Human Anatomy

Lecture 7

The orbital region

The Orbital Region

The orbits are a pair of bony cavities that contain the eyeballs; their associated muscles, nerves, vessels, and fat; and most of the lacrimal apparatus. The orbital opening is guarded by two thin, movable folds, the eyelids.

The Orbit

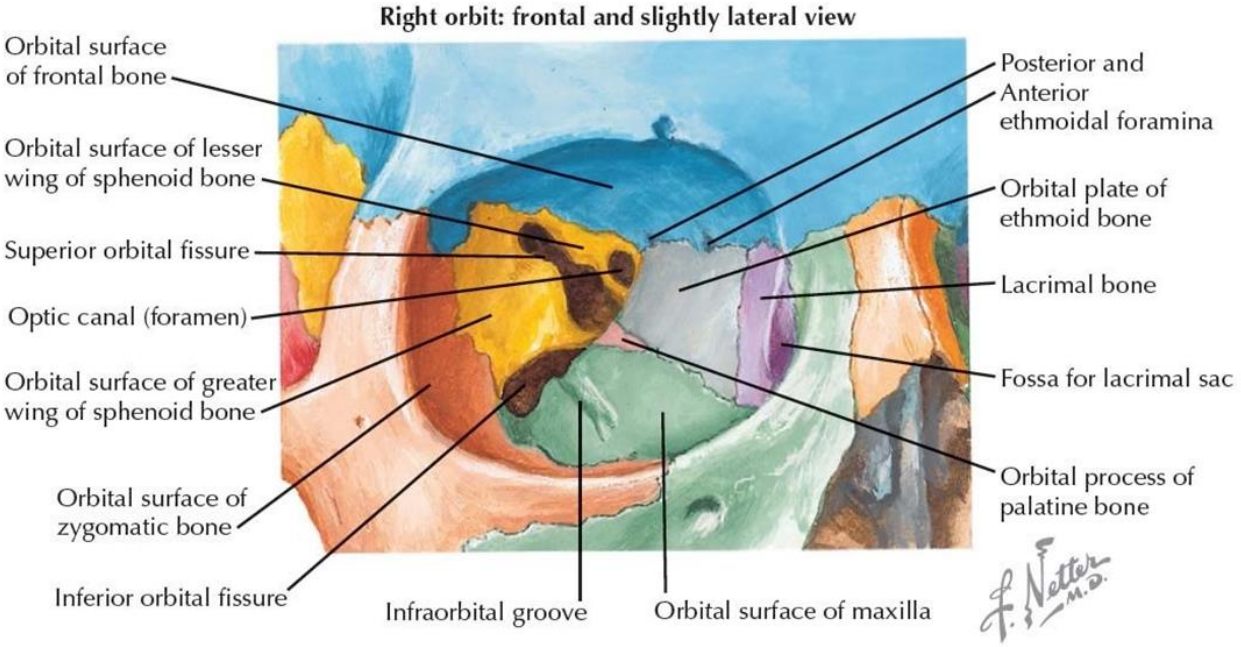
The orbit is a pyramidal cavity with its base anterior and its apex posteriorly. The **orbital margin** is formed above by the frontal bone, the lateral margin is formed by the processes of the frontal and zygomatic bones, the inferior margin is formed by the zygomatic bone and the maxilla, and the medial margin is formed by the processes of the maxilla and the frontal bone.

Roof: Formed by the orbital plate of the frontal bone; which separates the orbital cavity from the anterior cranial fossa.

Lateral wall: Formed by the zygomatic bone and the greater wing of the sphenoid

Floor: Formed by the orbital plate of the maxilla; which separates the orbital cavity from the maxillary sinus

Medial wall: Formed from front to backward by the frontal process of the maxilla, the lacrimal bone, the orbital plate of the ethmoid (which separates the orbital cavity from the ethmoid sinuses), and the body of the sphenoid



Openings into the Orbital Cavity

1. **Supraorbital notch (Foramen):** situated on the superior orbital margin. It transmits the supraorbital nerve and blood vessels.

2. **Infraorbital groove and canal:** Situated on the floor of the orbit in the orbital plate of the maxilla; they transmit the infraorbital nerve and blood vessels.

3. **Nasolacrimal canal:** Located anteriorly on the medial wall; it communicates with the inferior meatus of the nose. It transmits the nasolacrimal duct.

