraco-brachialis, and passes obliquely downward and outward between biceps and brachialis anticus. Reaches outer margin of biceps a short distance above elbow; pierces deep fascia and passes under median cephalic vein. It then becomes superficial. Branches: muscular, humeral-articular, terminal.

Median (6,7,8,1) arises from outer and inner heads. Inner crosses axillary-brachial artery to join outer on outer side of artery. Follows brachial artery down antero-laterally to inner side at elbow. Passes thru cubital fossa beneath median-basilic vein and bicipital fascia and enters forearm between heads of pronator radii teres, the deep head of which separates the nerve from the ulnar artery. It follows a straight course down the forearm accompanied by the median artery, lying upon the flexor profundus digitorum and covered by the flexor sublimis digitorum. Near the wrist the median becomes more superficial. No branches in the arm.

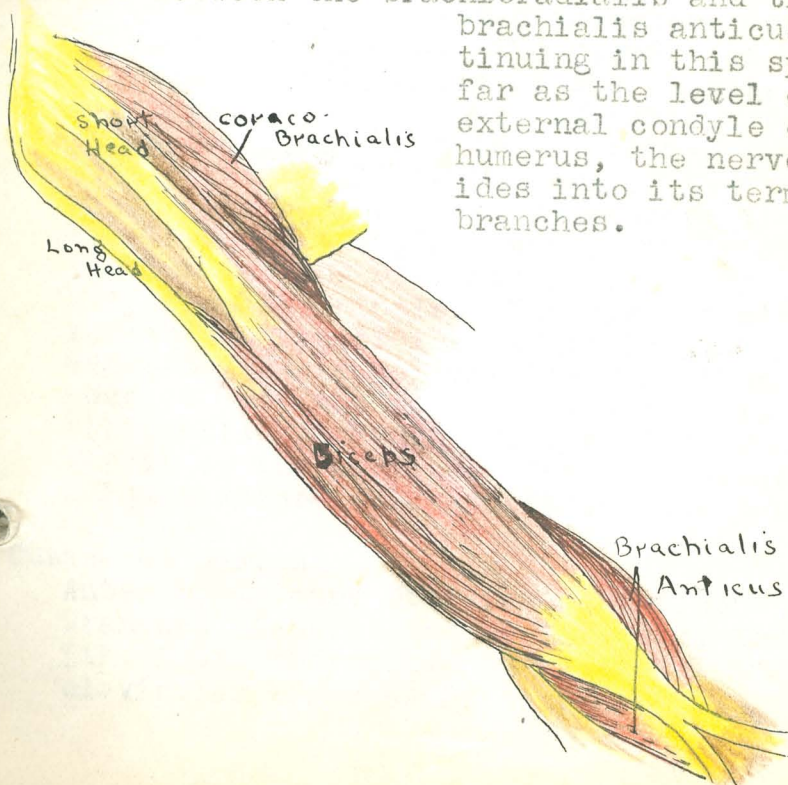
Ulnar Nerve



Ulnar Nerve (8,1) from the inner cord between the axillary artery and vein and posterior to the internal cutaneous nerve. Runs down in front of the triceps to the inner side of the axillary and brachial arteries. From the middle of the arm it passes either over the inner margin of or thru the internal intermuscular septum and in front of the inner head of the triceps, to the interval between the internal condyle of the humerus and the olecranon. It then passes thru the space between the heads of the flexor carpi ulnaris to the forearm. No branches in the arm.

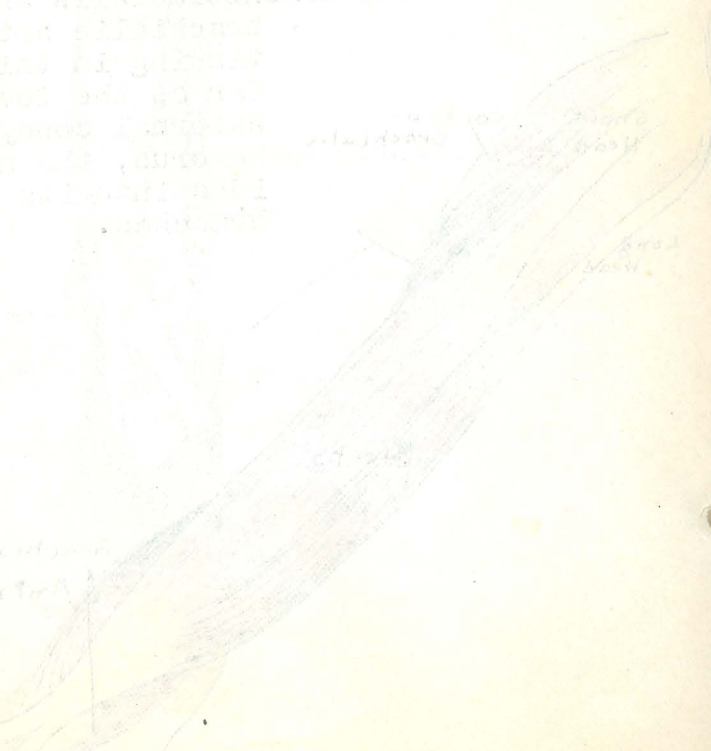
Musculo-Spiral (5,6,7,8,1) down behind axillary artery over latissimus dorsi and teres major. It then turns backward on the inner side of the arm and enters musculo-spiral groove, to traverse the interval between the internal and long and the external head of the triceps, and reaches the lateral aspect of the arm. It then passes forward thru the external intermuscular septum and becomes an occupant of the cleft between the brachioradialis and the

brachialis anticus. Continuing in this space as far as the level of the external condyle of the humerus, the nerve divides into its terminal branches.



new supply

Typical spinal nerve 1st + 2nd.



Thorax

S. sacca Mammary Glands, morphologically, are modified cutaneous glands, and in the female, are also to be considered as accessory to the reproductive apparatus. Each breast consists of twenty or more separate glands, opening by independent ducts, that collectively constitute the true secreting organ, as distinguished from the enveloping layer of fat and areolar tissue. The mammae lie on the thoracic wall on either side of the sternum, extending from the outer margin of the latter to the axillary border and from the level of the second to that of the sixth rib. The size depends on the amount of fat included, enveloping the glandular tissue. The approximate summit is marked by a wart like projection, the nipple which lies opposite the lower border of the fourth rib and is pierced by the lactiferous ducts from the lobules. The nipple is surrounded by the areola, a cutaneous zone roughened by the elevations of the subcutaneous glands or areola glands, which represent isolated accessory portions of secretory tissue. The gland lies within the superficial fascia of the thorax, which not only forms a general investment for the organ but also sends in supporting septa. Local peripheral thickenings of the fascia assume the character of suspensory ligaments. The lobes of the gland are radially disposed, the lobules and ultimate alveoli lying distally from the nipple. The alveoli closely resemble those of the sweat glands. The excretory ducts collect the secretion and pour it into the ampullae where it is stored till called for when the lactiferous ducts convey it to the surface. These ampullae are spindle shaped enlargements of the tubes.

Cutaneous Nerves

Anterior Primary Division, anterior cutaneous branches, lateral and mesial, 2nd, 3rd, 4th, 5th, & 6th thoracic. Suprasternal and supraclavicular branches of cervical plexus.

Pectoralis Major, a fan shaped muscle.

Origin:

Pars clavicularis from the inner half of the anterior border of the clavicle.

Pars sterno-costalis from the anterior surface of the sternum and the upper six costal cartilages.

Partio abdominalis from the upper part of the anterior layer of the sheath of the rectus abdominis.

Insertion: whence the fibers are directed laterally to the external bicipital ridge which extends downwards from the greater tuberosity of the humerus, the lower fibers of the sterno-costal and the abdominal portions of the muscle passing behind those of the clavicular and upper portions, so that the tendon of insertion is U-shaped in section, consisting of two layers separated above but continuous below. A bursa is usually interposed between the posterior surface of the tendon and the anterior surface and the long head of the biceps humeri.

Nerve: external and internal anterior thoracic by fibers from the lower four cervical and first thoracic nerves.

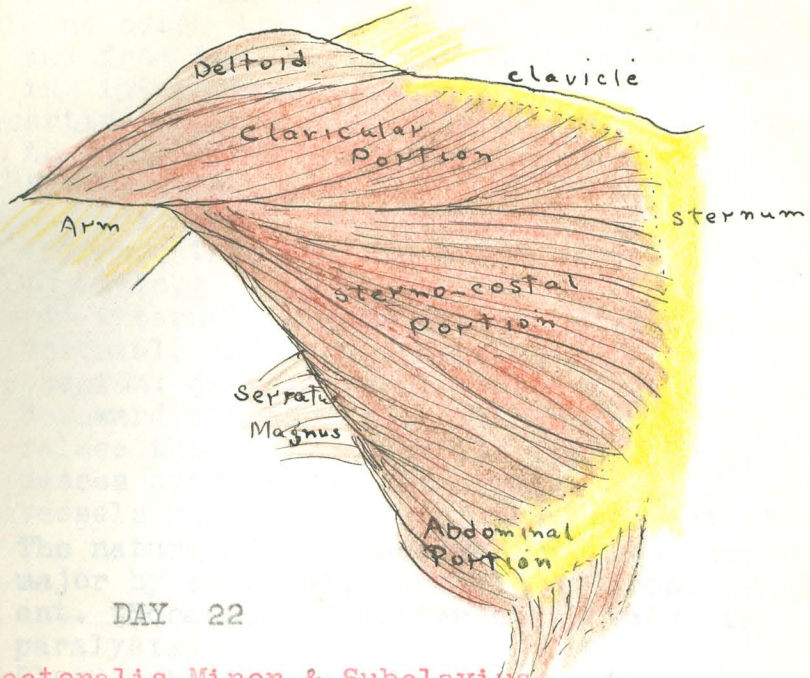
Blood: internal mammary, intercostals, superior acromial and long thoracic.

Discussion: pulls arm into plane anterior to the thorax. Climbing muscle. Aids forced inspiration, especially when shoulders fixed.

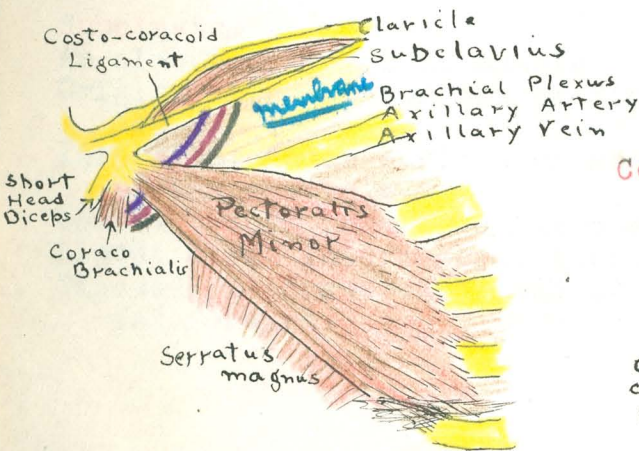
Sternalis Muscle present in 4%. Fibers obliquely from costal cartilage to sternum or clavicle. Probably derived from pectoralis.

Thoracio-Epigastric Vein: a more or less definite stem extending upward along the lateral walls of the thorax, subcutaneously, to open into the long thoracic near its termination.

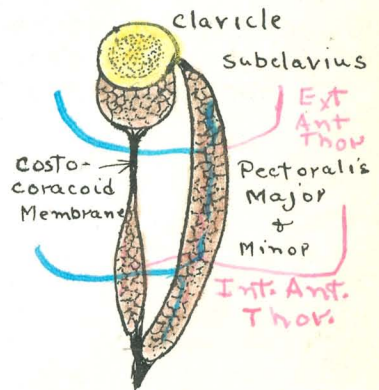
Pectoralis Major



Pectoralis Minor & Subclavius



Costo-Coracoid



Membrane

Pectoralis Minor

Lies beneath the Pectoralis major.

Origin: outer surface of 3rd, 4th, & 5th ribs and from the fascia covering the intervening interosseus muscles.

Insertion: passes obliquely upward and laterally to be inserted into the coracoid process of the scapula.

Nerve: branches from external and internal ant. thoracic from the 7th & 8th cervical and first thoracic.

Blood: internal mammary, intercostals, superior acromial, and long thoracic.

Discussion: draws lateral angle of scapula downward and forward. With scapula fixed it raises the ribs. Near its insertion it passes over the middle portion of the axillary vessels and the cords of the brachial plexus. The nature of the innervation, i.e. upper 2/3 major by ext. ant. thoracic and rest by int. ant. thoracic, of differential value in paralysis.

Blood principally from acromio-thoracic.

Subclavius

An almost cylindrical muscle

Origin: anterior surface of first costal cartilage

Insertion: under surface of about the middle third of the clavicle.

Nerve: branch from brachial plexus, 5th & 6th cerv

Blood: first intercostal, thoracic axis.

Discussion: draws outer end of clavicle down and forward.

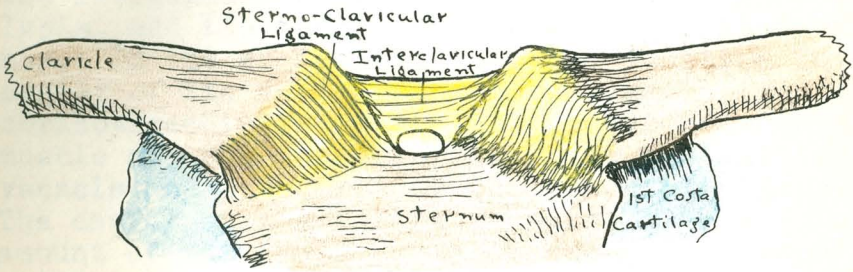
Sterno-Clavicular Articulation

The only joint between the trunk and the upper extremity. The socket on the upper angle of the manubrium often extends onto the first costal cartilage. It is shallow but made more secure by the forward inclination of the manubrium as well as being more on the back than the front of the bone, so that it overlaps the front of the clavicle somewhat. The irregular end of the clavicle is coated with cartilage. As a rule it is concave from before backwards, but there is often a swelling at the posterior lower angle. The **interarticular fibro-cartilaginous disk** subdivides the joint into two, and is the chief factor in maintaining the great security of the joint. It is a round disk, thickest at the upper border, and attached to the upper edge of the inner end of the clavicle, above, and to the first costal cartilage at the outer border of the joint. In the main it faces upward and outward so that the clavicle rests upon it. The **capsule** surrounds the joint, being attached to the borders of the articular surfaces and also the interarticular disk. It is strengthened before and behind by bands running upward and outward from the sternum, of which the posterior are the stronger, and sends some deep fibers to the disk. These bands strengthening the capsule are called the **anterior and posterior sterno-clavicular ligaments**. There are two distinct **synovial cavities**. The **interclavicular ligament** is a fairly well defined band running from the top of one clavicle across to the top of the other. It is closely connected with the top of the joint and loosely with the top of the sternum, towards which it sinks with a slight curve, thus helping fill the interclavicular notch. The **costo-clavicular ligament** arises from the costal cartilage just outside of the joint, with which it is loosely connected, and runs upward and outward to the rough rhomboid impression on the under side of the clavicle. It is a layer of short, strong fibers.

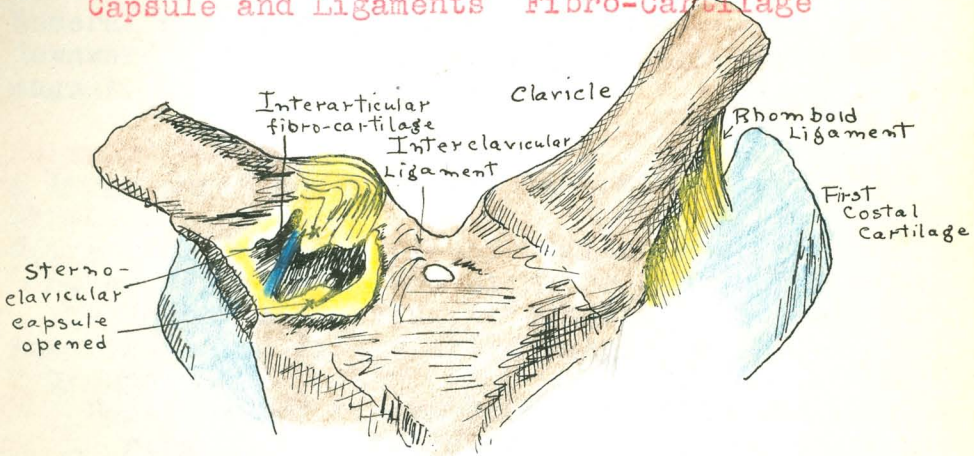
Structures affected by dislocation.

This is rare because of the strength of the ligaments. A forward dislocation is the commonest. Inward is next and upward least common. In a backward dislocation, the sternal end may press upon the trachea; the internal jugular, or the beginning of the innominate vein.

Sterno-Clavicular Articulation



Capsule and Ligaments Fibro-Cartilage



Axilla

A pyramidal space intervening between the upper part of the brachium and the lateral wall of the thorax. Its apex is directed upwards and the base, which is formed by the axillary fascia, downward. Its ventral wall is formed by the pectoralis major and minor, its dorsal wall by the latissimus dorsi, teres major, and subscapularis, and its medial wall by the serratus magnus. In the angle formed by the junction laterally of its ventral and dorsal walls lies the coraco-brachialis and in the groove between that muscle and the posterior wall are the axillary vessels and the cords of the brachial plexus. The cavity of the axilla contains a considerable amount of fat and a variable amount of lymph nodes. It is traversed by the thoracic branches of the axillary vessels and by the intercosto-humeral nerve, and the long thoracic nerve passes downward along its medial wall to the serratus magnus.

Serratus Magnus

A large sheet covering the lateral wall of the thorax.

Origin: nine or ten fleshy digitations from the outer surfaces of the eight or nine upper ribs, the second rib giving attachment to two slips.

Insertion: its fibers are arranged in three groups:

Uppermost of fibers from the first and second ribs to the ventral surface of the median angle of the scapula.

Middle group from the second and third ribs to the ventral surface of the vertebral border of the scapula.

Lower group converging to the inferior angle of the scapula.

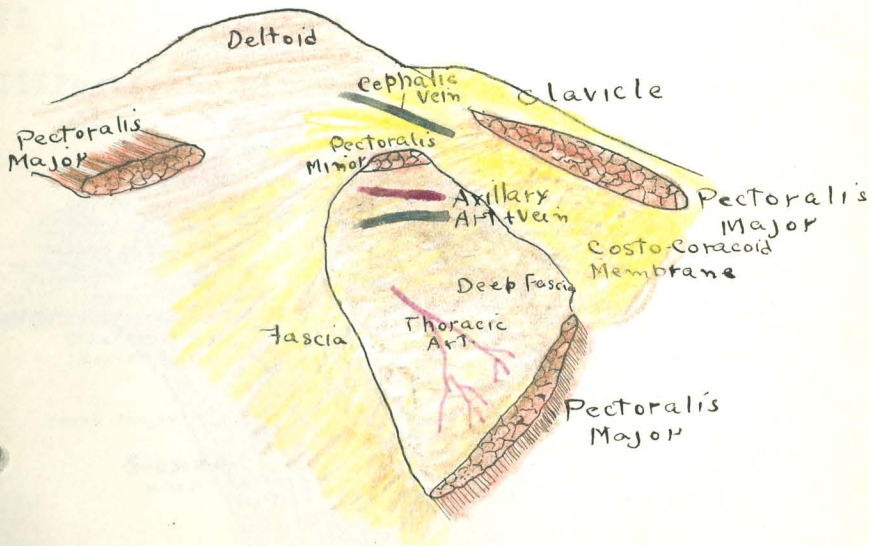
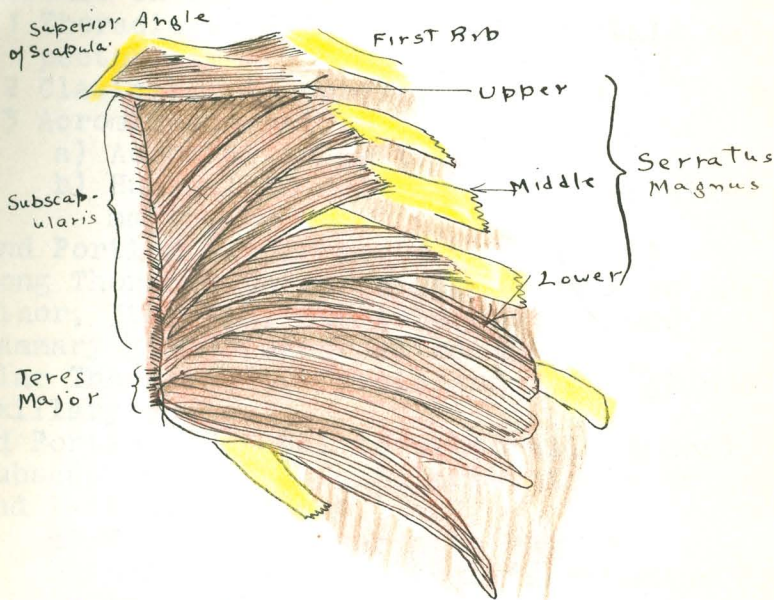
Nerve: long thoracic from 5th, 6th, 7th cervical.

Blood: intercostals, long and alar thoracic.

Discussion: keeps scapula closely applied to thoracic wall and draws it laterally.

Contents Palpated:

Lymph glands, fat, loose areolar tissue, axillary artery, axillary vein, median nerve, pectoralis major and minor, latissimus dorsi, teres major, subscapularis, serratus magnus, coraco-brachialis, ribs and intercostal spaces.



Axillary Artery

Subclavian -- Axillary -- Brachial

First Portion (central to pectoralis minor)

I Superior Thoracic to 1st intercostal space

II Acromio-Thoracic to

1 Thoracic to 2nd & 3rd intercostals and pectorals.

2 Clavicular to subclavius.

3 Acromio-humeral to

a) Acromial to deltoid.

b) Humeral to deltoid and pectoralis major.

Second Portion (under pectoralis minor)

I Long Thoracic to serratus magnus, pectoralis minor, 3th, 4th, 5th intercostals and to mammary gland (external mammary)

II Alar Thoracic, to fascia and lymph glands of axillary space.

Third Portion (distal to pectoralis minor)

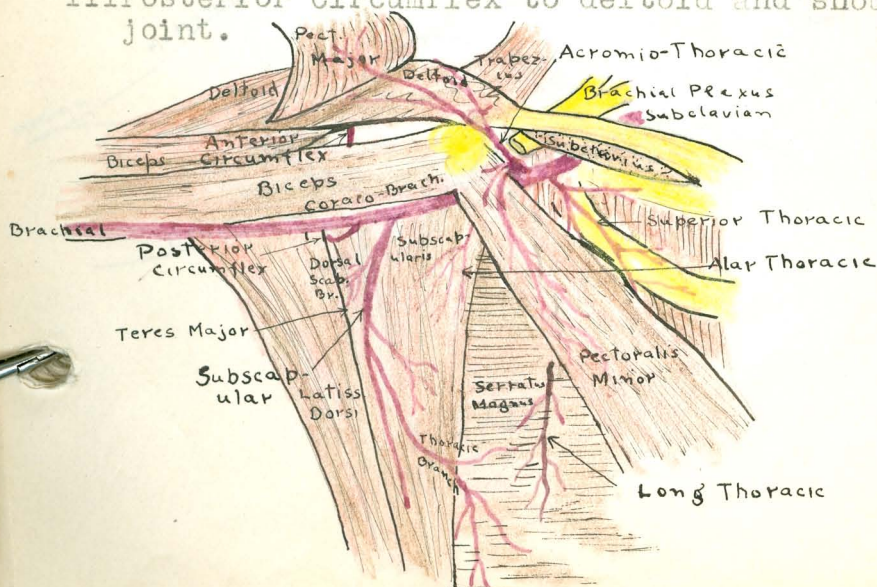
I Subscapular to subscapularis, teres major, and latissimus dorsi.

a) Thoracic to serratus magnus

b) Dorsal scapular to infraspinatus and teres minor

II Anterior Circumflex to capsule of shoulder joint, coraco-brachialis and biceps.

III Posterior Circumflex to deltoid and shoulder joint.



Nerves in the Axillary Space

Brachial Plexus and branches:

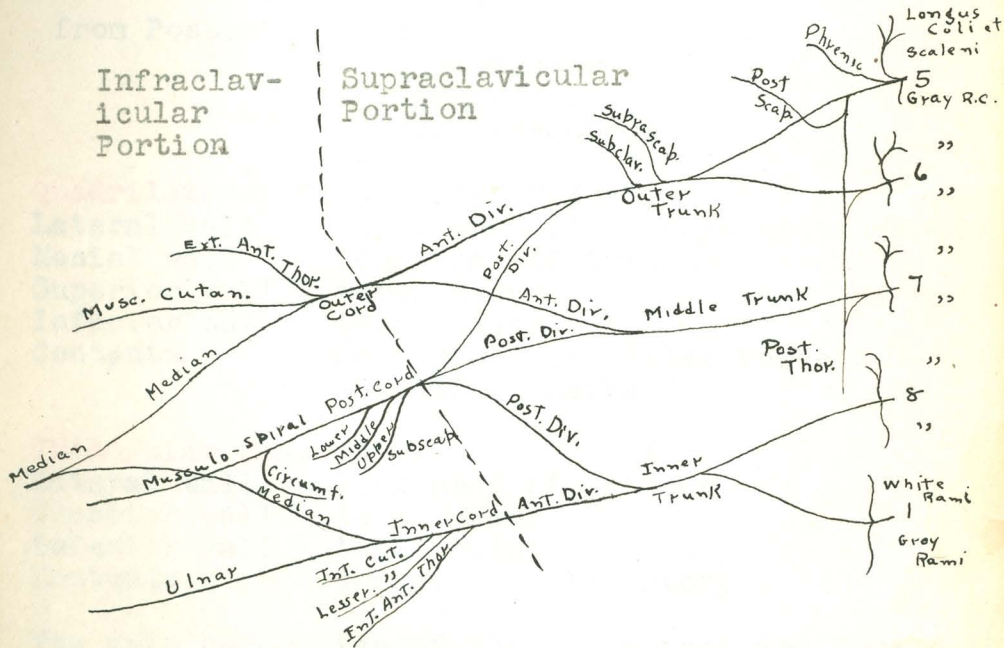
Musculo-Cutaneous, Median, Ulnar, Posterior Thoracic, Musculo-Spiral, Subscapularis, Internal Cutaneous, Lesser Internal Cutaneous, some branches of Intercostals,

Structures subject to injury.

The Circumflex nerve due to subluxations of the head of the humerus.

Crutch Paralysis and atrophy of the deltoid or other muscles due to pressure on the nerves.

BRACHIAL PLEXUS



3/5/21
M.L.L.

Infraclavicular Part of Brachial Plexus.

The component parts form a close ^sfaces around the axillary artery, whose sheath they occupy. In the upper part of the axilla the plexus is overlain by the subclavius and pectoralis major muscles and before dividing into its terminal branches it lies enclosed between the pectoralis minor and the subscapularis muscles. The branches from the infraclavicular portion are as follows:

from Outer Cord	External Anterior Thoracic Musculo-Cutaneous Median (Outer Head)
from Inner Cord	Internal Anterior Thoracic Lesser Internal Cutaneous Internal Cutaneous Ulnar Median (Inner Head)
from Posterior Cord	Subscapular Circumflex Musculo-Spiral

Quadrilateral Space (See DAY 17)

Lateral wall	outer head of triceps and humerus
Mesial wall	long head of triceps
Superior wall	teres minor
Inferior wall	teres major
Contents	posterior circumflex vessels circumflex nerve

Triangular Space

Lateral wall	long head of triceps
Superior wall	teres minor
Inferior wall	teres major
Contents	dorsal scapula artery

The main boundaries of the two spaces are formed by the teres muscles and the humerus, cut by the long head of the triceps.

DAY 26 3/8/21

Brachial Artery.

Anti-Cubital Fossa.

Trace the Brachial artery to its termination. Note relations, branches, dissect out all branches. Note Venae Committes. Define the Anti-cubital Fossa and structure passing thru it. Note Brachial, Radial, Ulnar, Profunda, Anastomotic, and Recurrent Arteries. Tendon of Biceps, Median, and Musculo-Spiral Nerve.

Questions:—

- (1) Give the relations and branches of Brachial Artery.
- (2) Bound and give contents of Anti-Cubital Fossa.
- (3) Describe the Arterial Anastomosis around the Elbow Joint.

DAY 27 3/9/21

Acromio-Clavicular Joint.

Shoulder Joint.

Note the ligaments, Synovial membrane, character of joint, limitation of motion, articular surfaces of bones and weak points of each joint.

Questions:—

- (1) Describe each of the above joints in full giving object of each ligament.
- (2) What are the most common displacements of these Joints?

DAY 28 3/10/21

Front of Forearm and Wrist.

Define the cutaneous nerves. Note Anterior Annular Ligament and structures passing over it. Dissect out the following muscles noting relations. Pronator Radii Teres, Flexor Carpi Radialis, Palmaris Longus, Flexor Carpi Ulnaris, Flexor Sublimis Digitorum, Flexor Profundus Digitorum, Flexor Longus Pollicis, Pronator Quadratus. Radial, Ulnar and Median Nerves. Radial and Ulnar Arteries.

Questions:—

- (1) Give O. I. B. & N. S. of above muscles.
- (2) Give their action as a group.
- (3) Give the relations of the above Nerves and Vessels.

DAY 29

3/11/21

Back of Forearm and Wrist.

Identify cutaneous nerves. Note insertion of Triceps. Expose and study noting relations, blood and nerve supply, Brachio-Radialis, Extensor Carpi Radialis Longus, Extensor Carpi Radialis Brevis, Extensor Communis Digitorum, Extensor Minimi Digiti, Extensor Carpi Ulnaris, Extensor Ossis Metacarpi Pollicis, Extensor Brevis Pollicis, Supinator Brevis, Extensor Longus, Extensor Indices, Anconeus. Secure the Posterior Interosseus Artery and Nerve.

Questions:—

- (1) Give O. I. & Nerve Supply of above muscles.
- (2) What is their action as a group?
- (3) Give the relations of the Nerves and Vessels found in this region.

DAY 30

3/12/21

Palm of Hand.

Superficial Palmar Arch.

Remove skin from Palm of hand and fingers. Note attachment of Palmaris Musclic. Remove Aponeurosis, clean muscles of hand noting nerve supply. Dissect out Superficial Palmar Arch and trace branches. Divide Anterior Annular Ligament and note structures beneath it. Secure the Nerves.

Questions:—

- (1) Give the formation of the Superficial Palmar arch.
- (2) What structures pass underneath the Anterior Annular Ligament. Give their relations.
- (3) What is the nerve supply to the hand?

DAY 31

3/14/21

Deep Palmar Arch.

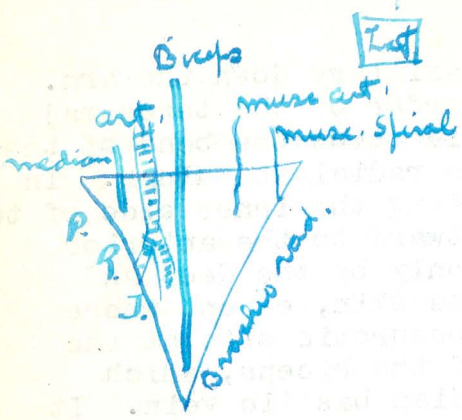
Dissect out Deep Palmar Arch, Flexor Tendons and their relations to each other. Note muscles of thumb, Lumbricales, and Interossei. Clean all musculature from Arm, Forearm and Hand and prepare to study the Joints.

Questions:—

- (1) Give formation and relations of Deep Palmar Arch.
- (2) Give O. I. and Action of Lumbricales and Interossei.

BRACHIAL ARTERY

The continuation of the axillary down the arm. It begins at the lower border of the teres major and terminates a little below the bend of the elbow by dividing into the radial and ulnar. In the upper part it lies along the inner side of the arm and then inclines outward to the anterior surface. It is covered only by the deep and superficial fascia and the skin, except where it passes beneath the aponeurotic slip at the elbow, from the tendon of the biceps, which separates it from the median basilic vein. It is crossed by the median nerve in the middle of its course. Posteriorly it rests in succession upon the long head of the triceps, the inner head of the triceps, the insertion of the coraco-brachialis, and the brachialis anticus. The musculo-spiral nerve and the superior profunda artery pass down between the vessel and the long head of the triceps. Externally to it, above, is the median nerve and the coraco-brachialis muscle, and lower down, the biceps and its tendon. Internally, it is in relation above, with the ulnar, internal cutaneous, and lesser internal cutaneous nerves, and in its lower third with the median nerve. The basilic vein is somewhat superficial to it and to its inner side. Two venae comites accompany the artery upon its inner and outer side, and cross branches pass from one to the other. It is also accompanied by two lymphatic vessels which have a few small lymph nodes.



8 art

Brachial
Radial } plexus

Vena Comitae
Median vein

Lymph node

Branches of Brachial Artery

Muscular to biceps
 coraco-brachialis
 brachialis anticus
 triceps
 pronator radii teres

Nutrient to Humerus from the
 brachial direct or
 muscular branch or
 inferior profunda

Superior profunda in musculo-spiral groove
 downward posteriorly to the external
 condyle and the radial artery. Supplies

Deltoid

Triceps

Median collateral branch. to olecranon

Articular to joint

Cutaneous with branches of Musculo-
 Spiral Nerve.

Inferior Profunda down to back of internal con-
 dyle with ulnar nerve to anastomotica
 magna and posterior ulnar recurrent. To

Triceps

Brachialis Anticus

Anastomotica Magna around inner border of hum-
 erus and joins

Posterior ulnar recurrent

Superior Profunda

Inferior Profunda

Anterior ulnar recurrent.

Anti-Cubital Fossa

The fossa on the anterior side of the elbow.
 The base of the triangle is directed upwards
 and is represented by a line connecting the
 two epicondyles of the humerus. The sides are
 formed by the medial edge of the Brachioradi-
 alis and the lateral margin of the Pronator
 Teres. The floor is formed by the Brachialis
 and Supinator. The space contains the .

brachial artery

venae comitantes

median nerve

radial nerve

radial artery

ulnar artery

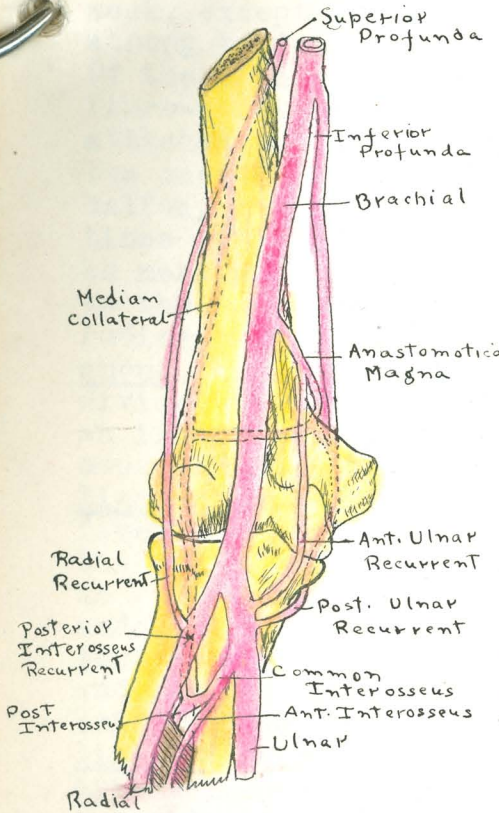
tendon of biceps

brachii.

Arterial anastomosis around elbow joint.

The brachial artery forms rich anastomoses around the elbow joint with both radial and ulnar arteries by means of its superior and inferior profunda branches and the anastomotica magna, a

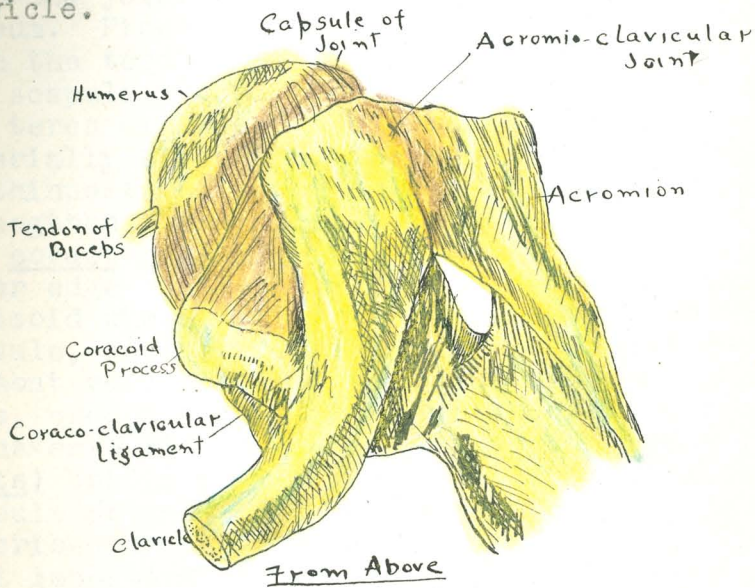
abundant opportunity being thus afforded for a collateral circulation to the forearm after ligation of the brachial. Thus, the superior profunda anastomoses in front of the external condyl of the humerus with the radial recurrent and its medial collateral branch anastomoses in the neighborhood of the olecranon process with the posterior interosseus and the posterior ulnar recurrents. The inferior profunda also anastomoses with the posterior ulnar recurrent behind the internal condyl, while the anastomotica magna makes connections in front of the internal condyle with the anterior ulnar recurrent; and posteriorly, with the posterior ulnar and the posterior interosseus recurrents.



Acromio-Clavicular Joint

This joint includes a capsular ligament and occasionally an intraarticular fibro-cartilage. The elongated facet on each bone is covered with articular cartilage, that of the clavicle usually overlapping the other. The capsule is weak, except above and behind, where there are strong bands extending outward from the clavicle. Of these the posterior are the longer. The fibro-cartilage, when present, is wedge shaped, attached by the base to the superior part of the capsule, the thin edge reaching, perhaps, halfway through the cavity of the joint. Sometimes it divides the joint into two. There may be merely a thick pad of fibrous tissue attached to the outer end of the clavicle with only a very rudimentary joint. The coraco-clavicular ligament is an important ligamentous apparatus divided into an outer part, the trapezoid, and an inner one, the conoid. These are continuous behind but diverge in front. The trapezoid ligament is a four sided layer of parallel fibers, springing from the trapezoid ridge and the top of the first part of the coracoid, to run outward to the trapezoid ridge on the under side of the clavicle. The line of attachment to the clavicle is usually the longer, and, as this runs forward and outward, the anterior fibers are almost horizontal. The conoid ligament or inner part, is less strong. It arises from the posterior border of the conoid tubercle at the root of the acromion, and runs to the tubercle of the same name at the back of the under side of the clavicle. Both these tubercles being prominences of some size, this ligament is not a cord, but another layer continuous with the trapezoid behind. The inner fibers incline inward as they ascend. The general direction is upward and a little backward but this changes with the position of the bones. There may be a synovial bursa in the open angle seen from the front between these two parts of the ligaments. This is one of the shallowest of the articulations. The powerful conoid and trapezoid ligaments are the most important factors in preserving the integrity when force is applied to the point of the shoulder.

Dislocation is rare. That of the acromial end of the clavicle upward is the most frequent. The capsular ligament is torn or stretched and the coraco-clavicular ligaments may be torn or ruptured, altho the latter is rare owing to the strength of the ligaments. Dislocation of the clavicle beneath the acromion, between it and the coracoid process, and dislocation of the clavicle beneath the coracoid are extremely rare. Both involve extensive laceration of the ligaments binding the scapula and the outer portion of the clavicle.



