GROWTH OF MANDIBLE
“Growth was conceived by an anatomist, born to a biologist, delivered by a physician, left on a chemist doorstep, and adopted by a physiologist. At an early age, she eloped with a statistician, divorced him for a psychologist, and is now wooed, alternatively and concurrently, by an endocrinologist, a biochemist, a physicist, a mathematician, an orthodontist, a eugenicist and the children’s bureau.”
Growth and development of an individual is divided into two periods:

- Prenatal period
- Post natal period
THE PRENATAL LIFE IS DIVIDED INTO THREE PERIODS –

1. PERIOD OF THE OVUM
2. PERIOD OF THE EMBRYO
3. PERIOD OF THE FETUS
About the **fourth** week of intrauterine life, the **pharyngeal** arches are laid down.

The first arch is called the **mandibular arch** and the second arch the **hyoid arch**.
Each of these five arches contain -

1. A central cartilage rod that form the skeleton of the arch.
2. A muscular component termed as bronchomere
3. A vascular component.
The first structure to develop in the primodium of the lower jaw is the mandibular division of trigeminal nerve that precedes the mesenchymal condensation forming the first [mandibular] arch.
At around 36-38 days of intrauterine life there is ectomesenchymal condensation. Some mesenchymal cells enlarges, acquire a basophilic cytoplasm and form osteoblasts. These osteoblasts secrete a gelatinous matrix called osteoid and result in ossification of an osteogenic membrane.
The resulting **intramembranous bone** lies lateral to Meckel’s cartilage of first [mandibular ] arch.

In the **sixth week of the intrauterine life** a single ossification centre for each half of the mandible arises in the **bifurcation of inferior alveolar nerve** into mental and incisive branches.
During **seventh week of intrauterine life** bone begin to develop lateral to **meckel’s cartilage** & continues until the posterior aspect is covered with bone.

Between **eighth & twelfth week of intrauterine life** mandibular growth accelerate, as a result mandibular length increases.
Ossification stops at a point, which later become mandibular lingula, the remaining part of Meckel's cartilage continues to form sphenomandibular ligament & spinous process of sphenoid.

Secondary accessory cartilage appear between tenth & fourteenth week of intrauterine life to form head of condyle, part of coronoid process & mental protuberance.
Endrocondral bone formation is seen in 3 areas of mandible-

1) The condylar process
2) The coronoid process
3) The mental process
THE CONDYLAR PROCESS -

At fifth week of intruterine life, an area of mesenchymal condensation is seen above the ventral part of developing mandible.

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At about tenth week it develops in cone shaped cartilage.

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It migrate inferior & fuses with mandibular ramus at about 4 month.
This cone shaped cartilage is replaced by bone but its upper end persists acting as growth cartilage & articular cartilage.
THE CORONOID PROCESS-

Secondary accessory cartilage appear in region of coronoid process at about 10-14 week of intrauterine life.

This cartilage become incorporated into expanding intramembranous bone of ramus & disappear before birth.
THE MENTAL REGION-

In mental region, on either side of symphysis, one or two small cartilage appear and ossify in the seventh week of intrauterine life to become mental ossicles.

These ossicles become incorporated into intramembranous bone when symphysis ossify completely.
POST NATAL GROWTH PHASE

At birth the two rami of the mandible are short, condylar development is minimum and there is no articular eminence in glenoid fossa. A thin layer of fibrocartilage & connective tissue exists at the midline of symphysis to separate right & left mandibular bodies.

At fourth month of age and end of first year symphysial cartilage is replaced by bone.
During first year of life, appositional growth is active at alveolar border, at distal & superior surfaces of the ramus, at the condyle, along the lower border of mandible and on its lateral surface.
After first year of life these changes occurs -

✓ Mandibular growth become more selective, condyle shows considerable activities, mandible moves and grows downward & forward.

✓ Appositional growth occurs on posterior border of the ramus and on the alveolar process.

✓ Resorption occurs along the anterior border of ramus lengthening the alveolar border & maintaining the anterior- posterior dimension of ramus.
✓ Gonial angle changes after little muscle activity.

✓ Transverse dimension is mainly due to growth at posterior border in an expanding V pattern.
Direction of condylar growth
The two rami also **diverge outward** from below to above so that additive growth at **coronoid notch**, **coronoid process** & **condyle** also increases the superior inter-ramus dimension.

**Alveolar process of mandible** grows **upward & outward** on an expanding arc. This permit dental arc to accommodate the larger permanent teeth.
Scott divides the mandible into three basic types of bone –

1) Basal
2) Muscular
3) Alveolar

- **Basal portion** is tube like central foundation running from condyle to the symphysis.

- **Muscular portion** [gonial angle & coronoid process] is under influence of masseter, internal pterygoid & temporal muscle. They determine the ultimate form of the mandible in these areas.
Alveolar portion exists to hold the teeth & gradually resorbed in the event of tooth loss.

Reduced muscular activity would account for flattening of gonial angle and reduction of the coronoid process.
MOSS say that the mandible as a group of microskeleton unit

- **Coronoid process** as one skeleton unit under influence of temporalis.
- **Gonial angle** is another skeleton unit under influence of massetor & internal pterygoid muscles.
- **Alveolar process** is under the influence of the dentition.

**Basal tubular portion of mandible** serves as protection for the mandibular canal and follows a logarithm spiral in its downward & forward movement from beneath the cranium.
Enlow & Harris feel that chin is “associated with a generalised cortical recession in the flattened regions positioned between the canine teeth. The process involves a mechanism of endosteal cortical growth.”

On lingual surface, behind the chin heavy periosteal growth occurs, with the dense lamellar bone merging and overlapping on the labial side of the chin.
In male, the apposition of the bone at symphysis seems to be about the last change in shape during the growing period. This change is much less apparent in the females.