

ORAL CAVITY, PHARYNX, PAROTID AND SCALP
(Text pp. 927-949, 1049-1060. 870-874 and Supplemental notes)

I. ORAL CAVITY:

A. General Points:

B. Hard Palate:

1. Location
2. Parts

C. Soft Palate:

1. Palatoglossal
2. Palatopharyngeal arches
3. Muscles associated with the soft palate (given on pg. 8)

D. Tongue:

1. Its attachments to surrounding structures
2. General points and parts
3. Muscles
 - a. Extrinsic (See Table 7.9 on pg. 4)
 - b. Intrinsic
 - 1) Four pairs
4. Lymphatics – trace with diagram
5. Innervation

E. Teeth:

1. Parts of a tooth
2. Structure

F. Sublingual Salivary Gland:

II. PHARYNX:

A. Subdivisions:

1. Nasopharynx – discussed
2. Oropharynx
 - a. Lymphatic ring
 - b. Tonsillitis
 - c. Tonsillar lymph nodes
3. Laryngopharynx

B. Muscles:

1. The Constrictors
2. Longitudinal MM (Salpingopharyngeus)

III. PAROTID GLAND:

A. Location:

B. Interrelationships

IV. SUBMANDIBULAR GLAND:

A. Location:

B. Palpation:

C. Innervation:

D. Blood Supply:

V. SCALP:

A. Structure: Trace with diagram

B. Occipitofrontalis / Epicranius M:

C. Location:

D. Attachments:

E. Innervation:

F. Blood Supply: Diagram

ORAL CAVITY (Palate, Tongue, Teeth, Pharynx, Scalp and Parotid Glands)

GENERAL POINTS: The oral cavity is divided into internal and external parts. The smaller external part is the:

Vestibule: Narrow space between the lips and cheek externally and the gums and teeth internally

Oral Fissure: Through this fissure vestibule communicates with the outside. When teeth are in contact with each other the vestibule communicates with the oral cavity from gaps between last molars and mandible

The parotid duct → vestibule (crosses above 2nd molar)

ORAL CAVITY PROPER:

Bounded by:

Anteriorly/Laterally – teeth and gums

Roof – soft and hard palates

Floor – Anterior tongue and mylohyoid muscle

Frenulum: Connects anterior tongue → floor

Submandibular ducts: R & L open onto floor of mouth

Sublingual papillae: Ducts and papillae form the sublingual folds = elevations on the R & L sides of frenulum

Lips and Cheeks: Upper and lower lips – covered by skin, contain the orbicularis oris muscle, small salivary glands (labial glands), labial vessels and nerves

Philtrum: Shallow groove on upper lip

Hairlip: Usually paramedian (congenital), associated with cleft palate

Cheeks: Structure from without to within made up of skin, buccal pad of fat and buccal muscle. The parotid duct passes through buccinator and fat pad → opens opposite the upper 2nd molar. Nasolabial groove – from nose to angle of mouth (so-called laugh line), marks the junction between cheeks and lips

PALATE: Constitutes the roof of mouth. It is arched (antero-posteriorly and transversely). Has two parts:

1) The hard palate (anterior 2/3rd)

2) The soft palate (posterior 1/3rd)

Hard Palate: Consists of palatine process maxillae (front), and palatine bone (behind), a median raphe, transverse palatine folds, and a median bony protuberance – torus palatinus

Soft Palate: (valum palatinum) Suspended from hard palate, it forms a partial partition between nasopharynx and oropharynx. It closes the pharyngeal isthmus in swallowing and during speech. Uvula – a small midline projection from the free end of the soft palate. Laterally, the soft palate forms two folds, the palatoglossal and palatopharyngeal arches. The soft palate and palatopharyngeal folds may intervene between nasopharynx and oropharynx

Arterial Supply: By the greater palatine artery (a branch of descending palatine from maxillary)

Innervation: Sensory from palatine and nasopalatine nerves (branch of maxillary division)

Structures:

Muscles: The palatoglossus muscle occupies the palatoglossal fold. The palatopharyngeus muscle occupies the palatopharyngeal fold

TONGUE: The tongue (L. = lingua, Gk. = glossa) is a muscular organ. It is attached by muscle to the hyoid bone, mandible, styloid process and pharynx. It is important in taste, mastication, swallowing and speech. It consists mainly of skeletal muscles.

Parts: Dorsum, inferior surface, tip, root and body and margin

Tip: Normally rests against the incisors

Margin and Body: Related to the gum and teeth, and the body is the area between the root and tip

Dorsum: Superior surface, partly in oral cavity, partly in oropharynx.

1) Sulcus terminalis – a v-shaped groove

2) Foramen cecum – indicates the site of origin of thyroglossal duct

Vallecula: Space on each side of median glosso-epiglottic fold is the epiglottic Vallecula

Inferior Surface: Frenulum of tongue; very well supplied by blood (absorption of drugs)

Root: This part rests on the floor of the mouth (Geniohyoid and mylohyoid)

- It is attached by muscles to the mandible and hyoid bone
- The nerves, vessels and extrinsic muscles enter or leave the tongue through the root

Muscles of Tongue: Made up of intrinsic and extrinsic muscles. All these muscles are bilateral

Intrinsic Muscles: Are arranged in several planes (longitudinal, transverse and vertical)

Extrinsic Muscles: Consist of genioglossus, hyoglossus, chondroglossus, styloglossus, and palatoglossus

Actions: The form of the tongue depends on both intrinsic and extrinsic muscles. Position of the tongue depends only on the extrinsic muscles

Lymph Drainage:

From tongue → submental

From tongue → submandibular

From tongue → deep cervical

Innervation: Sensory nerves of tongue

- Anterior 2/3rd – by lingual nerve of (V3) for general sensation
- Chorda tympani (of facial nerve) for taste
- Posterior 2/3rd – lingual branch of Glossopharyngeal nerve
 - Vallate papillae for general sensation and taste
 - Also facial nerve branch for taste
 - Near epiglottis – vagus for general sensation and taste

THEREFORE, the cranial nerves concerned with taste are **7, 9, 10**

Blood Supply: Main artery = lingual artery (branch of external carotid)

Venous drainage: Lingual vv → facial, eventually → internal jugular

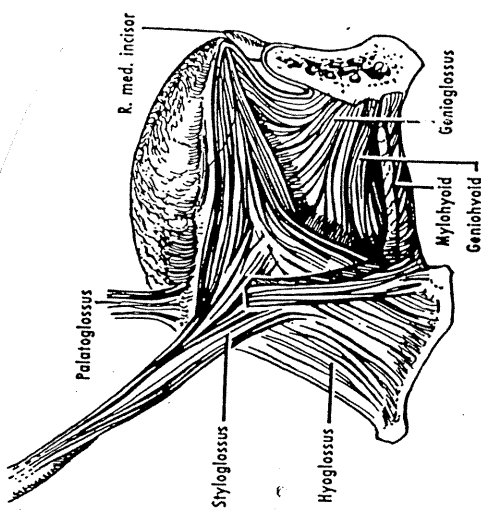


Figure 61-4 Extrinsic muscles of the tongue. Right lateral aspect. Most of the right half of the mandible and of the mylohyoid muscle has been removed.

