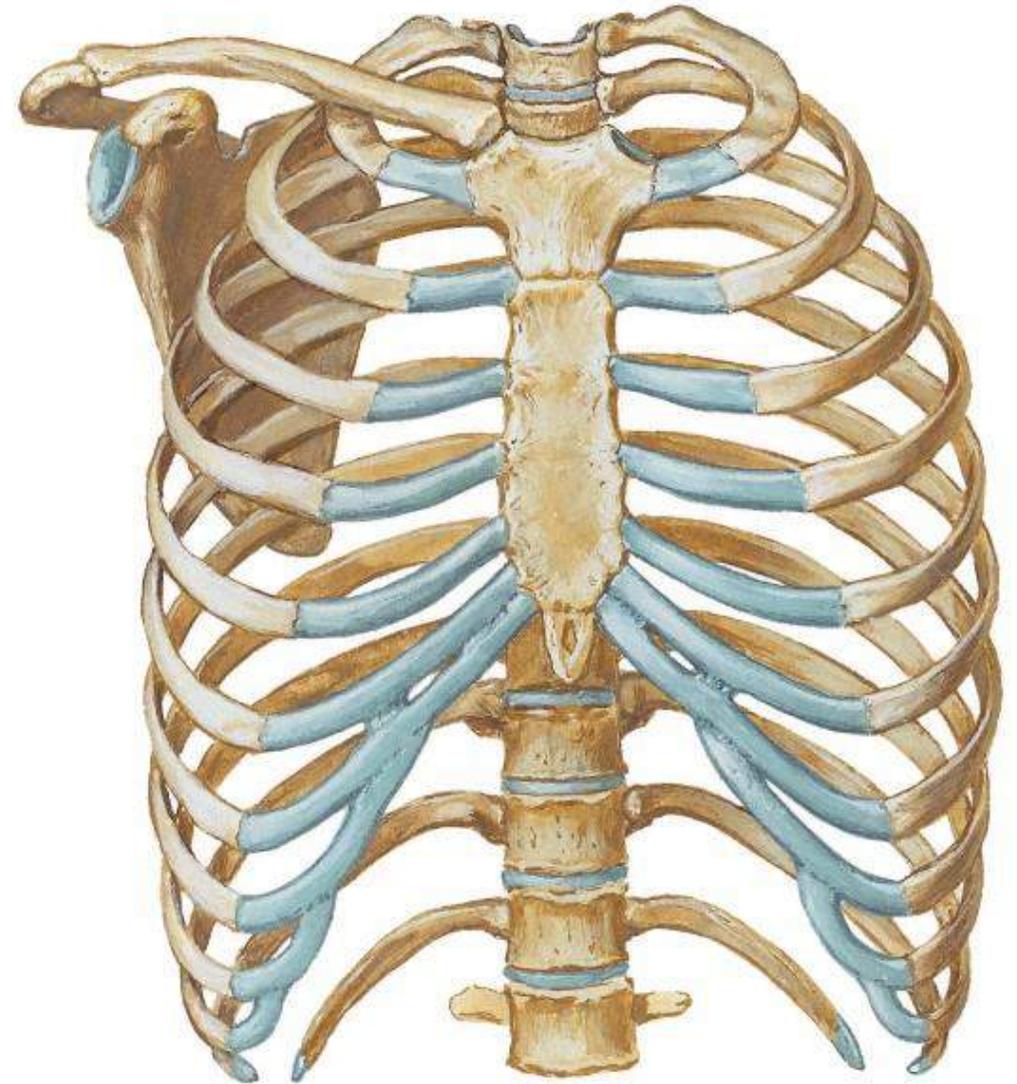


THORACIC CAGE & INTERCOSTAL SPACES 1

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THORACIC CAGE

DEF.:-

It is an osseocartilaginous frame around the principal organs of respiration and circulation

Structure

Anteriorly:

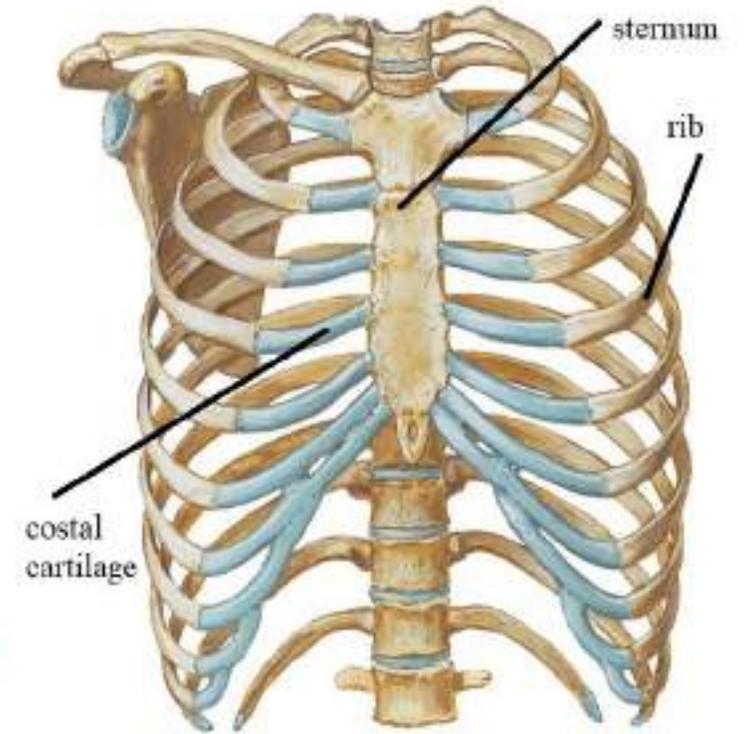
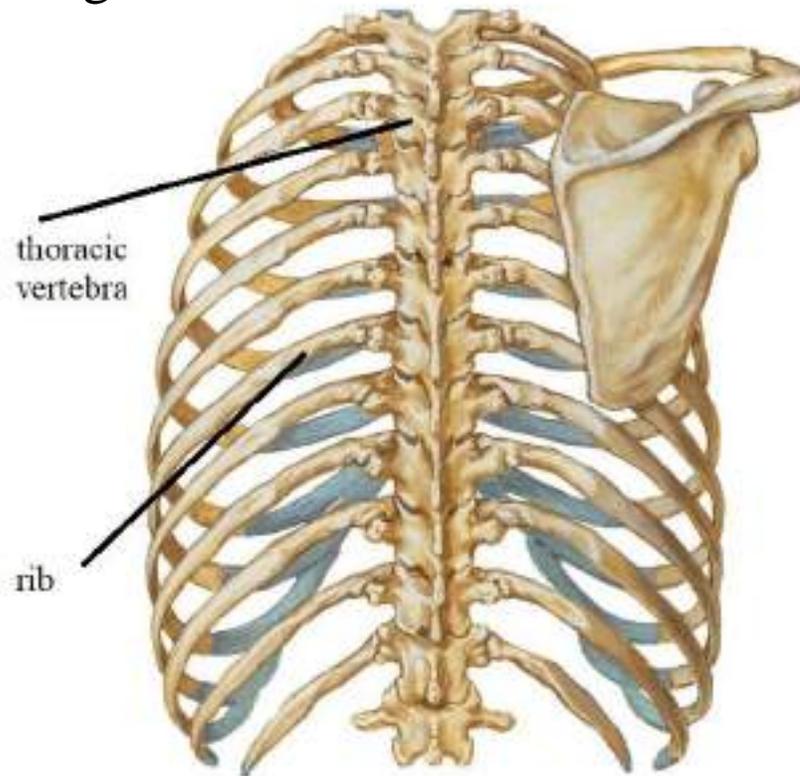
The sternum & costal cartilages.

Posteriorly:

12 thoracic vertebrae, intervertebral discs & posterior parts of ribs.

On sides:

ribs & intercostal spaces



STERNUM



PARTS OF THE STERNUM

manubrium sterni

Features:-

- Its upper border shows the suprasternal(jugular)notch
- Its superolateral angles show clavicular notch

Level :- It lies opposite T3,4

Body of the sternum

Features:-

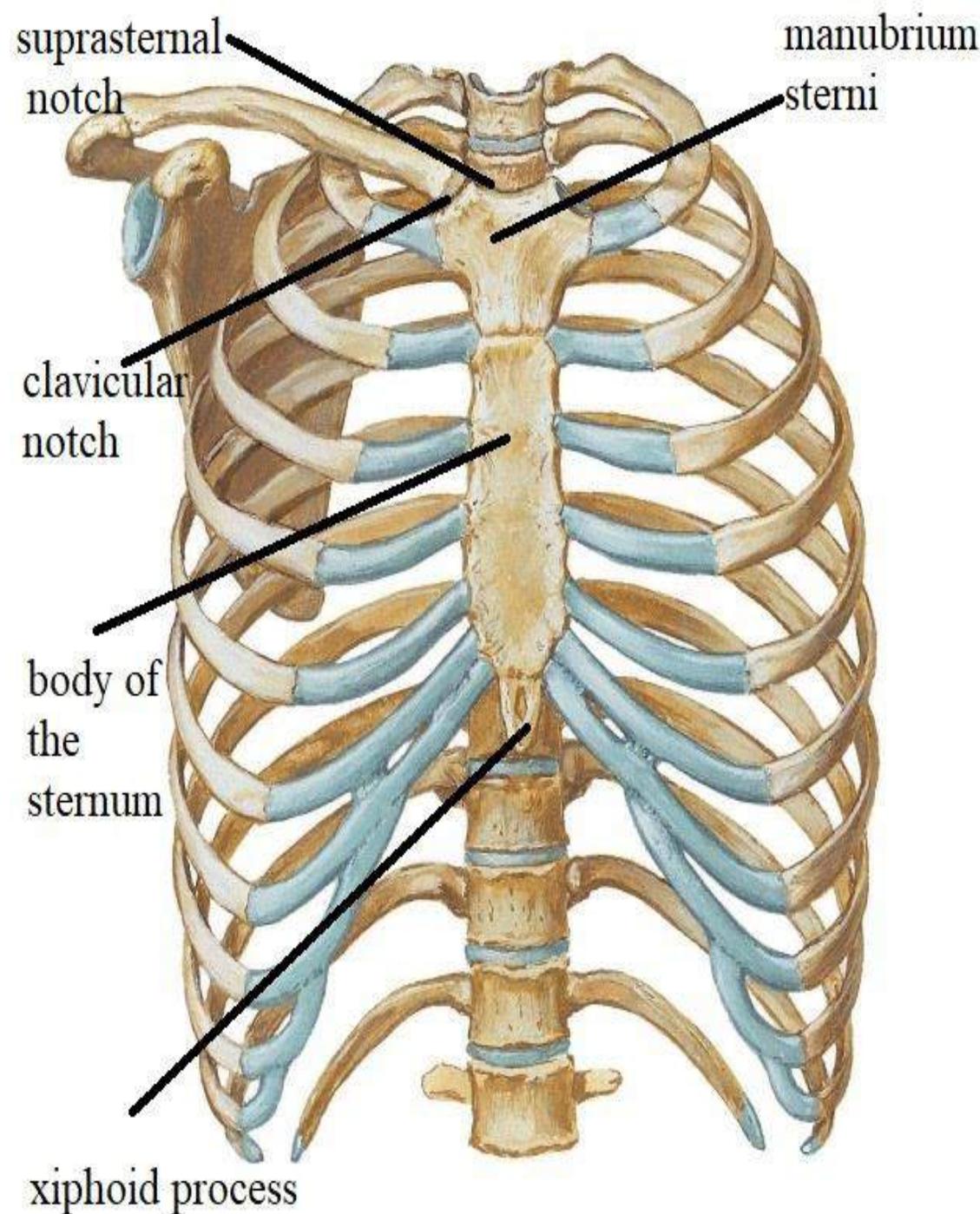
It consists of 4 parts that fuse in a single body at 25 years
The sites of fusion are indicated by 3 faint transverse ridges

