

## APPENDIX 1.4.0

### Type a<sub>3,4</sub>/b<sub>(1,2)</sub>±6±7±10±12

Lanceolate to polygonal shaped with one apex/acute prominence. With or without various crown ornament. May have pedicle, platform, or base.

### List of Tofino Basin subtypes a<sub>3,4</sub>/

a<sub>3</sub>/b<sub>2</sub>±12/c<sub>3</sub>/d<sub>5+6</sub>/e<sub>1</sub>/f<sub>1</sub>/g<sub>1+2</sub>/h<sub>3</sub>/i<sub>1.3-1.5</sub>/j<sub>3</sub> cf. *rhombus kite* Gupta, 1991

a<sub>4</sub>/b<sub>2</sub>±6/c<sub>3</sub>/d<sub>2+3</sub>/e<sub>2</sub>/f<sub>3</sub>/g<sub>1+2</sub>/h<sub>1,2,3</sub>/i<sub>1-2</sub>/j<sub>3</sub> *kite-shaped longitudinal line*  
Doyle, Kennedy, and Riedel, 1974

a<sub>4</sub>/b<sub>2</sub>±6/c<sub>3</sub>/d<sub>3</sub>/e<sub>1,2</sub>/f<sub>3</sub>/g<sub>1+4</sub>/h<sub>1</sub>/i<sub>1-1.5</sub>/j<sub>3,4</sub> cf. *kite-shaped longitudinal line*  
Doyle, Kennedy, and Riedel, 1974

a<sub>4</sub>/b<sub>2</sub>±6±12/c<sub>2,4</sub>/d<sub>4</sub>±(7,8)+10±13/e<sub>3</sub>/f<sub>3,4</sub>/g<sub>1</sub>/h<sub>1,2</sub>/i<sub>1,2</sub>/j<sub>(4,5,6)</sub>+11+13/k<sub>0,1,2,4</sub>+8/l<sub>1,2</sub>/m<sub>0,9</sub>/n<sub>0,3,4</sub> *pointed and skirted* Doyle, Dunsworth, and Riedel, 1978

a<sub>4</sub>/b<sub>2</sub>+6/c<sub>2</sub>/d<sub>4+8+10</sub>/e<sub>1,3</sub>/f<sub>4</sub>/g<sub>1,2</sub>/h<sub>2</sub>/i<sub>1</sub>/j<sub>(5,9)</sub>+11+13/k<sub>1,8</sub>/l<sub>2</sub>/m<sub>9</sub>/n<sub>3,4</sub>?  
cf. *pointed and skirted* Doyle, Dunsworth, and Riedel, 1978

a<sub>4</sub>/b<sub>6+8</sub>/c<sub>2</sub>/d<sub>2+8</sub>/e<sub>1</sub>/f<sub>0</sub>/g<sub>1,2</sub>/h<sub>1</sub>/i<sub>1,2</sub>/j<sub>2+(11,12)</sub>/k<sub>1</sub>/l<sub>3</sub>/m<sub>0</sub>/n<sub>1</sub> *Raja* sp. A  
(Figure 14.1-14.4)

a<sub>4,6</sub>/b<sub>1</sub>/c<sub>2</sub>/d<sub>1</sub>/e<sub>0</sub>/f<sub>3,4</sub>/g<sub>3</sub>/h<sub>1</sub>/i<sub>1</sub>/j<sub>1</sub>/k<sub>1</sub>/l<sub>3</sub>/m<sub>0,1</sub>/n<sub>0,1</sub> cf. *ogee lanceolate*  
Tway, Doyle, and Riedel, 1985