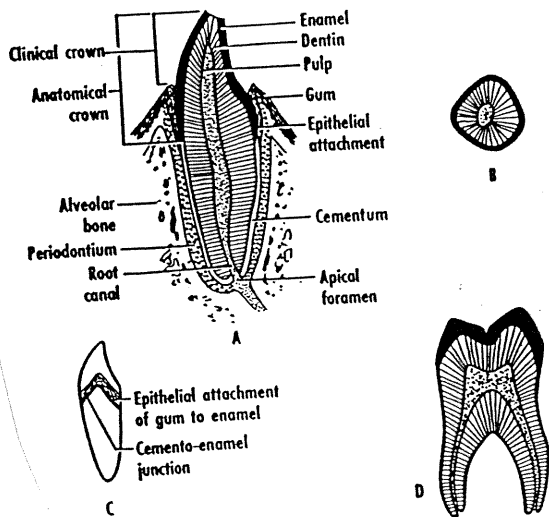


Figure 61-5 Lymphatic drainage of the tongue. A, right lateral aspect. The submandibular and sublingual salivary glands do not have labels. The cross-hatched circles indicate the sites of groups of nodes. JD, jugulodigastric; JOH, jugulo-omohyoid. B, schematic coronal section. A is from Rouvière. B is from Jamieson and Dobson.

Muscles of the Soft Palate:

MUSCLE	ORIGIN	INSERTION	INNERVATION	MAIN ACTION
Levator veli palatini	Cartilage of auditory tube and petrous part of temporal bone	Palatine aponeurosis	Pharyngeal plexus by fibers from the cranial root of CN XI	Elevates soft palate
Tensor veli palatini	Scaphoid fossa of medial pterygoid and spine of sphenoid bone	Palatine aponeurosis	Mandibular nerve	Tenses soft palate
Palatoglossus	Palatine aponeurosis	Side of tongue	Pharyngeal plexus by fibers from the cranial root of CN XI	Elevates posterior part of tongue and draws soft palate on to tongue (i.e closes off oral cavity)
Palatopharyngeus	Hard palate and palatine aponeurosis	Lateral wall of pharynx	See above	Tenses soft palate and pulls walls of pharynx superiorly, anteriorly and medially during swallowing
Musculus uvulae	Posterior nasal spine and palatine aponeurosis	Mucosa of the uvula	See above	Shortens uvula and pulls it superiorly

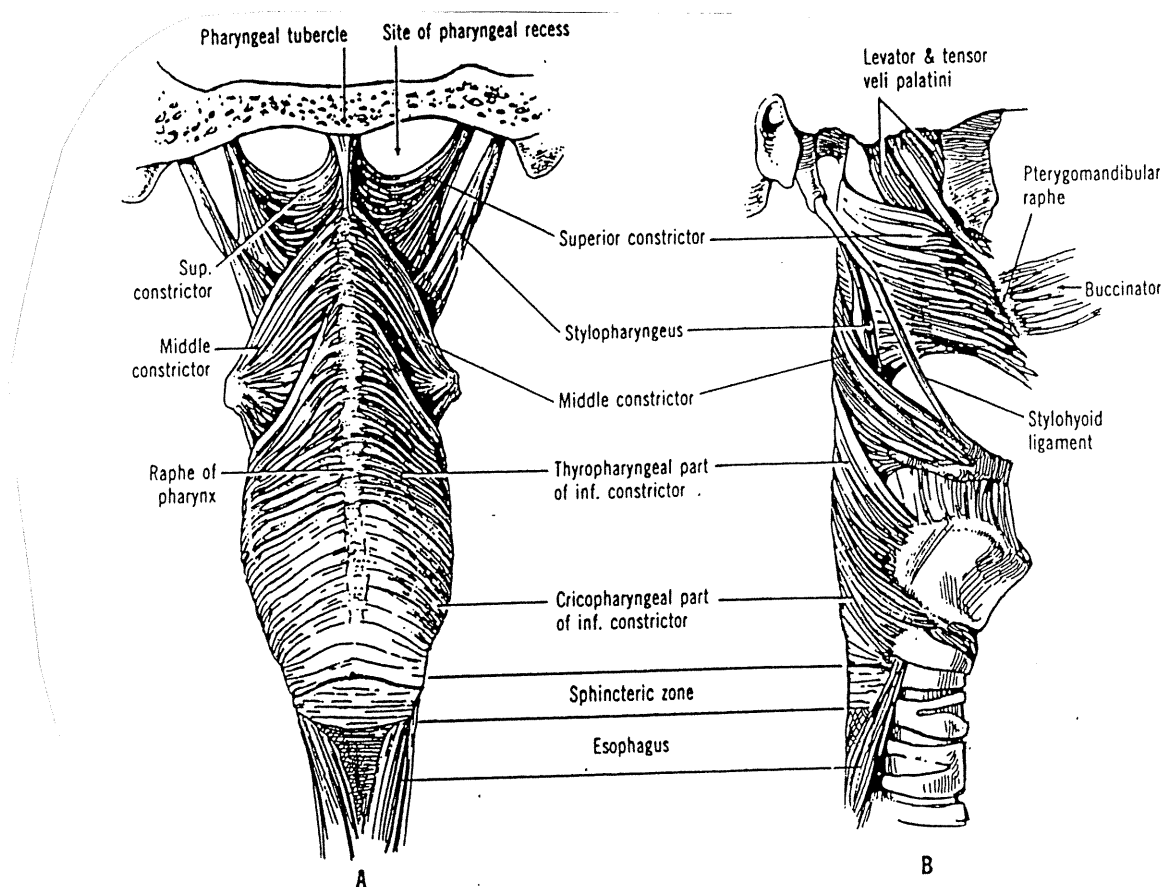


Figure 63–8. Muscles of the pharynx. A, posterior aspect. B, right lateral aspect.