Level :- It lies opposite T5,6,7,8,9

Xiphoid process

Features:- remains cartilage till the age of 40

Level :- It lies opposite T9



JOINTS OF THE STERNUM

Joints within the sternum

Manubrio sternal junction

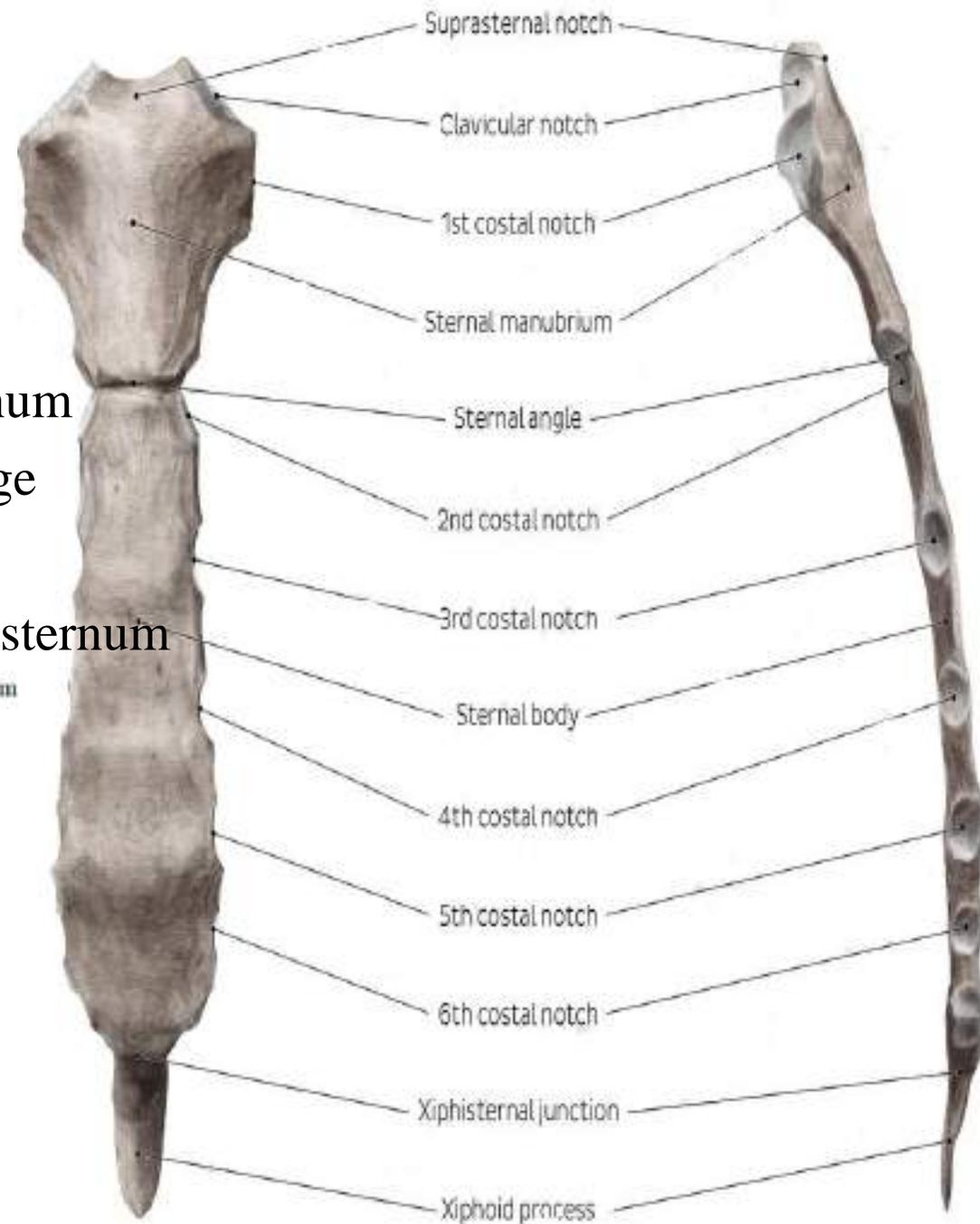
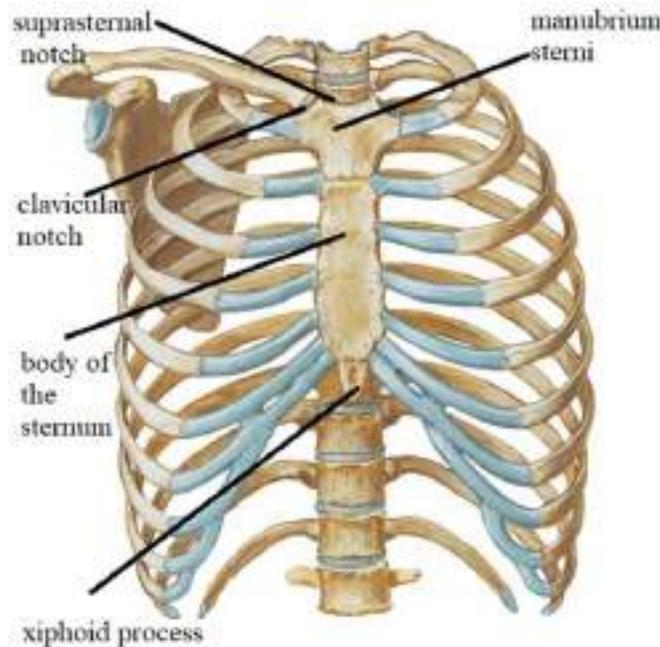
=sternal angle

= angle of LOUIS

- between the manubrium and body of the sternum
- Opposite T3/T4 OR level of 2nd costal cartilage

Xiphi sternal junction

- Between the xiphoid process and body of the sternum
- Opposite T9



JOINTS OF THE STERNUM

Joints between the sternum and other structures

Sterno clavicular joint

- Between the manubrium and the clavicle

Sterno costal joints

Between the lateral border of the sternum and the upper 7 costal cartilage

The 1st sternocostal joint:-

just below the clavicular notch

The 2nd sternocostal joint :-

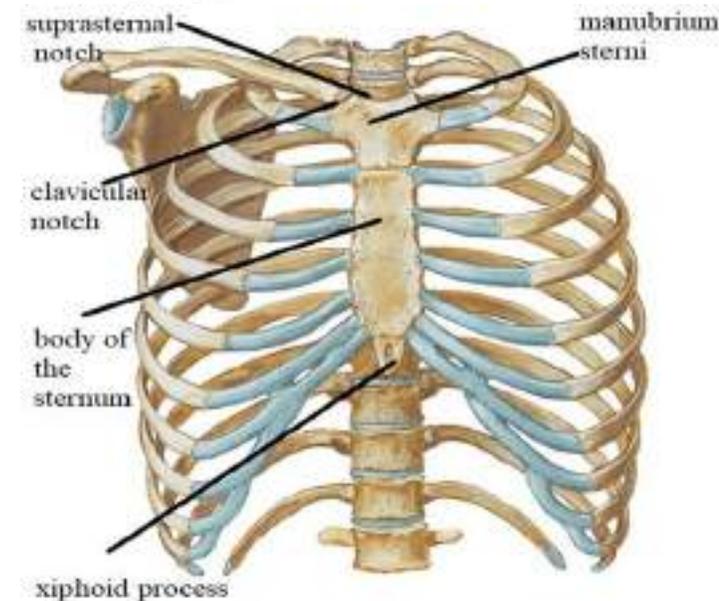
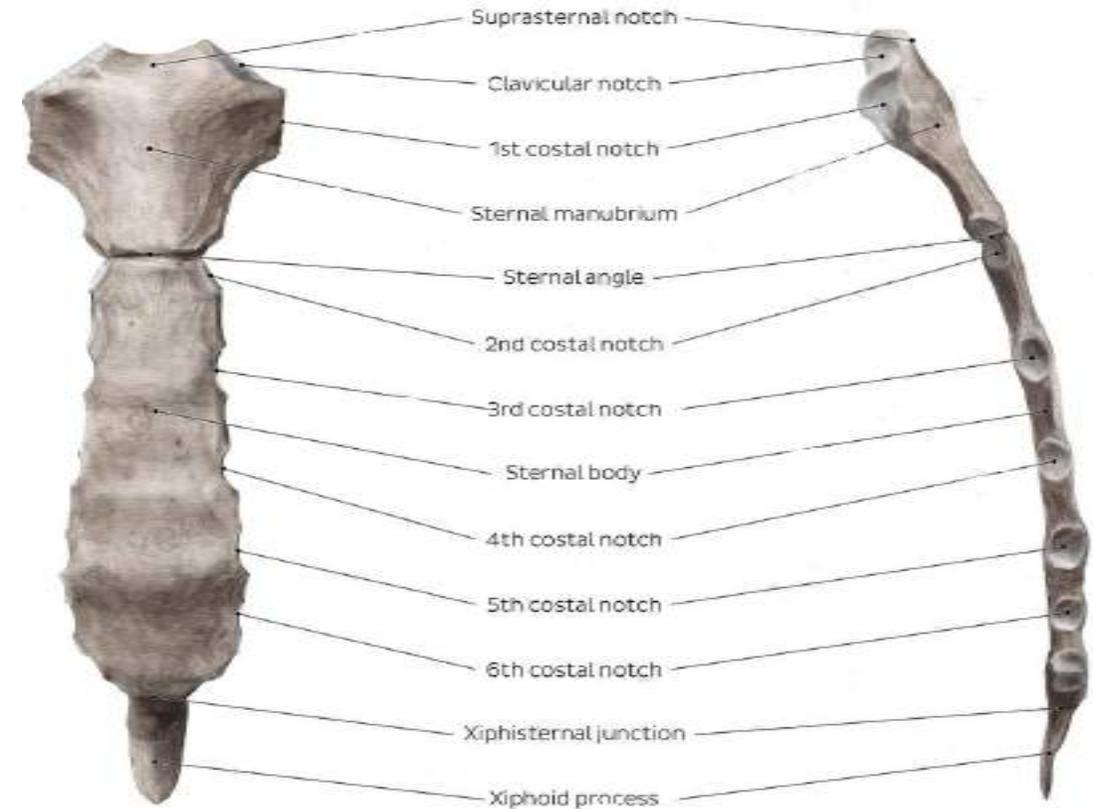
opposite the sternal angle

