

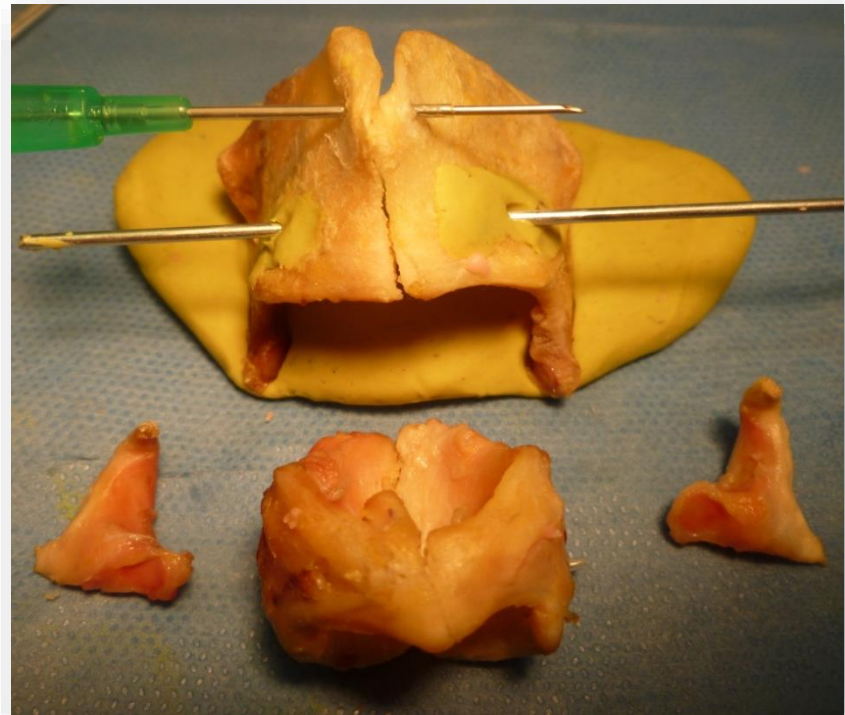
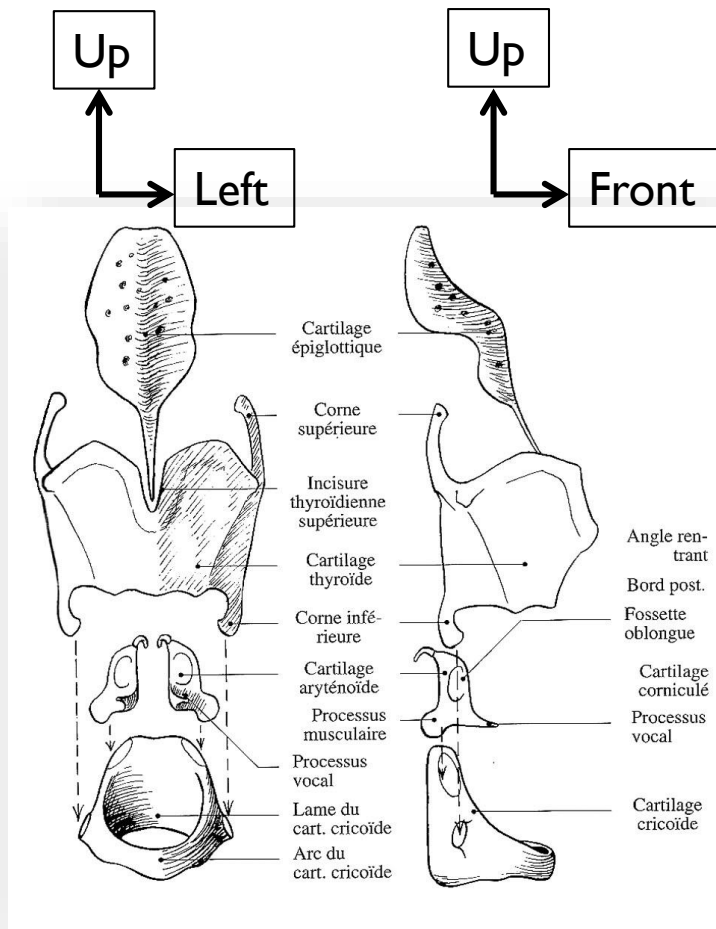
# Anatomical bases of laryngeal motricity

Aude Lagier

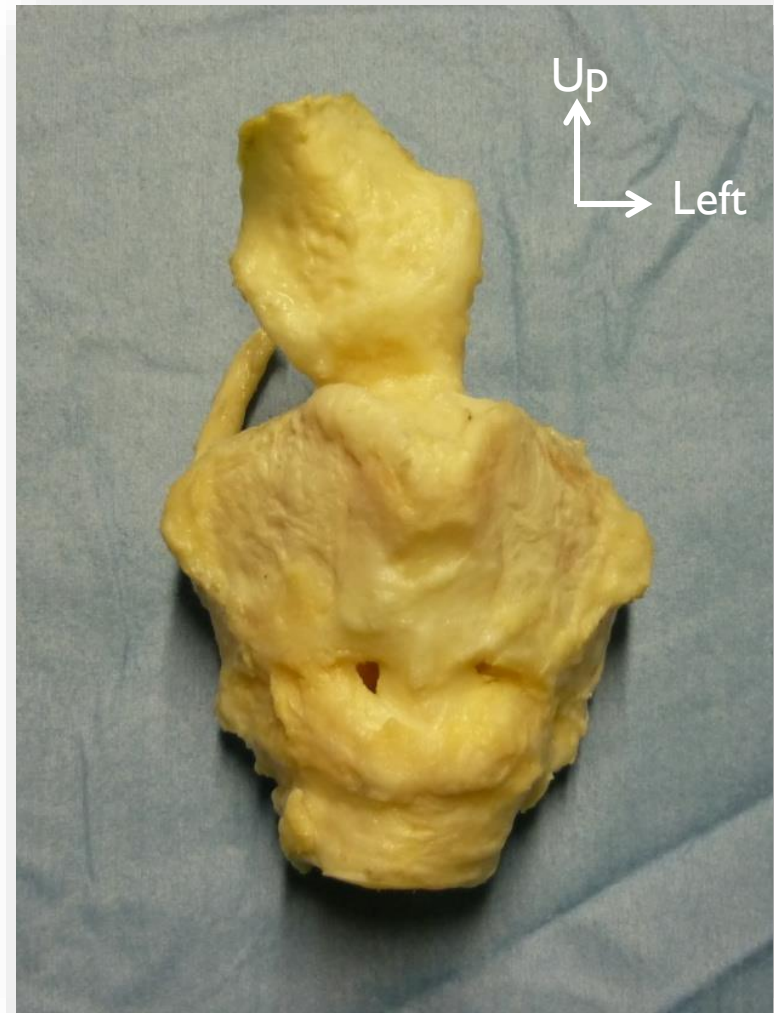
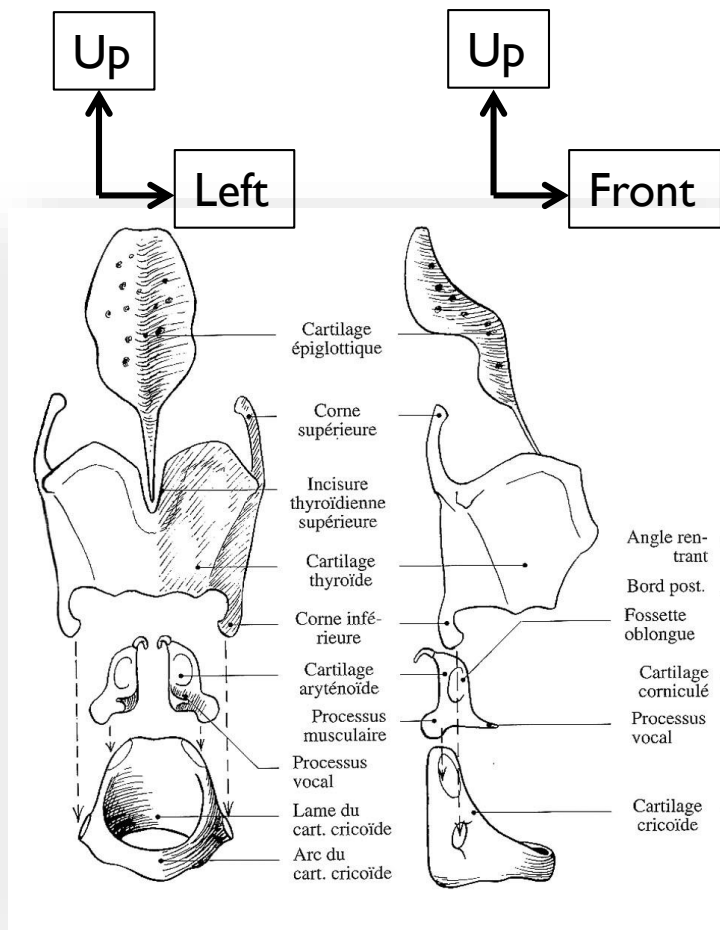
[Aude.lagier@chuliege.be](mailto:Aude.lagier@chuliege.be)

# Cartilages and joints

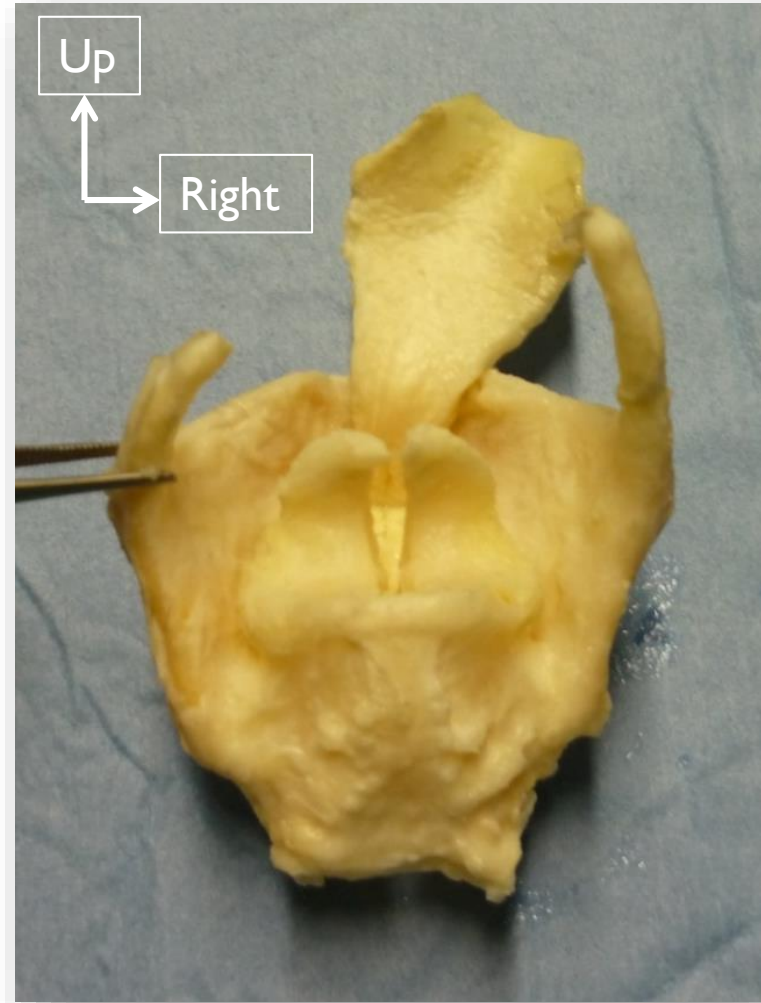
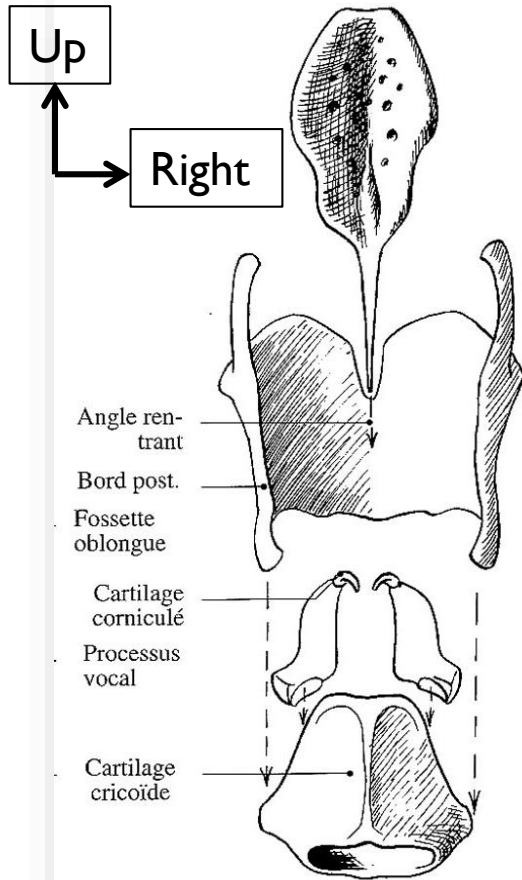
# Cartilages and joints of the larynx

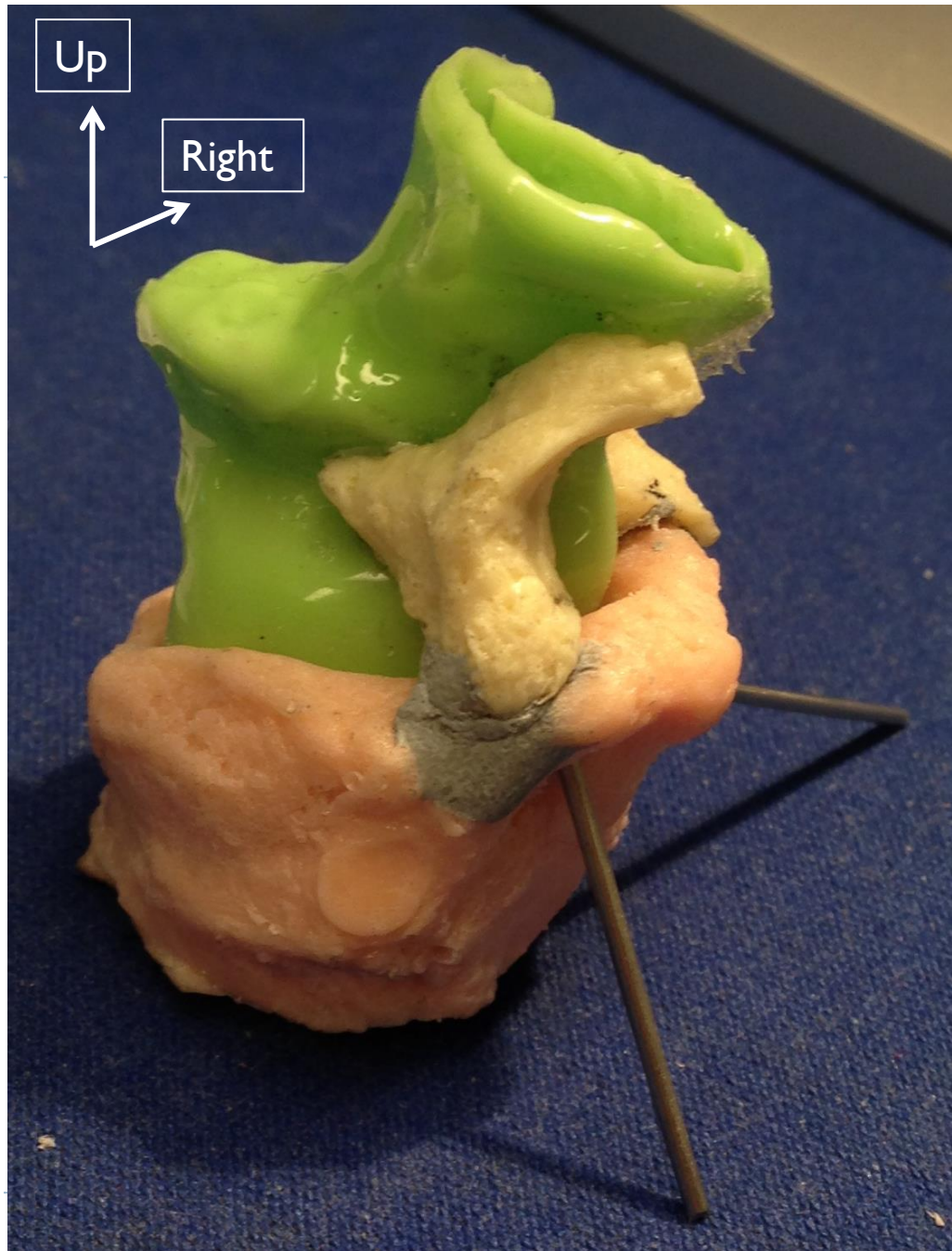


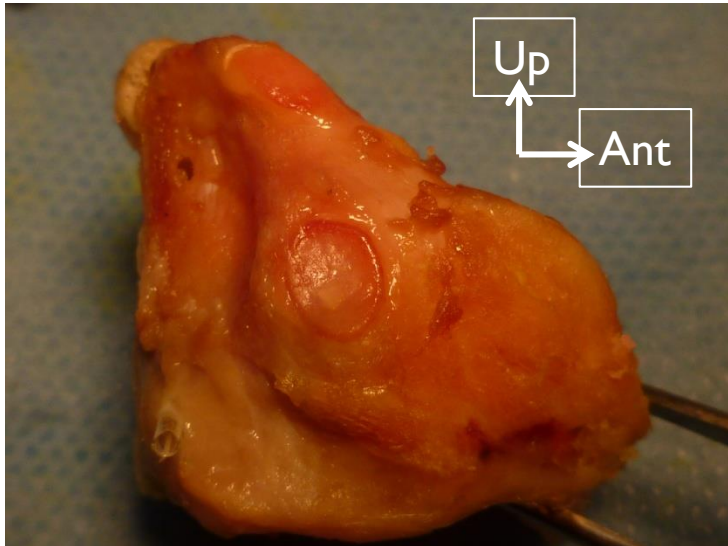
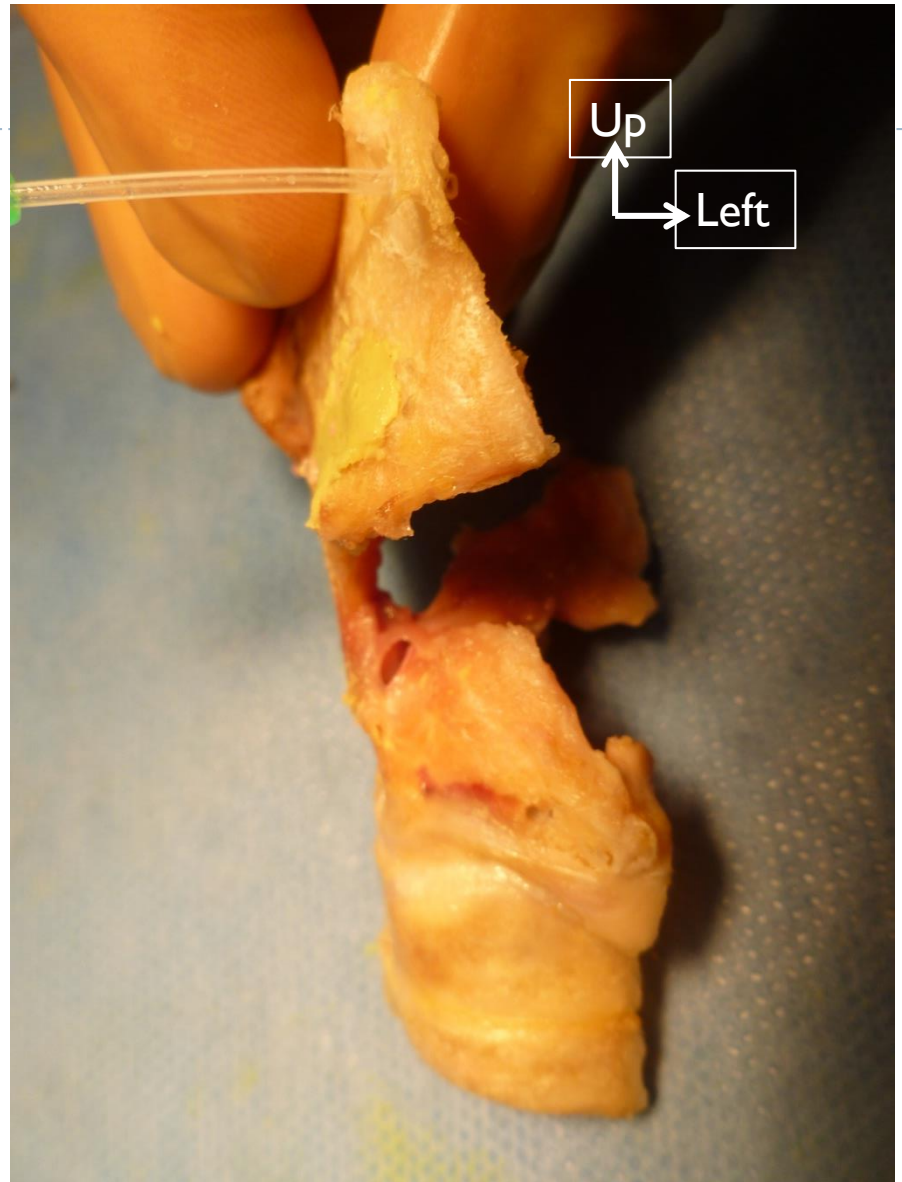
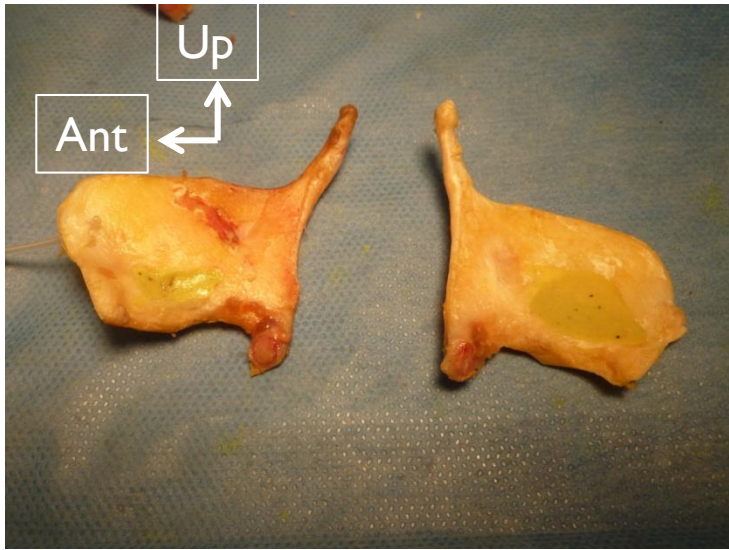
# Cartilages and joints of the larynx



