



ПОЛТАВСЬКИЙ
ДЕРЖАВНИЙ МЕДИЧНИЙ
УНІВЕРСИТЕТ

PDMU
Department of Orthodontics

Ukraine NOW



3 course

Orthodontia. Determination of subject. Historical stages of the orthodontic development. The role of national scientists in the discipline development

Plan of lecture

1. Oral cavity

- Orthodontics. Definition of the subject. Historical stages in the development of orthodontics. The role of domestic scientists in the development of the discipline. Features of the condition of teeth, dentition and occlusion, depending on age.
 - Stages of development of orthodontics (characteristics of each). Orthodontic schools. Outstanding representatives and their contribution to science. Development of the national orthodontic school. Poltava School of Orthodontics.
 - Embryogenesis of the maxillofacial region. Features of the structure of the oral cavity of the newborn. Condition of the temporomandibular joint. Functions of the baby's oral cavity. Morphological features of temporary and permanent teeth.
 - Characteristics of the first, second and third periods of temporary bite. Characteristics of the periods of mixed bite. Stages of forming a permanent bite.
 - Characteristics of periods of permanent bite. Angle, Andrews occlusion keys. Characteristics of the functions of the oral cavity in different age periods.
-

ORTHODONTIA

- is a science, which studies etiology, pathogenesis, clinics, diagnostics, methods of treatment and prophylaxis of malocclusion, abnormalities of the teeth, dental arches, and face of children and adults



"Malocclusion" is a general term that we use to describe a tooth and jaw size anomalies, position of the teeth and anomalies of the bite, and another dento-jaw region deformation.



Scientific development of orthodontia

- First period - from 1728 till 1889 - got the name "old school".
- Orthodontics, as we think of it today, has its root in France in 18th century when Pierre Fauchard (1728) - Father of Dentistry - described an orthodontic appliance 'Bantlette' later known as expansion arch.
- Orthodontia derived from 2 Greek words
 - ✦ 'Orthos' - Right/Correct.
 - ✦ 'Dons' - Tooth
- Term introduced by Frenchman LeFoulon in 1839.

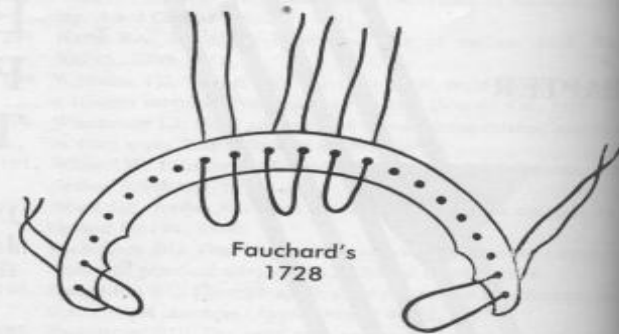
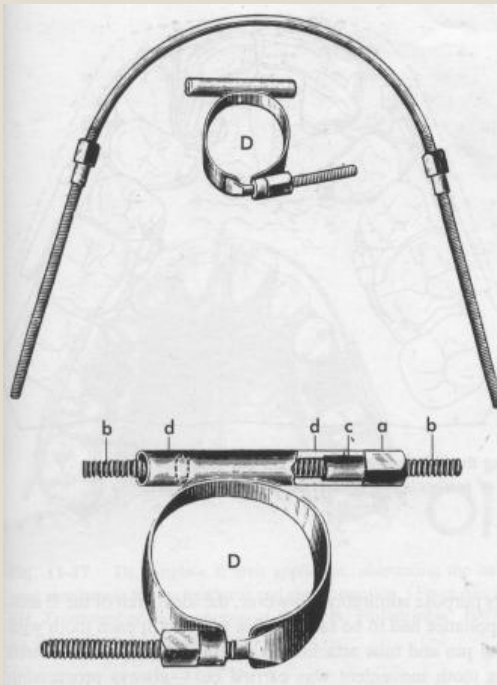
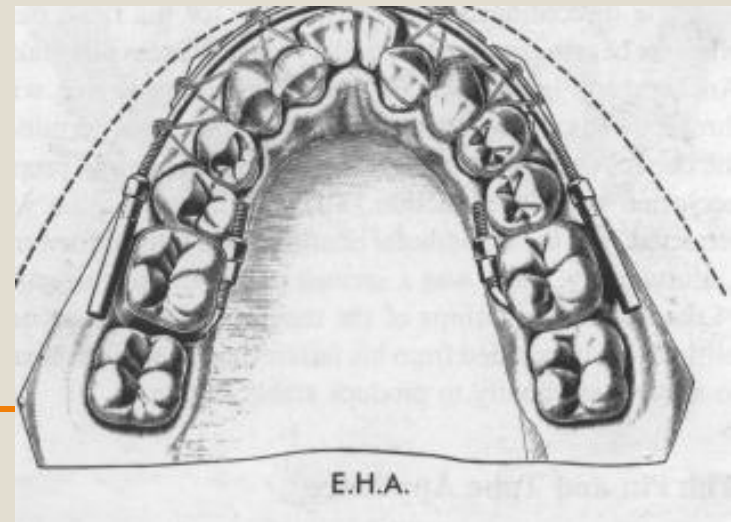


Fig. 11-3 Pierre Fauchard's orthodontic appliance, 1728. (From Angle EH: *Treatment of malocclusion of the teeth*, Philadelphia, 1907, SS White Dental Manufacturing, p. 196.)

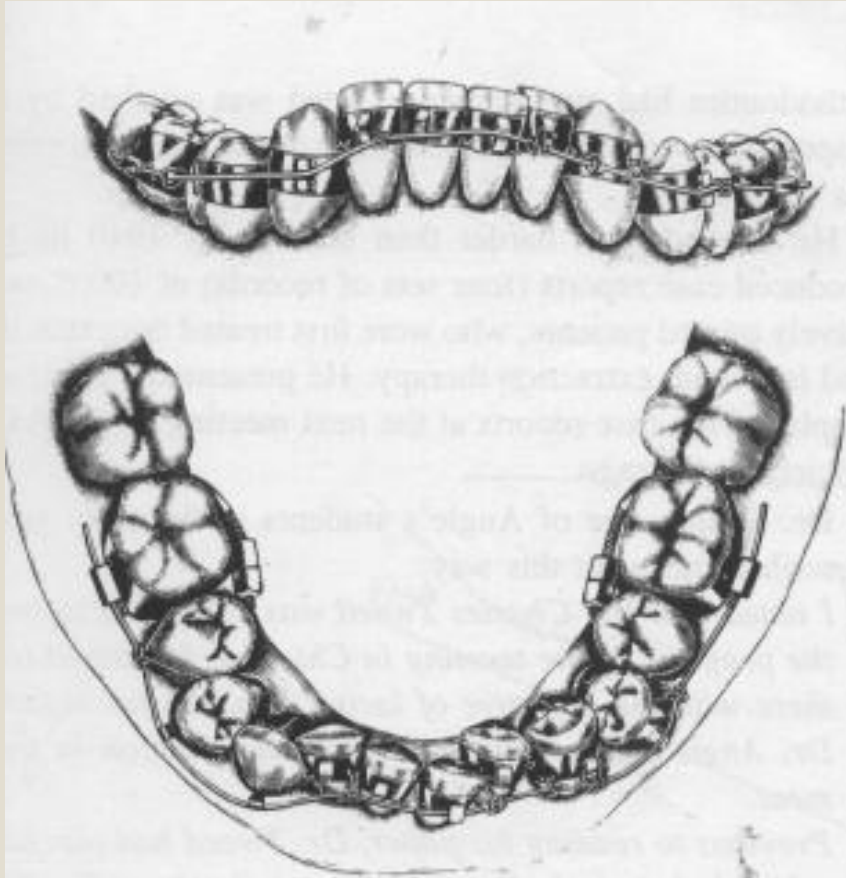
- The founder of the second period ("new school") - from 1890 till 1910 was American professor E. Angle.
- He was:
 - the first founder of scientific society of orthodontics;
 - the first founder of scientific orthodontic journal (1915);
 - the founder of the first institute of orthodontics (1922).



1907-Angle -
Arch Appliance

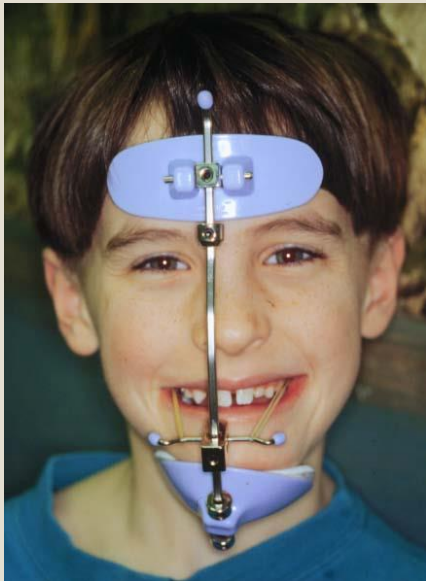


Development of the third period ("modern school") -from 1910 till 1929 is connected with the name of Mershon.



1928-Edgewise Appliance

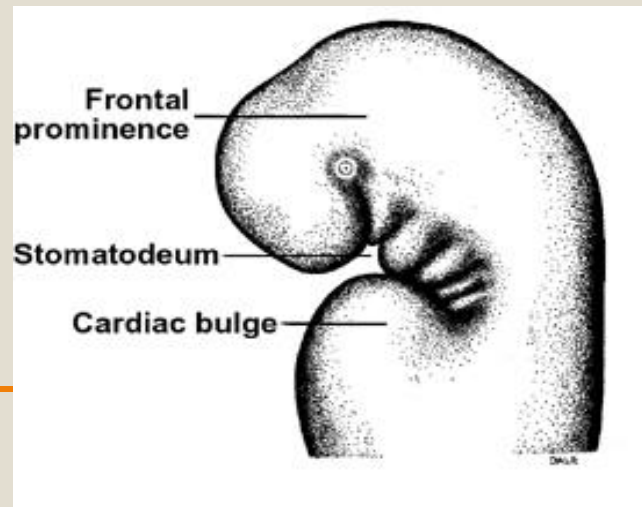
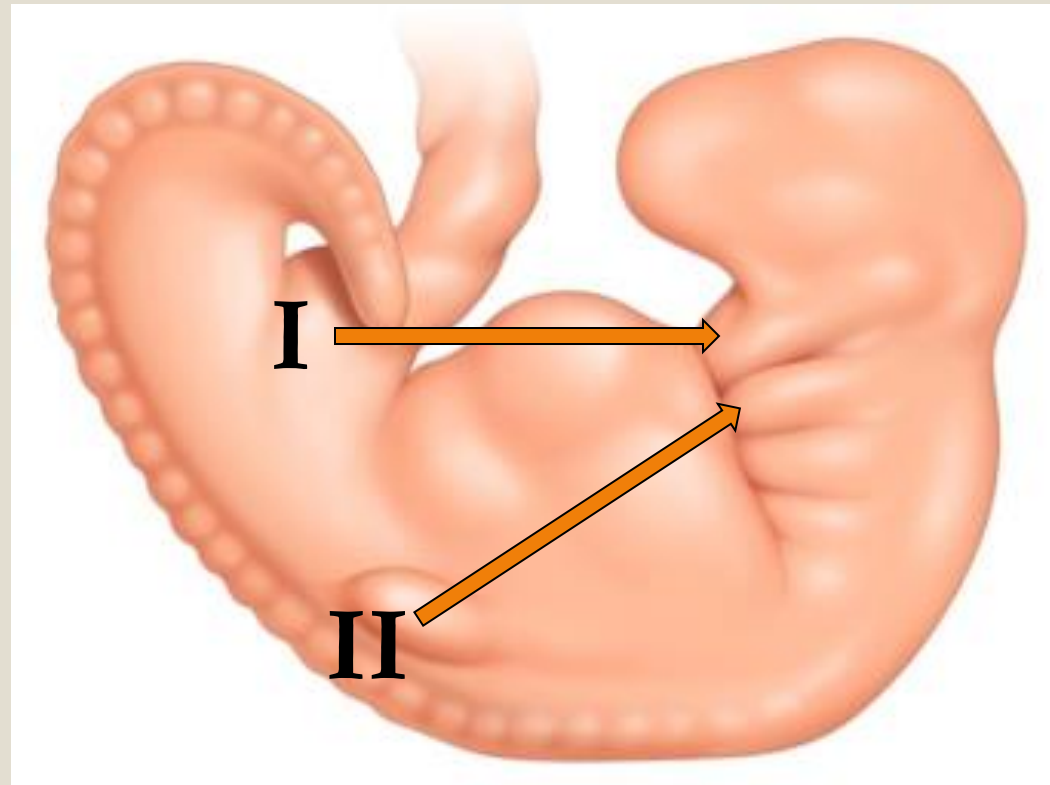
- Fourth period ("most modern school") -from 1929 till now - is characterized by subsequent development of orthodontics and development of new methods of diagnostics, treatment and prophylaxis of dent-facial anomalies.



