GROWTH OF MANDIBLE

- The mandible derives from the first pharyngeal arch and ossifies intramembranously, beginning in the 6th week i.u. It is the second bone to ossify after the clavicle.
- It ossifies laterally to Meckel's cartilage with the ossification centres appearing bilaterally at the bifurcation of the inferior alveolar nerve into the mental and incisive branches.
- Ossification extends forwards, backwards and upwards to form the body, alveolar processes and ramus.

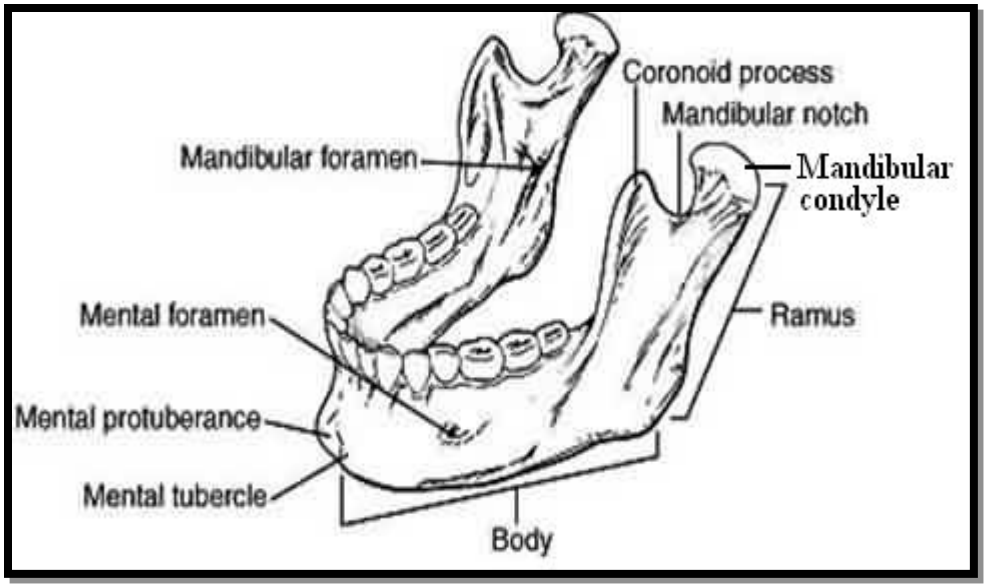
- Secondary cartilages appear, including the condylar cartilage during the 10th week i.u. Endochondral bone appears in the condylar cartilage by the 14th week i.u.

- The role of the condylar cartilage in the growth of the mandible is not yet entirely clear. It is not a primary growth centre in its own right, but rather it grows in response to some other controlling factors.
- However, normal growth at the condylar cartilage is required for normal mandibular growth to take place.

- Postnatal growth of the mandible follows a pattern intermediate between a neural and somatic pattern, although it follows the somatic pattern more closely than does the growth of the maxilla (Fig 4.8). Most mandibular growth occurs as a result of periosteal activity.