# Cartilages and joints of the larynx

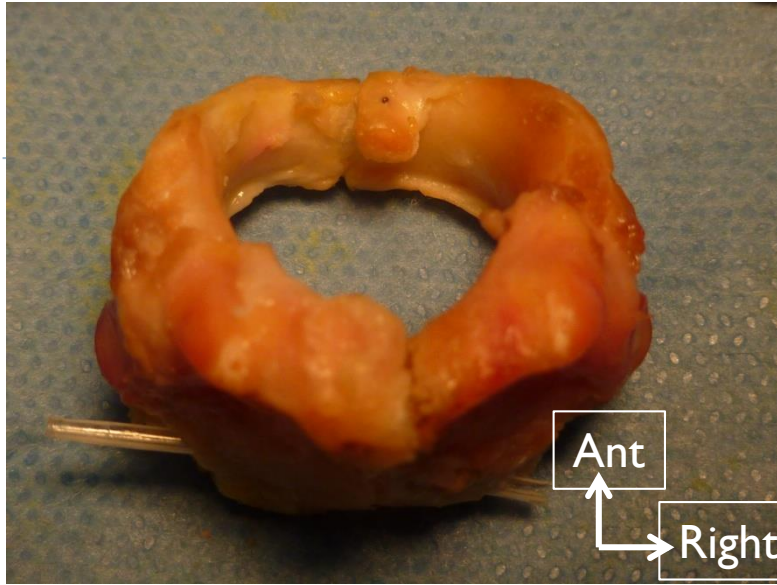




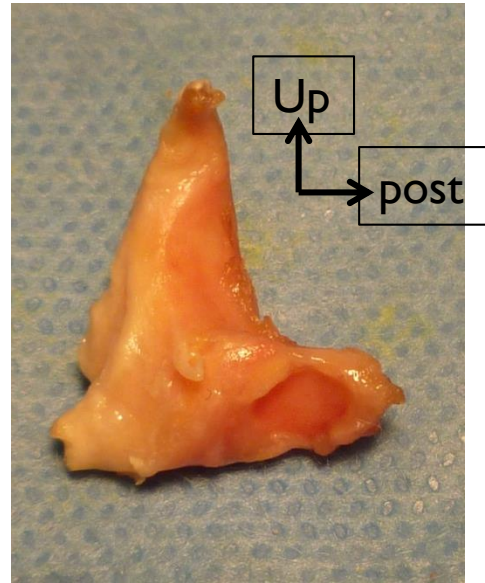
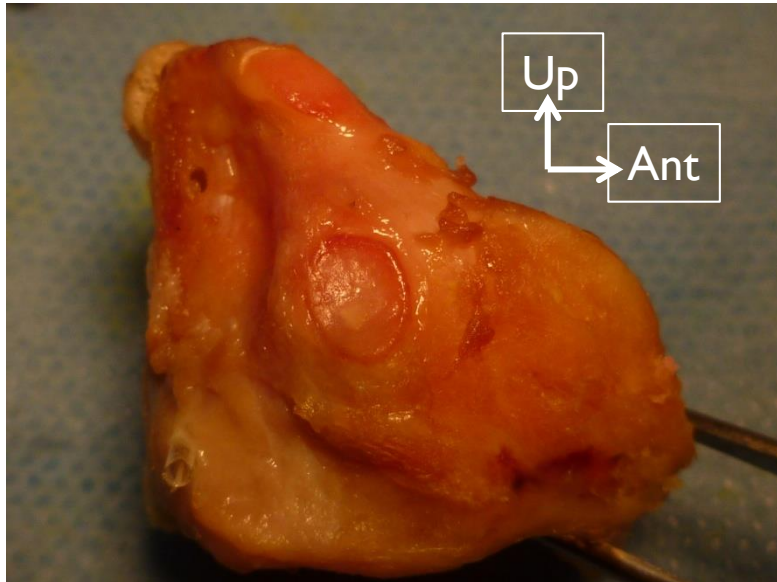
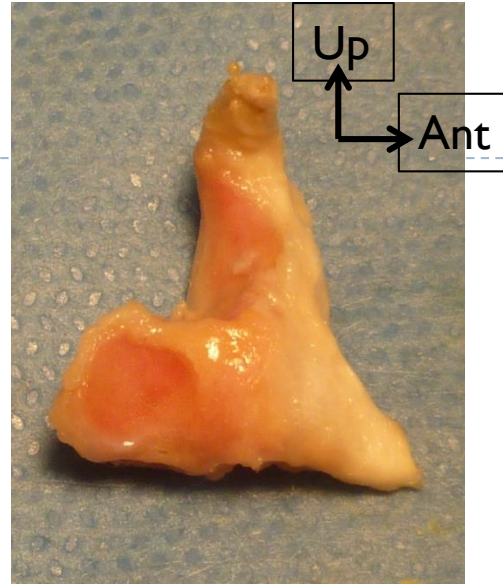








Left Arytenoid



Cricoid

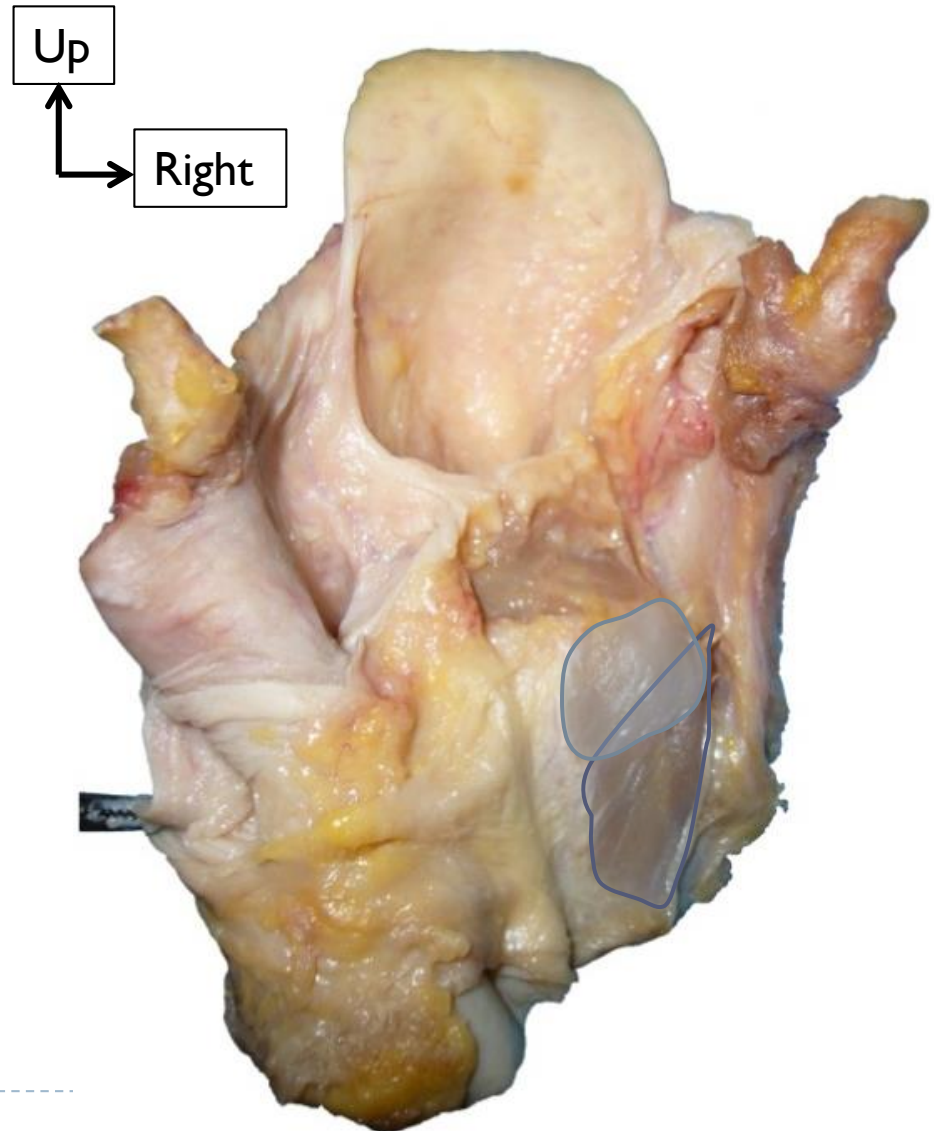
Right Arytenoid

# Intrinsic laryngeal muscles

# Posterior Crico-Arytenoid Muscle (PCA)

---

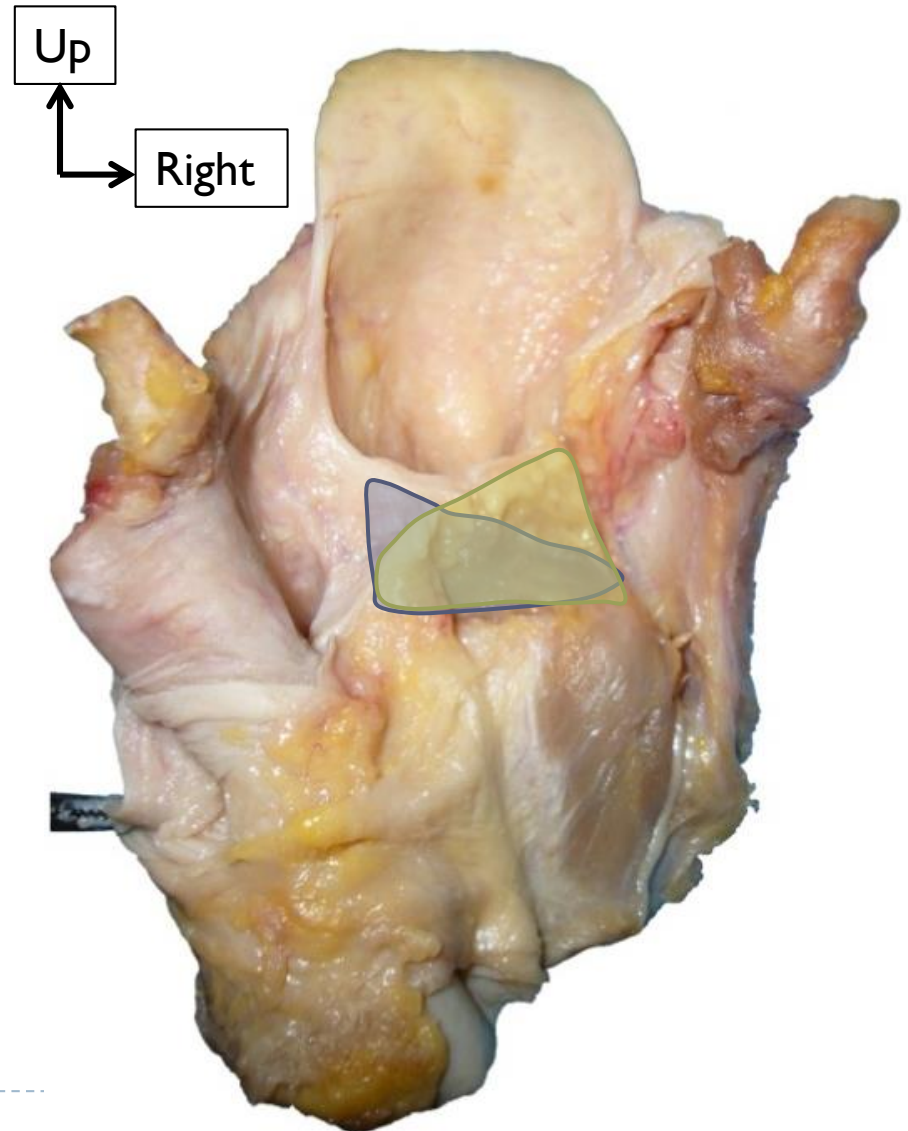
- ▶ Abduction of the vocal folds
  - ▶ Breathing muscle



# Inter-Arytenoid Muscle (IA)

---

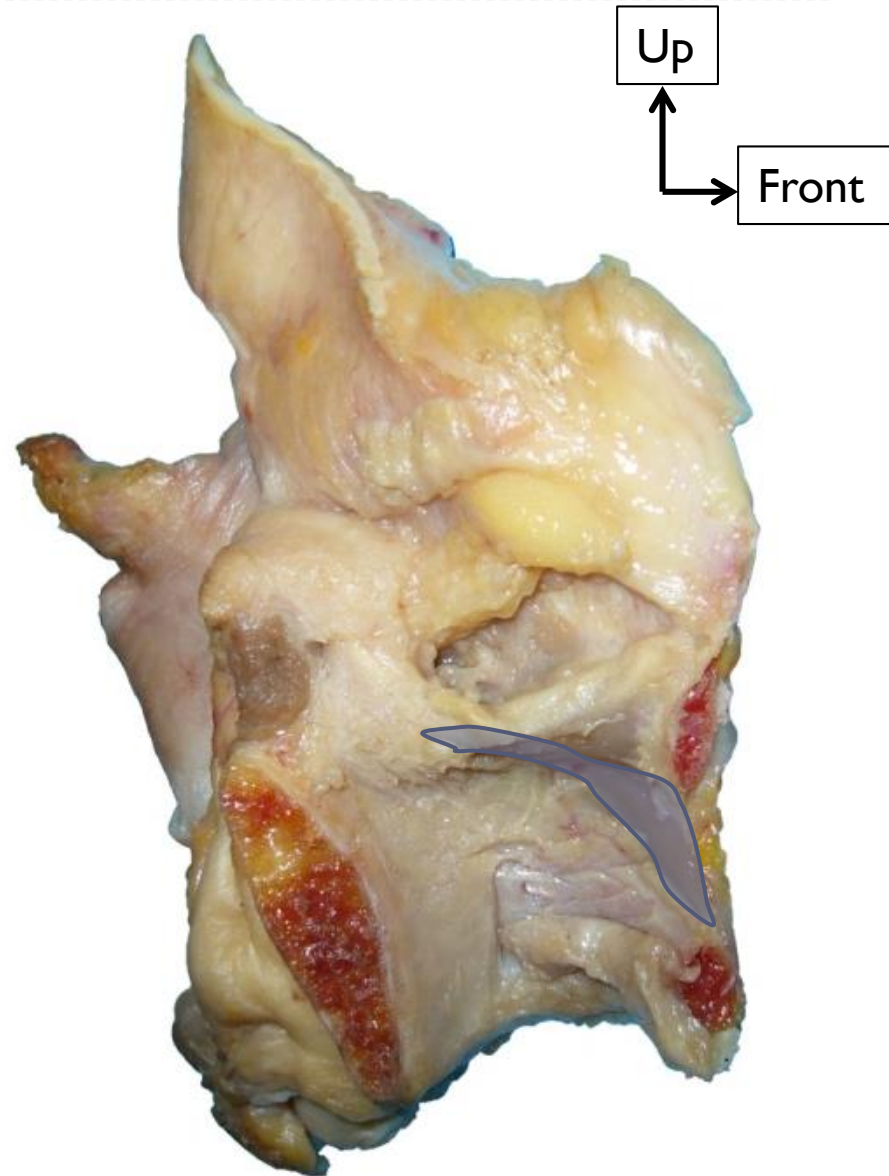
- ▶ Adduction of the arytenoids



# Lateral Crico-Arytenoid Muscle

---

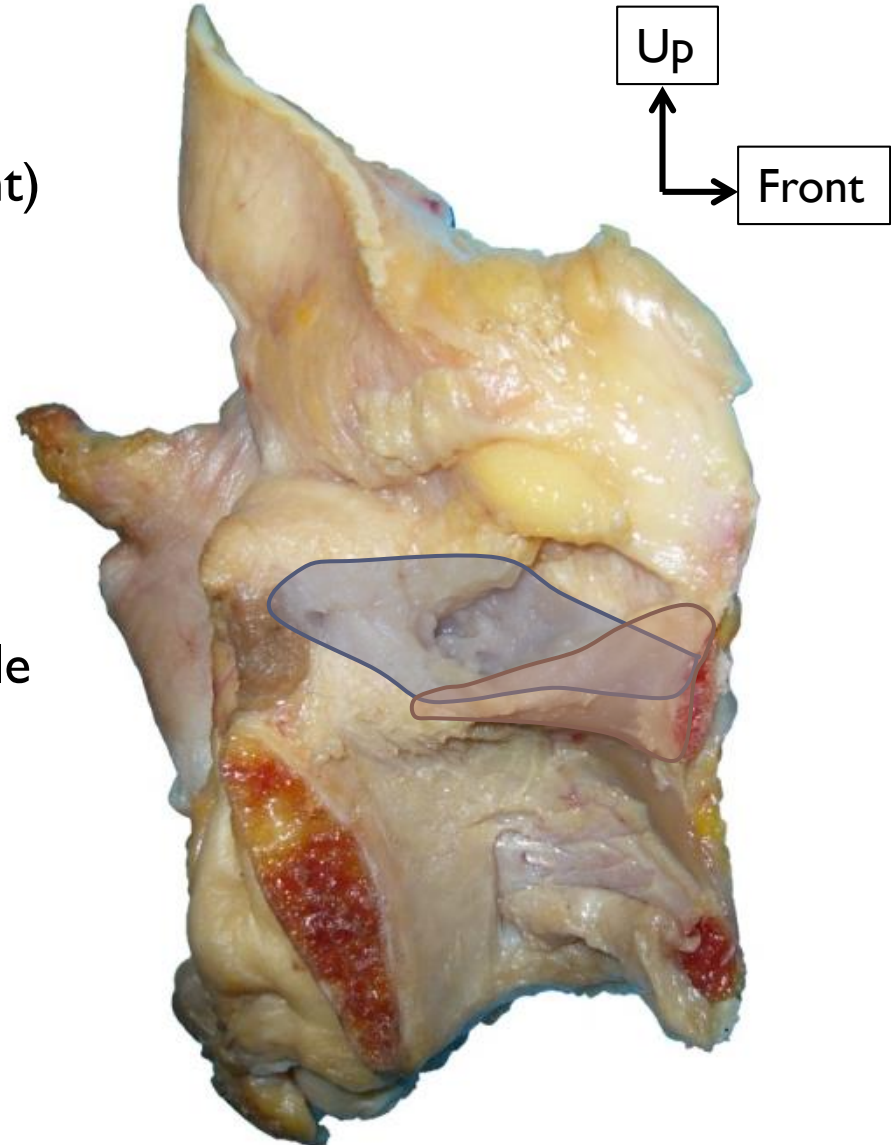
- ▶ Adduction of the vocal process of the arytenoids
- ▶ Sharpening of the vocal fold edge



# Thyro-Arytenoid Muscle

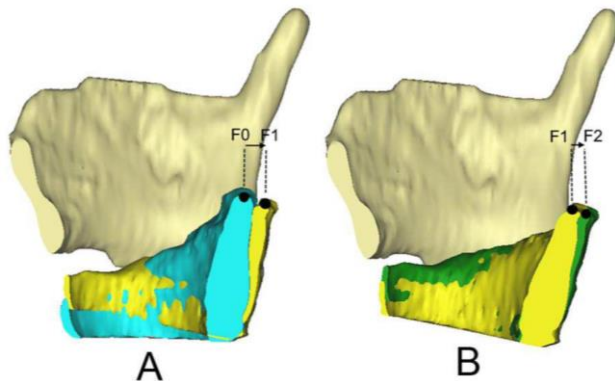
---

- ▶ Adduction of the vocal folds
  - ▶ (Action on the crico-arytenoid joint)
  - ▶ Action on the membranous part
  
- ▶ Shortening of the vocal folds
  - ▶ Rigidity of the vocal folds with co-contraction of crico-thyroid muscle

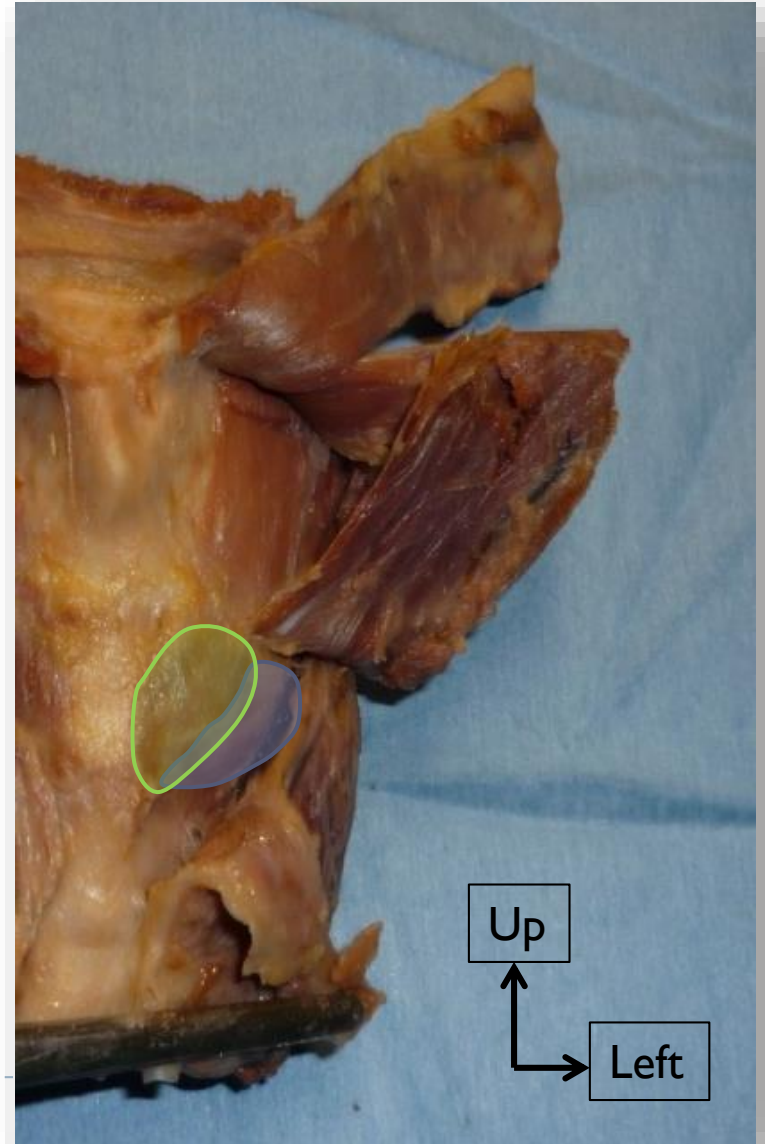


# Crico-Thyroid Muscle

- ▶ Crico-thyroid tilt
  - ▶ Backward rotation of the cricoid in relation to the thyroid