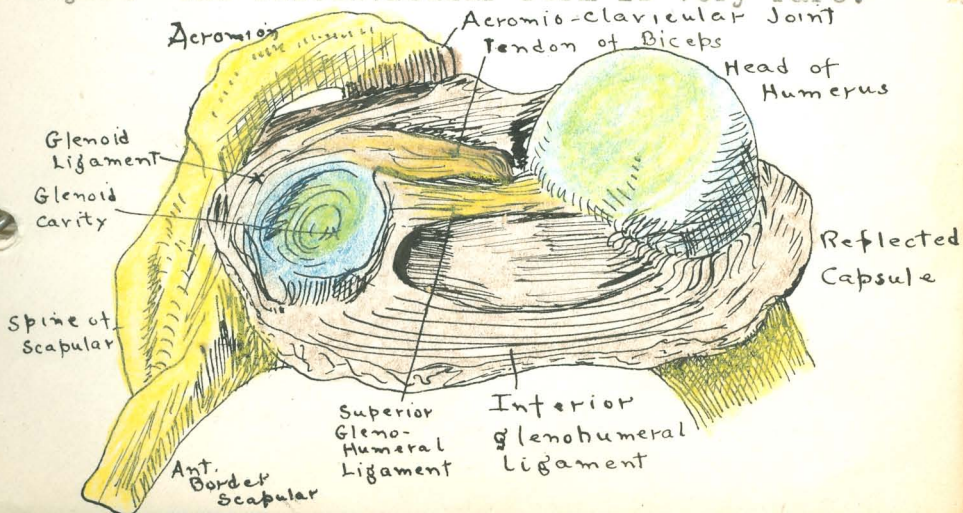
Shoulder Joint

A simple ball and socket joint with the axis of the shaft in a different plane from that of the axis of the articular head. The glenoid cavity is shallow and lined with articular cartilage. It is deepened by the glenoid ligament, a fibrocartilaginous band attached by its base to the border of the cavity and ending in a sharp edge. It is thus triangular on section. It is composed chiefly of fibers running around the socket. It is directly continuous with the fibers of the long head of the biceps from the insertion of the latter into the top of the socket. The Capsular ligament is quite lax and is kept in place chiefly by the tonicity of the surrounding muscles. The course of the muscles is in the

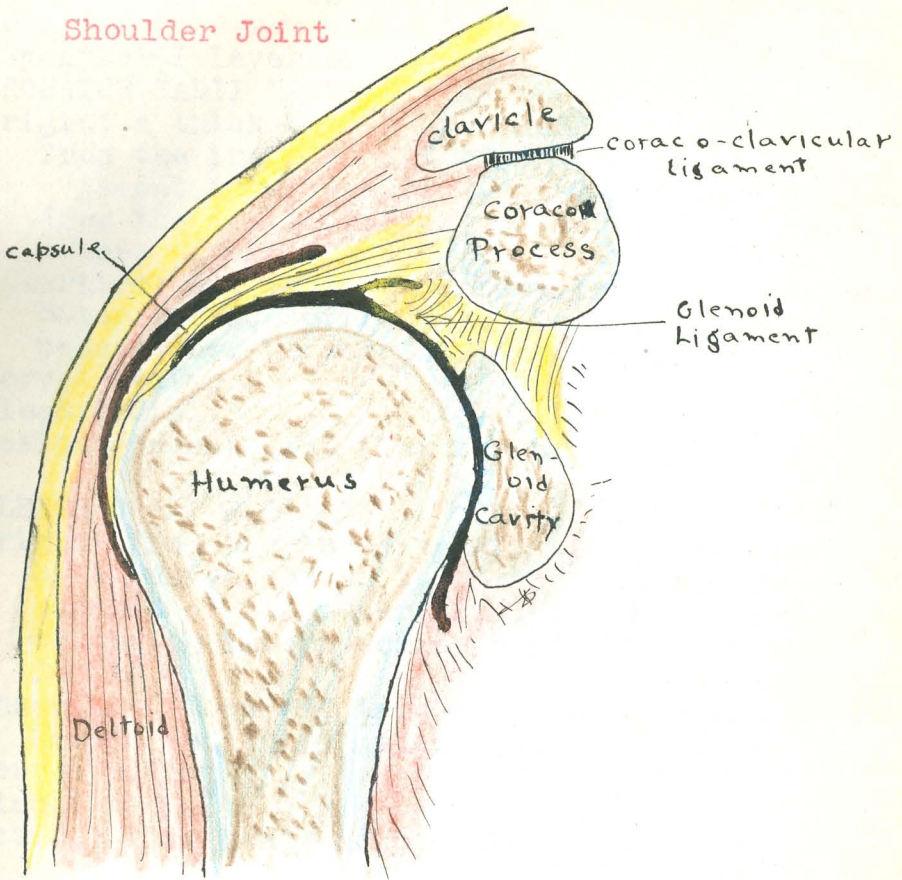
main longitudinal. The capsule arises above from the edge of the glenoid cavity and the bone just around it, from the outer surface of the glenoid ligament as far as its edge, excepting at the top, where it does not encroach on the ligament and at the inner side, where its origin is uncertain. The inferior attachment of the capsular ligament is to the groove round the head close to the latter above and externally, but a little way from it below and internally. The fibers can be traced from a considerable distance from the joint before they are lost in the periosteum. Fibers going to the tuberosities blend with the tendons of insertion of the muscles of the scapula group, the supra- and infraspinati, the teres minor and the subscapularis, which materially strengthen the capsule. The latter is thinnest behind. Certain ACCESSORY LIGAMENTS strengthen the capsule. The most important is the coraco-humeral, which, arising from the outer edge of the horizontal portion of the coracoid where a bursa separates it from the capsule, soon fuses with the latter and runs, without very distinct borders, to both tuberosities, crossing the bicipital groove. A few transverse fibers (the transverse humeral ligaments) bridge in the bicipital groove below the capsule proper. Three gleno-humeral bands are described on the inside of the capsule. The most important is the superior. This band springs from near the top of the inner border of the glenoid cavity and is inserted into the lesser tuberosity. In a part of its course it makes a prominent fold of the synovial membrane along the inner border of the tendon of the long head of the biceps. This ligament has been described as a deep part of the coraco-humeral. The middle Ligament is ill defined. The inferior running from the lower end of the glenoid socket to the inner side of the neck of the humerus, may be seen from within and from without the capsule. It is made tense when the arm is abducted and materially strengthens the joint. The capsule usually presents an opening on the inner side in the upper part, by which the bursa below the tendon of the subscapularis communicates with the joint. The tendon of the long head of the

biceps lies within the capsule from its origin at the top of the glenoid till it leaves the capsule in the bicipital groove. The tendon does not lie free within the joint, but is covered by a reflection of the synovial membrane as it lies curved over the head of the humerus. The synovial membrane of this joint is remarkable free from the synovial fringes. The bursae about the joint are numerous. The largest is the subacromial or subdeltoid bursa, situated between the top of the capsule, the coraco-acromial ligament, and the acromion, and extending downward under the deltoid. The subcoracoid bursa separates that process and the beginning of the coraco-humeral ligament from the capsule. Others may be found between the capsule and the muscles inserted into the tuberosities. That under the subscapularis is constant. The one under the infraspinatus is frequent.

Dislocation is most frequent here in all the body. The commonest luxation is in an inferior direction, due to the fact that strains in falling and the like come in such a direction as to be opposed by the weakest part of the capsule. Also a direct subcoracoid luxation may result, or a subspinous, depending on the force of the cause of the luxation. The subglenoid is called the primary form, since the subcoracoid usually results from the continuance of the force producing it, aided strongly by the pectoralis major. The subclavicular form is very rare.



Shoulder Joint



Front of fore-arm and wrist.

Superficial layer of muscles.

PRONATOR RADII TERES

Origin: a thick band by two heads:

from the inner condyl of the humerus, the adjacent intermuscular septa, and deep fascia.
 from the medial border of the coronoid process of the ulna.

Insertion: downward and laterally into middle of outer surface of radius. The median nerve passes down between the two heads.

Nerve: median

Blood: radial

Action: pronate and flex forearm.

FLEXOR CARPI RADIALIS

Origin: from the inner condyl of the humerus, by a tendon common to it and the neighboring muscles of the superficial layer, from the adjoining intermuscular septa and the deep fascia.

Insertion: down and laterally into bases of second and third metacarpal bones.

Nerve: median

Blood: radial

Action: flex hand and pronate forearm.

PALMARIS LONGUS

Origin: by the tendon common to the neighboring superficial muscles from inner condyl of the humerus, from the adjoining intermuscular septa, and the deep fascia. Spindle shaped, belly converges into slender tendon.

Insertion: down in front of anterior annular ligament of wrist into palmar fascia.

Nerve: median

Blood: radial & ulnar

Action: tense palmar fascia and flex hand.

FLEXOR CARPI ULNARIS

Origin: medial condyle of humerus with neighboring superficial muscles, from intermuscular septa and deep fascia, and from posterior surface of olecranon process, and upper part of posterior border of ulnar by aponeurosis common to it and flexor profundus digitorum and extensor carpi ulnaris.

Insertion: down along ulnar border of forearm into pisiform bone. Tendon continued on to hook of unciform and even base of fifth metacarpal.

Blood: ulnar

Nerve: ulnar

Action: flex and adduct hand.

FLEXOR SUBLIMIS DIGITORUM

Origin: from inner condyl of humerus with neighboring superficial muscles, from an oblique line on the anterior surface of the radius, and from the tendinous arch extending between these two points and beneath which the median nerve and ulnar artery pass. The fibers form four bellies, and as many tendons, which pass beneath the anterior annular ligament at the wrist and then diverge towards the bases of the second, third, fourth, and fifth fingers and enter the corresponding digital sheaths. Here each tendon divides over the surface of the first phalanx into two slips, which pass, one on either side of the subjacent tendon of the flexor profundus digitorum and partially unite beneath it.

Insertion: base of second phalanx

Nerve: median

Blood: radial & ulnar

Action: flex hand

The Middle Layer

FLEXOR PROFUNDUS DIGITORUM

Origin: from anterior and outer surfaces of ulna and inner half of interosseus membrane. Divides into four tendons at middle of forearm, which pass beneath anterior annular ligament to enter digital sheaths of second, third, fourth, and fifth fingers. Opposite the first phalangeal joint each tendon passes between the two slips of the corresponding tendon of the flexor sublimis.

Insertion: base of terminal phalanx.

Nerve: lateral half by anterior interosseus br.
of median

medial half by ulnar

Blood: ulnar

Action: flexes hand

Median nerve

P. R. T.

P. L.

F. C. R.

Ant Interosseus

F. S. D.

F. P. D. ($\frac{1}{2}$)

F. L. P.

P. Q.

FLEXOR LONGUS POLICIS

Origin: anterior surface of radius and anterior

half of interosseus mem-
branae. Usually, also, slip
from coronoid process of
ulnar or medial epicondyle
of humerus. Strong tendon
in middle of forearm down
in middle of forearm down
beneath lateral part of
annular ligament.

Insertion: base of terminal
phalanx of thumb.

Nerve: anterior interosseus

Blood: radial

Action: flex hand and thumb

Deep Layer

PRONATOR QUADRATUS

Origin: from volar surface
of ulnar laterally and
distally to

Insertion: lateral and anter-
ior surfaces of lower end of
radius.

Nerve: anterior interosseus
of median

Blood: radial & ulnar

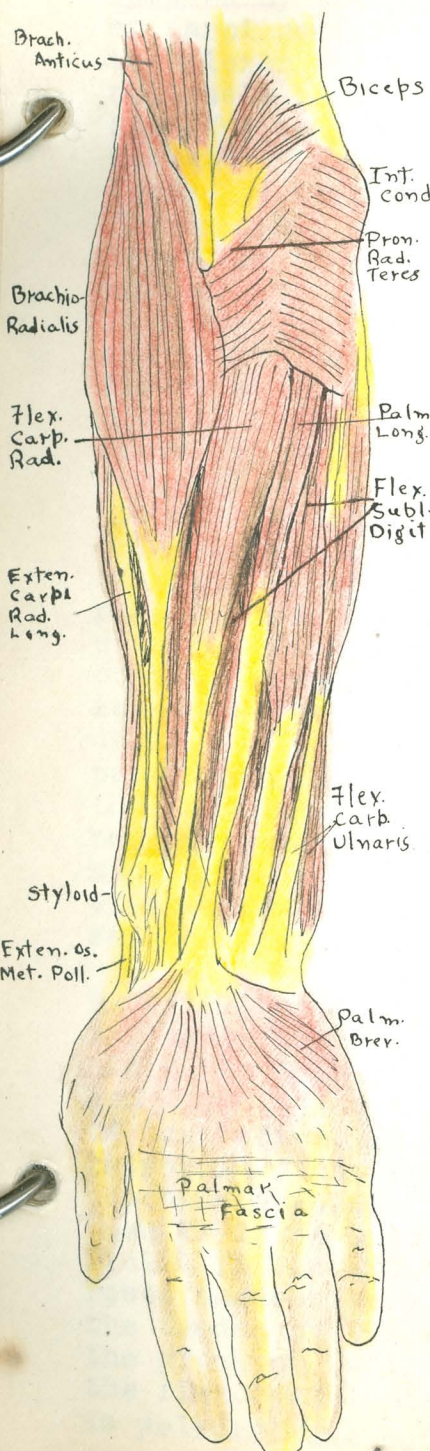
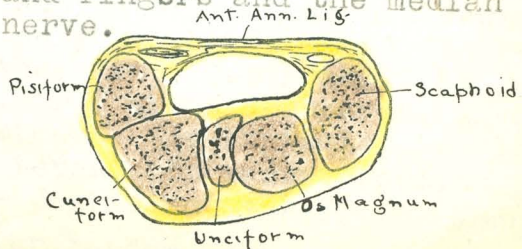
Action: pronate forearm.

Action as a Group:

Pronate and flex forearm,
flex and adduct hand, and
tense palmar fascia.

Anterior Annular Ligament

A strong structure bridging
the hollow of the wrist and
enclosing a canal through
which pass the tendons of the
long flexors of the thumb
and fingers and the median
nerve.



Relations of Arteries

ULNAR

The antibrachial portion in its upper third is covered by the pronator radii teres, the flexor carpi radialis, the palmaris longus, and the flexor sublimis digitorum, and is crossed obliquely by the median nerve. Behind it rests upon the tendons of the brachialis anticus and upon the flexor profundus digitorum. In its lower two thirds it is overlapped above by the flexor carpi ulnaris, but below it lies entirely on the radial side of the tendon of that muscle, and is covered only by skin and fascia. It rests upon the flexor profundus digitorum and to its radial side is the tendon of the flexor sublimis digitorum, while to its ulnar side it is in close relation with the ulnar nerve, as well as with the tendon of the flexor carpi ulnaris. In its carpal portion it rests upon the anterior surface of the anterior annular ligament, immediately to the radial side of the pisiform bone, and is covered by an expansion from the tendon of the flexor carpi ulnaris. The palmar portion, in the upper part of its course, is covered by the palmaris brevis and rests upon the flexor brevis minimi digiti. The superficial palmar arch, as it passes radialwards, is crossed successively by the palmar branch of the ulnar nerve, the palmar fascia, and the palmar branch of the median nerve. It rests upon the digital branches of the ulnar nerve, the long flexor tendons, and the digital branches of the median nerve.

RADIAL In its antibrachial portion its course may be indicated by a line drawn from the mid point between the condyles of the humerus and a point 1cm internal the styloid process of the radius. In its upper half it is overlapped in front by the inner border of the brachio-radialis (supinator longus) but lower down it is covered only by the deep and superficial fascia and the skin. Posteriorly it rests successively, from above downwards, upon the tendon of the biceps, the supinator brevis, the pronator radii teres, the radial portion of the flexor sublimis digitorum, the flexor longus pollicis, the outer border of the

pronator quadratus, and the anterior surface of the lower end of the radius. Internally it is in contact with the pronator radii teres in its upper third, and throughout the rest of its course with the outer border of the flexor carpi radialis. Externally, it is in relation throughout its entire length with the brachioradialis, and in the middle third of its course it is in contact with the radial nerve. Two venae comites accompany the artery on its inner and outer sides. In the carpal portion the radial artery rests at first upon the external lateral ligament of the wrist and then upon the posterior surface of the trapezium. It passes beneath, successively, the tendons of the extensor ossis metacarpi pollicis, the extensor brevis pollicis, and the extensor longus pollicis, being covered in the interval between the last two and to the ulnar side of the extensor longus pollicis only by the skin and fascia, in which are some branches of the radial nerve and tributaries of the radial vein. In the palmar portion as it passes forward through the proximal portion of the first intermetacarpal space, the artery lies between the two heads of the first dorsal interosseus muscle. It then bends inward obliquely beneath the oblique head of the adductor pollicis, and, either penetrating that muscle or passing between it and the transverse head of the same muscle, is continued ulnarward beneath the tendons of the long flexors, resting upon the bases of the metacarpal bones and upon the interosseus muscles.

Relations of Nerves

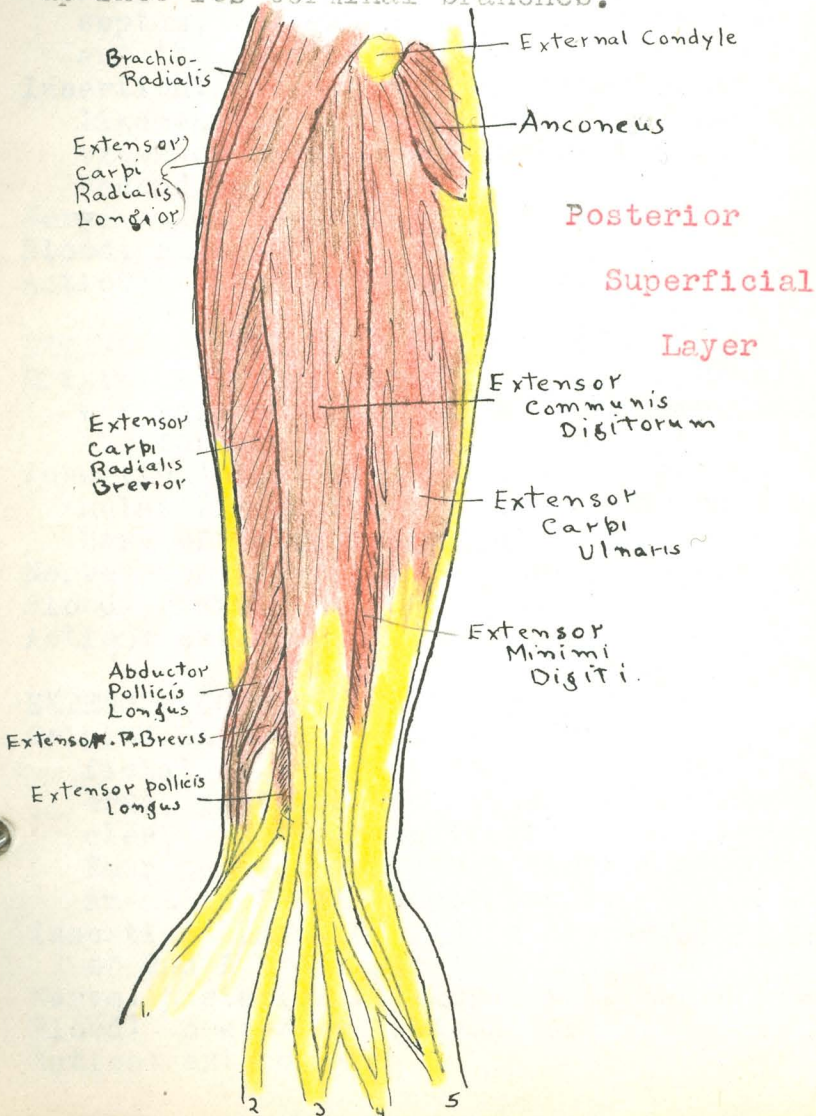
RADIAL, purely sensory, from musculo-spiral. It passes down the radial side of the forearm under cover of the brachioradialis and anterior to the supinator brevis, the pronator radii teres and the radial head of the flexor sublimis digitorum. It accompanied for the greater part of its course, the radial artery, to the radial side of which the radial nerve lies. At the junction of the middle and lower thirds of the forearm it begins to turn gradually backward over the radius and under the tendon of the brachioradialis. Reaching the extensor

surface of the forearm just above the wrist it divides into two diverging branches, which supply the back of the hand and the three outer digits.

ULNAR arises from the inner cord between the axillary artery and vein and posterior to the internal cutaneous nerve it runs down in front of the triceps and to the inner side of the axillary and brachial arteries. Reaching the middle of the arm it follows an inward and backward direction, in which it is accompanied by the inferior profunda artery, and passing either over the inner margin of or thru the internal intermuscular septum and in front of the inner head of the triceps, attains the interval between the internal condyle of the humerus and the olecranon. It becomes an occupant of the forearm by passing between the heads of the flexor carpi ulnaris muscle, a situation the nerve shares with the inferior profunda and posterior ulnar recurrent arteries. From this point the nerve follows a straight course to the wrist, lying in the forearm upon the flexor profundus digitorum and covered by the flexor carpi ulnaris. At about the middle of its course through the lower arm it approximates the ulnar vessels, close to the inner side of which it lies. At the wrist, accompanied by the ulnar artery, it pierces the deep fascia just above the annular ligament, to the outer side of the pisiform bone, and enters the hand by passing superficial to the annular ligament. After crossing it divides into its deep and superficial terminal branches.

MEDIAN passes down the arm in close relation to the brachial artery, laterally above, and as the elbow is neared, gradually attaining the inner side by crossing obliquely the anterior surface of the artery. It passes thru the cubital fossa beneath the median basilic vein and the bicipital fascia and enters the forearm between the heads of the pronator radii teres muscle, the deep head of which, separates the nerve from the ulnar artery.

It follows a straight course down the fore arm, accompanied by the median artery, lying upon the flexor profundus digitorum and covered by the flexor sublimis digitorum. Near the wrist the median becomes more superficial, with the tendons of the flexor sublimis digitorum and palmaris longus lying mesial and that of the flexor carpi radialis lateral to it. It passes into the hand beneath the anterior annular ligament, at the lower margin of which it spreads out into a reddish ganglionic swelling, which lies upon the flexor tendons. Below this point it breaks up into its terminal branches.



Back of Forearm and Wrist**Superficial Layer**

From the external condyle of the humerus
BRACHIO-RADIALIS (Supinator Longus)

Origin: external condylar ridge of the humerus
and lateral intermuscular septum.

Insertion: base of styloid process of radius

Nerve: musculo-spiral

Blood: brachial and radial

Action: flex forearm

EXTENSOR CARPI RADIALIS LONGIOR

Origin: lower third of external supracondylar ridge of humerus, external intermuscular septum, and extensor tendon common to it and the neighboring superficial muscles.

Insertion: tendon beneath posterior annular ligament in second compartment with that of extensor carpi radialis brevis to base of second metacarpal.

Nerve musculo-spiral

Blood: radial

Action: extend and abduct hand.

EXTENSOR CARPI RADIALIS BREVIOR

Origin: external condyle of the humerus, adjacent intermuscular septa, and deep fascia of the forearm.

Insertion: flat tendon beneath posterior annular ligament in second compartment to base of third metacarpal

Nerve: posterior interosseus of musc.-spiral

Blood: radial

Action: extend hand.

EXTENSOR COMMUNIS DIGITORUM

Origin: in common with the neighboring superficial extensors from external condyle of humerus, septa between it and the adjoining muscles, and the deep fascia of the forearm.

Four tendons beneath posterior annular ligament in fourth compartment.

Insertion: bases of middle and terminal phalanges of 2nd & 3rd & 4th & 5th fingers

Nerve: posterior interosseus of musculo-spiral

Blood: posterior interosseus

Action: extend hand

EXTENSOR MINIMI DIGITI

Origin: from the lateral epicondyl of the humerus and the antibrachial fascia in common with the preceding muscle. Its tendon passes beneath the posterior annular ligament in the fifth compartment and fuses with the tendon of the extensor communis digitorum

Insertion: bases of middle and terminal phalanges of second, third, fourth, and fifth fingers.

Nerve: posterior interosseus of musculo-spiral

Blood: posterior interosseus and radial

Action: extend little finger.

EXTENSOR CARPI UPNARIS

Origin: from the external condyle of the humerus from the deep fascia, and usually from the aponeurosis attached to the posterior border of the ulnar common to this muscle, the flexor profundus digitorum, and the flexor carpi ulnaris. Arises in common with the adjacent superficial extensors. Tendon passes thru the sixth compartment of the space beneath the posterior annular ligament.

Insertion: base of fifth metacarpal.

Nerve: posterior interosseus of musculo-spiral

Blood: ulnar

Action: extend and adduct the hand.

Deep Layer

EXTENSOR OSSIS METACARPI POLLICIS

Origin: middle third of posterior surfaces of ulnar, interosseus membrane, and radius.

Tendon down and lateral thru first compartment beneath posterior annular ligament

Insertion: outer side of base of first metacarpal bone.

Nerve: posterior interosseus of musculo-spiral

Blood: posterior interosseus

Action: abduct hand

EXTENSOR BREVIS POLLICIS

Origin: from interosseus membrane and posterior surface of radius, partly under cover of extensor longus policis. Tendon passes thru first compartment

Insertion: base of first phalanx of thumb

Nerve: posterior interosseus of musculo-spiral

Blood: posterior interosseus

Action: adduct thumb and extend first phalanx

SUPINATOR BREVIS

Origin: outer condyle of humerus and orbicular ligament of elbow joint, and partly from the upper part of the lateral border of the ulna and the smooth surface beneath the lesser sigmoid cavity of that bone.

Insertion: fibers obliquely downward and outward to posterior, lateral and anterior surfaces of radius, curving around that bone. Insertion down to about the middle of the bone.

Nerve: posterior interosseus of musculo-spiral

Blood: interosseus and radial

Action: supinate forearm.

EXTENSOR LONGUS POLLICIS

Origin: interosseus membrane and posterior surface of ulna. Tendon thru third compartment, crossing those of extensores carpi radiâlis

Insertion: base of terminal phalanx of thumb.

Nerve: posterior interosseus

Blood; posterior interosseus

Action: extend and adduct thumb

EXTENSOR INDICES

Origin: interosseus membrane and dorsal surface of ulna. Thru fourth compartment.

Insertion: with tendon of common extensor

Nerve: posterior interosseus

Blood: posterior interosseus

Action: extend index finger.

ANCONEUS

Origin: posterior surface of external condyle of humerus

Insertion by triangular sheet into upper part of posterior surface of ulna and outer surface of olecranon process

Nerve: musculo-spiral

Blood; radial and superior profunda

Action: extend arm

Action as a Group**Extend hand and forearm****Relations of Nerves**

MUSCULO-SPIRAL runs down in musculo-spiral groove to lateral aspect of arm to enter cleft between brachio-radialis and brachialis anticus. Divides at external condyle of humerus. Terminal branches are radial and POSTERIOR INTEROSSEUS, which approaches supinator brevis, shortly after its origin, thru a fissure in whose substance it makes its way to the lateral side of the radius, in this way reaching the posterior aspect of the forearm. Here it takes its position between the two layers of the extensor muscles and rapidly decreases in size by giving off in quick succession branches to the neighboring muscles. As a much attenuated nerve it reaches the posterior surface of the interosseus membrane at the junction of the middle and lower thirds of the forearm. From the interval between the extensores longus and brevis pollicis it courses along the membrane, covered in turn by the extensor longus pollicis, the extensor indicis, and the tendons of the extensor longus digitorum, finally reaching the dorsum of the wrist, where it presents a small ganglionic swelling.

Relations of Arteries

BRACHIAL (See Day 26)

RADIAL (See Day 28)

ULNAR (See Day 28)

SUPERIOR PROFUNDA accompanies the musculo-spiral nerve around to the outer side of the humerus to the external supracondylar ridge. Here it pierces the external intermuscular septum and continues downward between the brachialis anticus and the supinator longus, to the terminal anastomosis in front of the external condyle (See Day 26).

POSTERIOR INTEROSSEUS passes backward between radius and ulnar above interosseus membrane. Then turns abruptly downward between layers of extensor muscles and breaks up at wrist to assist in formation of dorsal carpal network.

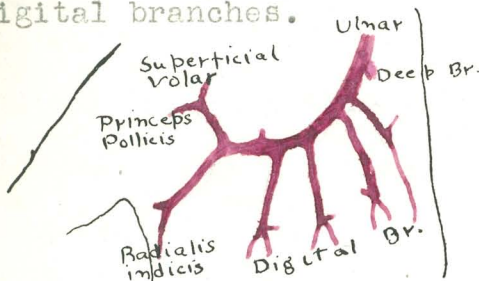
Palm of Hand

PALMARIS BREVIS

A thin quadrangular sheet which lies immediately beneath the skin of the hypothenar eminence. It arises from the proximal portion of the ulnar border of the palmar aponeurosis and is inserted into the skin of the ulnar border of the hand.

Superficial Palmar Arch

Formed by the ulnar artery and usually completed by a branch from the radialis indices but sometimes by the superficial volar or by a branch from the arteria princeps policis of the radial. The arch passes across the palm, describing a curve, with its convexity downward. From it rise the four digital branches.



Structures passing beneath the anterior annular ligament and their relations.

(See DAY 28) The groove which this ligament forms transmits the tendons of the long flexors (longus pollicis, sublimis digitorum, profundus digitorum) and of the flexor carpi radialis and the median nerve. The canal so formed is divided by a partition into a small radial compartment through which the flexor carpi radialis passes, and a large ulnar one which gives passage to the others mentioned. The tendons are enclosed within synovial sacs which extend downward to about the middle of the palm and upward to a short distance above the upper edge of the ligament. The sac which surrounds the flexor longus pollicis is usually separate from that which surrounds the remaining tendons of the ulnar compartment; occasionally the portion surrounding the tendons of the index finger is also separate.

Diagram of relations:

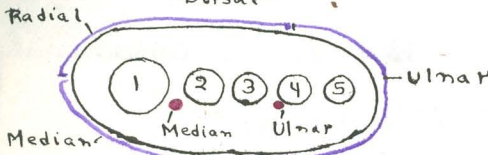
Flexor
 { Sublimis } Digitorum
 { Profundus }
 4 Tendons Each.



Nerve Supply to the Hand

Cutaneous:

- Radial (musculo-spiral) to dorsal side, as far as middle of ring finger.
- Median to ventral aspect, radial side as far as middle of ring finger.
- Ulnar to dorsal and ventral aspects as far as middle ring finger.



Muscular:

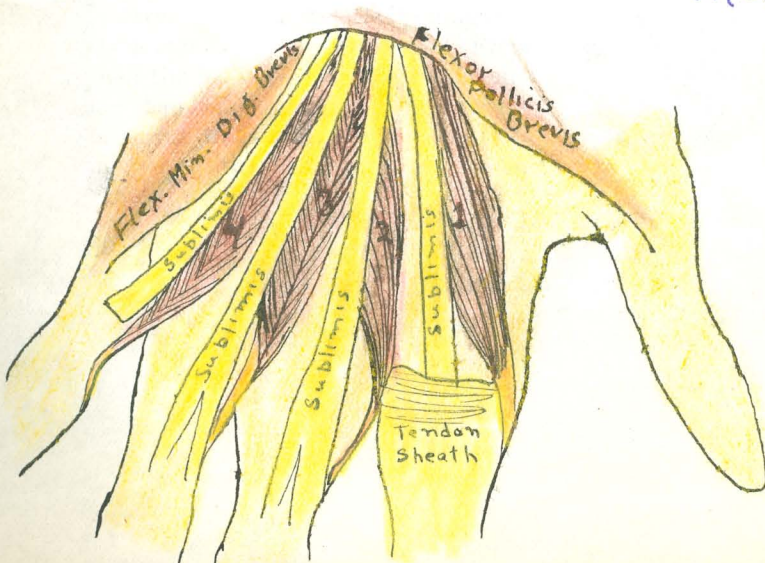
Ventral
Median to four and one half:

- Two outer lumbricales
- Abductor pollicis
- Opponens pollicis
- Flexor brevis pollicis (one half)

Ulnar to fifteen and one half:

- Flexor brevis pollicis (one half)
- Seven interossei
- Two inner lumbricales
- Abductor minimi digiti
- Opponens minimi digiti
- Flexor minimi digiti
- Adductor pollicis transversus
- Adductor pollicis obliquus
- Palmaris brevis

3/12/21
M.L.L.



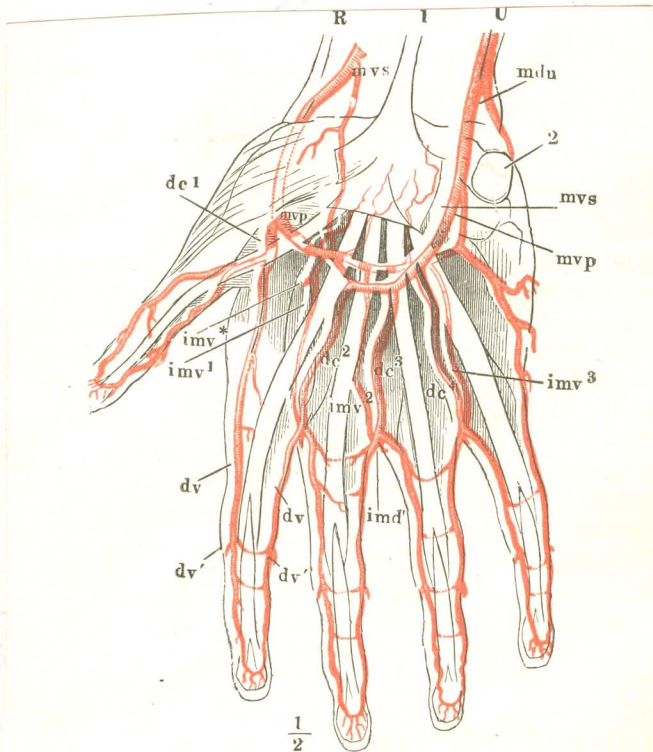
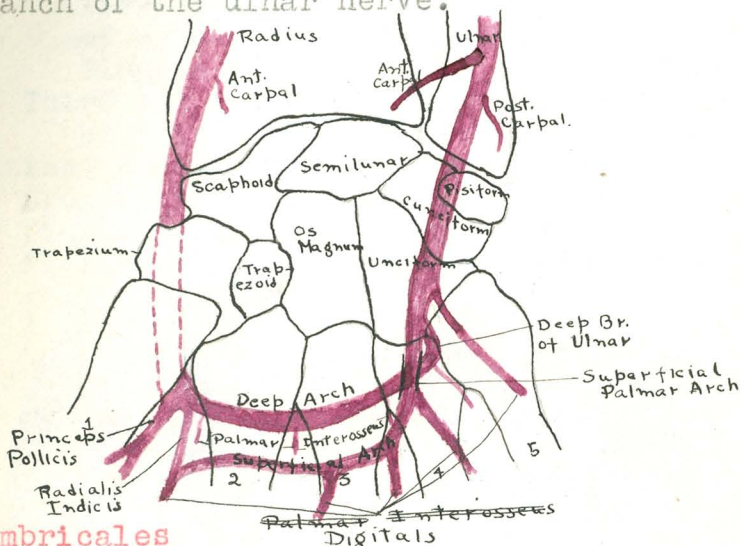


FIG. 77.—The arteries of the hand, showing the communications or anastomoses of different arteries and the fine terminal twigs given off from the larger trunks; these twigs end in the capillaries which would only be visible if magnified. *R*, the radial artery on which the pulse is usually felt at the wrist; *U*, the ulnar artery.

Deep Palmar Arch

Formed by the anastomosis of the terminal part of the radial artery with the deep volar branch of the ulnar. It lies upon the carpal extremities of the metacarpal bones and on the Interossei, being covered by the Adductor pollicis obliquus, the Flexor tendons of the fingers, and the Lumbricales. Along side of it, but running in the opposite direction, is the deep branch of the ulnar nerve.



Lumbricales

Four slender band like muscles in the palm.
Origin: (Radial to ulnar side)

First two from radial side of flexor profundus tendons to index and middle fingers respectively.

Third from adjacent sides of tendons of middle and ring fingers

Fourth from tendons of ring and little fingers.

Insertion: pass distally into slender tendons which are continued to the radial side of the first phalanges of the second, third, fourth, and fifth fingers and are inserted into the membranous expansions of the tendons of the extensor communis digitorum to those fingers.

Action: flex first phalanges of the fingers and at the same time, by their tension on the extensor tendons, to keep the second and third phalanges extended.

Dorsal Interossei

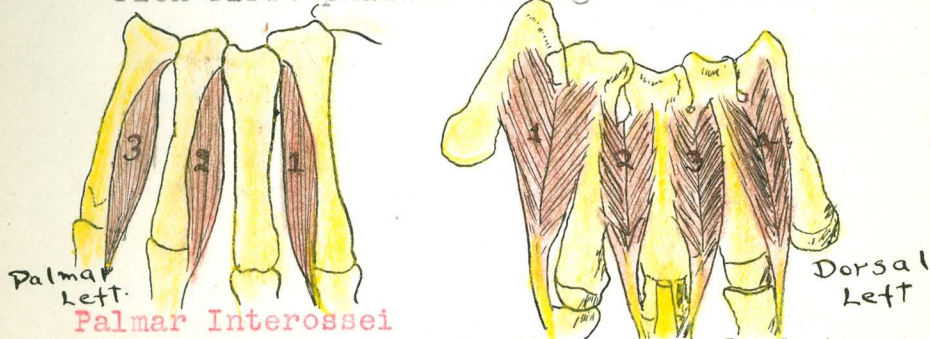
Four in number, lying in intervals between metacarpal bones, dorsal to the volar interossei. Origin: bipinnate from adjacent surfaces of metacarpals bounding the interspace in which muscle lies.

Insertion:

First and second, into radial side of base of first phalanx and into membranous expansion of extensor tendons of second and third fingers

Third and fourth similarly into ulnar sides of third and fourth fingers.

Action: Muscles 1 & 4 draw fingers 2 & 4 away from third while second and third draw third finger radially or ulnarly as the case may be. Flex first phalanx of digit to which attached

**Palmar Interossei**

Four slender muscles in the intervals between the metacarpal bones and resting upon the dorsal interossei. Counting from the radial side

Origin:

First and second from ulnar side of the bases of first and second metacarpals

Insertion: ulnar side of base of first phalanx, and, in the case of the second muscle, also into the membranous expansion of the long extensor tendon of the corresponding digit.

Third and fourth

Origin: radial side of fourth and fifth metacarpals

Insertion: similar to second but into radial sides of fourth and fifth digits.

Action: draw first, second, fourth, and fifth digits towards the middle finger and flex first phalanx of the same digits.

DAY 32

3/15/21

Elbow Joint and Superior Radio-Ulnar Articulation.

Define capsule and special ligaments noting position of each especially Lateral and Orbicular. Open capsule and note extent of Synovial Membrane and articular surfaces. Note Processes in relation to their fossae. Study the movement and strength of each joint.

Questions:—

- (1) Describe each joint fully naming ligaments, bones, etc. relative to each.

DAY 33

3/16/21

Interior Radio-Ulnar Articulation and Wrist Joint.

Define ligaments of these joints. Note these articulations. (1) Inferior Radio-Ulnar, (2) Radio-Carpal, (3) Inter-Carpal, (4) Carpo-Metacarpal, (5) Inter-Metacarpal. Note the articulation of the thumb. Open and examine the synovial membranes.

Questions:—

- (1) Describe fully the Radio-Ulnar and Wrist joints naming the bones and ligaments relative to each.
- (2) Name the bones of the wrist and give their relations.

DAY 34

3/17/21

Scapula.

Note margins, Supra-Scapular notch, Glenoid Fossa, Dorsal Surface, Spine, Supra- and Infra-Spinous fossae, Costal Surface and Subscapular fossae. Coracoid Process, Acromion Process.

Humerus.

Note Head, Neck, Greater and Lesser Tuberosities, Bicipital Groove, Shaft, Deltoid Tubercle, Musculo-Spiral Groove, Condylod Ridges, Condyles, Articular Surfaces, Coronoid, and Olecranon Fossae.

Ulna.

Note Olecranon and Coronoid Process, Sigmoid Cavities, Shaft, Head, Styloid Processes, Articular Surfaces.

Radius.

Note Head, Neck, Bicipital Tuberosity, Shaft, Styloid Process, Articular Surfaces.

Questions:—

- (1) Describe each of these bones.

Face:—

DAY 35

3/18/21

Make an incision in the midline from chin to root of nose. Another along the inferior border of mandible and obliquely upward posterior to ear. Remove skin of face carefully. Identify the Muscles of the face, arteries, veins and terminations of nerves.

Note:—Branches of Facial and Trigeminal nerves. Facial Artery and Vein.

Questions:—

- (1) Name muscles of the face.
- (2) Give blood and nerve supply.
- (3) What is peculiar about the origin and insertion of most of these muscles?
- (4) Name and locate the cutaneous nerves of the face.
- (5) Why should an Osteopath know these terminations?

DAY 36

3/19/21

Parotid Gland and Facial Nerve.

Make crucial incision in fascia over Parotid gland. Turn aside the 4 flaps and dissect out gland identifying the structures associated with it. Dissect out Stenson's Duct.

Note:—

Superficial Temporal, Transverse Facial, and Post. Auricular Arteries. Temporo Maxillary Vein. Branches of Facial, Auriculo-Temporal and Great Auricular Nerves.

Questions:—

- (1) Give the relations of the Parotid Gland.
- (2) What structures pass thru it?
- (3) Describe the Facial Nerve.

DAY 37

3/23/21

Masseter and Temporal Muscles.

Remove Parotid Gland keeping Artery, Vein and Nerve intact. Clean Masseter muscle. Separate Zygoma in front and behind, turn down leaving attachment of Masseter. Save Masseteric vessels and nerves. Clean Temporal muscle. Remove Masseter taking care not to injure structures in relation to its insertion.

Note:—

Structures on Masseter. Nerves and vessels in relation to Temporal. Note Buccinator Muscle and relations.

Questions:—

- (1) Give Origin and Insertion of these muscles.
- (2) Discuss Osteopathically.

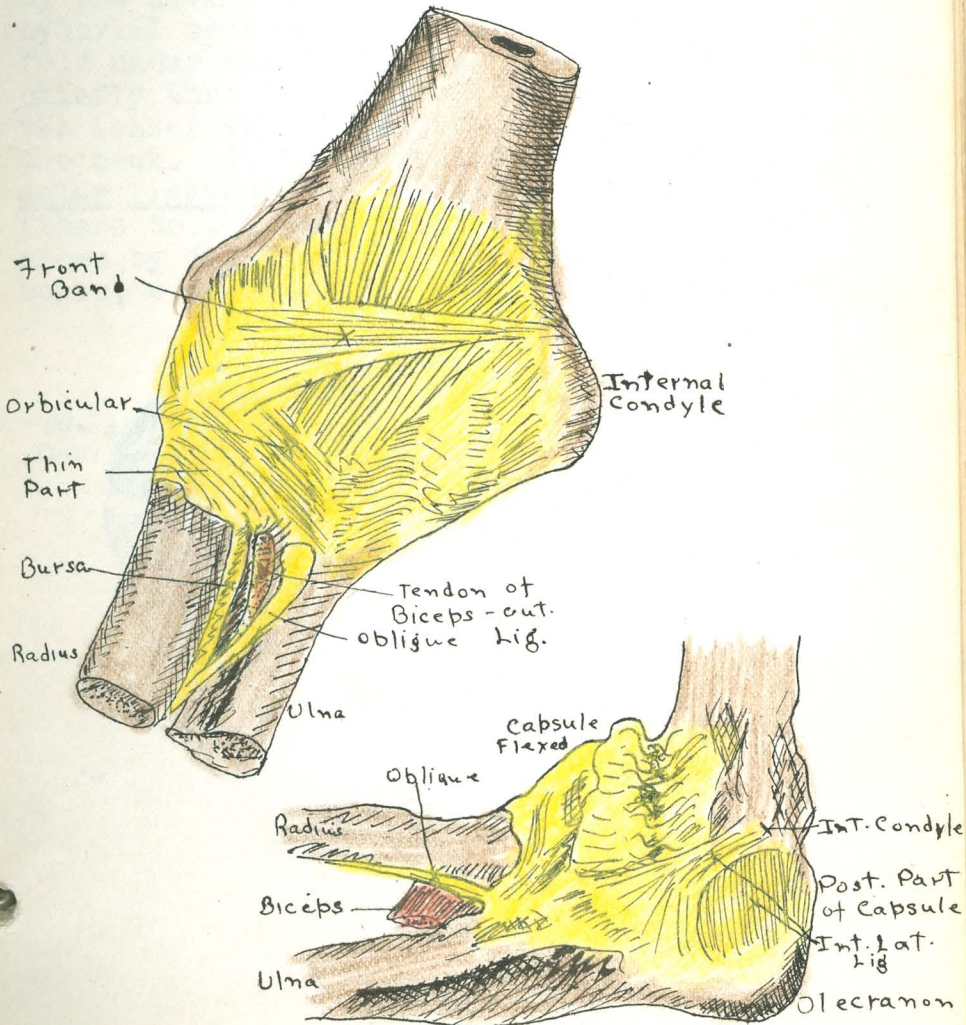
Elbow Joint and Superior Radio-Ulnar Articulation

ELBOW JOINT is a modified hinge joint with the axis of rotation oblique to the axis of both humerus and ulna. The motion depends on the trochlea and the surfaces of the greater sigmoid cavity. The shape of the trochlea causes the ulna to describe a spiral line in turning on it. The capsular ligament surrounds the joint. It is weak behind, stronger in front, and strongest at the sides, which last are usually called the lateral ligaments.

