

VISUAL ANATOMY

Head and Neck

By

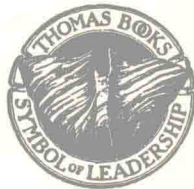
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CONTENTS

PREFACE	vii
	<i>Figure</i>
	<i>Number</i>
ANTERIOR ASPECT OF THE NECK	
Framework	1
Deep Muscular Plane	2
The Relations of Scalenus Anterior	
I. The Sympathetic Trunk and the Phrenic Nerve	3
II. The Common Carotid and Subclavian Arteries	4
III. The Branches of the Subclavian Artery	5
IV. The Vagus Nerve	6
V. The Internal Jugular and Subclavian Veins	7
The Cervical Viscera	8
The Thyroid Gland	9
The "Strap" Muscles	10
The Outer Musculo-Fascial Collar	11
The Subcutaneous Structures	12
LATERAL ASPECT OF THE NECK	
Framework	13
The Anterior Primary Rami of the Cervical Nerves	14
The Scalene Muscles	15
The Carotid and Subclavian Arteries	16
The Internal Jugular and Subclavian Veins	17
The Muscles of the Floor of the Posterior Triangle	18
Muscular Branches of the Cervical Nerves in the Posterior Triangle ..	19
The Inner Fascial Collar	20
The Cervical Viscera	21
The "Strap" Muscles	22
The Innervation of the "Strap" Muscles	23
Sterno-mastoid and Trapezius and a Tabulation of the Muscular	
Branches of the Cervical Nerves	24
The Cervical Fascias (Outer and Inner Collars)	25
THE SUPRAHYOID REGION	
The Deep Medial Plane	26
The Pharyngeal Muscles	27
The Relations of the Pharyngeal Muscles	
I. The IXth and Xth Nerves and the Internal Carotid Artery	28
II. The IXth, Xth, XIth and XIIth Nerves	29
The Vagus Nerve	30
The Branches of the External Carotid Artery	31
THE SUBMANDIBULAR REGION	
The First Muscular Plane	32

The Lingual Artery	33
The Second Muscular Plane	34
The Hypoglossal and Lingual Nerves	35
The Submandibular Gland	36
The Sublingual Gland	37
The Third Muscular Plane	38
The Facial Artery	39
The Fourth Muscular Plane	40
The Digastric as a Landmark	41
The Relations of the Mandible I	42
The Relations of the Mandible II	43
THE SKULL	
Lateral Aspect	44
THE INFRATEMPORAL REGION	
Medial and Lateral Walls	45
The Medial Pterygoid Muscle	46
The Mandibular Division of the Trigeminal Nerve (V)	47
The Lateral Pterygoid Muscle and the Maxillary Artery	48
The Temporo-Mandibular Joint	49
Temporalis	50
THE CONTINUITY OF TEMPORAL AND INFRATEMPORAL REGIONS	51
THE PAROTID REGION	
The Posterior Facial Vein and the External Carotid Artery	52
The Facial Nerve and a Tabulation of the Innervation of Clinically Accessible Muscle Groups	53
The Parotid Gland	54
THE FACE AND SCALP	
The Muscles of Facial Expression	55
The Facial Artery and the Anterior Facial Vein	56
Sensory Nerves	57
THE SKULL	
The Floor of the Cranium	58
The Cranial Nerves and the Floor of the Cranium	59
The Internal Carotid Artery and the Floor of the Cranium	60
The Intracranial Arteries	61
The Dura Mater and the Intracranial Venous Sinuses	62
THE ORBIT	
The Bony Cone	63
The Ocular Muscles	64
The Ocular Adnexa	65
The Nerves Outside the Muscular Cone	66

CONTENTS

xi

The Nerves within the Muscular Cone	67
The Arteries and Veins of the Orbit	68
The Maxillary Nerve	69
THE NOSE	
The Lateral Wall I	70
The Lateral Wall II and a Tabulation of the Parasympathetic Cranial Ganglia	71
The Nasal Septum	72
THE AUDITORY APPARATUS	
General Description	73
The Middle Ear I	74
The Middle Ear II	75
The Internal Ear	76
THE SKULL	
Basal Aspect	77
THE BACK OF THE NECK	
The Atlas and Axis	78
The Union of Skull and Vertebral Column	79
The Vertebral Artery	80
The Suboccipital Muscles	81
The Posterior Primary Rami of the Cervical Nerves	82
Splenius	83
Trapezius	84
THE CERVICAL VISCERA	
The Pharynx, Larynx and Palatine Tonsil	85
The Larynx I	86
The Larynx II	87
LYMPHATICS	88
INDEX	page 213