Extrinsic Muscles of the Tongue:

MUSCLE	ORIGIN	INSERTION	INNERVATION	MAIN ACTION
Genioglossus	Superior mental spine of mandible	Dorsum of tongue and body of hyoid bone	Hypoglossal n. (CN XII)	Depresses tongue, posterior part protrudes tongue
Hyoglossus	Body and greater horn of hyoid bone	Side and inferior aspect of tongue	See above	Depresses and retracts tongue
Styloglossus	Styloid process and stylohyoid ligament	Side and inferior aspect of tongue	See above	Retracts tongue and draws up sides to create trough for swallowing
Palatoglossus	Palatine aponeurosis of soft palate	Side of tongue	Pharyngeal plexus by fibers from cranial root of CN XI	Elevates posterior part of tongue

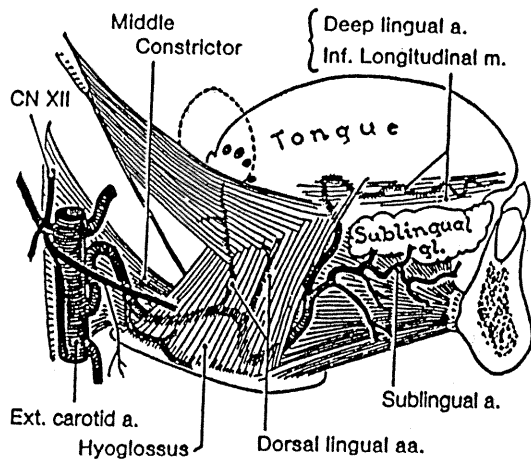
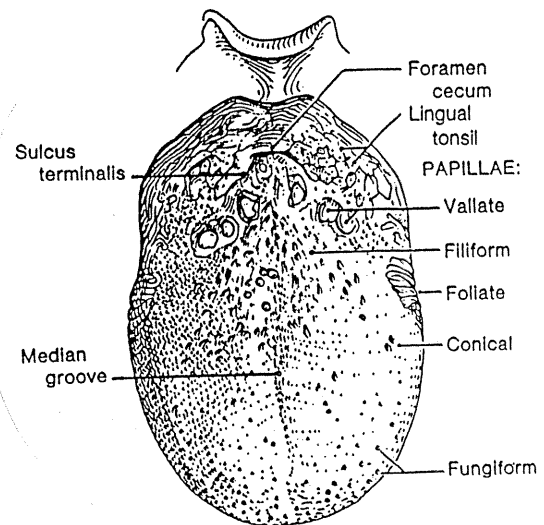


Figure 7-143. Drawing of the lingual artery and its branches. Note the dorsal lingual branches to the posterior part and the deep lingual artery to the anterior part of the tongue. The lingual artery, the main artery of the tongue, is a branch of the external carotid artery.



MOTOR NN.

Vagus n. (CN X) supplies Palatoglossus m.

Hypoglossal n. (CN XII) supplies all other mm. of the tongue

SENSORY NN. (general and special)

Internal laryngeal n. (CN X)

Glosso-pharyngeal n. (CN IX)

Lingual n. (CN V)
Chorda tympani (CN VII)

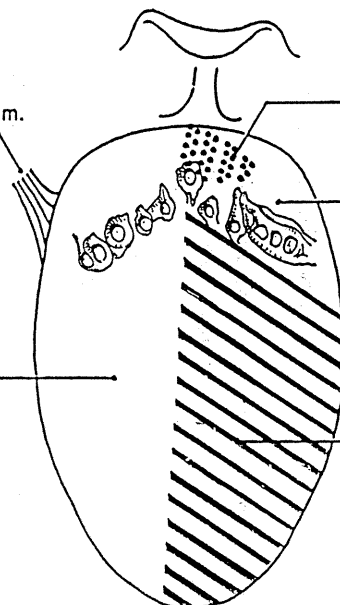


Figure 7-139. Diagram illustrating the nerve supply of the tongue. (Also see Figs. 7-33, 7-35, and 7-114).

TEETH:

General Points: Teeth (Gk. = odous, odontos, L. = dens, dentis = tooth) are organs of mastication

Parts of a Tooth: Crown, Neck and Root

Crown: (clinical, anatomical) The part above the gum – clinical crown. Anatomical crown is the part that is covered by enamel. Enamel is the hardest tissue in the body, and is designed to do rough jobs – break down food items

Neck: Small and narrow area surrounded by gum and it is adjacent to the crown

Root: Area below the gum, and it fits into the bony socket of upper and lower jaw. The root can be single or 2-3 pyramidal projections into the socket (alveolus). Actually it is suspended in the socket by the periodontal membrane.

Structure of a Typical Tooth: Each tooth is made up of specialized connective tissue, the pulp covered by 3 calcified tissues: dentin(e), enamel and cement(um)

Dentine: Forms the bulk of dental tissue. In the crown, enamel covers dentin; in the neck and root cementum covers dentin. Dentin has a connective tissue pulp cavity which is the root canal. It contains blood vessels, lymphatics and nerve endings

Innervation: The pulp and periodontal membrane of upper jaw are innervated by the plexus derived from branches of the superior alveolar nerve. In the lower jaw, the structures are innervated by the lower alveolar nerve. The gums are innervated by the nerves innervating the mucous membrane of the cheek

Arterial Supply: The superior alveolar artery (branch of the maxillary artery) supplies the upper jaw teeth. The inferior alveolar branch (of the maxillary artery) supplies the teeth in lower jaw

Dentition: Primary or deciduous and permanent dentition

Primary Dentition: At birth, no functioning teeth have penetrated into the oral cavity. This type of dentition begins around 6 mo. of age. There are 20 deciduous teeth (5 in each quadrant, 2 incisors, 1 canine and 2 molars)

Permanent Dentition: Replaces deciduous teeth. These fall out between 6-13 years (32 in number, 8 in each quadrant, 2 incisors, 1 canine, 2 premolars and 3 molars)

Clinical Note:

1. If impacted or malformed, the 3rd molar (wisdom teeth) will not erupt
2. Marked delay in dentition – from nutritional disturbance or severe childhood diseases
3. Caries – localized disintegration of one or more of the dental tissues
4. Pyorrhea – bleeding results from inflamed gum (bleeding, pus)
5. Gingival recession – resulting from tartar accumulation and advancing age

SUBLINGUAL SALIVARY GLANDS: Smallest of the 3 pairs of salivary glands (other 2 pairs – parotids and submandibulars – to be discussed later). The sublingual glands are located in the sublingual fossa in the floor of the mouth. Laterally, they are adjacent to the body of the mandible. These glands have very small ducts (up to 20 or so) which open to the floor of the mouth (over the sublingual fold)

Blood Supply: Sublingual artery (a branch of the lingual artery)

Innervation: Postganglionic parasympathetic secretomotor fibers from the submandibular ganglion

PHARYNX:

Location: In front of the cervical vertebral column and prevertebral fascia, and behind the nasal and oral cavities

Divisions: For descriptive purposes, it is divided into: 1) nasopharynx, 2) oropharynx and 3) Laryngopharynx. The pharynx is a fibromuscular tube and it extends from the base of the skull to the lower border of the cricoid cartilage (opposite C6) where it becomes continuous with the esophagus. It is a common channel for both respiration and deglutition.