About the fourth week of intrauterine life, the pharyngeal arches are laid down

first arch-
mandibular arch

second arch - hyoid
arch.



Face formation

Frontal prominence



Frontonasal process



Maxillary process



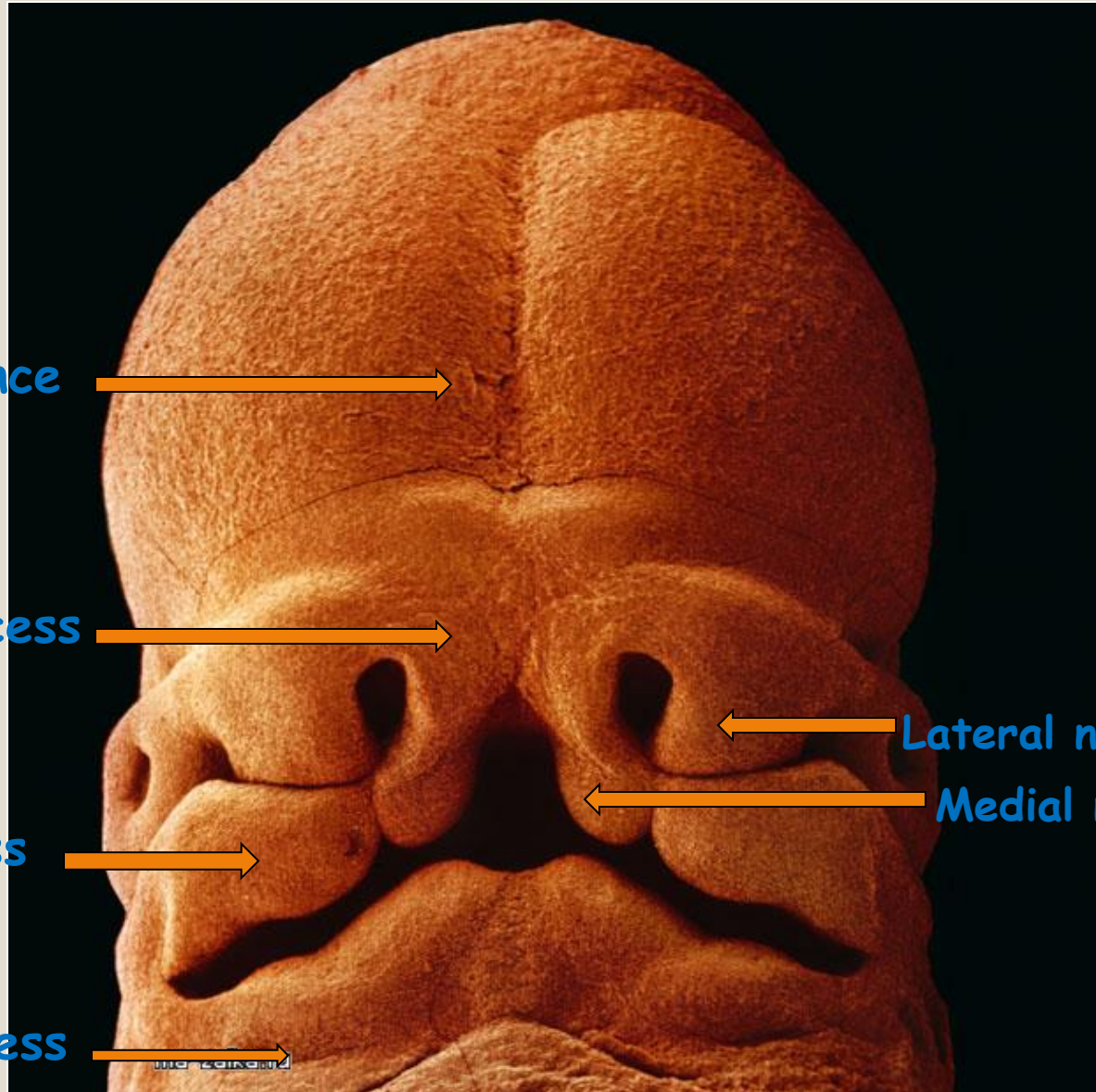
Mandibular process



Lateral nasal process



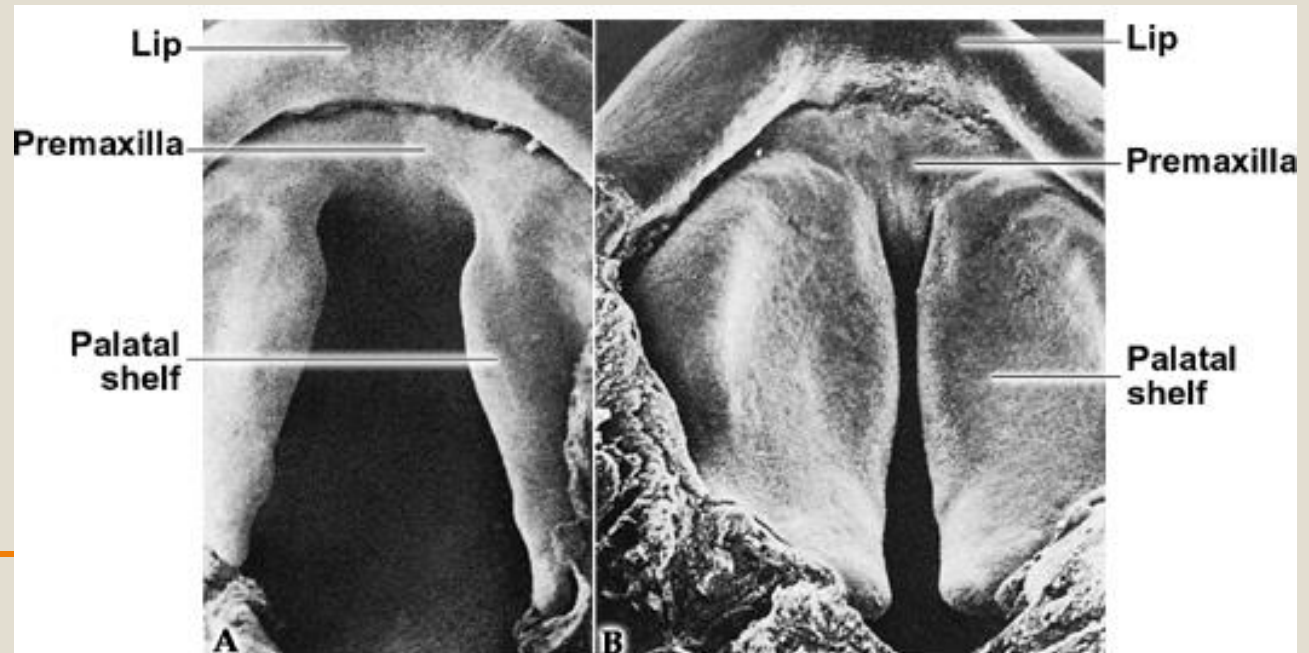
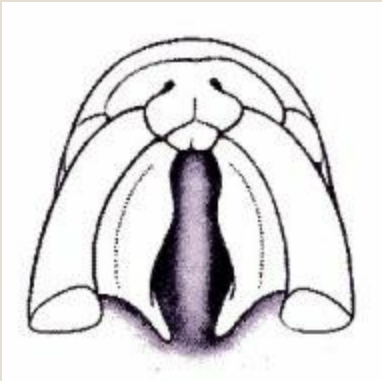
Medial nasal process



Development of the Palate

involves the formation of a primary palate, a secondary palate and fusion of their processes

- **Primary palate**
 - fusion of medial nasal processes (premaxilla)
- **Secondary palate**
 - forms from the two lateral palatine shelves or processes develop as internal projections of the maxillary process

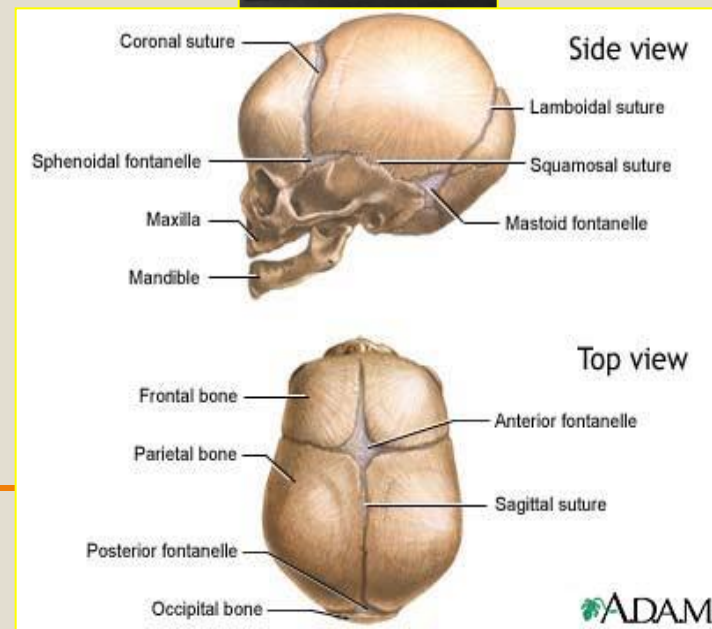
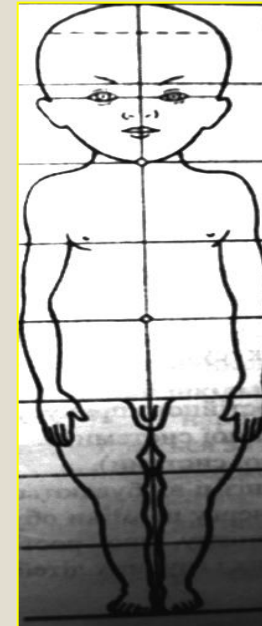


Factors affecting growth of jaws

- Heredity
 - Race
 - Nutrition
 - Disease
 - Socio-economic status
 - Psychological factor/stress
 - Function
 - Teeth eruption
 - Myodynamic balance
 - Soft tissues condition
-

