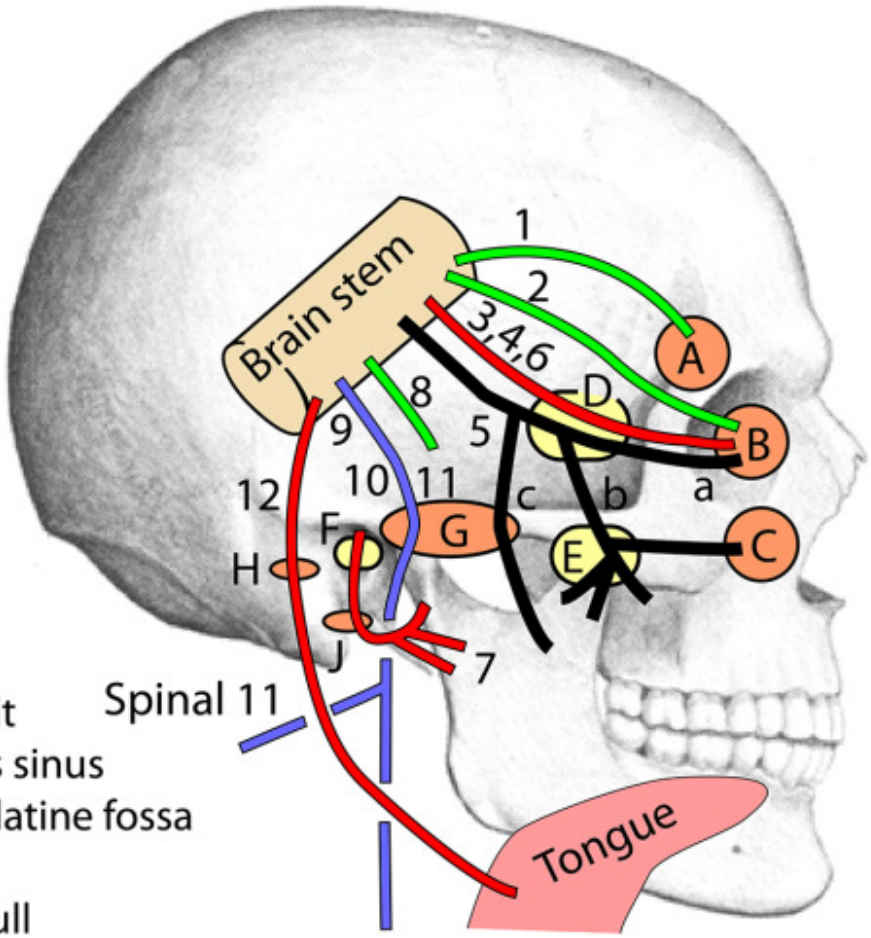
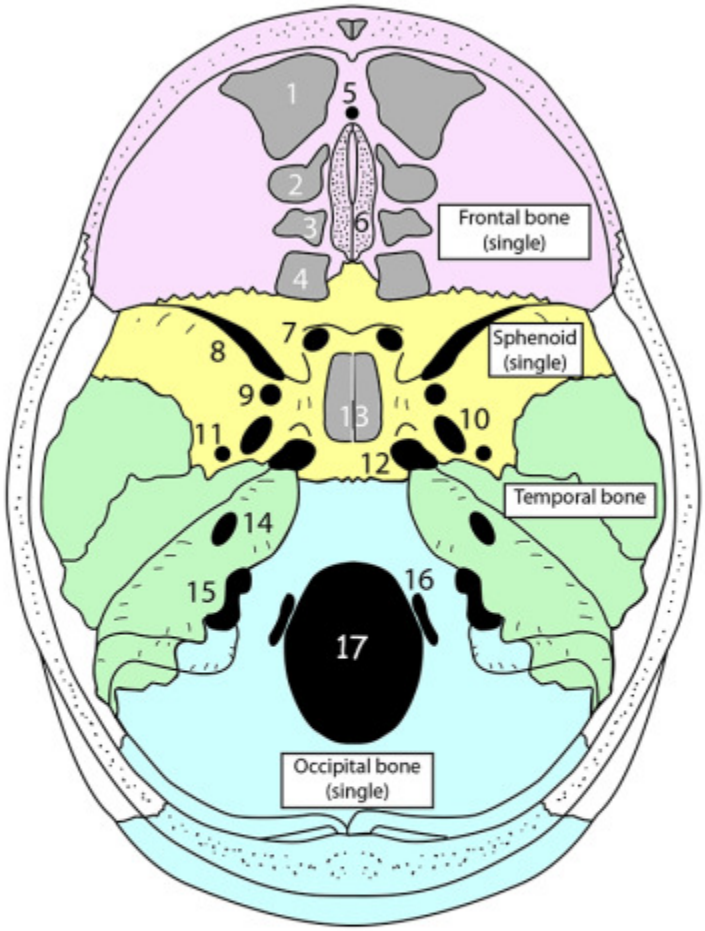
DIAGRAMATIC SUMMARY OF COURSES OF CRANIAL NERVES FROM BRAIN TO END ORGAN