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ANTERIOR ASPECT OF THE NECK

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Framework

The bony framework of the neck consists of the seven cervical vertebrae and may be considered to include the superior surface of the manubrium sterni and of the first rib. The apex of the lung, covered by pleura, fills the concavity of the first rib. Because this rib slopes downward and forward, the lung and its covering are exposed anteriorly in the lower part of the neck.

From this front view it is apparent that while the transverse processes of the 1st, 2nd, and 7th cervical vertebrae are simple and end bluntly, those of C3 to C6 inclusive are rather broadened and cupped, forming a viaduct for the corresponding emergent spinal nerves. The tips of these processes (C3 to C6) are expanded front and back to form well marked anterior and posterior tubercles. The anterior part of the transverse process of all the cervical vertebrae is homologous with rib and occasionally may actually form an anomalous rib, particularly in the case of C7 or, less commonly, C6. Since such cervical ribs may compress part or all of the brachial plexus, their presence must be considered in any diagnosis of upper limb pain or weakness.

Clinically, the lung can be percussed and auscultated over the apex where it rises into the neck uncovered by bone. Commonly, early tuberculosis first becomes manifest in this apical part of the lung. Finally, it should be remembered that operative procedures in this area must be performed with due caution not to introduce air or other foreign substances into the pleural cavity.

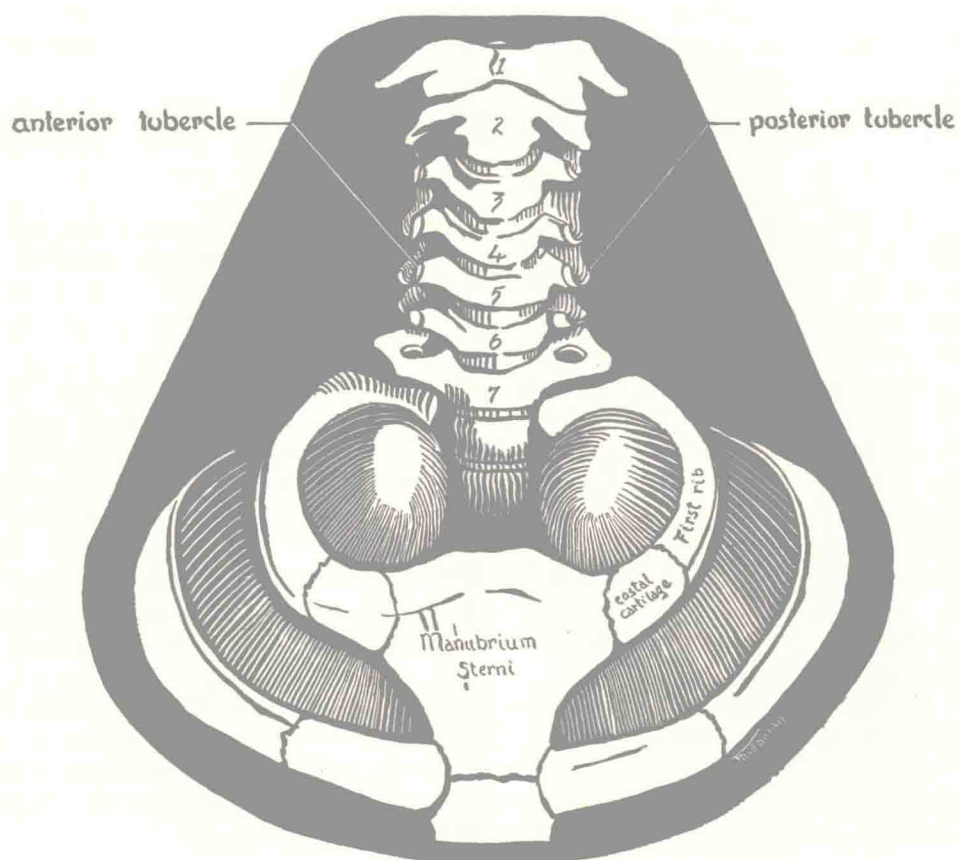


FIGURE 1

ANTERIOR ASPECT OF THE NECK

Deep Muscular Plane

Scalenus Anterior arises from all of the anterior tubercles, that is, C3 to C6 inclusive, and inserts by a strong tendon into the scalene tubercle on the upper surface of the first rib, passing in front of the dome of the pleura to do so. It is usually innervated by the anterior primary rami of C4 to C7.