The anterior fibers arise from the humerus above the coronoid and radial fossae, and from the front of the bases of both condyles. Behind, they arise from about the middle of the olecranon fossa, which is only partly within the capsule. Transverse fibers bridge it, passing from the highest points of the borders of the trochlea. Below this the posterior fibers arise beyond these borders, so that the trochlea is included in the joint. At the sides the so-called lateral ligament fibers radiate from points below the tips of the condyles. A little of the external and a large part of the internal condyle are not enclosed. The capsule is inserted below, posteriorly, into a little groove described with the bone at the border of the olecranon. The radiating fibers from the external condyle are inserted into the surface of the orbicular ligament, behind, outside, and in front. They are covered by tendonous fibers of the muscles from the condyle, which are also inseparable from them, and which greatly strengthen the joint. The fibers radiating from the tip of the inner condyle, or the internal lateral ligament are in two layers. The posterior, the deeper is attached to the side of the olecranon; the anterior is a strong band passing to the side of the coronoid process, which sends fibers backward, overlapping the deeper layer. The anterior fibers go to the orbicular ligament and to the coronoid process near its edge. The front part of the capsule is strengthened by delicate oblique fibers from the front of the internal condyle, passing downward and outward. Masses of fat, incorporated in the capsule both before and behind, project into

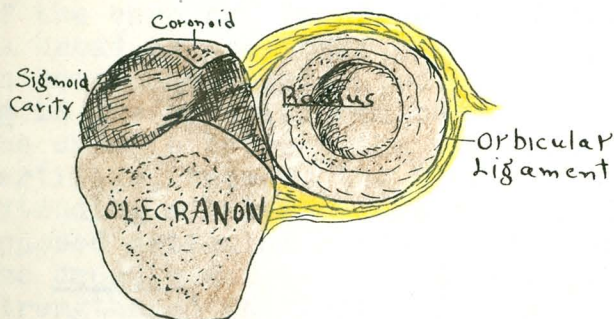
the joint, carrying the synovial membrane before them. There is a thick pad of fat, which, when large, may bear well marked synovial folds at the notch on the inner side of the ulna where the olecranon joins the coronoid.

The movements are of two orders: flexion and extension, and those which occur in twisting the forearm. Complete extension tenses the front of the capsule and forces the tip of the olecranon into the fossa on the back of the humerus.



SUPERIOR RADIO&ULNAR ARTICULATION

Between the circumference of the heads of the radius and the lesser sigmoid cavity of the ulnar extended into a circle by the orbicular ligament. The articular ends of the bones are coated with cartilage requiring no particular description. The orbicular ligament surrounds the head of the radius, springing from the two ends of the lesser sigmoid cavity and from the lines running down from them. This band embraces the head tightly, but is separated from it by the cavity of the joint, and is lined with synovial membrane. It narrows below so as to fold under the projecting head, and is attached chiefly thru fibers from the lower border of the lesser sigmoid cavity, to the inner side of the neck. It is connected above with the capsular ligament, of the elbow joint. That the fibers to the neck limit rotation is easily shown by dividing all bands connecting the bones, excepting the orbicular ligament.



Inferior Radio-Ulnar Articulation and Wrist**INFERIOR RADIO-ULNAR ARTICULATION****Triangular cartilage and capsular ligament**

From in front this joint is an L-shaped cavity the vertical part being between the head of the ulna and the hollow on the radius, and the horizontal limb between the ulna and the triangular cartilage, which is attached by its base to the border between the inner and lower ends of the radius in such a manner that its distal surface is in the same plane as the lower end of the radius. The apex of the cartilage is attached by a ligament some three millimeters long to the groove between the head and the styloid process of the ulna and to the inner surface and anterior edge of the latter. Strong bands, inseparable from the ligaments of the wrist, run along its border to the front and back of the articular surface of the radius. The fibro-cartilage is very flexible and adapts itself to the surfaces of the lower end of the ulna and of the first row of the carpus. Its inner end, however, is not as broad as the lower end of the ulna. It is in some cases perforated. The membrana sacciformis is the synovial membrane of this joint, lining the capsule between the ulna and the triangular cartilage, between the ulna and the radius, and extending a little above the top level of the apposed articular surfaces of these bones. The capsule enveloping it is delicate, but strengthened in front and behind by illmarked bands passing between the bones; these are sometimes described as distinct anterior and posterior ligaments. The connection between the lower ends of these bones is much strengthened by the pronator quadratus.

Wrist Joint**RADIO-CARPAL ARTICULATION**

The lower surface of the radius is articular for the scaphoid and semilunar bones of the wrist. It is roughly triangular with the base inward. It is concave with a faint ridge from before backward, marking off the inner square for the semilunar and the outer triangle for the scaphoid.

The semilunar presents a convex proximal surface for the articulation, but, extending under the triangular cartilage, broadest at its scaphoid edge, it narrows internally. The scaphoid is convex on the upper and outer side, which side is wholly articular.

INTER-CARPAL

First row: (radial to ulnar side)

Scaphoid, semilunar, cuneiform, pisiform

Second row:

Trapezium, trapezoid, os magnum, unciform

Articulations:

Scaphoid -- semilunar, trapezium, trapezoid, os magnum.

Semilunar -- scaphoid, cuneiform, os magnum, unciform.

Cuneiform -- semilunar, pisiform, unciform.

Pisiform -- cuneiform.

Trapezium -- scaphoid, trapezoid, 1st & 2nd metacarpals.

Trapezoid -- scaphoid, trapezium, os magnum, second metacarpal.

Os magnum -- scaphoid, semilunar, trapezoid, unciform, 2nd, 3rd, & 4th metacarpals

Unciform -- semilunar, cuneiform, os magnum, 4th & 5th metacarpals.

CARPO-METACARPAL

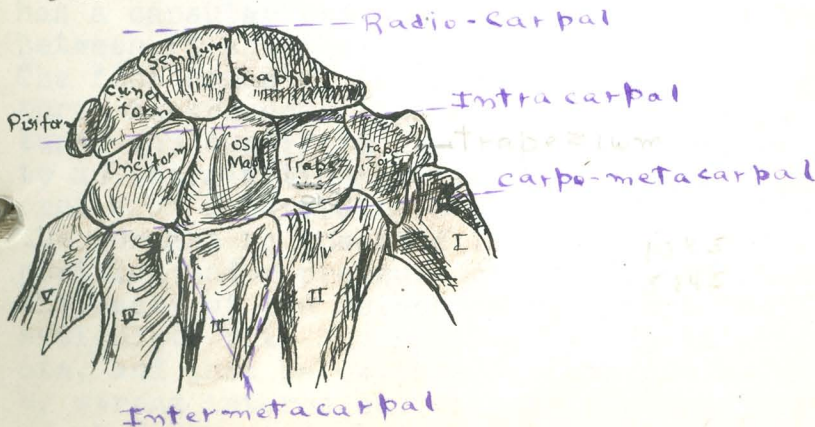
1st Metacarpal -- trapezium

2nd " -- trapezoid, trapezium, os magnum.

3rd " -- os magnum,

4th " -- unciform, os magnum

5th " -- unciform.



LIGAMENTS OF WRIST AND METACARPUS

Three articulations involved: radio-carpal, intracarpal, carpo-metacarpal. A common articulation consisting of a general capsular ligament enclosing synovial cavities separated by an interarticular fibro-osseus septum composed of the bones of the first row and their interosseus ligaments.

Condylarthritis

The upper end of the carpus presents an egg shaped articular surface made up of the convexities of the scaphoid and semilunar, and to a less degree of the cuneiform. These three bones are united by a strong interosseus ligament situated just below the proximal ends of the bones, covered by synovial membrane and completing the articular surface. They completely shut off the radio-carpal from the intracarpal joint.

The intracarpal joint is concavo-convex, the concave part being formed by the cuneiform the semilunar and the hollow surface of the scaphoid; the convexity by the lower surface of the latter bone, which articulates with the trapezium and trapezoid. The concavity amounts to a socket. Much more motion occurs between the scaphoid and the semilunar than between the semilunar and the cuneiform. The distal row of bones presents a prominence made by the os magnum and the unciform which are held firmly together and articulate with the first row. The os magnum receives a ligament from the scaphoid which may be called interosseus. The pisiform has a capsular ligament enclosing the joint between it and the cuneiform.

The four bones of the ^{proximal} ~~second~~ row are joined by three interosseus ligaments. The scaphoid, semilunar and cuneiform have very properly compared to an intra-articular fibro-cartilage, or meniscus subdividing a joint. No muscles of the forearm is inserted into them. They change position under pressure of the distal row. The bases of the metacarpals, except the thumb, articulate with one another by the lateral facets, and just below these joints are held together by strong interosseus ligaments connecting the rough depressions between the bases.

THE CONNECTING LIGAMENTS

The simplest conception is of a capsule, passing from the forearm to the metacarpus and attached to the intervening bones. It is much strengthened by neighboring tendons and their sheaths. It is strong at the sides, weak in front and behind. The stronger bands are blended with the rest. Of them the external lateral ligament runs from the radial styloid process to the outer side of the scaphoid, thence to the trapezium, and is continuous with the capsule of the carpo-metacarpal joint of the thumb. The internal lateral ligament runs from the styloid process of the ulna to the side of the cuneiform, and to the pisiform, thence to the narrow internal edge of the unciform, and finally to the fifth metacarpal. The dorsal part of the capsule is the weakest but is much strengthened by the extensor tendons. A continuous layer passes from the radius and ulnar to the first row, thence to the second, and thence to the metacarpals. The general direction of the fibers of the proximal part is transverse, inclining inward from the styloid process of the radius and the scaphoid to the cuneiform. This constitutes the dorsal transverse ligament, which serves to hold the head of the os magnum and the adjoining part of the unciform in the socket made by the concavity of the first row. The anterior part of the capsule in the hollow of the wrist is stronger, and is reinforced by oblique bands converging downward. Many of these fibers are attached to the narrow palmar prominence of the os magnum. Pretty distinct bundles go to the bases of the metacarpals.

Scapula**MARGINS**

Vertebral longest and nearly vertical.

Upper slants downward and forward to the suprascapula notch at the base of the coracoid process

Axillary border is thick for the insertion of the long head of the triceps and part of the subscapularis.

SUPRASCAPULA NOTCH

At the base of the coracoid process, transmits the suprascapula nerve. Usually bridged by a ligament but sometimes by a bone, forming a foramen.

GLENOID FOSSA

An oval, slightly hollowed, cartilage covered surface expanding from a narrower base. The long axis is vertical and the broad end below. There is often an indentation at the upper part of the inner margin. The edge is a little raised where it bears the glenoid ligament, which deepens the cavity for the head of the humerus. The top of the edge forms the supraglenoid tubercle, whence starts the long head of the biceps.

DORSAL SURFACE

Divided by the spine into a supraspinous and infraspinous fossa. The former gives origin to the supraspinatus. Near the back it is often strengthened by a vertical swelling. The infraspinous fossa is chiefly occupied by the infraspinatus, but two other areas are marked off by two lines, along the axillary border and nearly parallel to it, where the teres major and minor have their origin. (See DAY 19) High up on the axillary border is the groove for the dorsal artery.

SPINE

A triangular plate arising from a small triangular surface at the posterior border, running outward and somewhat forward, and upward. Its attached border stops at the neck before reaching the glenoid cavity. It forms an obtuse angle with the floor of the infraspinous fossa. Its front border is rounded and curves forward, and forms the posterior boundary of the great scapular notch.

The free border is narrow beyond the triangular area, but soon broadens, presenting an upper and a lower lip. The trapezius is inserted into the whole length of the former and of its continuation into the acromion. The lower gives origin to the deltoid.

SUPRASPINOUS FOSSA

A triangular area giving rise to the supraspinatus. Near the back it is often strengthened by a vertical swelling.

INFRASPINOUS FOSSA

Below the spine and chiefly occupied by the infraspinatus but giving origin along its axillary border from the inferior angle to the glenoid cavity to the teres major, teres minor, and triceps, respectively.

COSTAL SURFACE AND SUBSCAPULA FOSSA

Concave surface, forming the fossa, the deepest hollow being along the origin of the spine. At the very top the bone often takes a turn outward. The serratus magnus is attached to the rough surfaces inside the upper and lower angles and to a narrow line connecting them just beside the vertebral border. These surfaces are separated from the rest of the fossa by well marked lines, which, with some four ridges running upward and forward from the spinal border, give origin to tendinous septa from which the subscapularis springs. This muscle arises also from the deep groove inside the axillary border.

CORACOID PROCESS

Springs from the top of the head just behind the glenoid cavity and a little to the inner side. The root is compressed from side to side and inclines somewhat forward, and inward. The free projecting portion is somewhat cylindrical and runs forward, outward, and downward to end in a knob near the inner side of the shoulder joint. A rounded prominence, the conoid tubercle, for the conoid ligament, is situated on the top of the first part and rather to the inner side, just above the angle formed by the two parts. The trapezoid ridge for the ligament runs forward from the conoid tubercle along the inner side. The outer side of the

upper aspect has a ridge for the coraco-acromial ligament. The short head of the biceps and the coraco-brachialis arise from a roughness at the tip of the process, and the pectoralis minor inserts into one at its inner side.

ACROMION PROCESS

A broad flat expansion overhanging the shoulder joint and articulating with the clavicle by an elongated facet slanting slightly upwards. A short preclavicular border in front of this receiving the outer end of the coraco-acromial ligament, runs forward and outward to the anterior tubercle. From this the outer border runs backward to the metacromial tubercle, whence the posterior border runs into the hind edge of the spine. The outer border gives insertion to the deltoid. The lower tip of the spine runs directly into the hind border of the acromion. The shape varies from quadrate to three sided or even sickle shaped.

Humerus

HEAD AND NECK

A globular articular process looking upward, inward and backward. It is surrounded by a slight groove for the attachment of the capsular ligament at what is called the anatomical neck. The surgical neck is just below the whole upper extremity.

TUBEROSITIES AND BICIPITAL GROOVE

The tuberosities are separated in front by a deep furrow, the bicipital groove, thru which runs the tendon of the long head of the biceps. The greater tuberosity is a rough enlargement placed externally. Its highest point is in front. A super surface begins here, and passing downward and backward beside the head, broadens as it goes, it bears three smooth facets for the insertion of the supraspinatus, infraspinatus, and teres minor respectively.

The lesser tuberosity, much smaller, is on the front of the bone. It bears a prominent angle, running downward and inward for the subscapularis. The upper aspect of the process, which also looks inward, is smooth for a bursa beneath the tendon.

SHAFT is roughly cylindrical above and prismatic below. It presents three borders and three surfaces. The anterior border starts from the greater tuberosity as the outer lip of the bicipital groove which can be traced thru the first quarter of the shaft. This outer lip becomes thicker and more prominent for some two inches below the surgical neck to receive the insertion of the pectoralis major. Below this it is joined by the lower end of the deltoid eminence and may then be traced downward to a ridge separating the capitellum from the trochlea where it ends. The internal border starts at the inner side of the neck, often so near the inner lip of the bicipital groove as to be confounded with it and runs down to the very tip of the internal condyl. It is distinct in the middle and prominent in the last third and is known as the INTERNAL SUPRA-CONDYLAR RIDGE. The external border begins at the back of the greater tuberosity and runs to the outer condyle, the lower part being the EXTERNAL SUPRACONDYLAR RIDGE. The internal surface bears the inner lip of the bicipital groove. It receives the tendon of the teres major. The nutrient foramen is rather below the middle of this surface. The external surface is convex in the upper half and concave in the lower. Its second half is occupied by the DELTOID EMINENCE, a long rough elevation, slanting downward and forward against the inner border for the insertion for the deltoid. The posterior surface is twisted, facing somewhat inward above and backward below. The upper palne portion gives origin to the outer head of the triceps and the lower, to the inner head. A broad spiral groove beginning on the external surface behind the deltoid eminence, twists forward and downward, and is called the MUSCULO-SPIRAL GROOVE. The shaft takes a forward bend just at its termination, so that most of its lower end lies in front of the continuation of the axis of the shaft. The lower extremity is broad from side to side with an articular surface below, and two lateral projections, the condyles. The INNER CONDYLE, much the larger, is sharp and promin-

ent, giving rise to the flexor pronator muscles. It is faintly grooved behind by the ulnar nerve. The OUTER CONDYLE is a slightly raised knob. The articular surface consists of two parts, an inner pulley-like surface, the TROCHLEA, for the ulna, and an outer convexity, the CAPITELLUM, for the radius. The former is bounded internally by a sharp border forming about three quarters of a circle and projecting below the crest of the bone as well as before and behind it. It is bounded externally by a ridge which is prominent behind where the trochlea forms the whole of the articular surface, but is faint in front where it separates the two surfaces. The trochlea is convex from before backward. It is concavo-convex from side to side, the convexity being greatest at the inner border. There is a convexity above the trochlea both before and behind. The former is the CORONOID FOSSA. It is small and receives the coronoid process of the ulna in flexion. The posterior depression, triangular and much larger, is the OLECRANON FOSSA, receiving that process in extension. The bone separating these fossae is very thin. The joint is a spiral or screw joint. The CAPITELLUM on which the concave head of the radius plays, is situated on the front of the outer part of the lower end. It is a portion of a sphere. A groove runs between it and the outer ridge of the trochlear. The outer border is straight. The posterior runs from it obliquely backward and inward. The capitellum is placed quite to the front, and so the articulation is quite more extensive there.

ULNA

The upper part articulates with the humerus and with the radius, by means of the greater sigmoid cavity in the former case, which cavity is hollowed out of the continuous surfaces of the olecranon process behind and above and the coronoid process in front. The OLECRANON is a cubical piece of bone projecting upward in continuation with the bone. It presents a superior, posterior and two lateral surfaces. The superior surface gives attachment to the

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capsular ligament and the triceps. It is pointed in front. The posterior surface is triangular. The outer surface gives attachment to the capsule, and anconeus. The inner surface also gives attachment to the capsule. The CORONOID PROCESS rises from the anterior surface of the front of the shaft. Its upper surface is articular. The front rises to a point with the capsular groove around the border and the insertion of the brachialis anticus below. Here also is the tuberosity of the ulna for the oblique ligament. The inner surface gives origin to the flexor sublimis digitorum. The outer surface presents the lesser sigmoid cavity. The GREATER SIGMOID CAVITY is concave from above downward and broader in the upper half. It is surrounded by an ill marked groove for the capsule. The articular surface is subdivided by a rounded ridge, running from the point of the olecranon to that of the coronoid. The LESSER SIGMOID CAVITY for the head of the radius is separated from the greater by a ridge which does not interrupt the cartilage coating both. It is an oblong quadrilateral area. The SHAFT presents three borders and three surfaces, and diminishes steadily from above down. The posterior border is formed by the union of the two lines bounding the subcutaneous surface at the back of the olecranon. In the first two thirds it gives origin to the aponeurosis of the flexor carpi ulnaris. The anterior border springing from the junction of the front and inner sides of the coronoid runs down to the styloid. The pronator quadratus arises from the last quarter. The interosseus border is sharp. This arises above by two lines, the posterior of which is the supinator ridge. The depression which gives origin to the supinator brevis receives the bicipital tuberosity of the radius in pronation. The anterior surface is concave and gives origin low down to the pronator quadratus. Above it rises the flexor profundus digitorum. The inner surface is concave above and convex below. The posterior surface gives origin to part of the supinator brevis and anconeus. Below arises the extensor carpi ulnaris, and externally to that, the extensor ossis metacarpi pollicis, extensor longus pollicis, and extensor indicis.

The lower extremity consists of the head and styloid process. The HEAD is rounded and enlarged and articulates with the radius. A triangular fibro-cartilage separates it from the wrist joint. The STYLOID PROCESS is short and slender and runs down from the posterior internal angle. A groove between the styloid process and the head transmits the tendons of the extensor and flexor carpi ulnaris.

Radius

The HEAD is a circular enlargement with a shallow depression on the top to articulate with the capitellum, and a smooth margin to turn in the socket formed by the lesser sigmoid cavity and the orbicular ligament. The NECK is a smooth constricted portion some two centimeters long. The SHAFT bears a large prominence, the BICIPITAL TUBEROSITY, at the inner and front aspect, just below the neck. It receives the biceps tendon. The interosseus border of the shaft is distinct. The oblique line on the anterior surface gives rise to the flexor sublimis digitorum, partly, and separates the insertion of the supinator brevis from the origin of the flexor longus pollicis. The pronator quadratus inserts below. The triangular tubercle at the end gives insertion to the brachio-radialis. The anterior surface is slightly concave and gives origin to the flexor longus pollicis. The outer surface gives insertion to the pronator radii teres. The lower extremity bends slightly forward and ends in front in a ridge for the capsule attachment. The outer side is prolonged downward as the styloid process, whence comes the external lateral ligament of the wrist. The inner side is occupied by the sigmoid cavity for the articulation for the ulna. The lower surface is articular. (See DAY 32)

Muscles attached to

CLAVICLE

Scapula

- 1 Deltoid
- 2 Trapezoid
- 3 Pectoralis major
- 4 Sterno-cleido-mastoid
- 5 Sterno-hyoideus
- 6 Subclavius

HUMERUS

- | | |
|-----------------------|--------------------------------|
| 1 Deltoid | 13 Pronator radii teres |
| 2 Latissimus dorsi | 14 Supinator |
| 3 Pectoralis major | 15 Anconeus |
| 4 Teres major | 16 Palmaris longus |
| 5 Teres minor | 17 Flexor carpi radialis |
| 6 Triceps | 18 Flexor carpi ulnaris |
| 7 Subscapularis | 19 Flexor sublimis digitorum |
| 8 Infraspinatus | 20 Extensor carpi radialis b. |
| 9 Supraspinatus | 21 Extensor carpi radialis l. |
| 10 Coracobrachialis | 22 Extensor carpi ulnaris |
| 11 Brachioradialis | 23 Extensor communis digitorum |
| 12 Brachialis anticus | 24 Extensor minimi digiti |
| 13 | |

ULNA

- | | |
|------------------------|---------------------------|
| 1 Triceps | 8 F. carpi ulnaris |
| 2 Anconeus | 9 F. sublimis digitorum |
| 3 Brachialis | 10 F. profundus digitorum |
| 4 Pronator radii teres | 11 F. pollicis longus |
| 5 Pronator quadratus | 12 E. carpi ulnaris |
| 6 Supinator | 13 E. longus pollicis |
| 7 Abductor pollicis l. | 14 E. indices |

RADIUS

- 1 Supinator
- 2 Pronator radii teres
- 3 Pronator quadratus
- 4 Biceps
- 5 Brachioradialis
- 6 Flexor sublimis digitorum
- 7 Flexor longus pollicis
- 8 Abductor longus pollicis
- 9 Extensor brevis pollicis

Facial muscles Blood and Nerve Supply (Superficial)

PLATYSMA

- B -- superior thyroid, facial
- N -- inframandibular of facial

OCCIPITO-FRONTALIS

- B -- supra-orbital, frontal, temporal, occipital, posterior auricular
- N -- posterior auricular of facial (occipitalis)
temporal of facial (frontalis)

AURICULARIS POSTERIOR

- B -- posterior auricular
- N -- posterior auricular of facial

AURICULARIS SUPERIOR

- B -- temporal
- N -- temporal of facial

AURICULARIS ANTERIOR

- B -- temporal
- N -- temporal of facial

ORBICULARIS PALPEBRARUM

- B -- supraorbital, frontal, temporal
- N -- temporal and zygomatic of facial

ZYGOMATICUS MAJOR

- B -- facial
- N -- zygomatic of facial

LEVATOR LABII SUPERIORIS ALAEQUE NASI

- B -- facial
- N -- zygomatic of facial

DEPRESSOR LABII INFERIORIS

- B -- facial
- N -- supramandibular of facial

LEVATOR MENTI

- B -- facial
- N -- supramandibular of facial

DEEP LAYER

ORBICULARIS ORIS

- B -- superior and inferior coronaries, inferior labial
- N -- buccal and supramandibular of facial

NASALIS

- B -- facial
- N -- zygomatic and buccal of facial

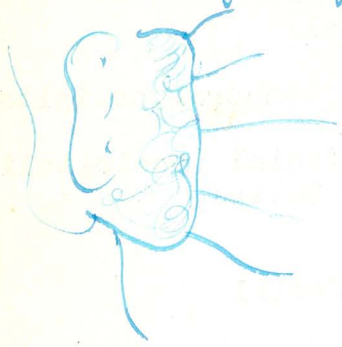
LEVATOR LABII SUPERIORIS

- B -- facial
- N -- zygomatic of facial

Large fascia

7th nerve at foramina

Seventh fans from parotid



LEVATOR ANGULI ORIS

- B -- facial
- N -- zygomatic of facial

RISORIIUS

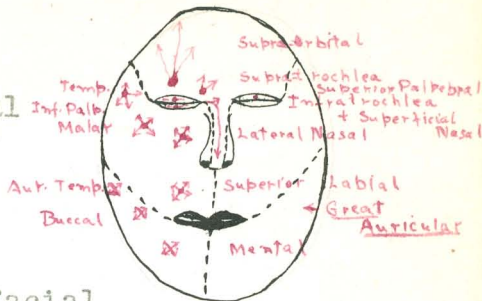
- B -- facial
- N -- buccal of facial

DEPRESSOR ANGULI ORIS

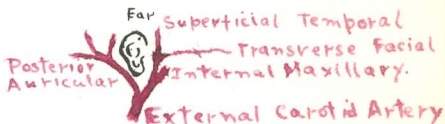
- B -- facial
- N -- supramarginal of facial

BUCCINATOR

- B -- facial
- N -- buccal of facial



Origin and inser-tion is in the skin or fascia in many cases.



Cutaneous nerves of face

FIFTH OR TRIGEMINAL

(Sensory to face and head; motor to mastication)

Ophthalmic Division

Frontal

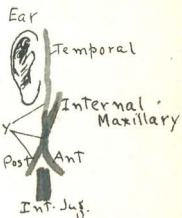
- Supratrochlea to mid line forehead
- Supraorbital to forehead and scalp to vertex

Nasal

- Superficial to dorsum of nose
- Infratrochlea to side of nose

Lacrimal

- Superior palpebral to upper eyelid



Maxillary Division

- Temporo-Malar to those regions
- Inferior Palpebral to lower eyelid
- Lateral Nasal
- Superior Labial

Mandibular Division

- Auriculo-Temporal
 - Auricular
 - Temporal
 - Mental to external auditory meatus
- Buccal to skin over muscle
- Mental to chin
- Lingual

A small branch of the great auricular from the cervical plexus supplies a small area at the angle of the jaw.

Importance due to frequency of neuralgia and reflex disturbances from this to other spinal nerves.

Relations of Parotid Gland.

It is situated behind the upper part of the ramus of the lower jaw, which it overlaps both within and without. Its limits in both directions are very variable. There may be an accessory gland in front of the masseter. The gland has a strong fibrous envelope, continuous with the cervical fascia in front of the sterno-mastoid, closely applied to the glandular substance and continuous with the partitions that pass thru the organ, so that it can be dissected off from the organ with difficulty. The parotid is divided into many small compartments or lobules by these resisting septa of fibrous tissue, the quantity of which gives it toughness. It occupies a cavity bounded in front by the ramus of the jaw, covered by the masseter and internal pterygoid muscles; behind by the external auditory meatus, the tympanic plate, the base of the styloid process, and the front of the atlas. The posterior wall is prolonged laterally by the posterior belly of the digastric, the stylo-hyoid, and more externally by the sterno-mastoid muscles. The posterior part of the gland is bounded internally by the stylo-glossus, stylo-pharyngeus, and by the fascia known as the stylo-maxillary ligament. Areolar tissue and fat lie anteriorly. The internal carotid artery, internal jugular vein, and pneumogastric nerve are close against the lower part of the inner surface of the gland.

Structures passing thru the gland.

The external carotid artery enters the gland from the inner side and divides into its temporal and internal maxillary branches, besides giving off the posterior auricular, and sometimes the occipital arteries, within its substance. The external jugular vein is formed within the gland and emerges from its lower side. Near the skull the great vessels and nerve are separated from the gland by the styloid process. The facial nerve enters the gland on its posterior side and passes thru it obliquely so as to become more superficial as it travels forward, lying external to the external carotid artery and jugular vein. Before emerging from the gland the facial nerve breaks up into its

Osteopathic Importance

Nerve of neuralgia,

The following is a list of the most important points to be remembered in the treatment of neuralgia. The first point is to identify the exact location of the pain. This is often done by drawing a line through the patient's body to indicate the path of the pain. The second point is to determine the nature of the pain. Is it sharp, dull, or burning? Is it constant or intermittent? The third point is to determine the cause of the pain. Is it due to a local lesion, such as a tumor or infection, or is it due to a systemic disease, such as diabetes or rheumatism? The fourth point is to determine the extent of the pain. Is it limited to a small area, or does it spread over a large area? The fifth point is to determine the duration of the pain. Is it a recent onset, or has it been present for a long time? The sixth point is to determine the response to treatment. Has the pain improved with rest, or with the use of analgesics, or with the use of other measures? The seventh point is to determine the prognosis. Is the pain likely to recur, or is it likely to be permanent? The eighth point is to determine the treatment. What measures should be taken to relieve the pain? What measures should be taken to prevent its recurrence? The ninth point is to determine the follow-up. How often should the patient be seen? What signs and symptoms should be watched for? The tenth point is to determine the patient's response to treatment. Has the patient improved? Has the pain been relieved? Has the patient been able to return to normal activities? The eleventh point is to determine the patient's satisfaction. Is the patient satisfied with the treatment? Is the patient satisfied with the results? The twelfth point is to determine the patient's compliance. Has the patient followed the instructions? Has the patient taken the medicine as directed? The thirteenth point is to determine the patient's understanding. Does the patient understand the nature of the disease? Does the patient understand the importance of the treatment? The fourteenth point is to determine the patient's cooperation. Has the patient cooperated with the treatment? Has the patient been helpful in the diagnosis and treatment? The fifteenth point is to determine the patient's attitude. Is the patient optimistic? Is the patient pessimistic? The sixteenth point is to determine the patient's social support. Does the patient have family support? Does the patient have social support? The seventeenth point is to determine the patient's financial support. Does the patient have the financial resources to pay for the treatment? The eighteenth point is to determine the patient's educational support. Does the patient have the educational resources to understand the disease and treatment? The nineteenth point is to determine the patient's cultural support. Does the patient have the cultural resources to understand the disease and treatment? The twentieth point is to determine the patient's spiritual support. Does the patient have the spiritual resources to understand the disease and treatment? The twenty-first point is to determine the patient's psychological support. Does the patient have the psychological resources to understand the disease and treatment? The twenty-second point is to determine the patient's physical support. Does the patient have the physical resources to understand the disease and treatment? The twenty-third point is to determine the patient's emotional support. Does the patient have the emotional resources to understand the disease and treatment? The twenty-fourth point is to determine the patient's intellectual support. Does the patient have the intellectual resources to understand the disease and treatment? The twenty-fifth point is to determine the patient's moral support. 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Does the patient have the moral resources to understand the disease and treatment? The fiftieth point is to determine the patient's spiritual support. Does the patient have the spiritual resources to understand the disease and treatment?

two great divisions, the branches of which begin to subdivide within the glandular mass. The auriculo-temporal nerve also passes thru the upper part of the gland, emerging on its outer aspect. A varying number of lymphatic glands lie in the substance of the parotid STANSON'S DUCT emerges from the front of the gland above its middle, and runs down across the masseter muscle to turn in sharply at its anterior border. It then runs obliquely thru the buccinator to empty into the mouth opposite the second or first superior molar.

Facial Nerve

Motor to the muscles of expression,
 muscles of the external ear,
 stylo-hyoid, posterior belly of digastric
 platysma

Sensory to anterior two thirds of the tongue.

Common path with VIII in the internal auditory meatus, which terminates mesial to the ear. At this point is located the geniculate ganglion whence the great superficial petrosal passes thru the hiatus, enters the middle cranial fossa, and passes to the Vidian canal to join the great deep petrosal and pass to the sphenopalatine ganglion.

There is also a communicating branch to the tympanic plexus, an external superficial petrosal, and a stapedial.

The facial canal carries the nerve down posterior to the tympanic cavity to the stylo-mastoid foramen. In its course the nerve gives off a stapedial branch to the muscle, and the chorda tympani which passes thru the iter chordae and mingles with the lingual branch of the mandibular. It ends as secretory fibers to the submaxillary and sublingual glands

Outside the stylo-mastoid foramen it gives off a posterior auricular branch to the ear muscles and then divides up in the substance of the parotid gland in such a manner as to warrant the name of pes anserine. Usually six muscular branches pass out to the face: temporal, supraorbital (frown), malar, infra-orbital, supra- and inframandibular.

Mid-semester

Examination

Up to this Point

3/19/21

M. L. L.

Masseter Muscle

A strong quadrilateral muscle composed of two portions, separated at their origin and posteriorly by a quantity of loose areolar tissue, but united towards their insertion into the mandible.

Origin:

Superficial part by a strong aponeurosis from the anterior two thirds of the lower border of the zygoma

Deep part from the posterior third of the lower border and the whole of the inner surface of the zygoma

Insertion:

Superficial fibers pass downwards and slightly backward into the outer surface of the angle of the mandible

Fibers of deep portion pass more directly downward into outer surface of ascending ramus as high as the bases of articular and coronoid processes, encroaching to a certain extent upon the insertion of the temporal muscle.

N: masseteric of mandibular Facial artery

Temporal Muscles

Origin: upper half of the deep surface of the temporal fascia and whole extent of floor of temporal fossa

Insertion: by very strong tendon into coronoid process of mandible.

Inter. Maxillary

N: temporal of mandibular B: Super. Temporal

Buccinator Muscle

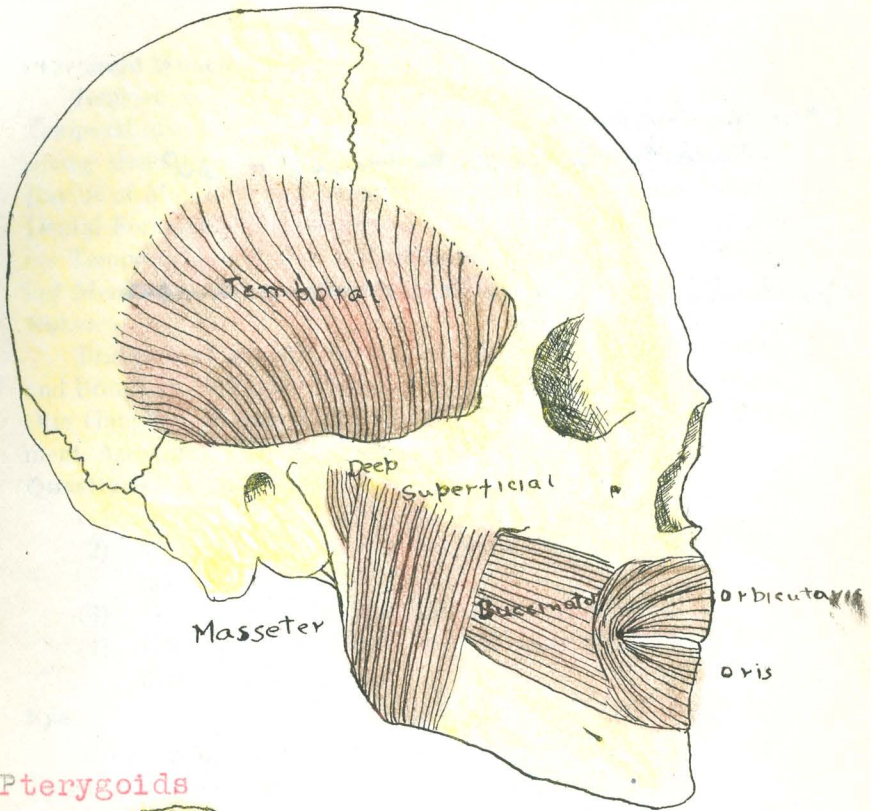
A thick quadrilateral muscle lying immediately exterior to the mucous membrane of the cheek.

Origin: horse-shoe shaped along alveolar border and tuberosity of maxilla and thence upon hamulus of internal pterygoid plate of the sphenoid. Then down along body of mandible as far as premolar teeth

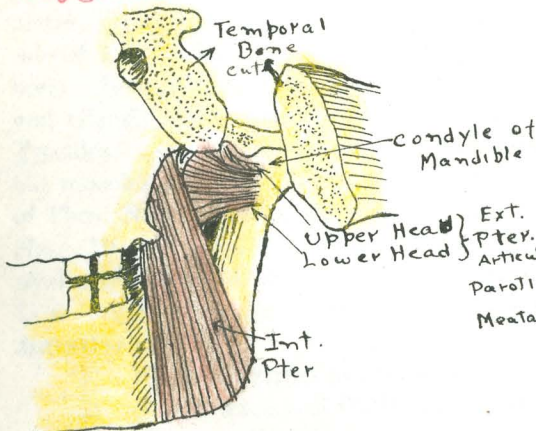
Insertion: into integument of lips.

Discussion

Affected first in Tetanus. Also stretched and violently elastic in case of dislocated jaw, requiring great care lest the thumbs injured in resetting.

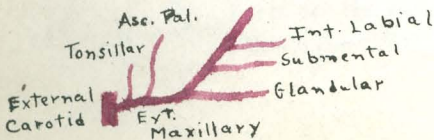
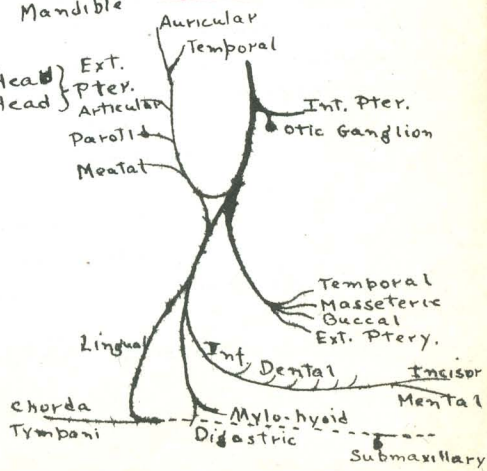


Pterygoids



Seen From Within

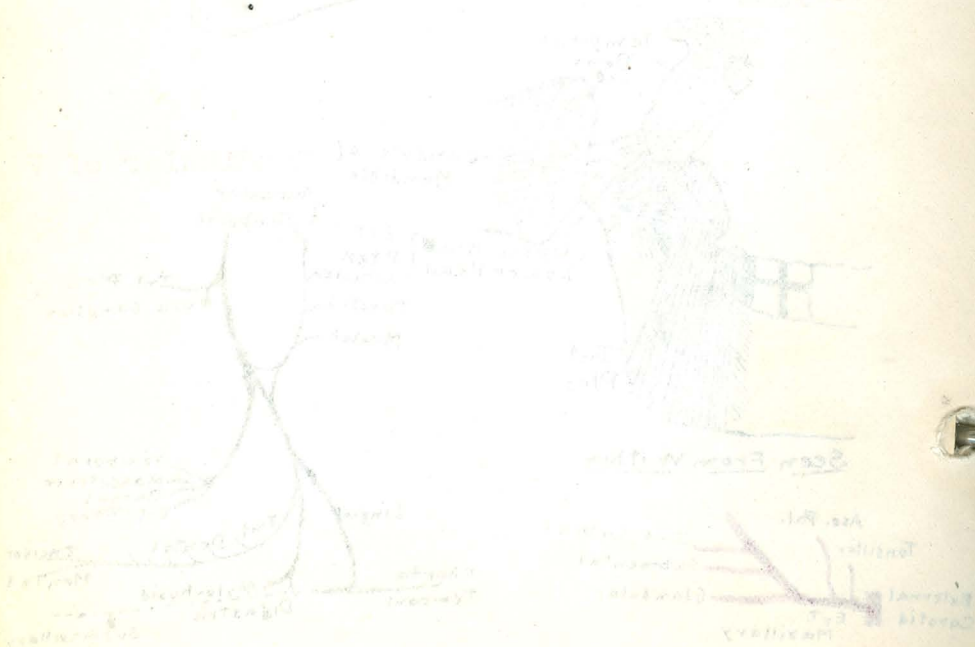
Mandibular of V



Palpebral fascia

Tarsal ligaments
attach tarsal plates to margins of orbit

Ophthalmic vein - cavernous sinus



Pterygoid Muscles.

Remove coronoid process of Mandible with insertion of Temporal muscle attached. Turn upwards and remove carefully saving structures beneath with blood and nerve supply. Clean Ramus of Mandible and remove piece between neck and Inferior Dental Foramen. Expose and clean Pterygoid Muscles. Examine Temporo-Mandibular Articulation and remove Condyle noting Meniscus. Remove Pterygoid Muscles.