A= Nose
B= Orbit
C= Lower orbit
D= Cavernous sinus
E= Pterygopalatine fossa
F= Middle ear
G= Base of skull
H= Hypoglossal canal
J= Stylomastoid foramen

The purpose of this figure is to show how some cranial nerves pass directly to their end organ (1,2,5c,8,9,10,11,12) whilst others pass through well defined cavities such as the cavernous sinus (3,4,5a,5b,6) or the pterygopalatine fossa (5b). For purposes of remembering the likely exit from the skull of cranial nerves, they can be grouped into those that pass to the nose (1), to the orbit (2,3,4,5a,6), to the front of the face (5b) and through the base of the skull (5c,7,9,10,11,12)

INTERNAL VIEW OF BASE OF SKULL TO SHOW SINUSES AND FORAMINA



FORAMINA AND AIR SINUSES

1 Frontal air sinuses
2 Anterior ethmoidal air sinuses
3 Middle ethmoidal air sinuses
4 Posterior ethmoidal air sinuses
5 Foramen caecum (single midline)
6 Cribriform plate of ethmoid
7 Optic canal
8 Superior orbital fissure
9 Foramen rotundum
10 Foramen ovale
11 Foramen spinosum
12 Foramen lacerum
13 Sphenoid air sinuses
14 Internal acoustic (auditory) meatus
15 Jugular foramen
16 Hypoglossal canal
17 Foramen magnum (single midline)

CRANIAL NERVES THAT SUPPLY SOMATIC FIBRES TO SKELETAL MUSCLES

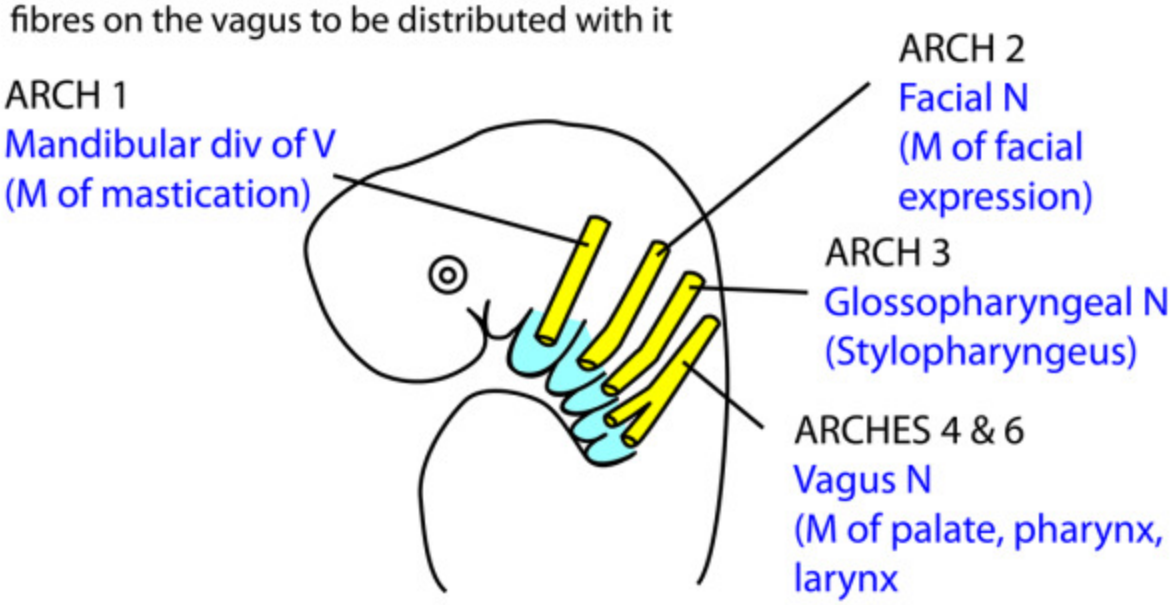
III	Nucleus: Oculomotor	
		Recti (sup, med, inf), inferior oblique, levator palpebrae superioris
IV	Nucleus: Trochlear	
		Superior oblique
VI	Nucleus: Abducent	
		Lateral rectus
XI	Nucleus: Lateral spinal roots C1-5	
		Sternocleidomastoid & trapezius
XII	Nucleus: Hypoglossal	
		Muscls of tongue except palatoglossus