The 3-6 sternocostal joints :-

on the lateral border of the sternal body

The 7th sternocostal joint:-

opposite the xiphisternal junction



RIBS



CLASSIFICATION OF THE RIBS

There are 12 pairs of ribs, all of which are attached posteriorly to the thoracic vertebrae

Classification according to their relation to sternum

True ribs

- the upper 7 ribs
- whose Costal Cartilages Join the sternum directly

False ribs

- the 8th ,9th &10th ribs
- whose costal cartilage Join each other & Join the 7th costal Cartilage forming the costal margin

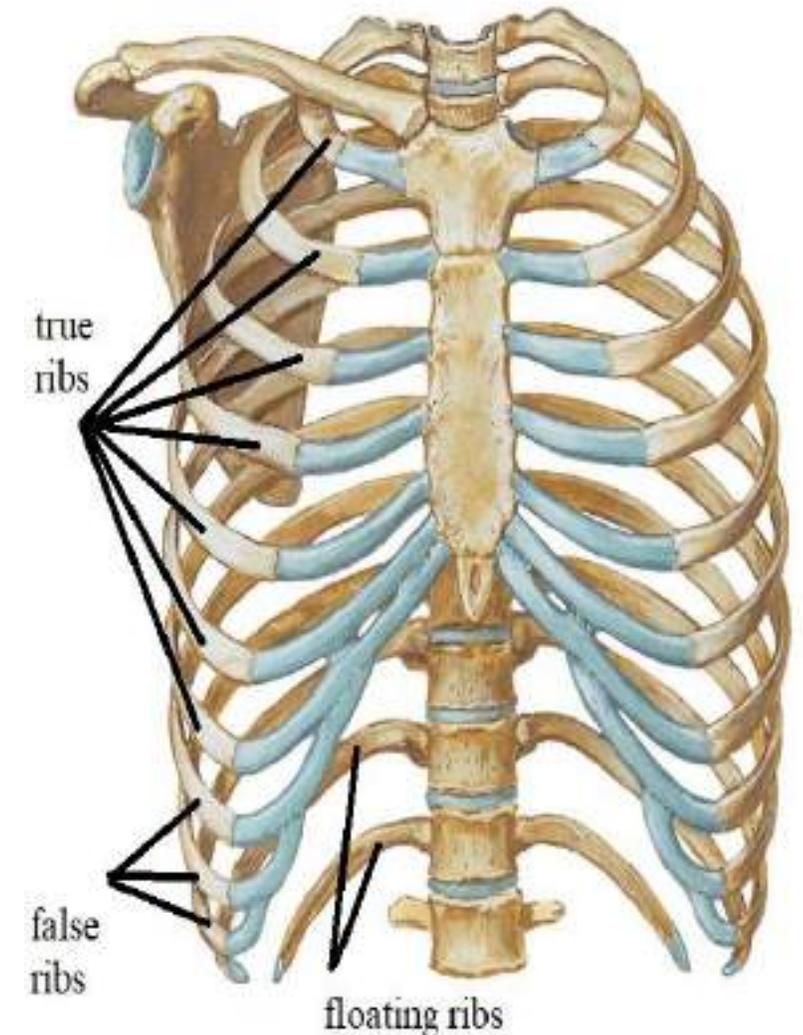
Floating ribs

- the 11th &12th ribs
- who end freely in the abdominal muscles.

Classification according to the features of the ribs

Typical ribs: From 3rd to 9th

Non-typical ribs: 1st , 2nd ,10th ,11th &12th



GENERAL FEATURES OF THE TYPICAL RIBS

Each typical rib has 3 parts: post. end, shaft & ant. end

The posterior end: formed of head, neck & tubercle

the head: has 2 articular facets separated by a crest

the upper facet:

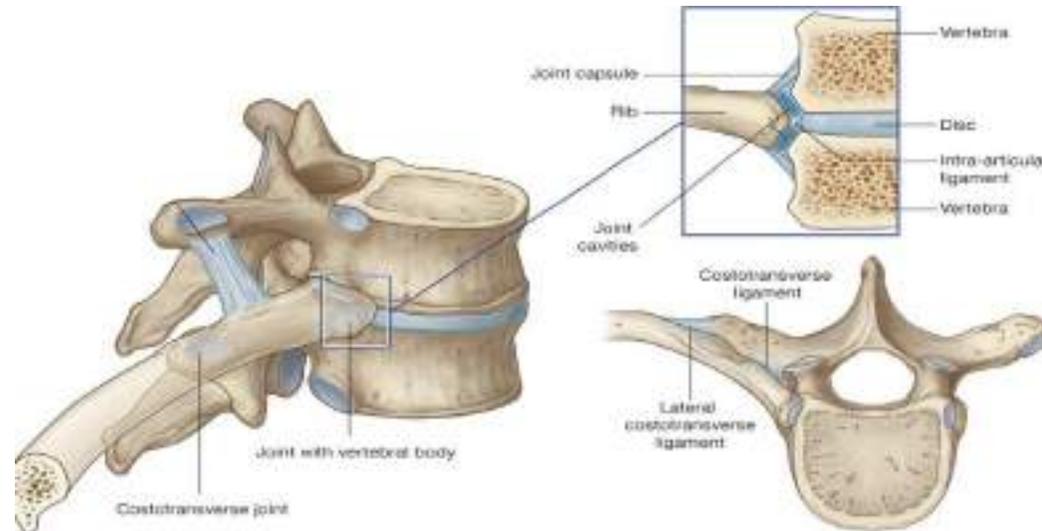
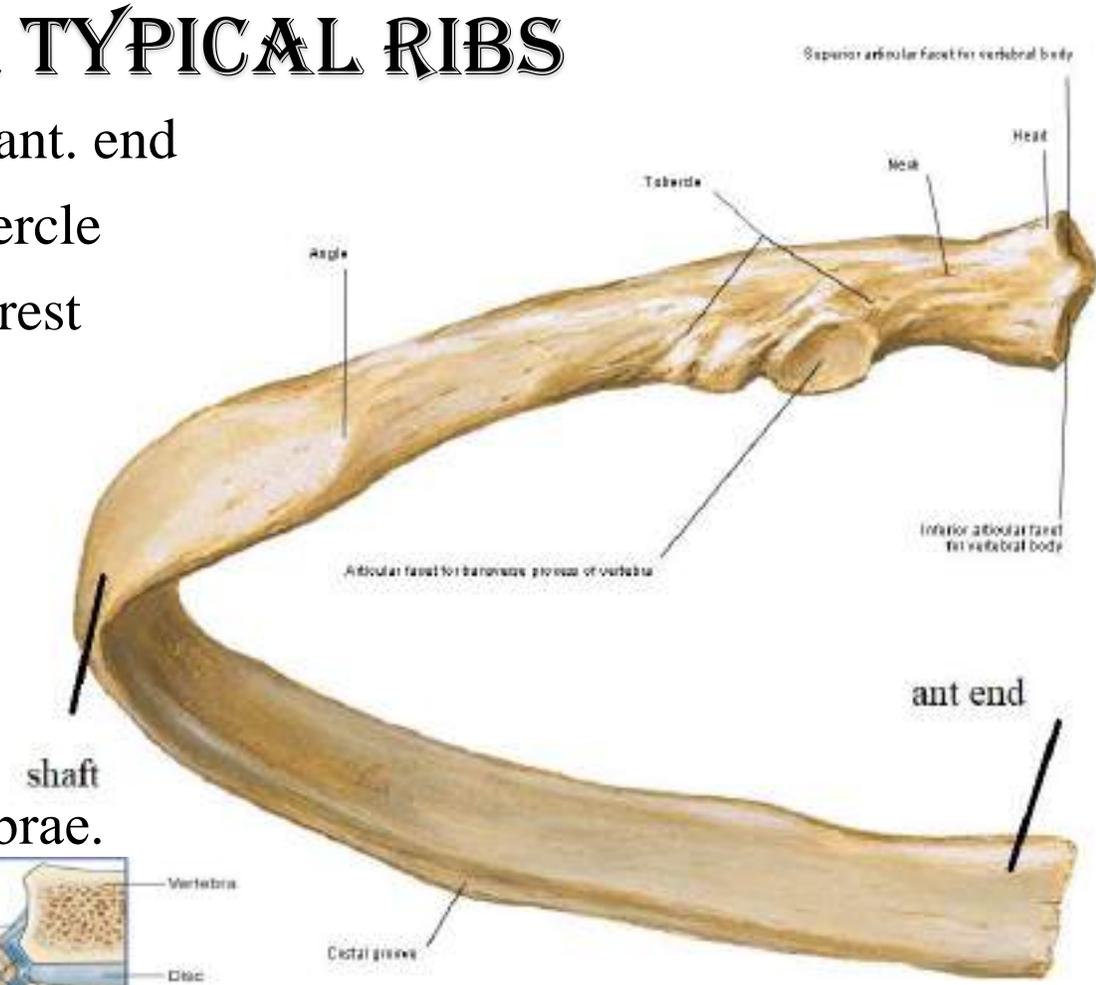
For the body of the vertebra above

the lower facet:

For the body of vertebra of the same number.

the crest:

For the inter vertebral disc between the 2 vertebrae.



