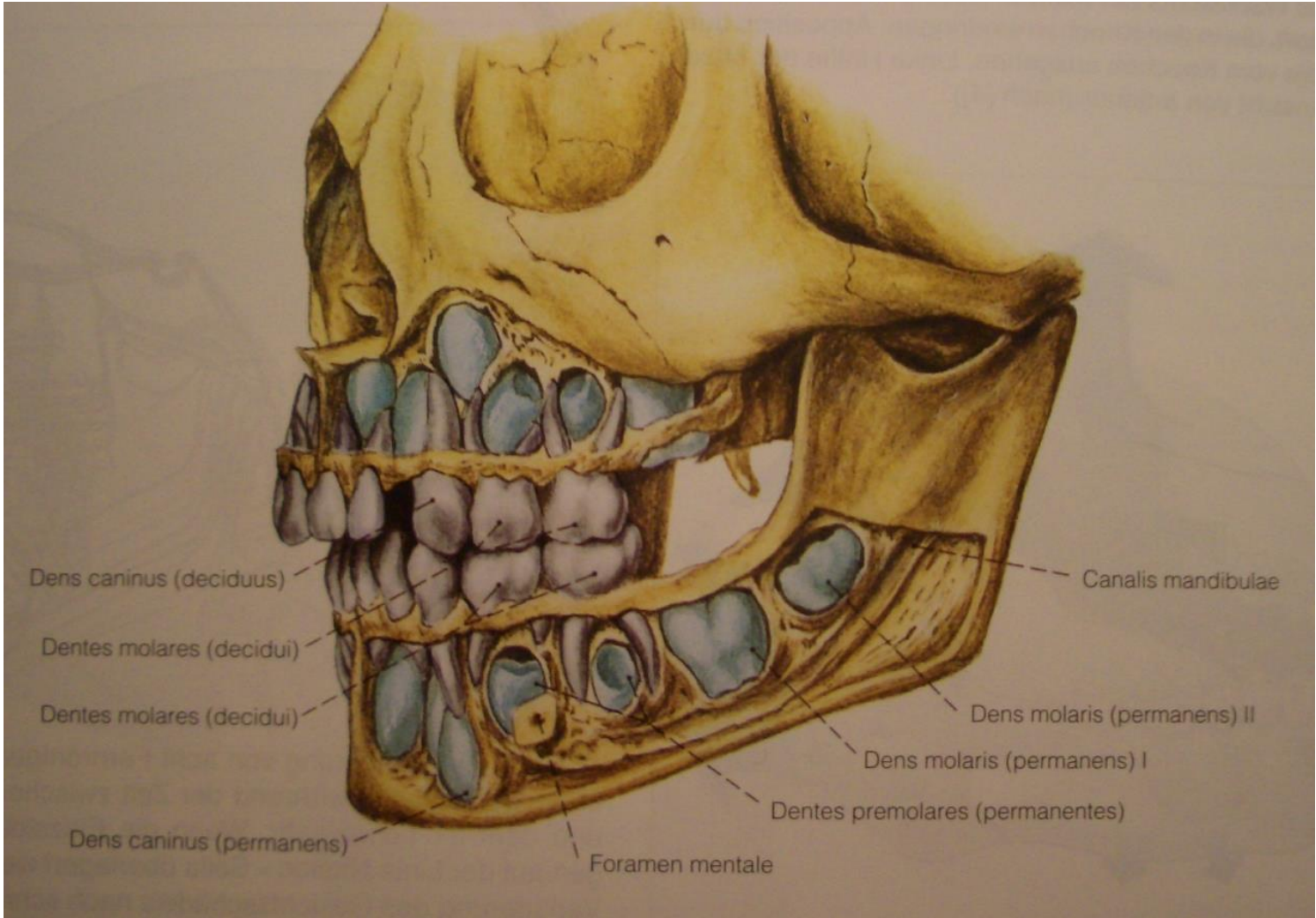


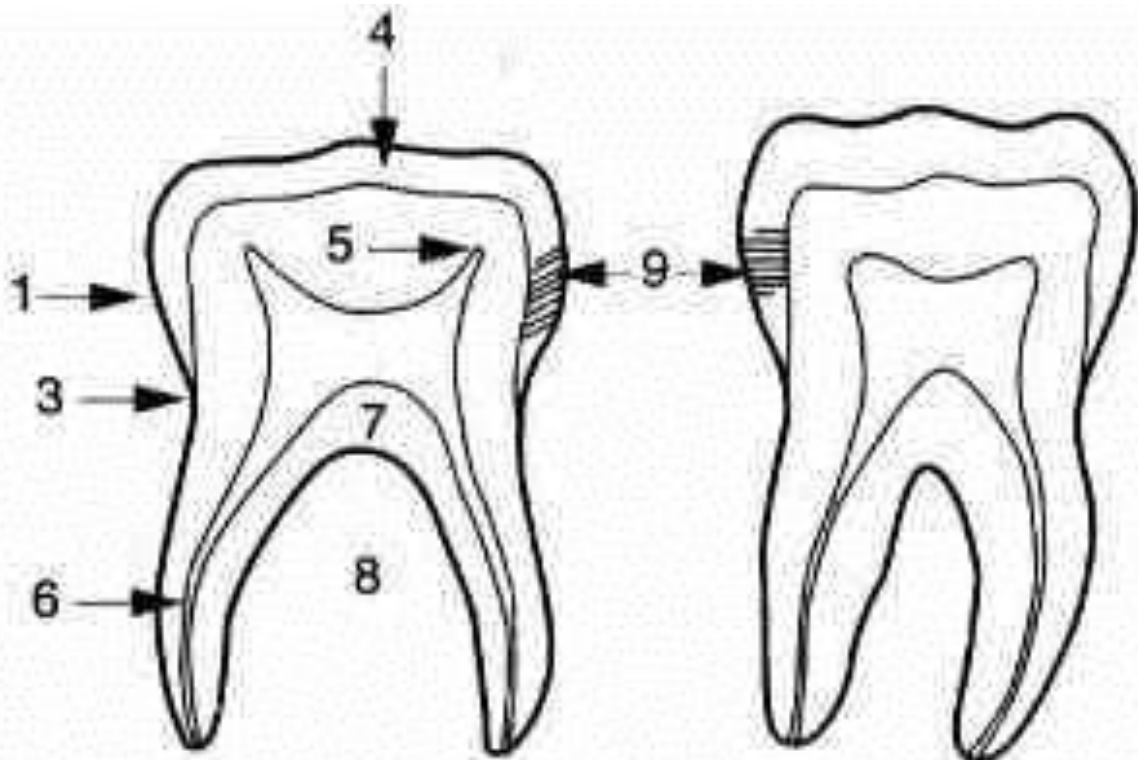
Tooth and Pulp Anatomy

Dr. Zsuzsanna Tóth Ph.D.

Semmelweis University