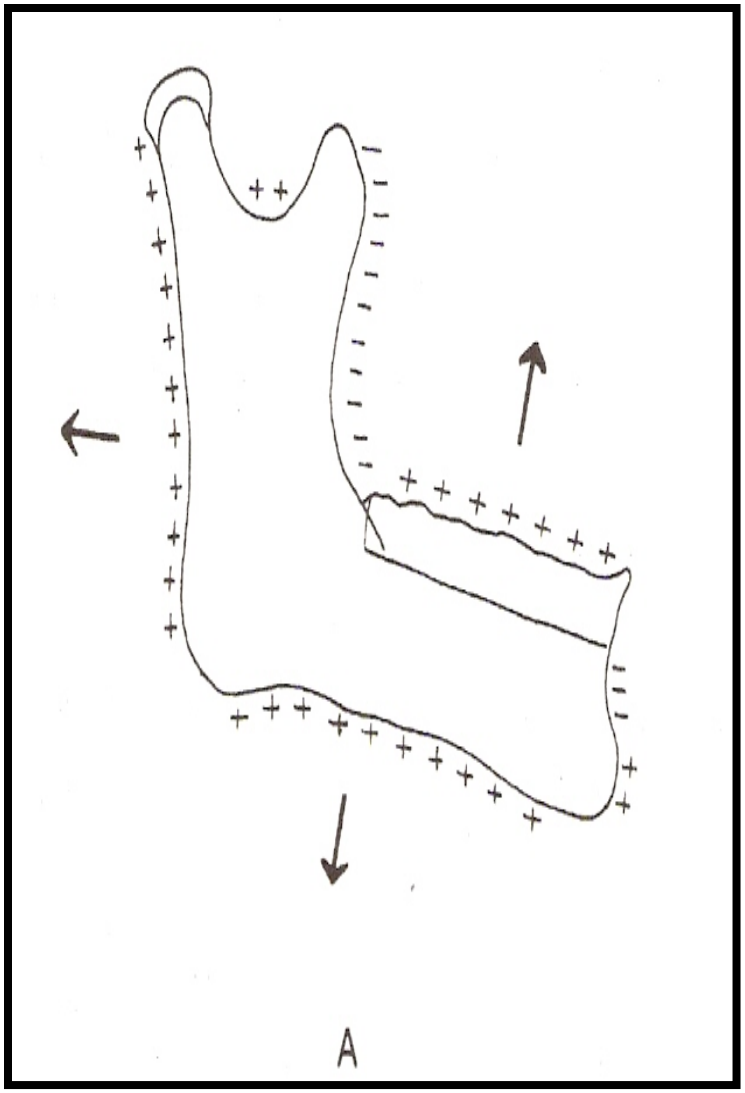
POST-NATAL GROWTH OF MANDIBLE

- While the mandible appears in the adult as single bone, it is developmentally and functionally divisible into a several skeletal sub-unit.
- Basal bone forms one unit, to which is attached the alveolar process, coronoid process, condylar process, angular process, the ramus and the chin.



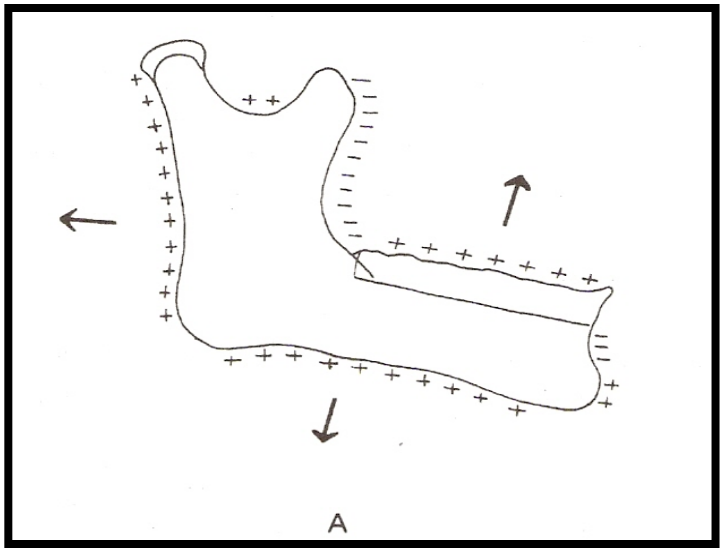
- RAMUS:

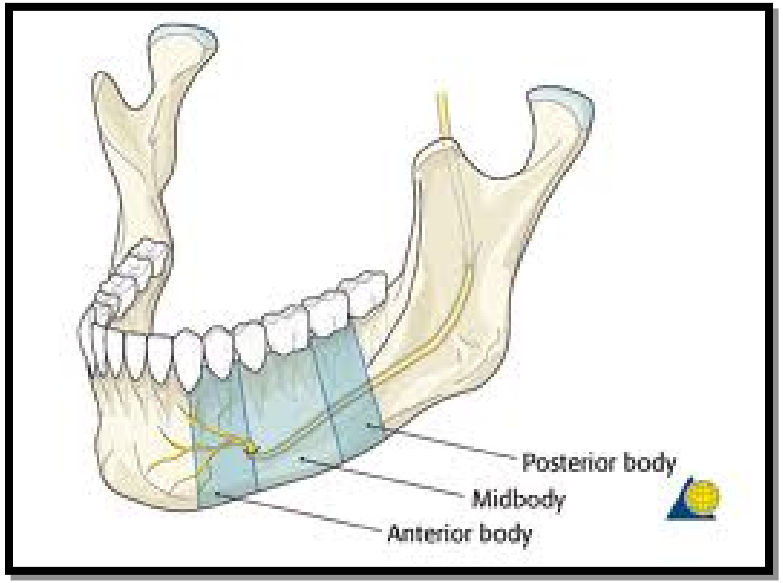
- It moves progressively posterior by a combination of deposition and resorption. Resorption occurs on anterior part of ramus while bone deposition occur on the posterior region.
- This result in a “drift” in posterior direction.
- Function of the remodelling of ramus is to facilitate the lengthening of the mandibular body, which in turn accommodates the erupting molars.



❑THE BODY OF THE MANDIBLE:

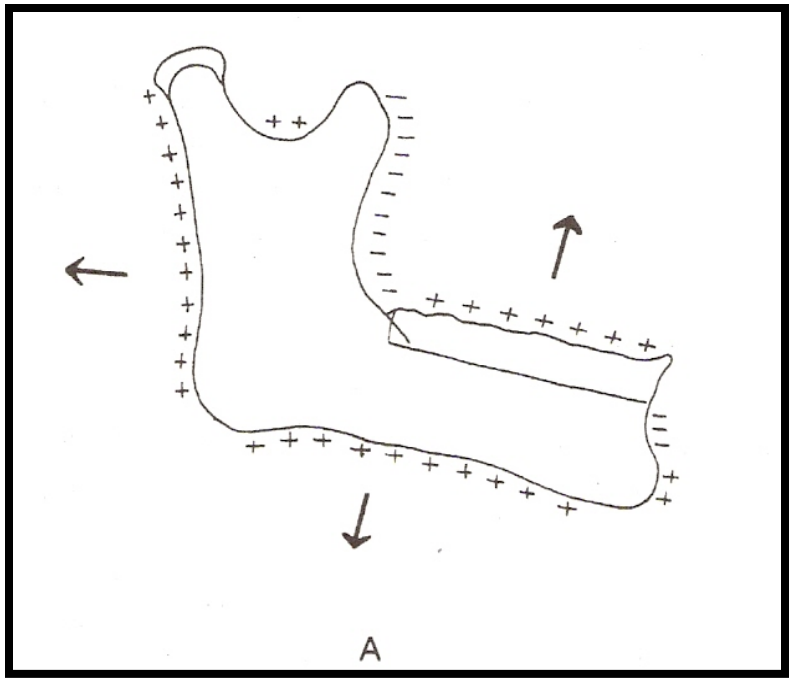
- Displacement of the ramus results in the conversion of the ramal bone into the posterior part of the body of the mandible.
- In this manner, it lengthens. Thus additional space made available by means of resorption of the anterior border of the ramus is made use of to accommodate the erupting molar.





❑THE BODY OF THE MANDIBLE:

Appositional growth occurs along the lower border of mandible and on its lateral surface.



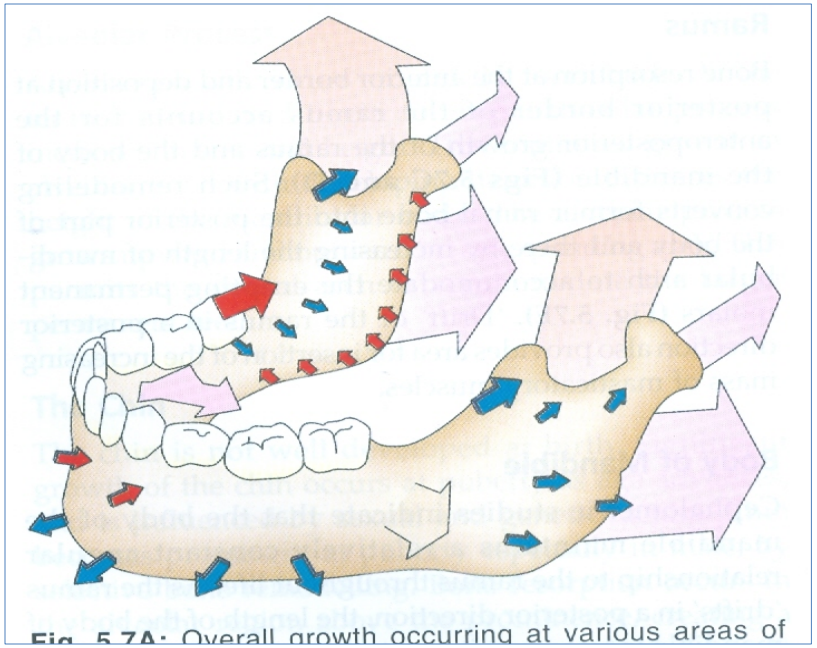


Fig. 5.7A: Overall growth occurring at various areas of

Red arrows - bone resorption
Blue arrows - bone deposition

ANGLE OF THE MANDIBLE:

- On the lingual side of the angle of the mandible, resorption take place on the posterio-inferior aspect while deposition on the anterio-superior aspect.
- On the buccal side, resorption occur on the anterio-superior part while deposition takes place on posterio-superior part.
- This results in flaring of the angle of mandible as age advances.