4. **Inferior orbital fissure:** Located posteriorly between the maxilla and the greater wing of the sphenoid; it communicates with the pterygopalatine fossa. It transmits the maxillary nerve and its Zygomatic branch, the inferior ophthalmic vein, and sympathetic nerves.

5. **Superior orbital fissure:** Located posteriorly between the greater and lesser wings of the sphenoid; it communicates with the middle cranial fossa. It transmits the lacrimal, frontal, and nasociliary branches of ophthalmic division of the trigeminal n., trochlear, oculomotor (upper and lower divisions), and abducent nerves, together with the superior ophthalmic vein.

6. **Optic canal:** Located posteriorly in the body of the sphenoid; it communicates with the middle cranial fossa. It transmits the optic nerve and the ophthalmic artery.

7. **Anterior ethmoidal foramen:** located between the frontal and ethmoidal bone and transmit the anterior ethmoidal nerve and vessels.

8. **Posterior ethmoidal foramen:** located between the frontal and ethmoidal bone and transmit the posterior ethmoidal nerve and vessels.

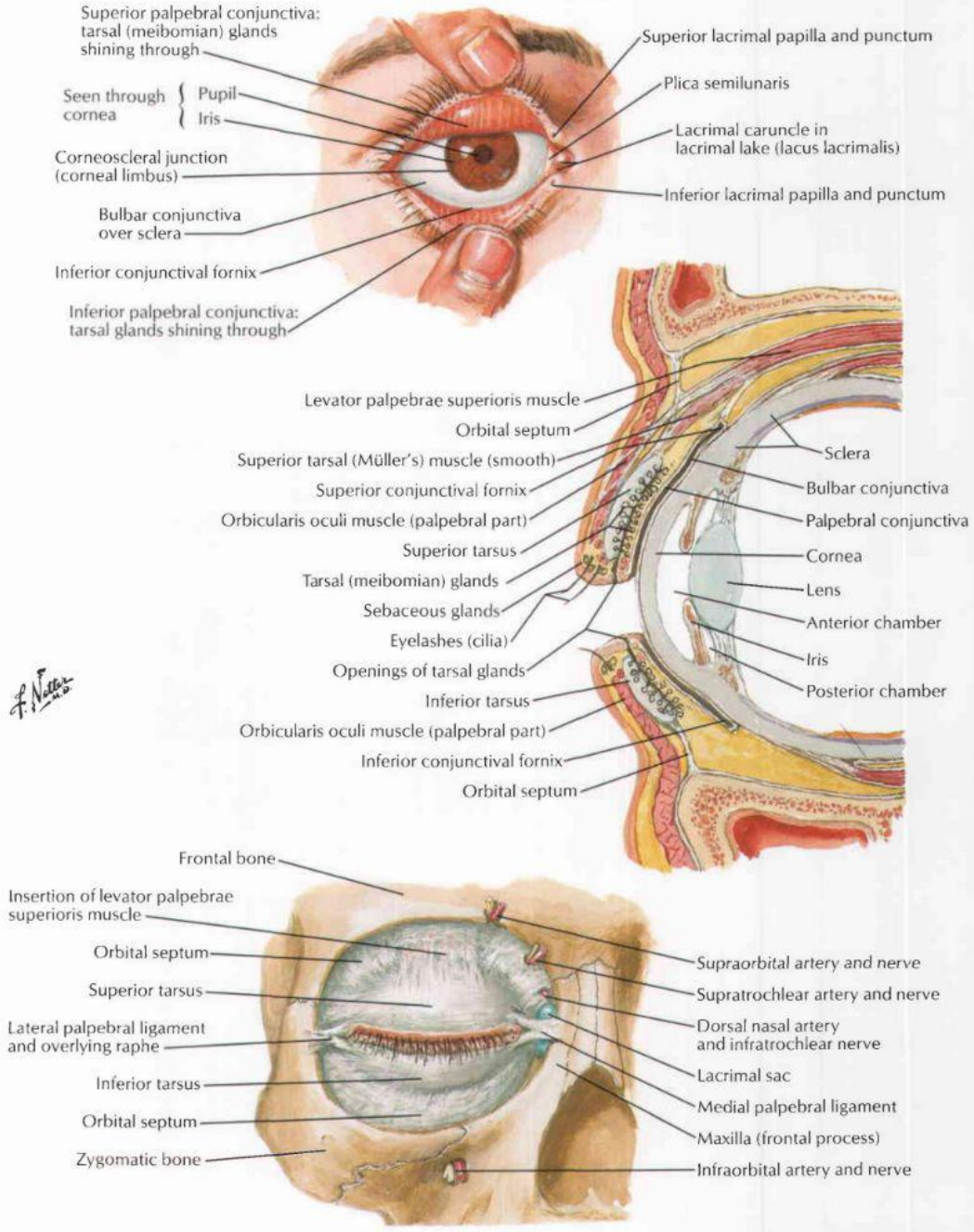
9. **Zygomatic foramen (1 or 2 openings):** located in the zygomatic bone and transmit the zygomatic branches.