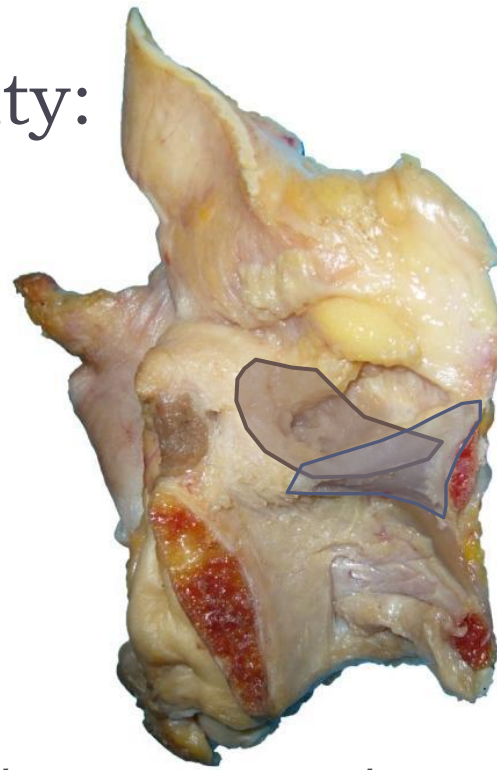


- ▶ Lengthening/tension of the vocal folds
- ▶ Adduction of the membranous part of the vocal folds



# Intrinsic muscles activity: EMG studies

---



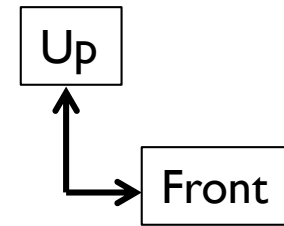
- ▶ Speaking voice:
  - ▶ Activation of the LCA at the phonation onset, then only TA activity
- ▶ Singing voice:
  - ▶ EMG of CT and TA in chest register, mix chest register, mix head register, head register
    - ▶ CT activity linked to the frequency (>register)
    - ▶ TA activity increases from head to chest register (>lowering frequency)