### Undescribed forms:

a<sub>3,4</sub>/b<sub>2</sub>/c<sub>2</sub>/d<sub>4+10</sub>/e<sub>2,3</sub>/f<sub>0</sub>/g<sub>0</sub>/h<sub>2</sub>/i<sub>1</sub>/j<sub>2+11</sub>/k<sub>3</sub>/l<sub>0</sub>/m<sub>0</sub>/n<sub>0</sub> or

a<sub>11</sub>/b<sub>2</sub>/c<sub>2</sub>/d<sub>0</sub>/e<sub>1</sub>/f<sub>3</sub>/g<sub>1</sub>/h<sub>2</sub>/i<sub>4+8</sub>/j<sub>4</sub> undescribed elasmobranch dermal denticle or tooth, Form B

a<sub>4</sub>/b<sub>1,2</sub>/c<sub>2</sub>/d<sub>1,4</sub>/e<sub>1,3</sub>/f<sub>0</sub>/g<sub>0</sub>/h<sub>0,1</sub>/i<sub>1</sub>/j<sub>6+12+13</sub>/k<sub>1</sub>/l<sub>2</sub>/m<sub>0</sub>/n<sub>0</sub> undescribed elasmobranch dermal denticle, Form C

a<sub>4</sub>/b<sub>2</sub>+6/c<sub>2</sub>/d<sub>4+8</sub>/e<sub>3</sub>/f<sub>0</sub>/g<sub>0</sub>/h<sub>1</sub>/i<sub>1</sub>/j<sub>(1,2)</sub>+11/k<sub>1</sub>/l<sub>2</sub>/m<sub>0</sub>/n<sub>0</sub> undescribed elasmobranch dermal denticle, Form D

a<sub>4</sub>/b<sub>2</sub>+6/c<sub>2</sub>/d<sub>4+8</sub>/e<sub>3</sub>/f<sub>0</sub>/g<sub>0</sub>/h<sub>1</sub>/i<sub>1</sub>/j<sub>1+12</sub>/k<sub>1</sub>/l<sub>2</sub>/m<sub>0</sub>/n<sub>0</sub> undescribed elasmobranch dermal denticle, Form E

a<sub>4</sub>/b<sub>2</sub>+6/c<sub>2</sub>/d<sub>4+8</sub>/e<sub>3</sub>/f<sub>0</sub>/g<sub>0</sub>/h<sub>1</sub>/i<sub>1</sub>/j<sub>6+12+13</sub>/k<sub>2</sub>/l<sub>3</sub>/m<sub>0</sub>/n<sub>0</sub> undescribed elasmobranch dermal denticle, Form F

a<sub>4</sub>/b<sub>2</sub>+6±12/c<sub>2</sub>/d<sub>4+8+10+13</sub>/e<sub>3</sub>/f<sub>8</sub>/g<sub>3</sub>/h<sub>1,2</sub>/i<sub>1</sub>/j<sub>5+11+15</sub>/k<sub>2</sub>/l<sub>3</sub>/m<sub>1</sub>/n<sub>1</sub> undescribed elasmobranch dermal denticle, Form G

a<sub>4</sub>/b<sub>(2,7)</sub>+6/c<sub>2</sub>/d<sub>(2,4)</sub>+8+10/e<sub>0,2</sub>/f<sub>3,4</sub>/g<sub>2,3</sub>/h<sub>1</sub>/i<sub>1,4</sub>/j<sub>2+11</sub>/k<sub>2</sub>/l<sub>1</sub>/m<sub>9</sub>/n<sub>2</sub> undescribed elasmobranch dermal denticle, Form H

a<sub>4</sub>/b<sub>2</sub>+10/c<sub>2</sub>/d<sub>4+10+14</sub>/e<sub>3</sub>/f<sub>0</sub>/g<sub>2</sub>/h<sub>1</sub>/i<sub>1,4</sub>/j<sub>4+11+13</sub>/k<sub>4,5</sub>/l<sub>1,2</sub>/m<sub>0,2</sub>/n<sub>0</sub> undescribed elasmobranch dermal denticle, Form I

a4/b2+13/c2/d4+12/e3,4/f0/g0/h1/i1/j0/k1/l1/m0/n0 undescribed  
elasmobranch dermal denticle, Form J

a4/b6+7/c2/d2+8/e1/f8/g3/h1/i1,2/j2+11/k1,2/l3/m1/n1 undescribed  
elasmobranch dermal denticle, Form K