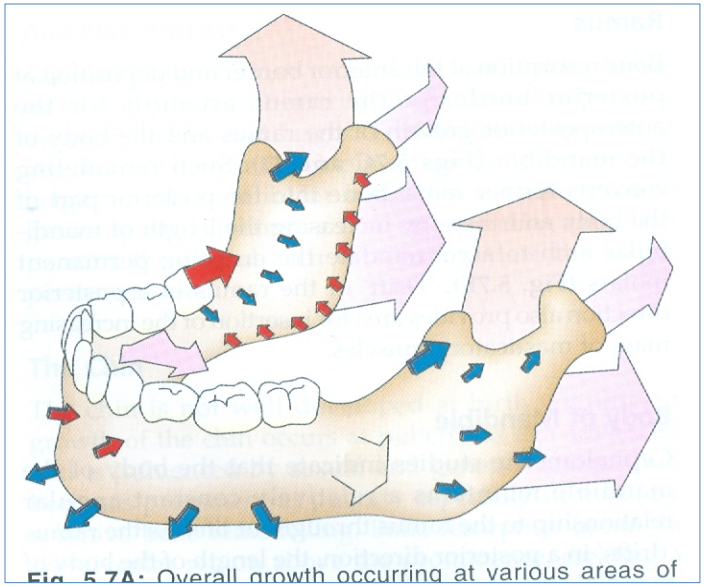


Fig. 5.7A: Overall growth occurring at various areas of

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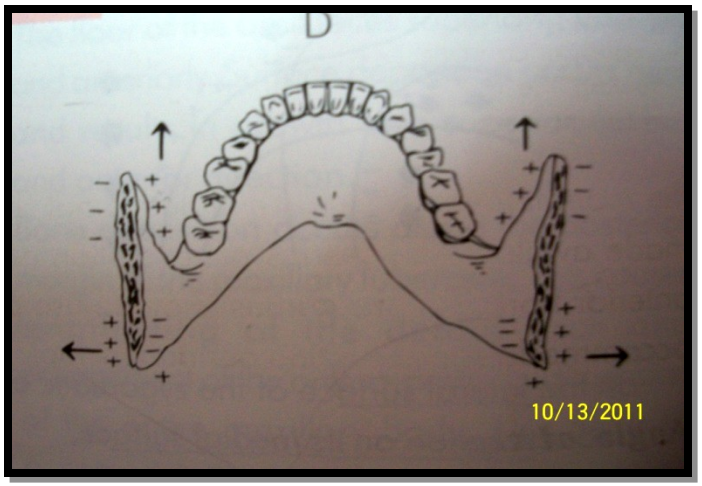
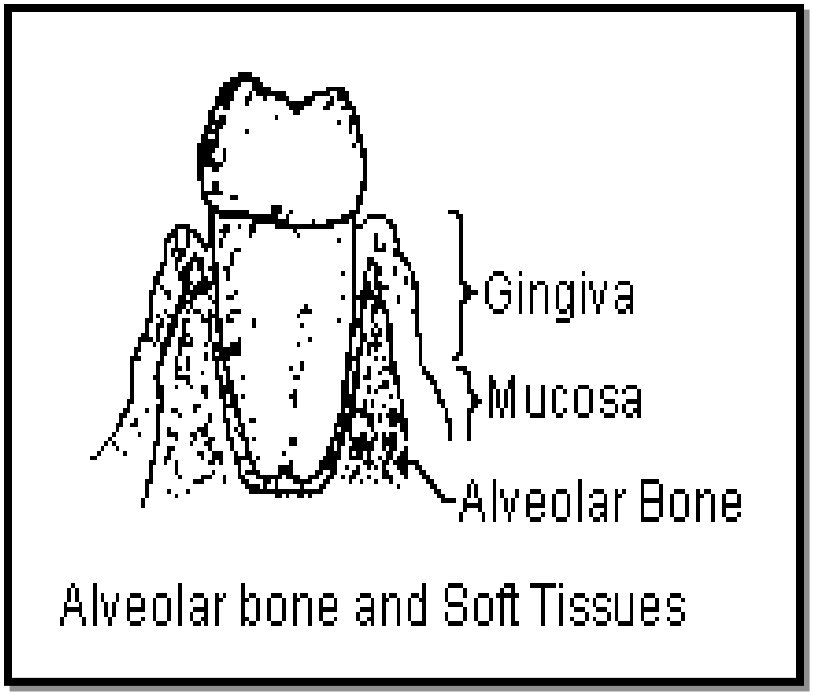
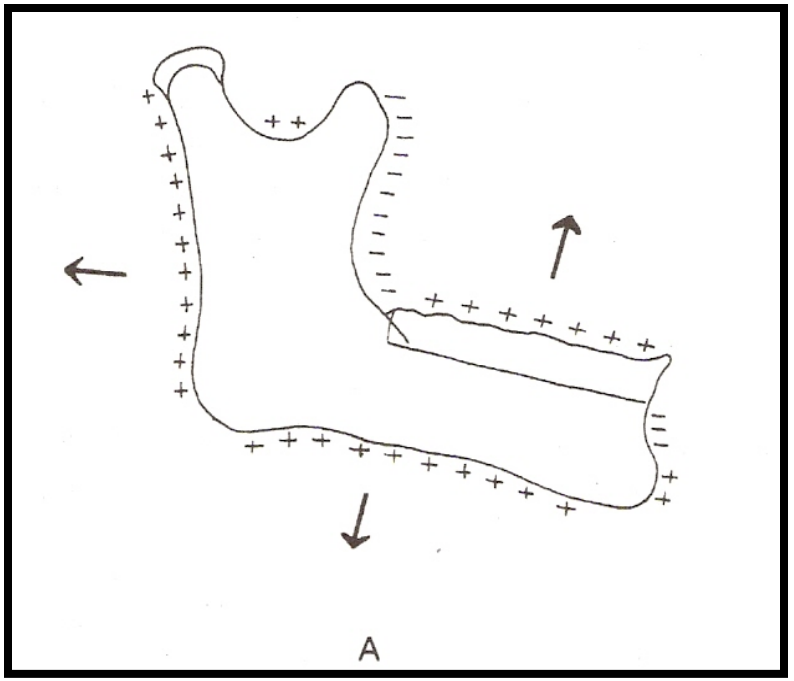


❑ ALVEOLAR PROCESS:

- It develops in response to the presence of tooth buds.
- As the teeth erupt, it develops and increases in height by bone deposition at the margins.