Morphological Features of the Infant oral cavity

- The head of newborn - $\frac{1}{4}$ length of his body
- The skull has small sizes of facial part
- The presence of fontanelle
- In the layer of cheeks - fatty pillows (lumps of Bish)
- Every jaw counts 18 follicles (10 - milky, 8 - permanent:
6 3 2 1 | 1 2 3 6)
- Gingival membrane - fold of Robena - Mazito (double fold of mucus shell in the frontal area jaw)
- Infantile swallowing (child sucks, breathes and swallows at the same time)
- Retrogenia of newborn (distal position of the lower jaw)
- Symptom of "lemon crust or thimble"
- Stairs of lips, big tongue, hard palate is plain

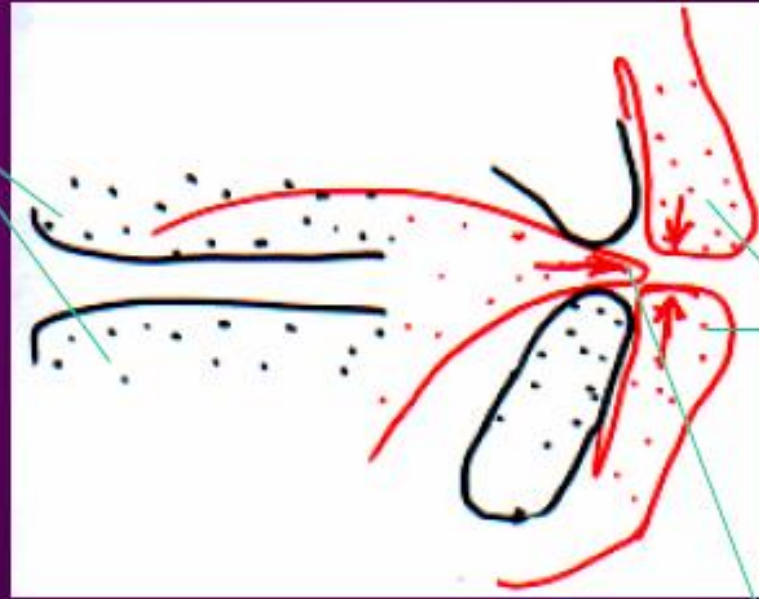


Infantile Swallowing



Infantile Swallow

gum pads apart



lips

forward postured tongue

- ❖ ***strong contraction of both lips***
- ❖ ***forward postured tongue between lips***
- ❖ ***gum pads apart***

Development of Occlusion

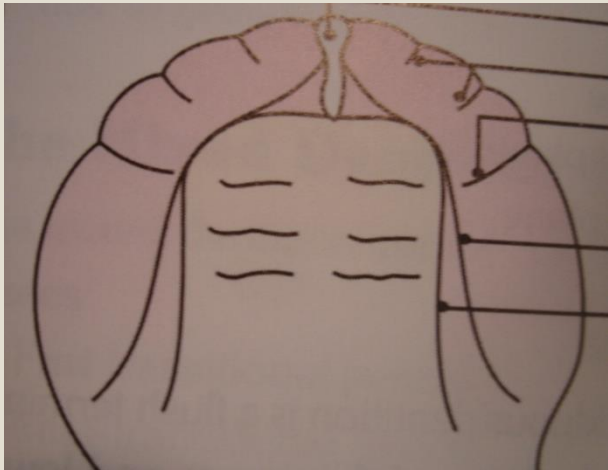
- Pre-dentate period
- Deciduous dentition
- Mixed dentition
- Permanent dentition



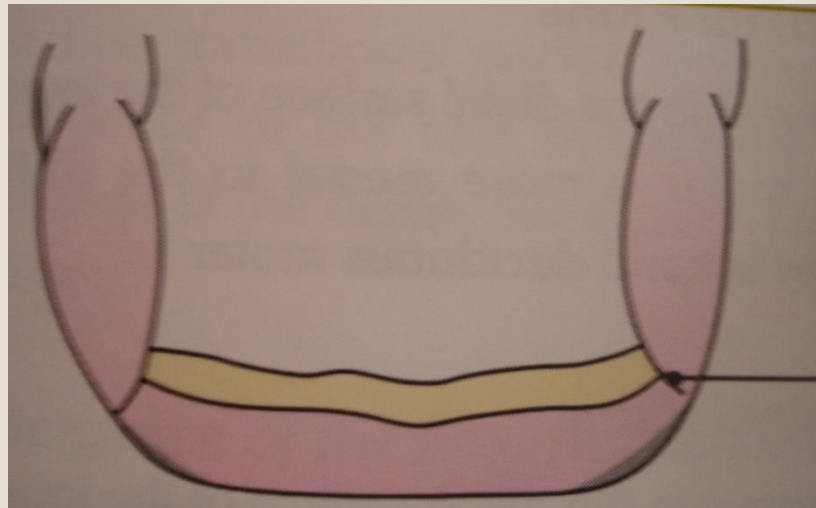
Pre-dentate period

Period from birth to eruption of first deciduous teeth

Alveolar arches of infant called gum pads



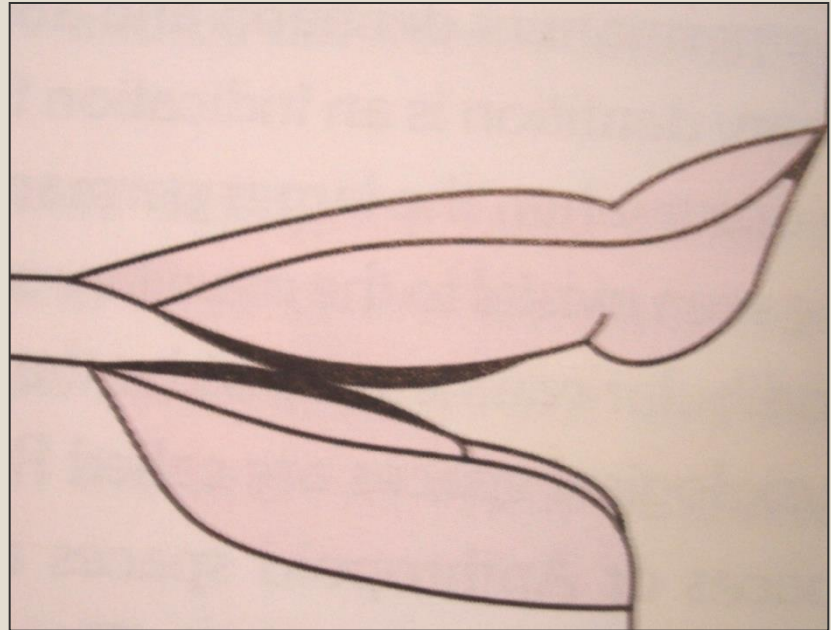
Maxillary Gum Pad



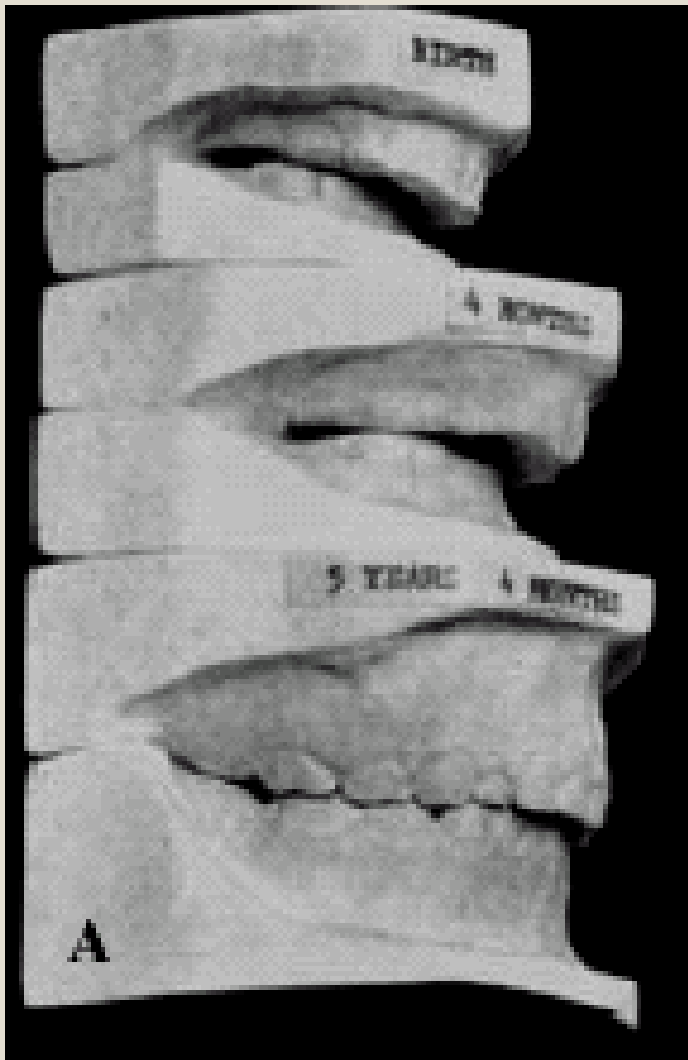
Mandibular Gum Pad

Relationship of Gum pads

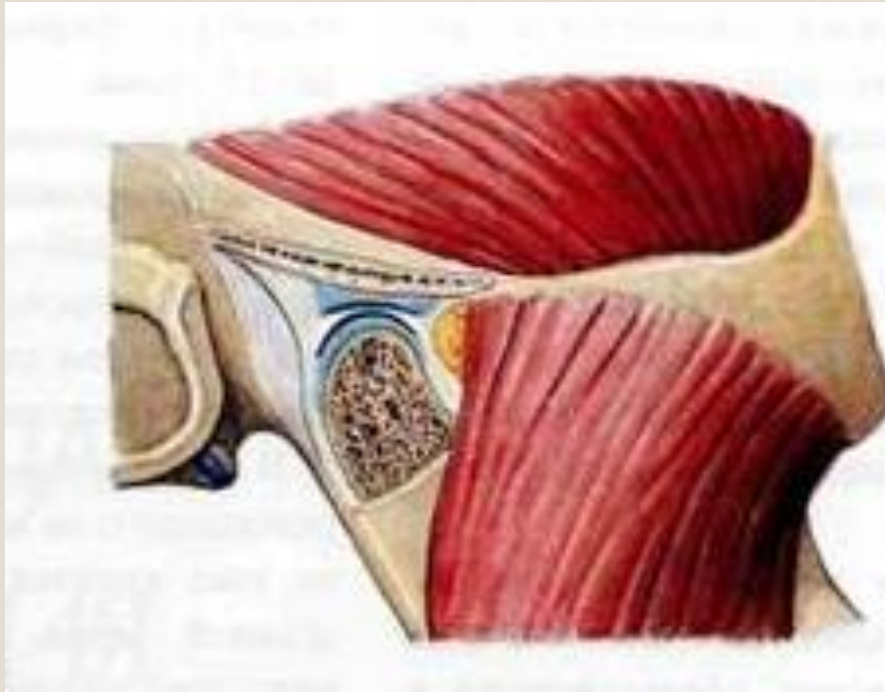
- At rest, gumpads separated by tongue over lower gum pad
- Variable overjet with contact only at molar segment
- At function:
 - Mainly vertical
 - No lateral movement
- flat palate form