### APPENDIX 1.4.1

#### Type a3,4/b(1,2)+6+7+10+12

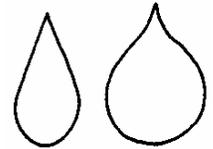
Lanceolate to polygonal shaped with one apex/acute prominence. With or without various crown ornament. May have pedicle, platform, or base. <sup>31</sup>

#### c. Shape of the crown <sup>2, 9, 31</sup>

0. indeterminate or none of the following <sup>9, 19</sup>

1. not used <sup>32</sup>

2. lanceolate <sup>2, 8, 9, 19, 32</sup>



#### d. Features on upper crown surface <sup>31</sup>

0. indeterminate or none of the following <sup>2, 8, 9, 19</sup>

1. absent (smooth) <sup>8, 9, 19, 31, 32</sup>



2. one median line, ridge, keel, or platform <sup>7, 8, 19, 31, 32</sup>



3. two lines, ridges, or keels <sup>9, 19, 31, 32</sup>



4. three or more parallel to subparallel lines, ridges, or keels which do not converge centrally <sup>8, 9, 19, 31, 32</sup>



5. three or more parallel to subparallel lines, ridges, or keels which converge centrally <sup>9, 11, 19, 31</sup>



6. irregular network of lines, or dendritic lines <sup>8, 9, 19, 22</sup>



7. faint and often non-continuous line parallel to anterior crown margins <sup>31, 32</sup>



8. prominent and continuous line, ridge or keel parallel to anterior crown margins <sup>31, 32</sup>



9. lines, ridges or keels which curve over crown anterior and posterior margins <sup>31, 32</sup>



10. median keel or platform that is more raised and broader than lateral lines, ridges, keels or platforms without closely paired lines, ridges or keels <sup>31, 32</sup>



11. platform with interior paired lines, ridges or keels; furrows on each side of platform do not undercut <sup>31, 32</sup>



12. high platforms with interior paired lines, ridges or keels; deep furrows on each side of platform which undercut <sup>31, 32</sup>



13. one or more lines terminating in a Y-shaped fork at end opposite acute prominence <sup>7, 8, 32</sup>



14. nodular (especially where lines or ridges join anterior longitudinal line) <sup>32</sup>



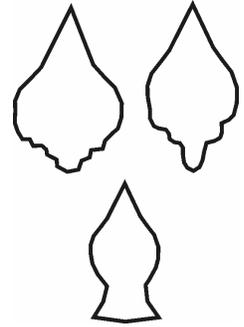
e. Anterior crown margin opposite the peak <sup>9, 19, 31</sup>

0. indeterminate or none of the following <sup>9, 19, 31</sup>

1. rounded <sup>9, 19, 32</sup>

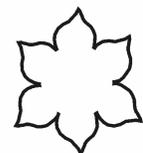
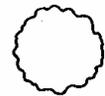
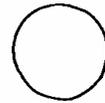


- 2. approximately V-shaped, angular <sup>9, 19, 32</sup>
- 3. irregular, uneven, or undulating (may have mesial protrusion) <sup>9, 19, 31, 32</sup>
- 4. flared into an irregular structure <sup>9, 19, 31, 32</sup>



f. Outline of pedicle base subsurface <sup>9, 19, 31</sup>

- 0. indeterminate or none of the following <sup>9, 19</sup>
- 1. equilateral triangle <sup>9, 19</sup>
- 2. isosceles triangle <sup>9, 19</sup>
- 3. circular to subcircular, smooth margins <sup>9, 19</sup>
- 4. square to diamond (rhomboid) shaped <sup>9, 19</sup>
- 5. circular to subcircular, crenulated margins <sup>9, 19</sup>
- 6. cruciform <sup>9, 19</sup>
- 7. ovoid to elliptical <sup>19, 32</sup>
- 8. tetrapetaloid <sup>31, 32</sup>
- 9. multi-petaloid <sup>31, 32</sup>