Behind **Scalenus Anterior** is the **Scalene Mass**. This muscle, consisting of **Scalenus Medius** and **Posterior**, arises from the transverse processes of all the cervical vertebrae—from the posterior tubercle in the case of C3 to C6, from the tip in the case of C1, 2 and 7. Frequently, the origin is not as high as C1, occasionally, not as low as C7. It inserts into the posterior part of the upper surface of the first rib and into the lateral part of the upper border of the 2nd rib. Innervation is by the anterior primary rami of C2 to C8. **Scalenus Medius** proper is that part of the mass which inserts into the 1st rib and arises from C1 or C2 to about C7, while the fibres of **Scalenus Posterior** are behind this, and insert into the 2nd rib after arising from only C5, 6 and 7. No useful purpose, however, is served by this subdivision.

Longus Capitis and **Longus Cervicis** (**Longus Colli**) form a muscular covering directly in front of the vertebral bodies and their transverse processes. **Longus Capitis** originates from all of the anterior tubercles (C3 to C6, the same as **Scalenus Anterior**) and inserts into the basilar part of the occipital bone. **Longus Cervicis** attaches to the fronts of the bodies of the cervical and upper thoracic vertebrae with slips to the fronts of the transverse processes of the middle cervical vertebrae. The innervation of both **Longus Capitis** and **Longus Cervicis** is by the anterior primary rami of all the adjacent cervical nerves.

On emerging from the spinal canal each spinal nerve passes laterally above the transverse process of the corresponding vertebra to appear on a plane immediately in front of **Scalenus Medius**. Here, the typical nerve gives off a small branch, the posterior ramus, while the remainder continues as the anterior primary ramus. The lower nerves lie between this muscle and **Scalenus Anterior**. The 8th cervical nerve emerges above the transverse process of T1.

The anterior primary rami of the first 4 cervical nerves are primarily involved in the formation of the **cervical plexus** and the subsequent branching from this. The anterior primary rami of C5 to C8, together with the anterior ramus of T1, form the **brachial plexus**, usually with a communicating addition from C4. In forming the brachial plexus, C5 and C6 unite to form the *upper trunk*, C7 runs alone as the *middle trunk*, and C8 unites with T1 to form the *lower trunk*. The three trunks run downwards and laterally in front of **Scalenus Medius** and cross the first rib as a compact bundle, the lower trunk being in actual contact with this bone. The grouping of the trunks of the brachial plexus into a compact cord as they cross the 1st rib makes it rather simple to secure surgical anesthesia of almost the whole upper limb by blocking the plexus in this area.

The usefulness of **Scalenus Anterior** as a landmark will appear in subsequent illustrations. It usually cannot be seen in the normal subject, but stands out clearly in those patients in whom respiratory distress calls into play the accessory muscles of respiration. Using the cervical vertebrae as fixed point, this muscle can elevate the first rib and through this the thoracic cage, thus aiding in inspiration.