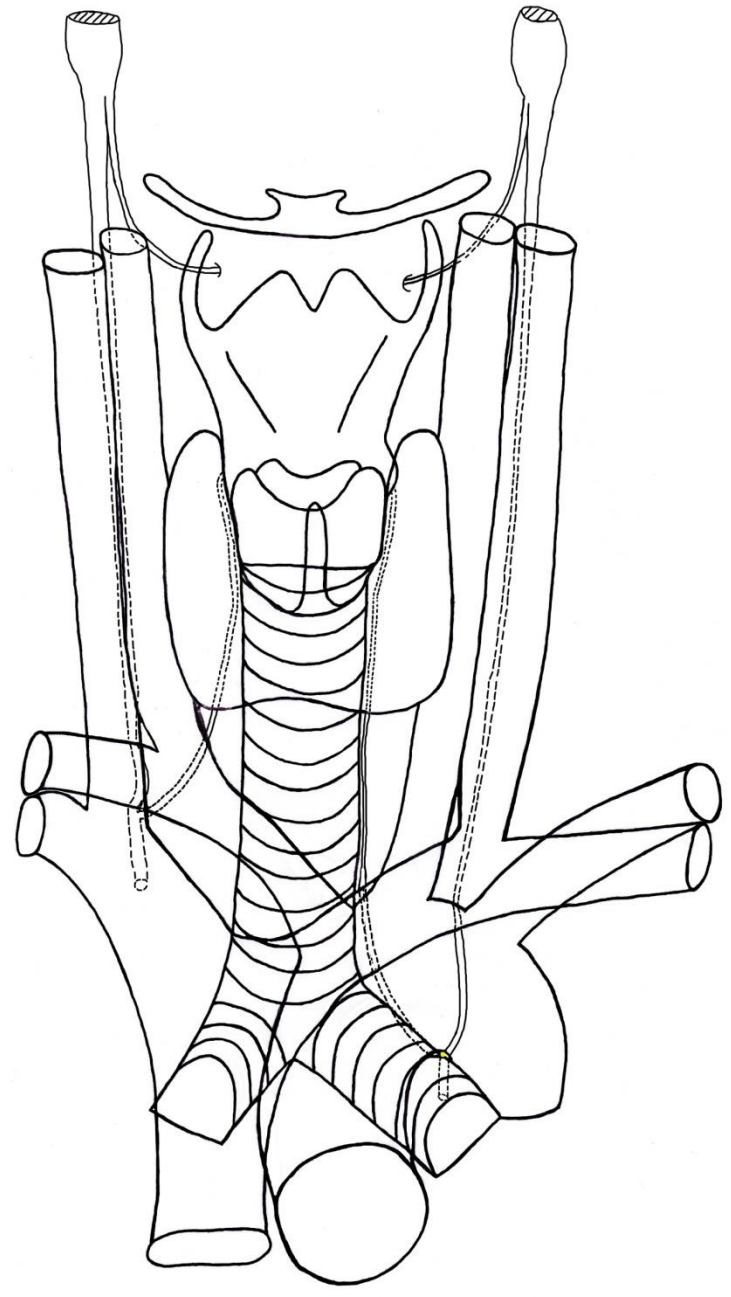
# Laryngeal innervation

# Laryngeal innervation

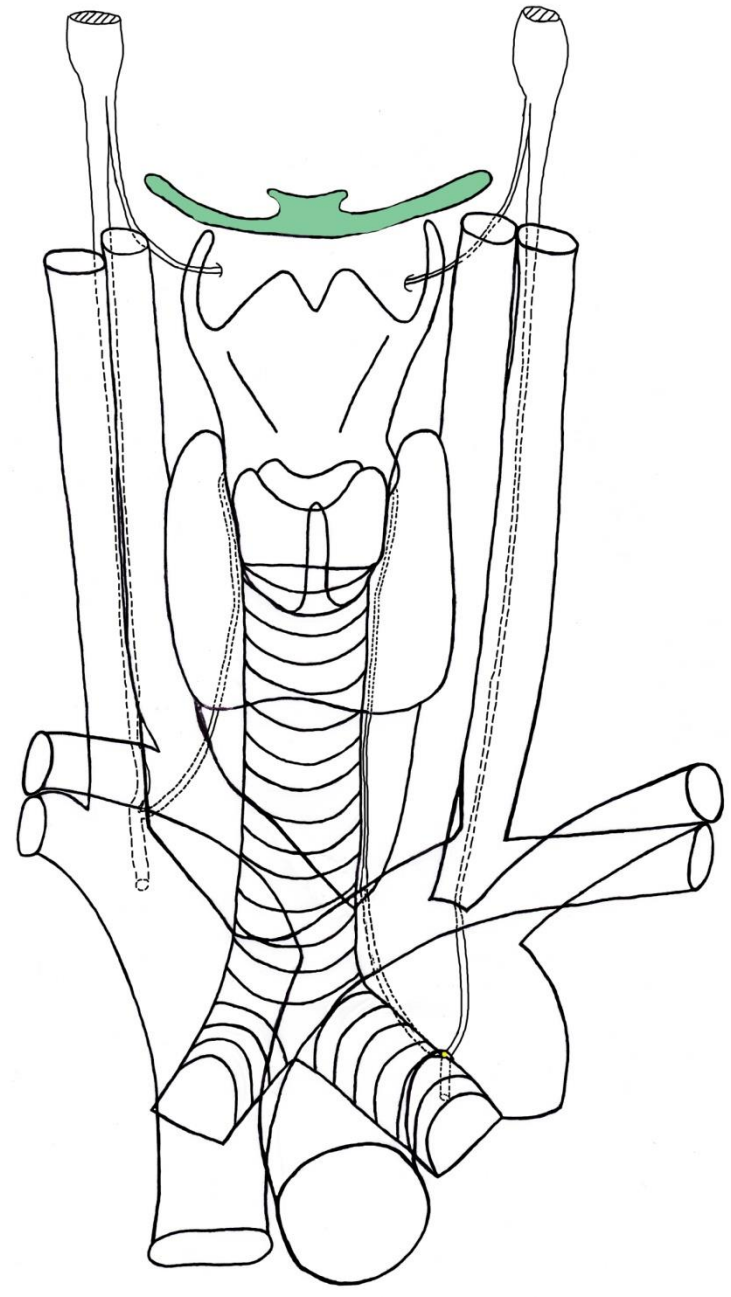
---



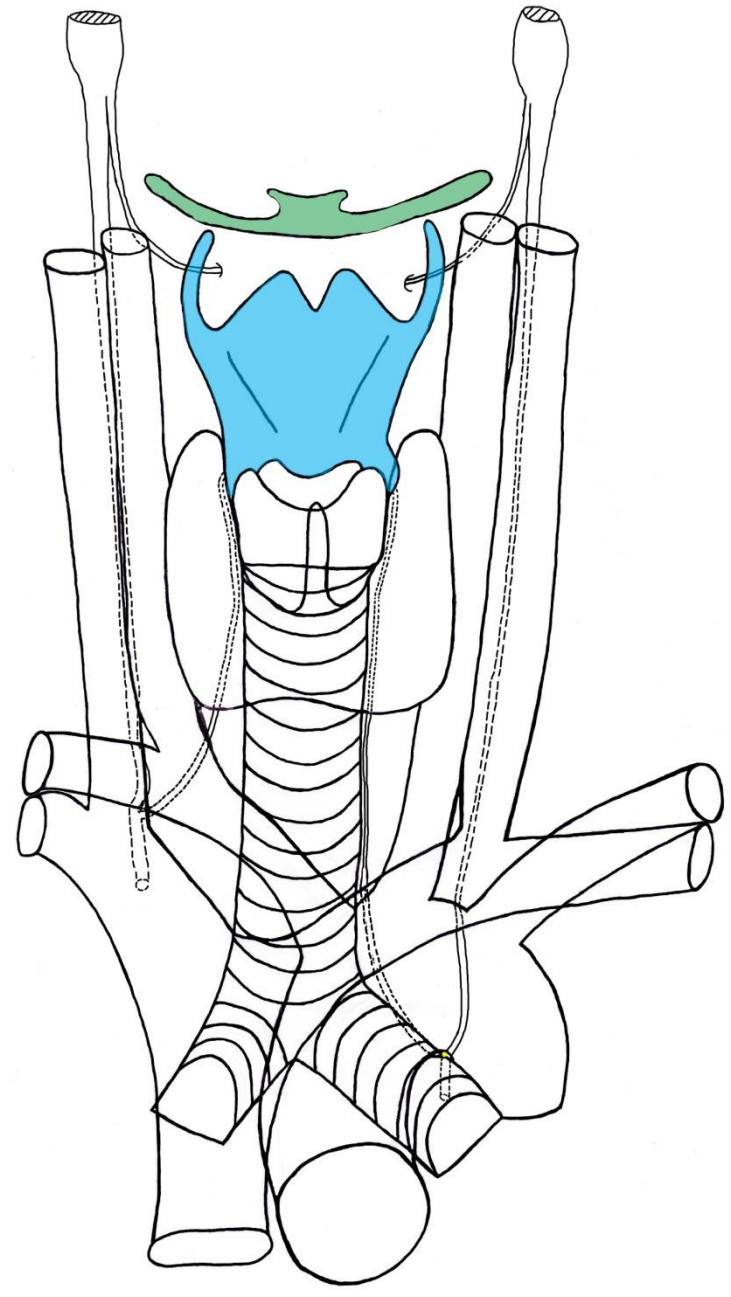
Ht  
G



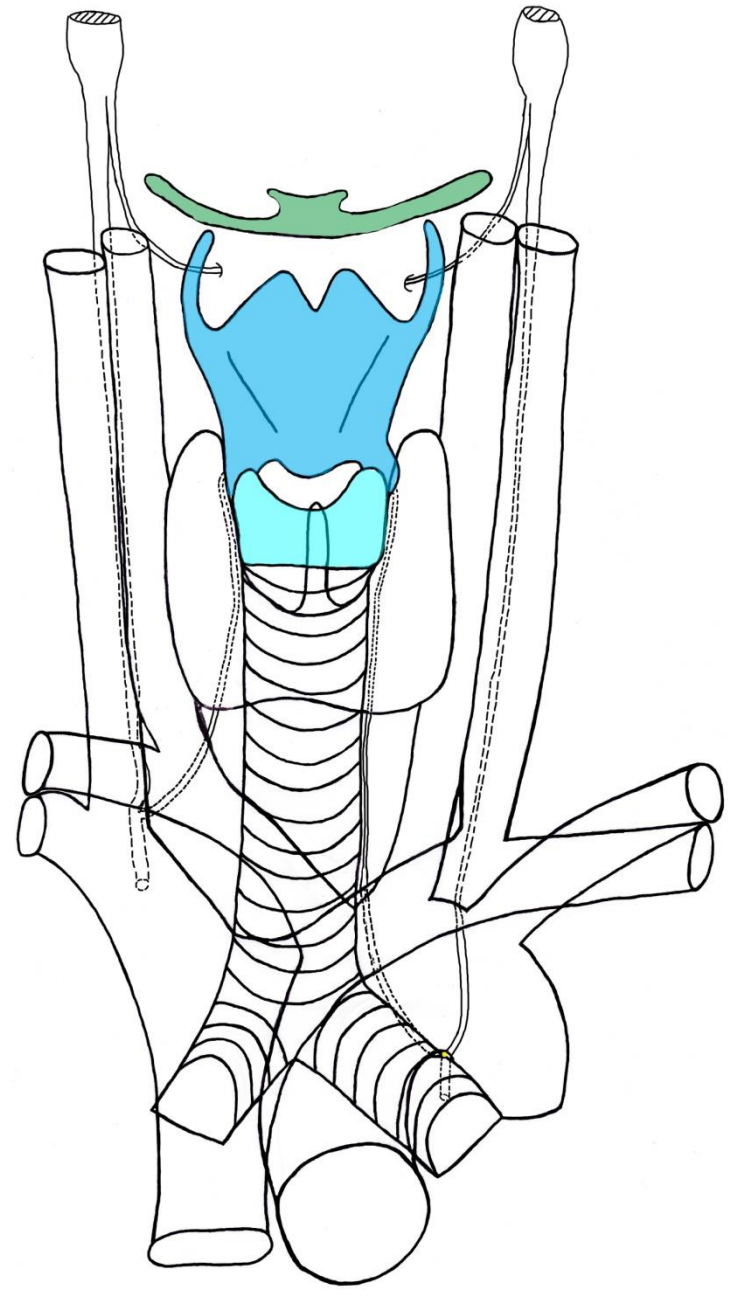
Ht  
G



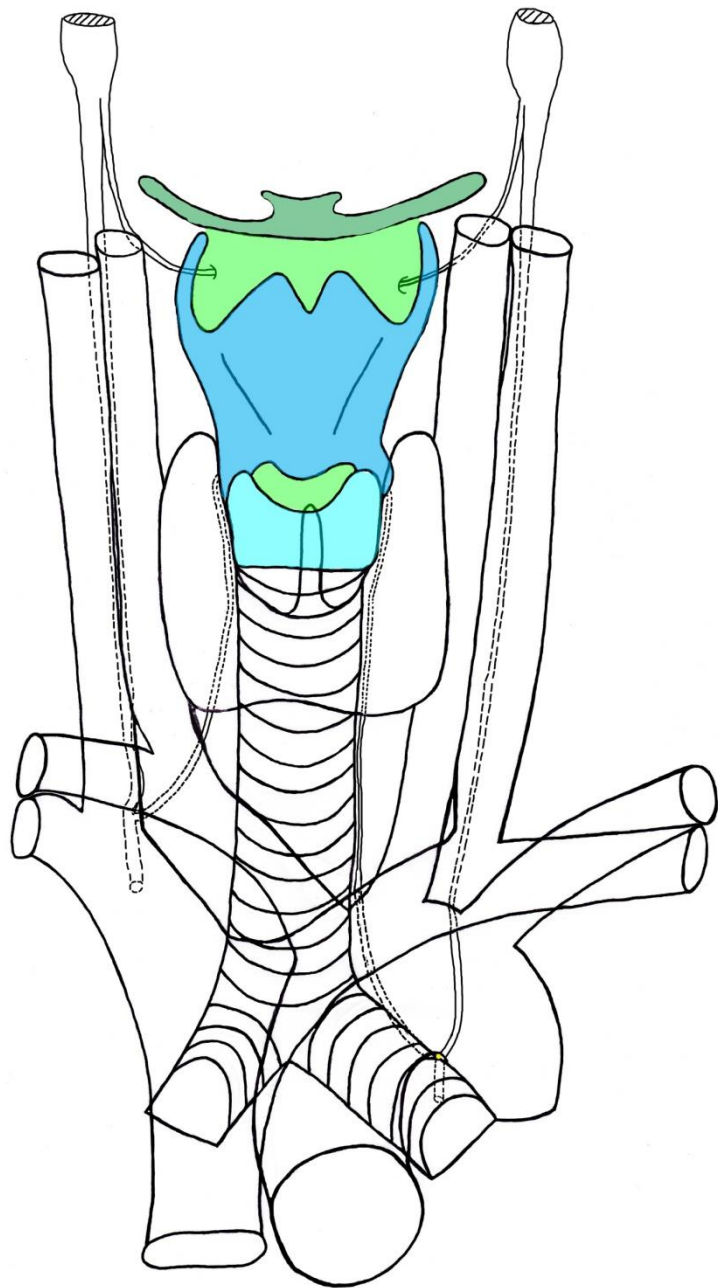
Ht  
G



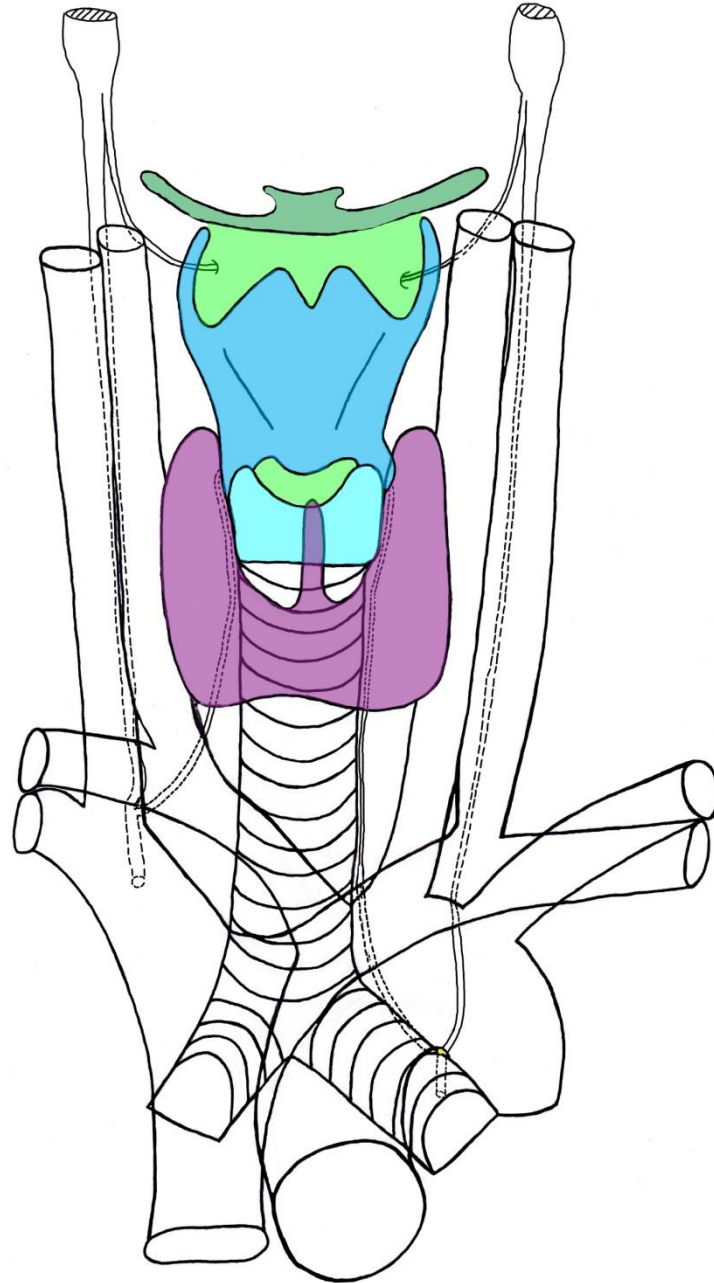
Ht  
G



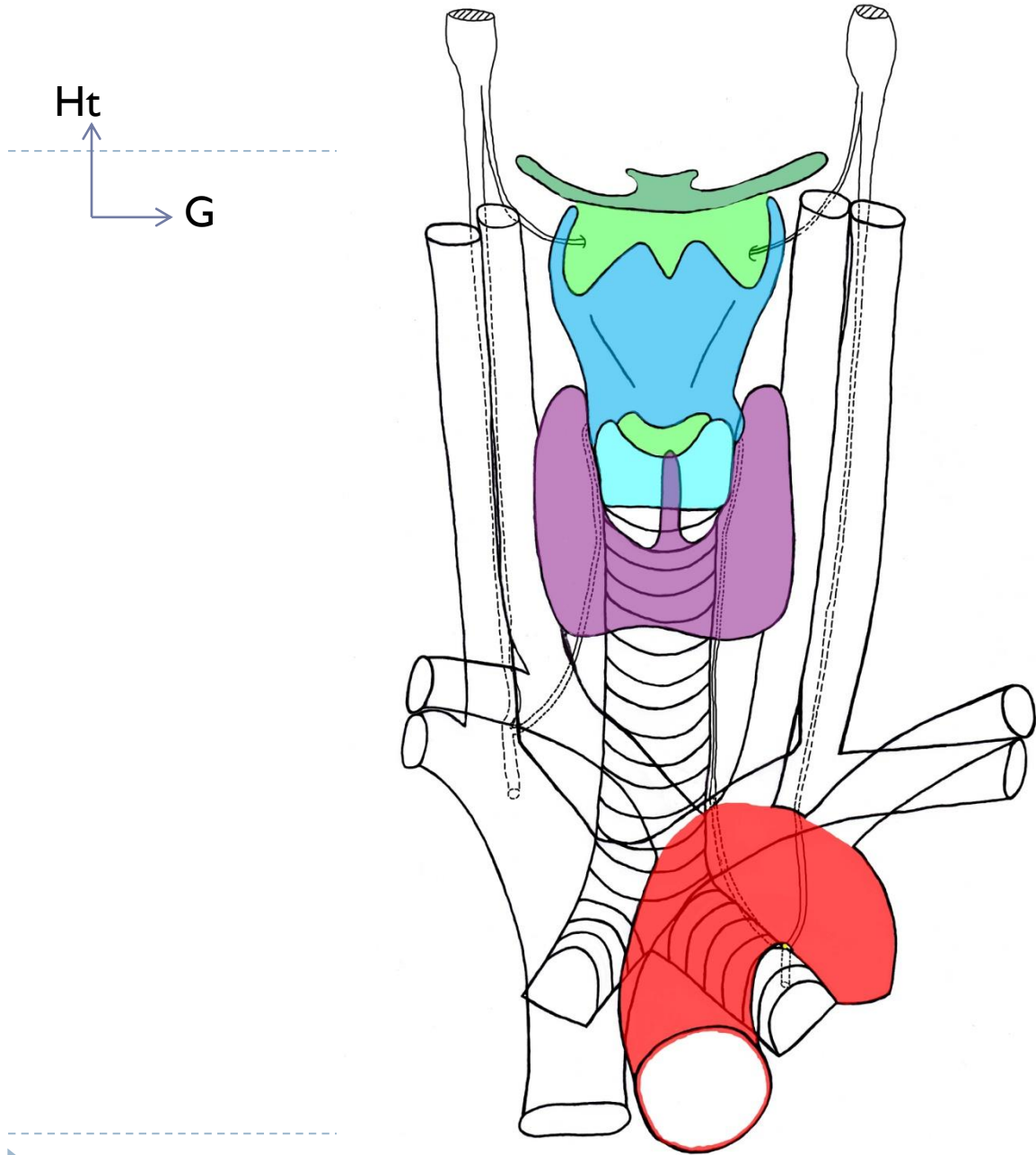
Ht  
G

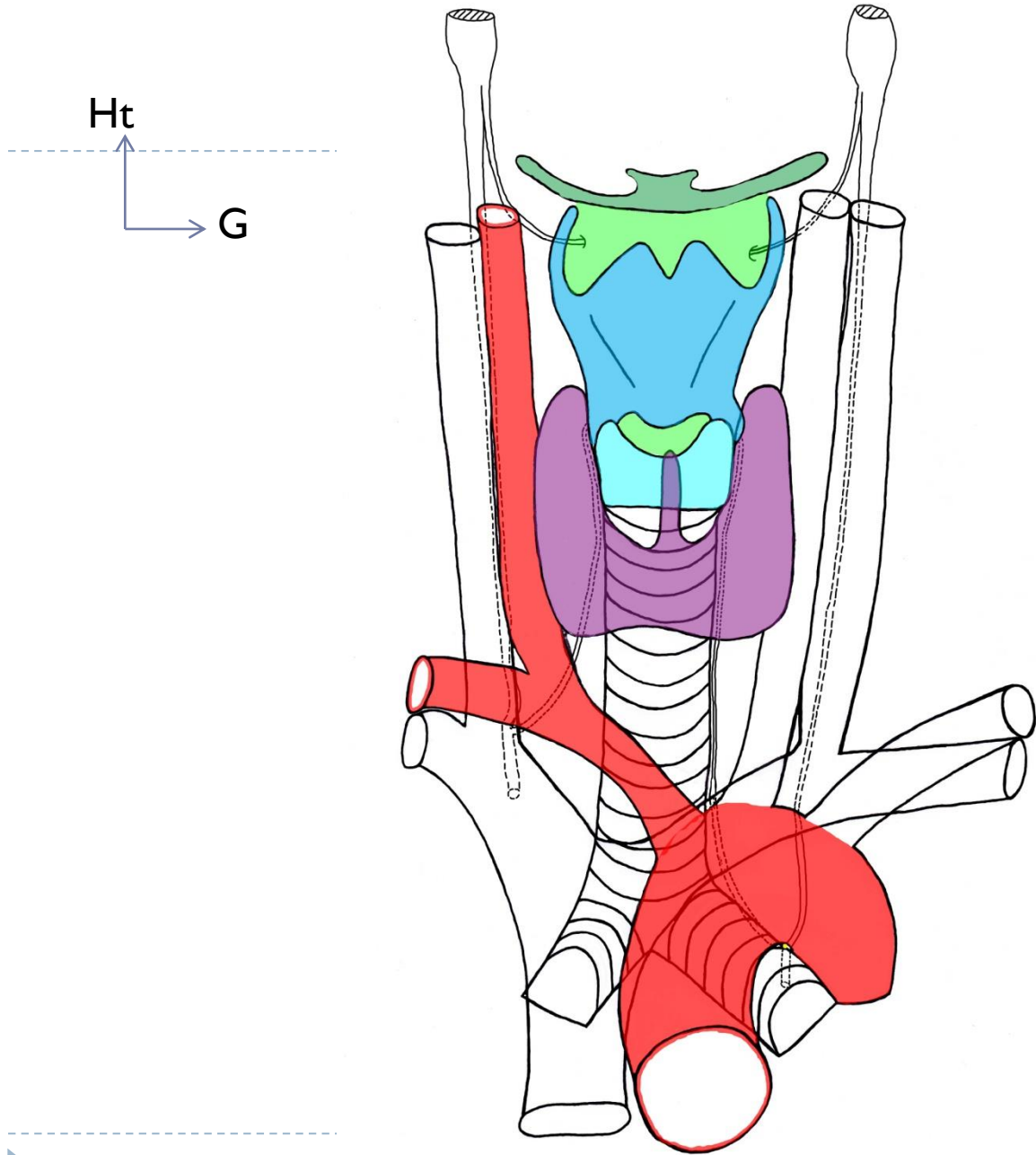


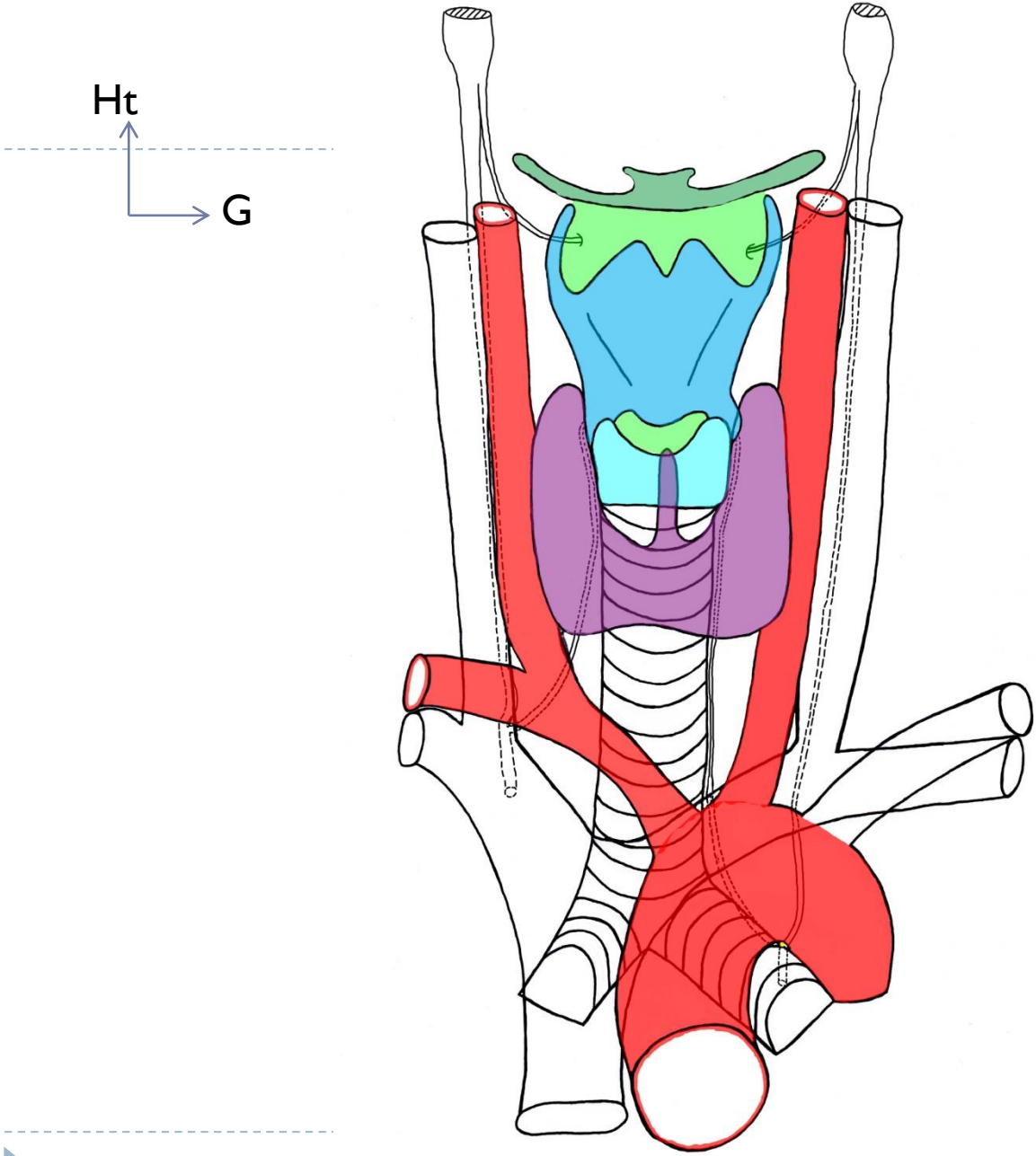
Ht  
G

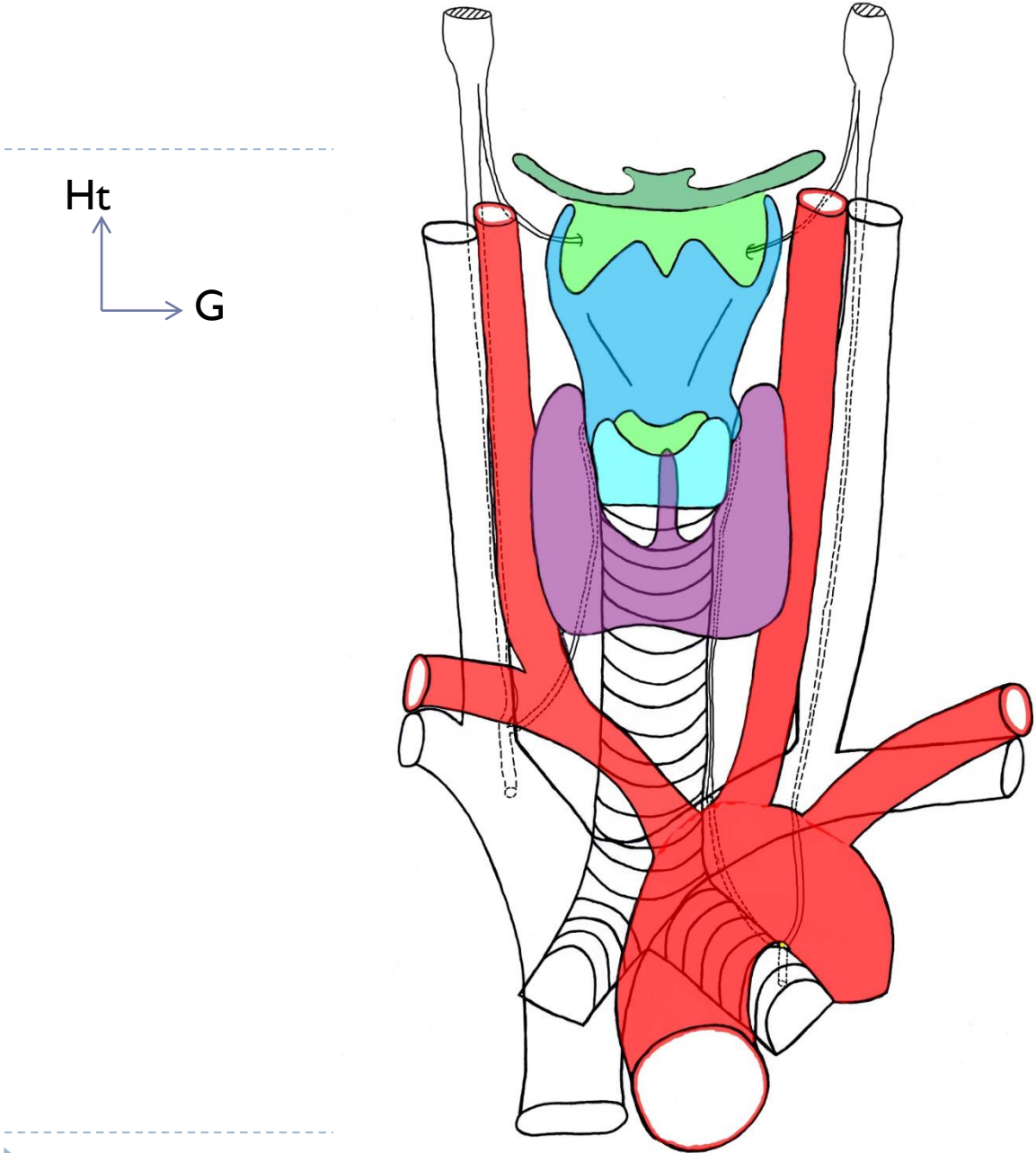




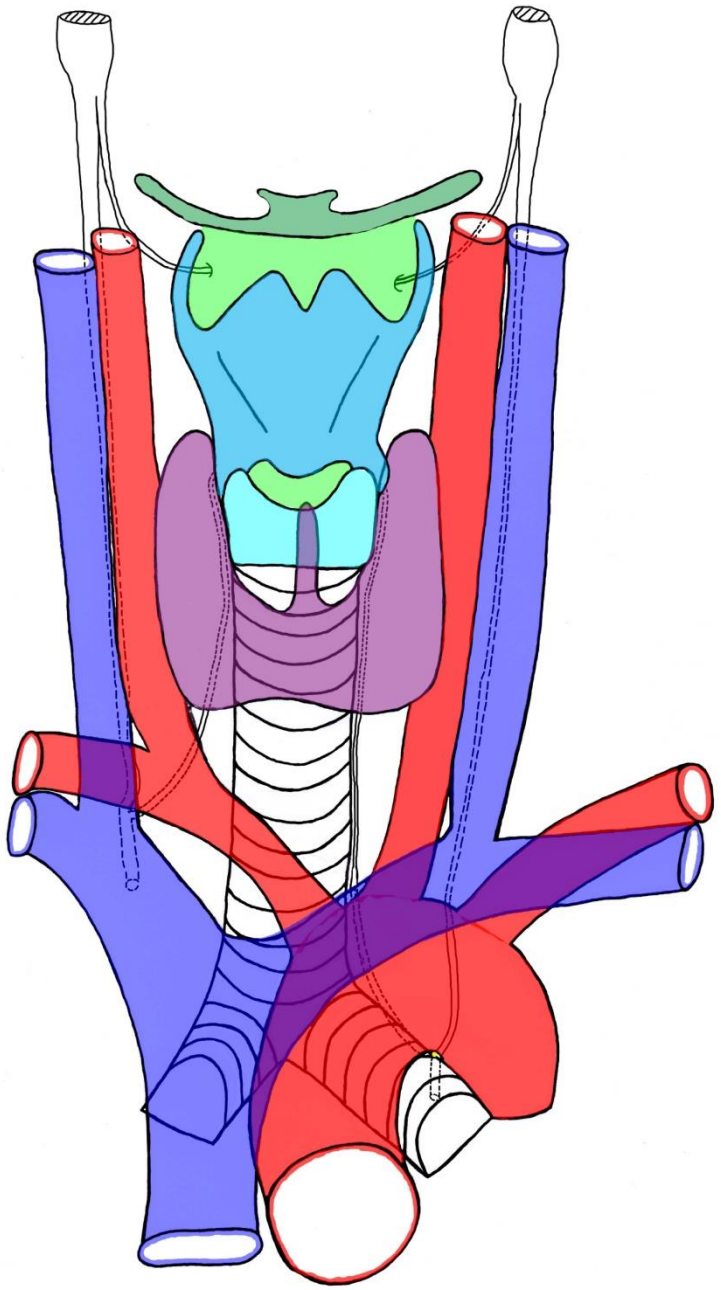




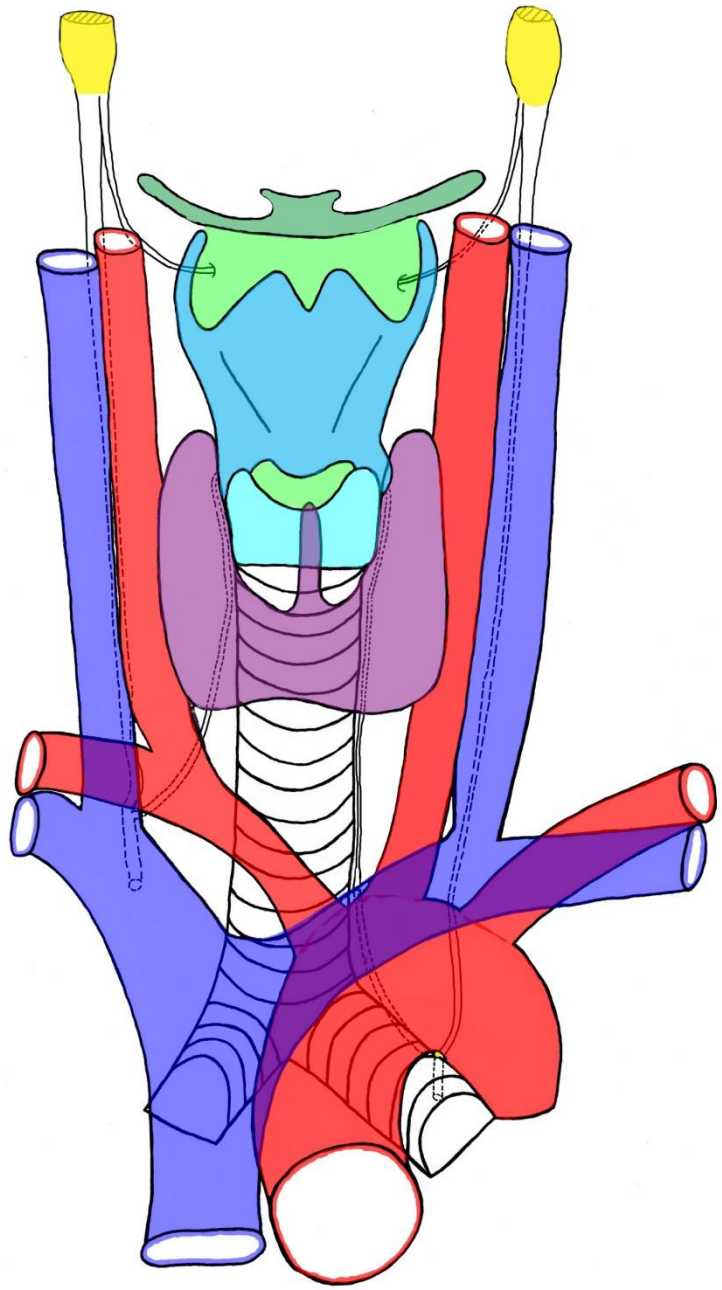




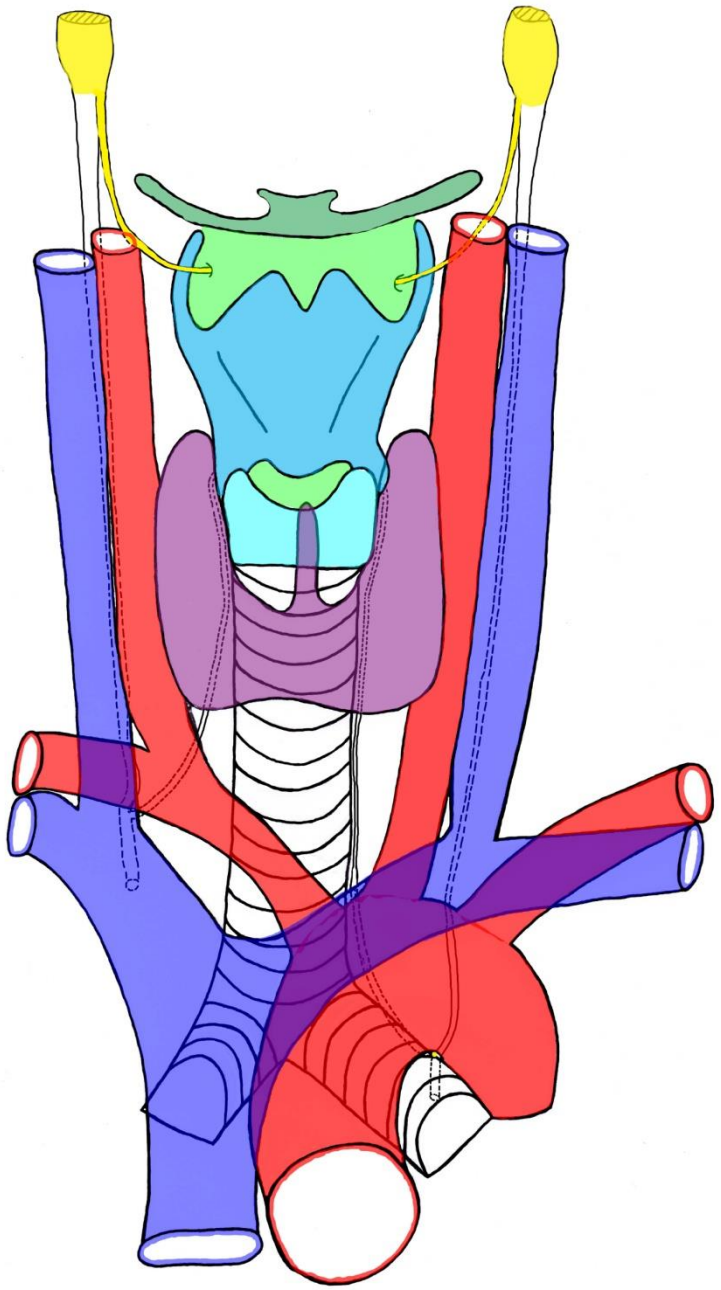
Hp  
Left



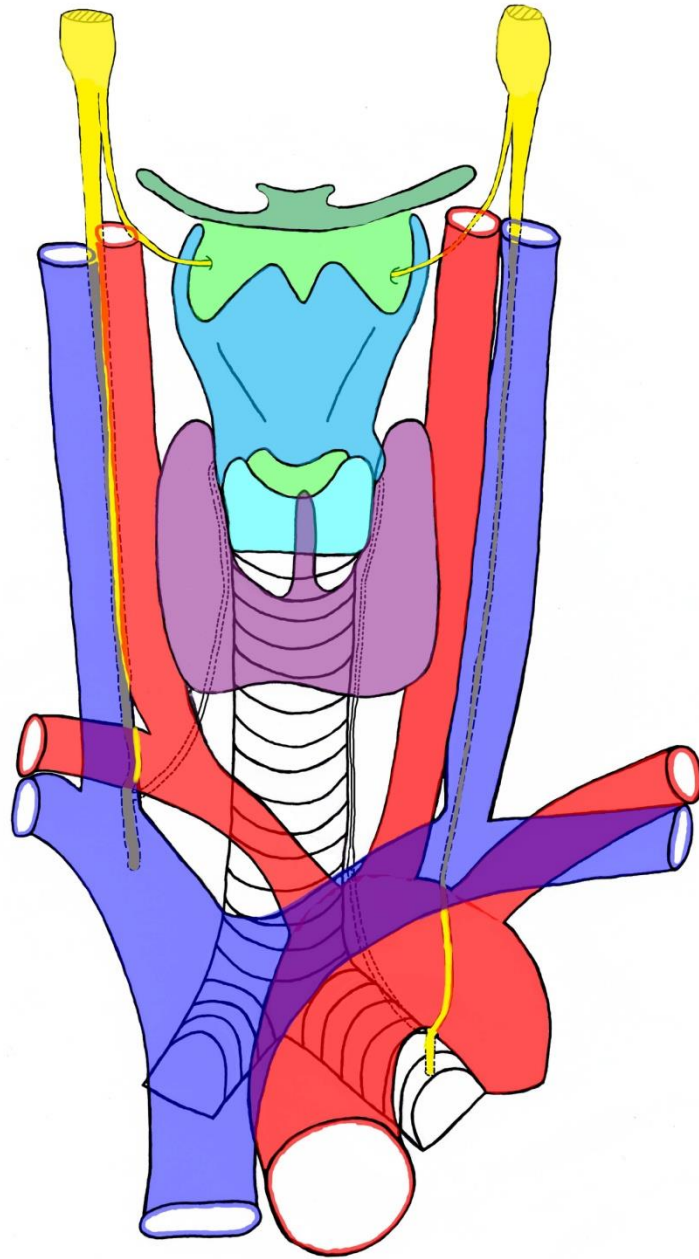
Hp  
Left



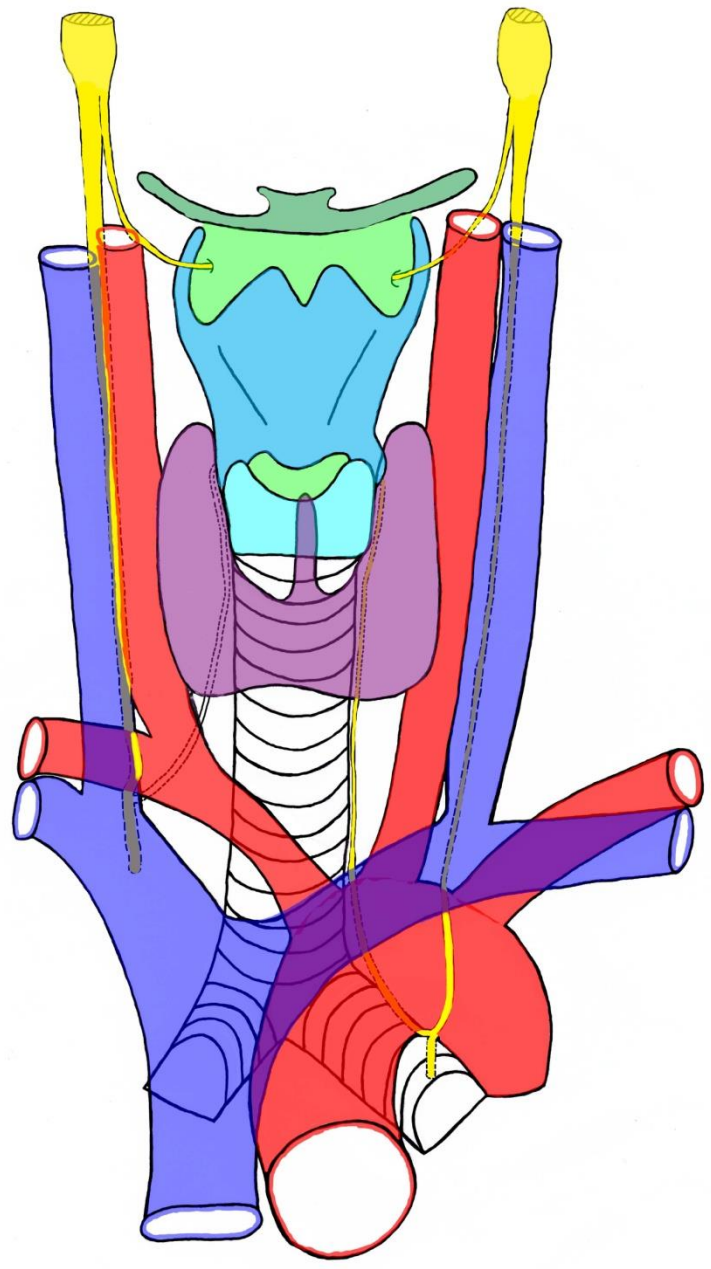
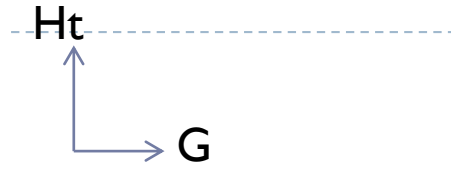
Hp  
Left

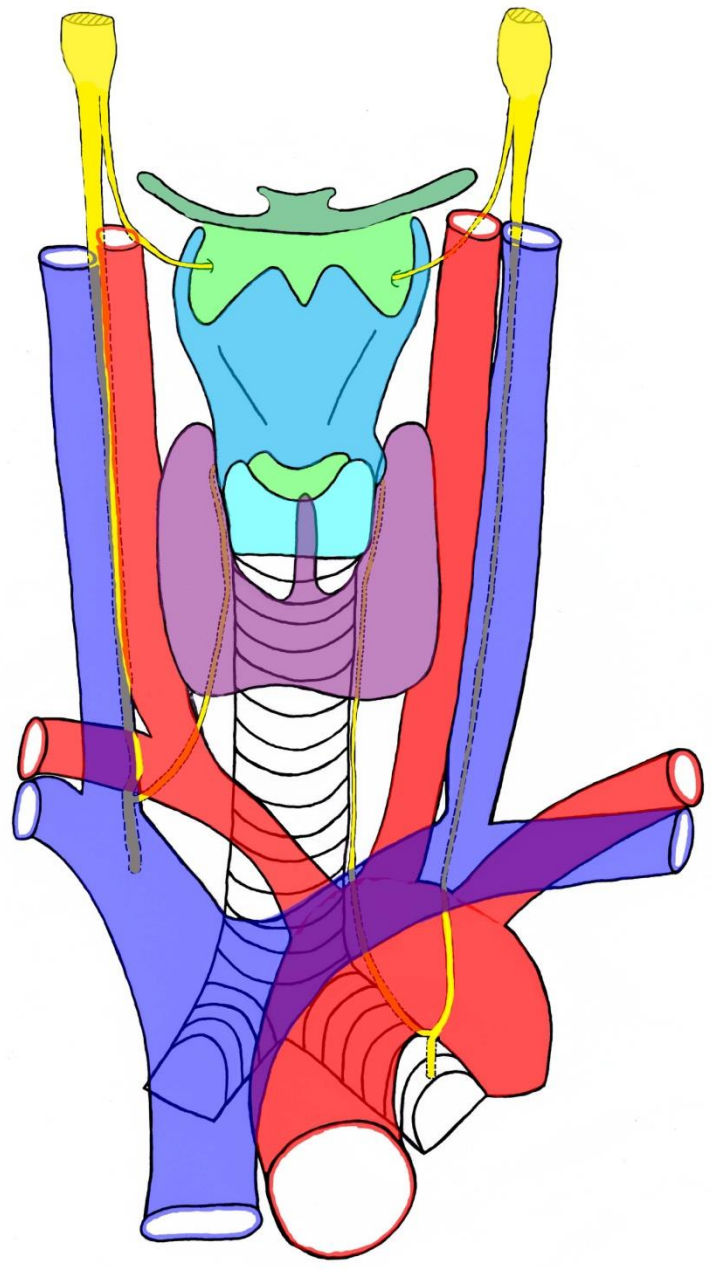