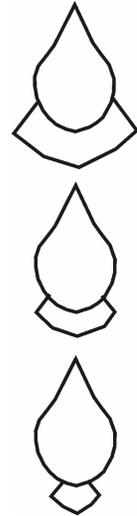
g. Size of pedicle (at anterior and sides) <sup>9, 19, 31</sup>

0. indeterminate or none of the following <sup>9, 19</sup>

1. pedicle wider than crown <sup>9, 19, 31, 32</sup>

2. pedicle same width as crown <sup>9, 19, 31, 32</sup>

3. pedicle narrower than crown <sup>9, 19, 31, 32</sup>



h. Development of lateral peaks on posterior crown <sup>9, 19, 31</sup>

0. indeterminate <sup>9, 19</sup>

1. no development, smooth margins <sup>9, 19</sup>

2. some development, irregular margins <sup>9, 19</sup>



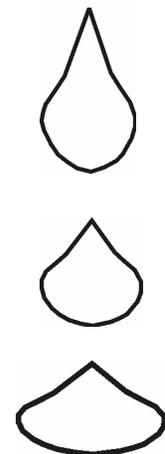
i. Length/width ratio of crown <sup>19, 31</sup>

0. indeterminate <sup>19</sup>

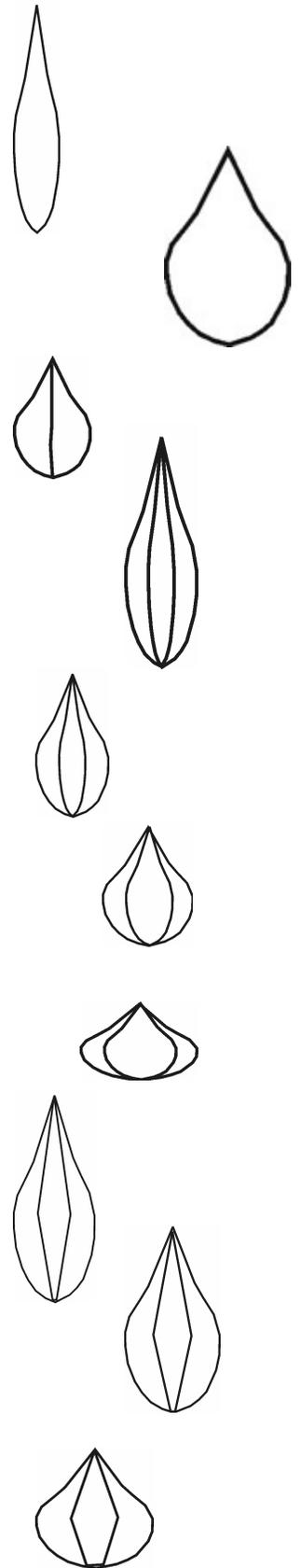
1. length greater than width, but less than three times width <sup>19, 32</sup>

2. length approximately equal to width <sup>19, 32</sup>

3. length less than width <sup>19, 32</sup>



4. length greater than three times width <sup>19, 32</sup>
- j. Upper crown mesial platform (or differentiated structure) <sup>31, 32</sup>
  0. indeterminate or none of the following <sup>31, 32</sup>
    1. absent or considerably reduced <sup>31, 32</sup>
    2. one line, ridge, or keel <sup>31, 32</sup>
    3. narrow and elongate lanceolate (rounded anterior margin, pointed posterior margin), (greater than five times longer than wide) <sup>31, 32</sup>
    4. elongate lanceolate (three to five times longer than wide) <sup>31, 32</sup>
    5. lanceolate (greater than one to less than three times longer than wide) <sup>31, 32</sup>
    6. broad lanceolate (equally as long as wide, or wider than long) <sup>31, 32</sup>
    7. narrow and elongate rhomboid (greater than five times longer than wide) <sup>31, 32</sup>
    8. elongate rhomboid (three to five times longer than wide) <sup>31, 32</sup>
    9. rhomboid (two to three times longer than wide) <sup>31, 32</sup>



10. broad rhomboid (equally as long as wide, or wider than long) <sup>31, 32</sup>