Note:—

Branches of Mandibular nerve. Internal Maxillary Artery and Branches, Pterygoid Plexus of Veins, Spheno-Maxillary Fossa, Otic Ganglion, Tensor Palati Muscle, Pterygo-Mandibular Ligament, Ascending Pharyngeal Artery.

Questions:—

- (1) Give Origin and Insertion of the Pterygoids.
- (2) What nerves and Arteries with their branches do you find?
- (3) Describe the Temporo-Maxillary Articulation.
- (4) What structures would be most easily injured by trauma in this region?

Eye.

DAYS 39 & 40

3/25/21

Reflect fibers of Orbicularis Oculi and expose Lacrimal Sac. Trace out Lacrymal Duct. Expose Palpebral fascia, Tarsal plates, Ligaments and muscles. Saw thru Frontal bone on each side of Eye. Chip out roof of orbit back to fissure and remove bone. Remove Malar bone by oblique saw cut. Expose Lacrymal Gland, Artery and Nerve, Frontal nerve, Supraorbital and Trochlear nerves, Supraorbital and Frontal Arteries. Dissect out muscles of Eye. Ophthalmic Artery and Vein and branches of Third Nerve. Clean Eye-ball and define attachments of muscles. Dissect out Infraorbital vessels and Nerve. Make cross-section of eye and define coats, Vitreous Humor, Aqueous Humor, Lens. Split Optic Nerve and note Central Artery.

Questions:—

- (1) Name the structures found in the Orbit.
- (2) Give branches of Ophthalmic Artery.
- (3) Make a diagram of the muscles of the Eye, and give nerve supply.
- (4) What are the sensory and secretory nerves to the structures in the Orbit?

DAY 41 3/26/21

Maxillary Nerves.

Chip bone away and expose the course of the Maxillary nerve, and third part of Internal Maxillary Artery. Clean up and prepare for the dissection of the Neck.

Questions:—

- (1) Give the course of the Maxillary Nerve from superficial origin to termination.
- (2) Name the structures found in the Spheno-Maxillary fossa.
- (3) What abnormalities have you found to date and how have they affected surrounding structures?

DAY 42 3/26/21

Neck.

Make incision in midline from Sternum to Mandible and from Sternum laterally along Clavicle to Acromion process. Reflect skin in one piece to be used later for protection of parts exposed. Remove Superficial fascia the same way. Note the cutaneous nerves. Dissect out the Platysma muscle. Note relations of External and Anterior Jugular Veins. Remove Platysma deeping intact the superficial Cervical nerves. Reflect from above downward working slowly and carefully.

Questions:—

- (1) Describe the Superficial Fascia.
- (2) Give O. I. B. & N. S. of Platysma.
- (3) Discuss its action.

DAY 43 3/28/21

Superficial Cervical Nerves.

Identify these nerves. Ascending:—Small Occipital and Great Auricular. Transverse:—Superficial Cervical. Descending: Acromial, Clavicular and Sternal, also Cervical branch of Facial nerve. Dissect out connections of External and Internal Jugular veins. Clean Sterno-Mastoid Muscle noting relations of nerves to it. Keep nerves intact. Note Veins.

Questions:—

- (1) Give the origin of these nerves.
- (2) Describe the deep fascia of the Neck.
- (3) Give O. I. B. & N. S. of Sterno-Mastoid.
- (4) Discuss Osteopathically.
- (5) Give the formation of the Superficial veins of the neck.

Pterygoid Muscles**PTERYGOID EXTERNUS**

Origin: upper head from under surface of great wing of sphenoid, internal to the pterygoid ridge. Lower head from the outer surface of the lateral pterygoid plate. Internal maxillary artery between heads. Pass back and out.

Insertion: united into anterior border of inter-articular fibro-cartilage of the mandibular articulation and into the neck of the condyloid process of the mandible

Nerve: external pterygoid of mandibular of V

Blood: internal maxillary.

PTERYGOIDEUS INTERNUS

Origin: walls and floor of the pterygoid fossa, the majority of the fibers being attached to the inner surface of the external pterygoid plate and to the tuberosity of the palate bone. A smaller bundle may arise from the tuberosity of the maxilla and the adjacent portion of the palate bone.

Insertion: downward into inner surface of angle and ramus of mandible below mylo-hyoid groove.

Nerve: internal pterygoid of mandibular of V

Blood: facial and internal maxillary.

Nerves**Mandibular of V**

External pterygoid branch from anterior portion
Buccal branch crosses lower head of Pterygoid externus.

Internal pterygoid branch from the trunk
Inferior dental and lingual of posterior division.

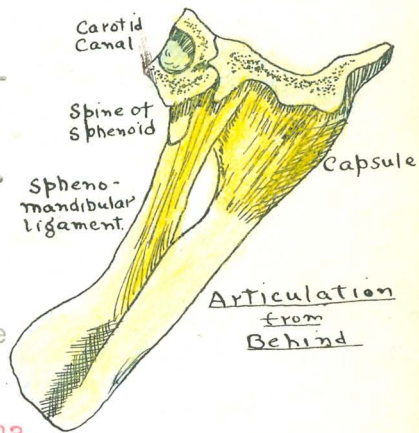
Otic ganglion on root of internal pterygoid.
S. small superficial petrosal to tympanic #
M. internal pterygoid
I. smallest deep to middle meningeal plexus.

Arteries

Internal maxillary between heads of pterygoideus externus and down over lower head, external to pterygoideus internus.
Ascending palatine in relation to inner surface of inner head of pterygoideus internus.

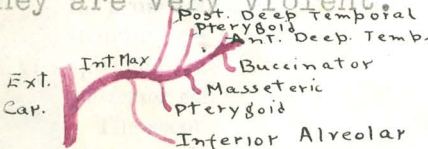
Temporo-Mandibular Articulation

A compound joint consisting of socket, condyle and meniscus, and enclosed by a capsular ligament. The socket includes the glenoid fossa and the articular eminence of the temporal bone. The interarticular fibro-cartilage rests more on the front of the condyle than on the top. It is biconcave. The capsule, weak and lax, is attached to the borders of the articular surfaces and the edges of the meniscus. The external lateral ligament is quite strong. The spheno-mandibular ligament is a weak fibrous structure running from the spine of the sphenoid to the lingular without connection with the joint. The capsule is far too loose to hold the jaw firmly in place, hence it is supplemented by the powerful muscles of mastication. The stylo-mandibular ligament is a bundle of fibers of the cervical fascia running from the styloid process to the angle of the jaw.



Structures subject to trauma.

Fifth nerve and middle ear altho the strong external lateral ligament prevents the latter in a great many cases such as blows, unless they are very violent.



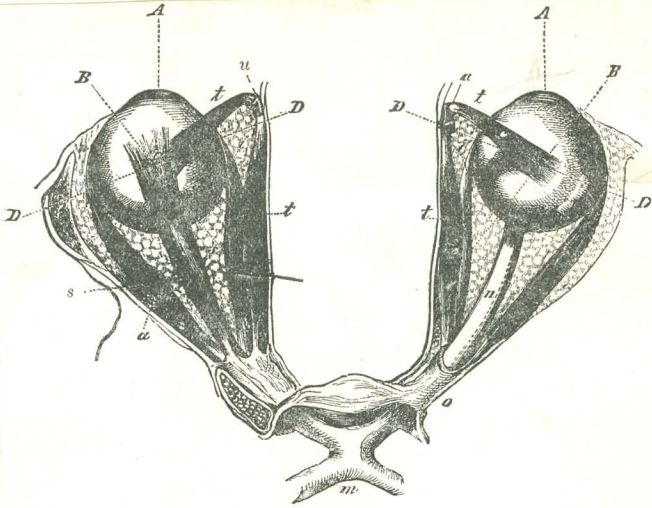


FIG. 123.—The eyeballs and their muscles as seen when the roof of the orbit has been removed and the fat in the cavity has been partly cleared away. On the right side the superior rectus muscle has been cut away. *a*, external rectus; *s*, superior rectus; *i*, internal rectus; *o*, superior oblique.

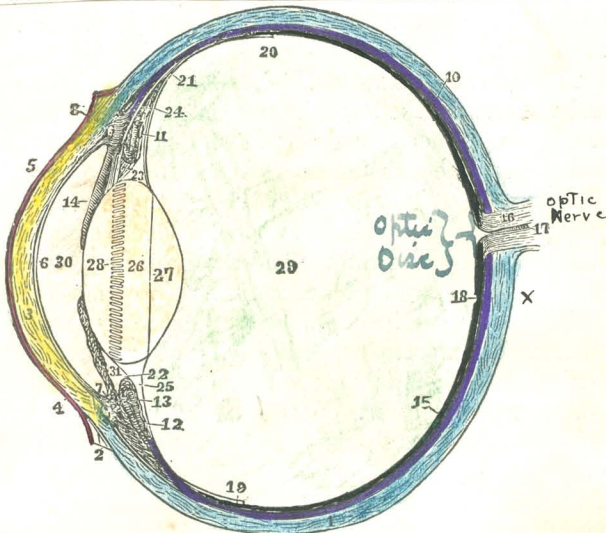


FIG. 124.—The left eyeball in horizontal section from before back. 1, sclerotic; 2, junction of sclerotic and cornea; 3, cornea; 4, 5, conjunctiva; 6, posterior elastic layer of cornea; 7, ciliary muscle; 10, choroid; 11, 13, ciliary processes; 14, iris; 15, retina; 16, optic nerve; 17, artery entering retina in optic nerve; 18, fovea centralis; 19, region where sensory part of retina ends; 22, suspensory ligament; 23 is placed in the canal of Petit and the line from 25 points to it; 24, the anterior part of the hyaloid membrane; 26, 27, 28 are placed on the lens; 28 points to the line of attachment around it of the suspensory ligament; 29, vitreous humor; 30, anterior chamber of aqueous humor; 31, posterior chamber of aqueous humor.

Structures found in the orbit

- Orbital fat with connective tissue lamellae
- Capsule and Space of Tenon
- Levator palpebrae superioris muscle
- Rectus superior
- Rectus internus
- Rectus inferior
- Rectus externus
- Obliquus ~~externus~~ superior
- Obliquus inferior
- Optic nerve
- Oculomotor nerve
- Trochlear "
- Abducent "
- Ophthalmic artery

Veins
Superior orbital — Sphenoidal for
Inferior — Sphenomax for

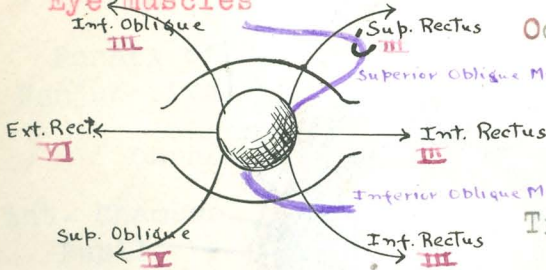
Branches of Ophthalmic

- Lacrimal
- Supraorbital
- Posterior Ethmoidal
- Anterior Ethmoidal
- Medial Palpebral
- Frontal
- Dorsal Nasal
- Central of Retina
- Short Post. Ciliary
- Long Post. Ciliary
- Anterior Ciliary
- Muscular

Superior and Inferior Ophthalmic Veins

Eyeballs

Eye muscles



Nerve Supply

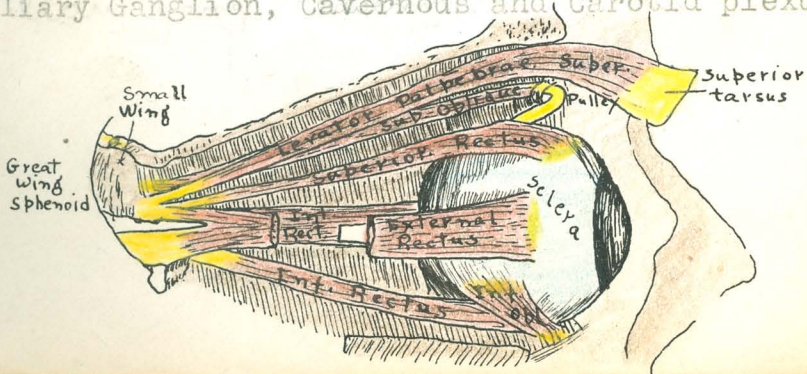
- Oculo-motor
- Levator palpebrarum
- Superior Rectus
- Internal "
- Inferior "
- " Oblique
- Trochlear
- Superior Oblique
- Abducens
- External Rectus

Sensory Nerves

Optic - V

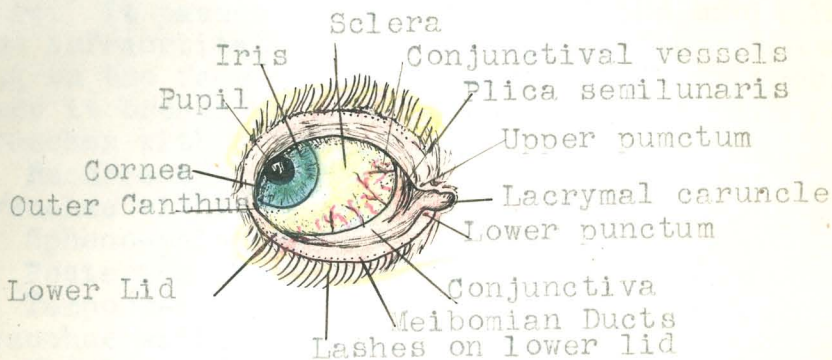
Secretory Nerves Lacrymal

Infratrochlea of nasal of ophthalmic of V
 Ciliary Ganglion, Cavernous and Carotid plexuses

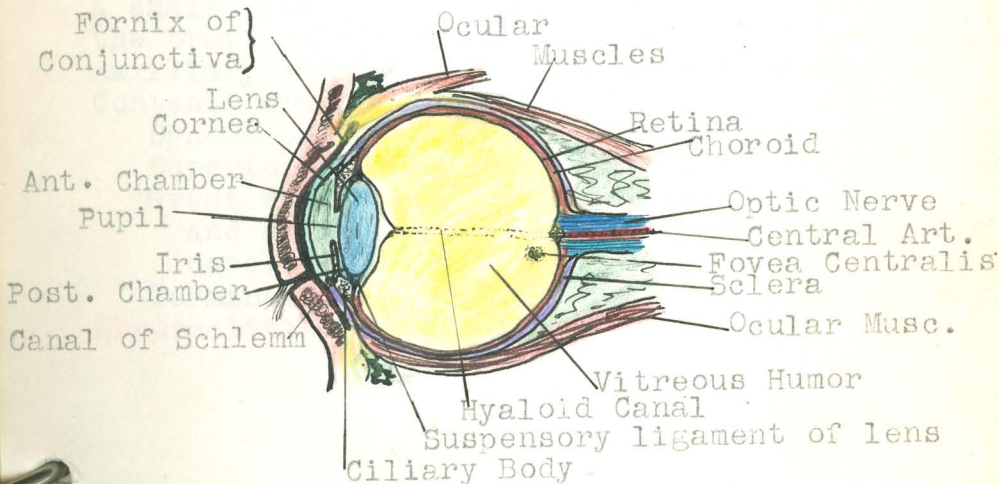


Harold Eye Magoun

Front View



Horizontal Section



Maxillary Nerve

From Gasserion Ganglion, forward beneath dura mater in middle cranial fossa, below the cavernous sinus. Leaves cranium thru foramen rotundum, transverses speno-maxillary fossa, and enters orbital cavity by means of speno-maxillary fissure. It passes out the floor of the orbit in the infraorbital groove and canal, finally amerging on the face thru the infraorbital foramen. Here it breaks up into its three terminal branches

Branches within the cranium

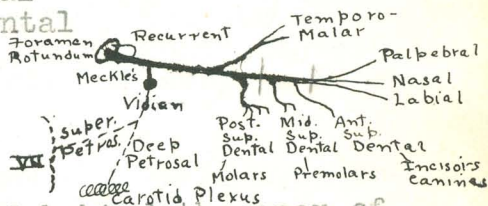
Recurrent
Branches within speno-maxillary fossa

- Spheno-palatine
- Posterior superior dental
- Temporo-malar

Branches within infra-orbital canal

- Middle superior dental
- Anterior superior dental

Branches on the face
Inferior palpebral
Lateral nasal
Superior labial.



Spheno-maxillary fossa

A small cavity below and behind the apex of the orbit at the point of junction of the speno-maxillary and the pterygo-maxillary fissures. Contents are as follows:

- Spheno-palatine or Meckle's ganglion
- Superior maxillary of V from foramen rotundum
- Great superficial and deep petrosal nerves and accompanying blood vessels from Vidian canal.
- Terminal branch of internal maxillary artery

Abnormalities

Cervical Fascia

A well marked sheet of connective tissue beneath the platysma, and forming a complete investment for the neck region. It gives off from its deeper portion numerous thin lamellae which enclose various structures of the neck region. Posteriorly it is attached to the ligamentum nuchae, while laterally it divides into two layers which enclose the trapezius, and unite again at its outer border. It is continued forward over the posterior triangle of the neck to the lateral border of the sterno-cleido-mastoid, where it again divides into two layers to enclose that muscle. Again united it is continued over the anterior triangle of the neck to the median line. Above it is attached to the superior nuchal line and the mastoid process, whence it is continued along the greater horn and body of the hyoid, to which it is firmly attached, and where it becomes continuous with the submental fascia. Below it ends over the anterior surface of the clavicle. (See DAY 43)

Platysma

Origin: skin and subcutaneous tissue over the pectoralis major and deltoid muscles on a line extending from the cartilage of the second rib to the tip of the acromion process.

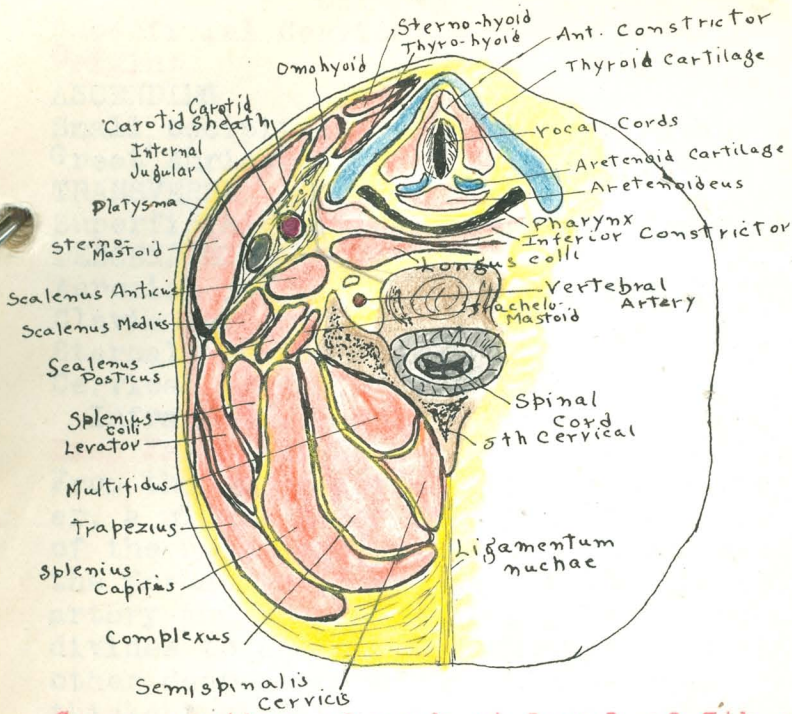
Insertion: fibers upward and inward into the body of the mandible from the symphysis to the insertion of the masseter, the more posterior fibers extending upward upon the face towards the angle of the mouth and becoming lost in the fascia and muscle.

Blood: superior thyroid, facial,

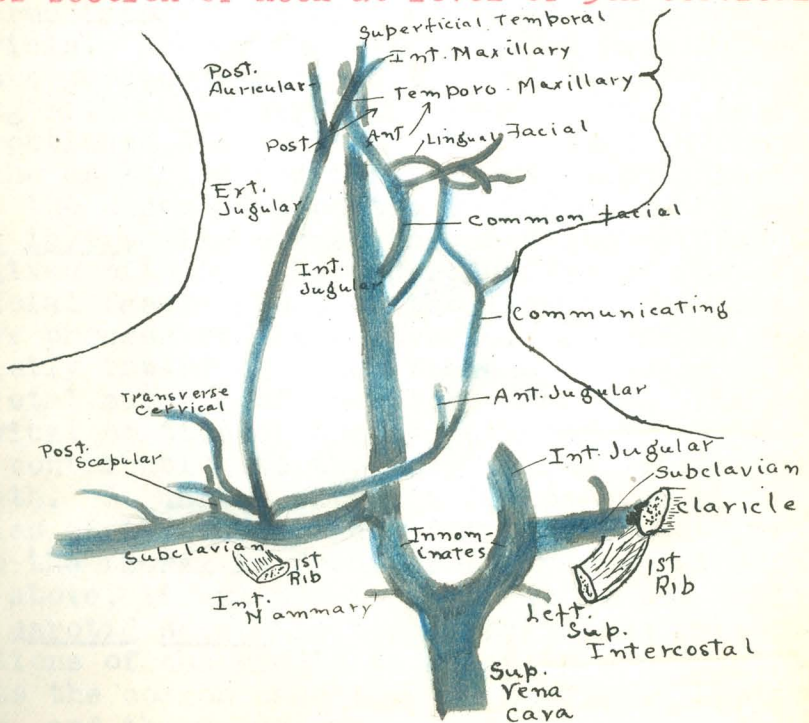
Nerve: inframandibular of **VII**

Action: it draws the lower lip downward and outward and at the same time raises the skin of the neck from the underlying parts. It is most important in "registering" horror or surprise. It probably has little effect in producing depression of the mandible.

3/26/21
M.L.L.



Cross section of neck at level of 5th cervical



Superficial Cervical Nerves**Origin:**

ASCENDING

Small occipital Cervical Plexus 2-3

Great Auricular Cervical Plexus 2-3

TRANSVERSE

Superficial Cervical Cervical Plexus 2-3

DESCENDING

Acromial Descending Cutaneous 3-4

Clavicular " " "

Sternal " " "

Cervical branch of VII

Inframandibular

Deep Fascia of Neck

From the under surface of the superficial layer, a middle layer is given off at the sides of the neck, and, passing forward, assists in the formation of the carotid sheath for the artery and the internal jugular vein, and then divides to enclose the omo-hyoideus and the other depressors of the hyoid bone, a special thickening of it extending downward from the intermediate tendon of the omo-hyoid to the clavicle. Above, the middle layer is attached to the greater cornu and body of the hyoid bone along with the superficial layer, but below it is continued downward into the thorax in front of the esophagus and trachea and becomes lost upon the upper part of the pericardium. The deep layer, also termed the prevertebral fascia, is given off from the under surface of the superficial fascia about on the line of the transverse process of the vertebrae. It passes almost directly inward over the scalene and hyposkeletal muscles of the neck, enclosing the cervical portion of the sympathetic trunk and contributing to the formation of the carotid sheath. It unites with its fellow over the bodies of the vertebrae. It is continued down into the thorax in front of the vertebral column and above, it extends to the base of the skull. The carotid sheath is formed by unions from portions of the middle and deep layers and invests the common carotid, the internal jugular vein, and the vagus nerve.

Sterno-cleido-mastoid

Origin: sternal head by a strong rounded tendon from the anterior surface of the manubrium sterni. Clavicular head more band like from the upper surface of the sternal end of the clavicle

Insertion: mastoid process of temporal bone and outer part of superior nuchal line.

Blood: superior thyroid, occipital, supra-scapular

Nerve: spinal accessory and second and third cervical.

Discussion: the two muscles, acting together, draw the head forward and bend the neck. Acting single, one muscle will draw the head towards its own side and at the same time rotate the head towards the opposite side. It is easily affected by cold drafts, being so superficially placed and in contracting may impinge upon the nerves in its substance and the structures beneath. It is also concerned in wry neck or torticollis.

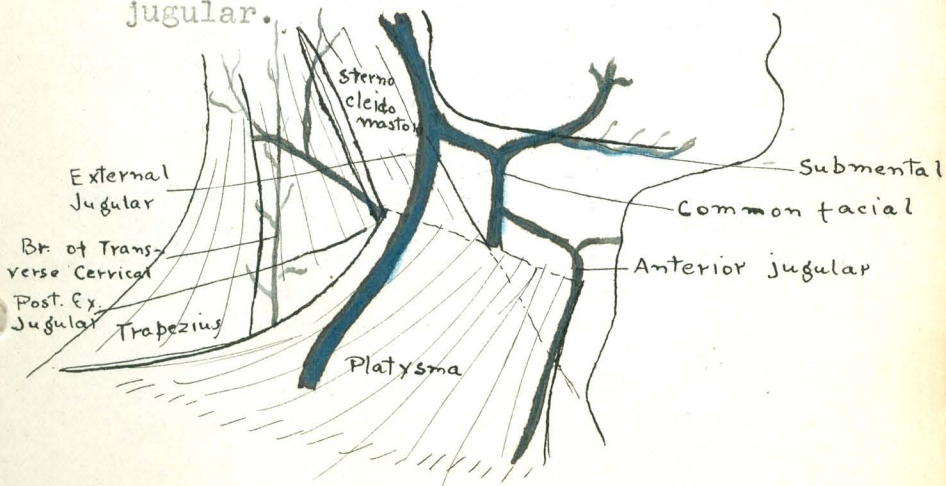
Superficial Veins of Neck

Mainly the

Common facial which empties into the internal jugular at the level of the hyoid bone.

Anterior jugular which empties into the external jugular immediately above its termination.

External jugular which empties into the subclavian near its junction with the internal jugular.



DAY 44

3/29/21

Anterior Triangles of the Neck.

Define the three subdivisions of the Anterior Triangle.

Inferior Carotid Triangle.

Note Boundaries. Dissect out, Sterno-Thyroid, Sterno-Hyoid, Thyro-Hyoid, Omo-Hyoid, Ansa, Descendens and Communicans Hypoglossi, Thyroid Gland with its Arteries and Veins, Trachea, Oesophagus, Recurrent Laryngeal Nerves, Cricoid Cartilage and Carotid Sheath.

Questions:—

- (1) Bound this triangle and give the contents.
- (2) Locate and describe the Hypoglossal Nerve Loop.
- (3) Give Origin and Insertion of the muscles found here.
- (4) Describe the Thyroid Gland.
- (5) What structures in this triangle can you palpate in your own neck?

DAY 45

3/30/21

Superior Carotid Triangle.

Note Boundaries. Carotid sheath and relations. Dissect out Common Carotid Artery, Bifurcation and branches of External and Internal within the triangle. Note Internal Jugular Vein. Trace the Hypoglossal, Vagus, Sympathetic, (Internal and External Laryngeal, Recurrent Laryngeal, Phenic, Cardiac Branches of Vagus and Sympathetic Nerves. *Term. = superior*

Questions:—

- (1) Bound and give contents of the triangle.
- (2) Give contents and relations of Carotid Sheath.
- (3) Name the branches of the Internal and External Carotid Arteries.
- (4) What forms the Internal Jugular Vein?
- (5) What structures in this triangle can you palpate in your own neck?

DAY 46

3/31/21

Sub-Maxillary Triangle.

Define Boundaries. Note Mylo-Hyoid, Hyo-Glossus Muscles, Sub-Maxillary Gland, Facial and Lingual arteries, Hypoglossal Nerve, Dissect out Sub-Maxillary Gland noting its relations to Facial Artery and Vein. Define Triangle of Lesser.

Questions:—

- (1) Bound and give contents of this triangle.
- (2) Name the branches of the Facial and Lingual Arteries.

- (3) Give the Origin and Insertion of the above muscles.
- (4) What structures in this triangle can you palpate in your own neck?

DAY 47 4/1/21

Posterior Triangles of Neck.

Note divisions and boundaries of the two triangles which make up the Posterior Triangle. The Trapezium having been removed disassociates some of the structures but the dissector can easily define most of the structures. Note Spinal Accessory Nerve, Branches of Cervical Plexus, External Jugular Vein and Tributaries, Transverse Cervical and Supra-Scapular Arteries, Upper border of Brachial Plexus. Remove Sterno-Mastoid, secure its nerves and arteries. Note Scaleni and Omo-Hyoid muscles. Palpate the Transverse Process of the Cervical Vertebrae. Note the Lymphatics of the Neck.

Questions:—

- (1) Bound and give contents of the Posterior Triangles.
- (2) Draw the Cervical Plexus.
- (3) Describe the lymphatics of the neck.
- (4) What abnormalities have you found in the neck?

DAY 48 4/2/21

Brachial Plexus. Subclavian Artery and Vein.

Define the parts of the Artery and Vein. Note relations to Brachial Plexus. Dissect out branches of the vessels and nerves before they enter the Axillary space. Note Thoracic Duct on left and Right Lymphatic Duct on right. Trace blood supply and venous drainage of Thyroid Gland. Wrap neck and axilla to keep moist until time for deep dissection.

Questions:—

- (1) Name the branches of the Subclavian artery and describe its course.
- (2) What are the relations of the Trachea and Oesophagus in the neck?
- (3) What structures pass between the clavicle and first rib?
- (4) Draw the Brachial Plexus.

Anterior triangles of the neck

The sterno-cleido-mastoid, on account of its position somewhat superficial to the remaining muscles of the neck, serves to divide that region into two triangular areas. Of these the anterior triangle has its base above, formed by the lower border of the mandible; its lateral boundary formed by the medial border of the sterno-cleido-mastoid; and its medial border formed by the mid line of the neck. This triangle is again divisible into subordinate triangles by the muscles crossing it. Thus the anterior belly of the omo-hyoid cuts off an inframedial triangle known as the muscular or inferior carotid. Below the mandible the two bellies of the digastric cut off the submaxillary triangle and the remaining space, laterally is the superior carotid triangle.

Inferior Carotid Triangle

This has its base along the median line and its apex directed laterally, its sides being formed by the sterno-cleido-mastoid below and the superior belly of the omo-hyoid above. It contains:

Sterno-thyroid muscle	Ansa hypoglossi
Sterno-hyoid "	Thyroid gland with
Thyro-hyoid "	its vessels
Thyroid cartilage	Trachea
Cricoid Cartilage	Carotid sheath

Hypoglossal Nerve Loop

Motor to musculature of tongue. Out thru anterior condyloid foramen. Down between internal carotid artery and internal jugular vein. At the inferior margin of the posterior belly of the digastric, the nerve winds around the occipital artery and courses downward to the outer side of the carotid arteries. The descendans hypoglossi arises near this point and runs down within or in front of the carotid sheath. It gives off a branch to the omo-hyoid (ant. belly) and at about the middle of the neck joins the descending cervical from 2nd and 3rd cervicals. A loop is thus formed called the ansa hypoglossi which supplies the sterno-hyoid, sterno-thyroid, and posterior belly of omo-hyoid.

Infra-Hyoid Group of Muscles

STERNO-HYOIDEUS flat band close to median line
 Origin: posterior surface of sternal end of clavicle and manubrium sterni
 Insertion: lower border of body of hyoid

OMO-HYOIDEUS long, flat, and two bellied
 Origin: inferior belly from lateral portion of superior border and superior transverse ligament of scapula to intermediate tendon. This lies behind clavicular portion of sterno-cleido-mastoid in deep cervical fascia. The superior belly arises from medial end of inferior tendon
 Insertion: lower border of hyoid bone lateral to sterno-hyoid.

STERNO-THYROIDEUS band beneath sterno-hyoid
 Origin: posterior surface of manubrium sterni and cartilages of first and second ribs
 Insertion: oblique line of thyroid cartilage

THYRO-HYOIDEUS beneath upper portion of omo-hyoid
 Origin: oblique line of thyroid cartilage
 Insertion: lateral portion of body and greater cornu of hyoid.

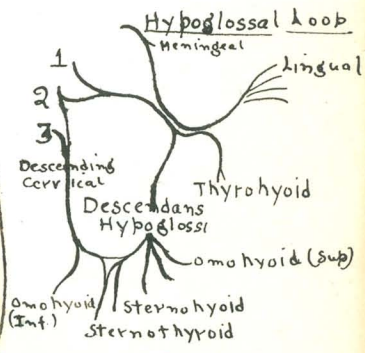
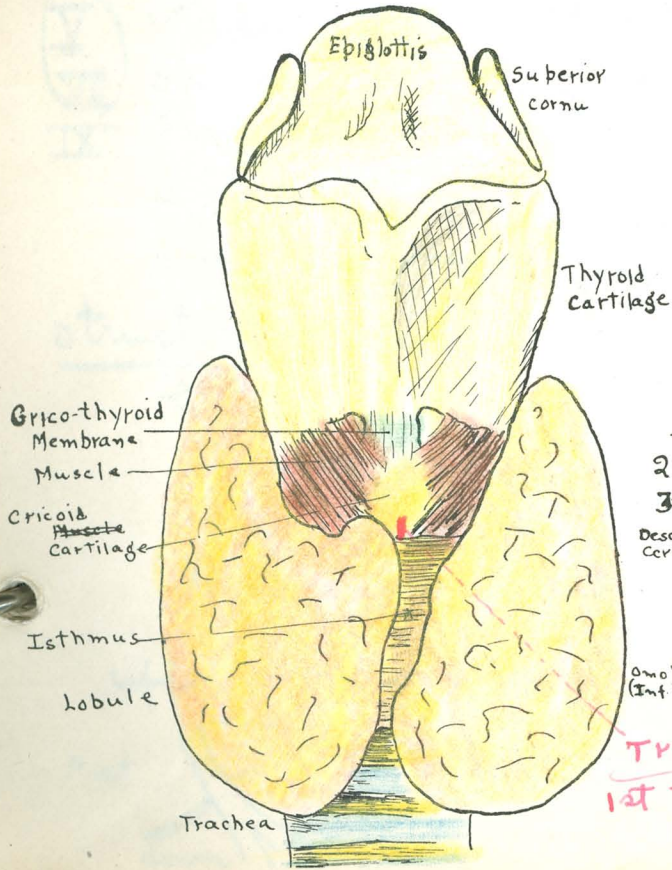
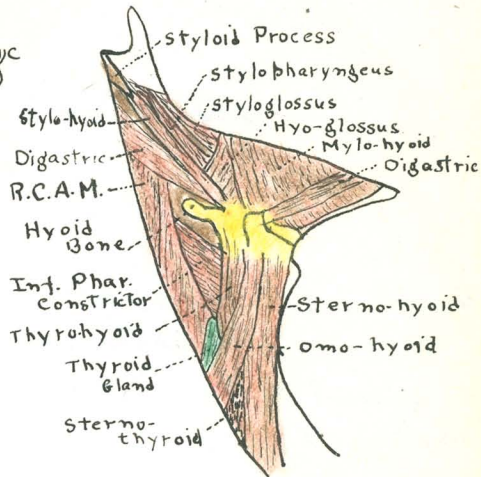
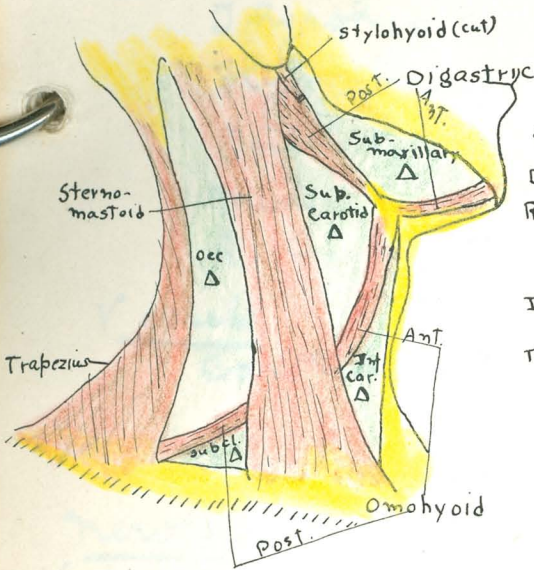
BLOOD: superior thyroid **NERVE:** ansa hypoglossi
 inferior thyroid
 lingual

Thyroid Gland

Situated in the neck in front and at the sides of the trachea. It consists of two lateral lobes connected by a narrow isthmus. They may be from 3 to 6 cm in height and the transverse diameter of the whole structure is usually about 6 or 7 cm. It has the appearance of a lobulated glandular body, reddish yellow in color. The inner surface is moulded over the trachea and larynx. The isthmus usually crosses the second and third rings of the trachea. It lies beneath the infra-hyoid group of muscles from which it is separated by the middle layer of the cervical fascia. The sheath of the carotid is in part external to the organ. The middle cervical invol. ganglion is behind.

Palpable structures in my own neck.

Hyoid bone, thyroid cartilage, cricoid cartilage, trachea, sterno-mastoid,



Tracheotomy
1st tracheal ring

Superior Carotid Triangle

Muscle

Thyrohyoid
 Hyoglossus
 Inf. Phar. Constrictor
 Mid. " "
 R. C. A. M.

Vessels

Carotid art.

{ common
 { internal
 { external

{ sup thyroid
 { lingual
 { facial
 { occipital
 { Arc. Phar.

Jugular vein

Nerves

(V)
 (VI)
 (VII)
 (IX)

Vagus (sup phar - phar)

Sp. Access.

Desc. Thy

Hypoglossal

Desc. Cerv.

Sympathetic

Sup. Laryngeal

{ Int br.
 { Ext br.

Structures

Larynx (upper)

Pharynx (lower)

Thyroid gland

Thyoid bone - post. cornu.

upper & lower nodes



Ret. int. carved straight + large.

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Ref. int. carotid straight + larger.



Superior Carotid Triangle

Base along upper part of sterno-cleido-mastoid.
Apex directed medially. Sides formed by superior belly of omo-hyoid below and posterior belly of digastric above. Contents:

Inferior pharyngeal constrictor
Thyrohyoid
Thyroid body
Posterior cornu hyoid bone
Rectus capitis anticus major
Hyo-glossus
Middle pharyngeal constrictor

Carotid sheath

Formed by the union of portions from middle and deep layers of cervical fascia. It invests the common carotid artery, internal jugular vein, and vagus nerve. It lies postero-medially to the sterno-mastoid muscle and is bounded internally by the scalene muscles, the longus colli, and the various structures connected with the digestive and respiratory tracts in this region.
(See DAY 43)

External Carotid Artery

Superior thyroid	Ascending Pharyngeal
Infrahyoid	Pharyngeal
Sterno-mastoid	Palatine
Superior laryngeal	Prevertebral
Cricothyroid	Inferior tympanic
Lingual	Posterior meningeal
Supra-hyoid	Occipital
Dorsales linguae	Muscular
Sublingual	Sternomastoid
Linguae profundus	Auricular
External Maxillary	Meningeal
Deep auricular	Terminals
Anterior tympanic	Descending
Glandular	Posterior Auricular
Submental	Auricular
Inferior labial	Stylomastoid
Superior labial	Occipital
Lateral nasal	Internal Maxillary
Angular	Tonsillar
Superficial Temporal	Ascending palatine
Transverse facial	Middle meningeal
Middle temporal	Accessory meningeal

Anterior auricular
 Frontal
 Parietal

Post. Inferior Alveolar
 Deep temporals (A&P)
 Pterygoids
 Masseter
 Buccinator
 Post. Sup. Alveolar
 Infraorbital
 Sphenopalatine
 Vidian
 Pharyngeal
 Descending palatine

Internal Carotid

Pet
 Vidian
 Caroticotympanic
 Ophthalmic
 Anterior meningeal
 Semilunar
 Pituitary
 Hypophysial

Choroidal
 Posterior communicating
 Middle cerebral
 Anterior cerebral

Interior Jugular Vein

Collects from brain, face, and neck. Continuous with transverse sinus and receives inferior petrosal sinus, common facial, lingual, pharyngeal, superior and middle thyroid, and sometimes the occipital. (See DAY 43)

Structures Palpable

Hyoid bone, trachea, muscles, side of larynx.

Submaxillary Triangle (Digastric)

Bounded below by the two bellies of the digastric muscle and above by the line of the lower border of the mandible and its continuation posteriorly to the sterno-mastoid muscle.

It contains:

Mylo-hyoid	Muscle	Submaxillary Gland
Hyo-glossus	"	Facial Artery
Stylo-glossus	"	Lingual Artery
Stylo-pharyngeus	"	Hypoglossal Nerve
Stylo-hyoid	"	Common Facial Vein

Facial Artery

Ascending palatine
Tonsillar
Glandular
Submental
Masseteric
Inferior labial
Inferior coronary
Superior coronary
Lateral nasal
Angular

Lingual Artery

Suprahyoid
Dorsal lingual
Sublingual

Muscles

MYLO-HYOID (Diaphragma oris)

Origin: ridge of mandible

Insertion: fibers inward and backward to the median fibrous raphe common to the two muscles of the opposite sides, and also to the upper border of the body of the hyoid bone.

Nerve: mylo-hyoid of inferior dental of 3rd of V

Blood: facial and inferior maxillary

DIGASTRIC

Origin: anterior belly from digastric fossa of mandible, down, back, and out to intermediate tendon which is bound down to the greater horn and body of the hyoid by fascia.

The posterior belly arises from the mastoid groove of the temporal bone.

Nerve: anterior by mylo-hyoid of inf. dental of V
posterior by digastric of facial.

Blood: lingual, facial, occipital, posterior aur.

STYLO-HYOID

Origin: upper portion of styloid process

Insertion: base of greater cornu of hyoid.

It usually divides before its insertion into two slips between which passes the intermediate tendon of the digastric.

Nerve: digastric of facial

Blood: lingual, facial, occipital, posterior auri.

X STYLO-PHARYNGEUS

Origin: inner surface of styloid near its base.

Insertion: down along with glosso-pharyngeal nerve between middle and superior constrictors of the pharynx into posterior border of thyroid cartilage and posterior wall of pharynx.

Blood: facial, superior thyroid, ascending phary.

Nerve: glosso-pharyngeal

HYO-GLOSSUS

Origin: side of body of hyoid and both horns
(Latter portion sometimes chondro-glossus)

Insertion: in side of tongue

Blood: lingual

Nerve: hypoglossal

X STYLO-GLOSSUS

Origin: tip of styloid process and beginning of stylo-maxillary ligament

Insertion: into hyo-glossus

Blood: facial, lingual, ascending pharyngeal

Nerve: hypoglossal

Triangle of Lesser

Hypoglossal nerve above and two bellies of digastricus below.