Relations:

Above – to the body of the sphenoid and basilar part occipit

Below – esophagus (opens into)

In Front – opens into the nasal and oral cavities and the larynx

Behind – prevertebral fascia and muscle, and C1-C6

Laterally – styloid process, styloid muscle, the medial pterygoid muscle, carotid sheath and the thyroid gland. The lateral wall shows the opening of the auditory tube. Torus tubarius – an elevation produced by the cartilage of the auditory tube

Nasopharynx: Posterior aspect of the nasal cavity – part of the respiratory system. The nasopharynx communicates with the oropharynx through the pharyngeal isthmus. The isthmus or hiatus is closed by muscular action during swallowing

Pharyngeal tonsil (adenoids): A mass of lymphoid tissue – embedded in the posterior wall of the nasopharynx. Enlarged pharyngeal tonsils = adenoids (respiratory obstruction, mouth breathing)

Pharyngeal recess: Part of the pharyngeal cavity behind the torus tubarius

Auditory tube (pharyngotympanic or Eustachian tube): Connects the nasopharynx to the middle ear cavity (= air pressure, spread of infection)

Oropharynx: Extends from the soft palate above to the superior border of the epiglottis below. It communicates in front with the oral cavity (this region is characterized by a lymphatic ring). The palatine tonsils are located laterally, while the lingual tonsils are found below the median glosso-epiglottic fold – the mucous membrane of the epiglottis is reflected onto the base of the tongue, and onto the lateral wall of the pharynx as the lateral glosso-epiglottic fold

Palatine tonsils (commonly referred to as "the tonsils"): Consists of two masses of lymphoid tissue, one on each side of the oropharynx. Each is located in the tonsillar fossa, bounded by the palatopharyngeal and palatoglossal arches of the tongue

Arterial supply: Tonsillar branch of the facial artery

Venous: Paratonsillar vein → facial vein

Lymphatics: → upper deep cervical nodes, and the jugulodigastric node

Innervation: Branch from the Glossopharyngeal nerve and branch from the pterygopalatine ganglion

There is a conspicuous decrease in size of the tonsils past the age of 30

Laryngopharynx: Extends from the upper border of the epiglottis to the lower border of C6

Relations:

Posteriorly – C4-C6

Anteriorly – inlet of larynx, and backs of the arytenoid and cricoid cartilage

Piriform recess (fossa): The cavity of the laryngopharynx on each side of the larynx

Structure of Pharynx: (mucous, muscular fascia)

Muscles of Pharynx: The wall of pharynx is composed largely of 2 layers of muscles. The external circular layer consists of 3 constrictors; the internal chiefly longitudinal layer consists of 2 levators: the palatopharyngeus and the stylopharyngeus. The constrictors have their fixed points in front, where they are attached to the bones and cartilage. Behind, they expand and overlap each other from below upward and end in the median raphe

The muscle wall is invested by the buccopharyngeal fascia and lined by the pharyngobasilar fascia

Innervation of Pharynx: The motor and most of the sensory innervation is by way of the pharyngeal plexus (located on the middle constrictor muscle). This plexus is made up of the pharyngeal branch of the vagus, Glossopharyngeal, and a sympathetic branch from the superior cervical ganglion. The motor fibers are from the 11th Cranial nerve; carried by the vagus

Blood Supply: Ascending pharyngeal and inferior thyroid artery (from the external carotid and subclavian). Venous supply from the submucous plexuses and on the back of the pharynx externally

Lymphatics: → deep cervical nodes

Muscles of the Pharynx:

MUSCLE	ORIGIN	INSERTION	INNERVATION	MAIN ACTION
Superior constrictor	Pterygoid hamulus, pterygomandibular raphe, posterior end of mylohyoid line of mandible and side of tongue	Median raphe of pharynx and pharyngeal tubercle	Pharyngeal and superior laryngeal branches of the vagus (CN x) through the pharyngeal plexus	Constrict wall of pharynx in swallowing
Middle constrictor	Stylohyoid ligament and greater and lesser horns of hyoid	Median raphe of pharynx	See above	See above
Inferior constrictor	Oblique line of thyroid cartilage and side of cricoid cartilage	Median raphe of pharynx	See above	See above
Palatopharyngeus	Hard palate and palatine aponeurosis	Posterior border of lamina of thyroid cartilage and sides of pharynx and esophagus	See above	Elevate pharynx and larynx
Salpingopharyngeus	Cartilaginous part of the auditory tube	Blends with palato-pharyngeus muscle	See above	See above
Stylopharyngeus	Styloid process	Posterior and superior borders of the thyroid cartilage with the palato-pharyngeus muscle	Glossopharyngeal nerve	See above

The salpingopharyngeus muscle also opens the auditory tube

SCALP: The scalp forms the covering of the cranial vault. It consists of 5 layers:

1. **S** - Skin
2. **C** – Dense connective tissue (blood vessels are wrapped in this) – which is firmly adherent to skin and aponeurosis
3. **A** - Aponeurosis of the occipitofrontalis muscle – fine but well defined fascia. In front – attachment to frontalis muscle. Back- attachment to the occipital area
4. **L** - Loose areolar tissue
5. **P** - Pericranium

The occipitofrontalis consists of two frontal bellies arising from the skin and two occipital bellies arising from the superior nuchal lines of the occipital bone, which are connected to the one another by epicranial aponeurosis. The frontal and occipital bellies receive their innervation from the temporal and postauricular branches of the facial nerve respectively

The scalp has a rich blood supply. The blood vessels anastomose freely with one another. The arteries are derived from both the internal carotid (supratrochlear and supraorbital arteries) and external carotid systems (superficial temporal, posterior auricular and occipital arteries). The blood vessels are located in the second layer of the scalp, embedded in the dense connective tissue, and when torn bleed profusely as the vessel wall does not retract and close off. Control of bleeding of scalp is best done by application of pressure bandage