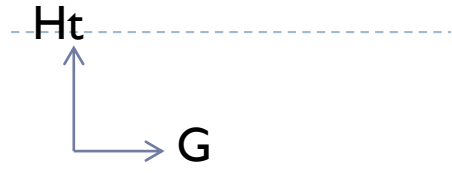


Ht  
↑  
G  
→









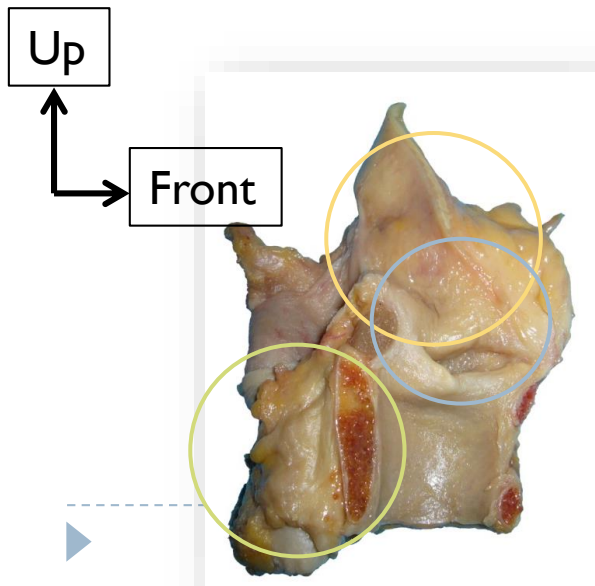
# Superior Laryngeal Nerve-Ending



## Superior laryngeal nerve trunk

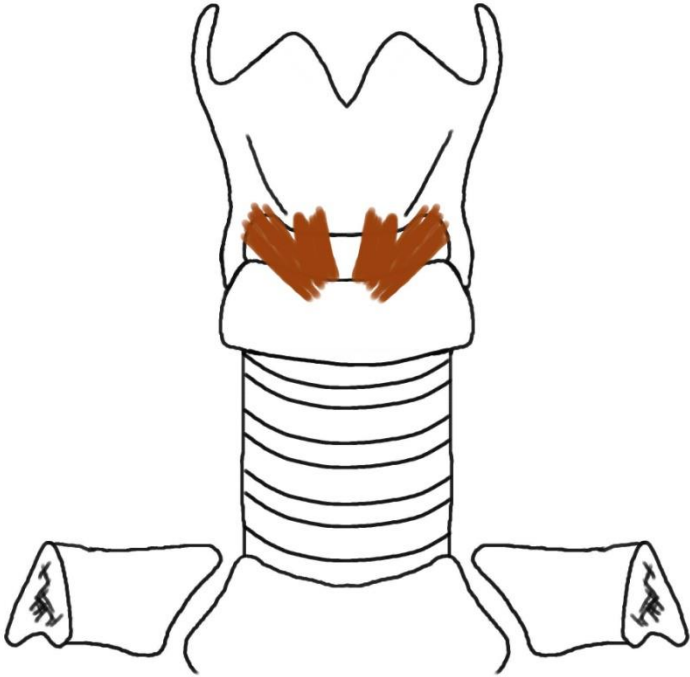
- Internal laryngeal nerve
  - Sensory
  - Laryngeal vestibule, glottic level, posterior wall

- External laryngeal nerve
  - Motricity
  - Crico-thyroid Muscle



Up

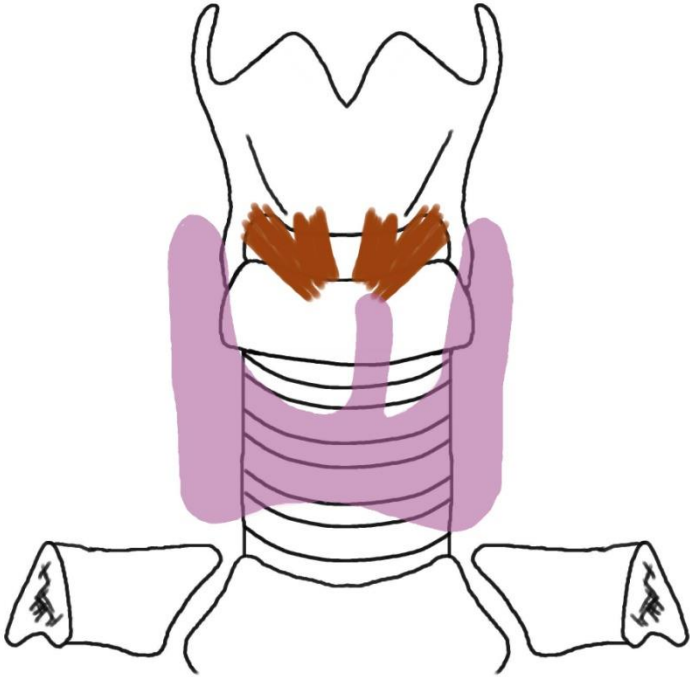
Left



---

Up

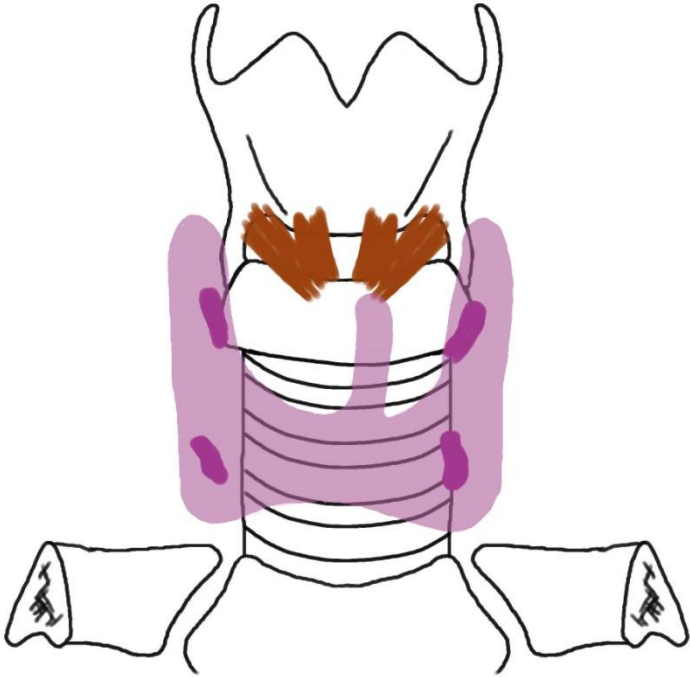
Left

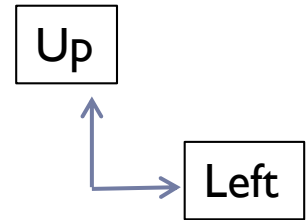
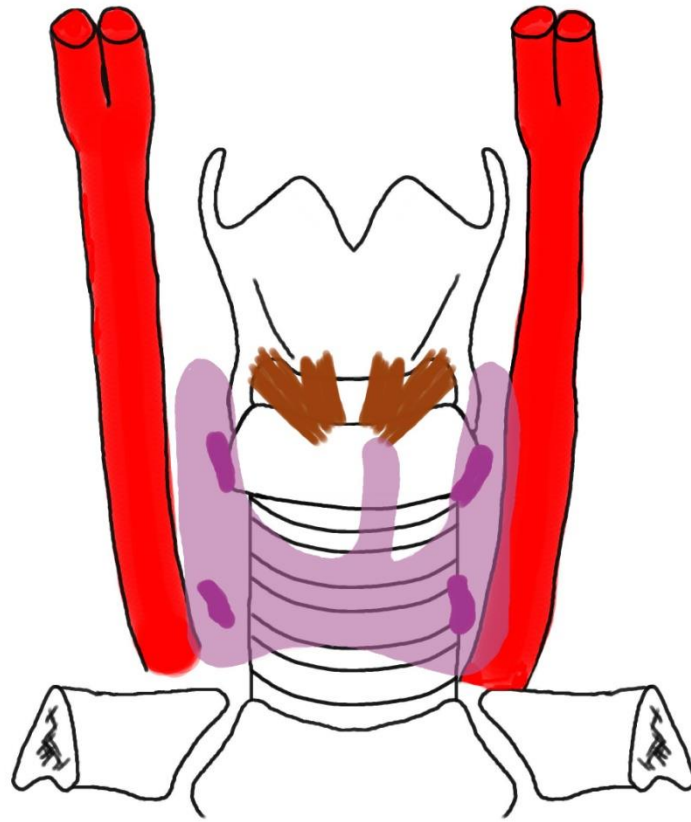


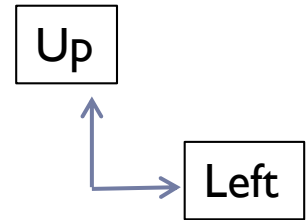
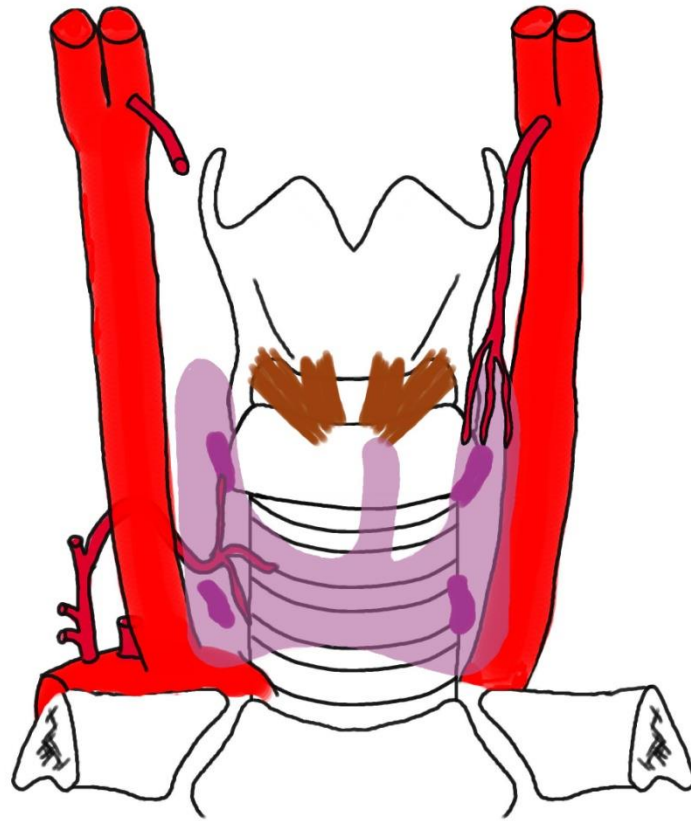
---

Up

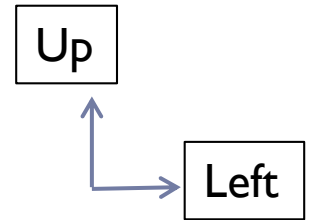
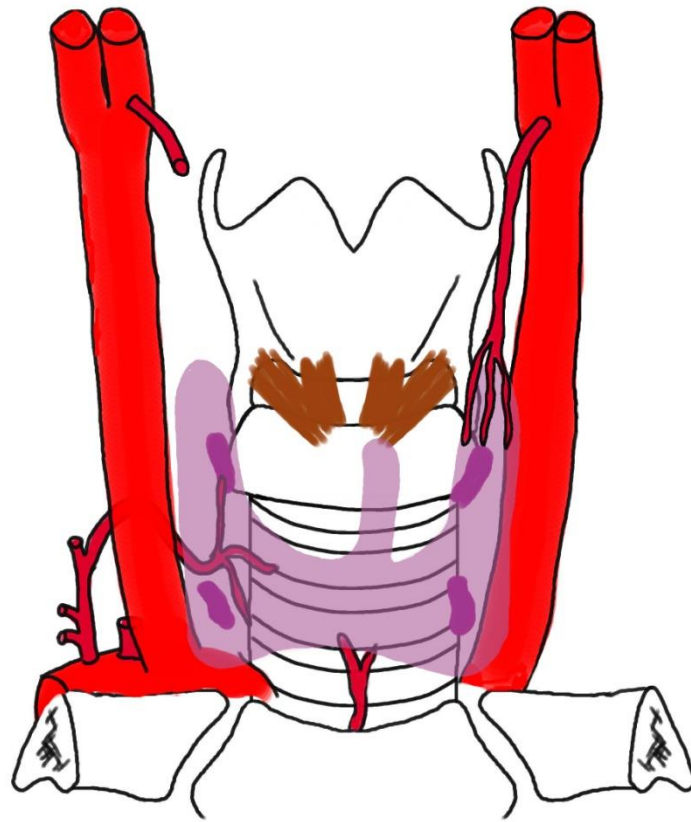
Left

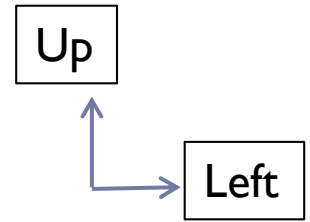
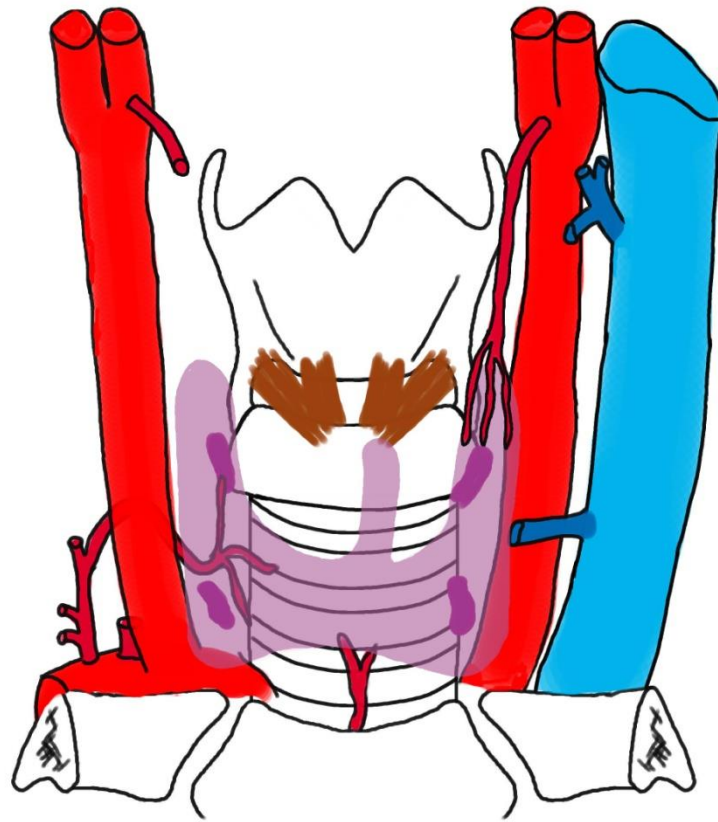