11. long, extends anterior to posterior (greater than 1/2 crown length) <sup>31, 32</sup>



12. short, (less than or equal to 1/2 crown length) <sup>31, 32</sup>



13. with internal lines, ridges, or keels (which are not closely paired) <sup>31, 32</sup>



14. with closely paired lines, ridges, or keels <sup>31, 32</sup>



15. with lines or ridges which bifurcate anteriorly <sup>32</sup>



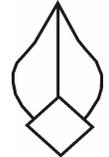
k. Features on the subcrown <sup>31</sup>

0. indeterminate or none of the following <sup>31</sup>

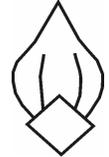


1. absent (smooth) <sup>31, 32</sup>

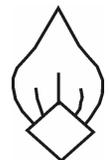
2. one median line, ridge, keel, or platform <sup>9, 19, 32</sup>



3. two lines, ridges, keels, or platforms <sup>31, 32</sup>



4. three or more short parallel to subparallel lines, ridges, or keels which commonly do not exceed 1/2 the crown length <sup>31, 32</sup>



5. three or more long parallel to subparallel lines, ridges, or keels which commonly extend from posterior pedicle margin to posterior crown margin or apex <sup>31, 32</sup>



6. curved line, ridge, or keel near the subcrown centre posterior region around pedicle <sup>19, 31, 32</sup>



7. curved depression surrounding junction of crown and pedicle <sup>19, 31, 32</sup>



8. stippled or pitted <sup>32</sup>



l. Anterior crown overhang of pedicle/crown junction <sup>31, 32</sup>

0. indeterminate <sup>31, 32</sup>

1. absent (crown drops obliquely or vertically to pedicle) <sup>31, 32</sup>



2. minor (crown slightly curves under to pedicle) <sup>31, 32</sup>



3. prominent (crown significantly curves under to pedicle) <sup>31, 32</sup>



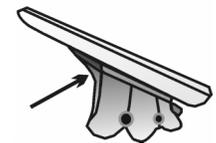
m. Pedicle type <sup>31</sup>

0. indeterminate or none of the following <sup>31</sup>

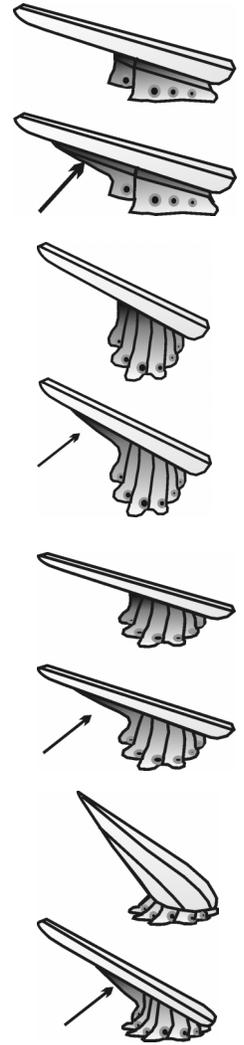
1. tetrahedroid <sup>31, 32</sup>



2. keeled tetrahedroid <sup>31, 32</sup>

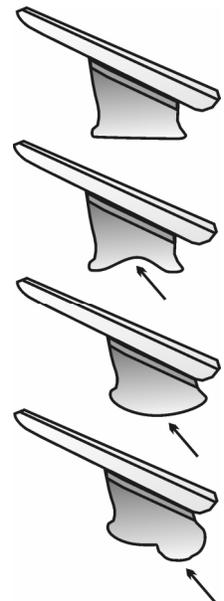


- 3. expanded tetrahedroid <sup>31, 32</sup>
- 4. keeled expanded tetrahedroid <sup>31, 32</sup>
- 5. tall trunk <sup>31, 32</sup>
- 6. keeled tall trunk <sup>31, 32</sup>
- 7. trunk-like <sup>31, 32</sup>
- 8. keeled trunk <sup>31, 32</sup>
- 9. short trunk <sup>32</sup>
- 10. keeled short trunk <sup>32</sup>



n. Pedicle subsurface <sup>31</sup>

- 0. indeterminate or none of the following <sup>31</sup>
- 1. flat <sup>31, 32</sup>
- 2. concave <sup>31, 32</sup>
- 3. convex <sup>31, 32</sup>
- 4. convex with bulge to one side <sup>31, 32</sup>