Palpable Structures

Submaxillary gland, common carotid artery, mylo-hyoid muscle, hyoid bone,

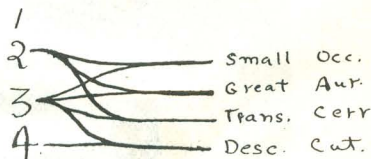
Posterior Triangles of the Neck

Bounded by the lateral border of the upper part of the trapezius behind and by the lateral border of the sterno-cleido-mastoid in front and has for its base the upper border of the clavicle between the insertion of these two muscles. It is subdivided into two by the inferior belly of the omo-hyoid, which crosses it obliquely, and marks off the upper occipital triangle and the lower subclavian. The triangles contain:

- | | |
|--|---------------------------------|
| Splenius | Spinal Accessory Nerve |
| Levator anguli scapulae | Cervical plexus |
| Scalenus medius | External Jugular Vein + tribut. |
| Scalenus anticus posterior | Transverse Cervical |
| Lymphatics | Supra-scapula Arteries |
| Transverse Processes of Cervical Vertebrae | Brachial Plexus |

Cervical Plexus

- Cutaneous Branches
- Small occipital 2-3
 - Great auricular 2-3
 - Transverse cervical 2-3
 - Descending Cutaneous 3-4



Communicating

- Superior cervical ganglion of sympathetic 1-4
- Communicating to vagus 1-2
- Communicating to spinal accessory 2-4
- Descendans hypoglossi 1-2
- Descendans cervicalis 2-3

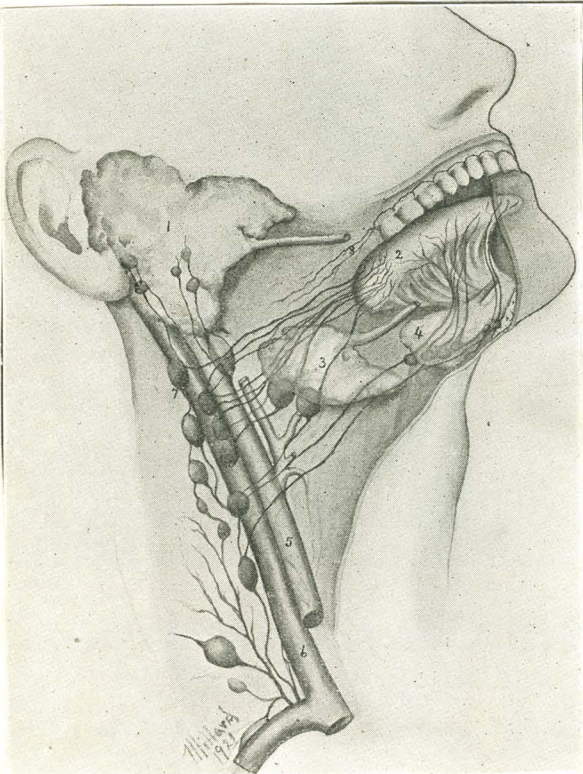
Muscular

- | | |
|--------------------|-----------------------------|
| Scaleni 2-4 | Longus colli 2-4 |
| Anterior recti 1-4 | Levator anguli scapulae 3-4 |
| Infrahyoid 1-3 | Diaphragm 3-5 |

Lymphatics of Neck

NODES

Principally situated along the course of the internal jugular vein forming the jugular plexus, in the pathway of the lymphatic system of the head and neck. They are sometimes subdivided into the superior and inferior deep and the superficial cervical nodes. Of these the superficial group lie on the outer surface of the sterno-mastoid, draining the pinna of the ear and the parotid region; and beneath the depressors of the hyoid on the anterior surface of the larynx and lateral surface of the trachea, and drain those structures.

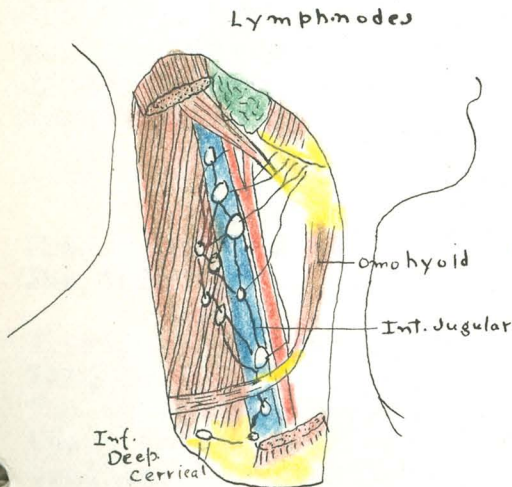


The superior deep group lie along the internal jugular and drain the lingual region, posterior auricular, occipital, retropharyngeal, parotid, submaxillary, submental, and superficial cervical nodes. Also the occipital region of the scalp, the back of the neck, the nasal mucous membrane, the palate, the upper portion of the pharynx, the esophagus, the larynx, the trachea, and the thyroid gland.

The inferior group occupy the supraclavicular triangle of the neck resting on the scalene muscles and trunks of the brachial plexus. They drain the superior nodes, the neck, upper pectoral region, the upper arm, and left side of the liver. They all drain into the jugular trunk which on the left opens into the arch of the thoracic duct and on the right unites with the subclavian trunk to form the right lymphatic duct. Both may open directly into the subclavian vein.

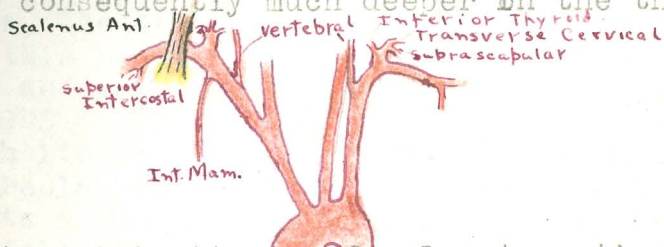
Abnormalities

None



Subclavian Artery

The right subclavian arises opposite the right sterno-clavicular articulation and from that point the artery ascends upward and outward in a gentle curve over the dome of the pleura to the inner border of the scalenus anticus. The left subclavian arises from the termination of the transverse portion of the aortic arch and is consequently much deeper in the thorax.



From its origin it ascends almost vertically and then curves outward and slightly forward to reach the inner border of the scalenus anticus. From here onward the course of the two arteries is the same. Passing behind the anterior scalene muscle, each artery continues its course outward across the root of the neck, curving downward to the outer border of the first rib, at which point it becomes known as the axillary. The artery is usually divided into three portions, for convenience in description, by the scalenus anticus. From the first portion arise the

- vertebral
- internal mammary
- superior intercostal
- thyroid axis

The second has none.

The third gives off the transverse cervical.

Relations of Trachea and Esophagus

TRACHEA

The esophagus, beginning at the lower border of the cricoid cartilage, lies at first behind the trachea, to which it is connected by areolar tissue; but almost at once it is, relatively to the trachea, displaced to the left, to be pushed over again by the arch of the aorta, where this vessel lies on the left of the trachea. The gullet always lies behind the origin of the left bronchus. Behind the first piece of the sternum the arch of the aorta passes in front

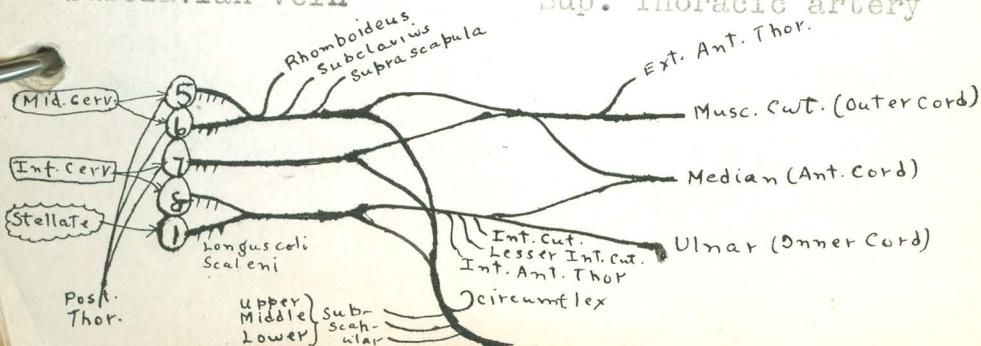
of the trachea, where it is placed almost symmetrically in the fork made by the innominate and left carotid arteries. The isthmus of the thyroid crosses usually the second and third rings, its lobes resting on the sides of the trachea. The inferior thyroid veins constitute a vascular layer before the lower part of the cervical portion of the trachea. The recurrent laryngeal nerves run up at the back of either side of the trachea, the left one being the first one to reach this position. The inferior laryngeal artery and veins are near them.

ESOPHAGUS

Through its course the gullet is surrounded by much areolar tissue and frequently sends fibers from its muscular coat to surrounding parts. While following the general direction of the vertebral column, below the bifurcation of the trachea, it lies a few centimeters distant. Directly after its beginning it inclines to the left, so that it projects by one half beyond the left border of the trachea. Just above the bifurcation of the trachea the esophagus meets the arch of the aorta, which so to speak, pushes it to the right. At first the esophagus lies behind the trachea on the prevertebral fascia, the lobes of the thyroid gland touching it on both sides. The left recurrent laryngeal nerve runs on the front. The right one is in relation with only the very beginning of the gullet. The right inferior thyroid artery is against it. On the right is also a chain of lymphatics.

Structures passing between clavicle and first rib.

- | | |
|-------------------|--------------------------|
| Brachial Plexus | Ext. Ant. thoracic nerve |
| Subclavian Artery | Acromio-thoracic duct |
| Subclavian Vein | Sup. Thoracic artery |



4/2/21
M.L.L.

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Thoracic Cavity.

Note Intercostal Muscles. Remove Ribs and Sternum mesial to origin of Serratus Magnus by clipping ribs with forceps. Lift up Sternum carefully dissecting from its internal surface the Internal Mammary Artery. Note position of Heart, Lungs and Great Vessels before being disturbed.

Questions:—

- (1) Bound, give shape and contents of Thoracic Cavity.
- (2) Give the origin, course and branches of Internal Mammary Artery.
- (3) Describe the Intercostal muscles.
- (4) Give the relations of the Pleura.

Lungs.

Examine and compare form and relations of the two lungs. Strip off the Pleura from root of each lung and dissect out structures in relation to each. Remove lungs carefully so as not to disturb to a great degree the relation of the structures in the Mediastinal Spaces. After removal trace Bronchi, Arteries and veins into each lung. Note difference in each.

Questions:—

- (1) Give relations of structures found at the Hilum of each lung.
- (2) Describe in full a lung unit.
- (3) Which lobes are most commonly affected first in Tuberculosis and in Pneumonia and why?

Mediastina.

Note the Superior, Anterior, Middle and Posterior Mediastina. Trace Phrenic Nerves, Pericardium its relations and extent. Expose Aorta, Oesophagus, Vagi Nerves, Note Superficial Cardiac Plexus. Ductus Arteriosus. Note structures in each Mediastina.

Questions:—

- (1) Bound and name structures in each Mediastina.
- (2) Describe the Pericardium.

DAY 52 4/6/21

Heart and Great Vessels.

Dissect out Aortic Arch and Branches. Identify Left Recurrent Laryngeal Nerve. Note Superior and Inferior Vena Cava, Sever the great vessels near origin and remove the heart, making a crucial incision in the Pericardium. Examine relations of all large vessels. Note Oesophagus. Dissect out Coronary Arteries and Sinus. Note Appendages and general External appearance of heart.

Questions:—

- (1) Name branches of Aortic arch and give relations.
- (2) What veins form the Inferior and Superior Vena Cava?
- (3) Describe the Blood supply to heart and Venous drainage.
- (4) Name the vessels entering and leaving the heart, the cavity they enter or leave and the kind of blood they carry.

DAY 53 4/6/21

Internal Structure of the Heart.

Open Auricles and Ventricles and examine structures within Right Auricle. Note: Musculi Pectinati, Superior and Inferior Vena Caval Orifices, Eustachian Valve, Coronary Sinus, Coronary Valve, Tubercle of Lower, Fossa Ovalis, Annulus Ovalis, Right Auriculo-Ventricular Orifice. Right Ventricle. Note: Conus Arteriosus, Tricuspid Orifice, Papillary Muscles, Columnae Carinae, Cordae Tendinae, Semilunar Valve Left Ventricle, Note: Aortic Vestibule, Sinus of Valsalva, Bicuspid Valve. Pack layer of cotton or cloth over posterior wall of thorax and keep damp until ready for dissection.

Questions:—

- (1) Describe the circulation thru heart.
- (2) Trace the Fetal circulation and describe changes after birth.
- (3) What pathology do you find in this heart?
- (4) Describe the Right Auricle fully.

DAY 54 4/7/21

Submaxillary Region.

Separate Anterior Belly of Digastric from insertion and turn aside. Divide facial vessels as they cross border of jaw. Saw thru body of lower jaw between incisor teeth and turn upwards to expose Mylo-Hyoid Muscle with its artery and nerve. Cut thru muscle to expose structures in floor of mouth. Note: Sub-

Thoracic Cavity

That part of the body cavity separated by the diaphragm from the abdomen below, but without complete separation from the neck above. Its bony walls are formed behind by the thoracic vertebrae, at the sides by the ribs, and in front by their continuations, the costal cartilages, and the sternum. It is a cage with movable walls capable of expansion. In shape it is an irregular truncated cone, much deeper behind than in front and broader from side to side than from before backward. The dome shaped diaphragm makes the thorax much smaller and the abdomen larger than one would be led to expect. As to contents it contains:

Arteries

Innominate	Aorta
Left common carotid	Two cardiac
Left subclavian	Four visceral branches
Two internal mammary	Three parietal
Two first posterior intercostal	

Veins

Two innominate	Three azygos	Sup. & Inf.
Two inferior thyroid	Two cardiac	Vena Cava

Muscles

Two sterno-hyoid	Triangularis sterni
Two sterno-thyroid	
Two longus colli	

Nerves

Two vagi
Two sympathetic chains
Two phrenic
Two first thoracic
One recurrent laryngeal
Ten cardiac nerves

Organs

Esophagus
Trachea
Thymus
Thoracic duct
Two lungs
Two pleurae
Heart

Internal Mammary Artery

Arises from the lower surface of the subclavian and proceeds downward, inward, and slightly forward to reach the posterior surface of the first costal cartilage, about half an inch lateral to the border of the sternum, and is thence continued vertically downward upon the inner surface of the anterior thoracic wall to the sixth intercostal space opposite which it terminates by dividing into the musculo-phrenic and the superior epigastric arteries. It gives off the following branches:

- Superior phrenic (c n. p.)
- Mediastinal
- Anterior intercostals
- Anterior perforating branches
- Musculo-phrenic
- Superior epigastric

Intercostal Muscles

THE EXTERNAL INTERCOSTALS are elevenⁱⁿ number, stretching across all the intercostal spaces from the lower border of one rib to the upper border of the next. The fibers, which are largely interspersed with strands of connective tissue are directed downward and forward, and form in each intercostal space, a sheet which extends in the upper spaces from the tubercle of the rib to the junction of the rib with its costal cartilage and in the lower spaces is continued upon the cartilages. The interval between the medial borders of the upper muscles and the border of the sternum is occupied by a sheet of connective tissue known as the external intercostal fascia or anterior intercostal aponeurosis. The nerve supply is by the anterior divisions of the thoracic nerves. THE INTERNAL INTERCOSTALS lie immediately beneath the external and, like these, extend across each of the intercostal spaces. The fibers have a direction almost at right angles to those of the external intercostals, being directed obliquely downward and inward from the lower border of one rib and its costal cartilage to the upper border of the next. The muscle sheets so formed extend from the medial extremity of each intercostal space as far back as the angles of the ribs, becoming there continuous with an internal intercostal fascia or

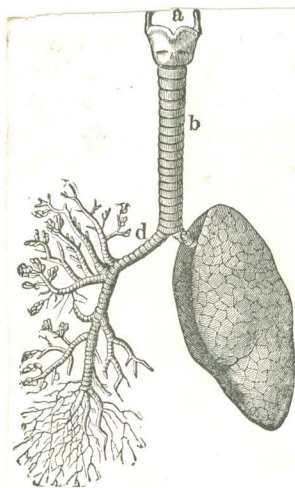
posterior intercostal aponeurosis, which continues backward to the tubercles of the ribs. the medial fibers of the muscles of the lower two intercostal spaces become continuous with the upper portion on the internal oblique muscle of the abdomen. The nerve supply is the same and the action is the same, i.e. to draw the ribs upward.

Relations of Pleurae

In some places the lungs and pleurae are always in the same relation; in others there is a varying relation with inspiration and expiration. This is especially so in the lower part of the thorax where there are depths to which the lungs never descend. Nor do the pleurae descend to the border of the chest at the sides for the diaphragm and connective tissue occupy more or less space there. The pleurae are a pair of serous sacks, disposed one over each lung and then reflect so as to line the walls of each cavity containing it. Hence it is divided into a parietal layer and a visceral layer. The latter closely invests the lung. It turns down over the pericardium, forming on each side a vertical antero-posterior septum between the lungs and the contents of the mediastina. The parietal layer is applied to the thoracic wall as described.

Hilum of lung and its relations

The roots of the lungs consist of the bronchi, the right one giving off a branch before entering the lung, the pulmonary artery and vein, the bronchial arteries and veins, the lymphatic vessels and nodes, and the nerves. The bronchi are the two tubes into which the trachea divides, one running downward and outward to each lung. The pulmonary artery at its bifurcation is anterior to the bronchi and at a lower plane. Each branch of the artery rises over the bronchus and comes to lie more or less external to it. This apparent crossing of the bronchus by the artery occurs on the right just after the origin of the first secondary bronchus. The artery divides before entering the lung, one branch entering thru the upper and the other thru the lower part of the hilum. The pulmonary veins are usually two on each side. The superior lie in front of and below the artery. The inferior are the lowest of the large vessels of the lung root, passing from behind under the bronchus into the heart. The bronchial arteries follow the bronchi along their posterior surfaces. The bronchial veins are both anterior and posterior. On the right side both open into the larger azygos vein. The left posterior ones often receive the anterior and open into the superior hemiazygos vein. There may be various anastomoses with mediastinal, pericardial, and tracheal veins. The lymphatics run for the most part behind the bronchi. The lymph nodes are for the most part on the posterior and inferior aspects of the tubes, the group under the bifurcation joining others at the sides. Some nodes occur on the front. The nerves from the involuntary and vagus form plexuses both before and behind the bronchi. Below the roots lies the pericardium over the left auricle. The great azygos vein arches over the right root from behind, to join the superior vena cava, which is against the root in front. The arch of the aorta crosses the left root from before backward, being less closely applied to it behind than elsewhere. The esophagus is behind the very beginning of the left root. The pleura is reflected over each root, which it completely envelops as it passes from the parietal into the visceral layer. The broad ligament of the lungs is a fold of pleura extending

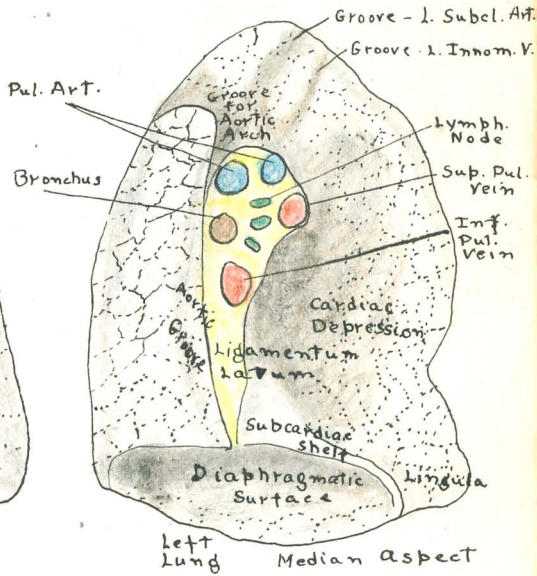
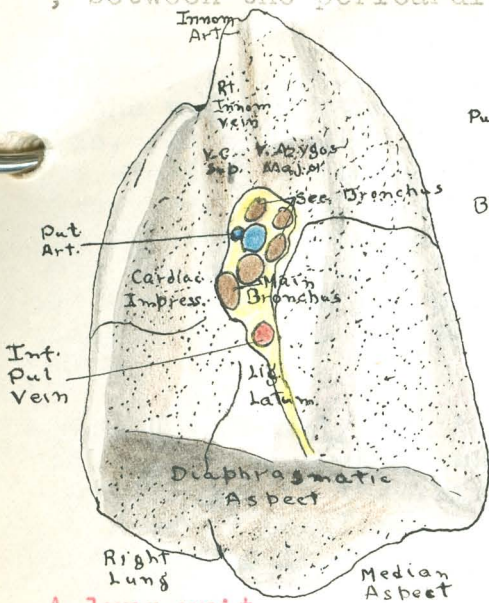


R.
B
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FIG. 104.—The lungs and air-passages seen from the front. On the left of the figure the pulmonary tissue has been dissected away to show the ramifications of the bronchial tubes. *a*, larynx; *b*, trachea; *d*, right bronchus. The left bronchus is seen entering the *root* of its lung.

downward from the end of the root. The phrenic nerve of each side passes in front of the root, between the pericardium and the pleura.

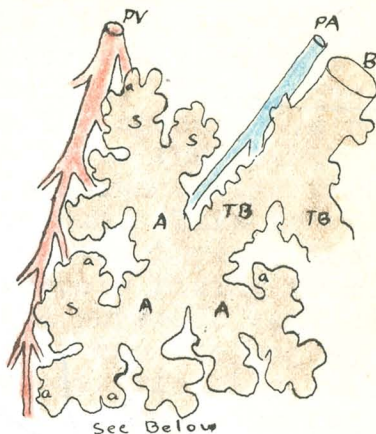


A lung unit

A lobule is a lung unit. Each lobule is entered by an intralobular bronchus, accompanied by its artery. The bronchus divided into two a little above the middle of the lobule; having previously given off two or three collateral branches to its upper part. In the third quarter of the lobule the two subdivisions again split and this is repeated in three or four successive bifurcations, a varying number of collateral branches being given off. The number of terminal bronchi in a single lobule may be as many as one hundred or more. The slightly dilated distal extremity of the terminal bronchus communicates with from three to six spherical cavities or atria. The atria, in turn, communicate with a group of larger and irregular cavities or air sacs into which open directly the ultimate air spaces, the alveoli. This lobule is more or less isolated and surrounded by connective tissue and vessels and receives a single intralobular bronchus and artery. The former is accompanied by some areolar tissue, and certain fibrous prolongations extend into the lobule from the connective tissue disposed about its surface. They extend but a short distance. An intralobular branch of the pulmonary artery enters

DAY 50.

with the bronchus and follows its ramifications until the ultimate bronchi have ended in the air sacs. The terminal arterioles break up into capillaries in the walls of the alveolae. Interlobular arteries supply the connective tissue between the lobules. The pulmonary veins arise from the capillaries in the walls and run on the periphery of the lobules to the hilum.



Lobes first affected in

PNEUMONIA Usually limited to the lower lobe of one lung, the congestion and edema being most apt to begin in the thick lower and posterior portions of the lower lobes.

TUBERCULOSIS is found oftenest in the apices, probably because of the relatively defective expansion in that region which occurs in all persons and especially in round shouldered individuals. A possible cause also is the greater exposure of the upper area to sudden changes in temperature and the short distance from the source of infection and the seat of infection.

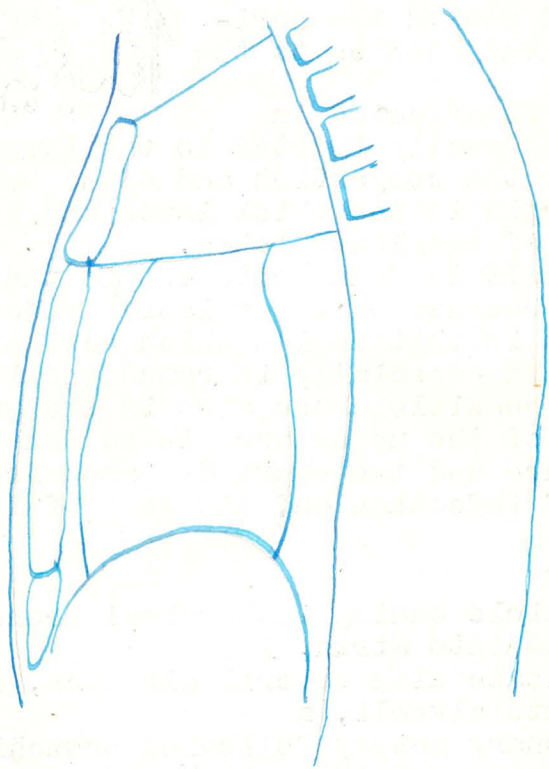
LUNG UNIT

B₁ bronchiole ending in terminal bronchi, TB
TB divided into atria, A

A communicate with several air sacs, s
s open into alveoli, a

PA- pulmonary artery following bronchiole

PV, pulmonary vein at periphery



Mediastina, boundary and contents.

The median space between the plurae is called the mediastinal space, and is subdivided into four parts called the mediastina. The superior mediastinum is that part of the space above a plane passing from the disk below the fourth thoracic vertebrae to the junction of the first and second pieces of the sternum. This is occupied by the upper part of the thymus, the arch of the aorta and the vessels rising from it, the innominate veins, and the superior vena cava. It is traversed by the trachea and esophagus, the thoracic duct, the pneumogastric, the phrenic, and the sympathetic nerves. The region below this is subdivided by the pericardial sac into an anterior middle and posterior compartment. The middle mediastinum is occupied by the heart within the pericardium. The roots of the lungs are partly within this and partly in the superior mediastinum. The shallow anterior mediastinum is between the middle one and the sternum. It contains the lower part of the thymus, a few lymph nodes, fat, and areolar tissue. The posterior mediastinum, between the spine and the middle mediastinum, contains the esophagus, the aorta, the thoracic duct, the azygos veins, the pneumogastric and sympathetic nerves.

The Pericardium

A serous sac which encloses the heart and the proximal portions of the great vessels. Like other serous sacs, it consists of two layers, one of which, the visceral layer, closely invests the heart and at its base becomes continuous with the parietal layer, within which it is invaginated. The visceral layer is exceedingly thin and closely applied to the musculature of the heart. The parietal layer is much stronger and forms a conical sac, the base of which rests upon and is attached to the diaphragm, while its apex surrounds the aortae. Normally there is no cavity between the two except at the base where a slight amount of pericardial fluid is to be found. Laterally and anteriorly the parietal layer is adherent to the plurae.

Heart and Great Vessels

The AORTIC ARCH arises from the base of the left ventricle and curves up over to the left and backward to descend along the body of the fourth thoracic vertebra and below. It gives off first the coronary arteries, two in number, from the right and left prominences at the base of the aorta. The left coronary lies behind the base of the pulmonary aorta and passes forward between that vessel and the left auricular appendix to reach the anterior interventricular groove, in which it divides into two branches. The larger of these descends in the groove to the apex of the heart, while the smaller one passes backward in the left portion of the auriculo-ventricular groove. The right coronary passes outward from its origin in the auriculo-ventricular groove to the posterior interventricular groove down which it continues to the apex of the heart. The innominate artery passes directly upward to the level of the right sterno-clavicular articulation, where it divides into the right common carotid and the right subclavian. Anteriorly it is separated from the sternum and from the origins of the right sterno-hyoid and sterno-thyroid muscles by the left innominate vein and by some fatty tissue which contains the remains of the thymus gland. Posteriorly it is in relation with the trachea and the sympathetic cardiac nerves. On the right it is in contact with the right pleura and on the left of it is the left common carotid artery. The left common carotid lies in the thoracic cavity during the first part of its course. It crosses obliquely in front near its root by the left innominate vein and the cardiac branches of the pneumogastric nerve. It is separated from the sternum and the origin of the sterno-thyroid muscle by some fatty tissue which contains the remains of the thymus gland and posteriorly it is in relation with the trachea below and higher up with the left recurrent laryngeal nerve. Below and to its right is the innominate. Above it is in close relation with the trachea, while to its left and somewhat posteriorly are the left subclavian artery and the left pneumogastric nerve.

The left subclavian ascends and curves outward and slightly forward to the inner border of the scalenus anticus. It ascends almost vertically thru the superior mediastinum. Behind and medially are the esophagus, the thoracic duct, and the longuscolli muscle, and at its emergence from the thorax the lower cervical sympathetic and cervical ganglion. Internal to it are the trachea and left recurrent laryngeal nerve and lateral to it are the left pleura and lung. Near its origin it is crossed by the left innominate vein, and higher up it is crossed by the internal jugular, vertebral and subclavian veins, as well as by the phrenic nerve and the thoracic duct, the latter arching over it to reach its termination in the subclavian vein. The left pneumogastric and cardiac involuntary nerves descend into the thorax in front of it. As it emerges from the thorax it lies behind the clavicular portion of the sterno-cleido-mastoid. In the neck it rests upon the dome of the left pleura.

(See DAY 48)

INFERIOR VENA CAVA

Formed by the union of the two common iliac veins and receives a number of tributaries from the abdominal walls and organs: inferior phrenic, lumbar, hepatic, renal, suprarenal, and spermatic or ovarian.

SUPERIOR VENA CAVA

Formed by the union of the right and left innominate veins. It also receives the vena azygos major and small veins from the mediastinum and pericardium.

(See DAY 43)

BLOOD SUPPLY TO HEART AND VENOUS DRAINAGE

Anterior surface of ventricles

Larger descending branch of left coronary

Left auricle and ventricle

Smaller descending branch of left coronary

Left auricle

Main stem of artery

Right auricle and ventricle

Left ventricle adjoining posterior interventricular groove.

Right coronary

Both surfaces of right ventricle

Marginal artery of right coronary

(See above)

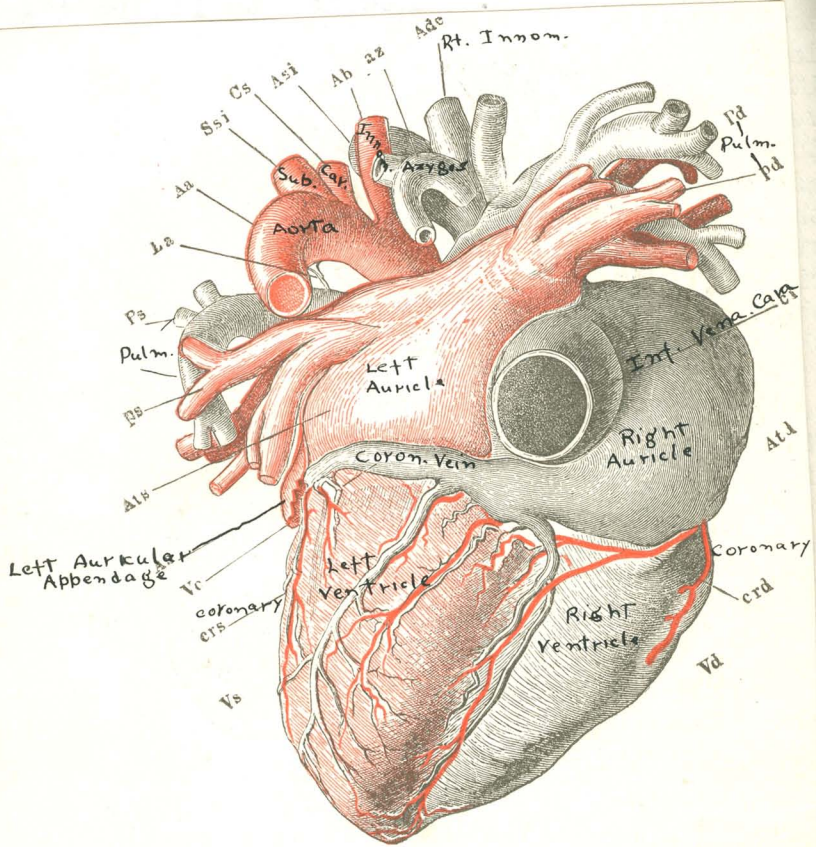


Fig. 80.—The heart viewed from its dorsal aspect. *Atd*, right auricle; *cz*, inferior vena cava; *az*, azygos vein; *Vc*, coronary vein. The remaining letters of reference have the same signification as in Fig. 79.

VENOUS DRAINAGE

The coronary sinus is a short venous trunk occupying right half of posterior auriculo-ventricular groove between left auricle and ventricle. At the right end it opens into the right auricle. At the left end it receives the great coronary vein, and also the posterior vein of the left ventricle and the middle cardiac vein, and the oblique vein of the left auricle.

The great cardiac or left coronary vein begins upon the anterior surface of the heart at the apex, where it anastomoses with the veins of the posterior surface and ascends the anterior interventricular groove in company with the left coronary artery, to the anterior auriculo-ventricular groove, in which it passes to the left, and curving around the left border of the heart to the posterior surface, terminates by opening into the left end of the coronary sinus. It drains the anterior surfaces of both ventricles as well as the surfaces of both the left auricle and ventricle.

The posterior cardiac vein ascends along the posterior surface of the left ventricle and drains that region into the coronary sinus.

The middle cardiac vein in the posterior interventricular groove drains the posterior surfaces of both ventricles into the coronary sinus. It is second in size to the great coron.

The right coronary or small cardiac vein in the posterior auriculo-ventricular groove drains posterior surface of right auricle and ventricle into coronary sinus. It may be lacking.

The oblique vein of the left auricle drains the posterior surface into coronary sinus.

There are also small anterior cardiac veins opening directly into the right auricle, and drain the anterior surface of the right ventricle.

VESSELS ENTERING HEART

(right auricle)

Superior and inferior venae cavae -- venous --

Pulmonary veins -- arterial -- left auricle

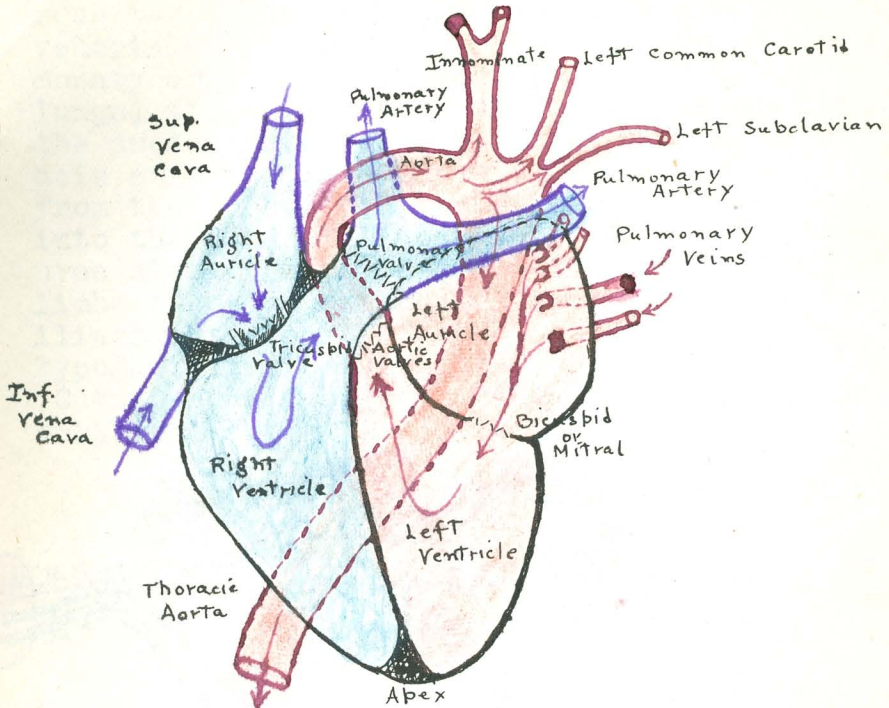
VESSELS LEAVING HEART

Aorta --arterial -- left ventricle.

Pulmonary Aorta -- venous -- right ventricle

Internal structure of the heart

CIRCULATION THRU THE HEART



Venous blood enters right auricle thru superior and inferior vena cava. Passes to right ventricle thru tricuspid valve and is pumped out thru the pulmonary aorta thru the pulmonary or semilunar valve.

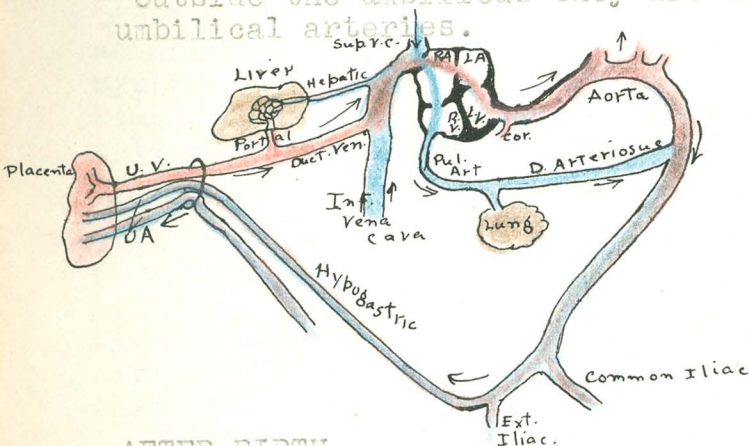
Arterial blood is returned to the heart thru the pulmonary veins into the left auricle and passes to the left ventricle thru the bicuspid or mitral valve. It leaves the left ventricle thru the aortic or semilunar valve.

FETAL CIRCULATION

Aerated blood leaves placenta thru umbilical vein and passes in under liver where portal vein carries part to liver and ductus venosus empties rest into inferior vena cava. The liver is drained by the hepatic vein. When the blood reaches the right auricle it is shunted directly into the left auricle by the Eustachian valve and thru the foramen ovale and is then pumped thru the systemic aorta by the left ventricle, to be distributed to the head.

From this region it is collected by the superior vena cava and shunted thru the right auricle by the tubercle of Lauer directly across the other stream and on into the right ventricle whence it is pumped into the pulmonary arteries. Instead of reaching the lungs, the majority of the blood passes thru the ductus arteriosus directly to the thoracic aorta and mingles with the arterial blood from the arch. The two streams pass on down into the common iliacs, supplying the structures along the way and continuing to the lower limbs thru the external iliacs. The internal iliacs carry part of the blood and then as the hypogastrics, return it to the placenta.

Outside the umbilicus they are known as the umbilical arteries.



AFTER BIRTH

With the assumption of the respiratory function the three structures peculiar to the fetal circulation -- the ductus venosus, foramen ovale, and ductus arteriosus -- become useless and soon undergo occlusion and atrophy, the two former ducts being represented by the fibrous cords seen on the posterior surface of the liver and terminal part of the aortic arch respectively. Closure of the foramen ovale proceeds more slowly and may never completely close.

PATHOLOGY

Fatty degeneration, sinosis of systemic aorta.

RIGHT AURICLE

A relatively thin walled chamber having in cross section a roughly triangular form. Viewed externally the roof of the chamber is directed upward, backward, and somewhat to the right, and near its junction with what may be termed the posterior wall receives the superior vena cava. The posterior wall, also smooth and rounded, receives, near its junction with the median wall, the inferior vena cava, and below and to the left of this, in the posterior auricular ventricular groove, is the terminal portion of a vein which winds around the heart from the left and is termed the coronary sinus. The antero-lateral wall is prolonged into a somewhat triangular diverticulum with crenulated edges, which winds anteriorly around the proximal portion of the systemic aorta and is known as the right auricular appendix. The median wall is not visible on surface view, and is formed by a rather thin muscular partition, the auricular septum, which is common to both auricles; and the floor, also invisible from the exterior, corresponds to the base of the right ventricle, and is perforated by an oval aperture, the right auriculo-ventricular orifice, which places the cavity of the auricle in communication with that of the right ventricle.

The interior is lined throughout by a delicate shining membrane, the endocardium. Minute depressions interrupt the continuity. The cavity of the auricular appendix is traversed by a network of anastomosing fibro-muscular trabeculae, the musculi pectinati, which give the appendix a somewhat spongy appearance. In the roof of the auricle is seen the circular orifice of the superior vena cava. and on the posterior wall is the somewhat oblique opening of the inferior vena cava. The lower and lateral margins of the orifice are guarded by a crescentic fold, the Eustachian valve, which tends to direct the blood entering by the vein upward and medially, and is the remains of the important structure of fetal circulation. Between the venae cavae is the tubercle of Lower. Below the inferior vena cava is the orifice of the coronary sinus, guarded by the Thebesian valve. The fossa ovalis lies in the median wall.