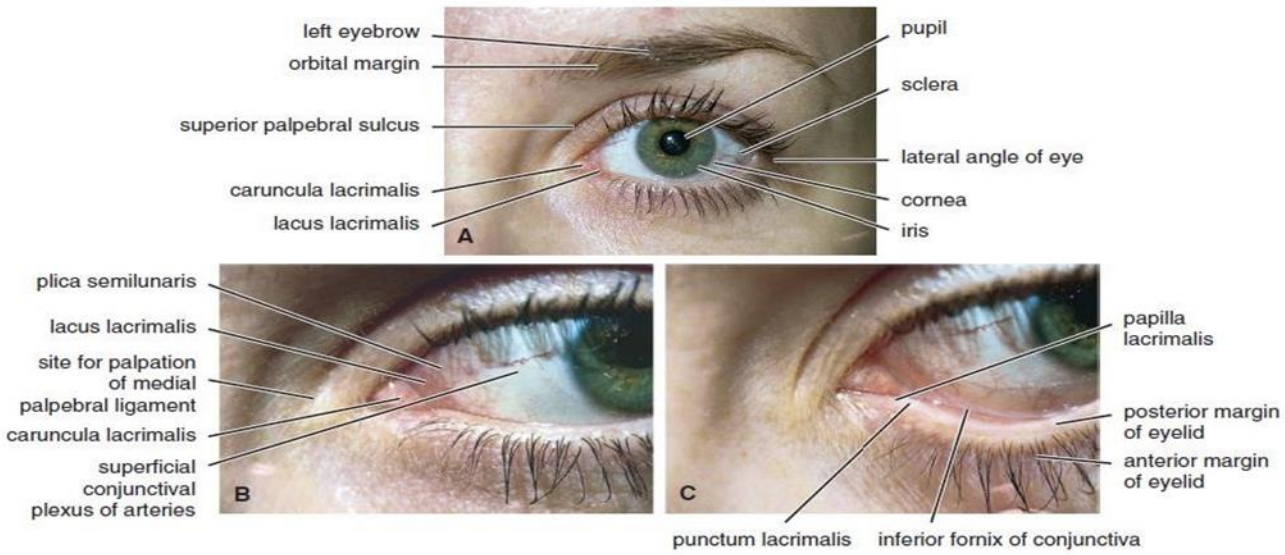
Eyelids

The eyelids protect the eye from injury and excessive light by their closure. The upper eyelid is larger and more mobile than the lower, and they meet each other at the **medial** and **lateral angles**. The **palpebral fissure** is the elliptical opening between the eyelids and is the entrance into the conjunctival sac. The superficial surface of the eyelids is covered by skin, and the deep surface is covered by a mucous membrane called the **conjunctiva.**

The **eyelashes** are short, curved hairs on the free edges of the eyelids. They are arranged in double or triple rows at the mucocutaneous junction. The **sebaceous glands** (*glands of Zeis*) open directly into the eyelash follicles. The **ciliary glands** (*glands of Moll*) are modified sweat glands that open separately between adjacent lashes. The **tarsal glands** (*Meibomian glands*) are long, modified sebaceous glands that pour their oily secretion onto the margin of the lid; their openings lie behind the eyelashes. It helps make the closed eyelids airtight. Near the medial angle of the eye a small elevation, the **papilla lacrimalis,** is present. On the summit of the papilla is a small hole, the **punctum lacrimale,** which leads into the **canaliculus lacrimalis**. The punctum and canaliculus carry tears down into the nose.