At birth, lower jaw situated posteriorly



Newborn TMJ



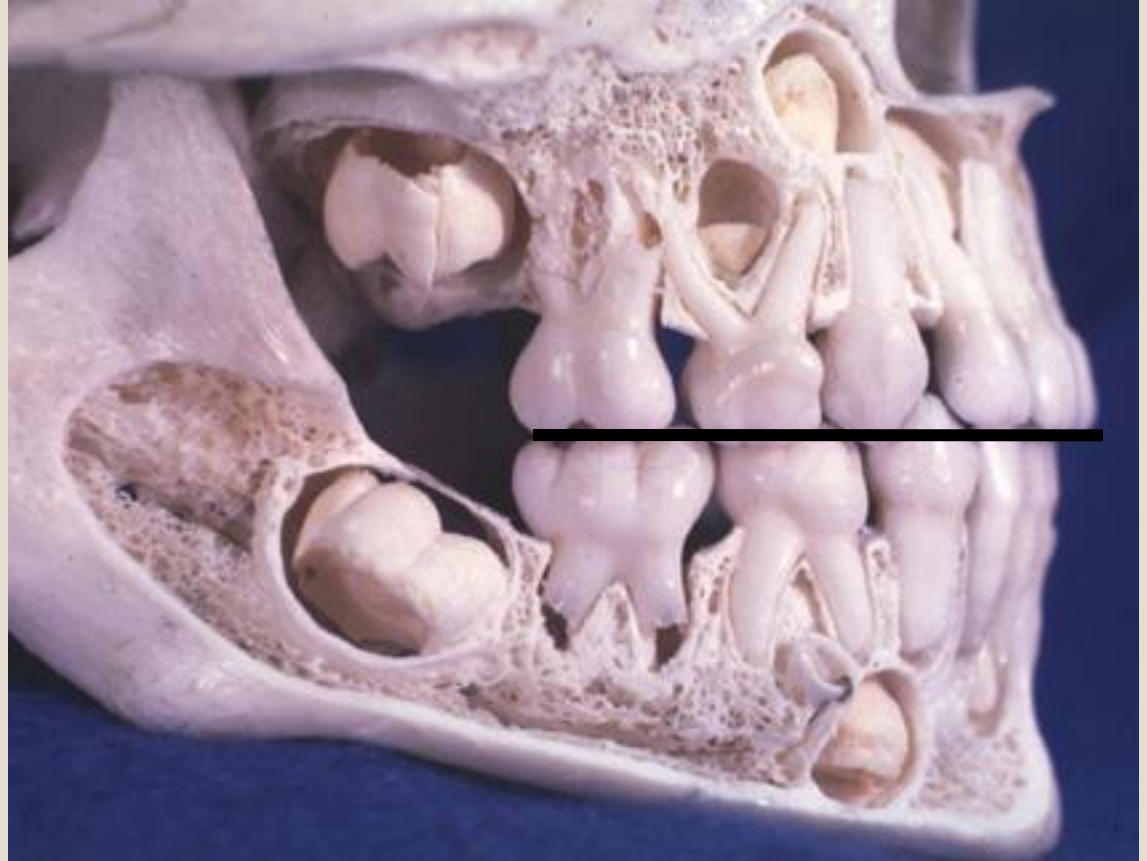
- The newborn condyle is usually rudimentary in respect to the adult.
- Glenoid fossa is flat and wide
- The absence of the articular tubercle
- Physiological retrognathia



Favorable condition for the lower jaw movements in the sagittal plane

Milky dentition

- start to form between the sixth and eighth weeks
- 20 teeth



Temporary bite (milky occlusion) from 6 - 8 month to 6 years:

- **forming** temporary bite - from 6 month to 2 - 2,5 years;
 - **stable** temporary bite - from 2,5 years to 4 years;
 - **Involution** (senescence) period of temporary bite - from 4 years to 6 years.
-

Forming temporary bite - from 6 month to 2 - 2,5 years;

features of eruption:

-terms

-order-first mandible teeth, then maxilla

-sequence -upper jaw - I, II, IV, III, V
lower jaw - I, II, IV, III, V

-evenness - THE SAME NAMES TEETH ON EVERY HALF OF JAWS erupt SIMULTANEOUSLY.



- **stable** temporary bite
- from 2,5 years to 4 years;



stable temporary bite - from
2,5 years to 4 years

- General features

Both dental arches are half round/ovoid

No curve of Spee

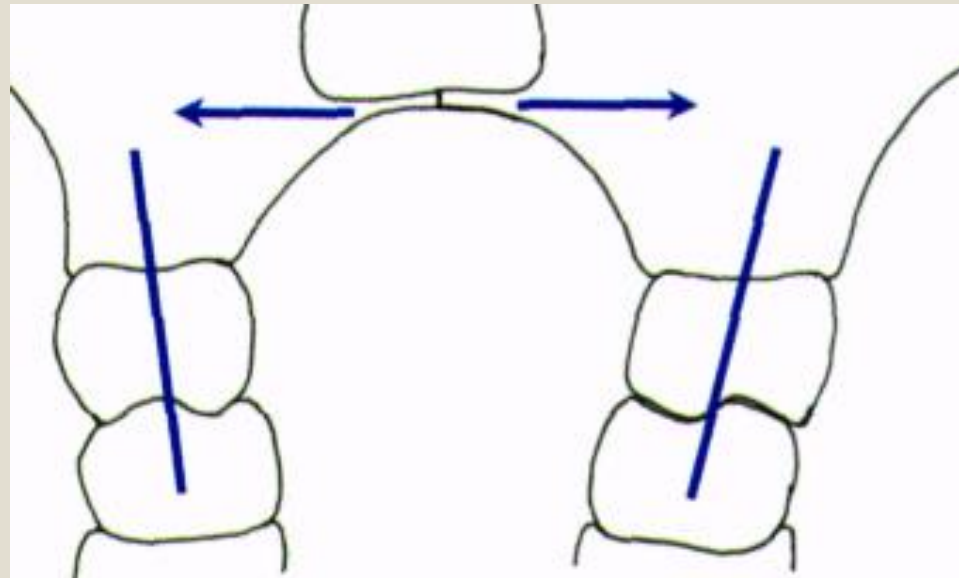
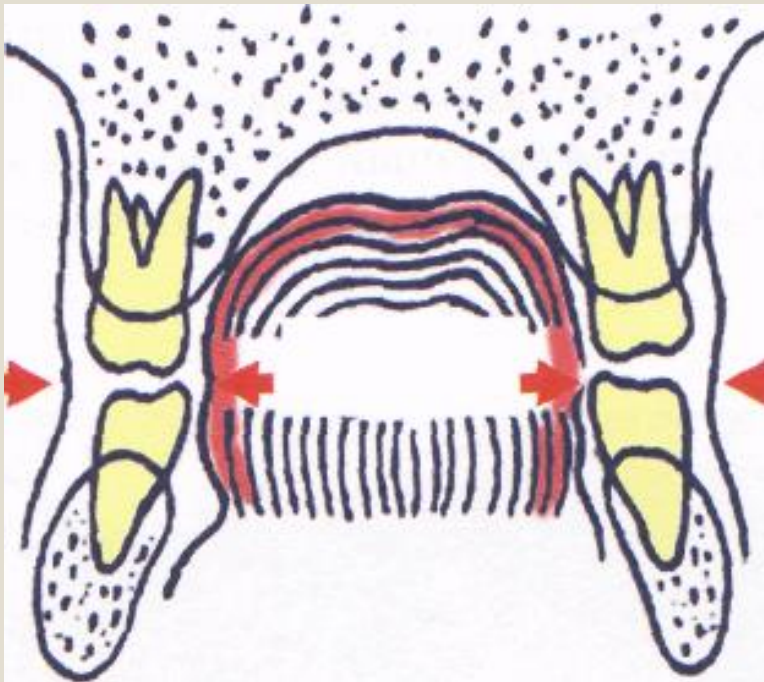
Slight overbite

Vertical incisors

Class I relationship



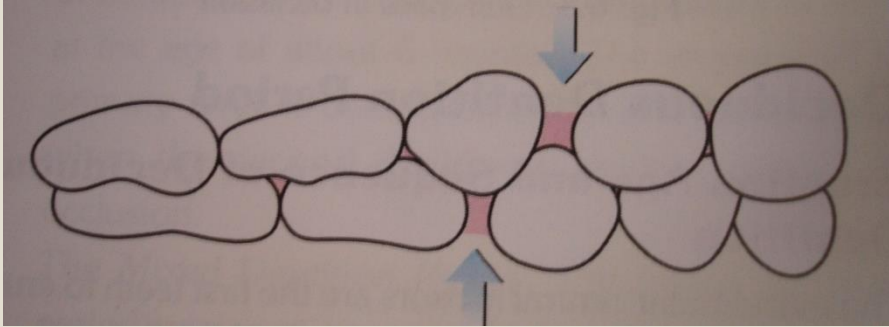
- The growth of the upper dental arch is determined by:
 - a) suture growth in the mid-palatal suture to 17 years
 - b) balance myodynamic antagonists and synergist muscles
 - c) dentition and occlusal relationship



Involution (senescence) period of temporary bite - from 4 years to 6 years.

General features

- Abrasion
- Spacing: Primate space/Simian/Anthropoid space
Physiologic space/Development space



Primate Spaces

- between upper lateral and canine
 - between lower canine and first deciduous molar
-

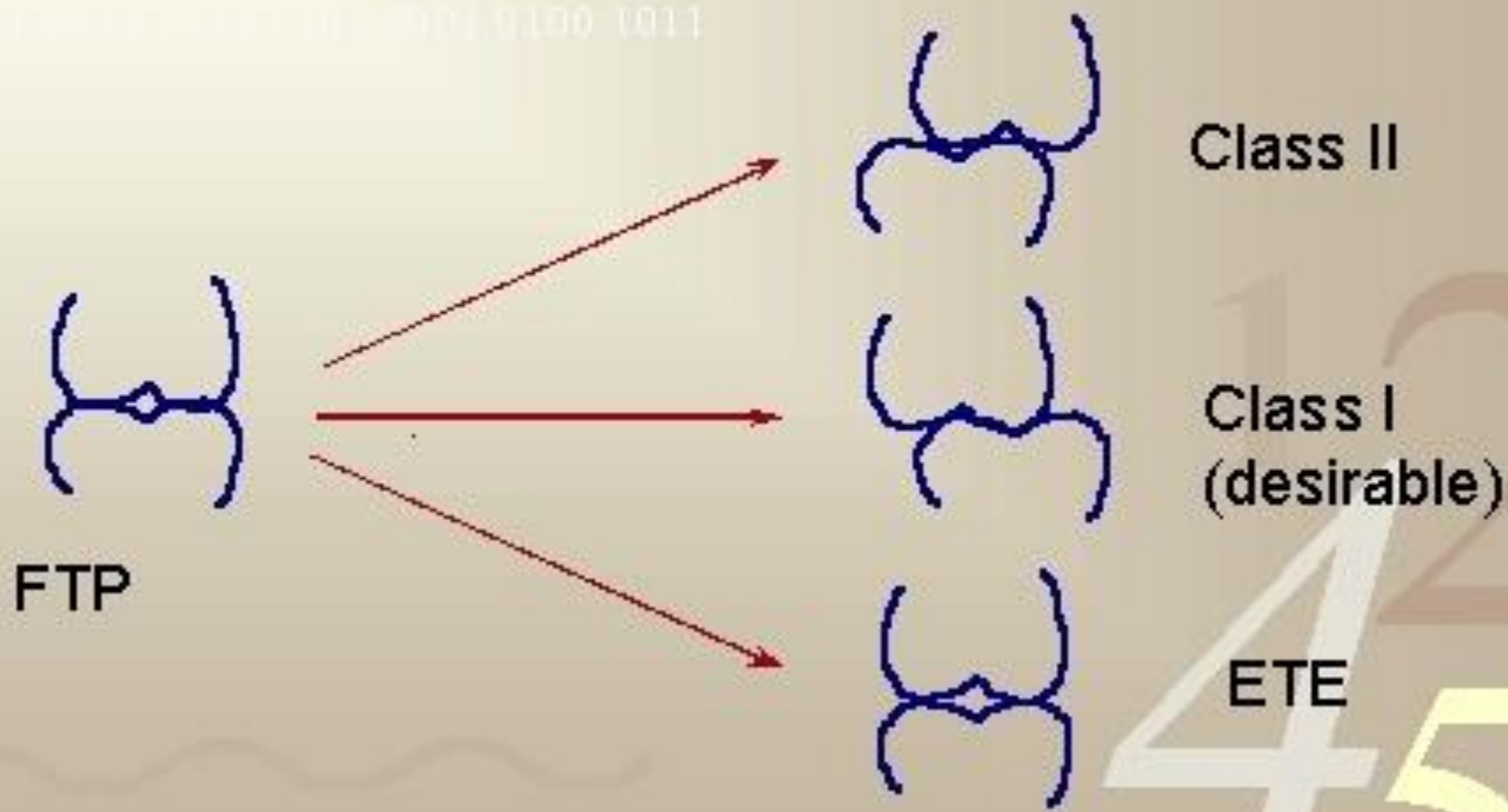
Primary Molar relation

Relationship of the Distal surface of maxillary and mandibular second primary molars