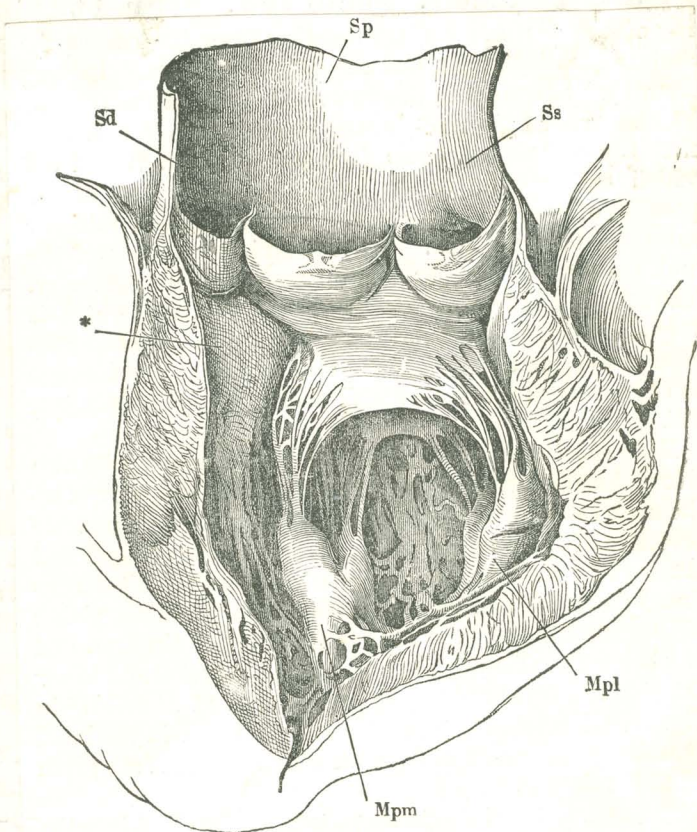
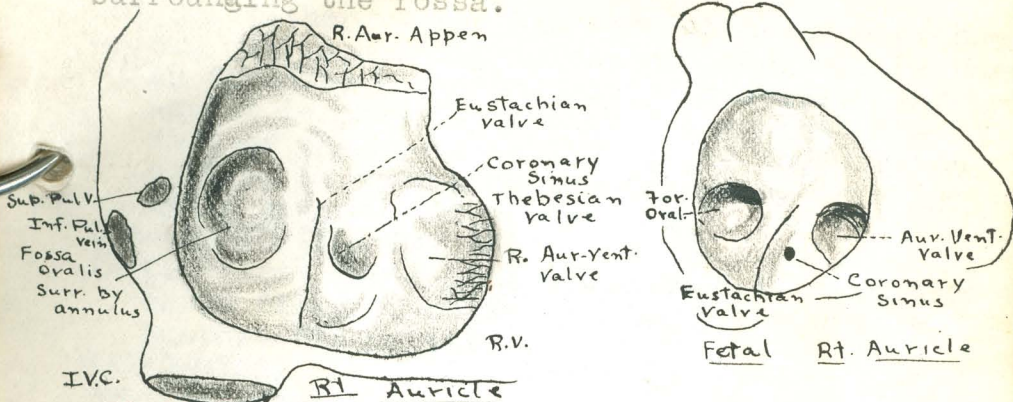


FIG. 81.—The left ventricle and the commencement of the aorta laid open. *Mpm*, *Mpl*, the papillary muscles. From their upper ends are seen the *chordae tendineae* proceeding to the edges of the flaps of the mitral valve. The opening into the auricle lies between these flaps. At the beginning of the aorta are seen its three pouch-like semilunar valves.

ANNULIS OVALIS, a thickening or slight fold surrounding the fossa.



Right Ventricle

CONUS ARTERIOSUS, a slight conical elevation of the base of the ventricle, carrying opening of pulmonary aorta.

PAPILLARY MUSCLES, small columns attached to the ventricular wall by the end only and passing into slender tendons or

CORDAE TENDINAE, slender tendons passing to the edges of the valves guarding the auriculo-ventricular orifices.

COLUMNAE CARNAE, ridges which are attached throughout their entire length to the wall of the ventricle, or only at either extremity and giving rise to the chordae tendinae.

SEMILUNAR VALVE, pulmonary valve of three segments, each a crescentic pouch like structure.

Left Ventricle

SINUS OF VALSALVA, a pouching of the aorta behind each segment of the semilunar valve to form a pocket and help distend the valve leaves.

BICUSPID OR MITRAL, auriculo-ventricular of two leaves supported by chordae tendinae.

Submaxillary Region (See DAY 44)**DIGASTRIC** (See DAY 46)

Action: either raises the hyoid bone or depresses the jaw, according as one or other of the bone is fixed by the antagonizing muscles. May assist in pressing the tongue against the roof of the mouth in the act of deglutition or help in elevating the larynx by drawing hyoid upwards and backwards.

MYLO-HYOID (See DAY 46)

Action: draw hyoid bone upwards and at same time raise floor of mouth, pressing the tongue against the palate.

GENIO-HYOID

Origin: inferior genial tubercle

Insertion: anterior surface of body of hyoid

Nerve: hypoglossal

Action: hyoid forward and upward or depress mandible.

GENIO-GLOSSUS

Origin: superior genial tubercle

Insertion: base of tongue and upwards to apex.
Median septum separates the two.

Nerve: hypoglossal

Action: retraction of tongue, protrusion of t, depression of tongue.

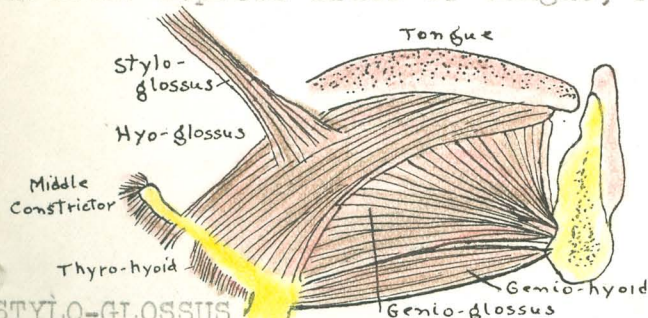
HYO-GLOSSUS

Origin: side of body of hyoid, greater and lesser horn.

Insertion: side of tongue, upwards and forwards

Nerve: hypoglossal

Action: depress sides of tongue, retract tongue.

**STYLO-GLOSSUS**

Origin: tip of styloid process

Insertion: side of tongue at $\frac{2}{3}$ posterior mark

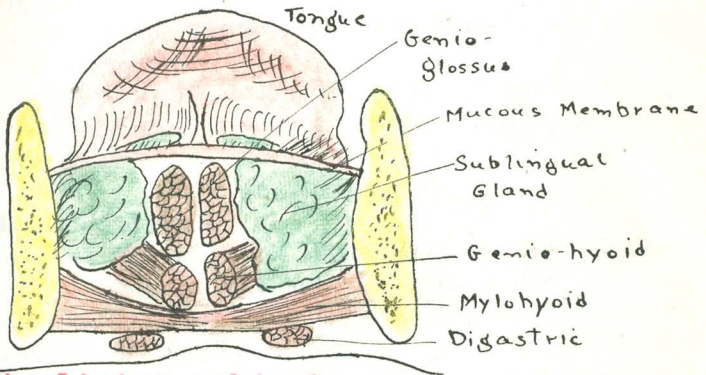
Nerve: hypoglossal

Action: retract tongue and elevate sides

Floor of mouth

- Mylo-hyoid muscle
- Genio-glossus "
- Genio-hyoid "
- Digastric "
- Oral mucous membrane
- Hypoglossal Nerve

- Sublingual gland
- Bartholin's Duct
- Submaxillary Gland
- Wharton's Duct
- Sublingual Bursa
- Lingual artery



Palpable in living subject.

- Digastric muscle
- Mylo-hyoid "

- Submaxillary glands
- Sublingual glands

4/7/21
M.L.L.

lingual Gland and deep part of Sub-maxillary gland with duct. Genio-Hyoid, Genio-Hyoglossus, Hyoglossus, Stylo-Glossus Muscles. Lingual Artery and Sub-lingual branch. Lingual Nerve and Hypoglossal Nerve. Dissect out structures in relation to Hyoglossus muscle and divide muscle to expose Lingual artery, Glosso-Pharyngeal nerve, Stylo-Hyoid Ligament, Middle constrictor Muscle.

Questions:—

- (1) Give Origin, insertion, nerve supply and action of the above muscles.
- (2) What structures are found in the floor of the mouth?
- (3) Which of these structures can you palpate in the living subject?

DAY 55 4/8/21

Deep Dissection of Neck.

Dissect out Ligaments and Muscles connected with Styloid process noting relations. Divide Styloid process near root and turn down with ligaments and muscles. Complete dissection of following nerves and their branches in this region: Facial, Hypoglossal, Spinal Accessory, Vagus, Glosso-Pharyngeal, Sympathetic, Loops between first and second cervical, Pharyngeal Plexus. Define the walls of the Pharynx.

Questions:—

- (1) Give origin and distribution of the above nerves in the neck.
- (2) Explain why the neck should be kept in good condition at all times.

DAY 56 4/9/21

Pre-Vertebral Region.

Head to be divided into an Anterior and Posterior part as follows: Saw obliquely posterior to Temporal bone down to Jugular Foramen. Make transverse incision thru Bassilar process about $\frac{1}{2}$ in. in front of Foramen Magnum. Nerves and vessels should be divided and the anterior part separated from the posterior leaving the Occipital bone articulating with the Vertebral column. Note structures in relation to vertebral column. The Pre-Vertebral Muscles, Vertebral Artery. Relation of Anterior Primary divisions of Cervical nerves to Vertebral Artery.

Questions:—

- (1) Name the Pre-Vertebral Muscles and give their action.
- (2) How does their development compare with corresponding muscles on the posterior aspect of the vertebra.

DAY 57 4/9/21

Pre-Vertebral Muscles.

Dissect out Scaleni, Rectus Capitus Anticus, Major, Minor, and Lateralis. Longus Colli, Intertransverse Muscles, Vertebral Artery. Note pull of all muscles and symmetry of development. Note course and branches of Vertebral Artery. Remove muscles noting their relations to the Cervical and Brachial Plexuses.

Questions:—

- (1) Give the Origin and Insertion and Nerve supply of these muscles.
- (2) Describe the Vertebral Artery.
- (3) What structures lie in relation to the Pre-Vertebral Muscles?

DAY 58 4/11/21

Pharynx.

Remove from the anterior part of the head each Temporal bone and preserve for dissection of ear. Define Eustachian tube and separate from bone and retain with Pharynx. Clean constrictors and Stylo-Pharyngeus Muscles. Define the intervals above, below and between these muscles and secure the structures occupying these intervals. Reflect the Constrictors outward on one side to expose Stylo-Pharyngeus and Palato-Pharyngeus. Above the latter is seen the fibrous aponeurosis of Pharynx pierced by the Eustachian Tube, Levator Palati muscle and Ascending Pharyngeal Artery. Note relation of these structures.

Questions:—

- (1) Describe the Eustachian Tube.
- (2) O. I. B. & N. S. of Constrictors.
- (3) Describe the arrangements and action of the Constrictors.
- (4) What are the relations of the Pharynx?

DAY 59 4/11/21

Interior of Pharynx.

Open cavity of Pharynx from behind by median longitudinal incision and note: Subdivisions, Nasal, Oral, and Laryngeal. Communications, Posterior Nares (2), Eustachian Tubes (2), Cavity of Mouth, Laryngeal Opening, Oesophageal Opening, Fossae, Lateral Recesses, Fossa of Rosenmuller. Glands, Waldeyer's Tonsillar Ring.

Pharynx

Distribution in neck (Stylo-hyoid)
Deep dissection of the neck.
ORIGIN AND DISTRIBUTION OF NERVES

Origin**Nerve**

Facial

VII cranial

Side of medulla below
pons.

Hypoglossal

XII cranial from ventr
al surface of medulla.

Spinal accessory

XI cranial from spinal
cord.

Vagus

X cranial from postero
lateral groove.

Glosso-pharyngeal

IX cranial

Sympathetic

Second dorsal to third
lumbar by white rami
From segmentsLoop of 1st & 2nd
cervical

Pharyngeal plexus

M from vagus

S from pharyngeal

I from superior cervical
ganglionInframaxillary branch to
platysma as far down as
hyoid bone. P. b. digastric.Floor of mouth and extrin-
sic and intrinsic muscles
of tongue.Supplies sterno-mastoid
and trapezius.Pharyngeal branch to
constrictors of pharynx
Superior laryngeal to
crico-thyroid muscle
and mucous membraneRecurrent laryngeal to
lower half of larynx.

Esophageal to esophagus

Pharyngeal branches

Stylo-hyoid muscle

Tonsillar and lingual

Accompany all the arteries

Infrahyoid group of muscles

Lateral wall of pharynx

STYLOID PROCESS gives origin to the stylo- hyoid
and stylo-glossus - stylo Pharyngeus

Condition of Neck

Owing to the intimate relations of important nerve and blood channels to and from the head region and the complex musculature of the neck any lesion in the neck may have serious results. Not only is the brain and part of the cord involved but also the organs of special sense and one of the main sources of involuntary nervous supply to the viscera passes thru this area. It is as vital to the body as the medulla is to the brain.

Pre-Vertebral Region**PRE-VERTEBRAL MUSCLES**

Scalenus anticus bends the neck forward and to the same side and rotates it to the opposite side. If the cervical vertebrae be fixed, it will raise the first rib and assist in inspiration.

Scalenus medius bends the neck laterally and assists in inspiration if the cervical vertebrae be fixed.

Scalenus posticus bends the neck laterally and raises the second rib if the cervical vertebrae be fixed.

Rectus capitis lateralis bends the head laterally

Intertransversales Anteriores bend the head laterally

Longus colli bends the head ventrally and laterally

Rectus capitis anticus major flexes the head and rotates it slightly towards the opposite side.

Rectus capitis anticus minor flexes the head.

Comparative development

(See DAY 43) The development is considerably less due partly to the other structures present in that region and partly to the smaller need for such.

Pre-Vertebral Muscles**SCALENUS ANTICUS**

Origin: four tendinous slips from the anterior tubercles of the transverse processes of the third to the sixth cervical vertebrae.

Insertion: flat muscle down and forward into scalene tubercle on upper surface of first rib.

Nerve: 4th, 5th, 6th cervicals

SCALENUS MEDIUS behind the above

Origin: six or seven tendinous slips from the transverse processes of the lower six or of all the cervical vertebrae.

Insertion: upper surface of first rib, behind the groove for the subclavian artery. Some fibers may extend to the second rib.

Nerve: anterior divisions of cervical nerves

SCALENUS POSTICUS

Origin: two or three tendinous slips from transverse processes of lower two or three cervical vertebrae

Insertion: outer surface of second rib.

Nerve: anterior divisions of lower three cervical

RECTUS CAPITIS LATERALIS

Origin: transverse process of atlas

Insertion: inferior surface of jugular process of occipital bone

Nerve: suboccipital

INTERTRANSVERSALES ANTERIORES

Origin and insertion: between anterior tubercles of transverse processes of cervical vertebrae.

LONGUS COLLI

Medial portion

Origin: bodies of upper three thoracic and lower two cervical vertebrae

Insertion: bodies of three or four upper cervical vertebrae, the slip to the atlas being inserted into its anterior tubercle

From the lower part of the median portion slips are given off which constitute the inferior oblique portion

Insertion: transverse processes of fifth and sixth, and sometimes also of fourth and seventh, cervical vertebrae.

The superior oblique portion is formed by slips

Origin: from the transverse processes of the sixth to the third cervical vertebrae and joining the upper part of the medial portion.

Nerve: anterior divisions of 2nd, 3rd, & 4th cervical

RECTUS CAPITIS ANTICUS MAJOR

Origin: four tendinous slips from the transverse processes of the third to the sixth cervical vertebrae

Insertion: basilar portion of the occipital bone lateral to the pharyngeal tubercle

Nerve: anterior divisions of 2nd, 3rd, & 4th cervical vertebrae.

RECTUS CAPITIS ANTICUS MINOR

Origin: anterior surface of lateral mass of atlas

Insertion: basilar portion of occipital bone, immediately behind the insertion of the longus capitis

Nerve: suboccipital nerve

Vertebral Artery

The first and largest branch of the subclavian. It supplies the spinal cord and brain, joining with the internal carotid arteries to form the circle of Willis. The artery is conveniently divided into four parts. The first portion arises from the upper surface of the subclavian opposite the interval between the longus colli and scalenus anticus, and courses upward between these muscles and in front of the transverse process of the seventh cervical vertebra, to the foramen in the transverse process of the sixth, which it enters. It is surrounded by a plexus of sympathetic nerve fibers, and in front is crossed by the inferior thyroid artery, and covered by the vertebral and internal jugular veins. The second portion includes the ascent of the artery thru the foramina in the transverse processes of the upper six cervical vertebrae in front of the trunks of the cervical nerves and surrounded by the sympathetic and venous plexuses. It passes upward and outward to reach the foramen of the atlas and as it leaves this opening it passes between the suboccipital nerve and the rectus capitis lateralis. Here its third portion begins, bending horizontally to the outer side and back of the superior articular surface of the atlas to enter the suboccipital triangle where it rests in the vertebral groove upon the posterior arch of the atlas, being separated from the bone by the suboccipital nerve. The artery then passes thru the occipito-atlantoid ligament and enters the spinal canal. The fourth portion enters the cranial cavity thru the foramen magnum and passes forward along the medulla to unite with its fellow at the posterior border of the pons and form the basilar. Its branches are:

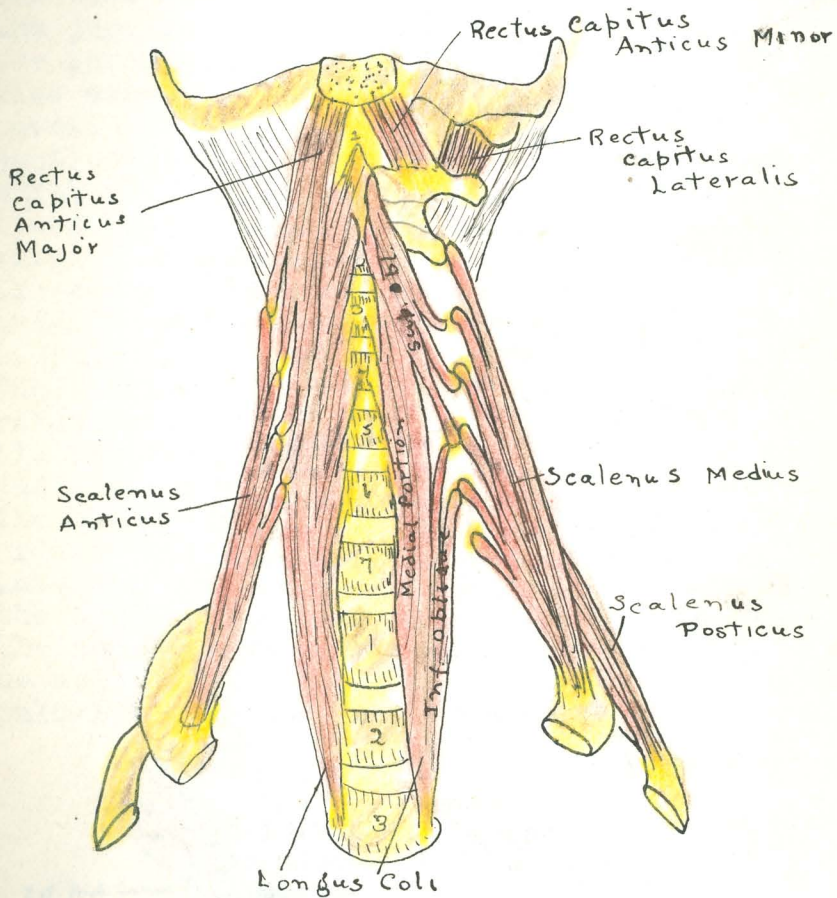
Muscular	Spinal	Posterior meningeal
Post. Spinal	Ant. Spinal	Post. Inf. Cerebellar.

A.P.D.
 Ova.
 P.P.D.

Relations of prevertebral muscles to

- Pharyngeal fascia
- Pharynx
- Esophagus
- Sympathetic nerves
- Vertebral artery

- Carotid sheath
- Inferior thyroid artery
- Recurrent laryngeal nerve
- Vertebral column
- Thyroid body



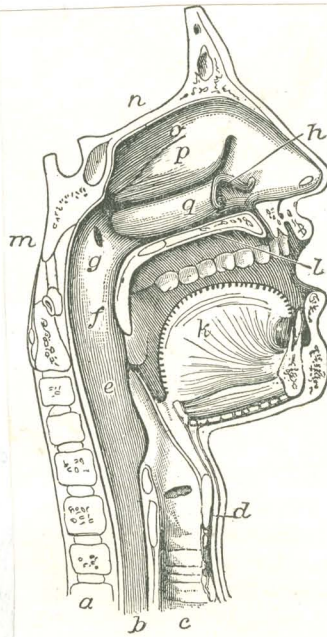
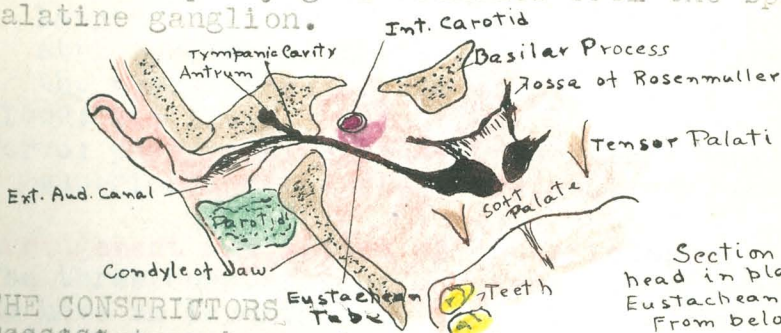


FIG. 88.—The mouth, nose and pharynx, with the commencement of the gullet and larynx, as exposed by a section, a little to the left of the median plane of the head. *a*, vertebral column; *b*, gullet; *c*, windpipe; *d*, larynx; *e*, epiglottis; *f*, soft palate; *g*, opening of Eustachian tube; *h*, tongue; *i*, hard palate; *m*, the sphenoid bone on the base of the skull; *n*, the fore part of the cranial cavity; *o*, *p*, *q*, the tubinate bones of the outer side of the left nostril chamber.

Pharynx**THE EUSTACHIAN TUBE**

A canal, partly bony and partly cartilagenous extending from the lateral wall of the nasopharynx backward, upward and outward to the anterior part of the tympanum. In the adult it measures about $1\frac{1}{2}$ inches in length of which the upper one third belongs to the bony portion. The tube is wider at its ends and narrower at the junction of the bony and cartilagenous parts, the isthmus. The osseus or tympanic portion lies above and internal to the canal for the carotid artery. The cartilagenous or pharyngeal portion joins the other at an obtuse angle which is very large and opens outward. It is lined throughout with mucous membrane and ciliated, stratified columnar epithelium. About the pharyngeal orifice of the tube lies the tubal tonsil, principally above, and infection of this tonsil may easily obstruct the orifice. The levator and tensor palati are in intimate relation to the tube and serve as dilators, the levator lying beneath and to the inner side, and the tensor extending to the outer side. The blood supply is from the ascending pharyngeal, middle meningeal, and Vidian branches on the internal maxillary. The venous drainage is thru the tympanum, pharynx, and cavernous sinus. The nerves are supplied from the tympanic plexus and the pharyngeal branches from the sphenopalatine ganglion.

**THE CONSTRICTORS****Constrictor pharyngis superior**

Origin: a thin quadrilateral sheet whose origin is closely associated with part of that of the buccinator, there being usually some interchange of the fibers. It arises from the lower part of the posterior border of the internal pterygoid plate and from its hamulus, from the posterior border of the

pterygo-mandibular ligament, and is thence continued upon the internal oblique line of the mandible, the mucous membrane of the mouth, and the side of the tongue.

Insertion: the uppermost fibers pass in a curve backward into the pharyngeal tubercle of the occipital bone, while the remainder unite with the muscle of the opposite side in a median raphe on the posterior wall of the pharynx.

Blood: superior thyroid, pterygo-palatine, ascending pharyngeal, descending palatine

Nerve: from pharyngeal plexus

Constrictor pharyngis medius

Origin: a fan shaped sheet from the stylo-hyoid ligament and both cornua of the hyoid bone.

Insertion: the fibers pass backward to the pharyngeal raphe, the upper fibers overlapping the lower part of the superior constrictor and extending in some cases almost to the occipital bone, while the lower fibers are overlapped by the inferior constrictor.

Blood: see above

Nerve: pharyngeal plexus and possibly by the glosso-pharyngeal nerve

Constrictor pharyngeus inferior

Origin: fan shaped sheet from outer surfaces of thyroid and cricoid cartilages

Insertion: pharyngeal raphe, upper fibers overlapping the lower part of the middle constrictor, while the lower ones mingle with the musculature of the esophagus.

Blood: see above

Nerve: pharyngeal plexus and possibly vagus thru superior and inferior laryngeal nerves.

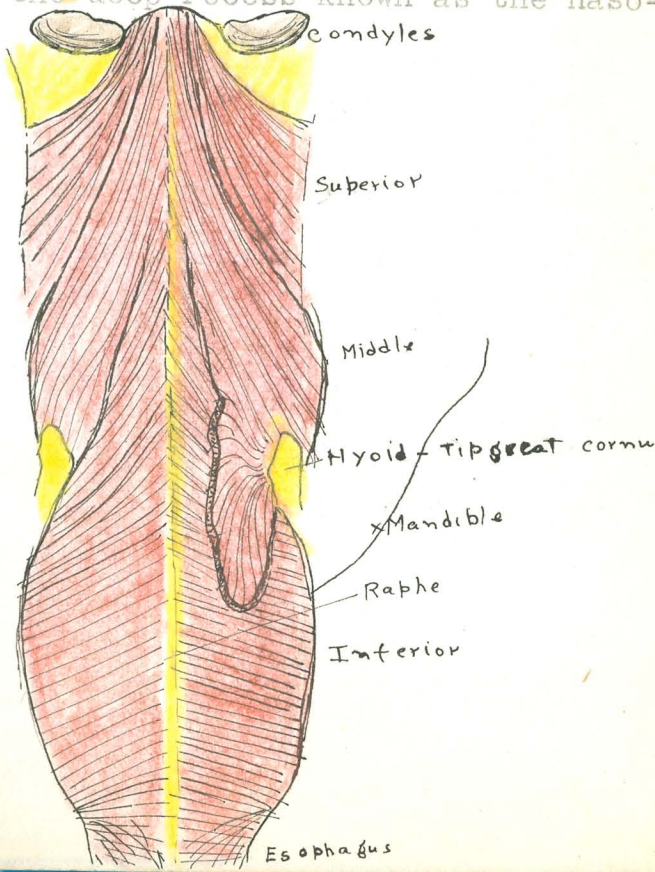
Arrangement and action of constrictors.

The three constrictors compress the pharynx and so have an important part to play in the final acts of deglutition, forcing the food towards the esophagus. They are also important agents in producing modulations of the voice, since the pharynx may be regarded as forming a resonator, alterations of whose form will naturally result in modifications of voice. The arrangement of the muscular tissue differs from the ordinary

one of the digestive tract, in as much as the outer layer is approximately circular and the longitudinal fibers are largely internal. The chief elements are the three constrictors, which overlap one another from below upward, the stylo-pharyngeus, the palato-pharyngeus, and certain accessory and rather irregular bundles of muscles.

Relations of the pharynx

The pharynx is a bag, open in front, with musculo-membranous walls extending from the base of the skull to the lower border of the larynx, near the top of the seventh cervical. Thus it is bounded behind by the spine, covered by the pre-vertebral muscles and fascia, and by the basilar process of the occipital bone, which, especially in the median line, is separated by much areolar tissue, as well as by the muscles, from the posterior wall. The steep rise of the basilar process, together with the downward growth of the face, forms the deep recess known as the naso-pharynx



The roof is formed by a little of the front of the basilar process and by the back part of the basi-sphenoid. The anterior is formed by the back of the framework of the face, the soft palate, the back of the tongue, the hyoid bone and the larynx. The pharynx communicates in front with the nasal chambers and the mouth; the Eustachean tubes open into it on either side near the top; and below it contains the opening of the larynx, behind which it passes into the esophagus. The tip of the normal uvula hangs on a level near the lower part of the axis or the top of the third cervical vertebra. The tip of the epiglottis is usually opposite the lower part of the third. The second and third cervical vertebrae are those behind that part of the pharynx that can be seen thru the open mouth. The lateral wall of the pharynx is very narrow, except in the region of the tonsils where it reaches forward to the anterior pillars of the fauces. The upper part of the lobes of the thyroid come very close to the lower part of the pharynx. They separate the common carotid from the pharynx. The common carotid is very close just before its division. The internal carotid lies against it until it reaches the skull. The internal carotid, and part of the external lie against it, as well as the ascending pharyngeal and middle meningeal. As to nerves, the sympathetic, the vagus, the superior laryngeal, the spinal accessory, and the glossopharyngeal are in contact at some point along the pharynx.

Interior of pharynx**POSTERIOR NARES**

The apertures thru which the nasal fossae communicate with the naso-pharynx, one on either side of the septum. Each opening is bounded below by the horizontal plate of the palate bone, above by the vaginal process of the sphenoid and the ala of the vomer, and mesially by the vertical posterior borders of the vomer.

EUSTACHEAN TUBES

Extends from lateral wall of naso-pharynx backward, upward and outward to the anterior wall of the tympanum. It opens about on a level with the lower border of the inferior turbinate, between the tubal and pharyngeal tonsils.

CAVITY OF MOUTH

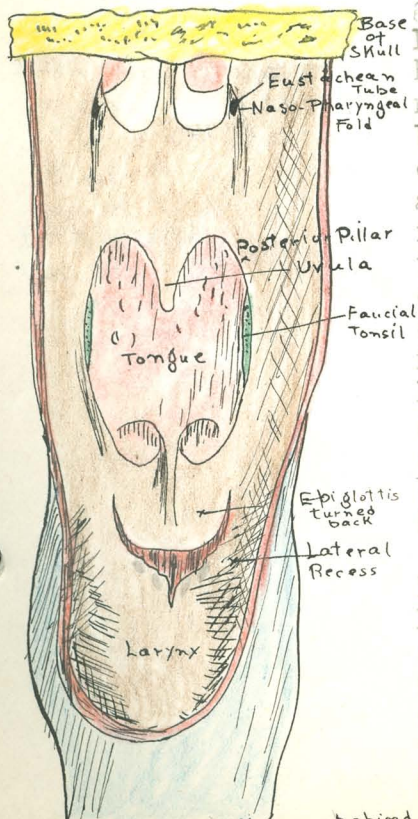
Opens into the pharynx at about the level of the axis and third cervical. The opening is bounded above by the soft palate and uvula, laterally by the pillars of the fauces and faucial tonsils and inferiorly by the epiglottis.

LARYNGEAL OPENING

Heart shaped plane, facing nearly backwards. It is bounded by the free border of the epiglottis in front and by the aryepiglottic fold which passes from this on either side back over the top of the arytenoid cartilages. It is interrupted in the median line by a notch. On either side of this the fold presents two swellings caused by the cartilages of Santorini and Wrisberg.

ESOPHAGEAL OPENING

Begins at the lower border of the cricoid cartilage near the disc between the sixth and seventh cervical vertebrae, the pharynx narrowing into it.



Pharynx opened from behind.

LATERAL RECESSES

A depression on either side of the entrance of the larynx between the aryteno-epiglottic fold and the arytenoid cartilage internally and the thyro-hyoid membrane externally.

FOSSA OF ROSENMULLER

A deep socket at the angle of the pharynx between the posterior wall and the back of the projection of the cartilage of the tube.

Waldeyer's Tonsillar Ring

The upper part of the pharynx contains many lymphoid collections. The larger and more constant of these are described as forming a ring. At the apex of the nasopharynx lies Luschka's tonsil, a single mass of lymphoid tissue sometimes known as adenoids. Somewhat below and anterior, and separated by the fossa of Rosenmuller lie the tubal tonsils, more or less surrounding the Eustachean tube opening. Stretching from these downward and forward to the soft palate lie the irregular pharyngeal tonsils which are the largest and most often affected in sore throat. At the base of the tongue below the soft palate and between the pillars of the fauces are the faucial tonsils concerned in tonsillitis. Abscess here is spoken of as Quinsy. Lastly the lingual tonsil is a small mass around the foramen cecum on the base of the tongue.

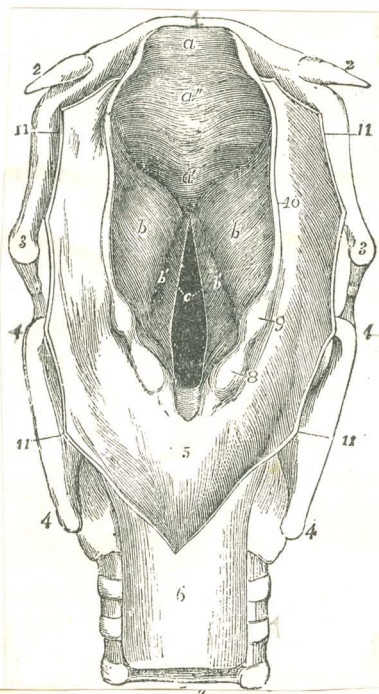


FIG. 157.—The larynx viewed from its pharyngeal opening. The back wall of the pharynx has been divided and its edges (11) turned aside. 1, body of hyoid; 2, its small, and 3, its great, horns; 4, upper and lower horns of thyroid cartilage; 5, mucous membrane of front of pharynx, covering the back of the cricoid cartilage; 6, upper end of gullet; 7, windpipe, lying in front of the gullet; 8, eminence caused by cartilage of Santorini; 9, eminence caused by cartilage of Wrisberg; both lie in, 10, the *aryteno-epiglottidean fold* of mucous membrane, surrounding the opening (*aditus laryngis*) from pharynx to larynx. *a*, projecting tip of epiglottis; *c*, the glottis, the lines leading from the letter point to the free vibratory edges of the vocal cords. *b*, the ventricles of the larynx; their upper edges, marking them off from the eminences *b*, are the false vocal cords.

Questions:—

- (1) Give location of each of the above named openings and Fossae.
- (2) Describe Waldeyer's Tonsillar Ring.

DAY 60 4/12/21

Larynx.

Clean and define Muscles, vessels and nerves associated with front and sides of Larynx. Remove Thyroid Body and its vessels. Stretch out walls of open Pharynx and examine Larynx from behind. Note position and relations of Epiglottis, Aryteno-Epiglottidian folds. Cuneiform, Corniculate, Thyroid, Cricoid, Arytenoid Cartilages. Remove muscles attached to Hyoid bone. Note muscles that take part in movements of Larynx. Detach Hyoid bone by removing Thyro-Hyoid Membrane and ligament and expose Vocal Cords. Dissect out cartilages of Larynx and examine articulations.

Questions:—

- (1) Describe the movements of the larynx.
- (2) Describe the Vocal cords and name their muscles.
- (3) Name cartilages of Larynx.
- (4) Explain Hyoid bone as diagnostic of Laryngeal trouble.

DAY 61 4/13/21

Mouth.

Clean Buccinator muscle defining its vessels and nerves, Pterygo-Mandibular Ligament and termination of Stenson's Duct. Divide muscle transversely and expose cavity of Mouth. Examine boundaries of cavity. Examine form and relations of Tongue, Mucous Membrane, Glands, Papillae. Dissect Muscles of Tongue and trace branches of Lingual Artery, and Nerves into its substance.

Questions:—

- (1) Give boundaries of the cavity.
- (2) Describe the interior of Mouth.
- (3) Describe the muscles of the Tongue.
- (4) What vessels and nerves are found in the Oral Cavity?

DAY 62 4/14/21

Nose.

Divide all soft parts adjacent to Nasal Fossa in midline. Saw thru bony structure above and below saving Nasal Septum. Dissect out cartilages of nose, blood vessels and nerves to Septum. Define all openings into Nasal Fossa, from Sinuses. Follow course of Infundibulum, and Nasal Duct. Note Spheno-Maxillary Fossa and relations. Define Spheno-Palatine foramen and trace Naso-Palatine nerve and artery to origin.

Questions:—

- (1) Describe the Nasal Fossa.
- (2) Give the origin of the nerves found in the fossa.
- (3) What Sinuses communicate with the Nasal Fossa?
- (4) Describe the Blood supply to the nose.

DAY 63 4/15/21

Ear.

The Temporal bone with Pinna attached should be cleaned. Identify, Internal Auditory Meatus with Facial nerve, Auditory Nerve, Auditory Artery, Hiatus Fallopi, and Great Superficial Petrosal Nerve. Eustachian Tube, Glaserian Fissure, External Auditory Meatus, Deep Auricular Artery, Origin of Levator Palati Muscle, Carotid Canal, Jugular Fossa, *Stylomastoid Foramen*, with Facial Nerve and Stylomastoid Artery. Show continuity of Pinna with cartilage of External Auditory Meatus. Remove roof of External Auditory Meatus to show course and attachments of Tympanic Membrane. Chip away top of cavity carefully and expose Ossicles. Study their position. Remove and saw thru remaining bone to display canals.

Questions:—

- (1) Describe the Middle Ear.
- (2) Give the course of Facial Nerve and Auditory Nerve.
- (3) What structures comprise the Internal ear?
- (4) Trace infection from Mouth to Mastoid Cells.

Deep auricular - Int ~~artery~~ *max* to walls Ext Aud. m.
Levator Palati - under surface apex petrosal
temp bone + cart Eustachian

Larynx Movements

The larynx consists of a number of cartilages which, by their relative changes of position, modify the approximation and tension of two folds of mucous membrane over fibrous tissue, known as the vocal cords, on either side of the cleft thru which the air enters the wind pipe. In swallowing the epiglottis is carried bodily backward while the approximated aryepiglottic folds and tubercles of Santorini are drawn upward thereby closing the laryngeal opening. In swallowing, the glottis is reflexly closed by contraction of the adductor muscles, which raise the larynx against the epiglottis, the vocal cords being ~~being~~ adducted by the lateral crico-arytenoids and constrictors of the glottis, and and the elevation of the larynx and depression of the epiglottis being effected by the action of the thyrohyoids, digastrics, geniohyoids, mylohyoids, and the muscles in the aryteno-epiglottidean folds.

Vocal cords and muscles

The false vocal cords are folds of mucous membrane continuous with the sides of the supraglottic space. They are attached in front to the inner side of the angle of the thyroid, above its middle, and behind to the antero-external surface of the arytenoids. They are soft folds of mucous membrane containing connective tissue, many glands, and some fibers from the thyroid arytenoid muscle. The true vocal cords arise a little below the false, and run to the vocal processes of the arytenoid cartilages. They arise a little above the middle of a line from the bottom of the thyroid notch to the lower border of the thyroid. The cords arise either directly from the thyroid, just on each side of the depth of the angle, or from a median cartilagenous nodule, or from one for each cord, the distance between them being the same in both sexes. The cords are triangular on section, with a sharp free edge, an upper surface slanting downward and outward from it, a longer internal surface which slants steeply downward and outward, -and an imaginary attached base placed laterally. The free edge

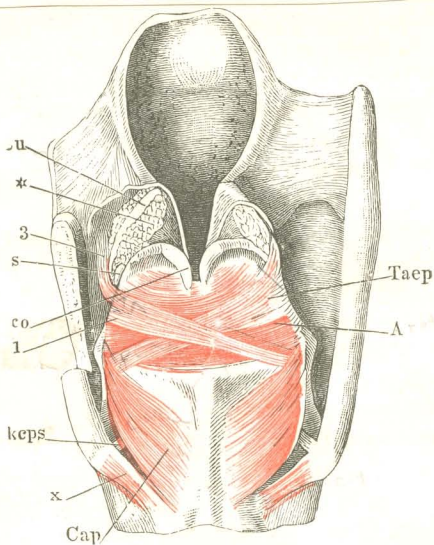


FIG. 158.—The larynx seen from behind and dissected so as to display some of its muscles. The mucous membrane of the front of the pharynx (5, Fig. 157) has been dissected away, so as to display the laryngeal muscles beneath it. Part of the left half of the thyroid cartilage has been cut away: *co*, cartilage of Santorini; *cu*, cartilage of Wrisberg.

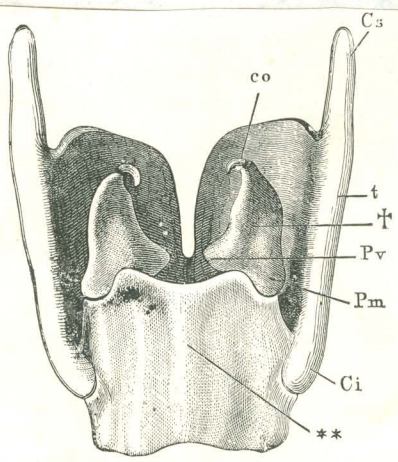


FIG. 156.—The more important cartilages of the larynx from behind. *t*, thyroid; *Cs*, its superior, and *Ci*, its inferior, horn of the right side; **, cricoid cartilage; †, arytenoid cartilage; *Pv*, the corner to which the posterior end of a vocal cord is attached; *Pm*, corner on which the muscles which approximate or separate the vocal cords are inserted; *co*, cartilage of Santorini.

is composed of the whitish ligament which shows thru the thin and closely attached mucous membrane. The substance is chiefly muscular tissue from the thyro-arytenoid, which forms a three sided prism, giving a solidity which the false cords lack. The muscles: constrictors, dilators, and those modifying the tension of the cords:

- Crico- thyroid *tenses*
- Posterior crico-arytenoid *v. p. out*
- Lateral crico-arytenoid *v. c. in*
- Thyro-arytenoid *relaxes*
- Arytenoid (single) *st. hinciter*

Cartilages of the larynx

Three single ones:

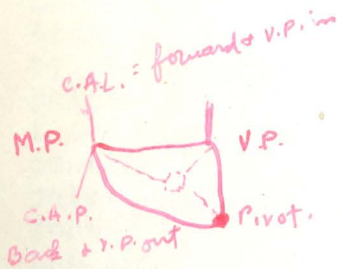
- Cricoid
- Thyroid
- Epiglottis

Three pairs:

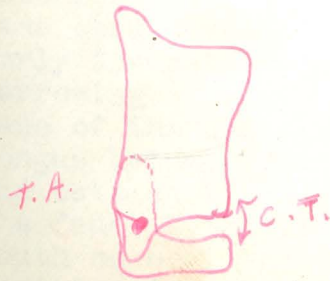
- Arytenoids
- Cornicula laryngis (Cartilages of Santorini)
- Cuneiform cartilages (Cartilages of Wrisberg)

Laryngeal trouble and hyoid bone

lesion hyoid press on nerve



4/12/21
M.L.L.



Mouth**Boundaries**

The framework of the mouth is made up of the hard palate and the alveolar processes of the upper jaw, by the greater part of the body, including the alveolar processes of the lower jaw and part of the ramus, and by the hyoid bone with the mylo-hyoid ~~muscle~~ ^{muscle} forming the floor over it. The hard palate is continued posteriorly by the soft palate and the uvula, which hangs down between the posterior pillars of the fauces to form what there is of a posterior wall, the greater part of the latter being occupied by the opening to the pharynx.