The scalp is well supplied with cutaneous nerve – those in front of the ear come from the trigeminal (all 3 parts) and those behind the ear arise from the ventral and dorsal rami of cervical nerves 2 and 3

The subaponeurotic space containing loose areolar tissue permits free movement of scalp and allows large accumulations of pus or blood. This space is a closed laterally along the temporal lines, posteriorly along the highest nuchal lines and anteriorly just above the supraorbital ridges

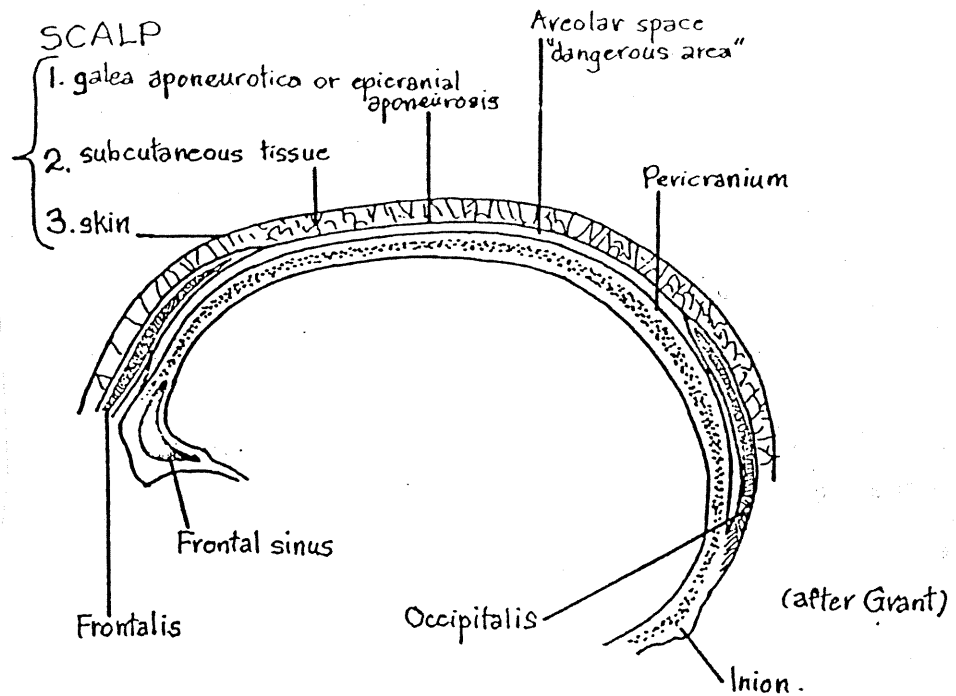


Fig. 5 - Diagram of the skull cap and its coverings on median section.

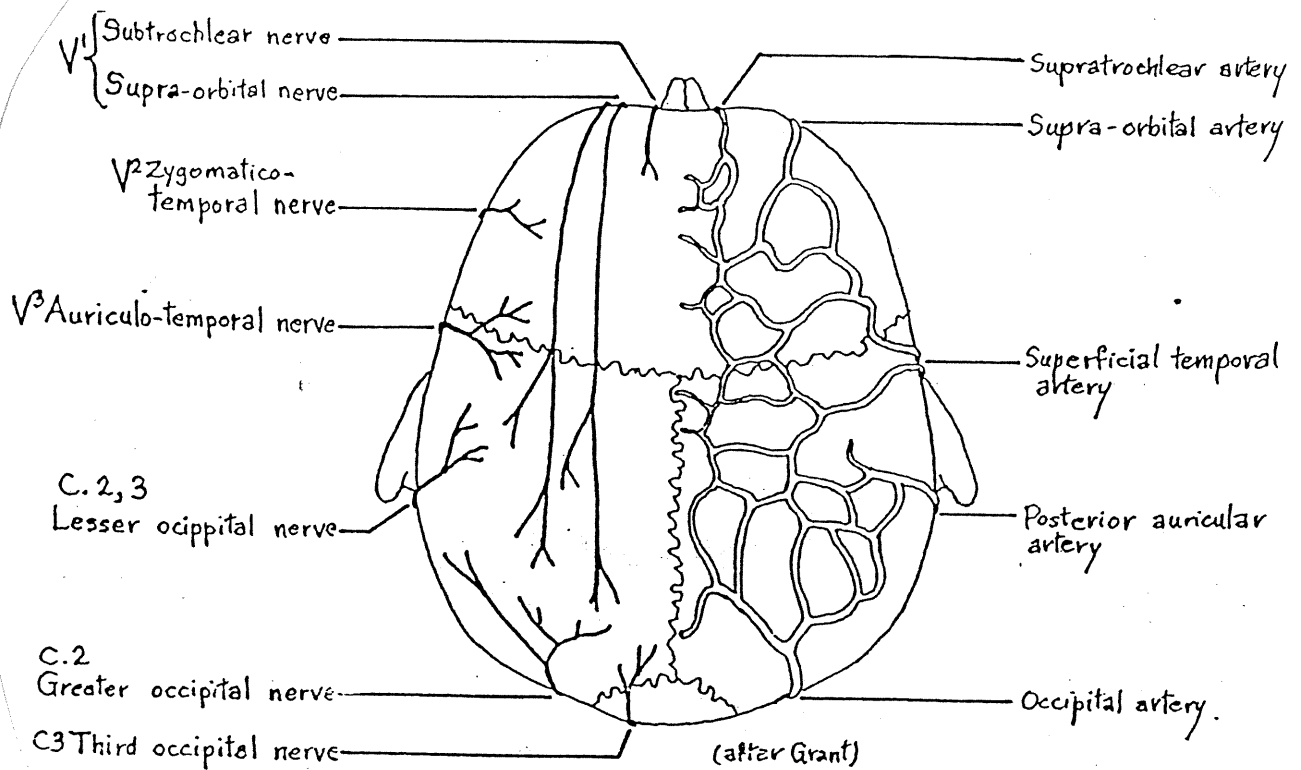


Fig. 6 - Diagram of the arteries and nerves of the scalp.