- Flush Terminal Plane relation
 - Mesial step
 - Distal step
-

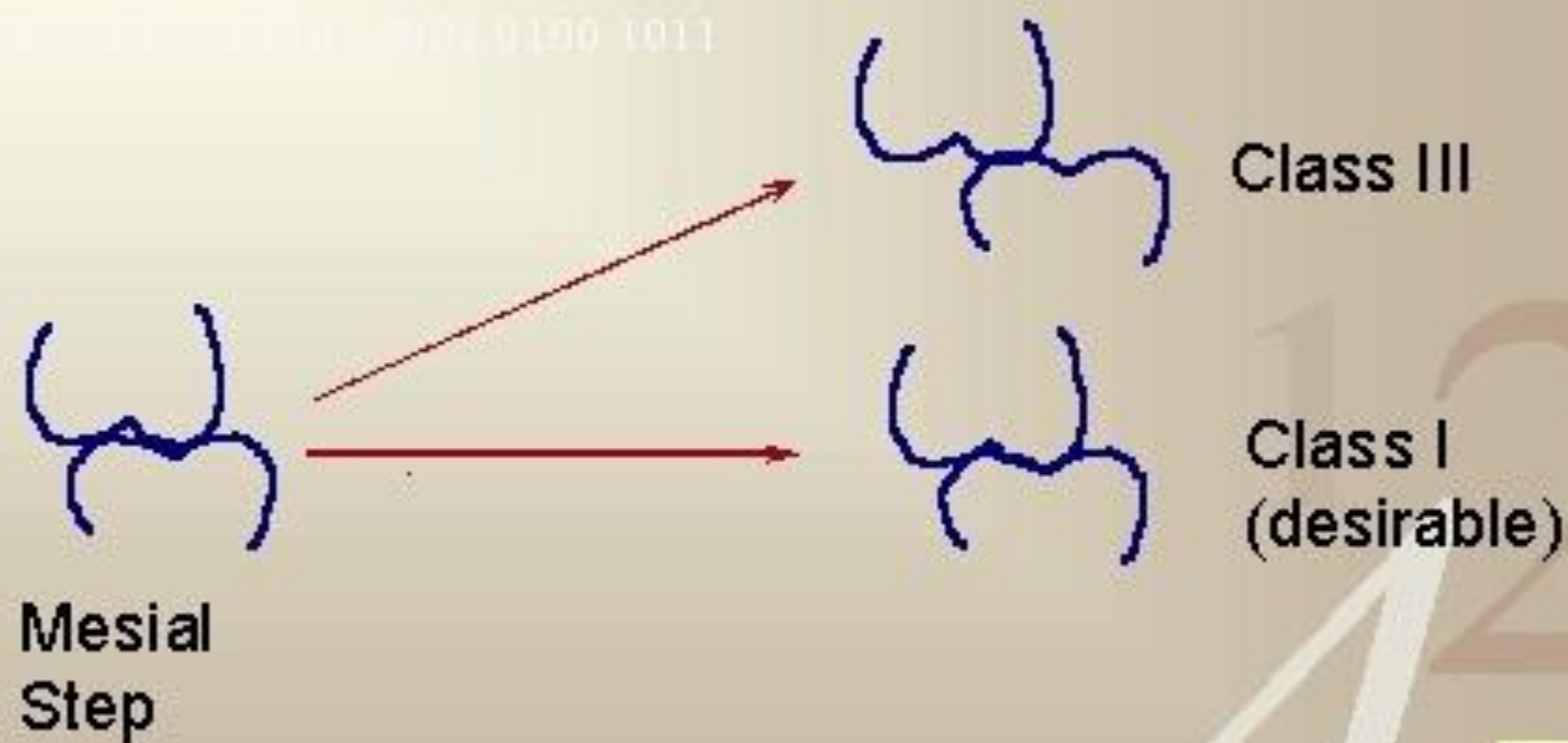
Flush Terminal Plane

0100 1011 0100 0100 1011



1245

Mesial Step



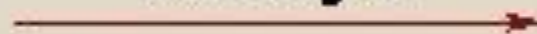
Disto Step

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Disto
Step

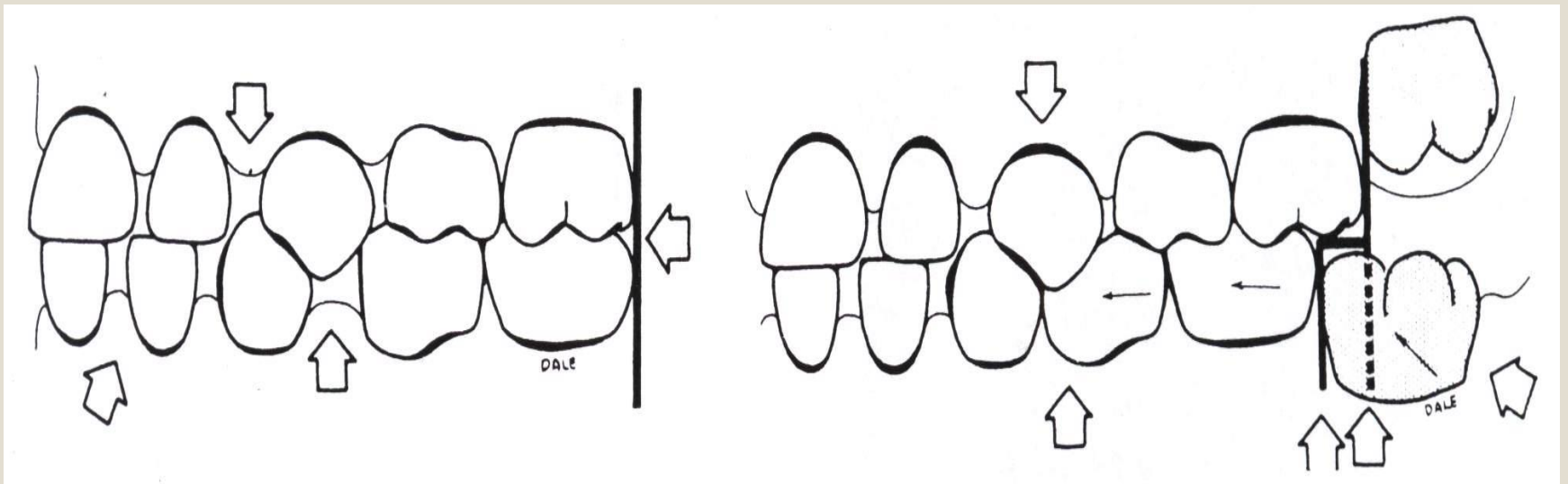
Always



Class II

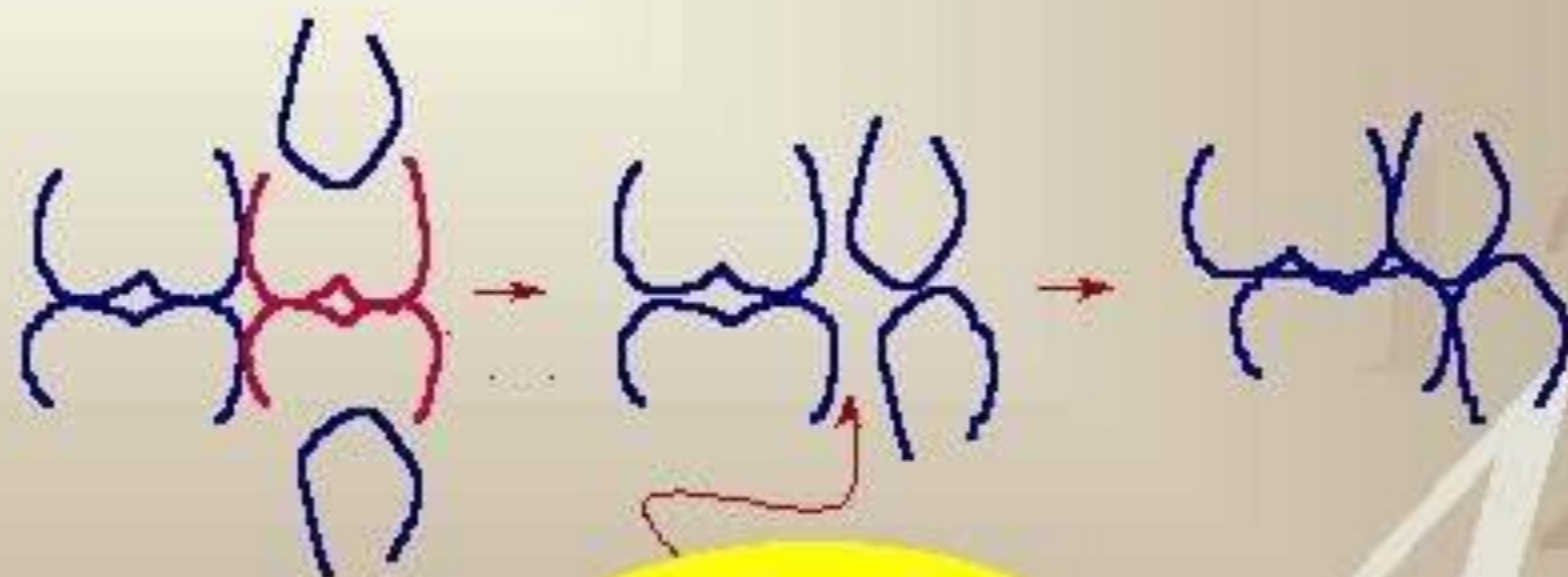
45

EARLY MESIAL SHIFT



Late Mesial Shift

www.dentalcare.com 002 0100 1011



FTP

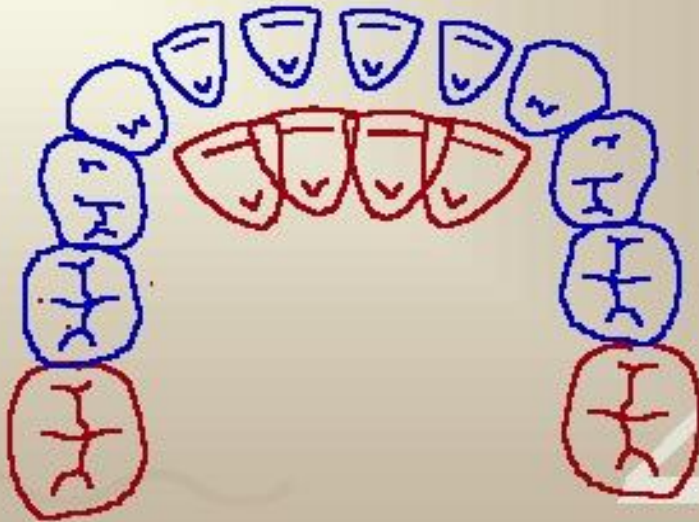
Molar moves into
this space...