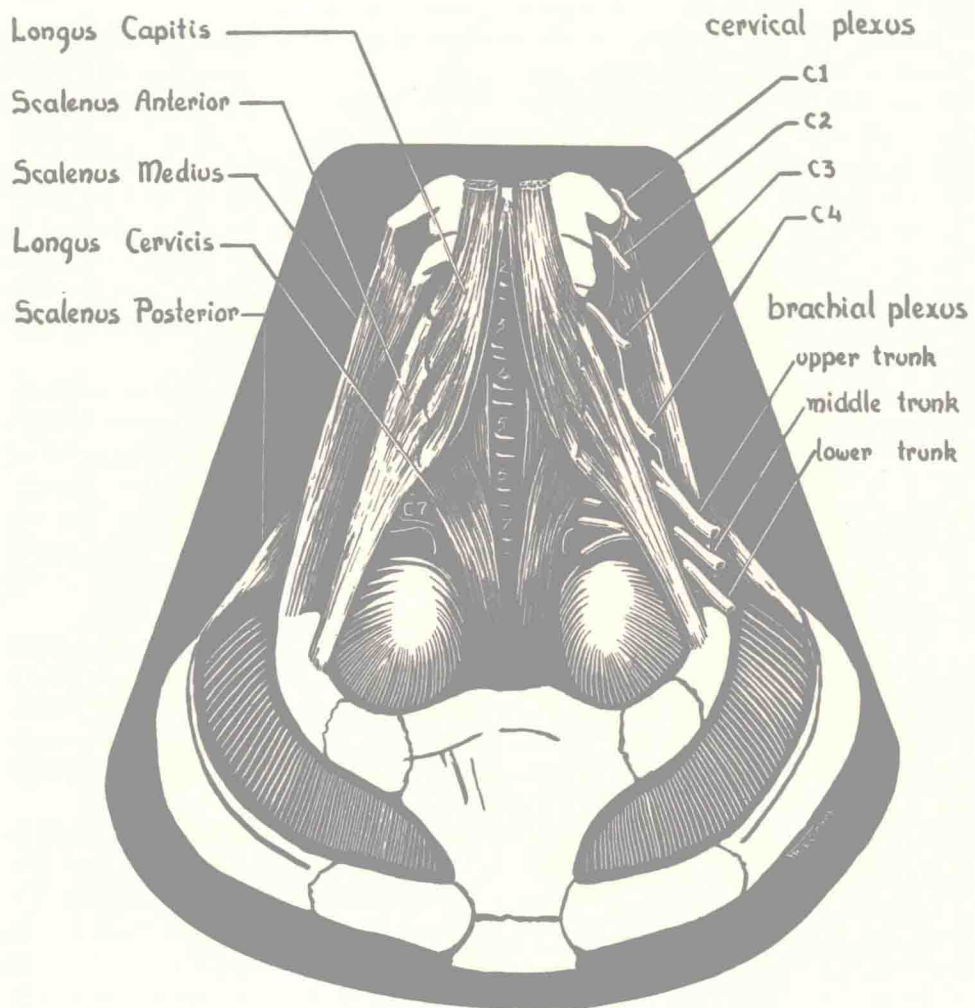


FIGURE 2

ANTERIOR ASPECT OF THE NECK

The Relations of Scalenus Anterior—I. The Sympathetic Trunk and the Phrenic Nerve

The cervical part of the sympathetic trunk lies immediately in front of the transverse processes of all but the first cervical vertebra. It is thus between Scalenus Anterior laterally and Longus Capitis and Cervicis medially. The *superior cervical sympathetic ganglion* is the upper termination of the trunk and lies opposite C2 and C3. The *middle cervical ganglion* usually begins at about C6 and consists of several small ganglia, sometimes recognizable only with difficulty. These are situated on strands of the trunk which is rather divided at this level as it encircles the vertebral and inferior thyroid arteries. The *inferior cervical ganglion* is usually not separable from the 1st thoracic ganglion but forms with it the large *stellate ganglion* which lies in front of the head of the 1st rib.

Gray rami containing mostly efferent, but some afferent fibers as well, pass from the cervical sympathetic trunk to the cervical spinal nerves. Thus, from the superior ganglion, communicating fibers run to the upper four cervical spinal nerves and are distributed with these. Similarly, the middle sympathetic ganglion effects a peripheral distribution through the fifth and sixth cervical nerves, while the inferior ganglion sends fibers to the seventh and eighth nerves. In addition, the superior ganglion provides sympathetic innervation to the head by means of a plexus of fibers surrounding the internal and external carotid arteries and their branches. All three cervical ganglia give off cardiac branches which form part of the sympathetic innervation of the heart. (The sympathetic system is described in greater detail with the thorax in volume II.)

The **phrenic nerve** is formed by branches from C3, 4 and 5 at the lateral border of Scalenus Anterior. This nerve passes vertically downwards on Scalenus Anterior, crossing from its lateral to medial side and finally leaving on the medial side near the insertion of this muscle. It innervates the diaphragm.