PAROTID GLAND: The parotid gland, which is the largest of the salivary glands, lies in the hollow between the sternomastoid muscle and ramus of the mandible known as the parotid space. The gland has a fascial sheath. The gland is divided into superficial and deep portions by the facial nerve. The deep portion of the gland is related to the common carotid, internal and external carotid arteries; internal jugular vein; CN's 9, 10, 11, and 12; and the styloid process with the muscles that arise from it (styloglossus, stylohyoid and stylopharyngeus). The parotid duct (Stenson's duct) runs forward over the masseter and turns inward to open into the inside of the cheek at the level of the upper 2nd molar tooth

The branches of the facial nerve are related to the superior, anterior and inferior borders of the parotid gland. In addition, the superior border is related to the superficial temporal artery and vein; the anterior border to the transverse facial vessels and parotid duct, and the inferior to the external jugular vein

Clinical Considerations:

1. The most common inflammatory condition of the parotid gland is parotitis due to mumps
2. Mixed tumors form the most common neoplasms of the salivary glands, and the parotid which is the largest of salivary glands in the site of 85-90% of the mixed tumors. Tumor may involve either the superficial or deep lobe or both lobes of parotid. Treatment consists of excision of tumor with a considerable margin of normal gland. The most important step in doing parotidectomy is identification, dissection, isolation and preservation of the facial nerve. In malignant tumors of the parotid, it may be necessary to sacrifice the facial nerve and its branches. If the lymph nodes below the parotid tumor or in the neck are involved, it may be necessary to extend the operative procedure to include a block or radical dissection of the neck

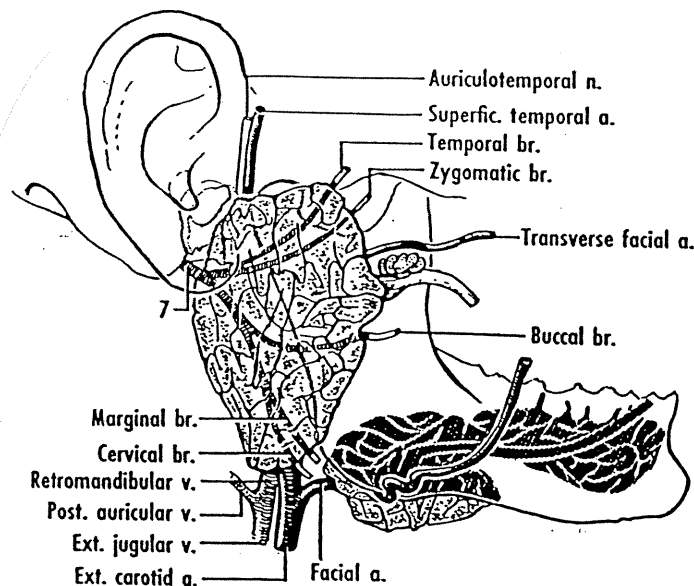


Figure 58-1 Diagram showing the location of the three main salivary glands and their ducts: parotid, submandibular, and sublingual. Note also the accessory parotid gland above the parotid duct. Although the details of the parotid plexus of nerves have not been shown, the chief branches of the facial nerve have been indicated.

The Tongue:

VASCULARIZED by the lingual, ascending pharyngeal, and tonsilar branches of the facial.

SENSORY INNERVATION by lingual nerve and Glossopharyngeal (IX), some of the root by vagus – superior laryngeal nerve. TASTE fibers travel in the Chorda tympani – anterior 1/3 rd of tongue and glossopharyngeal for posterior 2/3 rd of tongue. AUTONOMICS – parasympathetics travel in the chorda, sympathetics follow arteries. MUSCLE innervation of all except the palatoglossus is by the Hypoglossal nerve (XII); the palatoglossus is innervated by the Vagus (X)

Structure:

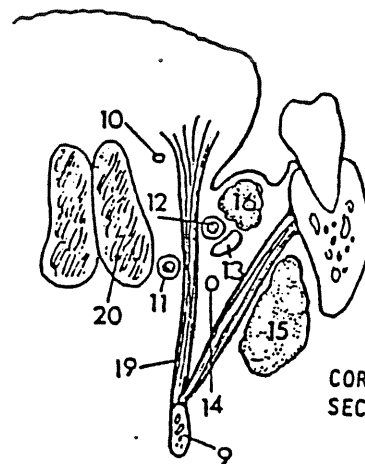
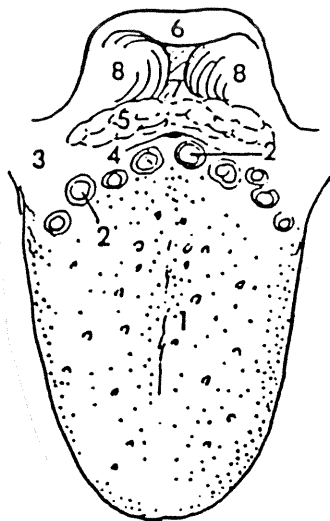
- (1) Body of the tongue
- (2) Vallate papillae
- (3) Root of the tongue – separated by (2)
- (4) Sulcus limitans – with foramen cecum in midline
- (5) Lingual tonsil
- (6) Epiglottis
- (7) Median glossoepiglottic fold
- (8) Vallecule – a recess
- (9) Hyoid bone
- (10) Glossopharyngeal nerve
- (11) Lingual artery
- (12) Lingual nerve – note attached ganglion
- (13) Submandibular duct
- (14) Hypoglossal nerve
- (15) Submandibular gland
- (16) Sublingual gland

Extrinsic Muscles:

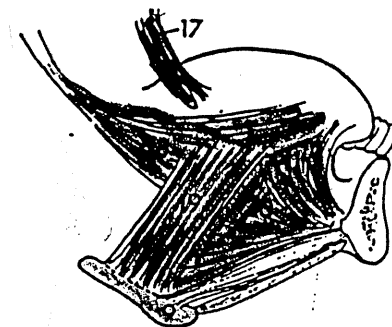
- (17) Palatoglossus
- (18) Styloglossus
- (19) Hyoglossus
- (20) Genioglossus

Intrinsic Muscles:

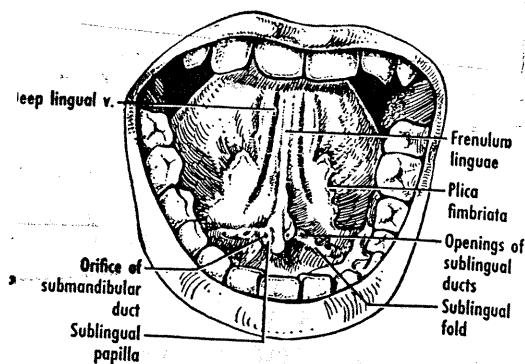
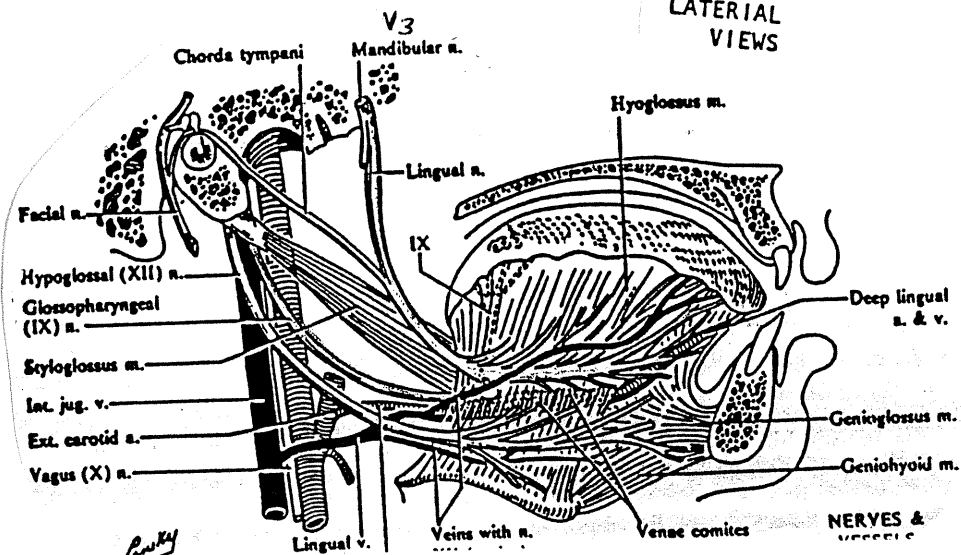
Superior longitudinal
Inferior longitudinal
Transverse