Cranial nerves III, IV, VI, XI & XII carry somatic nerve fibres to head & neck muscles that have NOT originated from branchial arches

CRANIAL NERVES WITH MOTOR SUPPLY TO MUSCLES OF BRANCHIAL ORIGIN

	BRANCHIOMOTOR (MUSCLES OF BRANCHIAL ORIGIN)
V	**Nucleus:** Motor of trigeminal M of mastication, mylohyoid, ant digastric, tensors palati & tympani
VII	**Nucleus:** Facial M of facial expression, buccinator, post digastric, stylohyoid, stapedius, occipitalis
IX	**Nucleus:** Ambiguus Stylopharyngeus
X	**Nucleus:** Ambiguus M of pharynx, upper oesophagus, palate, larynx (from cranial XI)
XI	**Nucleus:** Ambiguus M of palate & pharynx via vagus

Cranial nerves V, VII, IX, X are the nerves to the branchial (pharyngeal) arches 1, 2, 3, 4/6 respectively. In addition the cranial part of XI dumps its fibres on the vagus to be distributed with it



CRANIAL NERVES THAT CARRY PARASYMPATHETIC FIBRES

III Nucleus: Edinger - Westphal
Ganglion: Ciliary
Ciliary body & muscle
Sphincter pupillae

VII Nucleus: Superior salivary
Ganglia: Pterygopalatine & submandibular
Lacrimal, submandibular, sublingual & palatine glands

IX Nucleus: Inferior salivary
Ganglion: Otic
Parotid, glands in posterior third of tongue & oropharynx

X Nucleus: Dorsal motor of vagus
Cardiac & visceral muscle in thorax & abdomen

Cranial nerves III, VII, IX & X all carry parasympathetic fibres from the various central parasympathetic nuclei and they take these fibres to their respective parasympathetic ganglia where they synapse and then are distributed via a branch of the trigeminal nerve to the end organ

CRANIAL NERVES CARRYING GENERAL AND SPECIAL SENSORY FIBRES

	GENERAL VISCERAL SENSORY	SPECIAL VISCERAL SENSORY
VII		Nucleus: Solitarius Chorda tympani Taste: Ant 2/3 tongue
IX		Nucleus: Solitarius Taste: Post 1/3 tongue, vallate papillae, oropharynx, baro-, chemoreceptors
X	Nucleus: Solitarius or dorsal sensory of vagus From heart, lungs & abdominal viscera	Nucleus: Solitarius Taste: Vallecula & epiglottis, baro-, chemoreceptors
NB	From heart, lungs & gut	Taste & baroreception

Note that in the case of the vagus the sensation travels with this parasympathetic nerve but the fibres are really general visceral sensory and not parasympathetic.
Special visceral sensory comprises taste and baroreception

CRANIAL NERVES THAT CARRY SOMATIC SENSORY FIBRES

V Nucleus: Sensory of trigeminal
Mesencephalic: Proprioception
Main: Touch
Spinal: Pain & temperature
For trigeminal supplying face, orbit, tongue

VII Nucleus: Sensory of trigeminal
Some skin of external auditory meatus & tympanic membrane

IX Nucleus: Sensory of trigeminal
Posterior 1/3 of tongue, palate, pharynx tonsil, middle ear

X Nucleus: Sensory of trigeminal
Skin of posterior/inferior auricle, external auditory meatus, pharynx, larynx

NB Cell bodies are all outside the central nervous system except for mesencaphalic nucleus where they are inside

Thus, the trigeminal nerve is the main sensory nerve for the head. Note that whichever nerve carries the sensation, the fibres eventually reach the sensory nucleus of the trigeminal nerve. Note also that the facial nerve (VII) is essentially a motor nerve even though it does have a small sensory component

CRANIAL NERVES FOR SPECIAL SENSES

I Smell
Limbic system

II Sight
Lateral geniculate body

VIII Hearing
2 nuclei
Equilibrium
4 nuclei

CRANIAL NERVE NUCLEI IN BRAIN STEM