The **conjunctiva** is a thin mucous membrane that lines the eyelids and is reflected at **the superior** and **inferior fornices** onto the anterior surface of the eyeball. The conjunctiva thus forms a potential space, the **conjunctival sac,** which is open at the **palpebral fissure.** Beneath the eyelid is a groove, the **subtarsal sulcus,** which tends to trap small foreign particles introduced into the conjunctival sac and is thus clinically important. The framework of the eyelids is formed by a fibrous sheet, the **orbital septum,** which thickened at the margins of the lids to form the superior and inferior **tarsal plates.** The lateral ends of the plates are attached by the **lateral palpebral ligament** to a bony tubercle just within the orbital margin. The medial ends of the plates are attached by the **medial palpebral ligament** to the crest of the lacrimal bone.


Superior palpebral conjunctiva: tarsal (meibomian) glands shining through
Seen through cornea
Pupil
Iris
Corneoscleral junction (corneal limbus)
Bulbar conjunctiva over sclera
Inferior conjunctival fornix
Inferior palpebral conjunctiva: tarsal glands shining through
Superior lacrimal papilla and punctum
Plica semilunaris
Lacrimal caruncle in lacrimal lake (lacus lacrimalis)
Inferior lacrimal papilla and punctum
Levator palpebrae superioris muscle
Orbital septum
Superior tarsal (Müller's) muscle (smooth)
Superior conjunctival fornix
Orbicularis oculi muscle (palpebral part)
Superior tarsus
Tarsal (meibomian) glands
Sebaceous glands
Eyelashes (cilia)
Openings of tarsal glands
Inferior tarsus
Orbicularis oculi muscle (palpebral part)
Inferior conjunctival fornix
Orbital septum
Sclera
Bulbar conjunctiva
Palpebral conjunctiva
Cornea
Lens
Anterior chamber
Iris
Posterior chamber
Frontal bone
Insertion of levator palpebrae superioris muscle
Orbital septum
Superior tarsus
Lateral palpebral ligament and overlying raphe
Inferior tarsus
Orbital septum
Zygomatic bone
Supraorbital artery and nerve
Supratrochlear artery and nerve
Dorsal nasal artery and infratrochlear nerve
Lacrimal sac
Medial palpebral ligament
Maxilla (frontal process)
Infraorbital artery and nerve



Movements of the Eyelids

The eyelids are closed by the contraction of the orbicularis oculi and the relaxation of the levator palpebrae superioris muscles. The eye is opened by the levator palpebrae superioris raising the upper lid. On looking upward, the levator palpebrae superioris contracts, and the upper lid moves with the eyeball. On looking downward, both lids move, the upper lid continues to cover the upper part of the cornea, and the lower lid is pulled downward slightly by the conjunctiva, which is attached to the sclera and the lower lid.