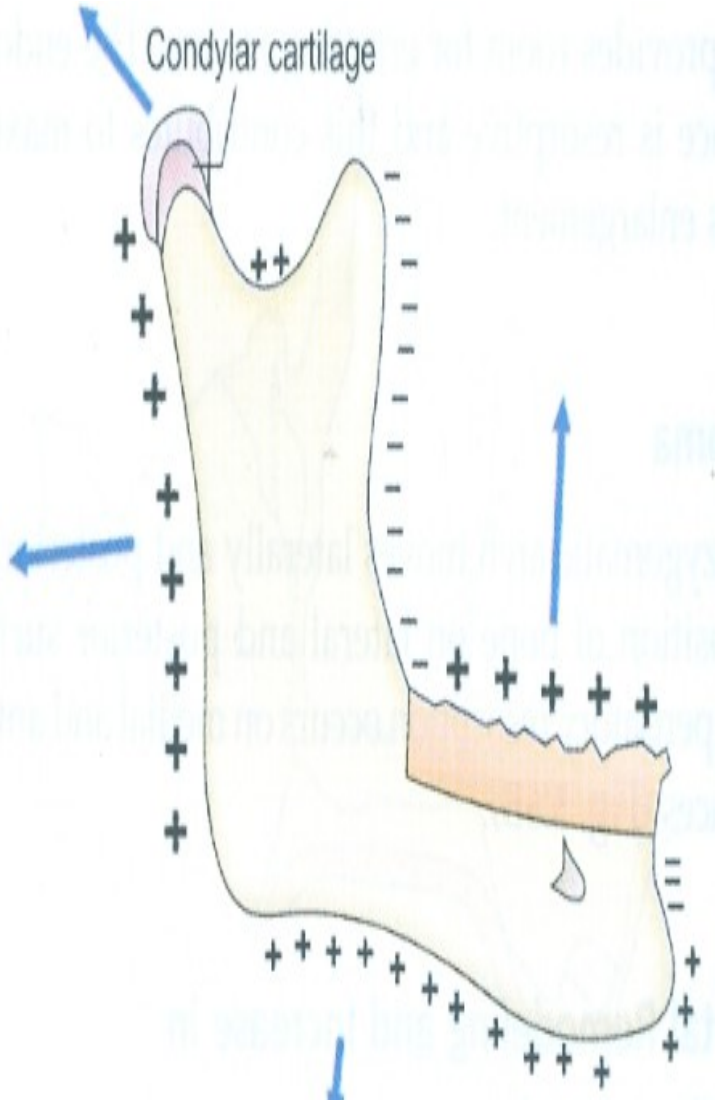


Alveolar bone and Soft Tissues



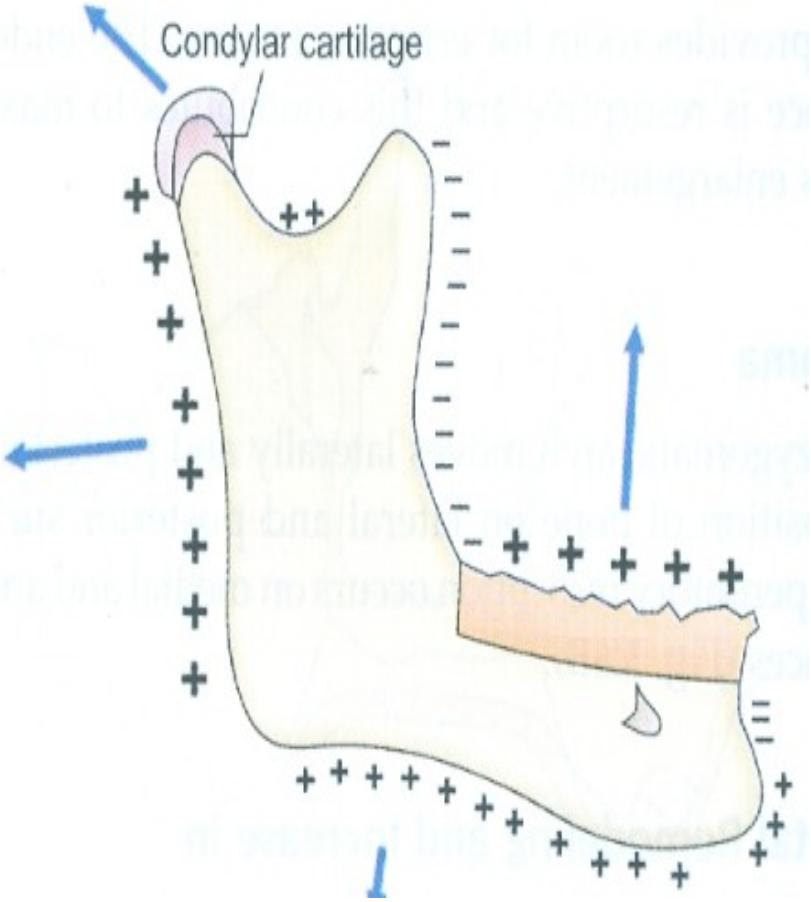
❑THE CHIN:

- As the age advances the growth of chin becomes significant.
- Usually males are seen to have prominent chin as compared to females.
- Bone deposition on mental protuberance.
- Bone resorption on alveolar region above the prominence creating a concavity.