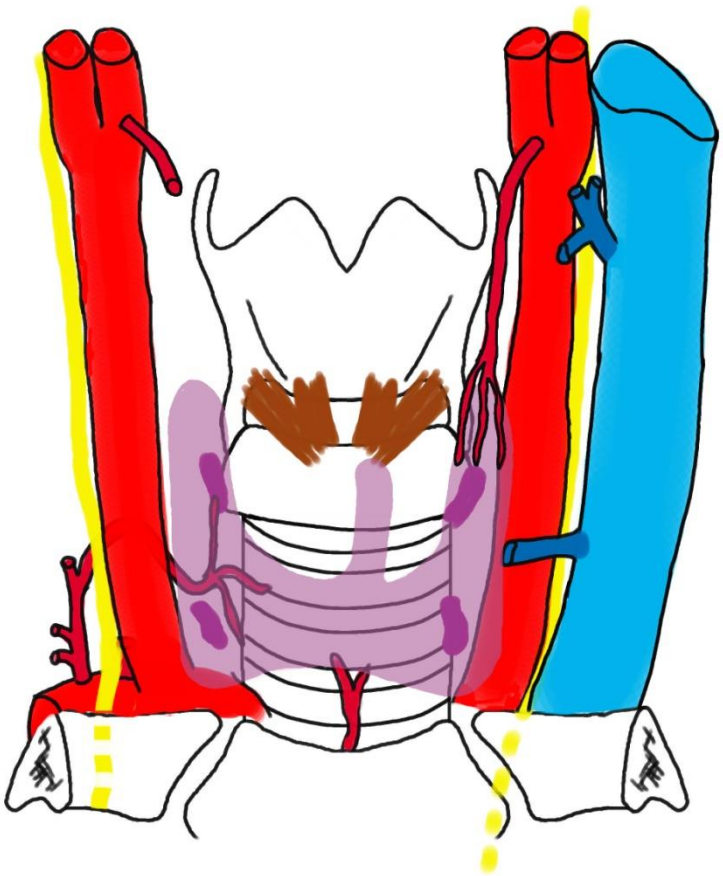








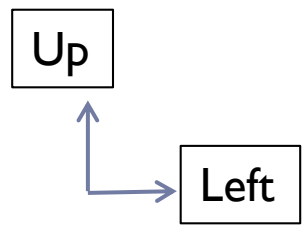
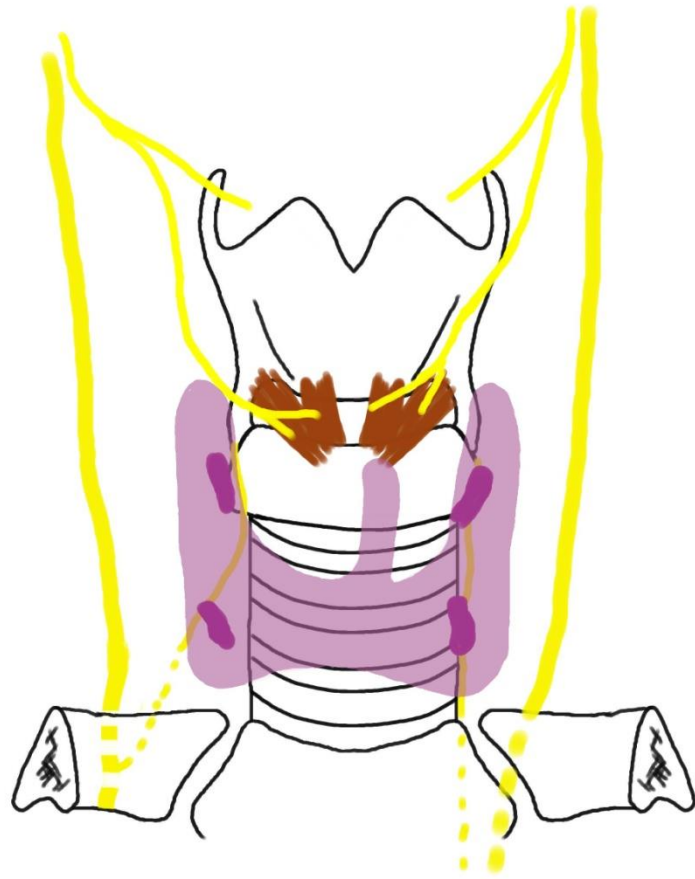


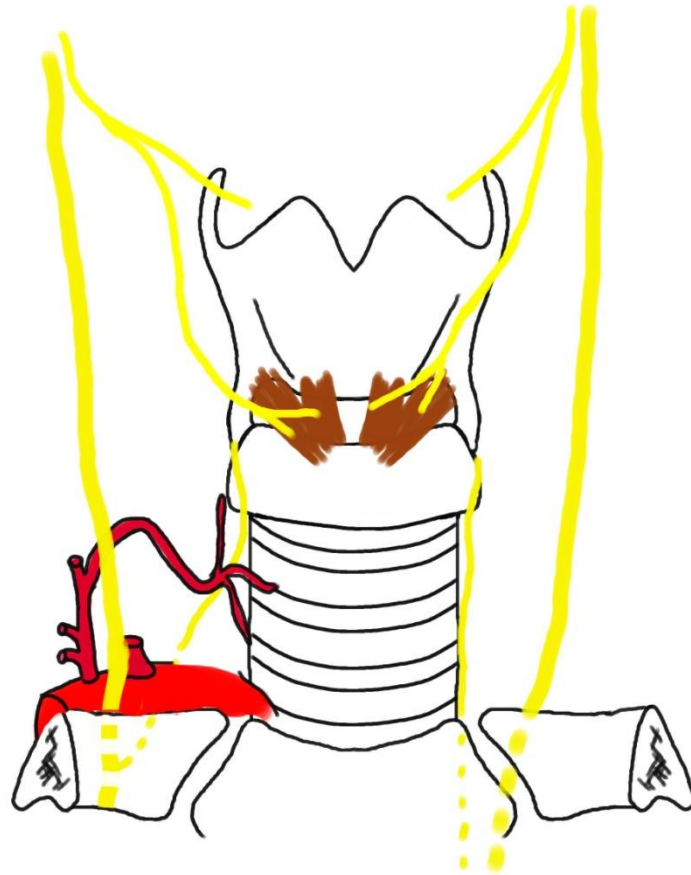


Up

Left

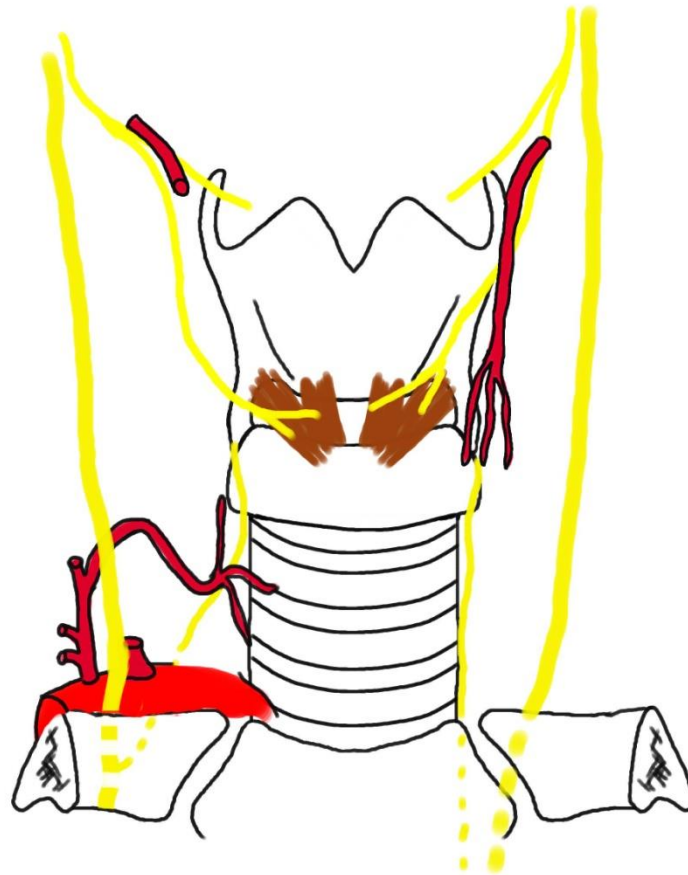






Up  
Left



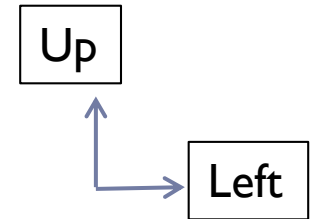
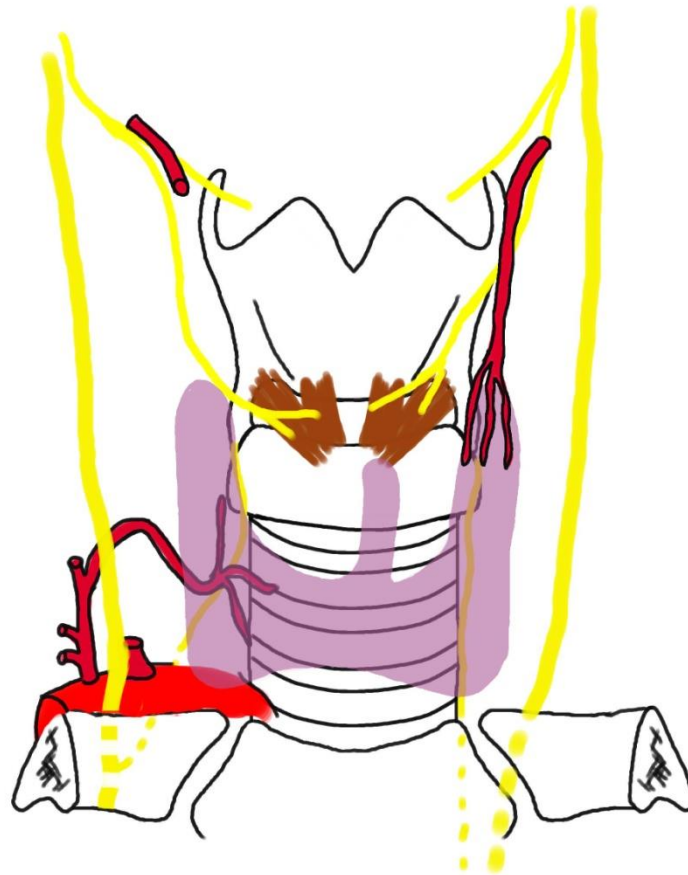


Haut



Gauche

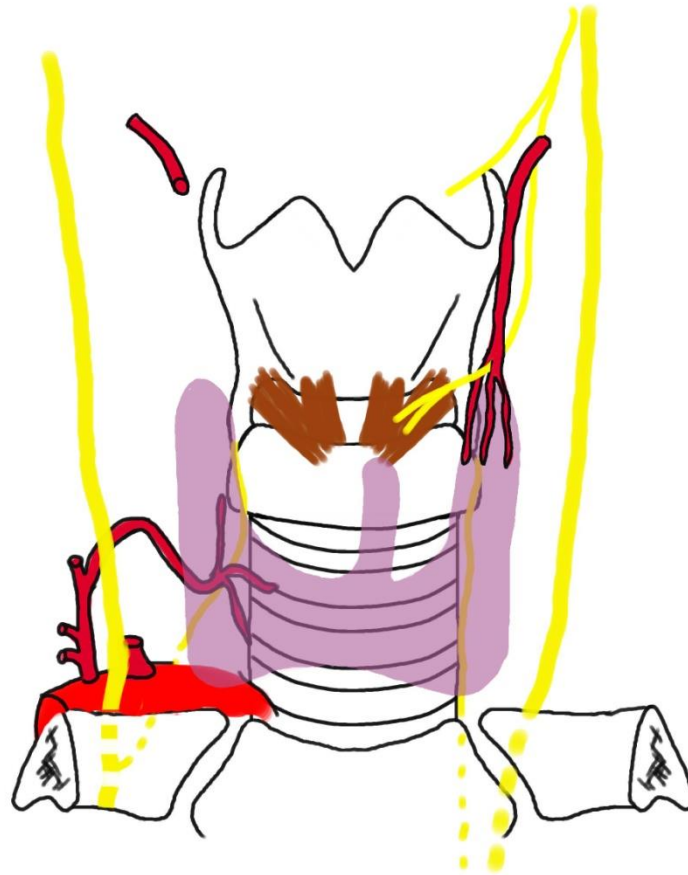




Cernea type I

---

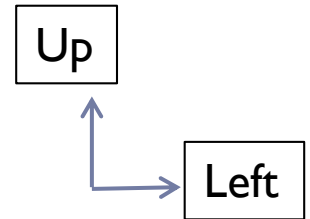
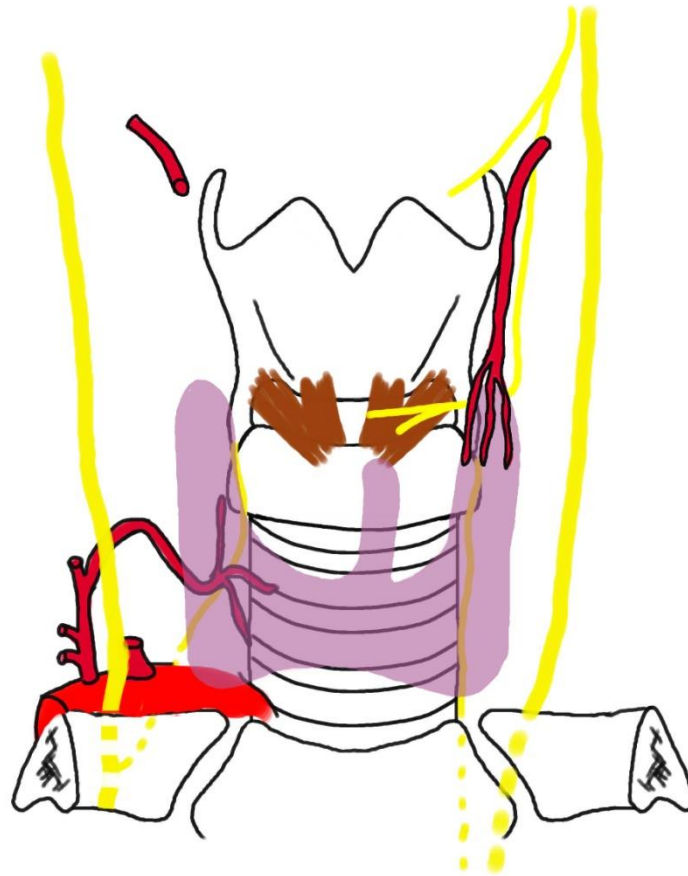




Cernea type 2

---





Cernea type 3

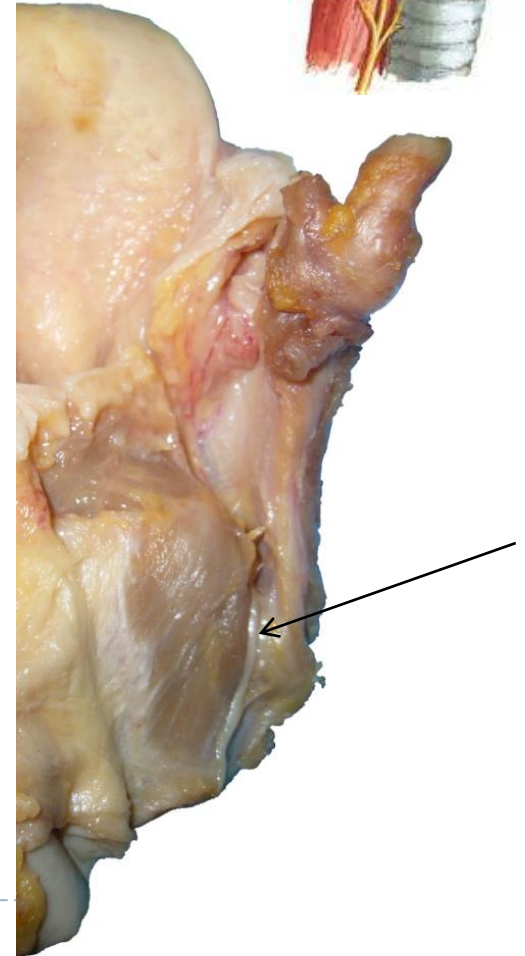
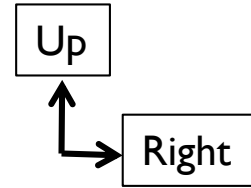
---



# Inferior Laryngeal Nerve-Ending

---

- ▶ Enters in the larynx
  - ▶ Under the inferior pharyngeal constrictor
  - ▶ Behind the crico-thyroid joint
  - ▶ Under the hypopharynx mucosa





A.L

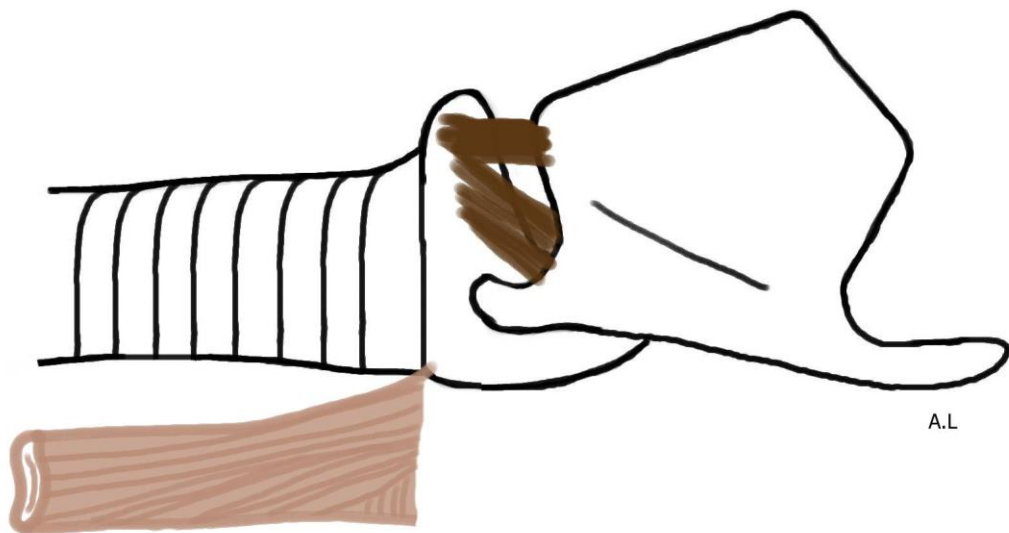
Ant



Up

---





Ant

Up



A.L.