**3. kite-shaped, with two longer sides** <sup>2, 8, 9, 19, 32</sup>

d. Pattern of lines on upper crown surface <sup>2, 8, 9</sup>

0. indeterminate or none of the following <sup>2, 8, 9</sup>

1. absent <sup>2, 8, 9</sup>

2. one line <sup>2, 8, 9</sup>

3. three or more lines; parallel to subparallel <sup>2, 8, 9</sup>

4. irregular network of lines or dendritic <sup>2, 8, 9</sup>

5. lines converge at acute prominence <sup>2, 7</sup>

6. median line bifurcates <sup>2, 7, 8</sup>

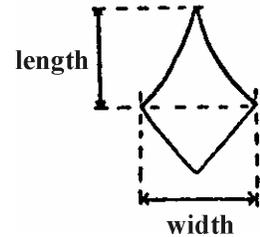
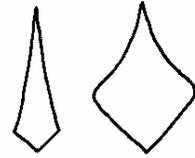
e. Length of acute prominence (apex or pointed margin) <sup>2, 8, 9</sup>

0. indeterminate <sup>2, 8, 9</sup>

1. length equal to or less than width of base <sup>2, 8, 9, 30</sup>

2. length less than twice width of base <sup>2, 8, 9</sup>

3. length more than twice but less than three times width of base <sup>2, 8, 9</sup>



4. length more than three times width of base <sup>2,8,9</sup>



f. Narrow differentiated area at upper crown margin <sup>2,8,9</sup>

0. indeterminate <sup>2,8,9</sup>

1. absent <sup>2,8,9</sup>



2. present on long sides <sup>2,8,9</sup>



3. present on short sides <sup>2,8,9</sup>



g. Margin <sup>2,8,9</sup>

0. indeterminate or none of the following <sup>2,8,9</sup>

1. smooth and continuous on long sides (on sides of acute prominence) <sup>2,8,9</sup>



2. smooth and continuous on short sides (on sides opposite acute prominence) <sup>2,8,9</sup>



3. irregularly undulating on long sides (on sides of acute prominence) <sup>2,8,9</sup>



4. irregularly undulating on short sides (on sides opposite acute prominence) <sup>2,8,9</sup>



5. regularly undulating on long sides (on sides of acute prominence) <sup>2,8,9</sup>



6. regularly undulating on short sides (on sides opposite acute prominence)<sup>2, 8, 9</sup>



7. broken on long sides (on sides of acute prominence)<sup>2, 8, 9</sup>

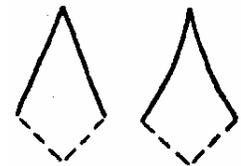


8. broken on short sides (on sides opposite acute prominence)<sup>2, 8, 9</sup>



h. Degree of curvature on sides of acute prominence<sup>7, 8</sup>

0. indeterminate or none of the following<sup>8</sup>



1. straight or slightly concave<sup>7, 8</sup>

2. pronounced concave<sup>7, 8</sup>



3. sigmoid<sup>32</sup>

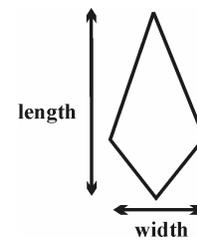


4. convex<sup>32</sup>



i. Length to width ratio<sup>19, 32</sup>

Recorded as numbers<sup>32</sup>



j. Degree of curvature on sides opposite acute prominence <sup>32</sup>

0. indeterminate or none of the following <sup>32</sup>

1. straight <sup>32</sup>

2. pronounced convex <sup>32</sup>

3. pronounced concave <sup>32</sup>

4. regularly undulating <sup>32</sup>

5. irregularly undulating <sup>32</sup>



4. **rhombic** <sup>2, 8, 9, 19</sup>

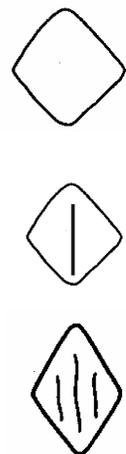
d. Pattern of lines, ridges, or keels on upper crown surface <sup>2, 9, 19, 31</sup>