GENERAL FEATURES OF THE TYPICAL RIBS

Each typical rib has 3 parts: post. end, shaft & ant. end

The posterior end: formed of head, neck & tubercle

the neck: is the flat part between the head & the tubercle

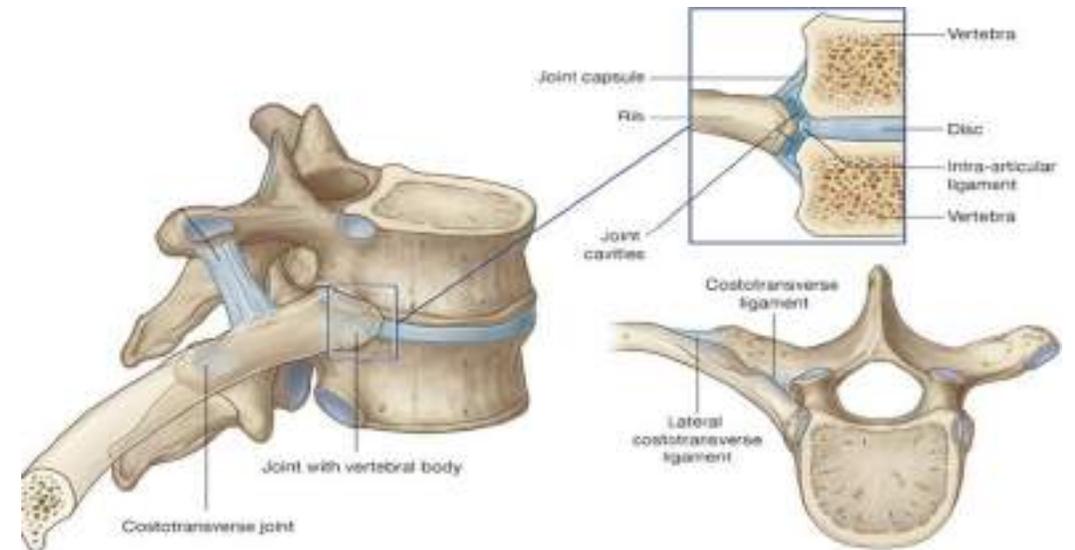
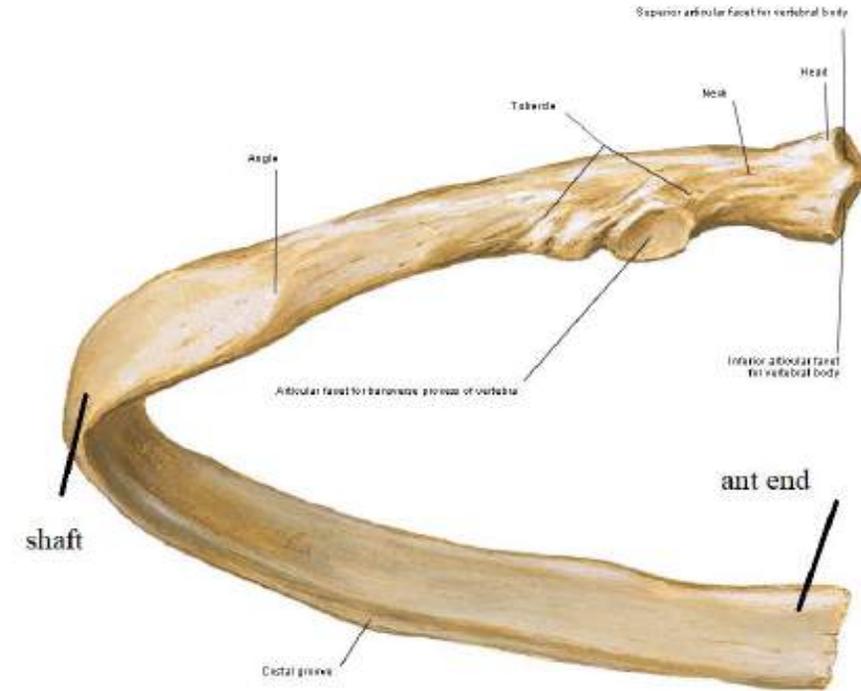
the tubercle:

Medial smooth part:-

articulates with the transverse process of the vertebra of the same number

lateral rough part:

gives attachment to the lat-costo-transverse lig.
Connecting it with the transverse process of the vertebra of the same number.



GENERAL FEATURES OF THE TYPICAL RIBS

Each typical rib has 3 parts: post. end, shaft & ant. end

The Shaft has the following features

- **the angle** of the rib which is the point of greatest change in curvature

- **flat** & has:

2 borders:

Upper border:- rounded

Lower border:- sharp .

2 Surfaces:

outer surface:- convex

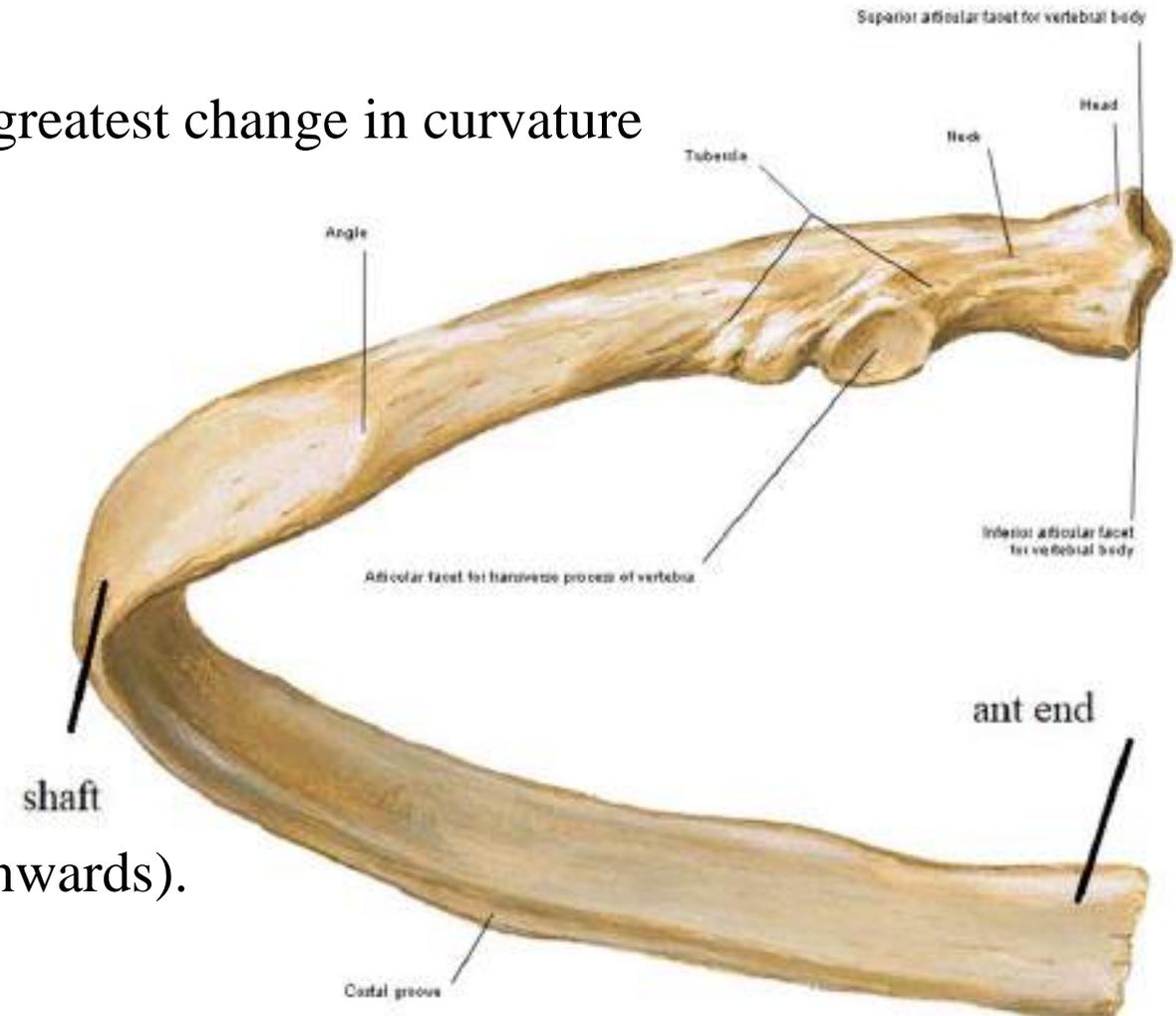
Inner surface :- concave showing

a costal groove in its lower part lodging the intercostal V.,A.&N (from above downwards).

- **twisted**

The anterior end

is cup-shaped & articulates with the Costal cartilage



THE FEATURES OF THE NONE-TYPICAL RIBS

1st rib:-

Head : has one facet for the body of T1

Shaft : flat & has 2 surfaces & 2 borders:

the upper surface

is rough & shows the following features

scalene tubercle : a prominent tubercle on the inner border

groove for subclavian v.: in front of scalene tubercle.

groove for subclavian a. &

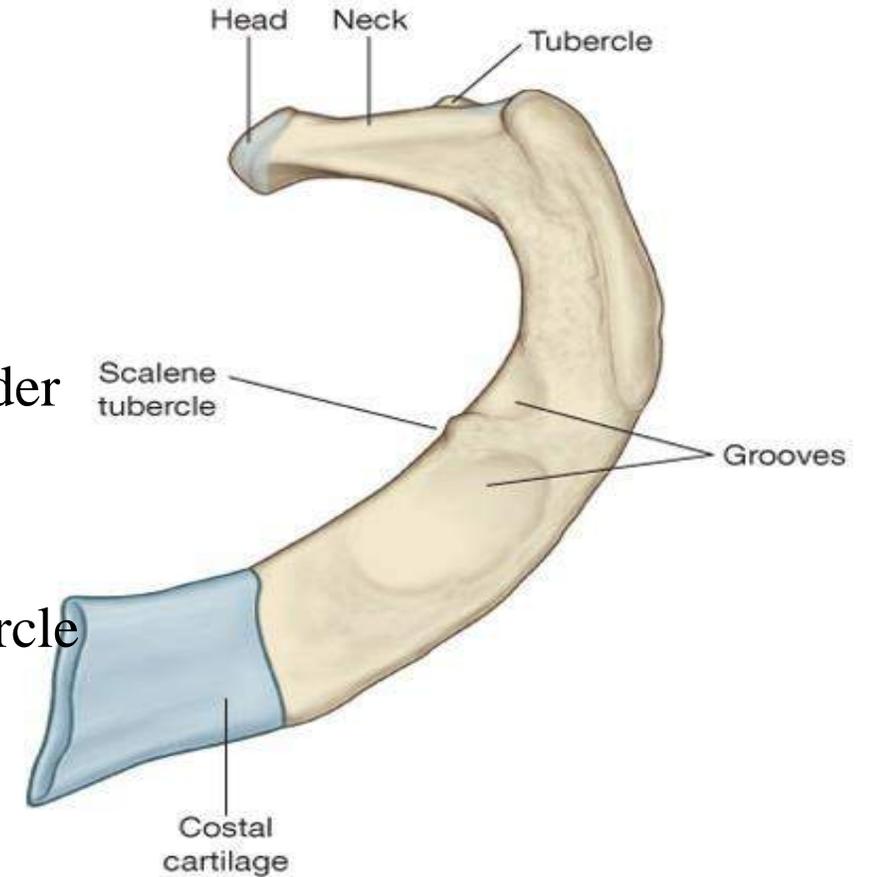
lower trunk of brachial plexus: behind the scalene tubercle

the lower surface is smooth, has no costal groove .