❑THE CONDYLE:

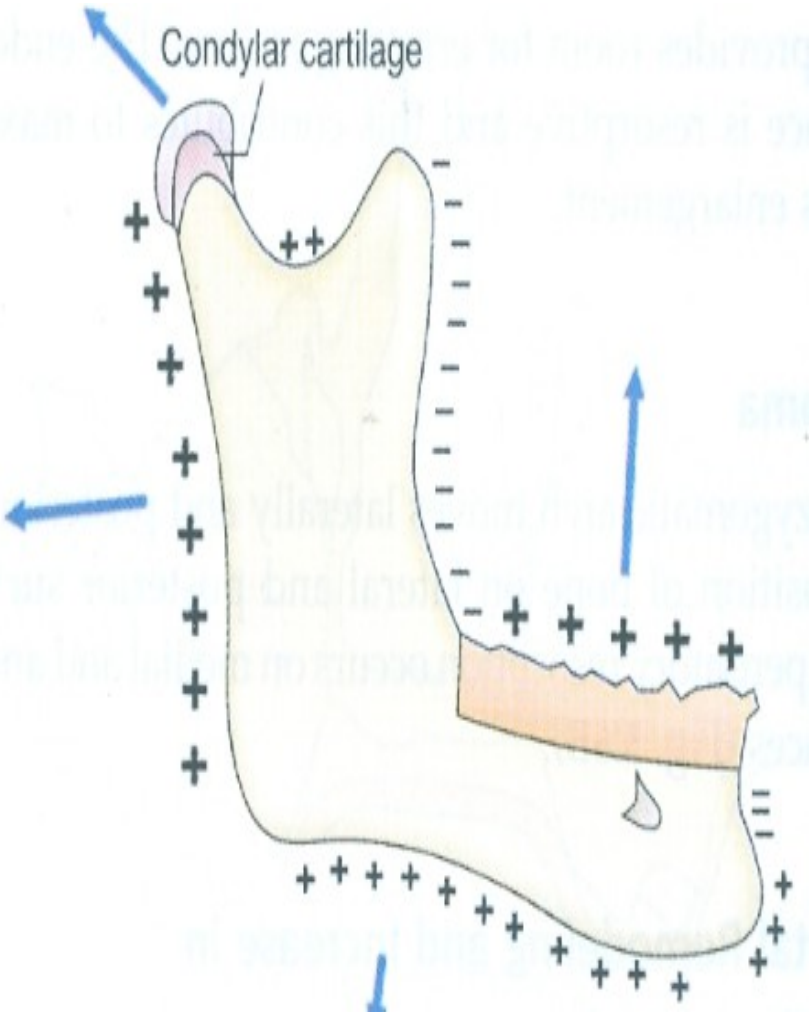
- The head of the condyle is covered by the thin layer of cartilage called the condylar cartilage.
- The presence of conylar cartilage is an adaptation to withstand the compression that occurs at the joint.



❑THE CONDYLE:

- It is believed that the growth of the soft tissues including the muscles and the connective tissues carries the mandible forward away from cranial base. Bone growth follows secondary at the condyle to maintain constant contact with cranial base.

- The condylar growth rate increases at puberty reaching a peak between 12-14 years. The growth ceases around 20 years of age.

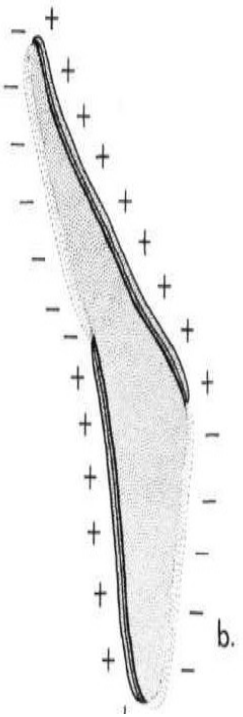


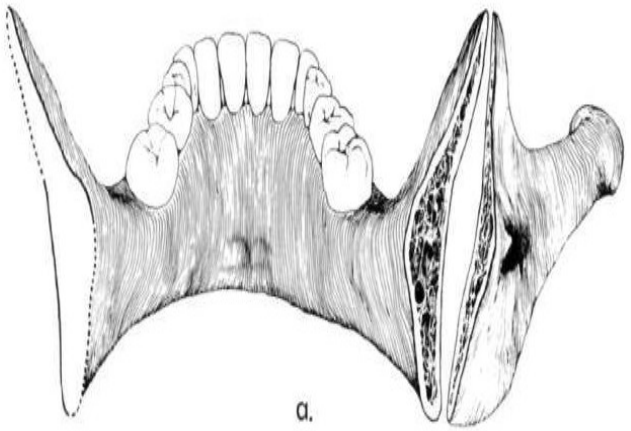
❑THE CORONOID PROCESS:

- The growth follows the enlarging ‘V’ principle.
- Viewing, the logitudinal section of coronoid process from posterior aspect, it can be seen that deposition occurs on the lingual (medial) surfaces of the left and right coronoid process .
- Although additions take places on the lingual side, the vertical dimension of the coronoid process also increases. This follows the ‘V’ principle.
- Viewing from the occusal aspect, the deposition on lingual of coronoid process brings about posterior growth movement in ‘V’ pattern

Vertical section of coronoid process

- BONE DEPOISITION - lingual surface (+ +)
- BONE RESORPTION - buccal surface (- -)





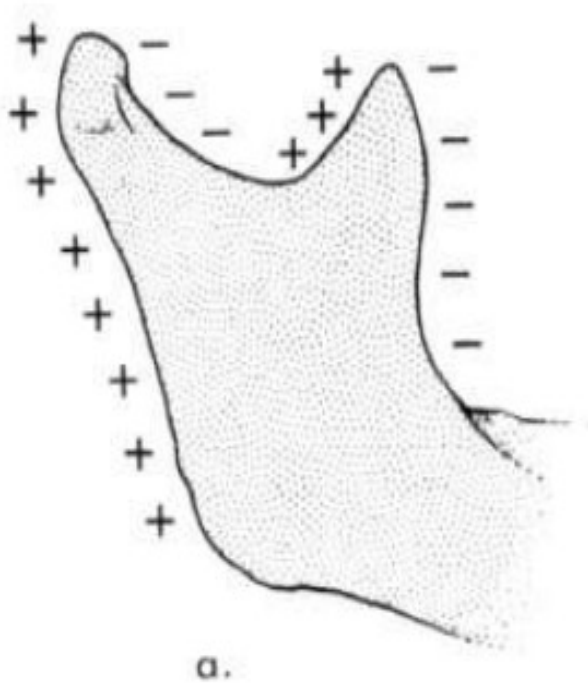
SIGMOID NOTCH

- Bone deposition -

  posterior border of coronoid process

- Bone resorption -

anterior Face of neck of condyle.