Because of the occasional occurrence of intractable hiccough several techniques have been devised for applying local anesthesia to the phrenic nerve in the neck. Interruption of phrenic nerve impulses paralyses the diaphragm and hence stops the spasmodic contraction of this muscle which is the major feature of the condition. The absence of reliable landmarks to guide the injection needle makes this procedure difficult and not uniformly successful. A more common clinical procedure is surgical interruption of the phrenic nerve in order to rest a tuberculous lung.

Among the most striking clinical manifestations of stimulation of the cervical part of the sympathetic chain is the appearance of flushing of the face, sweating, and dilatation of the pupil. This occurs on the side stimulated. In contrast, interruption of the sympathetic impulses produces dryness of the face, constriction of the pupil and, for unexplained reasons, recession of the eyeball (enophthalmos) and drooping of the upper lid (ptosis). Lesions of the sympathetic chain in the neck may produce any of the above manifestations, commonly termed "Horner's syndrome."

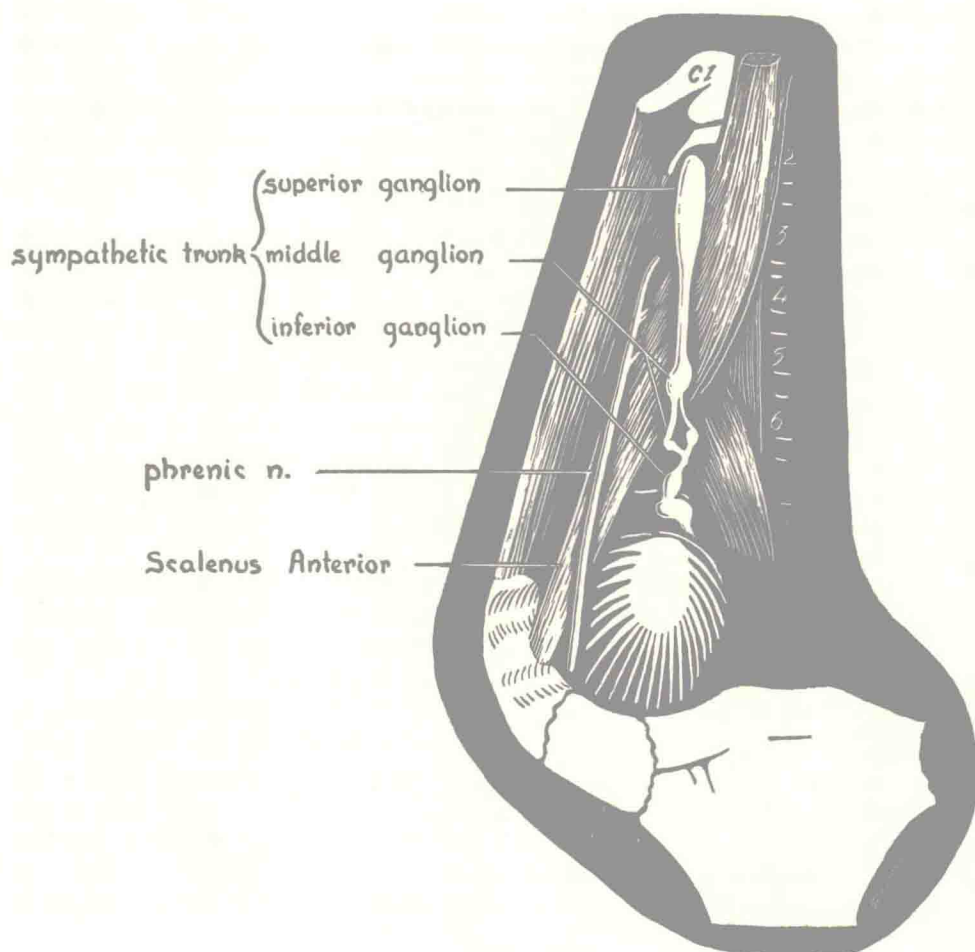


FIGURE 3

ANTERIOR ASPECT OF THE NECK

The Relations of Scalenus Anterior—II. The Common Carotid and Subclavian Arteries

