The permanent maxillary molars:

1. The permanent maxillary molars assist the mandibular molars in performing the major portion of the work in the mastication and comminution of food. They are the largest and strongest maxillary teeth.
2. Generally speaking, the maxillary molars have large crowns with four well-developed cusps. They have three roots, two buccal and one lingual. The lingual root is the largest. The crowns have two buccal cusps and two lingual cusps.

Maxillary First Molar

1. The maxillary first molar is normally the largest tooth in the maxillary arch.
2. It has well-developed functioning cusps and one supplemental cusp of little practical use.The four large cusps of most phsiologic signifiance are the mesiobuccal, distobucal, the mesiolingual, and the distolingual. A supplemental cusp is called the ***cusp or tubercle of Carabelli.***
3. There are three roots: the mesiobuccal,distobuccal, and lingual. The lingual root is the longest root, the mesiobuccal root is not as long, but it is broader buccolingually so that its resistance to torsion is greater than that of the lingual root. The distobuccal root is the smallest of the three and smoothly rounded.

Eruption time: 6 years
Root complete: 9-10 years

Buccal aspect:

1. The crown is roughly trapezoidal, with cervical and occlusal outlines representing the uneven sides. The cervical line is the shorter of the uneven sides.
2. Parts of four cusps are seen, the mesiobuccal, distobuccal, mesiolingual and distolingual. The mesiobuccal cusp is broader than the distobuccal cusp, and its mesial solpe meets its distal slope at an obtuse angle. The mesial slope of

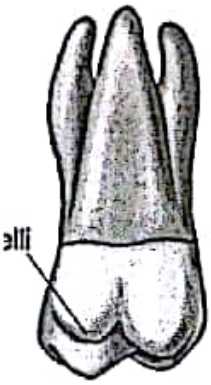
the distobuccal cusp meets its distal slope at right angle. The distobuccal cusp is therefore sharper than the mesiobuccal cusp, and it is at least as long and often longer.

3. The cervical line of the crown is generally convex with the convexity toward the root.
4. Buccal groove that divide two buccal cusps terminate in the center of buccal aspect cervicoocclusally.
5. The mesial outline of the crown follows a nearly straight path downward and mesially, curving occlusally as it reaches the contact area this is approximately two thirds the distance from cervical line to tip of mesiobuccal cusp. It continues downward and distally with the mesial slope of the mesiobuccal cusp.
6. The distal outline of the crown is convex. The crest of curvature is loated is located at a level approximately half the distance from cervical line to tip of cusp. The distal contact area is in the middle of the middle third.
7. All three of the roots may be seen from the buccal aspet. The axes of the roots are inclined distally. Mesiobuccal root curved distally at its middle third and distobuccal root curve at its middle third.
8. The point of bifurcation of the two buccal roots is located approximately 4mm above the cervical line.
9. There is a deep developmental groove buccally on the root trunk which is starts at the bifurcation and progress downward and it terminates in a shallow depression at the cervical line.


Buccal

Lingual aspect:

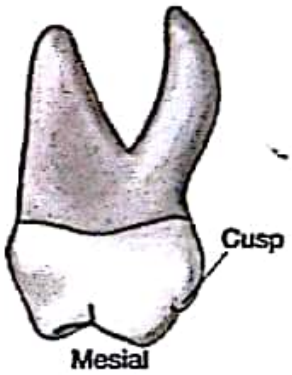
1. From the lingual aspect, the gross outline of maxillary first molar is the reverse of that from the buccal aspect.
2. The variation between the outline of the mesial surface and that of the distal surface is apparent. A shallow depression extend from the terminus of the lingual groove to the center of the lingual surface of the lingual root at the cervical line and then continues in an apical direction on the lingual root
3. The lingual cusps are the only ones to be seen from the lingual aspect.


Lingual

4. The mesiolingual cusp is much the larger. The angle formed by the mesial outline of the crown and the mesial slope of the mesiolingual cusp is almost 90 degrees. An obtuse angle describes the junction of the mesial and distal slopes of this cusp. the distolingual cusp is so spheroidal and smooth that is difficult to describe any angulation on the mesial and distal slopes.
5. The lingual developmental groove statrs in the center of the lingual surface mesiodistally and continues on to the occlusal surface. The fifth cusp appears attached to the mesiolingual surface of the mesiolingual cusp and its about 2mm cervical to cusps ridges of mesiolingual cusp.
6. All three of the roots are visible from the lingual aspect.

Mesial aspect:

1. From this aspect, the increased buccolingual dimensions may be observed as well as the cervical curvatures of the crown outlines at the cervical third buccally and lingually.
2. The outline of the crown makes a short arc buccally to its crest of curvature within the cervical third of the crown.
3. The outline then becomes slightly convex as it progresses downward and inward to the mesiobuccal cusp. The lingual outline of the crown curves outward and lingually to the same extent as on buccal side.



4. The cervical line of the crown is irregular, curving occlusally.
5. The mesial contact area is above the marginal ridge but closer to it than to the cervical line, approximately at the junction of the middle and occlusal thirds of the crown.
6. The mesiobuccal root is broad and flattened on its mesial surface. The level of the bifurcation is a little closer to the cervical line than is found between the roots buccally.
7. The lingual root is longer than the mesial root but is narrower from this aspect. It is a banana-shaped, extending lingually to the lingual and its concave outline to the buccal.