Interior of mouth

This is a cavity, which, when closed, is practically entirely filled by the tongue. There is a preoral cavity or vestibule between the lips and teeth, cheeks and jaws. The external wall of this is composed of the muscles of expression covered by mucous membrane and containing layers of fat - oftentimes. The lips are formed by the orbicularis oris muscle and its mucous membrane. The inner boundary of the vestibule is formed by the maxilla and mandible overlaid by a dense mucous membrane, the gums, and the teeth, which vary in number, the normal adult having 28, or 32 if the wisdom teeth be counted. The oral cavity is roofed by the palatine process of the maxilla and the palate bone, covered by a dense tunica propria intermingled with periosteum. The backward continuation of this constitutes the soft palate and uvula. The floor of the mouth is formed by the mylo-hyoid muscle, assisted by the extrinsic muscles of the tongue. The anterior and lateral walls are bounded by the same structures as in the vestibule. Posteriorly the palato-glossal muscles arch in the narrowing entrance to the pharynx from the base of the uvula above to the sides of the tongue below. Posterior to this muscle, and between it and the ^{Palato-}pharyngo-glossus lies the faucial tonsil. The mucous lining of the mouth or oral cavity proper is dense and contains few glands except under the tongue where the submaxillary and sublingual glands

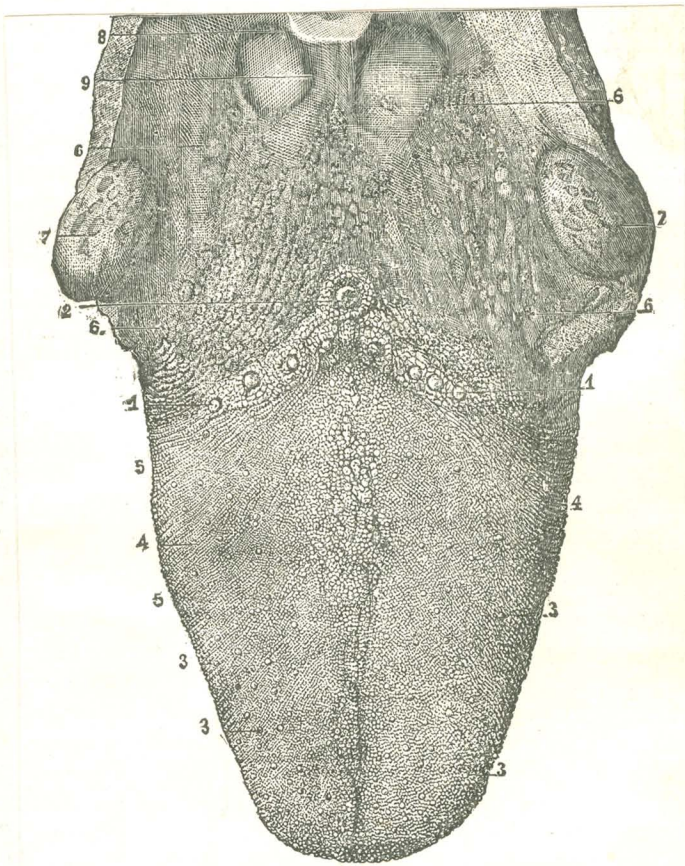
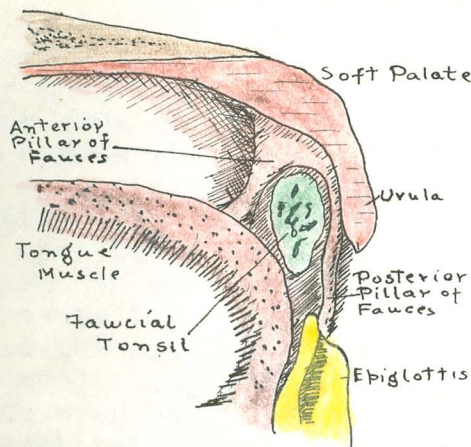


FIG. 95.—The upper surface of the tongue with part of the pillars of the fauces and the tonsils. 1, 2, circumvallate papillae; 3, fungiform papillae; 4, filiform papillae; 6, mucous glands; 7, tonsils; 8, part of epiglottis.

lingual
 Facial (cev)
 Int max - dental

pour in their secretions. The tongue nearly fills the floor and the cavity of the mouth, and presents a roughened surface over its dorsum.



Muscles of Tongue

There are two groups, the extrinsic and intrinsic. The former pass from the skull or hyoid bone to the tongue; The latter comprise those both arising and ending within the

organ. The general arrangement is as follows: Under the mucous membrane is a dense sheath of longitudinal fibers surrounding the others completely near the apex, and farther back wanting at the middle of the under surface where the fibers of the genio-glossi and hyo-glossi enter the organ. The inner part is divided into two by a median vertical septum of areolar tissue. It is composed of transverse muscle fibers interposed between layers of those called vertical. The extrinsic muscles are the genio-glossus
hyo-glossus
stylo-glossus
palato-glossus. (See DAY 54)

Vessels and nerves in the oral cavity

- △ Facial artery & vein & lymph vessels
- △ Facial & trifacial nerves
- N Superior labial and temporo-malar of maxillary
- N Buccal of mandibular
- N Facial branch of great auricular
- Stenson's duct across the cheek
- △ Naso-palatine artery from internal maxillary
- " " veins and nerves
- △ Posterior palatine arteries and veins
- " " " nerves from maxillary
- N Branches of IX, X, XII, and lateral chain ganglia
- N Lingual and sublingual of external max. art.

Hiatus - crescentic fissure - leads into
Infund - deep groove

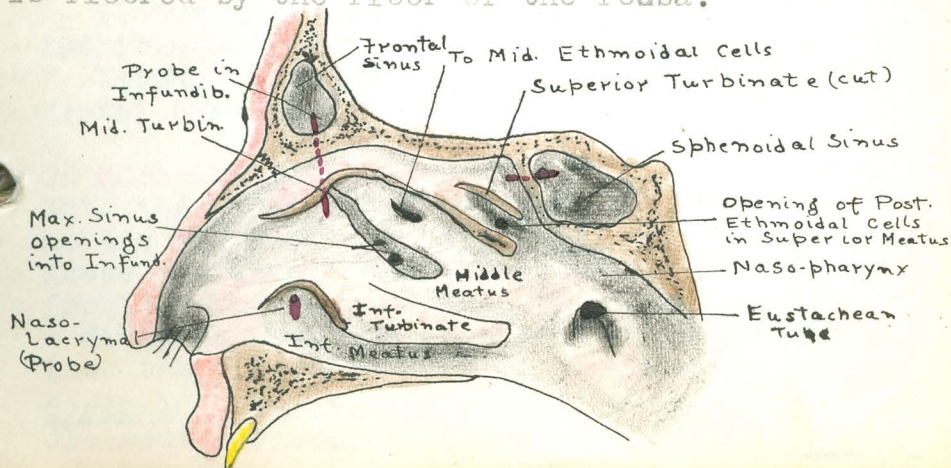
Nose

Nasal fossa

The cavity of the nose is divided by the median septum into two fossae which extend from the anterior to the posterior nares. Thru the latter they open into the naso-pharynx. They communicate more or less freely with the accessory air spaces within the frontal, the ethmoid, the sphenoid and the maxillary bones. In frontal section each fossa is triangular in section, the apex being above at the narrowed roof.

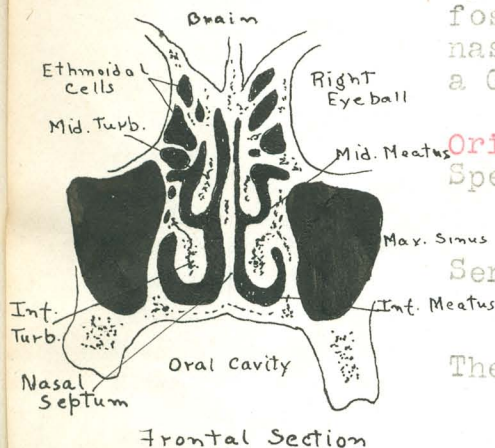
The smooth median wall is approximately vertical and meets the floor at almost a right angle while the sloping lateral wall is modelled by the projecting scrolls of the three turbinates, which overhang the corresponding meatuses. In sagittal section the contour of the fossa resembles an irregular parallelogram from which the upper front corner has been cut off. The anterior part of the fossa, immediately above the opening of the nostril and embraced by the outer and inner plates of the lower lateral cartilage and adjoining portion of the septum, is somewhat expanded and constitutes the vestibule. Coarse hairs or vibrissae project into the space.

Above and beyond the vestibule, the nasal fossa rapidly expands into a triangular space, the atrium nasi, that lies in advance of the middle nasal meatus. The lateral wall is modelled by the projecting scrolls of the three turbinates. The latter partly subdivide each fossa into three lateral recesses, the superior, middle, and inferior meatuses. These are overhung by the corresponding bony concha. The inferior meatus is floored by the floor of the fossa.



There are numerous openings from the neighboring sinuses into the meatuses which are described below. The roof of the fossa is arched and divisible into a naso-frontal, ethmoidal, and sphenoidal portion, in accordance with the bone over which the mucous membrane stretches. The lower part of the naso-frontal division is cartilaginous. Anteriorly the roof is little more than a groove but it broadens posteriorly. The floor is concave from side to side but horizontal from before backwards.

The posterior nares are apertures thru which the fossae communicate with the naso-pharynx. They resemble a Gothic arch in shape.



Origin of nerves in the fossa

Special olfactory fibers from olfactory bulb thru ethmoidal foramen.

Sensation from ophthalmic and superior maxillary of the fifth.

The lateral wall by the upper posterior nasal branches from Meckle's ganglion and the lower posterior

nasal branches from the larger palatine nerve behind.

The front of the fossa by the external division of the nasal nerve and the nasal branch of the anterior superior dental.

Floor of fossa by anterior superior dental Septum from naso-palatine, Meckle's ganglion, and internal division of nasal nerve

Antrum by infraorbital nerve thru superior dental branches

Communicating Sinuses

Into the upper and front part of the superior meatus the posterior ethmoidal air cells open.

Above and behind the upper turbinate and in front of the body of the sphenoid bone lies a diverticulum, the spheno-ethmoidal recess, into the posterior part of which opens the

Sphenoidal sinus. The infundibulum of the middle meatus receives the opening of the frontal

sinus. Also between the front of the attachment of the middle turbinate bone and the uncinatè process of the ethmoid there exists a passage which leads to the frontal sinus. Into the upper part of the infundibulum usually open some of the anterior ethmoidal cells, while lower in the groove lies the slit like ostium maxillary, the chief communication of the antrum of Highmore or maxillary sinus.

Blood supply to the nose.

The spheno-palatine branch of the internal maxillary is the largest and most important of the arteries. It enters the nose thru the spheno-palatine foramen, divides into external and internal branches which supply an extended tract reaching from the posterior to the anterior nares. The external branches are distributed to the turbinate bones and the mucous membranes of the meatuses, including the lower part of the olfactory region, ethmoidal cells, and frontal and maxillary sinuses. The internal or naso-palatine artery supplies the septum and upper part of the olfactory region. Numerous small twigs from the ethmoidal branches of the ophthalmic pass to the upper part of the fossa. The descending palatine helps in the supply of the posterior part and the facial supplies the nostril. The antrum receives sinus branches from the infraorbital. The sphenoidal is supplies by the pterygo-palatine.

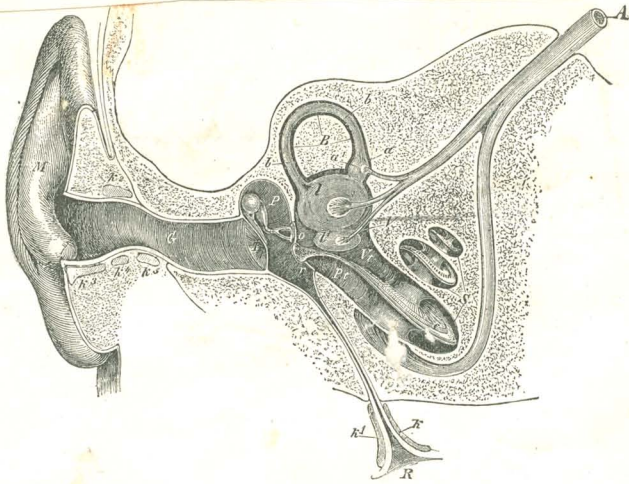


FIG. 143.—Semidiagrammatic section through the right ear (Czermak). *M*, concha; *G*, external auditory meatus; *T*, tympanic membrane; *P*, tympanic cavity; *o*, oval foramen; *r*, round foramen; *E*, pharyngeal opening of Eustachian tube; *V*, vestibule; *B*, a semicircular canal; *S*, the cochlea; *Vt*, scala vestibuli; *Pt*, scala tympani; *A*, auditory nerve.

The Internal Ear. The labyrinth consists primarily of chambers and tubes hollowed out in the temporal bone and inclosed by it on all sides, except for the oval and round

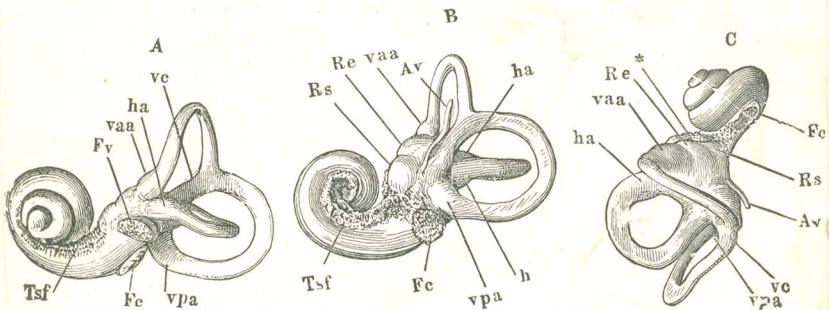


FIG. 145.—Casts of the bony labyrinth. *A*, left labyrinth seen from the outer side; *B*, right labyrinth from the inner side; *C*, left labyrinth from above; *Fc*, round foramen; *Fv*, oval foramen; *h*, horizontal semicircular canal; *ha*, its ampulla; *vaa*, ampulla of anterior vertical semicircular canal; *vpa*, ampulla of posterior vertical semicircular canal; *vc*, conjoined portion of the two vertical canals.

Ear**Middle ear**

The middle ear included three subdivisions: the tympanic cavity, the Eustachean tube, and the mastoid cells. It is an irregular air chamber beginning on the lateral wall of the naso pharynx with the Eustachean tube, which leads upward, backward and outward, for about one inch and a half into the temporal bone. Opposite the external auditory canal, it widens into the tympanic cavity and continues backward into the mastoid cells. The tympanic cavity or tympanum is an irregular space within the temporal bone, lying between the internal ear and the external auditory canal. It contains the chain of ear ossicles. The cavity of the tympanum is subdivided into three parts: the atrium or tympanic cavity proper; the cavum epitympanicum, the upper part of the space which overlies the atrium; and the antrum which leads into the mastoid cells. The outer wall of the tympanic cavity proper is formed by the ear drum. The inner wall separates the tympanum from the internal ear and bears the round and oval windows. The anterior wall separates the tympanum from the carotid artery. At its upper part is the irregular opening of the Eustachean tube and above this the small canal for the tensor tympani muscle.

Course of facial nerve, and auditory nerve

The motor part of the facial supplies the extrinsic and intrinsic muscles of the external ear. At its superficial origin it lies internally to the eighth, from which it is separated by the sensory roots of the seventh. The nerve passes outward to the internal auditory meatus thru which it passes above and anterior to the eighth. At the bottom of the meatus the two nerves part company, the facial entering the facial canal, whose course it follows throughout. At first the canal is directed horizontally outward, between the cochlea and the vestibule, until it reaches the median tympanic wall. It then bends abruptly backwards, passes above the fenestra ovalis and turns downward behind the pyramid, in the posterior wall of the tympanic cavity, to end in the stylo-mastoid foramen. The point where the canal turns backward marks a bend, the genu, of the facial nerve. In this situation is found the

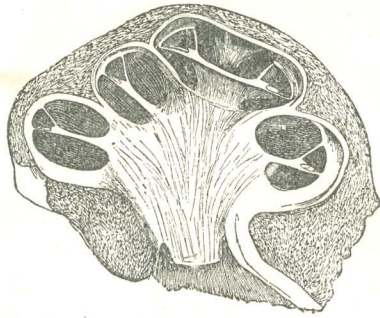


FIG. 146.—A section through the cochlea in the line of its axis.

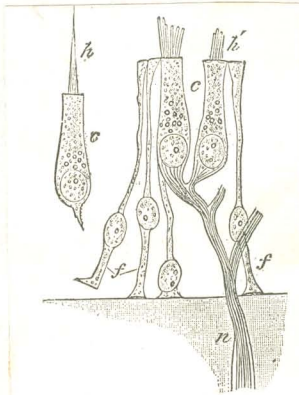


FIG. 149.—Sensory epithelium from ampulla of semicircular canal, and saccule.

geniculate ganglion and here the two roots fuse to form a single trunk. (The sensory fibers ascend in the facial canal and internal auditory meatus, lying above the auditory nerve and below the motor root of the seventh.)

After emerging from the stylo-mastoid foramen the nerve passes downward, outward and forward thru the parotid gland and divides in the formation known as the pes anserina.

The auditory nerve passes down externally to the above thru the internal auditory meatus and separates into its two divisions, the nerve of hearing and the nerve of equilibration. At the bend of the passage the eighth passes thru apertures in the lamina cribrosa to gain the several parts of the membranous labyrinth of the ear.

The internal ear

The internal ear consists essentially of a highly complex membranous sac, connected with the peripheral ramifications of the auditory nerve, and a bony capsule, which encloses all parts of the membranous structure and is embedded within the substance of the petrous portion of the temporal bone. These two parts known respectively as the membranous and bony labyrinths, are not everywhere in close apposition, but in most places are separated by an intervening space filled with a fluid, the perilymph, the inner sac lying within the osseous capsule like a shrunken cast within a mold. The membranous labyrinth is hollow and everywhere filled with a fluid, the endolymph, which nowhere gains access to the cavity occupied by the perilymph. The irregular cavity of the bony labyrinth, hollowed out in the temporal bone, comprises three subdivisions: a middle one, the vestibule, an anterior one the cochlea, and a posterior one, the semi-circular canals. Both the front and hind divisions communicate freely with the vestibule, but neither communicates with the membranous labyrinth nor with the tympanic cavity. The membranous labyrinth agrees roughly with the contour of the bony vestibule and is subdivided into two unequal compartments, known as the saccule and the utricle. The divisions of the

membranous labyrinth are, therefore, four, which from before backward are: the membranous cochlea, the saccule, the utricle, and the membranous semicircular canals.

Course of infection

Mouth	Tympanic cavity
Fauces	Antrum tympanicum
Oro-pharynx	Mastoid cells
Naso-pharynx	
Eustachean tube	

UPPERS AND LOWERS

DAY 64 4/16/21

Diaphragm.

Note attachments, Shape, Dome, Central tendon, Openings, Direction of fibers. Remove and hold up to light noting appearance. Study structures on posterior abdominal and thoracic wall. Lower remove all Viscera and attachments except in Pelvis. Uppers remove Oesophagus and Trachea noting relations. Dissect out Aorta and Inferior Vena Cava and Branches or Tributaries.

Questions:—

- (1) O. I. B. & N. S. of Diaphragm.
- (2) Name the openings in the Diaphragm and the level at which they occur.
- (3) Name the muscles of Respiration.
- (4) Name branches of Thoracic Aorta.
- (5) Give the relations of the Aorta from the Arch to the Iliacs.

DAY 65 4/16/21

Posterior Thoracic and Abdominal Wall.

Dissect out Vena Azygos, Thoracic Duct and Receptaculum Chyle, Sympathetic Ganglion, Spinal Nerves with Anterior and Posterior divisions and Rami Communicantes. After all structures on wall have been dissected remove ribs by dissecting out articulation with vertebra noting ligaments, planes of movements and any abnormalities. Clean entire vertebral column but do not separate any vertebra. Lower should have entire column cleaned down to sacrum both anteriorly and posteriorly.

Questions:—

- (1) Describe the Vena Azygos.
- (2) Give the course and relations of the Thoracic Duct.
- (3) Describe the Sympathetic System and its connections with Central.
- (4) What are the movements of the ribs?
- (5) Draw a Typical Spinal Nerve.

epicritic - fingertips
Protopathic - back of hand

DAY 66 4/16/21

Movements of the Spine.

Note ligaments of the spine. Anterior and Posterior Common, Supra-Spinous, Interspinous, Ligamenta Subflava. Bend the spine Anteriorly, Posteriorly, and Laterally noting amount of motion in each region. Bend in each of the four directions again and attempt to rotate. Note amount of rotation in each region.

Questions:—

- (1) Name the ligaments of the spine and give their function.
- (2) Tabulate your findings in regard to movements of the Spine.

DAY 67 4/16/21

The Vertebrae.

Divide the spine into four parts. The first being the Cervical, the second the Dorsal from the 1st to 6th, the third the Dorsal from the 7th to the 12th, the fourth the Lumbar vertebrae. Do not break the spinous processes or articular facets but divide carefully in the regions. Each two dissecting will then remove the Vertebrae one at a time from about the cord. This must be done carefully so as to avoid injuring the cord. Each two will then have a section of the cord and vertebrae to study. Place the Vertebrae and Occiput after cleaning as much as possible, in a receptacle furnished and mark from which body so the Sacrum may be added later.

Questions:—

- (1) Describe a typical vertebra of each region.
- (2) What are the peculiar vertebrae. Describe them.
- (3) Describe the Intervertebral Discs.

DAY 68 4/19/21

Spinal Cord.

Note coverings. Blood supply and venous drainage. Dissect off the coverings noting Ligamentum Denticulatum, Cervical and Lumbar Enlargements. Define the arteries and veins within the Dural Sheath.

Questions:—

- (1) Describe the cord and its coverings.
- (2) Locate the enlargements.
- (3) Describe in full the blood supply to the cord and make diagram.
- (4) Describe in full the Venous drainage and make diagram.

Diaphragm

A muscular sheet composed of fibers radiating from the lower border of the thorax and from the upper lumbar vertebrae towards a central tendinous area, termed the central tendon. According to their origin the muscle fibers may be grouped into three portions. The sternal portion consists of two bands which arise from the posterior surface of the xiphoid process of the sternum and are separated from one another by a narrow interval filled with connective tissue. Laterally they are separated by a similar interval, thru which the superior epigastric artery enters the sheath of the rectus abdominus, from the costal portion, the fibers of which take their origin from the cartilages of the lower six ribs, interdigitating with the origins of the transversalis abdominis. In continuity with the costal part is the lumbar part whose fibers take origin (1) from two tendinous arches, the internal and external arcuate ligaments, which pass over the upper portions of the psoas and the quadratus lumborum muscles respectively, stretching between the twelfth rib and the transverse process of the first lumbar vertebra, and (2), by two downward prolongations, the crura, from the anterior and lateral surfaces of the upper three or four lumbar vertebrae. The right crus extends somewhat farther downward than the left, whose attachment does not pass below the second or third vertebra. The greater splanchnic nerve and the azygos veins and the sympathetic trunk pass down the crura. The two crura, as they pass upward, leave between them an opening the hiatus aorticus, which is bridged over by a tendinous band and gives passage to the aorta and thoracic duct. Just behind the posterior margin of the central tendon the crural fibers diverge to surround in a sphincter like manner the hiatus esophagus thru which pass the esophagus and the vagus nerves and esophageal branches of the gastric artery and veins. The central tendon is situated somewhat nearer the anterior than the posterior margin of the diaphragm, so that the fibers of the sternal musculature are considerably shorter than the others. The right lobe of the diaphragm is perforated by a quadrate foramen transmitting the inferior vena cava.

D.V.C - 5

Esoff 10

anta 12

Suf Pbr 2

Inf .. 2

Misc Pbr 2

Int. Cost 10

Com. m. Pbr 2

Blood: phrenic and intercostals

Nerve: phrenic and intercostals

Muscles of respiration

Diaphragm *all attached to ribs*

Levetores costarum

Intercostales externi

Scaleni

Sterno-mastoid

Pectoralis major

Serratus posticus sup.

Branches of Thoracic Aorta

Posterior pericardial

Esophageal

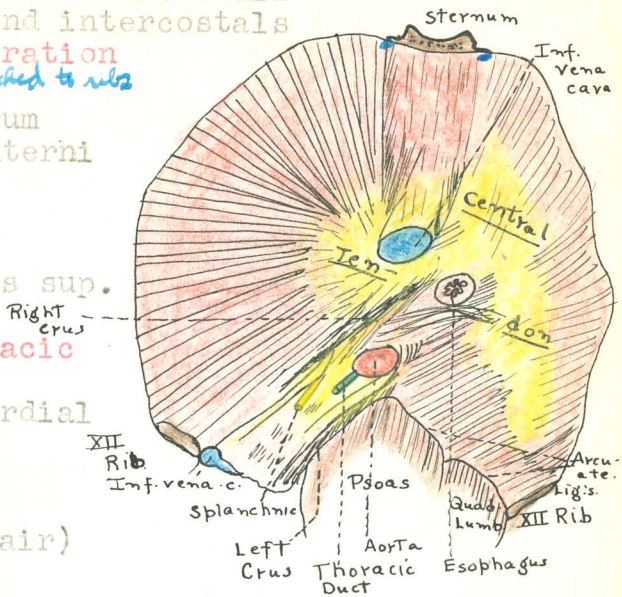
Mediastinal

Bronchial

Intercostals (9pair)

Subcostal

Superior phrenics



Relations of Aorta -- Arch to Iliacs

The thoracic aorta begins on the left side of the body of the fourth thoracic vertebra. It passes downward thru the thorax in the posterior mediastinum. In the upper part of its course it lies a little to the left of the median line but it tends slightly to the right as it descends, and occupies the median line just before it reaches the diaphragm. Anteriorly it is in relation with the left bronchus and the root of the left lung in its upper part, and it is crossed very obliquely by the esophagus, which separates it from the pericardium and the posterior surface of the left auricle of the heart. Posteriorly it rests upon the bodies of the eight lower thoracic vertebrae, or rather throughout the greater part of its extent upon the anterior common ligament of the thoracic vertebrae, and at about the level of the fifth vertebra has passing obliquely up behind it the thoracic duct, and, at the level of the eighth vertebra, the vena azygos minor. To the right lie, above, the esophagus, and lower down, the right pleura. The thoracic duct passes upward and slightly behind it as far as the fifth thoracic vertebra, and the vena azygos also lies upon its right side, but on a

plane slightly posterior to it. On the left side are the pleura and lung above, and the esophagus below, while the vena azygos minor also lies to the left but slightly posteriorly. The abdominal aorta begins at the lower border of the twelfth thoracic and passes down upon the bodies of the four upper lumbar lying almost in the medial line. It terminates opposite the fourth lumbar by dividing into the common iliacs. Posteriorly it rests upon the anterior common ligament of the four upper lumbar vertebrae and crosses the left lumbar veins. Anteriorly in its uppermost part, it is invested by the sympathetic solar plexus, from which arises the aortic plexus. A little lower it is crossed by the splenic vein, the pancreas, the left renal vein, and the third portion of the duodenum, and still lower it is in relation with the coils of the small intestine, from which, however it is separated by the peritoneum. The left lobe of the liver, the stomach, and transverse colon lie over it above. To the right it is in contact, above, with the thoracic duct and the receptaculum chyli, which lie partly covered by it, and with the right crus of the diaphragm which separates it from the inferior vena cava. Lower down there is direct contact with the last. To the left is the crus of the diaphragm and the fourth portion of the duodenum, above, while below it is separated by the peritoneum from coils of the small intestine and has running along side, the left spermatic or ovarian artery and vein, and still more laterally the left ureter.

Posterior abdominal and thoracic walls**Vena Azygos**

This begins immediately below the diaphragm, where it is directly continuous with the right ascending lumbar vein, formed by the anastomosis of branches of the lumbar veins and connecting below with the ilio--umbar or common iliac. The vein passes upward into the thoracic cavity, traversing the diaphragm either by the cleft between the medial and intermediate portions of the right crus or else by the aortic opening. It then continues its way upwards in the posterior mediastinum, resting upon the anterior surfaces of the bodies of the thoracic vertebrae a little to the right of the middle line, passing over the right intercostal arteries and having the thoracic aorta and the thoracic duct immediately to the left of it. When it reaches the level of the fourth vertebra it bends forward and somewhat to the right and, curving over the right bronchus and the right pulmonary artery, it descends slightly to enter into the posterior surface of the superior vena cava, just above the level at which that vessel becomes invested by the pericardium. The terminal portion of the vein from the fourth vertebra onward is the azygos arch. The vein is frequently without valves. At its origin it usually has some small connections with the inferior vena cava, but its principle tributaries are the right intercostal veins. In addition it receives branches from the esophagus, from the areolar tissue and lymph nodes of the posterior mediastinum and from a plexus which surrounds the thoracic aorta, from the posterior surface of the pericardium, and from the substance of the right lung, these last bronchial veins issuing from the hilum of the lung and opening into the azygos at the beginning of its arch. They anastomose with the pulmonary veins. To receive the left vena azygos veins and the intercostals makes this vein of considerable importance. It forms the connecting link between the cardinal and inferior caval systems and can carry on a collateral circulation very successfully.

Course and relations of thoracic duct.

This extends from the lower border of the second lumbar vertebra up thru the thorax to open into the left subclavian vein close to the point where it is joined by the internal jugular. It passes thru the aortic opening of the diaphragm and then lies a little to the right of the bodies of the thoracic vertebrae. At about the fifth, however, it inclines to the left and at the seventh changes its course abruptly, upward, forward, and to the left, and then downward and forward, thus forming an arch. It lies in the middle on the bodies of the first two lumbar and the twelfth thoracic vertebrae in the abdomen. Anteriorly it is in relation with the right side of the abdominal aorta, and with the greater azygos vein to the right. Above the diaphragm it lies in the posterior mediastinum and superior mediastinum. In the former it lies on the bodies of the vertebrae behind the pericardium, esophagus, and arch of the aorta. The thoracic aorta lies to the left of it, and to the right are the pleura and greater azygos vein. The lower right intercostal arteries pass between it and the bodies of the vertebrae, as does also the terminal portion of the azygos minor. In the superior mediastinum it rests upon the lower part of the left longus colli, being separated by it from the bodies of the three upper thoracic vertebrae. Anteriorly it is in relation with the origin of the left subclavian artery and with the vertebral vein. To the left is the pleura and to the right are the esophagus and the left recurrent laryngeal nerve. Its arch is in relation below with the apex of the left lung and with the left subclavian artery. To the left and posterior to it is the vertebral vein and to the right and anteriorly are the left common carotid, the left internal jugular, and the left pneumogastric nerve.

Sympathetic System and Connections with Central

It consists of an elongated pair of ganglionated cords extending from the base of the skull (connections as high as the ganglion of Ribes at the anterior communicating artery) to the ganglion impar at the coccyx. At these two points the

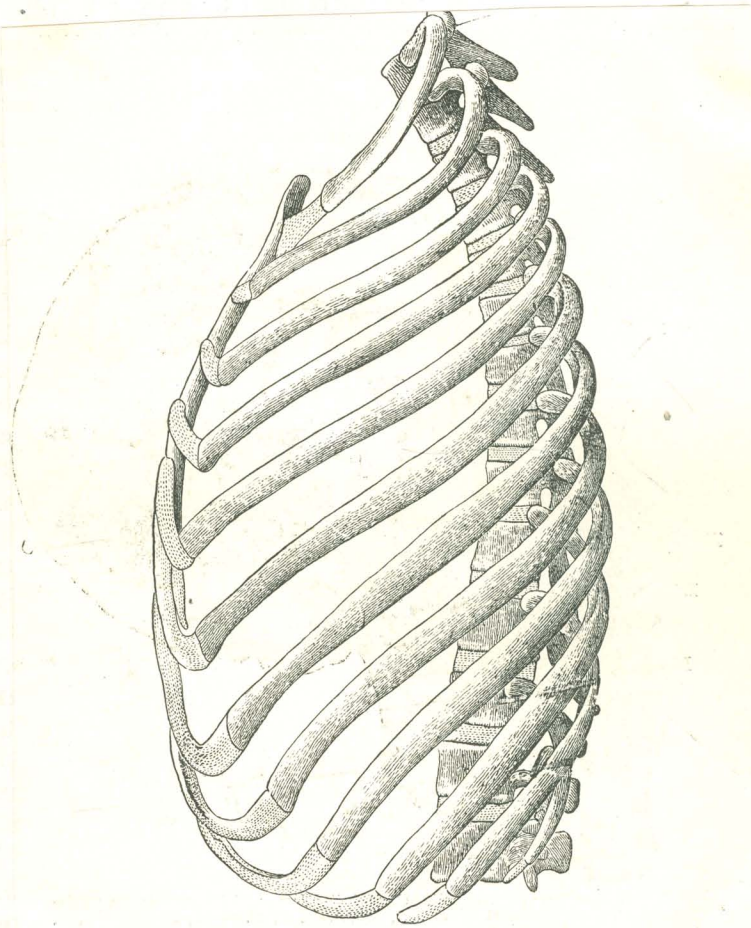


FIG. 25.—The ribs of the left side, with the dorsal and two lumbar vertebræ, the rib cartilages and the sternum.

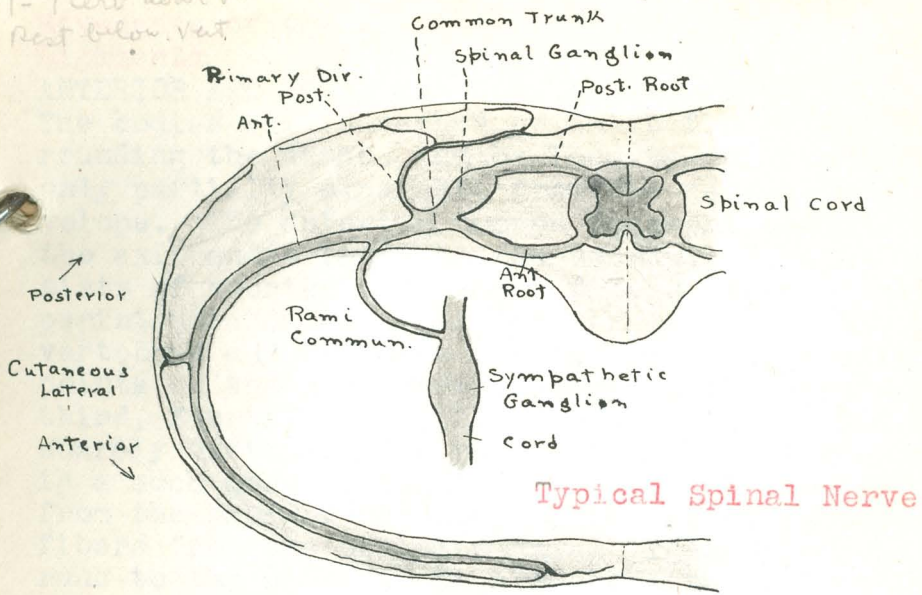
two cords join. The origin is limited from second dorsal to third lumbar segments, incl.. The distribution is unlimited, filaments being found in all parts of the body. From the segments of origin white fibers pass out over the anterior primary division to leave the main nerve and terminate in the lateral chain ganglion outside the spinal canal. These white fibers are called white rami communicantes and serve as the spinal origin of all the impulses transmitted over the lateral chain of ganglia. Derived from these white rami we have the series of lateral ganglia that form the chains on either side. The first branches of this lateral chain are grey rami communicantes, given off to each segment of the spinal cord making altogether thirty two pair. Thus the white rami carry impulses away from the cord while they gray carry impulses back to the cord or its membranes and arteries. Other branches are given off in the various regions, which would require detailed description.

Movements of the Ribs

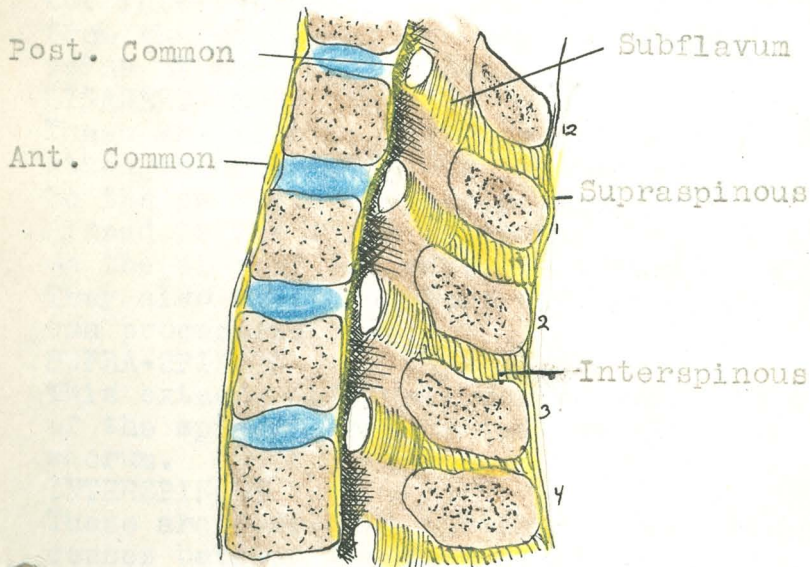
Each rib is attached to the spinal column at two points: the head to the body of the vertebra and the tubercle to the transverse process. The up and down movements may be regarded as rotations around an axis joining these two points. The ribs slant downward so that when the sternal end is carried further away from the sternum the ribs must be elevated and the chest is enlarged in the dorso-ventral direction. There is moreover an enlargement in the lateral diameter. This is due to the axis of rotation of the ribs being inclined downward so that the plane of rotation is inclined outward. So the rib-in moving up, must move out. Secondly the cartilagenous end of each rib is fixed at the sternum so that as it moves upward and outward it will be twisted or everted somewhat in the middle, with a torsion of the cartilagenous ends.

4/16/21
M.L.L.

nerves
 1-7 cerv above v.
 Rest below vert.



Ligaments of the Spine



Movements of the spine**Ligaments****ANTERIOR AND POSTERIOR COMMON**

The bodies are connected by short fibers surrounding the disks, and by long bands which are only partially separable from the general envelope. The anterior common ligament begins at the axis and extends to the sacrum. It consists of shorter and longer fibers blending with peristeum and springing from the edges of the vertebrae and from the disks, to end at similar points on the next vertebra, or on the second, third, fourth, or fifth. The borders are not sharply defined. The posterior common ligament is a much more distinct structure. It arises from the back of the body of the axis, receiving fibers from the occipito-axial ligament, and runs to the sacrum. It also is attached to the disks and the edges of the bodies, but possesses a distinct margin, which, except in the neck, expands laterally into a series of points at the intervertebral disks. It stands well out from the middle of the bodies, bridging over the veins of the larger ones.

LIGAMENTA SUBFLAVA

These are elastic membranes of considerable strength connecting the laminae from the axis to the sacrum. They are particularly well developed in the lumbar region. They encroach on the side of the capsules towards the canal. They also extend a short distance under the spinous processes.

SUPRA-SPINOUS

This extends as a well marked cord along the tips of the spines from the last cervical to the sacrum.

INTERSPINOUS

These are membranes connecting the spinous processes between the tips and the laminae, extending from the ligamenta subflava to the supraspinous ligament.

Movements of the spine**CERVICAL REGION**

Movements: flexion and extension

lateral flexion and rotation combined

Flexion is unevenly distributed. Extension is limited only by the approximation of the spines.

In flexion the supraspinous, interspinous, ligamenta flava, articular capsules and posterior common ligaments are stretched and the and the spinous processes separated. In extension there will be relaxation of the above with stretching of the anterior common ligament and approximation of the spinous processes. Side bending must be accompanied by some rotation. Lateral flexion and rotation is prevented in extension by the approximation of the inferior margins of the articular facets, and in flexion by the tension on the articular capsules.

DORSAL REGION

Flexion and extension

Lateral flexion and rotation combined

Flexion is limited. The greater part occurs in the lower dorsal region. The ligamenta flava are stretched and prevent too great forward bending. Extension is also limited and occurs more in the lower dorsal. It is limited by the approximation of the laminae and spinous processes and intervening ligaments, and by the tension on the anterior common ligaments. Rotation and lateral flexion are combined. It is fairly free. Rotation is more marked in the upper dorsal, being present in small degree at the dorso-lumbar articulation. Side bending is limited in the upper dorsal and becomes more free as the lumbar region is approached. Each movement is limited more in extension than in flexion.

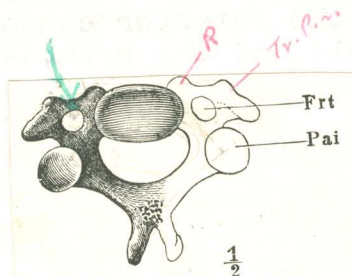
LUMBAR REGION

Flexion and extension

Lateral flexion

Flexion here is a free movement, increasing from above downward to its maximum between the fifth lumbar and the sacrum. The ligamenta flava are tensed. Extension is also free with approximation of the spinous processes. There is tension of the anterior common ligament. Lateral flexion is evenly distributed and free but is not accompanied by rotation.

1 Body
Spine
Trans. Pr.
2 Pedicles
Lamina
Spinal Canal
Intervert For.
Ant. Proc.



up & back

FIG. 18.—A cervical vertebra. *Frt*, vertebral foramen; *Pai*, anterior articular process.

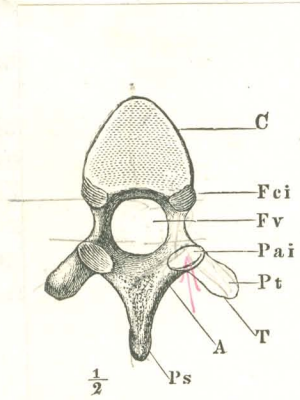


FIG. 15.

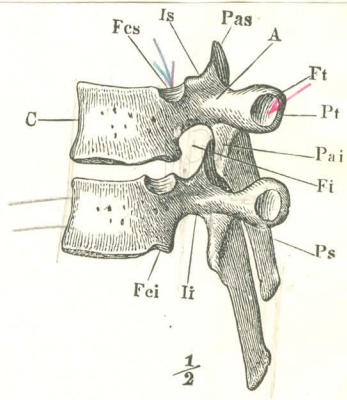


FIG. 16.

FIG. 15.—A dorsal vertebra seen from behind, *i.e.* the end turned from the head.