The common carotid and subclavian arteries are intimately related to Scalenus Anterior. These vessels enter the neck separately on the left side, while on the right, as shown here, they are derived from the parent innominate artery which branches immediately on entering the neck. In both cases the essential relations are the same. The arterial trunks enter from just behind the junction of the sternum with the first costal cartilage. (A more practical landmark for this position is the sterno-clavicular joint.) From this point the subclavian artery describes an arch as it passes laterally to cross the upper surface of the 1st rib. At the lateral border of the first rib this vessel is renamed the axillary artery. In its course, the subclavian artery lies in front of the dome of the pleura and behind Scalenus Anterior. Three parts of its course are described—first, *medial to Scalenus Anterior*; second, *posterior to Scalenus Anterior*; and third, *lateral to Scalenus Anterior*. Because of the inclination of the 1st rib, the third part of the artery has bone both behind and below it and lies in a shallow groove. The lower trunk of the brachial plexus (fig. 2) occupies this same groove.

The common carotid artery passes vertically upwards in the neck to end between C3 and C4 where it divides into the internal and external carotid arteries. The internal carotid artery is regarded as the direct upward continuation of the parent trunk. In its course, the common carotid lies first in front of the dome of the pleura, then in front of the transverse process of C7 but at a distance from it, and finally rests immediately in front of the transverse processes of C6 to C4 (or C3). In front of these transverse processes the artery is separated from bony contact by Longus Cervicis and Capitis, Scalenus Anterior and the sympathetic trunk, but the vessel can easily be compressed against the bony points, particularly at C6.

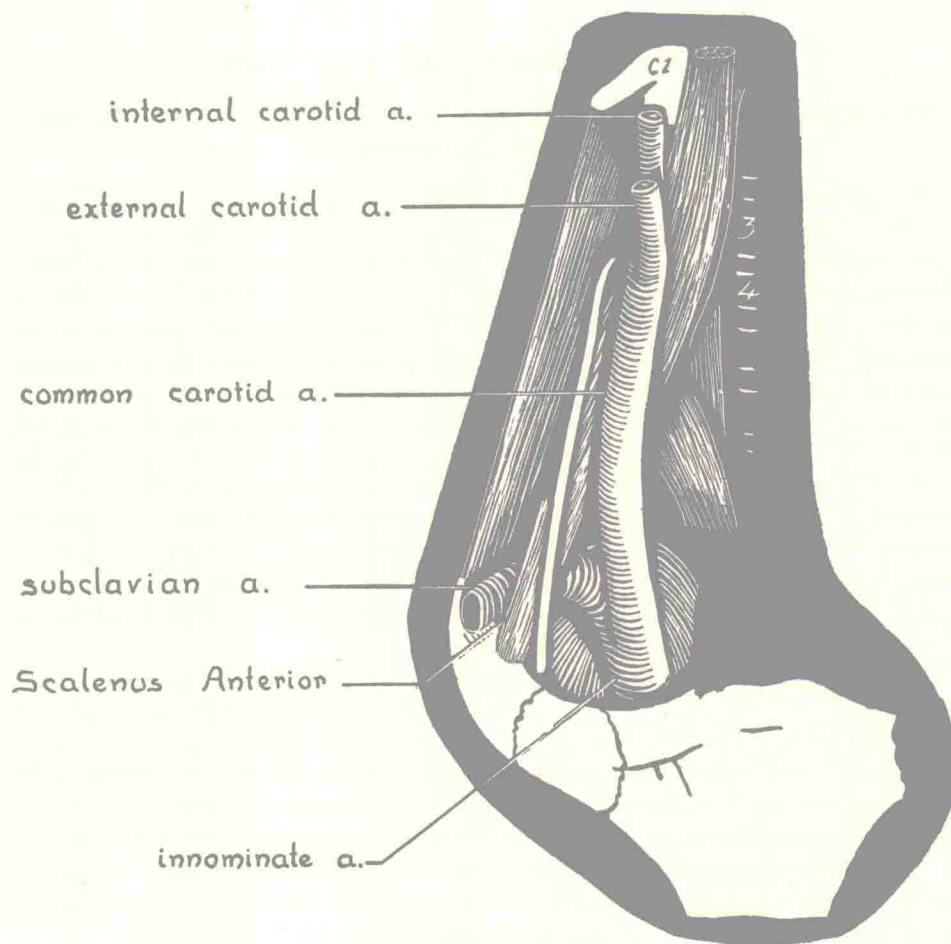


FIGURE 4