the inner border is Concave

the outer border is convex

Rib I



THE FEATURES OF THE NONE-TYPICAL RIBS

2nd rib:-

The shaft is not twisted

The 10th rib:

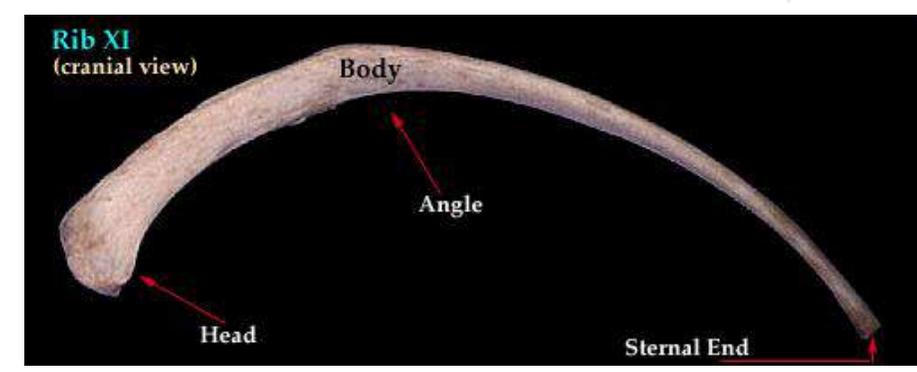
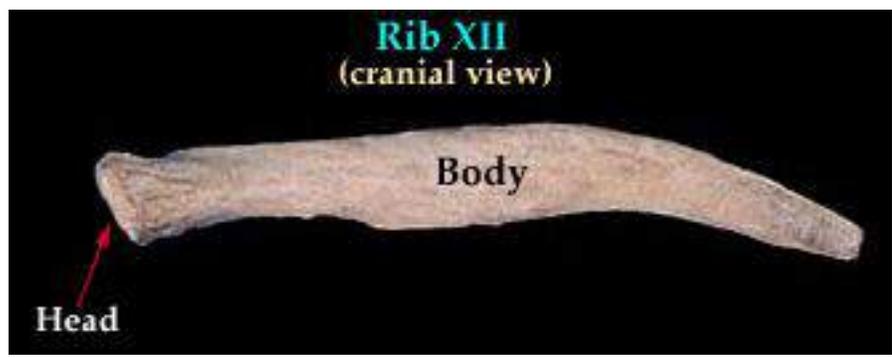
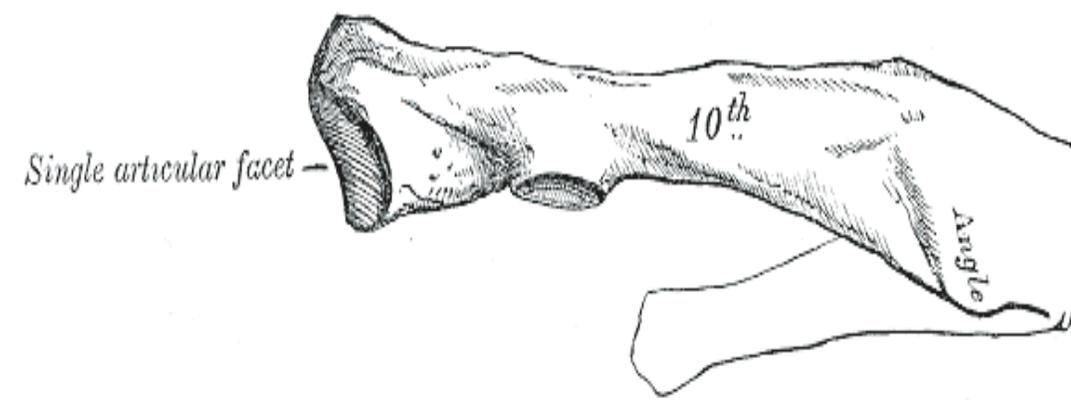
its head : has one facet

The 11th & 12th ribs:

each of them has :

- a large head with one facet
- No neck , no tubercle

the 12th rib differs from the 11th in being shorter & having NO Costal groove



JOINTS OF THE RIBS

Joints between the ribs and vertebrae:-

Costo vertebral :

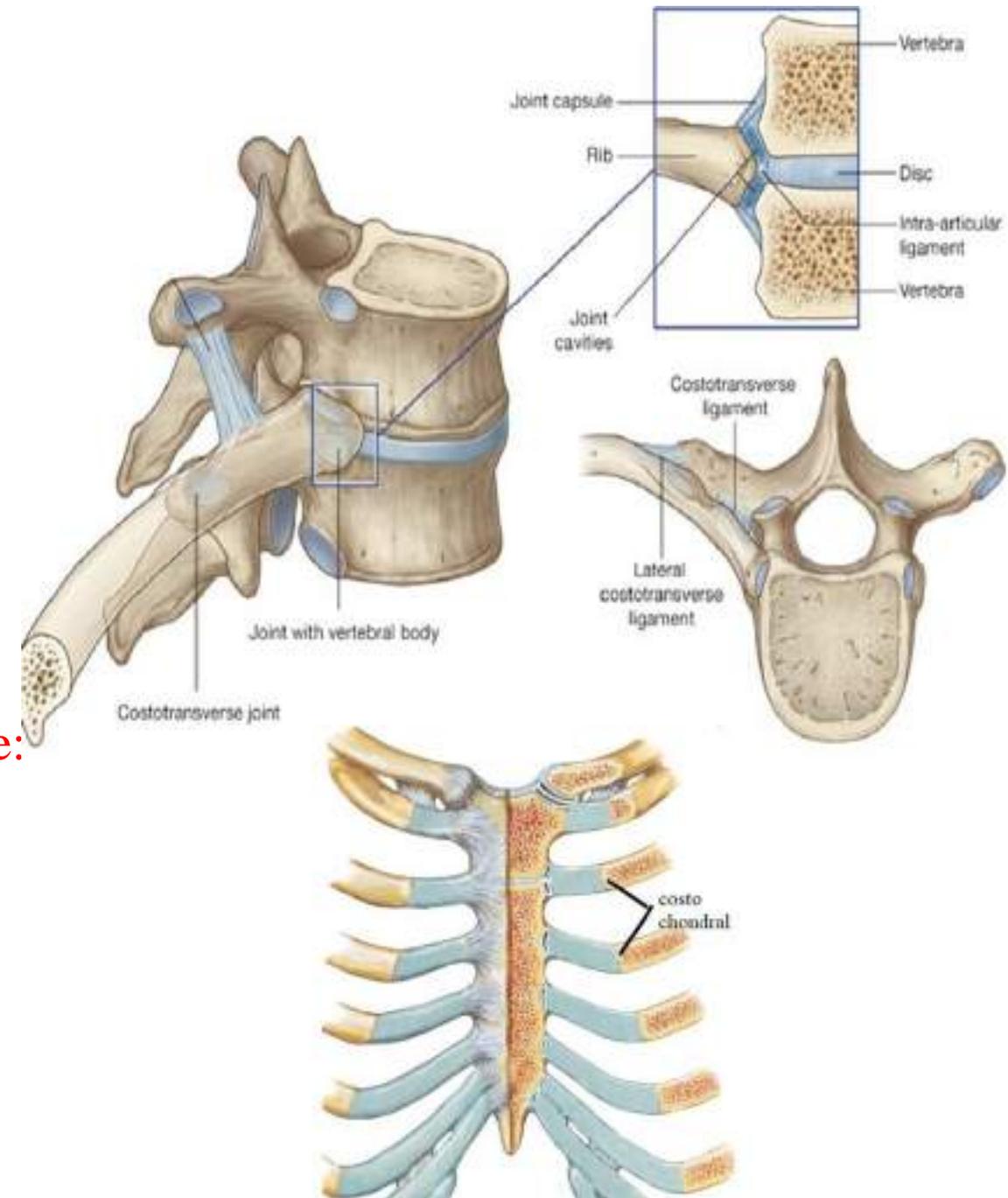
- synovial
- Between the head of the ribs and the body of the thoracic vertebrae

Costo transverse :

- synovial
- Between the tubercle of the rib and the transverse process of the vertebra

Joints between the ribs and the costal cartilage:

Costo Chondral : 1ry cartilaginous



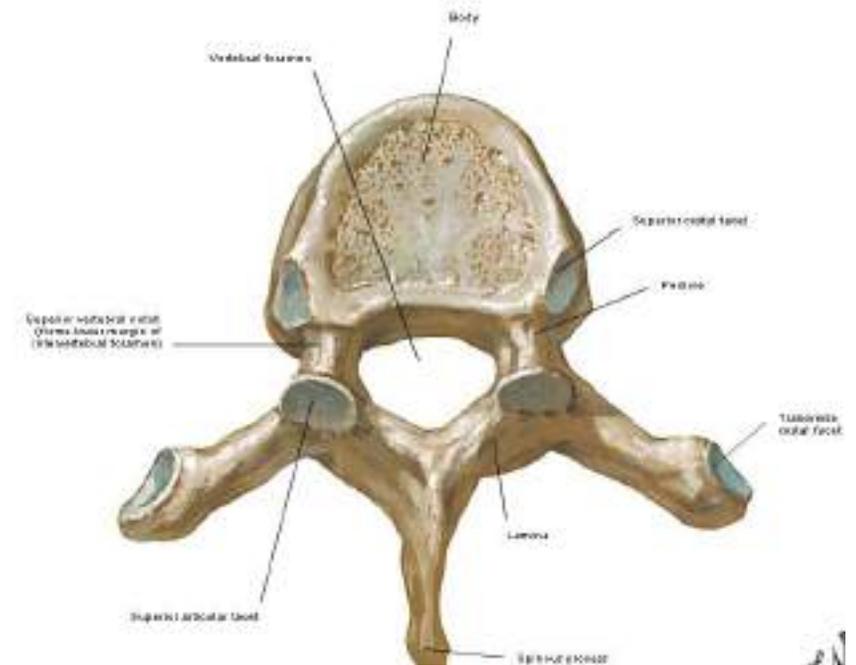
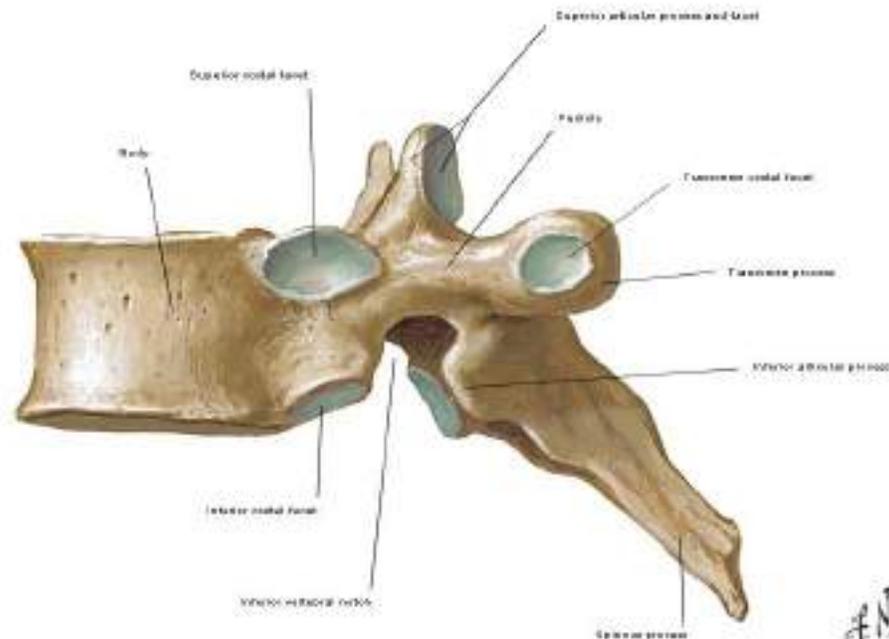
THORACIC VERTEBRÆ



FEATURES OF THE TYPICAL THORACIC VERTEBRAE

The typical thoracic vertebrae are the 2nd till 8th vertebrae that has the following features

- 1- Two demi facets (on the side of body)
the upper for the rib of the same number
but the lower for the rib below
- 2- An articular facet on transverse process
- 3- Spine is long and directed backwards and downwards



FEATURES OF THE NON TYPICAL THORACIC VERTEBRAE

T1

the body has

one superior complete facet (for the head of the 1st rib)
and small inferior demi facet
(for part of the head of the 2nd rib).

T9

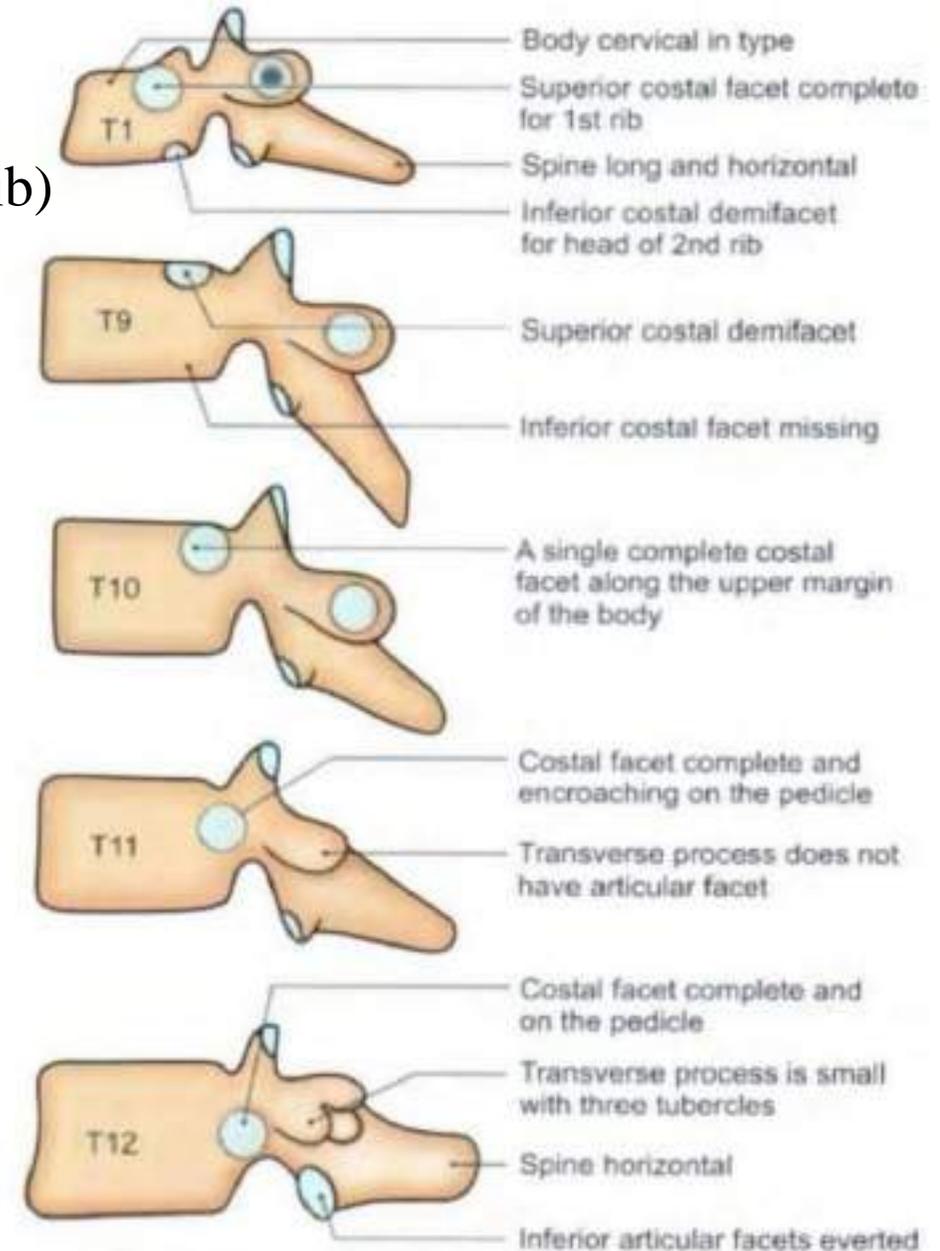
the body has

superior demi facet (for the head of the 9th rib)

T10

The body has

only one sup. Complete facet
(for the head of 10th rib)



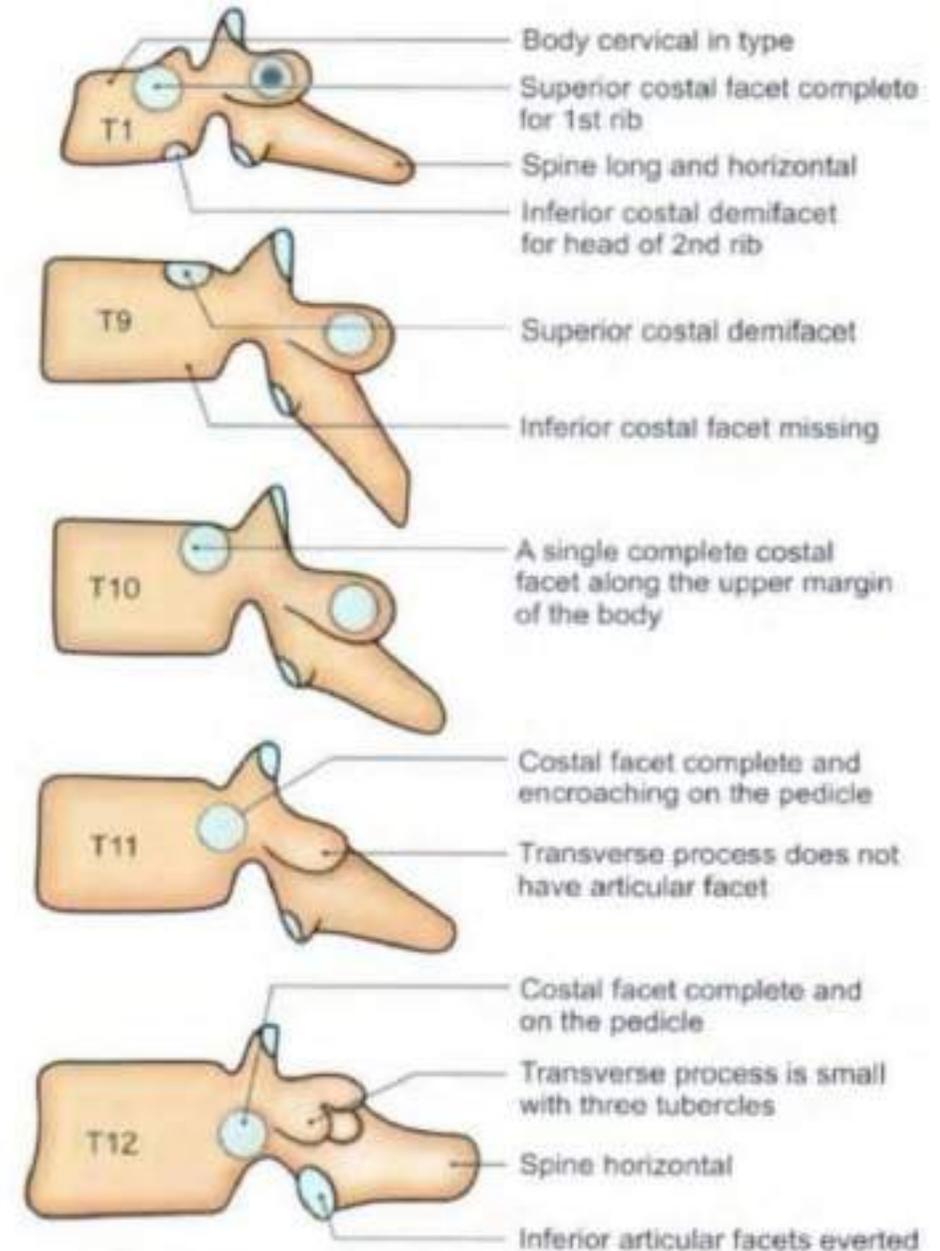
FEATURES OF THE NON TYPICAL THORACIC VERTEBRAE

T11

- the body has only one complete facet above (for head of 11th rib).
- the transverse process is small & has no costal facet.