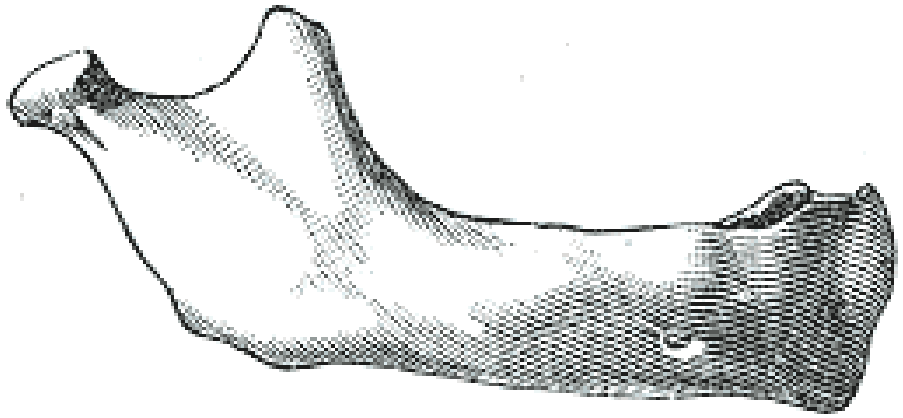
Age changes in mandible

- **INFANTS –**

Mental foramen - near lower border

Mandibular canal - lower border of body of mandible

Angle of mandible - obtuse around 140* or more

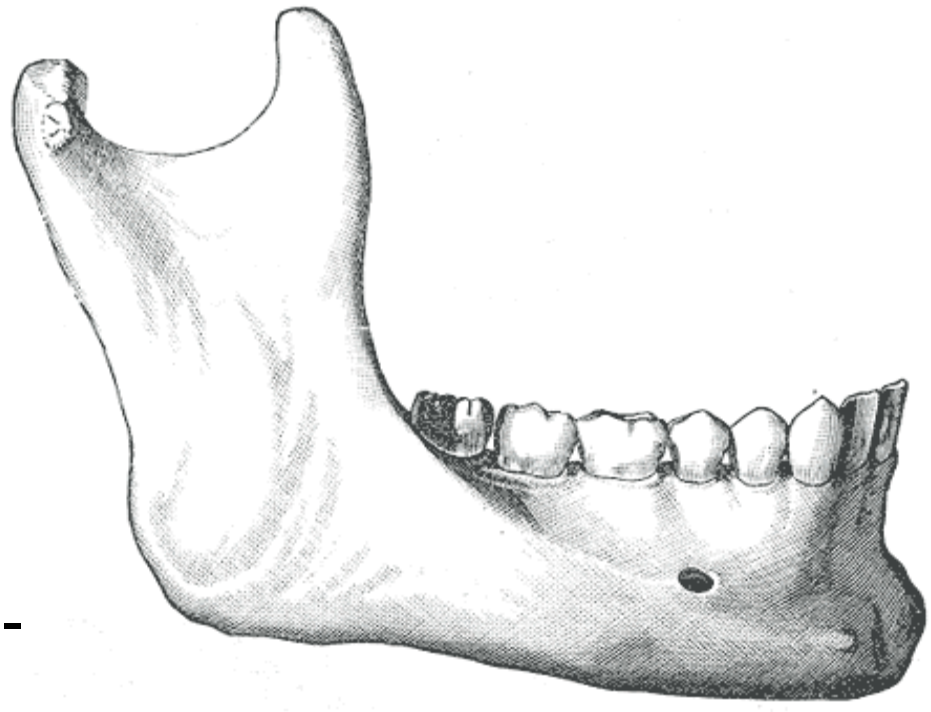


ADULTS-

- Mental foramen - midway of upper & lower border.

- Mandibular canal - runs parallel with mylohyoid line.

- Angle of mandible - 110* - 120*

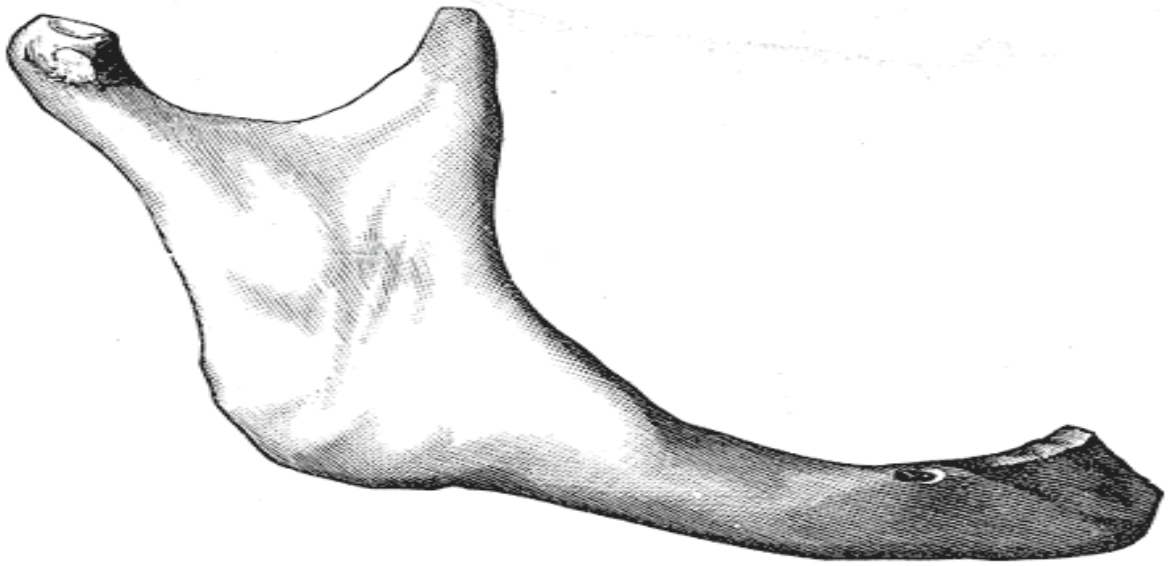


- **OLD AGE**

Mandibular foramen - near alv. Bone

Mandibular canal - near alv. Bone

Angle of mandible - obtuse 140*



- Muscular processes develop at the angles of the mandible and the coronoid processes, and the alveolar processes develop vertically to keep pace with the eruption of the teeth.

- As the mandible is displaced forwards growth at the condylar cartilage fills in posteriorly while at the same time periosteal remodelling maintains its shape (Fig. 4.12).
- Bone is laid down on the posterior margin of the vertical ramus and resorbed on the anterior margin, and this posterior drift of the ramus allows lengthening of the dental arch posteriorly.

- At the same time the vertical ramus becomes taller to accommodate the increase in height of the alveolar processes.

- Remodelling also brings about an increase in the width of the mandible, particularly posteriorly.

- Lengthening of the mandible and anterior remodelling together cause the chin to become more prominent, an obvious feature of facial maturation especially in males.
- Indeed, just as in the maxilla, the whole surface of the mandible undergoes many complex patterns of remodelling as it grows in order to maintain its proper anatomical form.

- Before puberty growth occurs at steady rate with an increase of 1–2 mm per year in ramus height and 2–3 mm per year in body length.
- However, growth rates can double during puberty and the associated growth spurt.
- Mandibular growth slows to adult levels rather later than maxillary growth, on average at about 17 years in girls and 19 years in boys, although it may continue for longer.