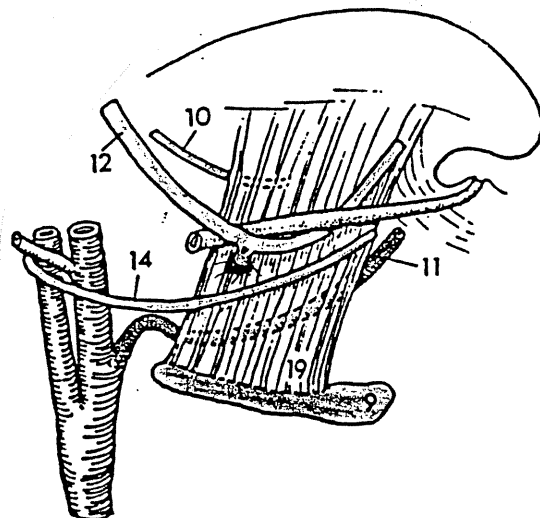
CORONAL SECTION



LATERAL VIEWS



UNDERSURFACE
RT. SIDE DISSECTED



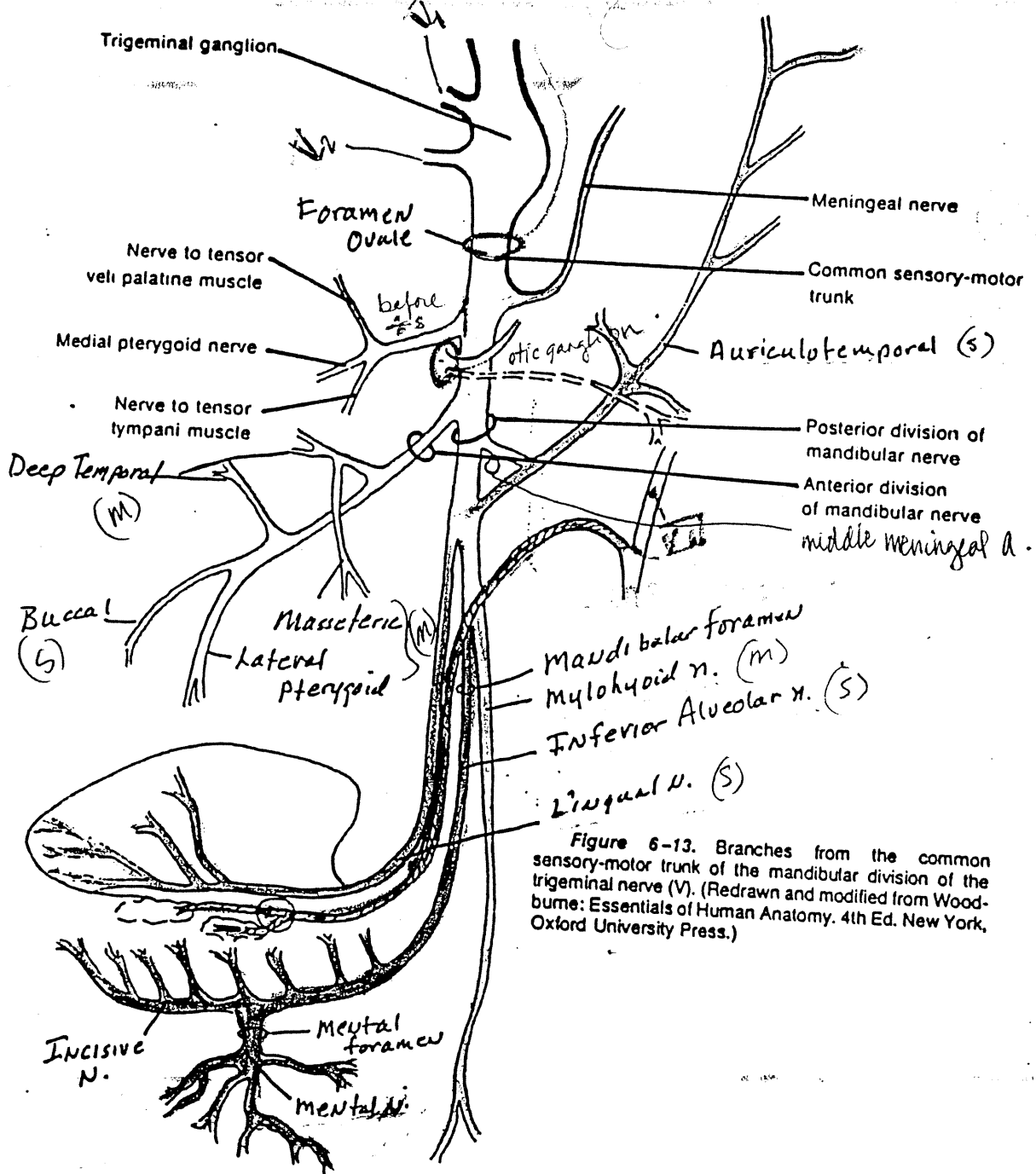
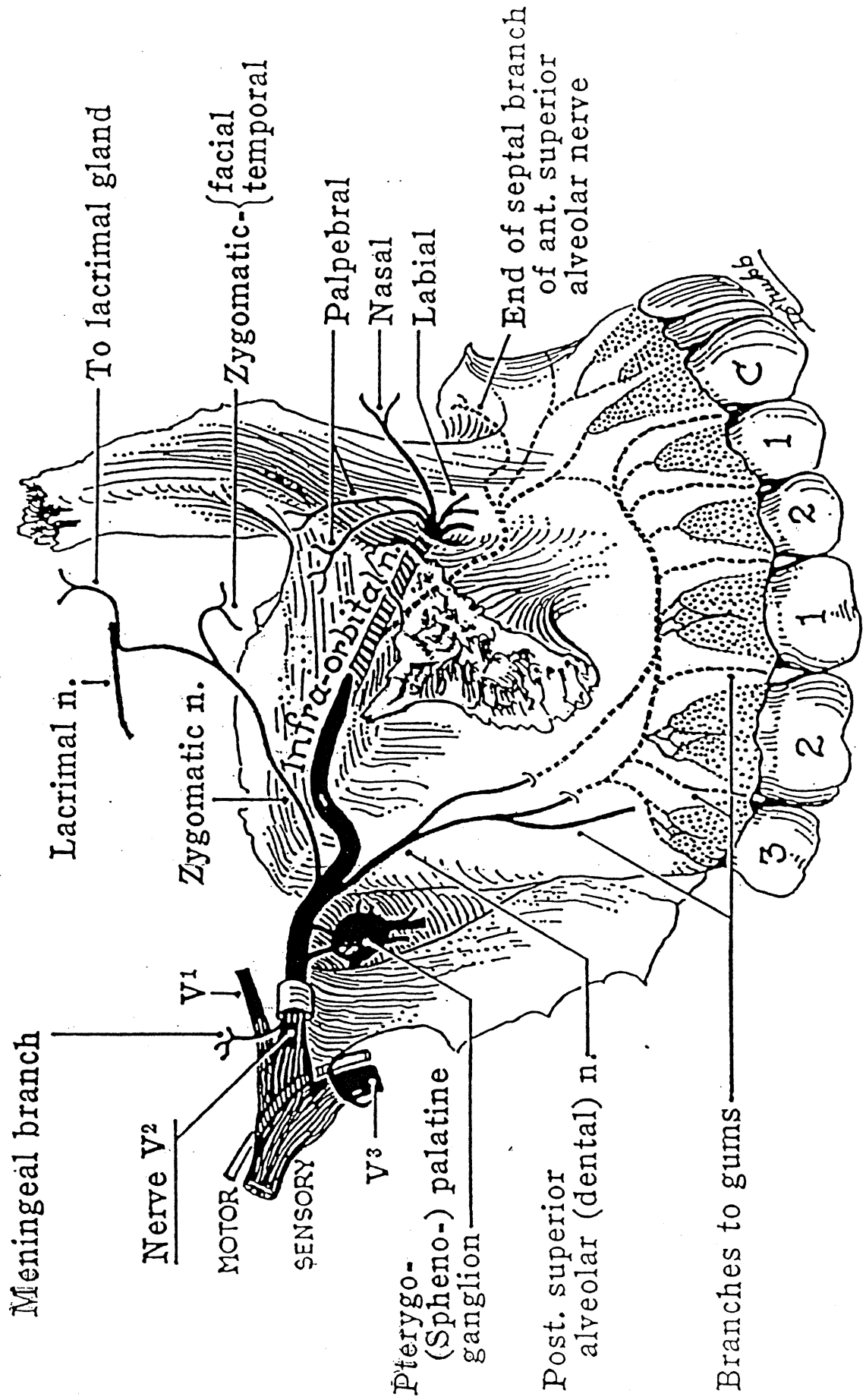


Figure 6-13. Branches from the common sensory-motor trunk of the mandibular division of the trigeminal nerve (V). (Redrawn and modified from Woodburne: Essentials of Human Anatomy, 4th Ed. New York, Oxford University Press.)



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COMPETENCIES FOR THE ORAL CAVITY

After studying the Oral Cavity, the participant should be able to:

1. Id. the locations at which the following glands usually release their secretions: the parotids, sublingual and submandibular;
2. Id. the locations at which you may visualize the palatoglossal and palatopharyngeal arches when you are examining the oropharynx;
3. Define a tongue-tie;
4. Id. the specific structures to which the tongue shows attachments;
5. Briefly describe the intrinsic mm. of the tongue with respect to their type and their arrangement;
6. Id. the mm. that are responsible for the shape of the tongue and those that are responsible for the position of the tongue;
7. Briefly describe the lymphatic drainage of the tongue from various regions of the tongue;
8. Id. the nerves that are responsible for carrying general and the special sensations from various regions of the tongue;
9. Id. the nerves that are involved in case of a person not being able to close off the ⁿasopharynx during swallowing;
10. Id. the mm. that are involved in closing or bloc^king the nasopharynx when the food is passing in the oropharynx;
11. Id. the nerves and the muscles that are involved in cases of a person not being able to: stick the tongue out, depress the tongue, retract the tongue or elevate the tongue;
12. Id. the connective-tissue membrane which is likely to be affected in case of a tooth being loose in its socket;
13. Distinguish between the anatomical crown and the clinical crown of a tooth;
14. Id. the location and the contents of the root canal;
15. Briefly discuss dental caries, gingival recession and pyorrhea;
16. Define dentine and enamel with reference to their location and consistency;
17. Id. the locations of the larger salivary glands (3 pairs);
18. Briefly discuss how an infection in the throat may spread to the middle ear, especially in case of a child;
19. Id. the locations, names and functions of the ring of lymphoid tissue found in the area of the throat;
20. Id. the components of the pharyngeal plexus of nerves;
21. Id. the nerves and mm. that are very likely to be responsible in case of person not being able to elevate the larynx and pharynx;
22. Id. the nerves that are responsible for a person not being able to wrinkle the forehead;
23. Id. the steps you will take in case of haemorrhage (bleeding) from the scalp;
24. Id. all the nerves involved in carrying sensory impulses from the various regions of the scalp; and
25. Define mumps, parotitis and the most common applications of both of these conditions.