T12 like T11 BUT

- the body has one complete facet encroaches on the middle of the pedicle.
- the inf. articular facet is directed laterally instead of forwards



THE INTERCOSTAL SPACES



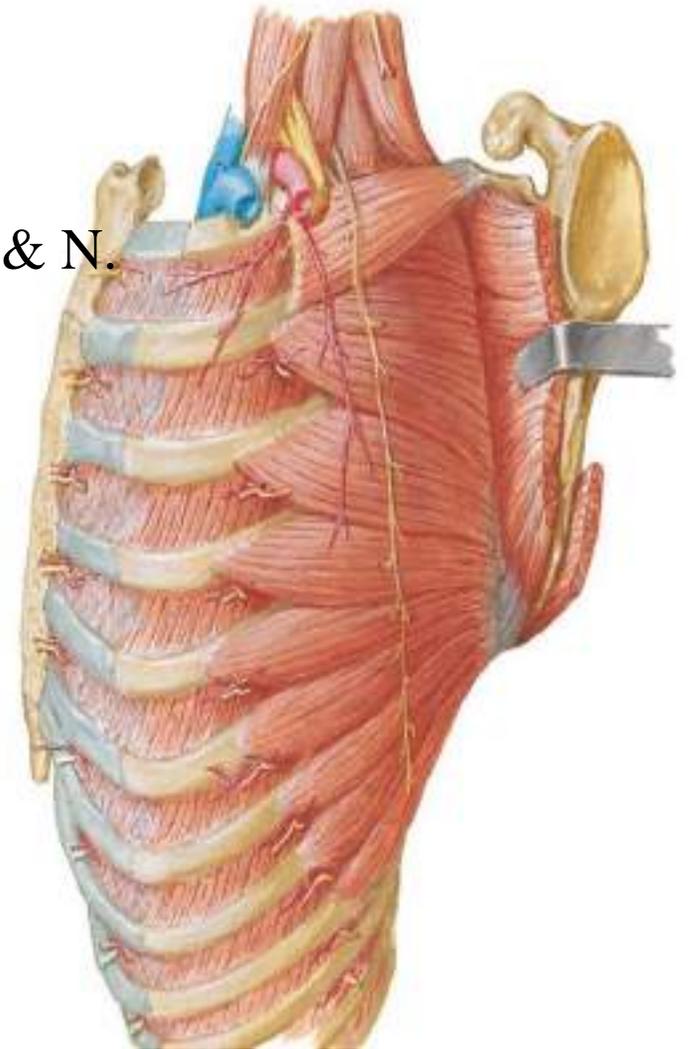
INTERCOSTAL SPACES

Def.: the space between each 2 successive ribs. There are 11 intercostal spaces on either side & each space lies below the numerically corresponding rib i.e the 1st space lies below the 1st rib

Structure: each intercostal space contains:

1- Intercostal muscles & membranes

2- a neurovascular bundle consisting of : intercostal V. & A. & N.



INTERCOSTAL MUSCLES

External intercostal muscle

O.: from the lower border of the rib above.

Direction of fibers: obliquely downwards & forwards

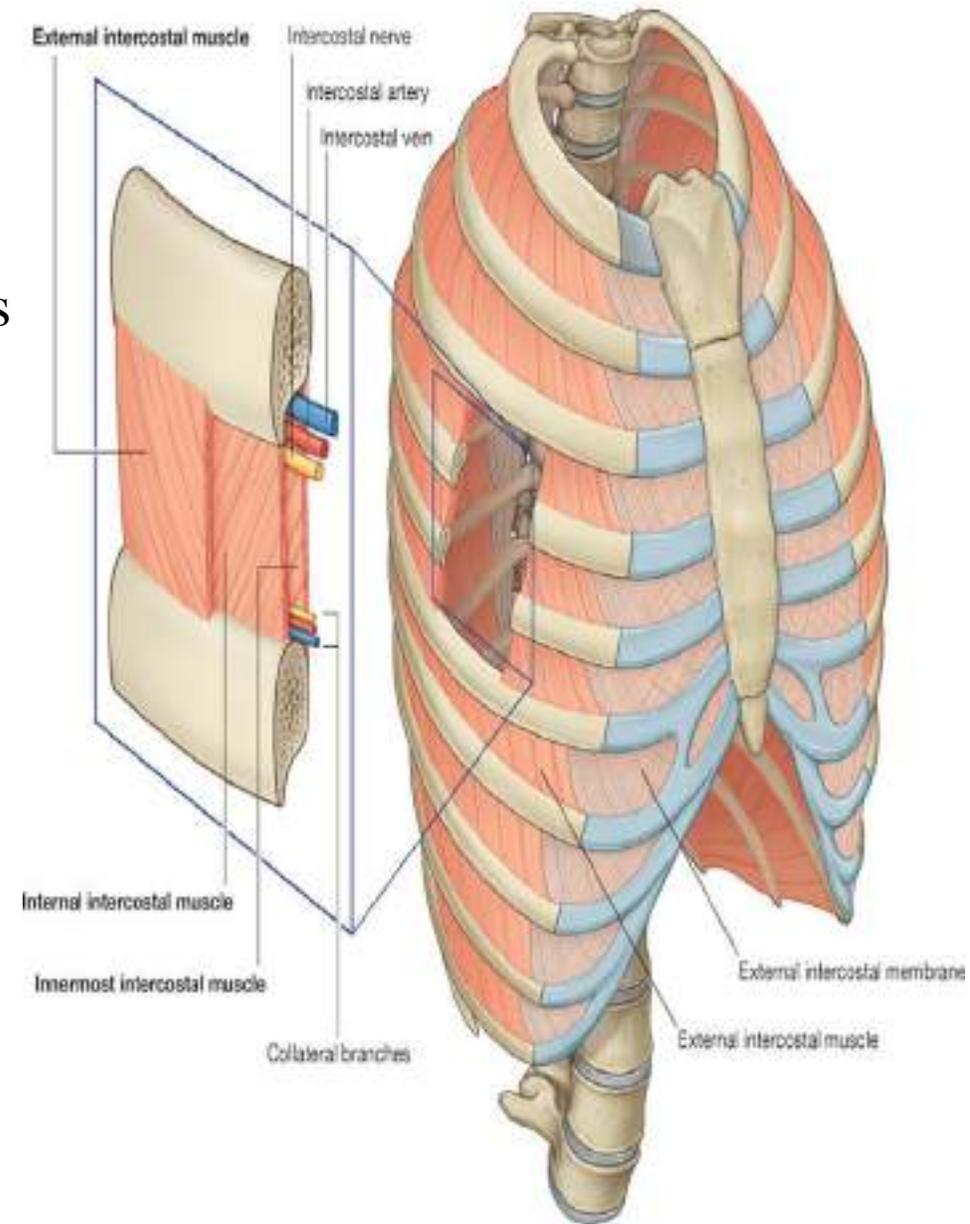
I.: into the upper border of the rib below.

Extension:

From the tubercle of the rib to the costo-chondral Junction to become the ant. intercostal membrane extending to sternum.

Action:- Elevations of ribs during inspiration

N.S.:- Intercostal nerves



INTERCOSTAL MUSCLES

Internal intercostal muscle

O.: floor of costal groove of the rib above

Direction of fibers: obliquely downwards & backwards

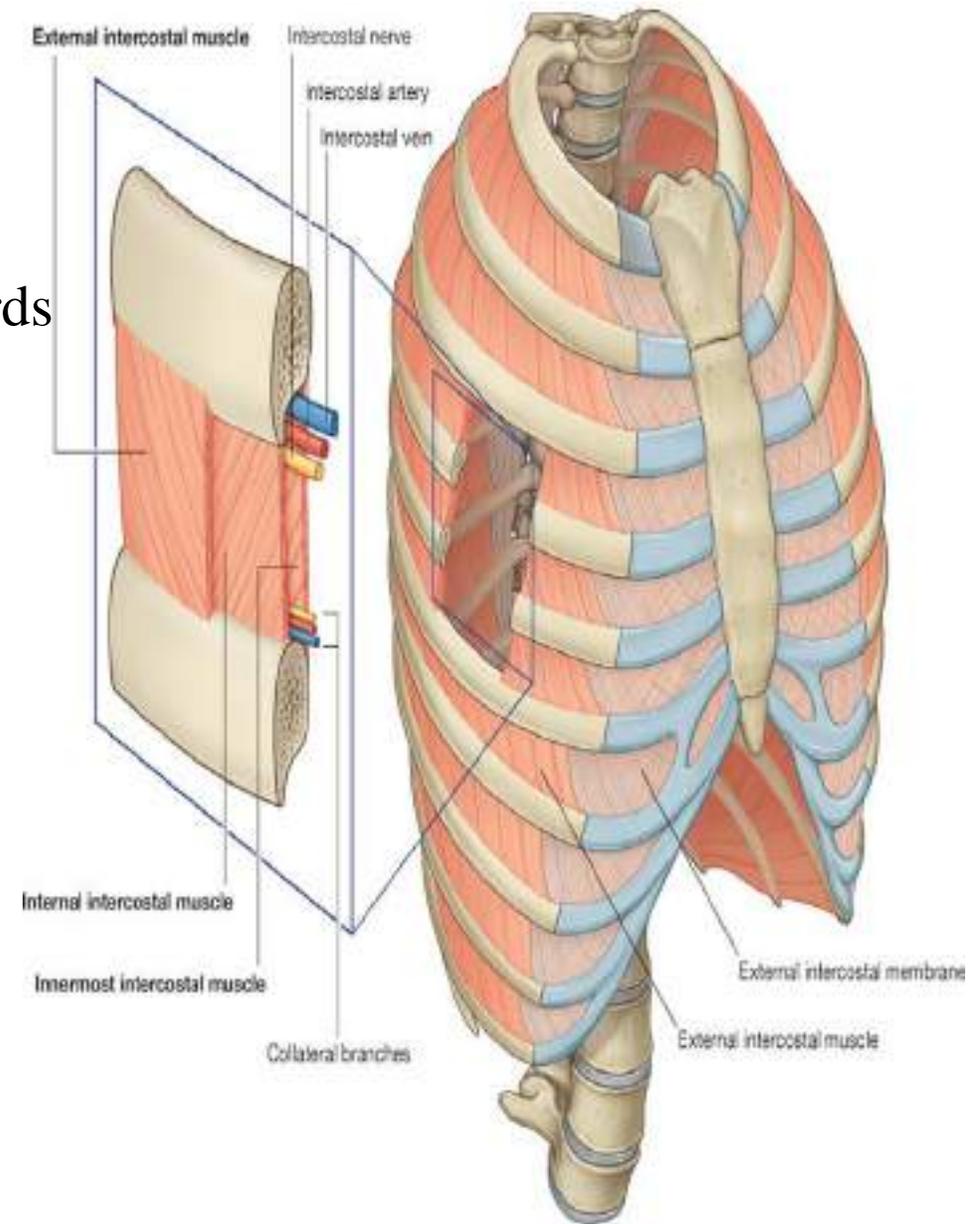
I.: into the upper border of the rib below.