Class I

425

ESSENTIAL FACTORS FOR A SMOOTH TRANSITION FROM PRIMARY TO PERMANENT DENTITION:

Primary Spacing

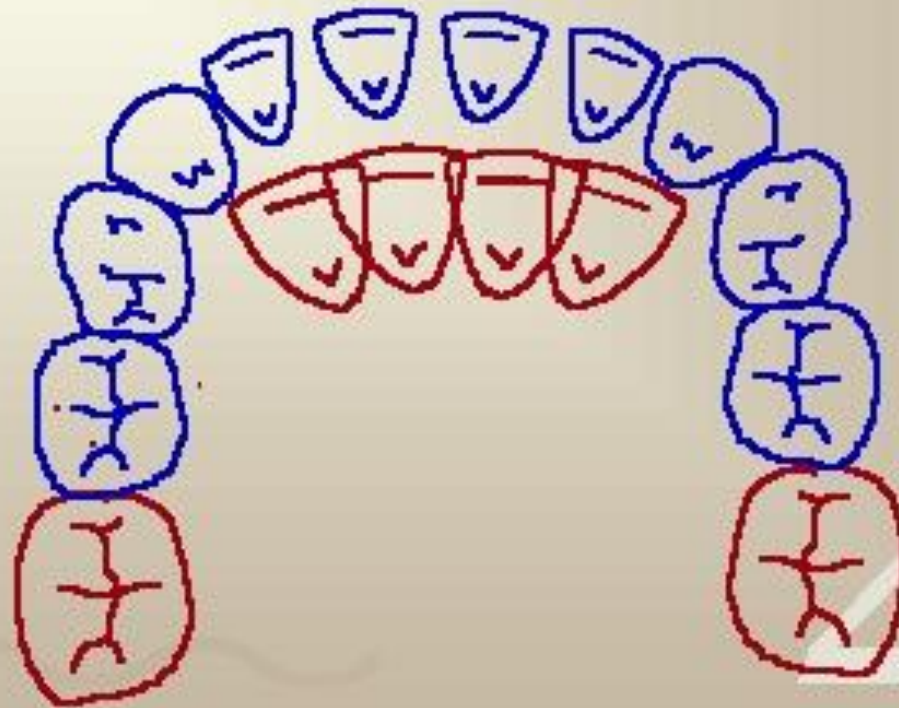


- 4 mm in maxillary arch;
- 3 mm in mandibular arch.



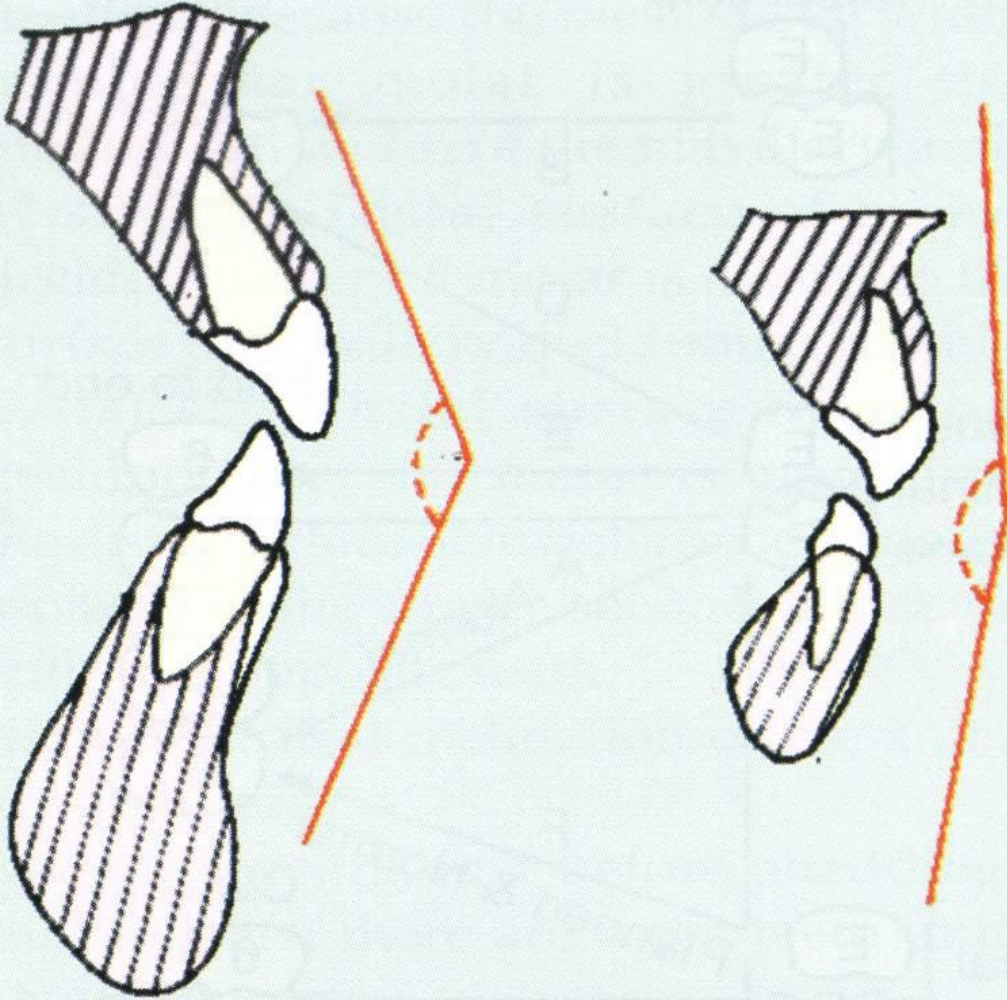
Intercanine growth

0000 0100 0100 1011



12
45

Change in Incisor inclination:



The primary incisors are more upright than the permanent incisors, which incline to the labial surface thus decreasing the inter-incisal angle from about 150° in the deciduous dentition to 123° in the permanent dentition

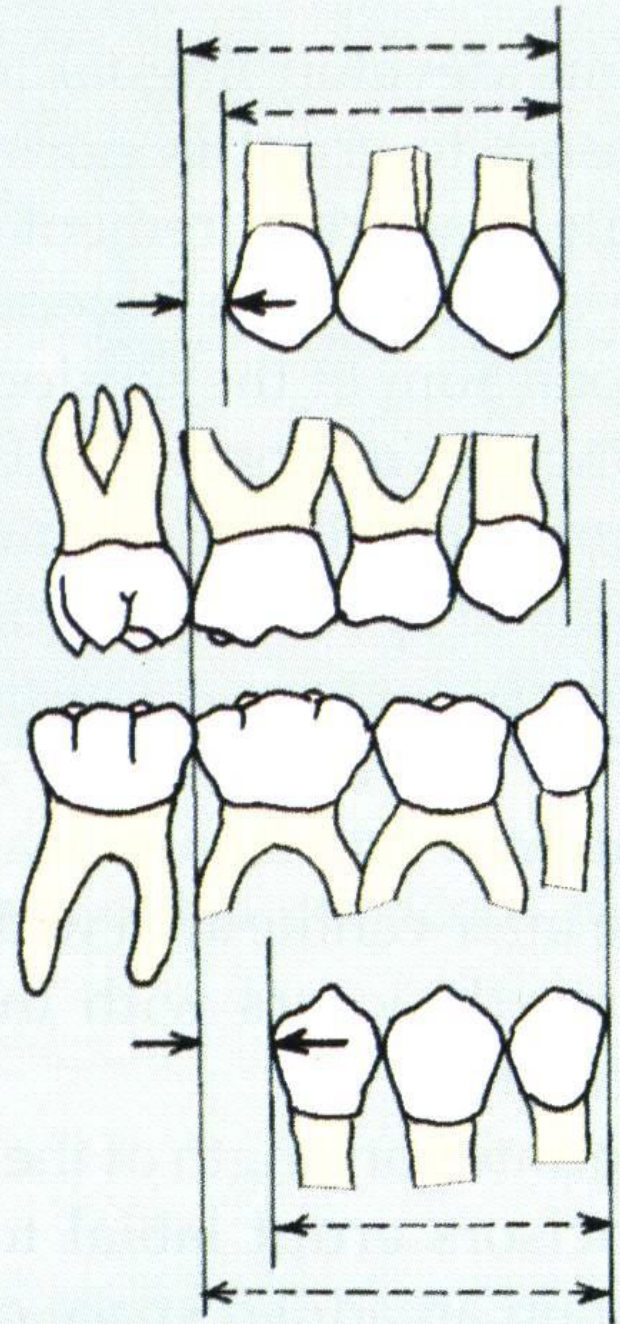
Leeway Space of Nance

Maxilla

0.9 mm/segment
= 1.8 mm total

Mandible

1.7mm/segment
= 3.4 mm total



II. Mixed dentition

1 period - early Mixed dentition - from 6 to 9 years

Eruption of 6 2 1 | 1 2 6;

The second physiology increase of the height of bite begins from eruption of the first permanent molars;

Forming of sagittal and transversal curves;

Growth of jaws;

Transition of the form of dental arches;

Somatic swallowing!