Lacrimal Apparatus

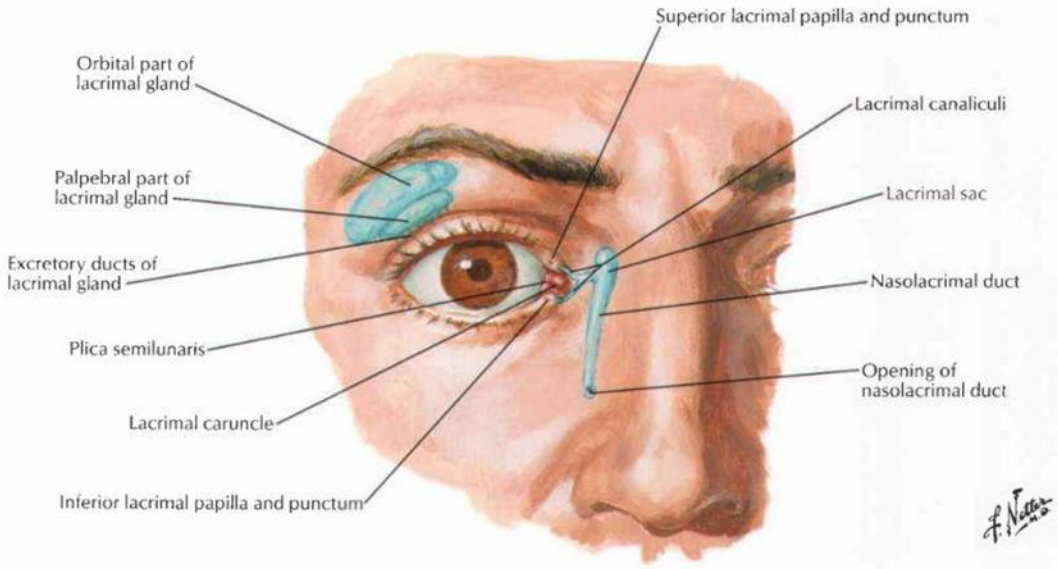
- **Lacrimal Gland**

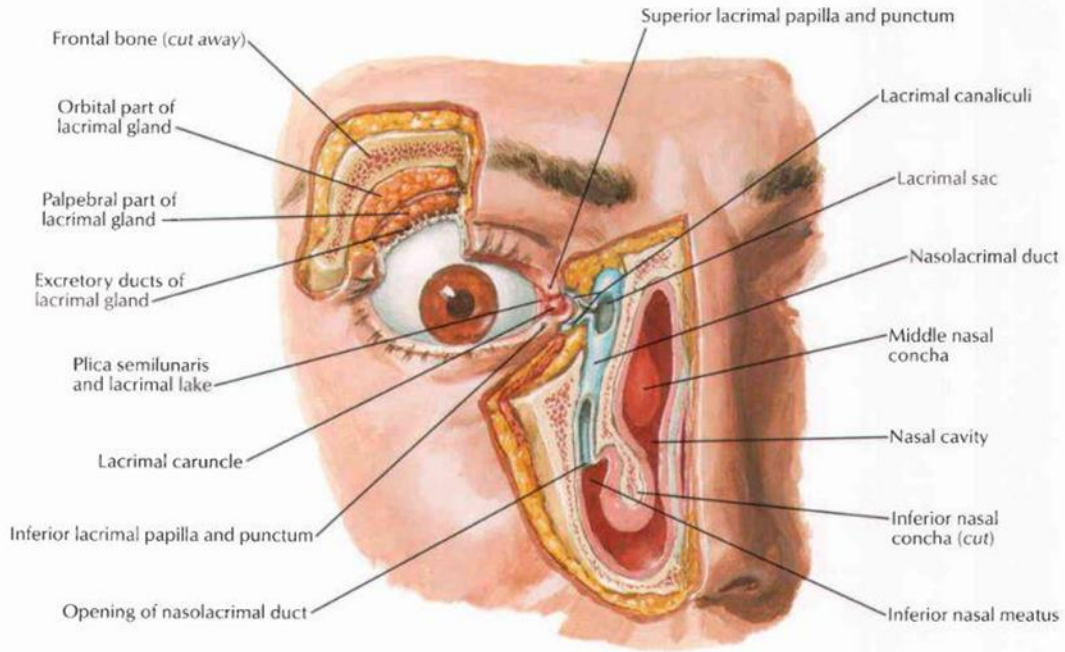
The lacrimal gland consists of a large **orbital part** and a small **palpebral part,** which are continuous with each other around the lateral edge of the aponeurosis of the levator palpebrae superioris. It is situated above the eyeball and opens by 12 ducts into the lateral part of the superior fornix of the conjunctiva. The **parasympathetic secretomotor nerve nerve fibers** are derived from the **lacrimal nucleus** of the facial nerve. The **sympathetic postganglionic nerve fibers** from the internal carotid plexus travels in (the deep petrosal nerve), both of parasympathetic and synpathatic nereve fibers are joined together to form the nerve of the pterygoid canal (the vidian nerve) which inter the ptrygopalatine ganglia, exit the ganglia by giving a branch to the maxillary nerve, to be continuous within the zygomatic and the zygomaticotemporal branches of the maxillary nerve, and finally travel through the lacrimal nerve (branch of the ophthalmic division of the trigeminal nerve) to reach the lacrimal gland.

The lacrimal nerve (a branch of the ophthalmic division of the trigeminal nerve), also provides **sensory innervation** to the lacrimal gland.