FIG. 16.—Two dorsal vertebrae viewed from the left side, and in their natural relative positions. *C*, the body; *A*, neural arch; *Fv*, the neural ring; *Ps*, spinous process; *Pas*, anterior articular process; *Pai*, posterior articular process; *Pt*, transverse process; *Ft*, facet for articulation with the tubercle of a rib; *Fcs*, *Fci*, articular surfaces on the centrum for articulation with a rib.

back + out

The Vertebrae of each region.

CERVICAL -- the body is smaller than that of the other regions and is oval in shape, the long axis being transverse. The upper surface is convex antero-posteriorly and concave transversely, making the articulation between the bodies similar to a saddle joint. The pedicles are attached to the body near its center and are directed laterally and posteriorly. The attachment to the center of the body forms the intervertebral foramen from equal parts of the vertebrae above and below. The spines are very irregular, and most of them are bifid. The inferior articular surfaces are directed forward and downward while the superior look upward and backward. The transverse processes are directed forward and present two tubercles: the anterior, representing the costal portion of the process; and the posterior tubercle, the true transverse process. Each process in the cervical region is perforated by the vertebral artery and vein with the exception of the seventh, which transmits the vein only. The articulations are between the bodies of the vertebrae and the articular facets.

DORSAL -- the bodies are, in general, heart-shaped, excluding the first two and the last one, as these are intermediate. The bodies are slightly thinner anteriorly than posteriorly and account for part of the curve. The pedicles are attached to the upper border of the body and are directed posteriorly, but slightly outward and outward. This arrangement causes the intervertebral foramen to be formed by a greater part of the vertebra above than the one below. The superior articular processes are situated slightly anterior to the plane of the inferior and are found at the junction of the pedicles with the transverse process. Their plane of articulation is directed backward with slight upward and outward inclination. The inferior articular processes are found at the junction of the transverse processes with the lamina and are deeply placed, being in a plane anterior to that of the tip of the transverse

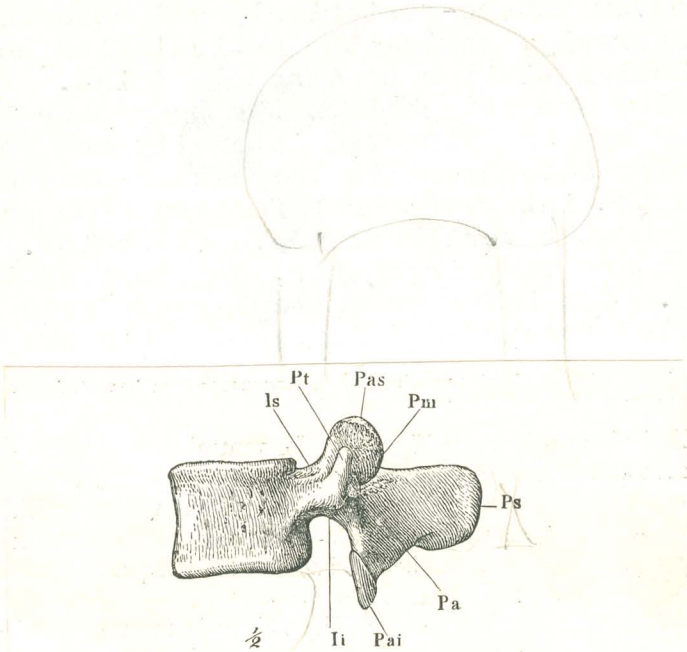


FIG. 21.—A lumbar vertebra seen from the left side. *Ps*, spinous process; *Pas*, anterior articular process; *Pai*, posterior articular process; *Pt*, transverse process.

process. The articular surface is directed forward, slightly inward and downward. The transverse processes are strong rounded masses, directed backward; outward, and slightly upward, and, with the exception of the last two, present at the tip an articular surface for the corresponding rib. The laminae are arranged in a slanting manner so that they overlap, the succeeding vertebra thus forming, in this region, an almost complete bony covering for the spinal canal. The spinous process is long and slender, and directed downwards ending in a slightly marked tubercle. This obliquity is most marked at the seventh dorsal. The characteristic feature of the region is the series of articular facets for the ribs on the bodies of the vertebrae and at the tip of the transverse processes.

LUMBAR REGION -- salient features are as follows: large size of vertebrae, absence of articular facets for ribs and of transverse or vertebral foramen. The typical body is kidney shaped, the concavity being directed posteriorly, making the transverse diameter the greatest. The superior and inferior surfaces are flat, but are not found in the same plane, as the bodies of the vertebrae in this region are slightly deeper anteriorly than posteriorly, thus aiding in the formation of the lumbar curve. The pedicles which extend posteriorly are short and strong and are attached to the body above its center, making the inferior vertebral notch the larger. The laminae are very short and thick, and support, at their upper border, the superior articular processes and, at the lower margin, the inferior articular processes. The spinous process is thick, broad, and blunt at its extremity, the inferior border being thicker than the superior. The superior articular process projects above the level of the upper surface of the body and supports the mammillary process which corresponds to the superior tubercle of the transverse process of the twelfth dorsal. The articular surface is directed inward and slightly backwards in a vertical plane and encloses the inferior articular facets of the vertebra above. The inferior articular process extends below the level of the lower surface of the body; its articular

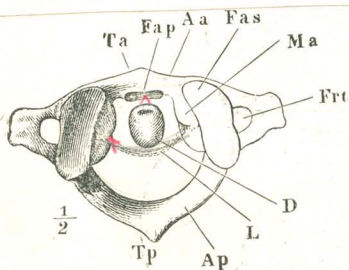


FIG. 19.

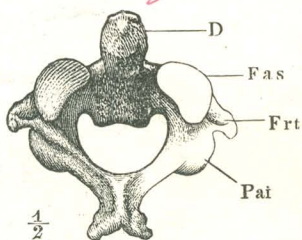


FIG. 20.

FIG. 19.—The atlas. FIG. 20.—The axis. *Aa*, body of atlas; *D*, odontoid process; *Fas*, facet on front of atlas with which the skull articulates; and in Fig. 20, anterior articular surface of axis; *L*, transverse ligament; *Frt*, vertebral foramen; *Ap*, neural arch; *Tp*, spinous process.

surface is directed outward and slightly forward in a vertical plane. The transverse processes are slender and flattened antero-posteriorly and project outwards and slightly backwards in a horizontal plane. The transverse processes of the third are usually the longest. The transverse process is the costal element in the lumbar region.

Peculiar Vertebrae

ATLAS -- body fused to axis as odontoid process. Having no body, it consists of two lateral masses connected by a short anterior arch and a long posterior one. The lateral masses bear the articular facets above and below. The inferior look downward and slightly inward. Each lateral mass presents a tubercle on its inner side for the transverse ligament retaining the odontoid process. The anterior arch has an articular facet for the odontoid. The posterior tubercle takes the place of the spinous process. The transverse processes extend out farther than any in the cervical region. Bifurcation is rare. The transverse foramen pierces the transverse process at its base for the passage of the vertebral artery.

AXIS -- differs mostly in the possession of the odontoid process. Its body is long even without the surmounting odontoid. This is a cylindrical process, rising up thru the atlas and articulating with the inner side of its anterior arch. The laminae and spinous processes are heavy. The transverse process is small. The transverse foramen is replaced by a short canal. The superior articular facets are approximately on the body instead of the arch.

THE SEVENTH CERVICAL -- has a very prominent spine. It resembles the upper thoracic. The transverse foramen is smaller than those above it, and the anterior tubercle of the transverse process is particularly small and near the body.

THE FIRST THORACIC -- has the sides of the upper surface somewhat raised at the roots of the pedicles. It has a complete facet for the head of the first rib and a half facet at the lower border of the body.

THE NINTH THORACIC has no half facet below.

THE TENTH THORACIC has a nearly complete facet above and none below.

THE ELEVENTH THORACIC has a complete facet on the body and none on the transverse process.

THE TWELFTH THORACIC has a complete facet a little above the middle of the body. The transverse process is broken up into the three tubercles. The lower articular facets face outward. The spine is of the lumbar type.

THE FIFTH LUMBAR is much higher in front than behind. The transverse process is broad at the base, springing in part from the body. The spine is relatively small.

Intervertebral discs.

A series of fibro-cartilages interposed between the bodies of the vertebrae, forming about one fourth of the movable part of the spine and adding greatly to its strength. The outer part of each consists of oblique layers of fibers, slanting alternately in opposite directions, some almost horizontal, which hold the vertebral bodies firmly together. The center of the discs is occupied by a space containing fluid in the meshes of the yellowish pulp. This central core is strongly compressed, so as practically to be a resistant ball within the more yielding fibro-cartilagenous socket. The proportions of the discs to the vertebral bodies varies, being absolutely larger in the lumbar and relatively so in the cervical.

Spinal Cord

That part of the central nervous system which lies within the vertebral canal. At its upper limit it joins the medulla. This is at a point on a level with the upper border of the posterior arch of the atlas. Below, the cord terminates somewhat abruptly in a pointed end, the conus medullaris, opposite the disc between the first and second lumbar.

Coverings

It is enclosed by three membranes which, from without inward, are: the dura mater, the arachnoid, and the pia mater. The dural sheath is a robust fibro-elastic tubular envelope, much longer and considerably wider than the cord. It is separated from the wall of the vertebral canal by plexiform veins and loose fatty connective tissue. That part of the sac not occupied by the cord encloses the longitudinal bundles of root fibers, that pass obliquely to the levels at which the corresponding nerves leave the vertebral canal, and a fibrous strand, the filum terminale, prolonged from the cord to the lower end of the spine. The sheath extends to the level of the second sacral. The pia constitutes the immediate investment of the cord and supports the blood vessels nourishing the cord. It is composed of an outer fibrous and inner vascular layer, the connective tissue of the latter accompanying the blood vessels into the substance of the cord. The arachnoid is delicate and consists of interlacing bundles of fibro-elastic tissue. It lies between the other two membranes, loosely investing the inner surface of the dura, and closely the outer surface of the pia. It subdivides the interspace between external and internal sheaths, which is considerable, into two compartments. The subdural space is a capillary cleft filled with modified lymph. The subarachnoid contains the cerebro-spinal fluid. Thus the cord hangs suspended within the tube of dura. The subarachnoid is crossed by numerous trabeculae. The cord is fixed by the ligamentum denticulata, as well as by the spinal nerves. The former are two serrated fibrous bands laterally along the pia.

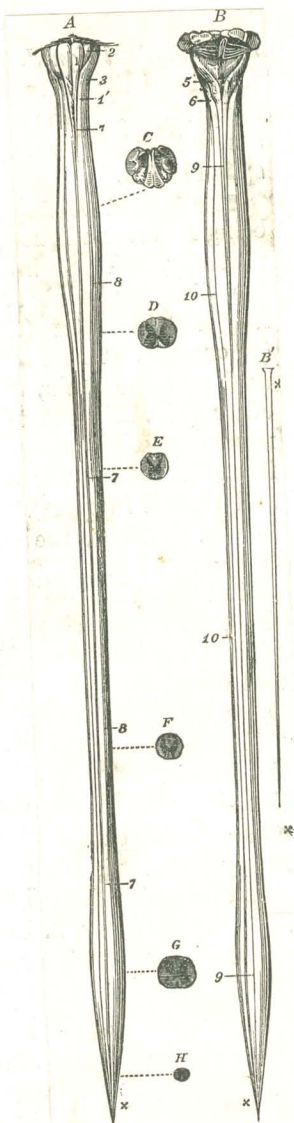


FIG. 63.—The spinal cord and *medulla oblongata*. A, from the ventral, and B, from the dorsal aspect; C to H, cross-sections at different levels.

The Enlargements

The cervical enlargement begins just below the upper end of the cord and ends opposite the second thoracic, having its greatest expansion opposite the fifth and sixth.

The lumbar enlargement begins opposite the tenth thoracic and fades away in the conus medullaris below. It reaches its maximum opposite the twelfth thoracic.

Blood Supply.

From many sources:

Vertebral	Lumbar
Deep cervical	Ilio-lumbar
Intercostal	Lateral sacral

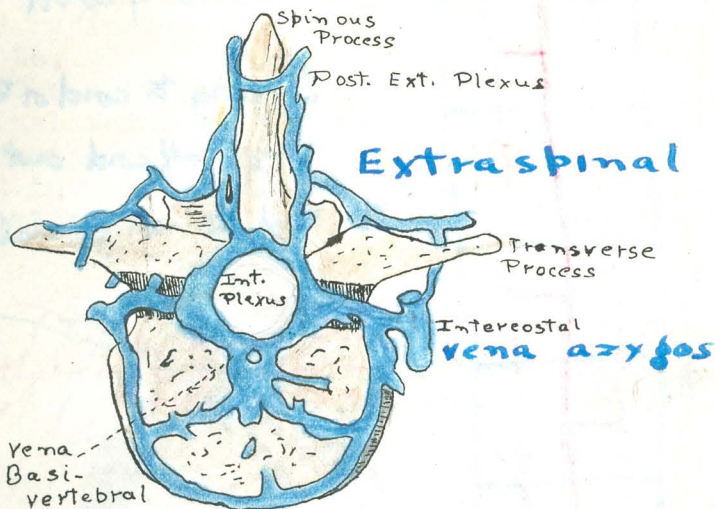
thru the vascular net-work within the pia. In the skull the vertebral artery gives off anterior and posterior spinal arteries of which the posterior remain separate while the anterior unite at the level of the third cervical and descend in front of the anterior median fissure. These are joined by the segmental spinal branches from the vertebral, intercostal, lumbar, and lateral sacral, which pass in thru the intervertebral foramina. Horizontal branches from these arteries form a complete series of annular anastomoses around the cord. These are further joined by vertical stems. Thus there is a large single anterior trunk, two posterior trunks, and accessory trunks formed by the upward and downward anastomosis of the branches. Penetrating twigs enter the cord at various points. The gray matter is supplied principally by the series of anterior fissural arteries which pass from the anterior trunk back within the median fissure and divide into right and left branches. The white matter is supplied from the penetrating branches. These are all end arteries.

Venous Drainage

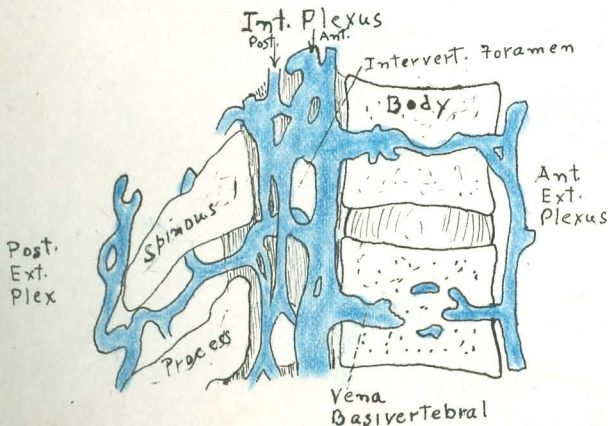
The plexiform veins within the pia are formed by the union of small radicles collecting the blood from intraspinal capillaries, and after an independent course similar to that of the arteries, emerging at the surface. From the venous network within the pia six main longitudinal trunks are differentiated:

- 1 The unpaired median vein (median fissure)

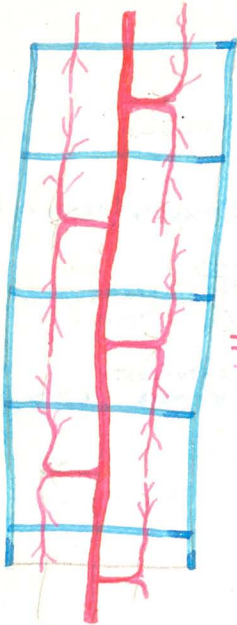
Veins of the vertebral column



- External plexus
 - Anterior
 - Posterior
- Internal plexus
 - Anterior
 - Posterior
- venous rings .
- Basivertebral veins
- Intervertebral veins with nerves



Extradural



Ant. Spinal

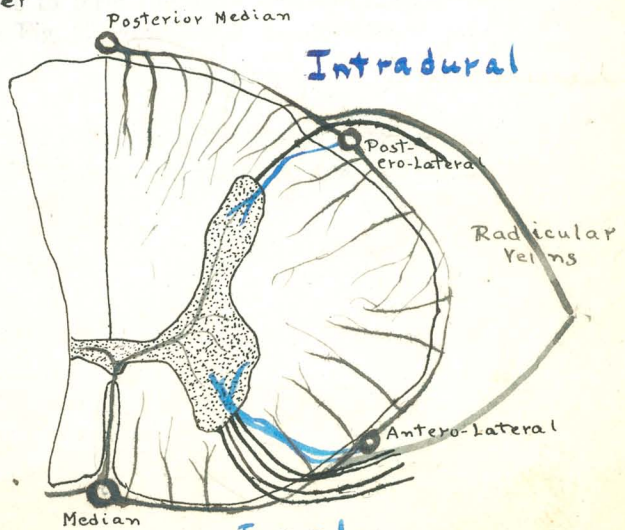
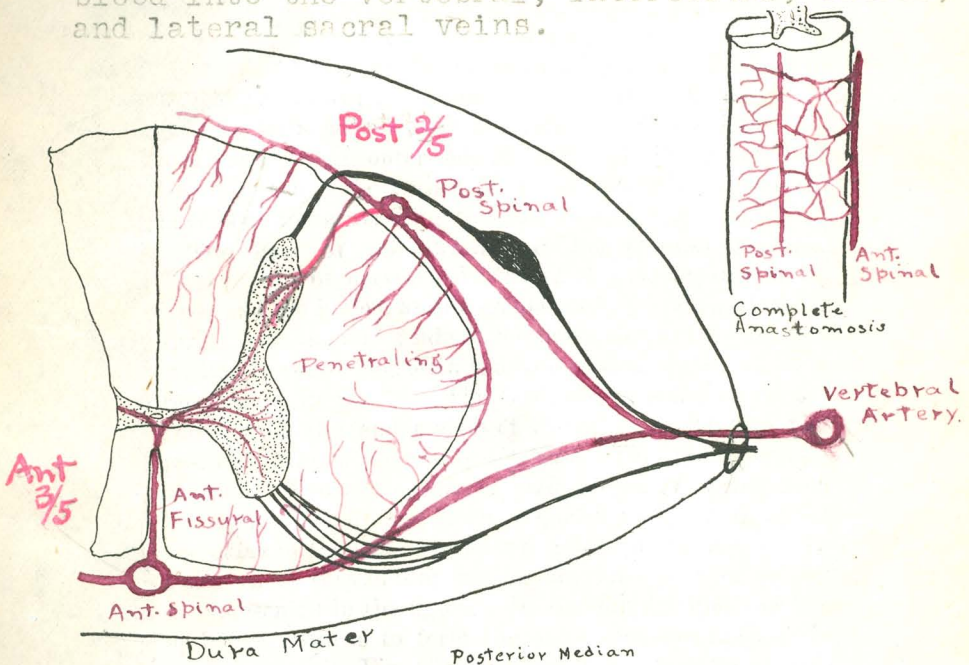
Segments of cord

Injury to cord or thrombosis
 Only half cord out of use
 and so not general paralysis

Fissural

Whole Segment
 + half above } on alternate
 + half below } sides

- 2 The antero-lateral veins, just behind the ventral nerve roots.
- 3 The posterior median vein
- 4 The postero-lateral veins, just behind the dorsal roots.
- 5 The radicular veins, following the nerve roots, which communicate with or terminate in the anterior and posterior longitudinal spinal veins within the vertebral canal
- 6 whence the intervertebral efferents carry the blood into the vertebral, intercostal, lumbar, and lateral sacral veins.



ant 3/5 } median
Ant - Lat

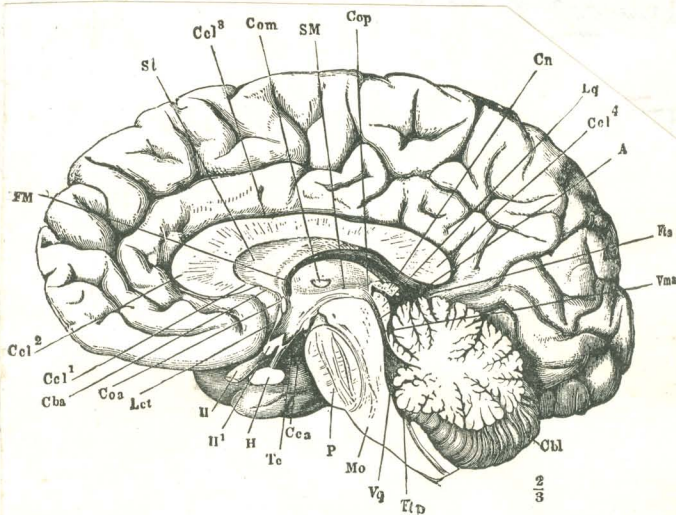
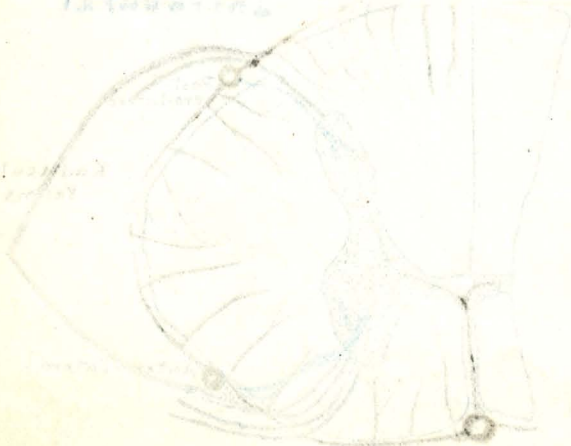


FIG. 69.—The right half of the brain as seen on its median side after a section made through the organ in the middle line. *Vg*, fourth ventricle; *Mo*, medulla oblongata; *P*, pons Varolii; *II*, optic nerve; *H*, pituitary body; *Coa*, anterior commissure; *FM*, foramen of Monro leading from the third ventricle, in the cavity of which the lower end of the line *SM* lies, to the right lateral ventricle; *Com*, soft commissure, running from side to side of the third ventricle, divided; *Cop*, posterior commissure; *Lq*, corpora quadrigemina; *A*, aqueduct of Sylvius or *iter a tertio ad quartum ventriculum*; *Ccl*¹–*Ccl*⁴, corpus callosum; *Sl*, septum lucidum; *II*¹, the divided optic commissure.



DAY 69

Clean-Up Day.

Clean up table. Extra time to be spent in review.

Questions:—

- (1) What abnormalities have you found?
- (2) Discuss each from an Osteopathic standpoint.

DAY 70

Brain-External.

By this time the Brain should be sufficiently hardened to examine without injury to its structures and after the table is cleared of all dissected parts of the body the Brain is to be placed on the table and a sagittal section made. Examine the Exterior of the Brain noting its Blood supply. Define the Arteries, Circle of Willis. Note their relations to fissures. Define Superficial origin of Cranial Nerves. Remove Pia Mater. Expose structures in Interpeduncular Space. Note all structures at base of Brain. Note Island of Reil. Compare sagittal section with picture and define all structures.

Questions:—

- (1) What is the blood supply to the Brain?
- (2) Give the superficial origin of the Cranial nerves.
- (3) Name the structures found in each Cranial Fossa.

DAY 71

Brain-Venticle Sections.

Take one-half of the Brain and make sections $\frac{1}{4}$ in. thick parallel with sagittal section. Follow sections with careful reference to your anatomy. Study the Ventricles, Connections between the different parts. Study each section carefully. Preserve the sections in the order that you remove them.

Questions:—

- (1) Name and locate the central connections of the Brain.
- (2) Describe the Ventricles and trace the course of the Cerebro-Spinal Fluid.

Brain—Horizontal Section.

Take the remaining half of the Brain and make $\frac{1}{4}$ in. sections in the horizontal plane. Follow with careful study of your anatomy. Study parts same as in sagittal sections making comparisons. Note radiation of Corpus Callosum. Note shape of Ventricles. Follow course of Optic Tract.

Questions:—

- (1) What structures lie in relation to the Lateral Ventricles?
- (2) Describe the Optic, Olfactory and Auditory nerve tracts.

O. K. -----

Date. *Apr. 20, 1921* -----

Prosector *Mary Lou Logan* -----

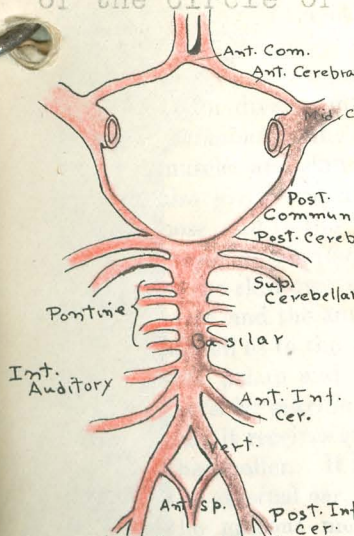
O. K. -----

Date -----

Prosector -----

Brain -- External**Blood supply to the brain**

There are two chief sources: the internal carotids and the vertebrals. After entering the cranium these form the remarkable anastomosis of the Circle of Willis. The latter gives off



two sets of branches. The ganglionic are short vessels which soon plunge into the nervous mass to supply the internal nuclei, the striate body, and the optic thalami. The cortical pursue a superficial course and are carried by the pia mater to all parts of the cortex and the subjacent medulla. The medulla oblongata and the pons are supplied from the anterior spinal, vertebral, basilar, and posterior cerebral arteries. The cerebellum is supplied by the anterior and posterior inferior and the superior, cerebellar.

The thalamus is supplied by end arteries from the posterior communicating, middle cerebral, and posterior cerebral. The base of the brain is supplied by the posterior communicating. The corpus striatum is supplied by the middle cerebral. (Lenticulo-striate == artery of cerebral hemorrhage). The choroid plexus of the lateral ventricle is supplied by the anterior and posterior choroidal arteries. The cerebral hemispheres are supplied by the cortical branches of the anterior- middle, and posterior cerebral. The frontal lobe is supplied by the anterior cerebral. The parietal lobe is supplied by the middle cerebral artery and part by the anterior cerebral. The occipital lobe is supplied by the posterior cerebral. The temporal lobe is supplied by the middle cerebral and part by the posterior.

Superficial origin of the cranial nerves

OLFACTORY -- olfactory bulb overlying cribriform plate of ethmoid.

OPTIC -- optic commissure near the olivary eminence, medial to the internal carotid artery.

OCULOMOTOR -- oculomotor sulcus, a shallow groove on the medial surface of the cerebral peduncle,

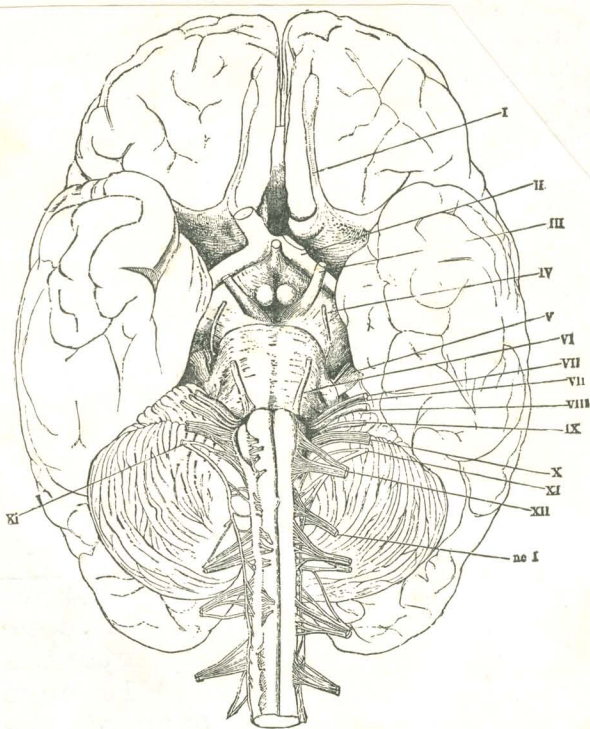


FIG. 70.—The base of the brain. The cerebral hemispheres are seen overlapping all the rest. *I*, olfactory lobes; *II*, optic tract passing to the optic commissure from which the optic nerves proceed; *III*, the third nerve or *motor oculi*; *IV*, the fourth nerve or *patheticus*; *V*, the fifth nerve or *trigeminalis*; *VI*, the sixth nerve or *abducens*; *VII*, the seventh or facial nerve or *portio dura*; *VIII*, the auditory nerve or *portio mollis*; *IX*, the ninth or glosso-pharyngeal; *X*, the tenth or pneumogastric or *vagus*; *XI*, the spinal accessory; *XII*, the hypoglossal; *nc I*, the first cervical spinal nerve.

just in front of the pons and at the side of the interpeduncular space.

TROCHLEAR -- dorsal surface of the brain stem just below the inferior corpora quadrigemina, between the frenum of the velum and the mesial border of the superior cerebellar peduncle.

TRIGEMINAL -- lateral surface of the pons, slightly behind the superior border.

ABDUCENT -- in the sulcus which demarcates the lower edge of the pons from the medulla, a little lateral to the pyramid.

FACIAL -- at the lower border of the pons, between the motor root of the seventh and the auditory nerve.

AUDITORY -- mesial and lateral roots embracing inferior cerebellar peduncle at the posterior border of the pons.

GLOSSO-PHARYNGEAL -- in the groove separating the olivary eminence from the inferior cerebellar peduncle

VAGUS -- postero-lateral groove behind the olivary eminence.

SPINAL ACCESSORY -- a series of fasciculi along the lateral surface of the spinal cord between anterior and posterior roots of spinal nerves.

HYPOGLOSSAL -- slender fasciculi from the ventral surface of the medulla in the groove between the olivary eminence and the pyramid.

Structures found in cranial fossa

ANTERIOR -- frontal lobes of the cerebrum, meningeal vessels, attachment of falx cerebri, olfactory bulb, anterior ethmoidal vessels, nasociliary nerve,

MIDDLE -- optic chiasm, optic nerve, ophthalmic artery, attachment of tentorium cerebellae, hypophysis, abducent nerve, cavernous sinus, internal carotid artery, temporal lobes, meningeal vessels, oculomotor, trochlear, ophthalmic branch of trigeminal, abducent, lacrimal artery, ophthalmic veins, maxillary nerve, mandibular nerve, lesser superficial petrosal nerve, greater superficial petrosal nerve, semilunar gang.

POSTERIOR -- cerebellum, pons, medulla oblongata, attachment of tentorium, trigeminal nerve, hypoglossal nerve, meningeal artery, inferior petrosal sinus, transverse sinus, IX, X, XI, VIII, occipital sinus,

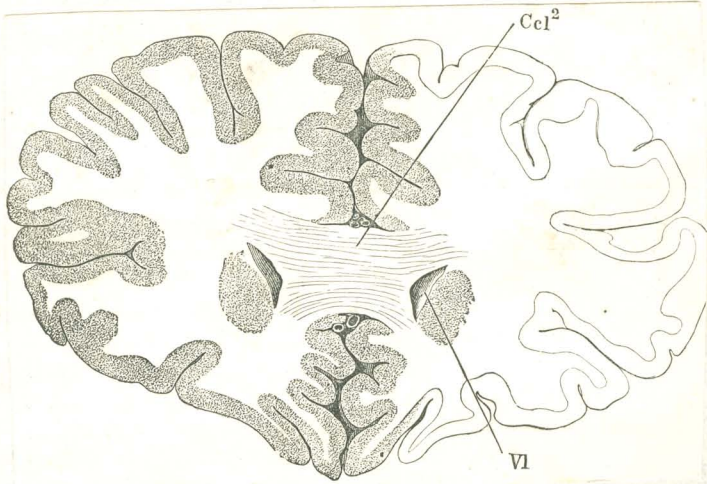


FIG. 68.—A vertical section across the cerebral hemispheres. *Ccl*², the *corpus callosum*; *VI*, the anterior end of the right lateral ventricle: the gray mass on its exterior is the *corpus striatum*. On the left side the superficial gray matter covering the convolutions is shaded.

Brain -- Verticle Sections**Central connections**

Mid-brain connecting the fore- and hind-brains.

Dorsal part consists of corpora quadrigemina.

Rest made up of peduncles. Aqueduct of Sylvius between these and connecting third and fourth ventricles.

Middle commissure joining the optic thalami

Corpus callosum lying in the floor of the longitudinal fissure, and connecting the cortic

Anterior commissure joining the temporal lobes of opposite sides.

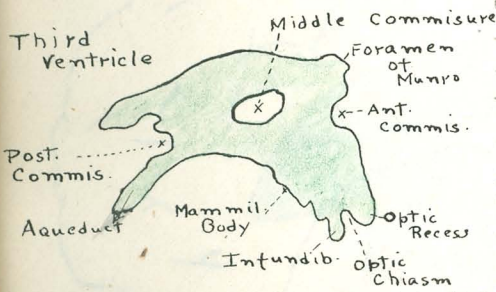
Transverse fibers of the fornices running from one hippocampal convolution to the other.

The ventricles

FOURTH. In outline the floor is diamond or lozenge shaped. The lower boundaries are formed by the columns of Goll and the restiform bodies. The inferior angle, at the point of divergence of the columns of Goll, is the calamus scriptorius. The upper boundaries are formed by the superior peduncles of the cerebellum. The floor is divided by a median longitudinal furrow and each half is subdivided into an upper and a lower part by some superficial transverse fibers connected with the auditory nerve, and known as the striae acusticae. Immediately within each lateral angle is a rounded elevated surface the tuberculum acusticum, beneath which are certain nuclei of the auditory nerve. Alongside the median groove on either side is a narrow rounded elevation. Below, this is the trigonum hypoglossi while above, it is the eminentia teres these overlying the nuclei of the hypoglossal and abducent nerves respectively. Between the

Between the trigonum hypoglossi and the tuberculum acusticum is a triangular depression, the trigonum vagi beneath which are the nuclei of the ninth and tenth nerves.

THIRD This is situated between the optic thalami below the corpus callosum. It is a narrow space, somewhat broader behind and much deeper in front. Behind it communicates with the aqueduct of Sylvius and anteriorly with the two lateral ventricles by means of the foramina of Munro. The middle commissure passes between the thalami thru its middle. In front of this is the downward curving elevation produced by the anterior pillar of the fornix. The roof extends from the foramina of Munro, bounded above and in front by the arching pillars of the fornix, to the pineal body behind. It is occupied by more or less vascular tissue forming the choroid plexus.



The posterior wall is very short and includes the base of the pineal body, the posterior commissure, and the opening into the aqueduct. The floor slopes downward and forward and forms part of the mammil-

lary bodies, the infundibulum and associated structures. The optic chiasm marks the anterior limit.

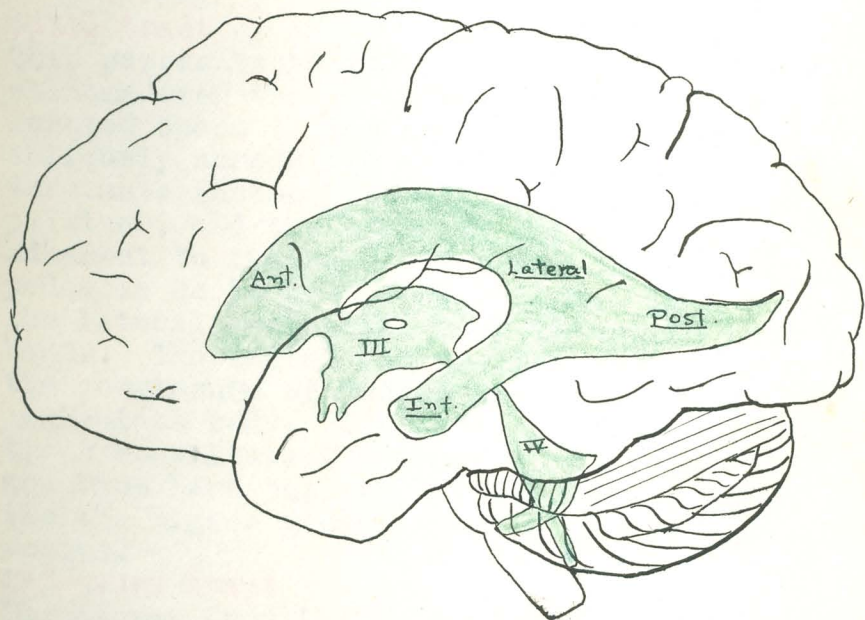
L. 63-64

LATERAL These are irregular cavities within the cerebrum. Viewed from above each lateral ventricle appears as an elongated, irregular curved cavity extending for about two thirds of the length of the hemisphere and also penetrating the temporal lobe to its pole. These parts consist of an anterior, posterior, and inferior horn.

The anterior horn curves forward and outward around the head of the caudate nucleus into the frontal lobe. It is triangular in cross section.

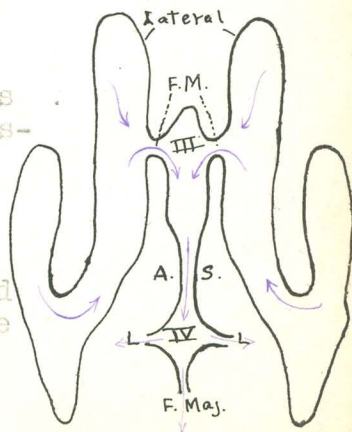
The corpus callosum forms the roof or base of the triangle. The vertical mesial side is formed by the septum lucidum. The lateral wall lies close to the caudate nucleus. The body of the ventricle lies between the foramen of Munro and the bifurcation of the posterior and inferior horns. In its floor lie the caudate nucleus, part of the thalamus, the choroid plexus, and the fornix

The inferior horn curves backward and downward around the thalamus well into the temporal lobe. It is roofed by the corpus callosum, floored principally by the hippocampus, and more or less filled by the choroid plexus. The posterior horn is much smaller than either of the others and curves back into the occipital lobe. In cross section it is irregularly crescentic, the concavity lying infero-mesially. It is roofed by the tapetum of the corpus callosum. In the lower part of the mesial wall lies the hippocampus minor.



Course of Spino-cerebellar fluid

It is formed within the ventricles from the choroid plexuses and passes out thru the foramina of Munro and the aqueduct of Sylvius to the fourth ventricle. Thence it enters the subarachnoid spaces by way of the foramen of Magendie and the foramina of Luschka. Here the cerebral veins absorb it.



Brain -- Horizontal Section**Relations of lateral ventricles.**

BODY: corpus callosum, caudate nucleus of corpus striatum, stria terminalis, terminal vein, thalamus, choroid plexus, fornix, septum pellucidum.

ANTERIOR CORNU: caudate nucleus, corpus callosum, septum pellucidum, c

POSTERIOR CORNU: corpus callosum, hippocampus minor,

INFERIOR CORNU: thalamus, corpus callosum, caudate nucleus, stria terminalis, hippocampus, fimbria, choroid plexus,

Optic tract

This passes backward and outward from the optic chiasma over the tuber cinereum and anterior perforated space to the cerebral peduncle and winds obliquely across its under surface. Its fibers terminate in the lateral geniculate body, the pulvinar, and the superior colliculus. It is adherent to the tuber cinereum and the cerebral peduncle as it passes over them. In the region of the lateral geniculate body it splits into two bands. The medial and smaller one of these is the commissure of Gudden and ends in the medial geniculate body. The above mentioned terminations constitute the lower visual centers. Fibers from here pass thru the internal capsule to the higher visual centers in the occipital cortex.

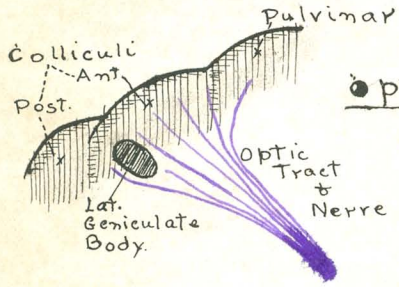
Olfactory tract

The nerves from the Schneiderian membrane are collected into about twenty branches which pierce the cribriform plate of the ethmoid and end in the glomeruli of the olfactory bulb. The olfactory center in the cortex is generally associated with the rhinencephalon. This comprises the olfactory lobe, uncus, subcallosal and supra-callosal gyri, fascia dentata hippocampi, septum pellucidum, fornix, and hippocampus. The olfactory lobe includes the olfactory bulb and tract. These lie on the cribriform plate of the ethmoid and the olfactory sulcus, respectively.

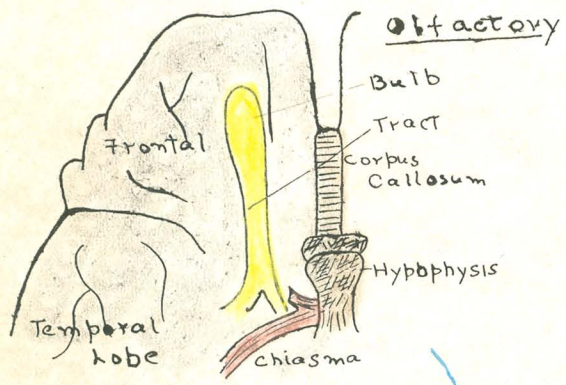
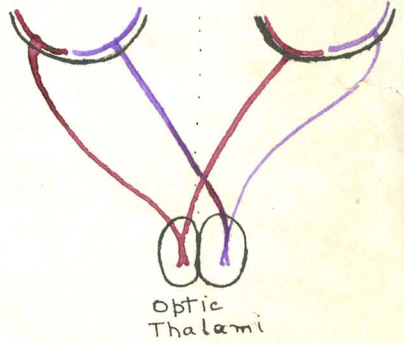
The auditory nerve

The fibers arise in the spiral ganglion of the cochlea and pass down the modiolus and then into

the internal auditory meatus, which it traverses with the vestibular nerve. It crosses the subarachnoid space and terminates in the cochlear nucleus. The fibers end in the accessory nucleus in front of the inferior peduncle, and in the tuberculum, somewhat lateral to it. From the latter the striae acusticae pass to the superior olivary nuclei. Some pass also to the lateral lemniscus. The ultimate ending is in the medial geniculate body and the inferior colliculi. From here fibers pass in to thru the internal capsule to the posterior part of the superior temporal gyrus and the transverse temporal gyri.



Optic



Olfactory