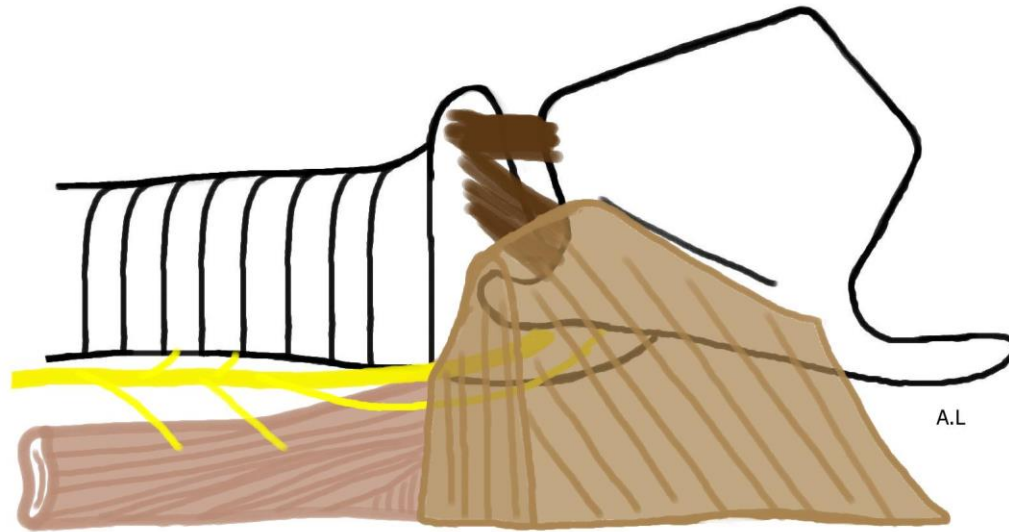




Ant

Up

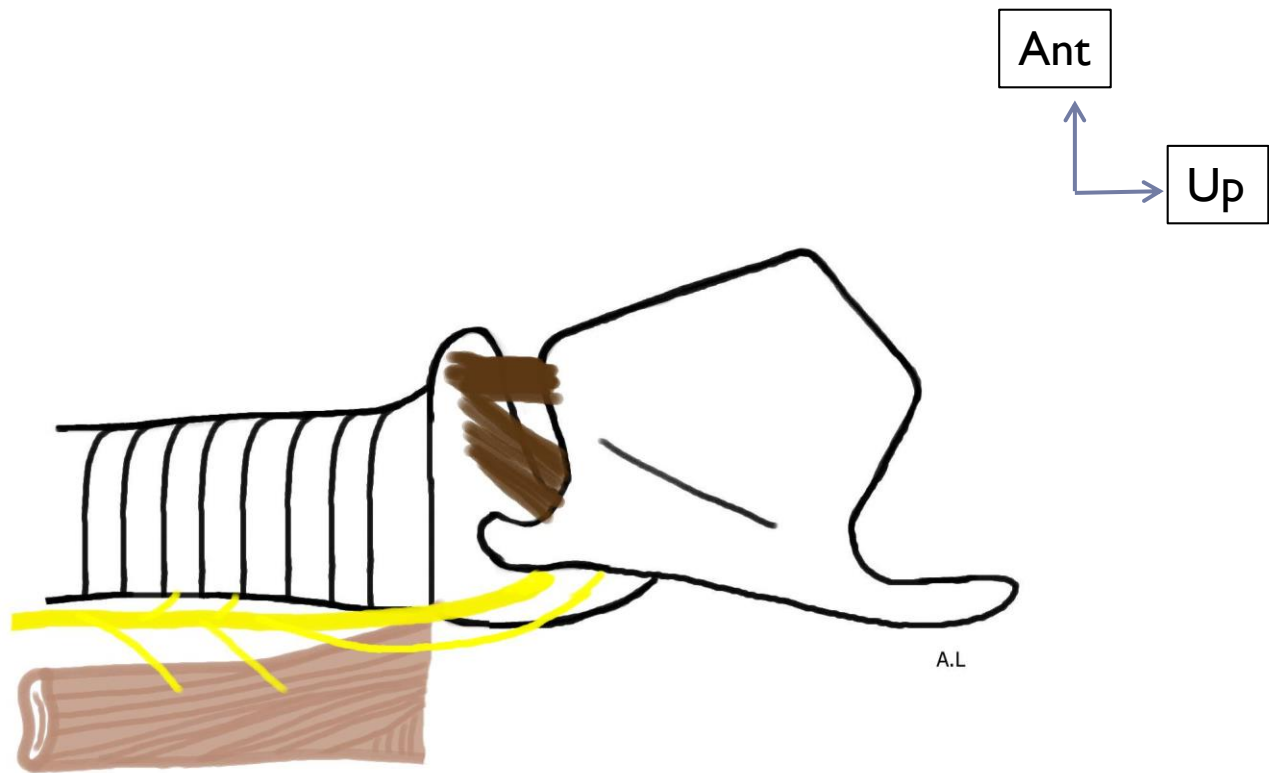


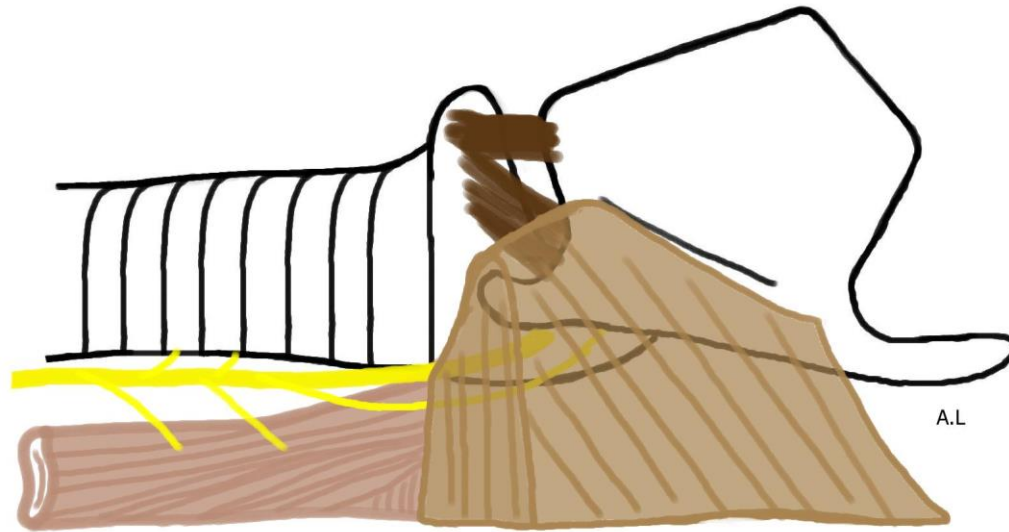


Ant

Up





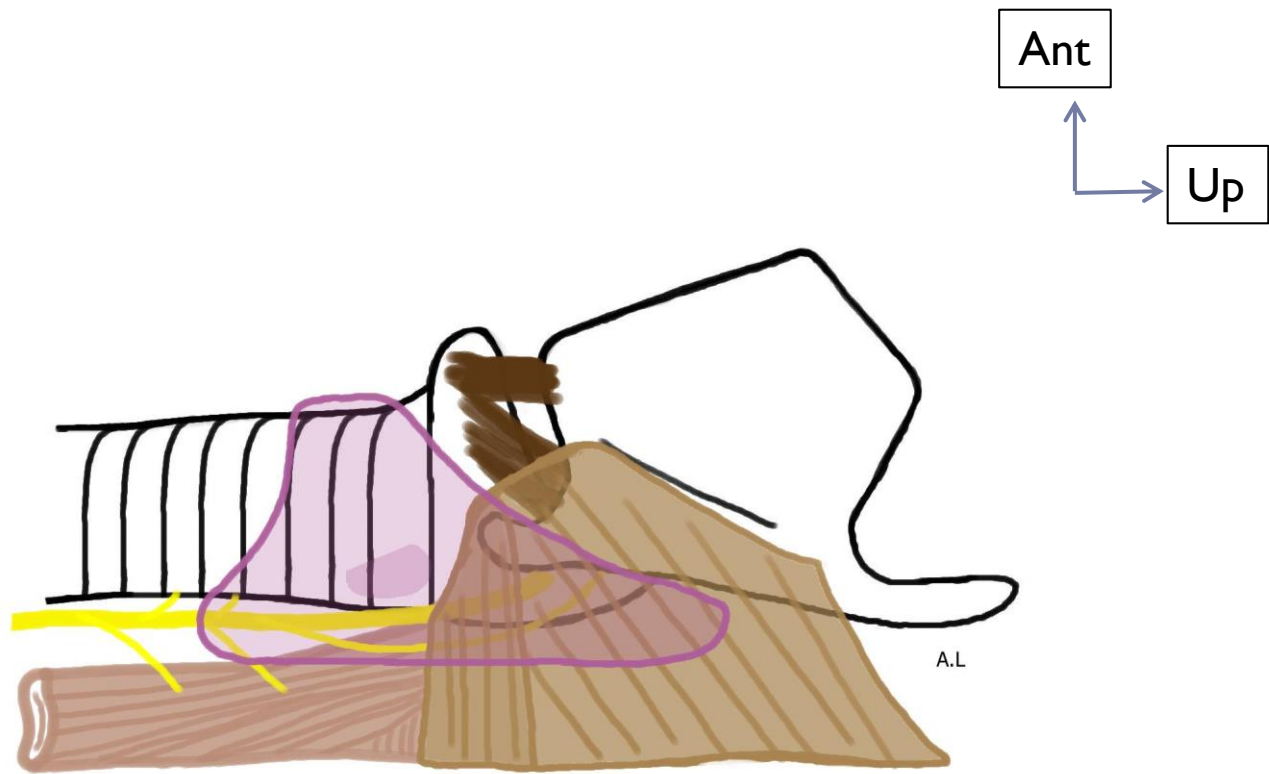


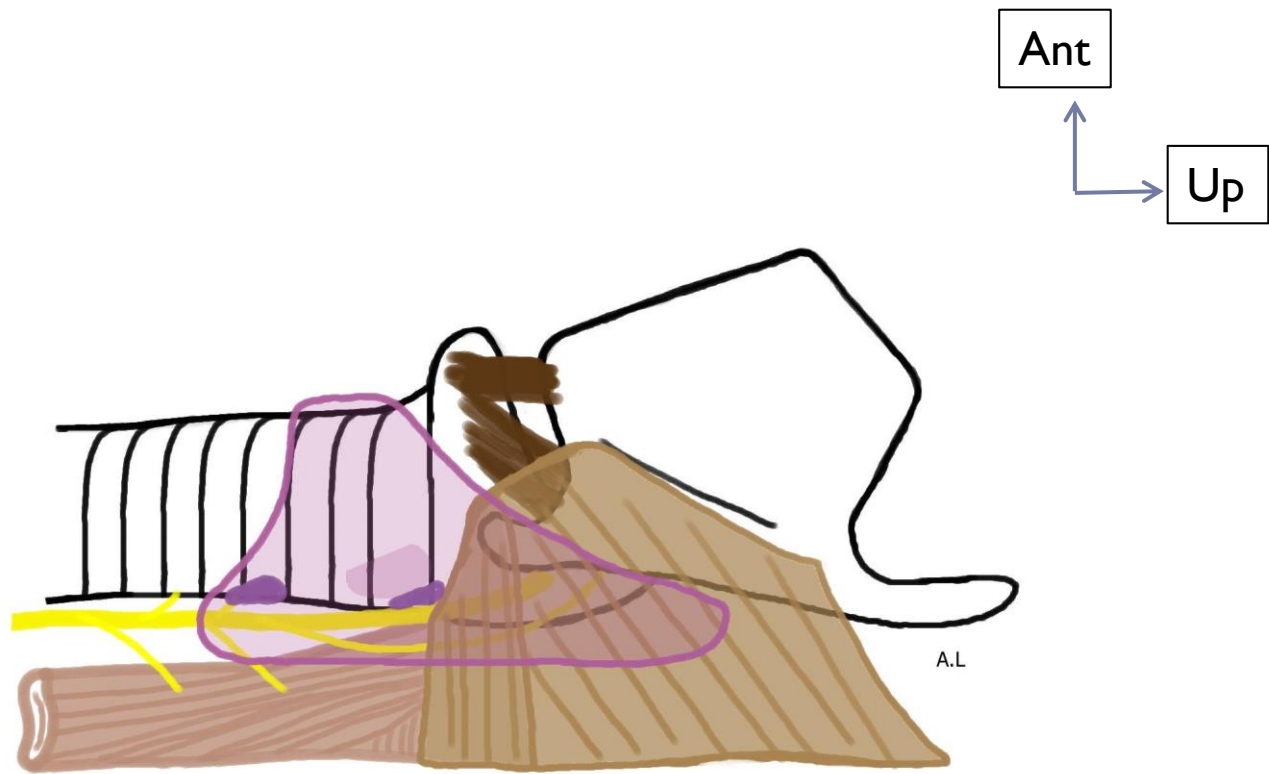
Ant

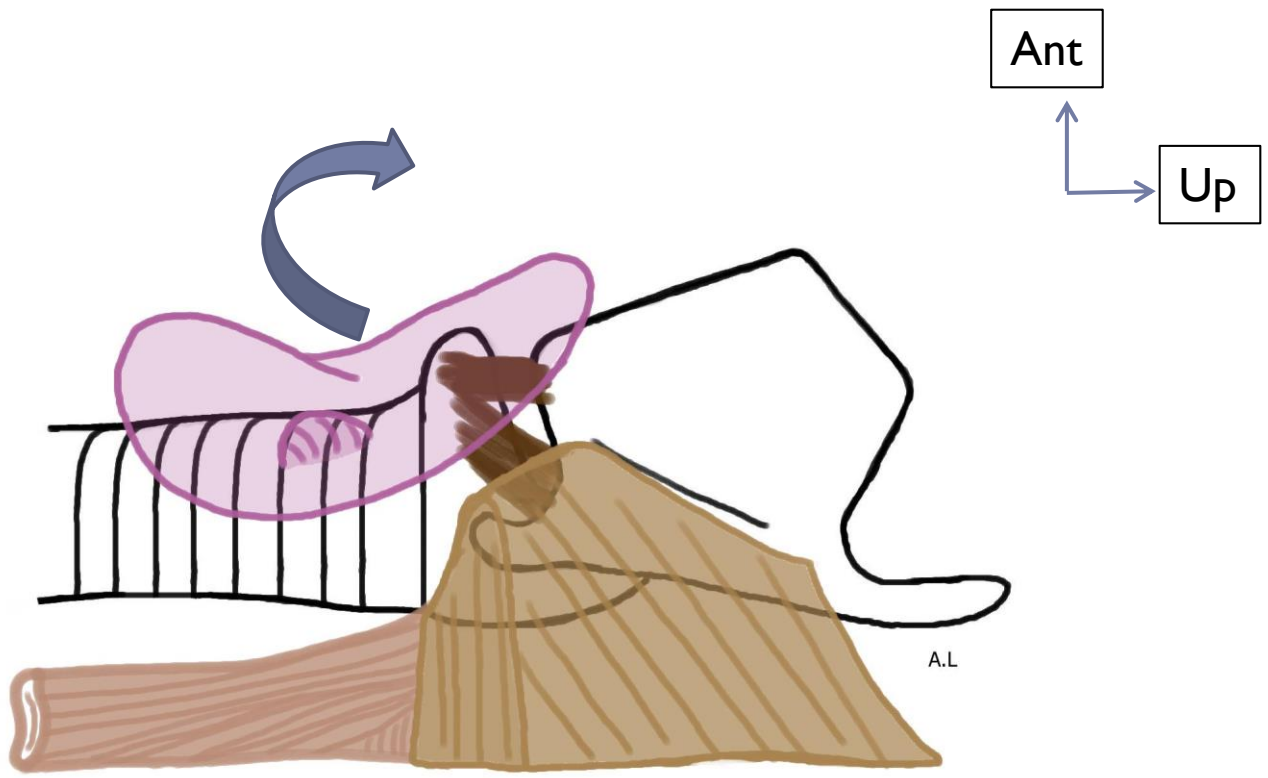
Up





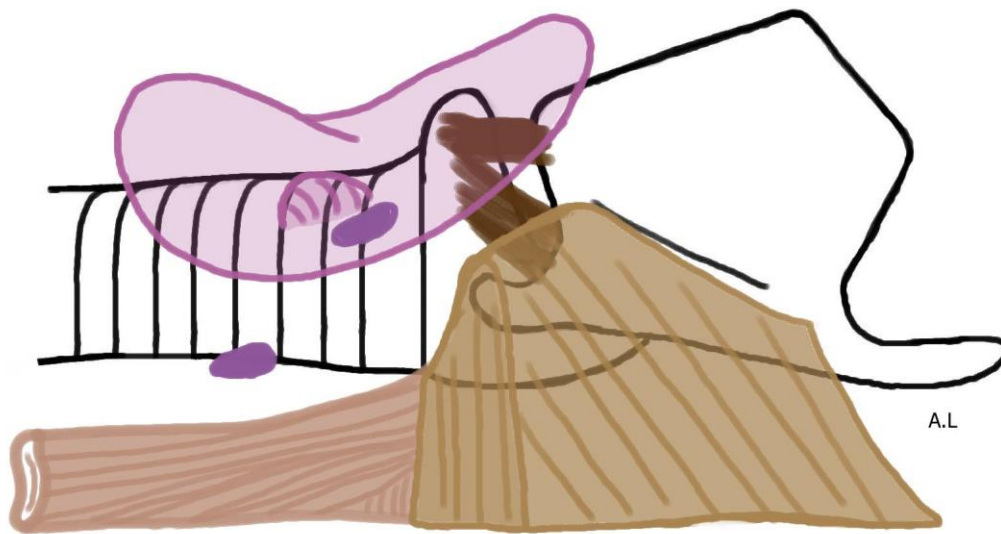






A.L



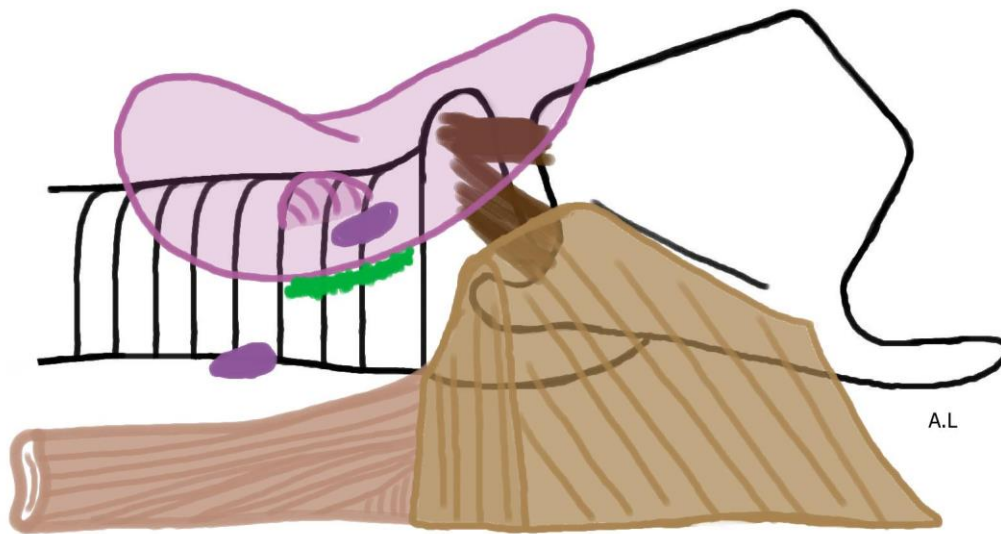


Ant

Up

A.L.



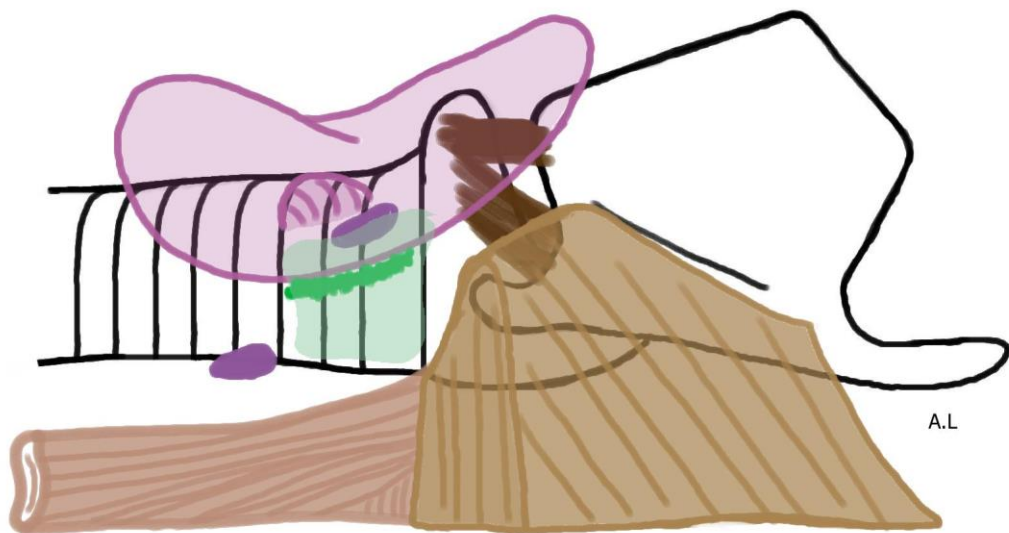


Ant

Up

A.L

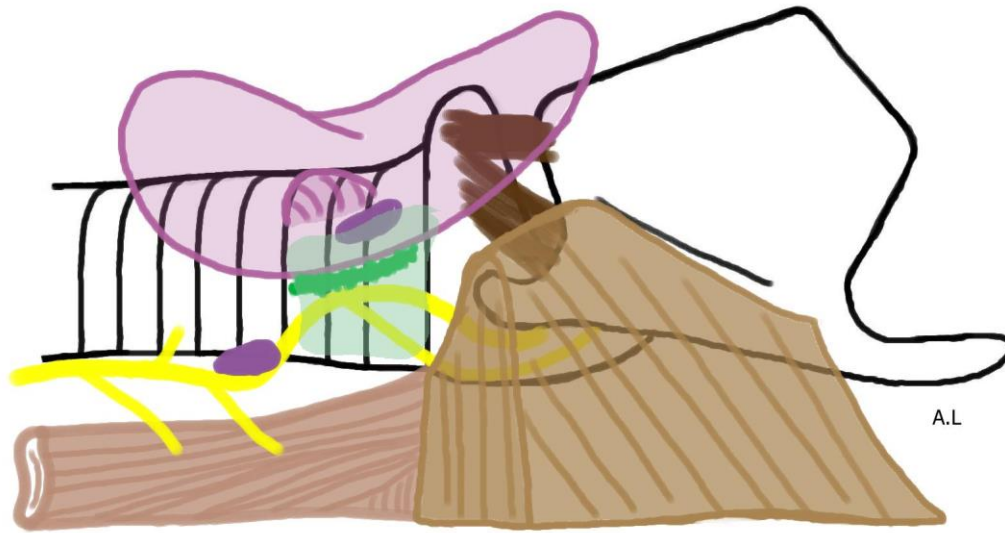




Ant

Up





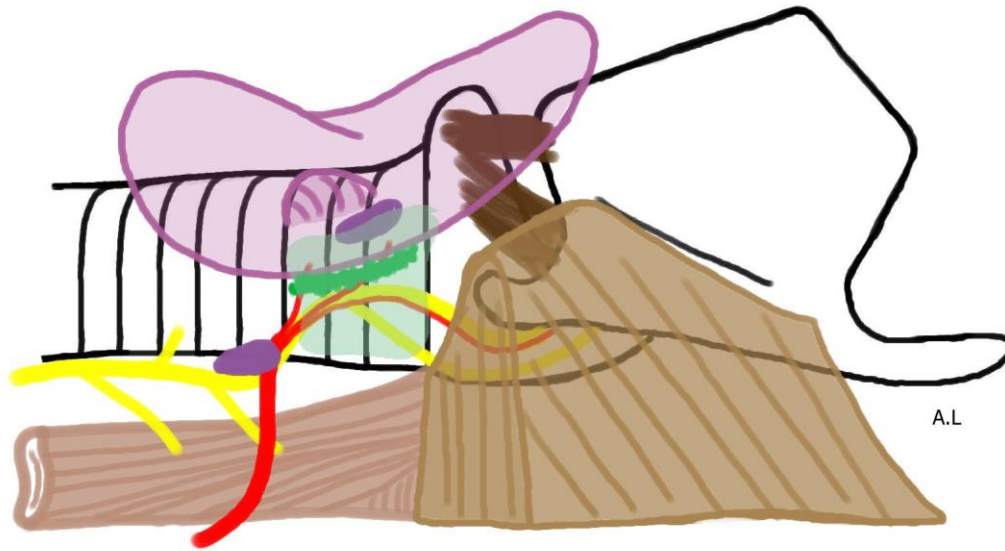
A.L

Ant



Up





Ant



Up

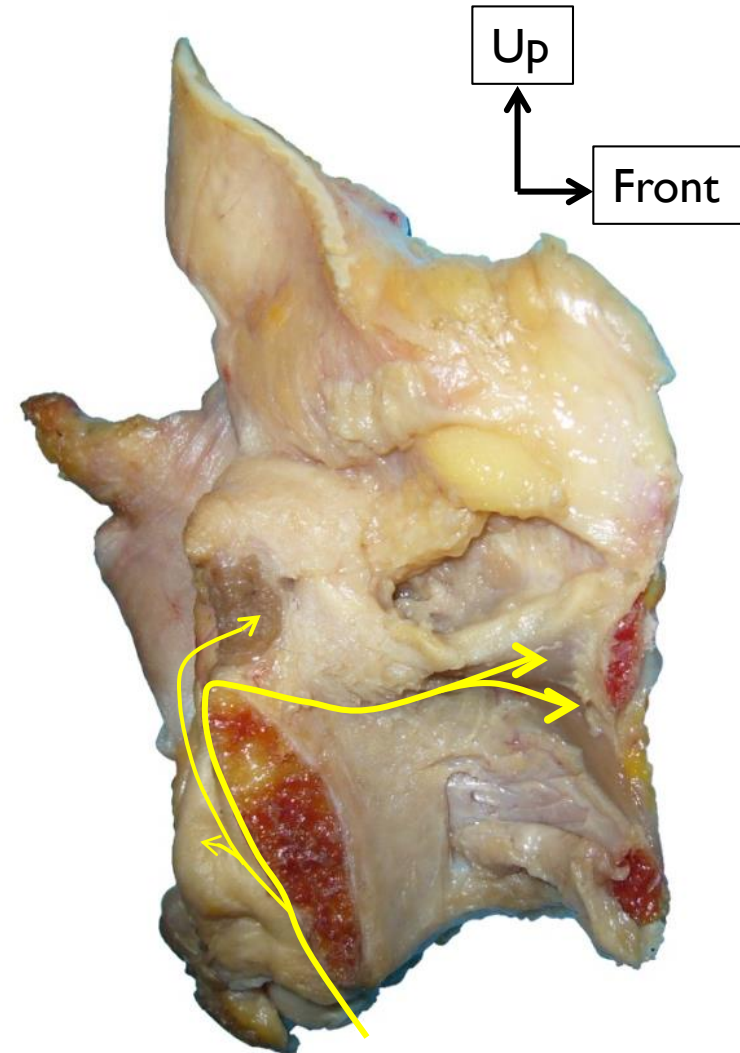




# Inferior Laryngeal Nerve-Ending

---

- ▶ **Motor nervous branches**
  - ▶ For all the intrinsic laryngeal muscles
  - ▶ **EXCEPT** crico-thyroid muscle