1 Lacrimal Apparatus

See also **Plates 45, 133**





1 Trigeminal Nerve (V): Schema

See also **Plates 24, 42, 43, 45, 46, 167, 168**

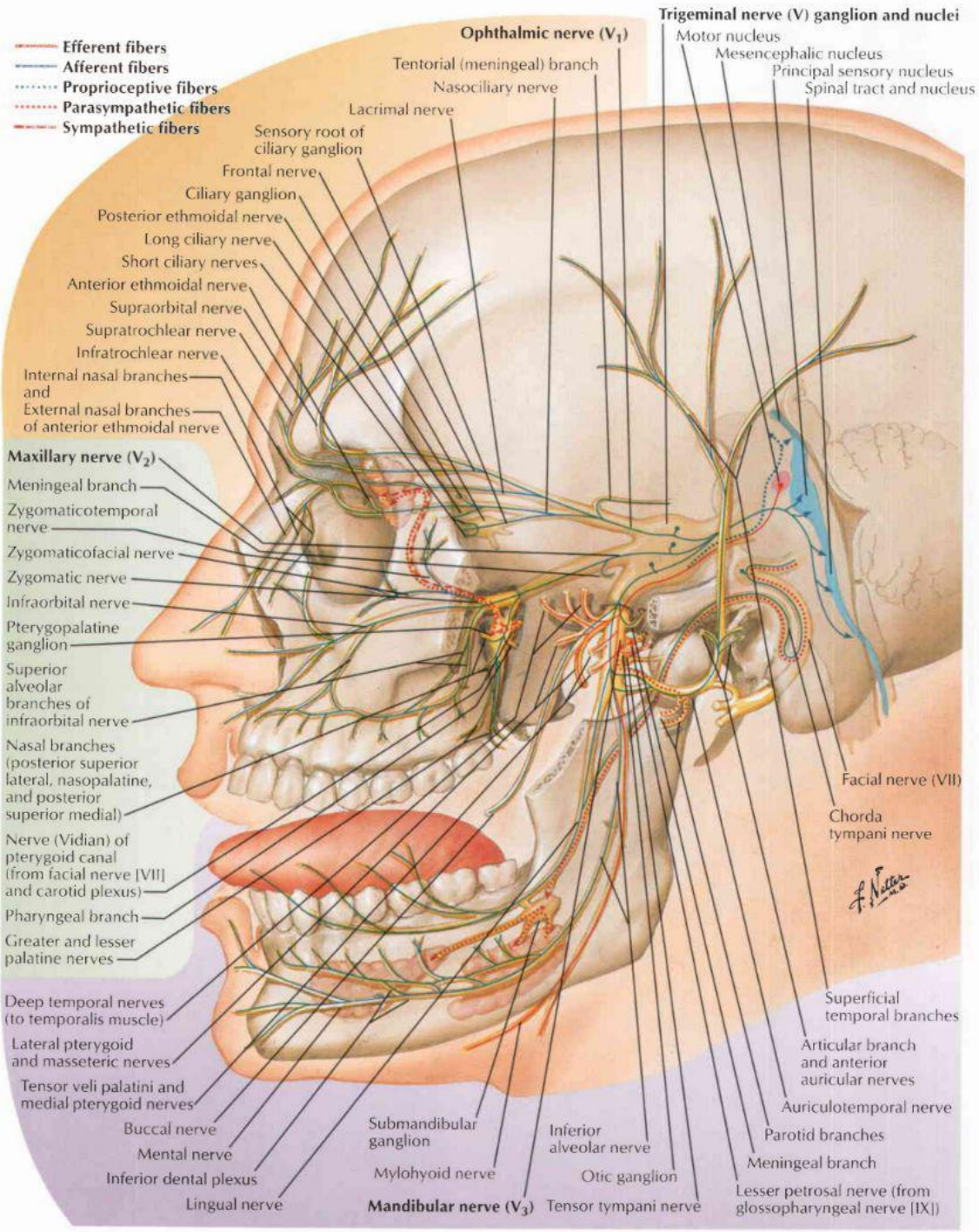


Plate 122 **Cranial and Cervical Nerves**

- **Lacrimal Ducts**

The tears circulate across the cornea and enter the **canaliculi lacrimales** through the **puncta lacrimalis.** The canaliculi lacrimales open into the **lacrimal sac**, which lies behind the medial palpebral ligament. The nasolacrimal duct emerges from the lower end of the lacrimal sac. It descends downward in a bony canal and opens into the inferior meatus of the nose. The opening is guarded by a fold of mucous membrane known as the **lacrimal fold**. This prevents air from being forced up the duct into the lacrimal sac on blowing the nose.