2 period - late Mixed dentition - from 9-10 to 12-14 years

Eruption of 7 5 4 3 | 3 4 5 7;

3 and 4 stage of physiology increase of the height of bite;

Growth of jaws;

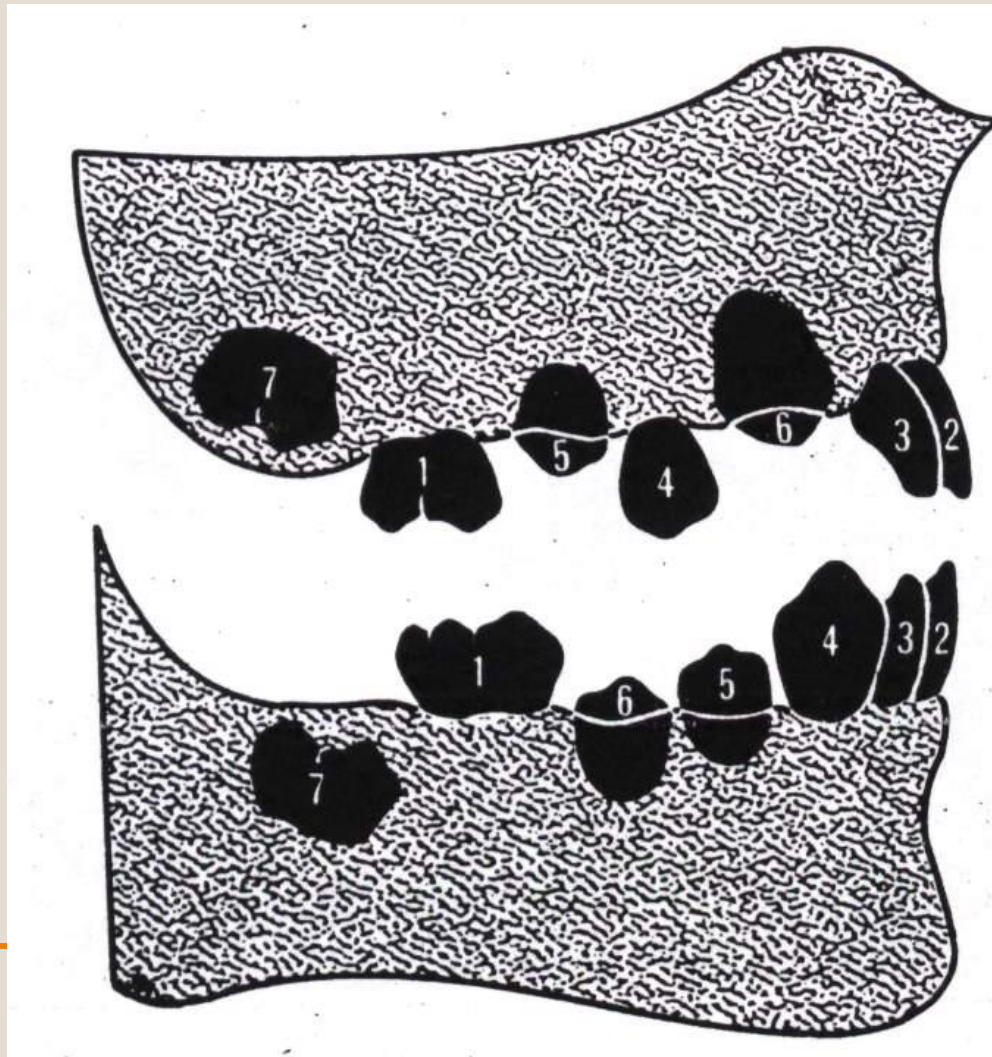
Final of forming of sagittal and transversal curves;

Upper dental arch - semi-oval

Lower dental arch - parabolic

Somatic swallowing!

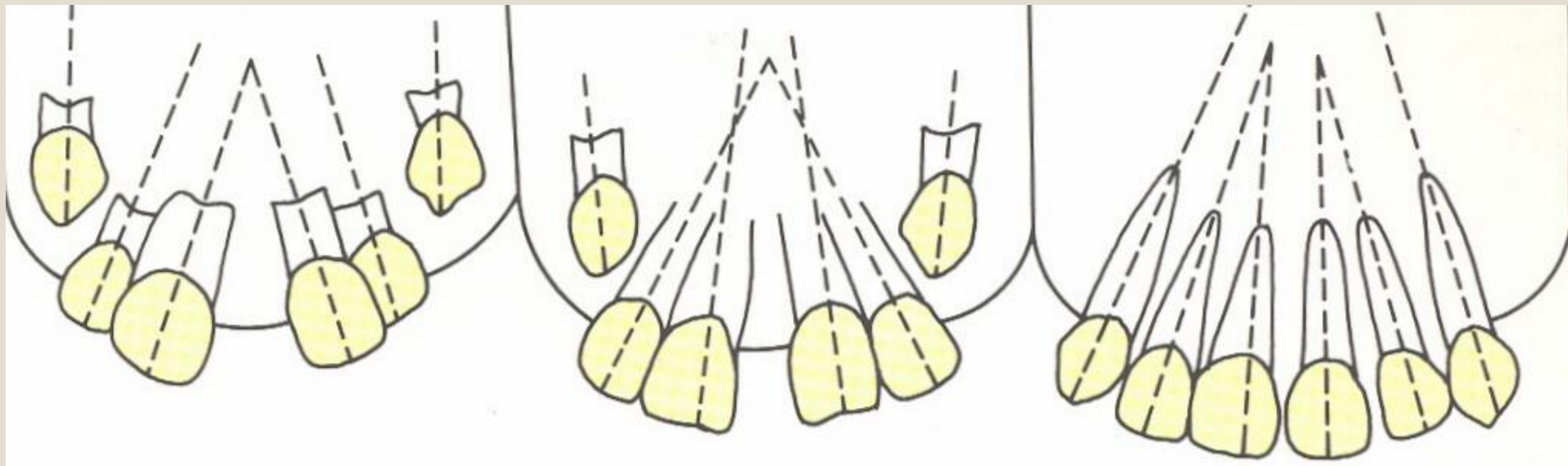
SEQUENCE OF ERUPTION OF PERMANENT TEETH



7 years old

9 years old

14 years old



Changes in the axial inclination due to the eruption of the maxillary anterior teeth (Broadbent, 1957).

THE PERMANENT DENTITION PERIOD

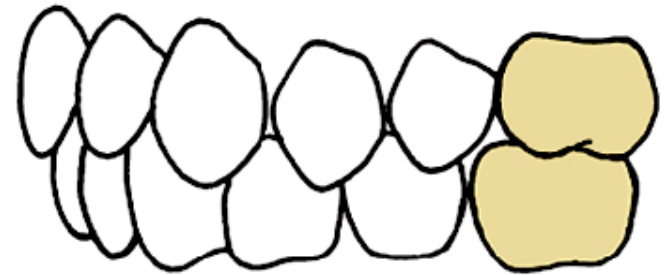
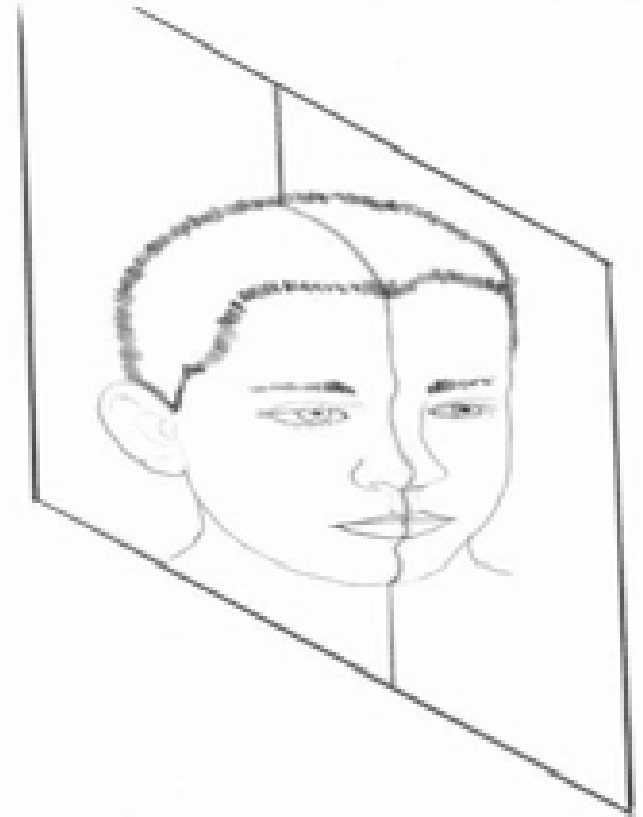
- The permanent dentition forms within the jaws soon after birth.
 - At approximately 13 years of age all permanent teeth except third molars are fully erupted.
 - Before the deciduous incisors are shed, there are 48 teeth/ parts of teeth present in the jaws.
-

Sagittal Plane

An imaginary plane that passes longitudinally through the middle of the head and divides it into right and left halves. Used to describe anterior-posterior relationships.

•Describe

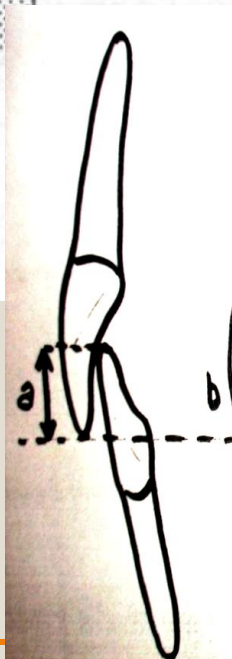
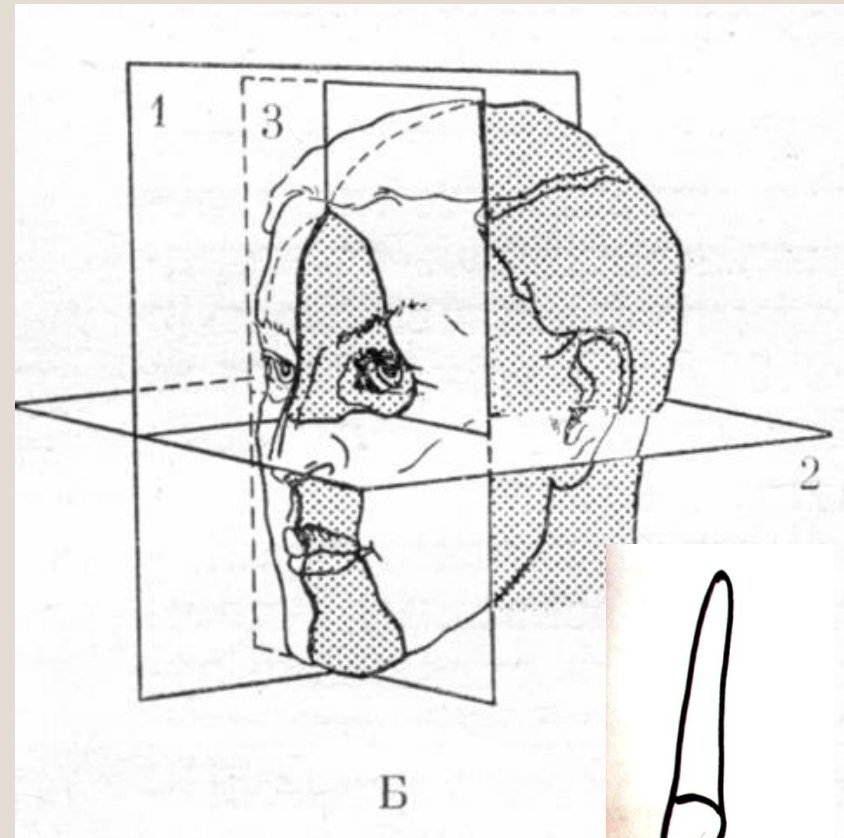
- Canine and molars relationship
- Overjet (in norm - is about 3 mm)
- Incisors covering



Normal occlusion

The vertical plane (movement of the lower jaw in the upper - lower direction):

- 1. **Incisal overbite** - is the vertical distance between the tips of the upper and lower incisors in occlusion. Ideally the lower incisors contact the middle third of the palatal surface of the upper incisors in occlusion



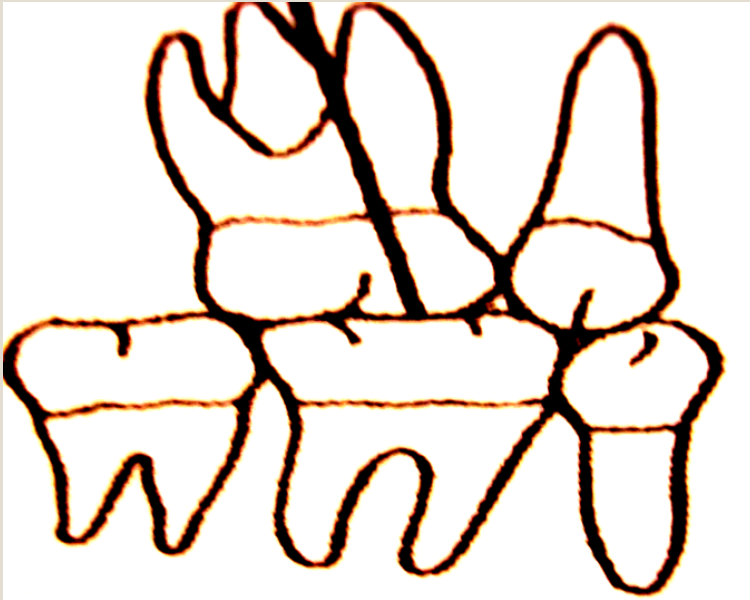
Signs in a transversal plane (movement of the lower jaw in the left - right direction):

1. Relationship between middle lines of the central incisors and frenulum of the lips (upper and lower)
2. Relationship between posterior teeth: each upper buccal tooth in occlusion is a half tooth - width more posterior than the corresponding lower tooth.