0. indeterminate or none of the following <sup>2, 9, 19</sup>

1. absent <sup>2, 9, 19</sup>

2. one line, ridge, or keel <sup>2, 9, 19, 31</sup>

3. two or more parallel to subparallel lines, ridges, or keels not converging centrally or at a corner <sup>2, 9, 19, 31</sup>



4. three or more parallel to subparallel lines converging at or near one or more corner <sup>2,9,19</sup>



5. irregular network of lines, ridges, or keels <sup>2,9,19,31,32</sup>



6. concentric chevrons, with centre at one corner of crown <sup>9,19,31</sup>



7. concentric rhombs with centre at middle of crown <sup>9,19,31</sup>



8. many parallel or subparallel lines arising predominantly from one or two edges of crown <sup>19</sup>

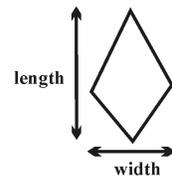


9. concentric rhombs with centre at one corner of crown <sup>19,31</sup>



e. Length/width ratio of crown <sup>9,19,31</sup>

0. indeterminate <sup>9,19</sup>



1. length greater than width <sup>9,19,32</sup>



2. length approximately same as width <sup>9,19</sup>



3. length less than width <sup>31,32</sup>



f. Other features present <sup>9, 19</sup>

0. indeterminate or none of the following <sup>9, 19</sup>

1. no other significant features <sup>19</sup>

2. one line, ridge, or keel on subcrown <sup>9, 19, 30, 31</sup>

3. platform, pedicle, or base present (basal/subcrown and side views) <sup>9, 19, 30, 31</sup>

4. more than one line, ridge, or keel on subcrown <sup>19, 30, 31</sup>

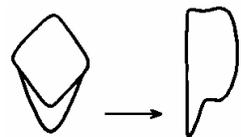
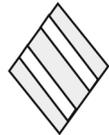
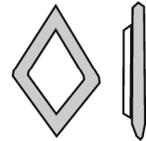
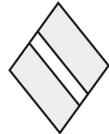
5. extension of crown into a peg-like structure <sup>9, 19, 31</sup>

6. subcrown smooth and unornamented <sup>30, 31, 32</sup>

7. one or two crown edges serrated <sup>30, 31, 32</sup>

8. upper crown surface with stippled region(s) <sup>30, 31, 32</sup>

9. canal opening(s) or hooded foramina on upper crown surface <sup>30, 31, 32</sup>



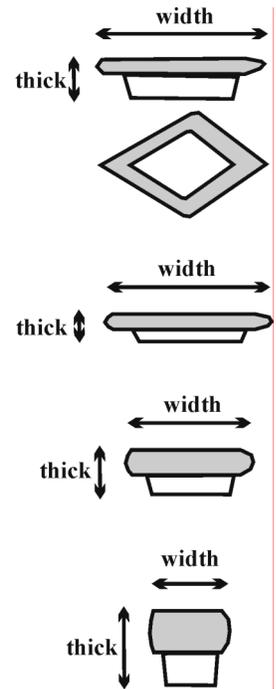
g. Thickness of element (crown and base) <sup>9, 19, 32</sup>

0. indeterminate <sup>9, 19</sup>

1. very flattened (thickness less than 1/4 maximum width) <sup>9, 19, 31, 32</sup>

2. moderately flattened (thickness = 1/4 - 1/2 maximum width) <sup>9, 19, 32</sup>

3. very thick (thickness greater than maximum width) <sup>9, 19, 32</sup>



5. **cruciform** <sup>11</sup>