Extension:

From lateral border of the sternum
to angle of the rib
to become the posterior intercostal membrane

Action:- Elevations of ribs during inspiration

N.S.:- Intercostal nerves



INTERCOSTAL MUSCLES

Innermost intercostal muscle

O.: upper border of costal groove of the rib above

Direction of fibers: obliquely downwards & backwards

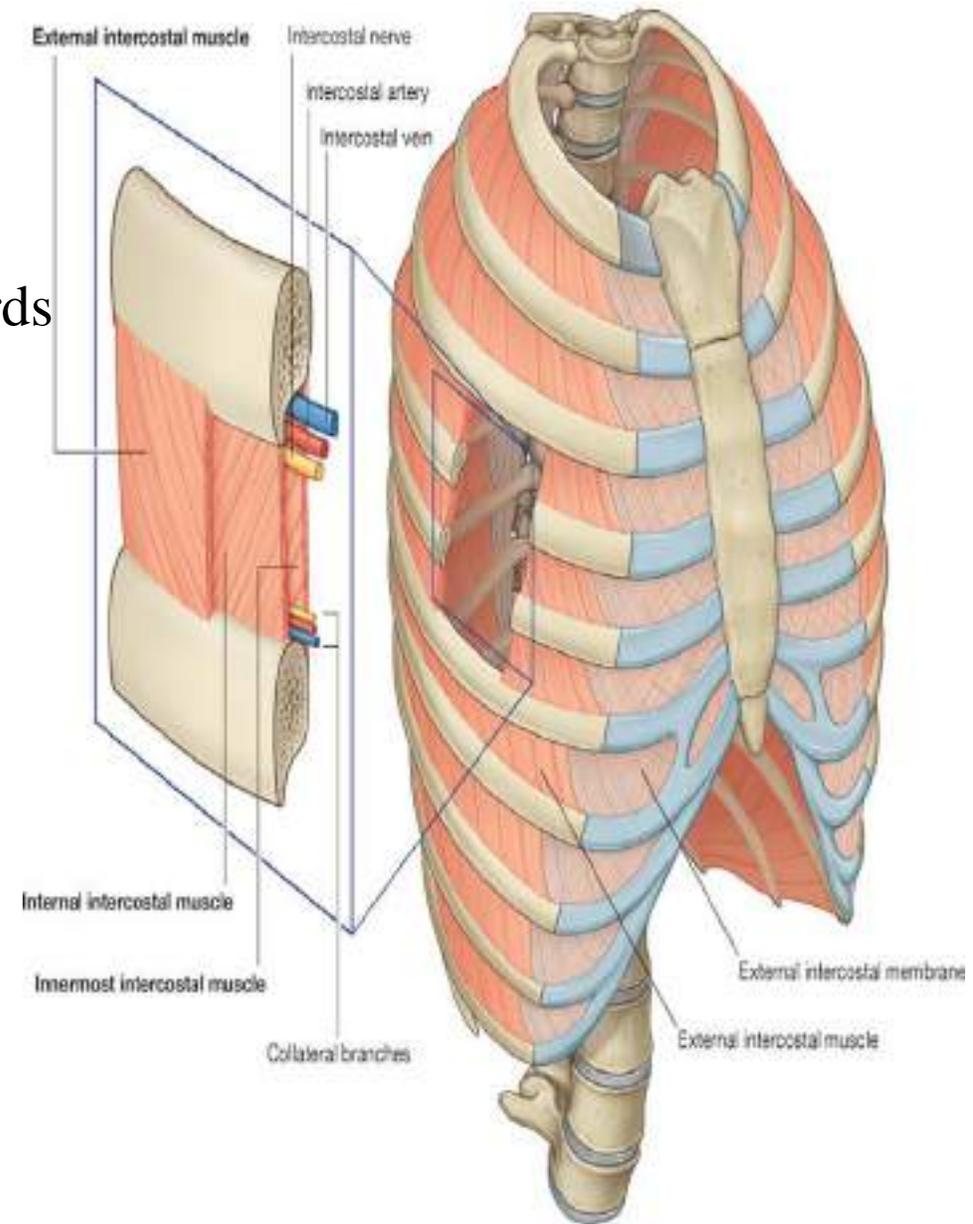
I.: into the upper border of the rib below.

Extension:

middle 2/4 of the intercostal space
considered a slip separated from int. intercostal
by intercostal n. & vessels

Action:- Elevations of ribs during inspiration

N.S.:- Intercostal nerves



STERNOCOSTALIS MUSCLE

O.: 4 or 5 slips from the post-surface of the lower part of the sternum.

Direction of fibers: upwards and laterally

I.: the inner surfaces

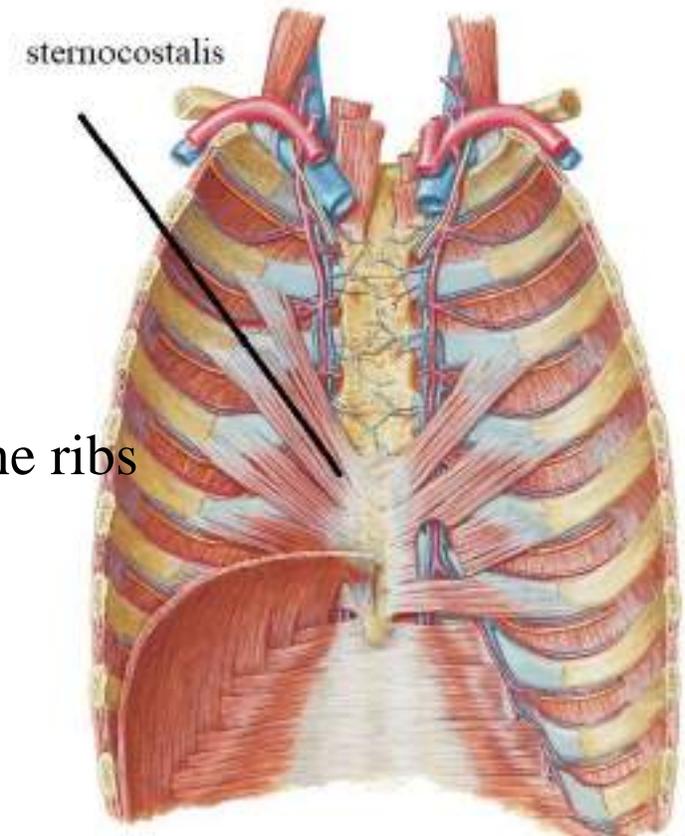
of the Costal Cartilages from the 2nd to the 6th

Extension:- it lies in the ant-part of the inner surface

Of the chest wall

Action:-Support sternocostal joints during movement of the ribs

N.S.:- Intercostal nerves



SUBCOSTALIS MUSCLE

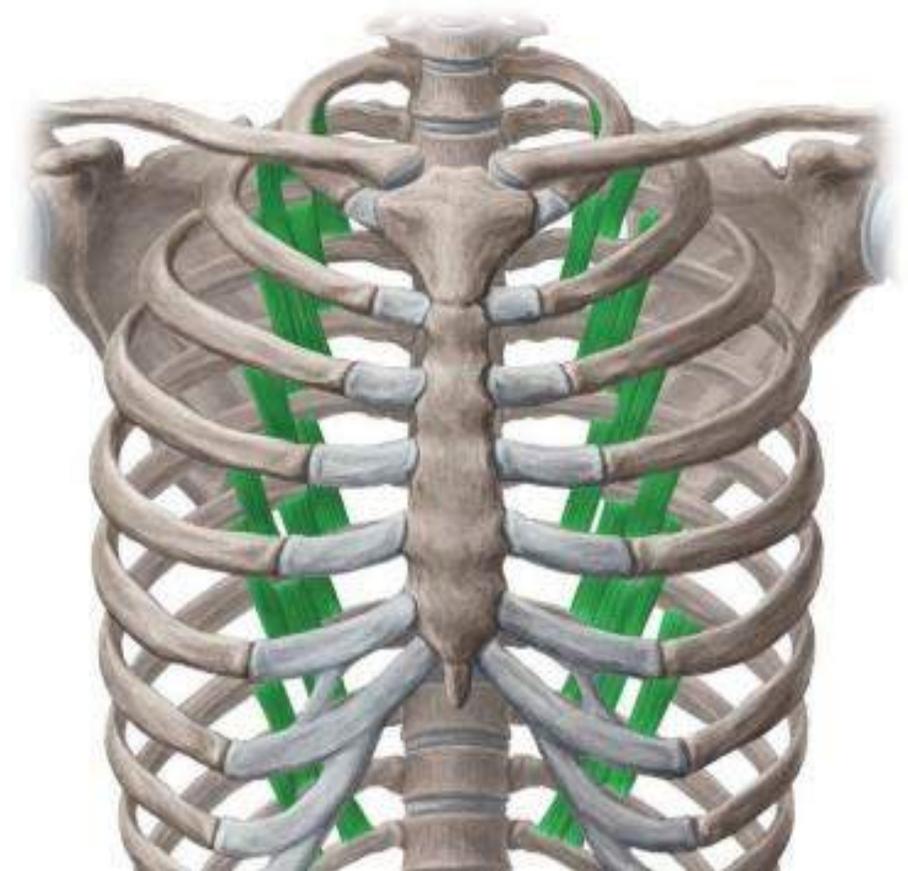
O.: Inner surface of the rib medial to the angle

Direction of fibers: downwards and medially

I.: Inner surface of 2nd. Or 3rd rib below

Action:-Support costotransverse joints during movement of the ribs

N.S.:- Intercostal nerves





THANQ