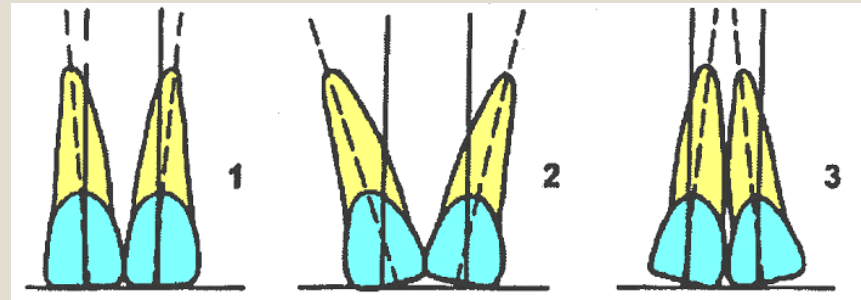


6 keys of ideal occlusion by L. Andrews (1972 year)

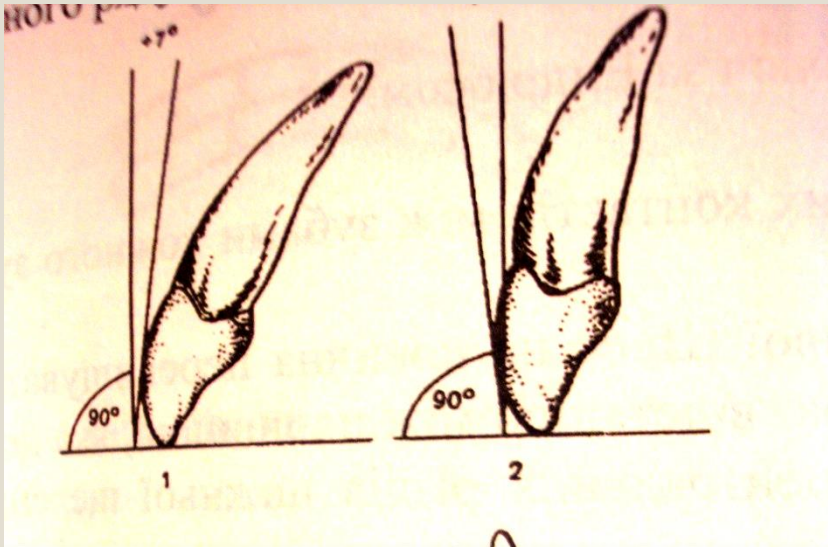
- **I key** - correct tuberculum-fissural contacts between the first constant molar upper and lower



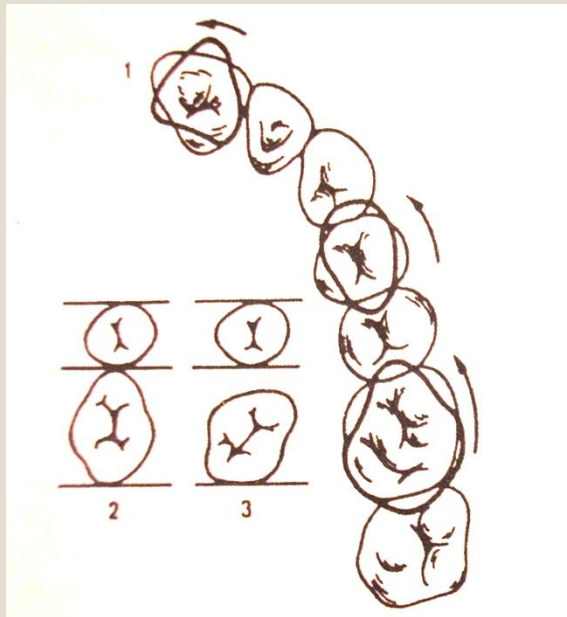
- **II key** - normal angulation



- (mesial-distal inclination) It is characterized by size of an angle, which is formed at crossing an axis of a clinical crown of each tooth and perpendicular to occlusal planes..

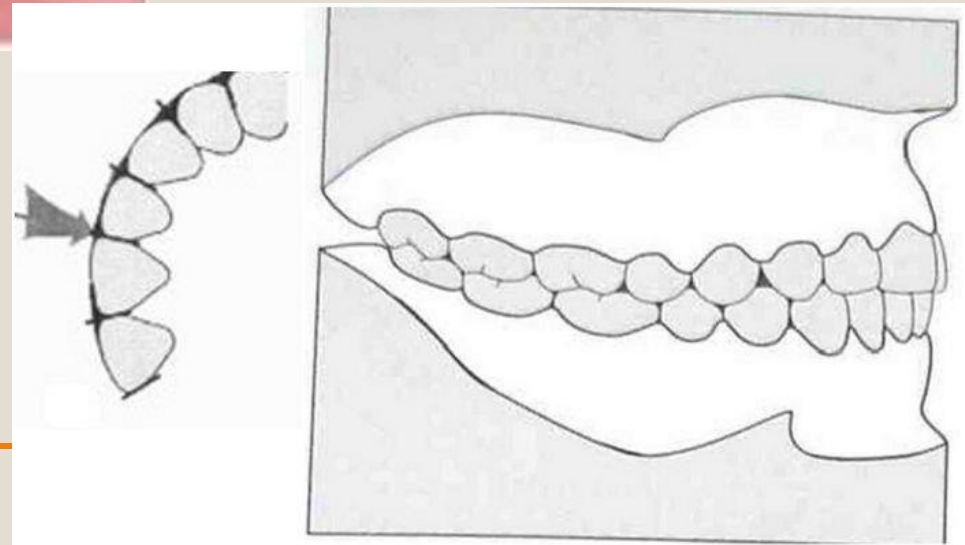


- **Key III** - correct torque (vestibulooral an inclination of crowns and roots of teeth). It characterize by size of an angle, which form at crossing of tangent to facial axes of a clinical crown of a tooth in its median facial to a point and perpendicular to occlusal planes.

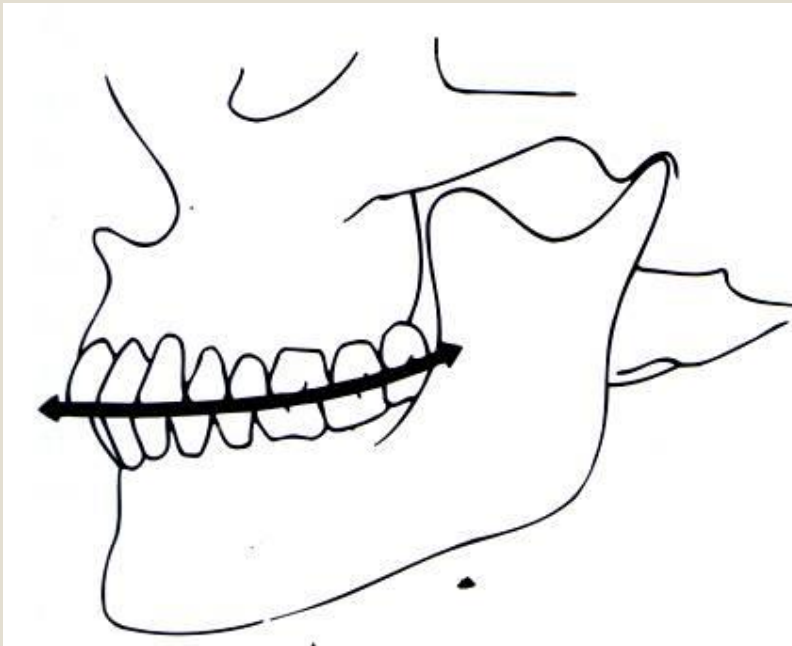
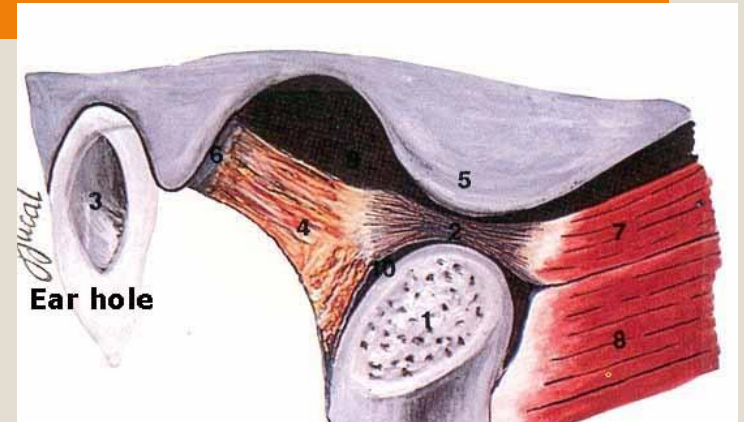


- **Key IV** - rotation.

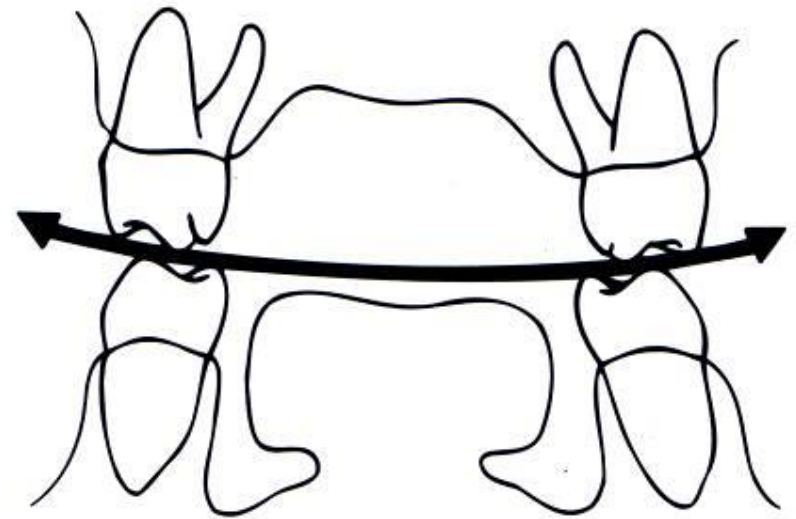
Key V - presence of teeth contacts,
without diastema and spaces.



Key VI - concavity of the curve of Spee should not exceed 1,5 mm.



curve of Spee



curve of Wilson

Growth spurts

1. just before birth (Pre natal)

2. 1 year after birth (childhood spurt is same for both sexes)

3. Mixed dentition growth spurt (Juvenile growth spurt)

4. Prepubertal growth spurt (Adolescent growth spurt)

Girls-7-9 yrs
Boys-8-11yrs

Girls-11-13 yrs
Boys-14-11 yrs



Thanks!

Quality?