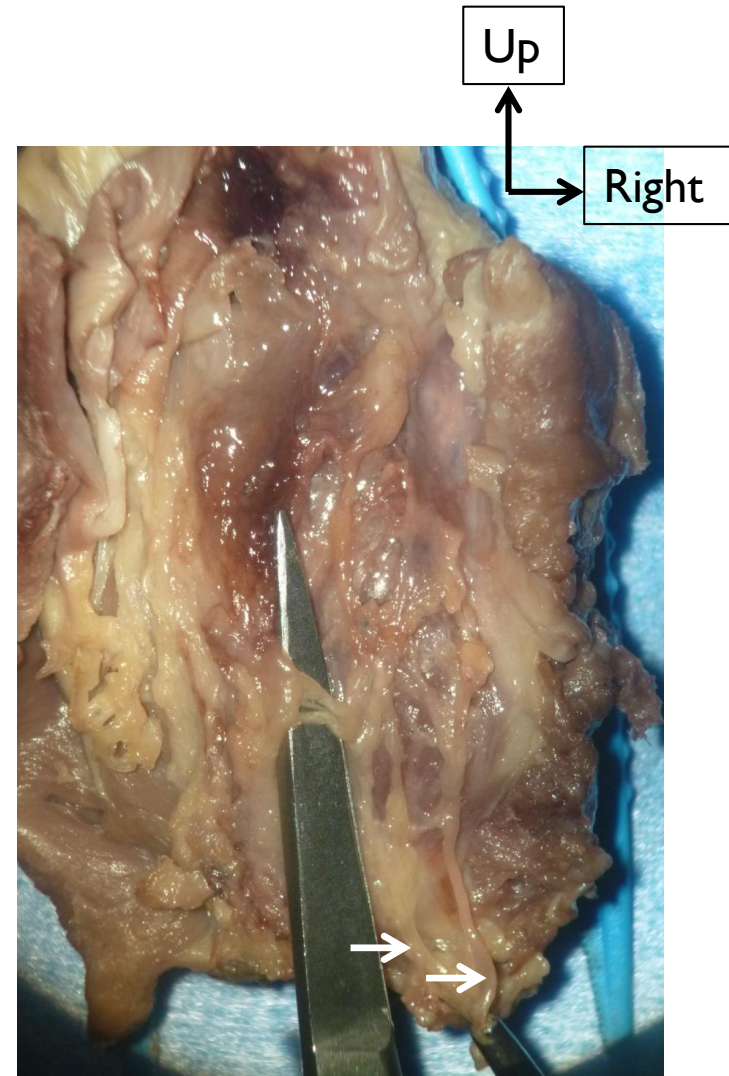


# Inferior Laryngeal Nerve-Ending

## 2 Terminal branches

### ▶ Posterior

- ▶ Runs on the posterior aspect of the PCA, under the pharyngeal mucosa
- ▶ Communication with the internal laryngeal nerve
  - ▶ Galien ansa

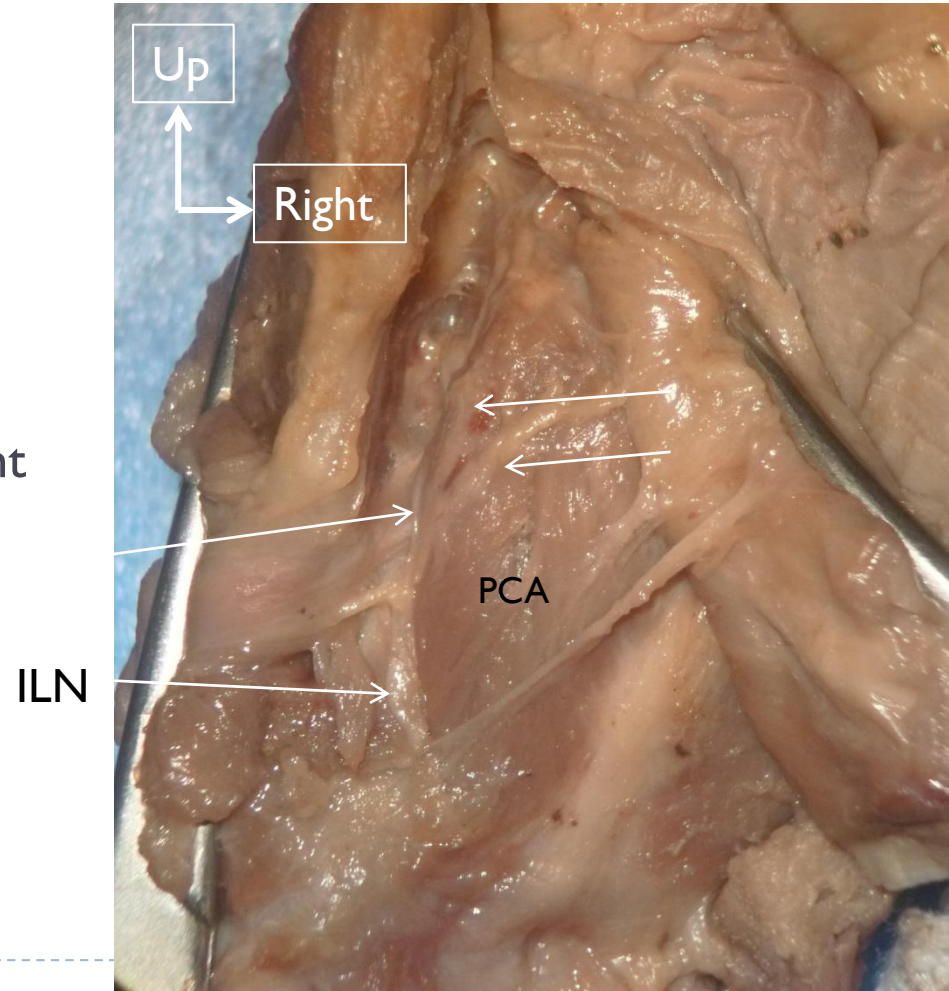


# Inferior Laryngeal Nerve-Ending

## 2 Terminal branches

### ▶ Anterior

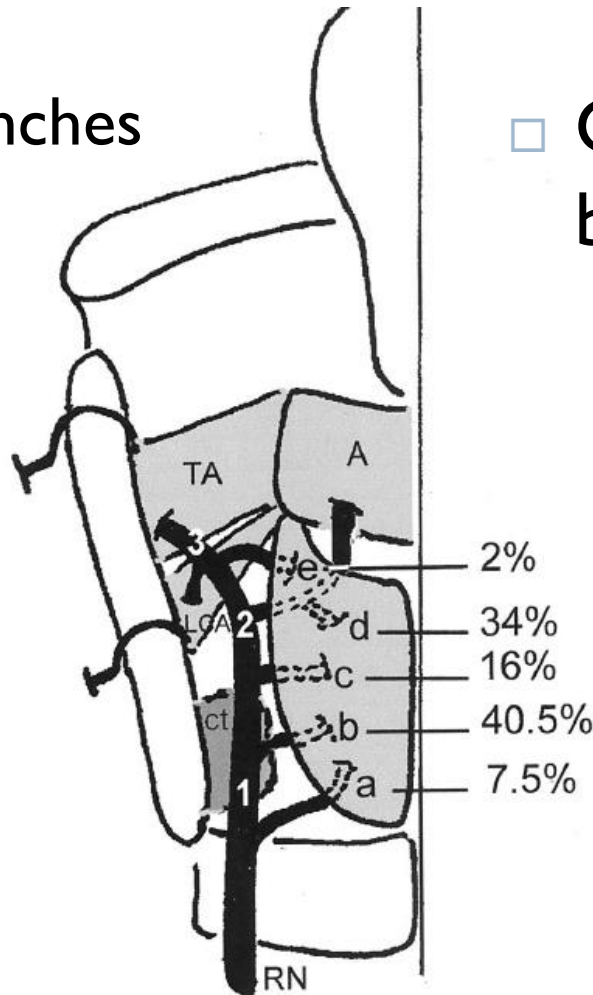
- ▶ Motor Innervation of the intrinsic muscles
- ▶ Vertical segment: behind the cricothyroid joint
- ▶ Genu: Anterior curve, above the joint
- ▶ Oblique segment, laterally to LCA muscle



# Inferior laryngeal Nerve : variability of the terminal branches

## ▶ Number of branches

- ▶ 1 branch=7.3%
- ▶ 2 branches=42.7%
- ▶ 3 branches=34%
- ▶ 4 branches=10.7%
- ▶ 5 branches=4.7%
- ▶ 6 branches: 0.6%



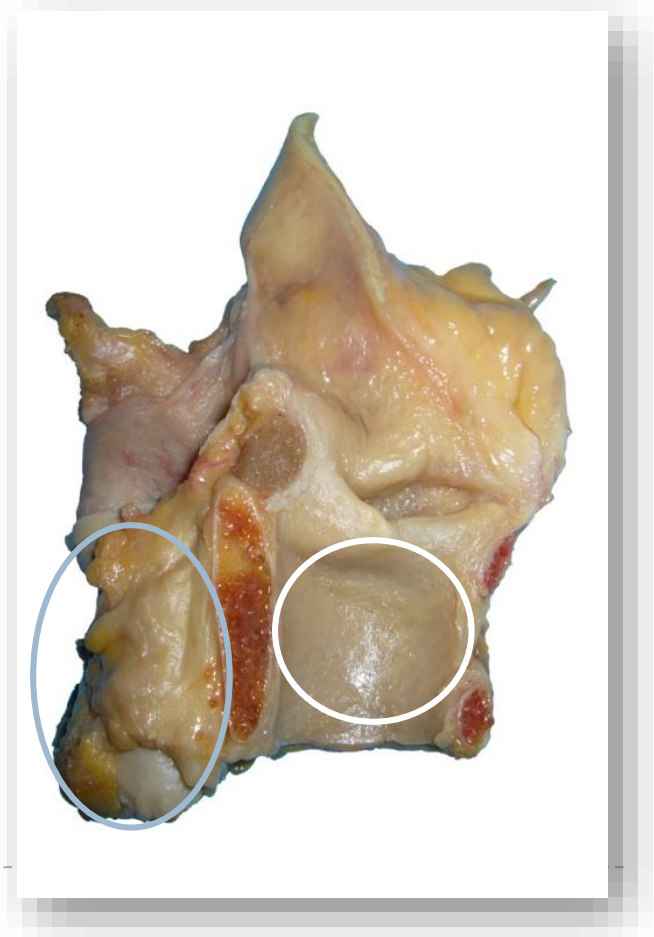
## □ Origins of the PCA branches

- A: vertical segment under CT joint
- b: vertical segment behind CT joint
- c: vertical segment above CT joint
- d=genu, common origin with IA nerve branch
- e=oblique segment, between the IA and LCA branches

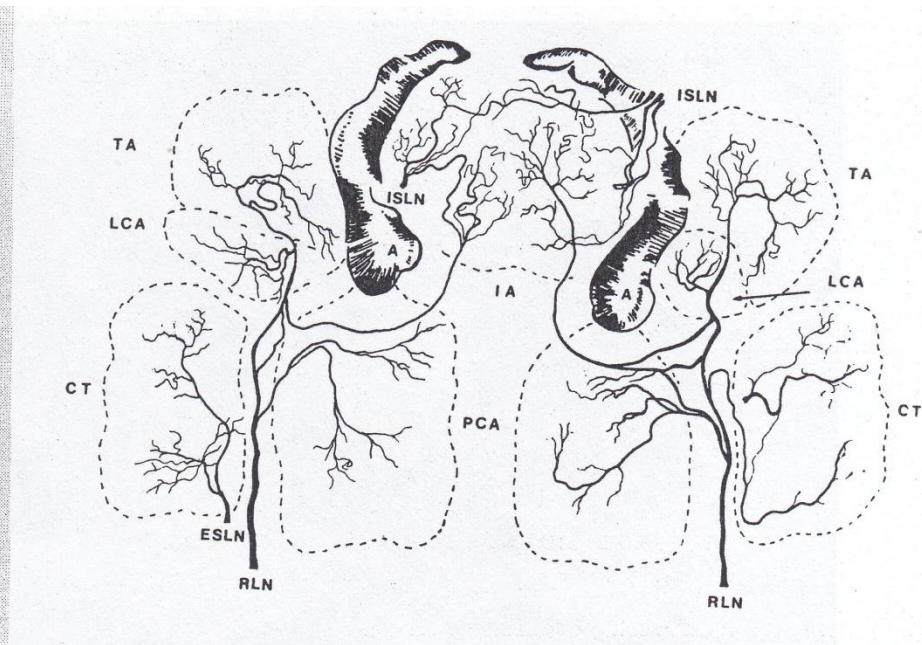
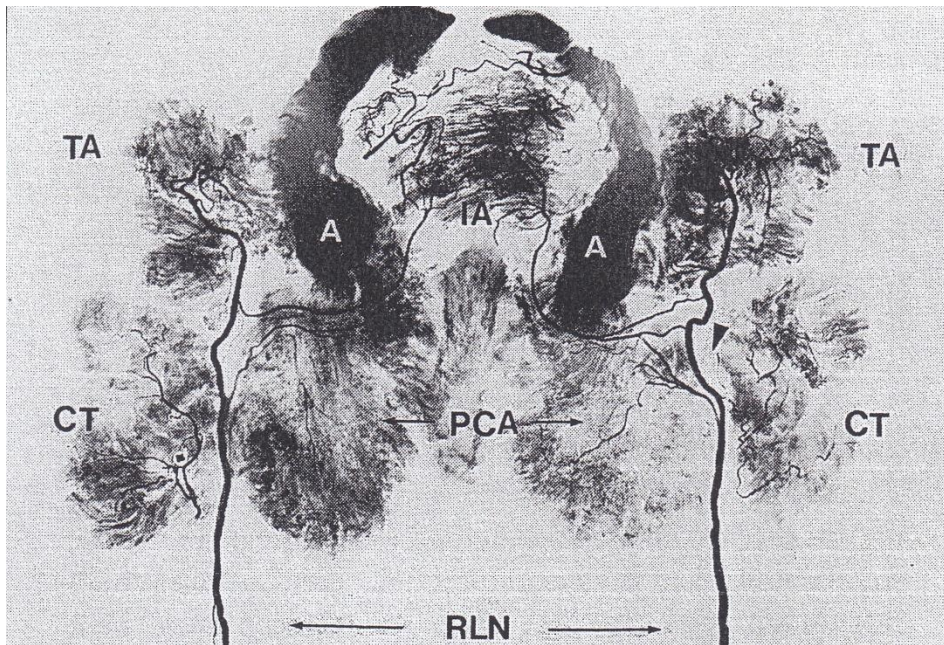
# Inferior laryngeal nerve-Ending

---

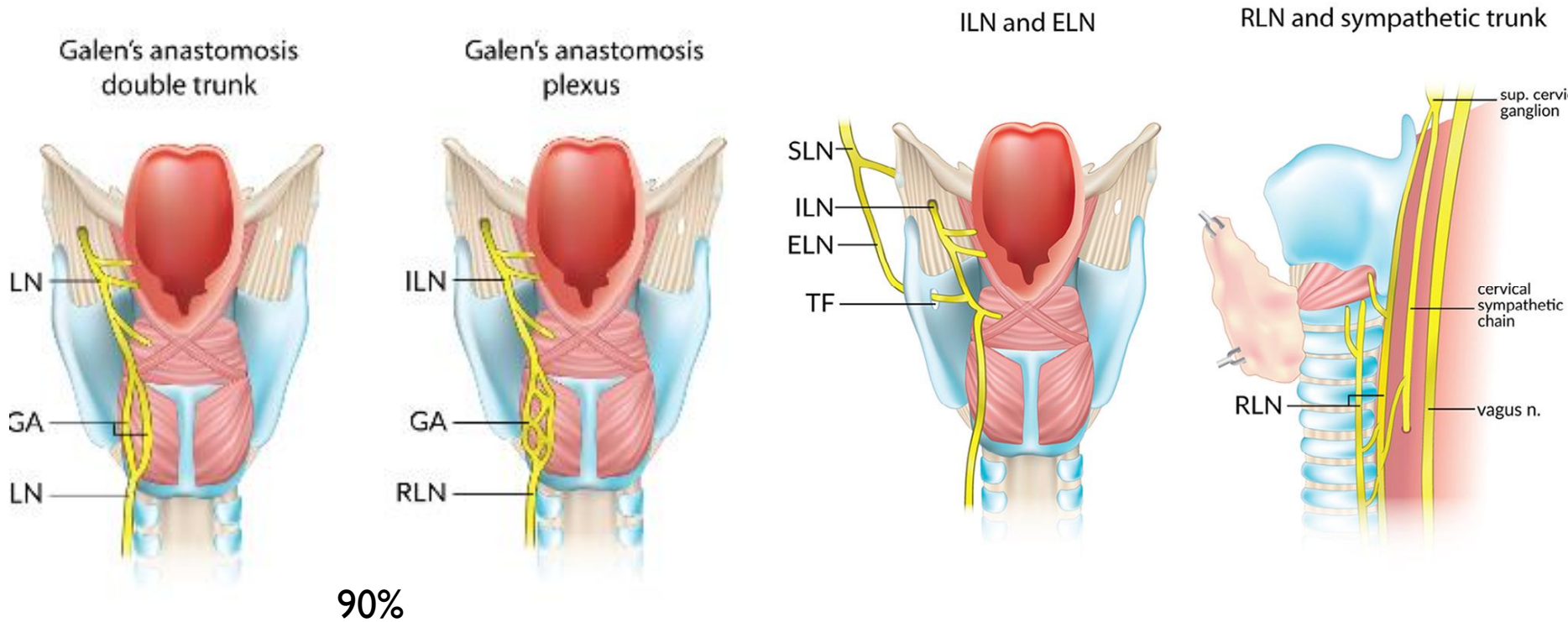
- ▶ Sensory branches
  - ▶ Piriform sinus
  - ▶ Subglottic space



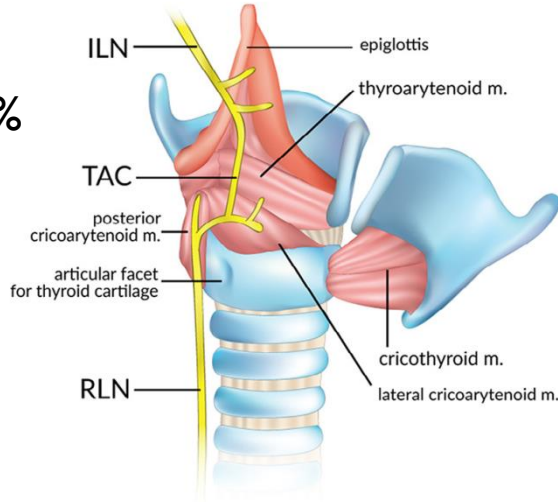
# Communications between ILN and SLN



# Communications between ILN and SLN

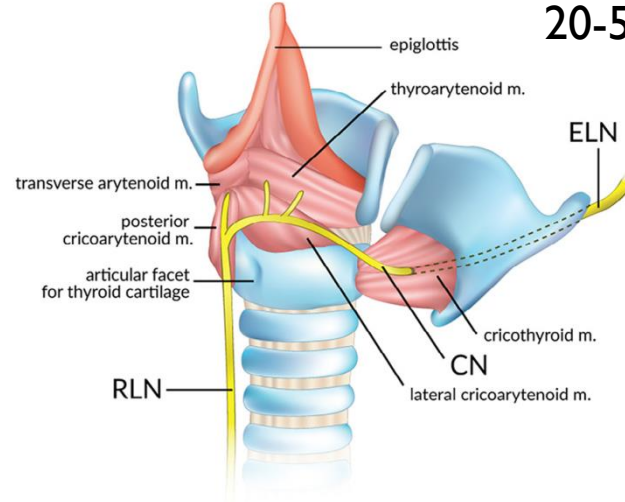


Thyroarythenoid communication



8-15%

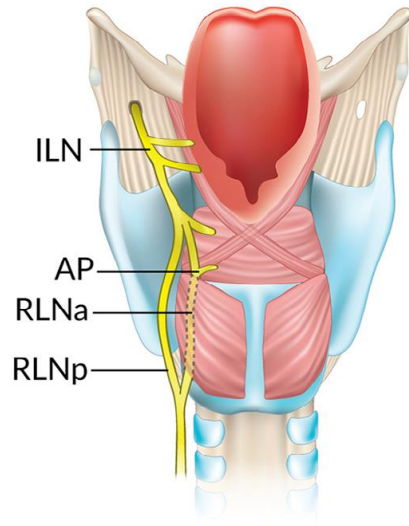
Communication between ELN and RLN



20-50%

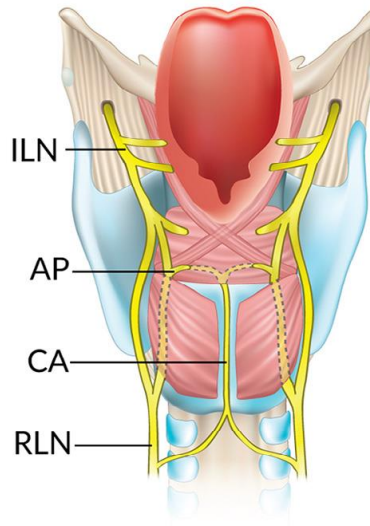
Arytenoid plexus

70%



Cricoid communication

20%





---

# Thanks for your attention

[Aude.lagier@chuliege.be](mailto:Aude.lagier@chuliege.be)