Distal aspect:


Distal

1. The gross outline of this aspect is similar to that of the mesial aspect except several variations must be noted from the distal aspect.
2. Because of the tendency of the crown to taper distally on the buccal surface, most of buccal surface of the crown may be seen. This is because the buccolingual measurement of the crown mesially is greater than the same measurement distally.
3. The cervical line is almost straight across from buccal to lingual.
4. The distal surface of the crown is convex, with a smoothly rounded surface except for a small area near the distobuccal root at the cervical third.
5. The distobuccal root is narrower at its base than either of the others. The lingual outline of the root from the apex to the bifurcation is slightly concave. There is no concavity between the bifurcation of the roots and the cervical line. The bifurcation here is more apical than either of the other two areas on this tooth.

Occlusal aspect:

From the occlusal aspect, the maxillary first molar is somewhat **rhomboidal.** measurement of the crown buccolingually and mesial to the buccal and lingual grooves will be greater than the measurement on that portion which is distal to these developmental grooves. Also , a measurement of the crown immediatly lingual to contact areas mesiodistally is greater than the measurement buccal to the contact areas. Thus it is apparent that the maxillary first molar crown is wider mesially than distally and wider lingually than buccally.

The four major cusps are well developed, with the small minor, or fifth cusp appearing on the lingual surface of the mesiolingual cusp near the mesiolingual line angle of the crown. The fifth cusp may be indistinct, or all the cusp form may be absent. The **mesiolingual cusp** is the largest cusp; it is followed in size by the **mesiobuccal, distolingual , distobuccal,** and **fifth cusps.** The occlusal aspect of this molar locates the various angles of the rhomboidal figure as follows: acute angles, mesiobuccal and distolingual; and obtuse angles, mesiolingual and distobuccal.

Developmentally, there are only **three major cusps** to be analyzed as primary, with the **mesiolingual cusp** (the most primitive), and the **two buccal cusps.** The **distolingual cusp** development common to all of the maxillary molars, and any other additional one, such as ***cusp of Carabelli*** must be regarded as **secondary.**

The occlusal surface of the maxillary first molar is within the confines of the cusp ridges and marginal ridges. It may be described as follows: **There are two major fossae and two minor fossae. The major fossae are the *central fossa*, (which is triangular and mesial to the oblique ridge), and the *distal fossa*, (which is linear and distal to the oblique ridge). The two minor fossae are the *mesial triangular fossa*, immediately to the distal to the mesial marginal ridge, and the *distal triangular fossa*, immediately mesial to the distal marginal ridge.**

The ***oblique ridge*** is a ridge that crosses the occlusal surface obliquely. It is formed by the union of the triangular ridge of the distobuccal cusp and the distal ridge of the mesiolingual cusp.

The ***central fossa*** is a concave area bounded by the distal slope of the mesiobuccal cusp, the mesial slope of the distobuccal cusp, the crest of the oblique ridge, and the crests of the two triangular ridges of the mesiobuccal and the mesiolingual cusps. The central fossa has connecting sulci within its boundaries, with developmental grooves at the deepest portions of these sulci. In addition, it contains supplemental grooves, short grooves that are disconnected, and also the central developmental pit.

<u>There are 6 developmental grooves on the occlusal aspect which are:</u>

Central developmental groove radiate from central pit and progress in a mesial direction at an obtuse angle to the buccal developmental groove to end in mesial triangular fossa.

Buccal developmental groove radiate buccally from central pit at the bottom of buccal sulcus of the central fossa, continuing on to the buccal surface of the crown between the buccal cusps.

Distal oblique groove from distal triangular fossae going obliquely.

Lingual developmental groove this joining with distal oblique groove going between the mesiolingual and distolingual cusps in cervical direction.

Transverse groove of the oblique ridge An additional short developmental groove radiates from the central pit of the central fossa at an obtuse angulation to the buccal and central developmental grooves. When it crosses the oblique ridge transversely, however, as it sometimes does, joining the central and distal fossae with a shallow groove.

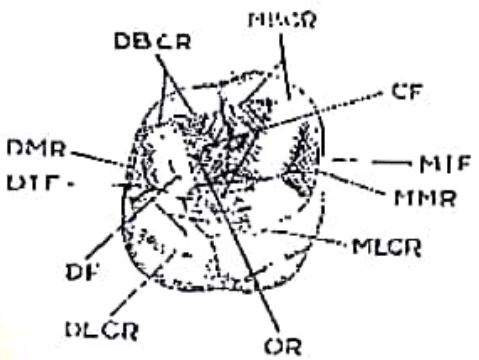
Fifth cusp groove a part of the developmental groove that outlines a fifth cusp.

<u>There are three pits:</u>

Central pit it located at the deepest part of the central fossae, at the junction between the central groove and buccal groove.

Mesial pit it located at the deepest part of the mesial triangular fossae.

Distal pit it located where the distal fossae and distal triangular fossae join.



Occlusal