Dept. of Conservative Dentistry

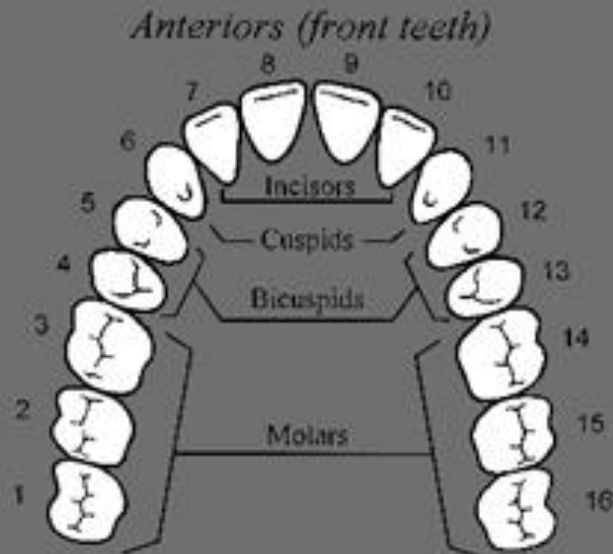




deciduous

permanent

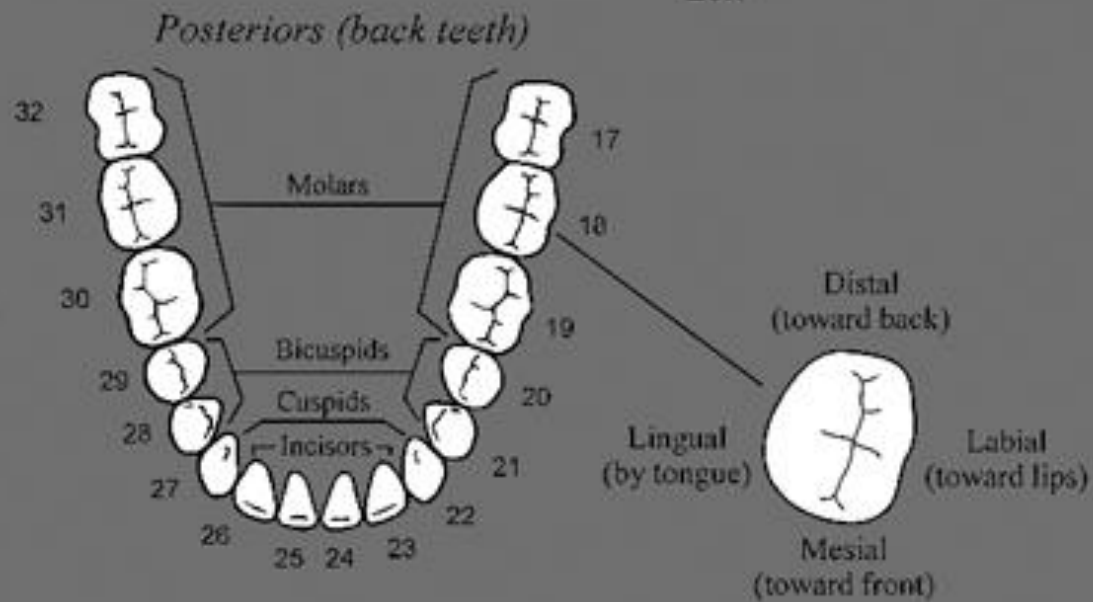
Uppers
(maxillary)



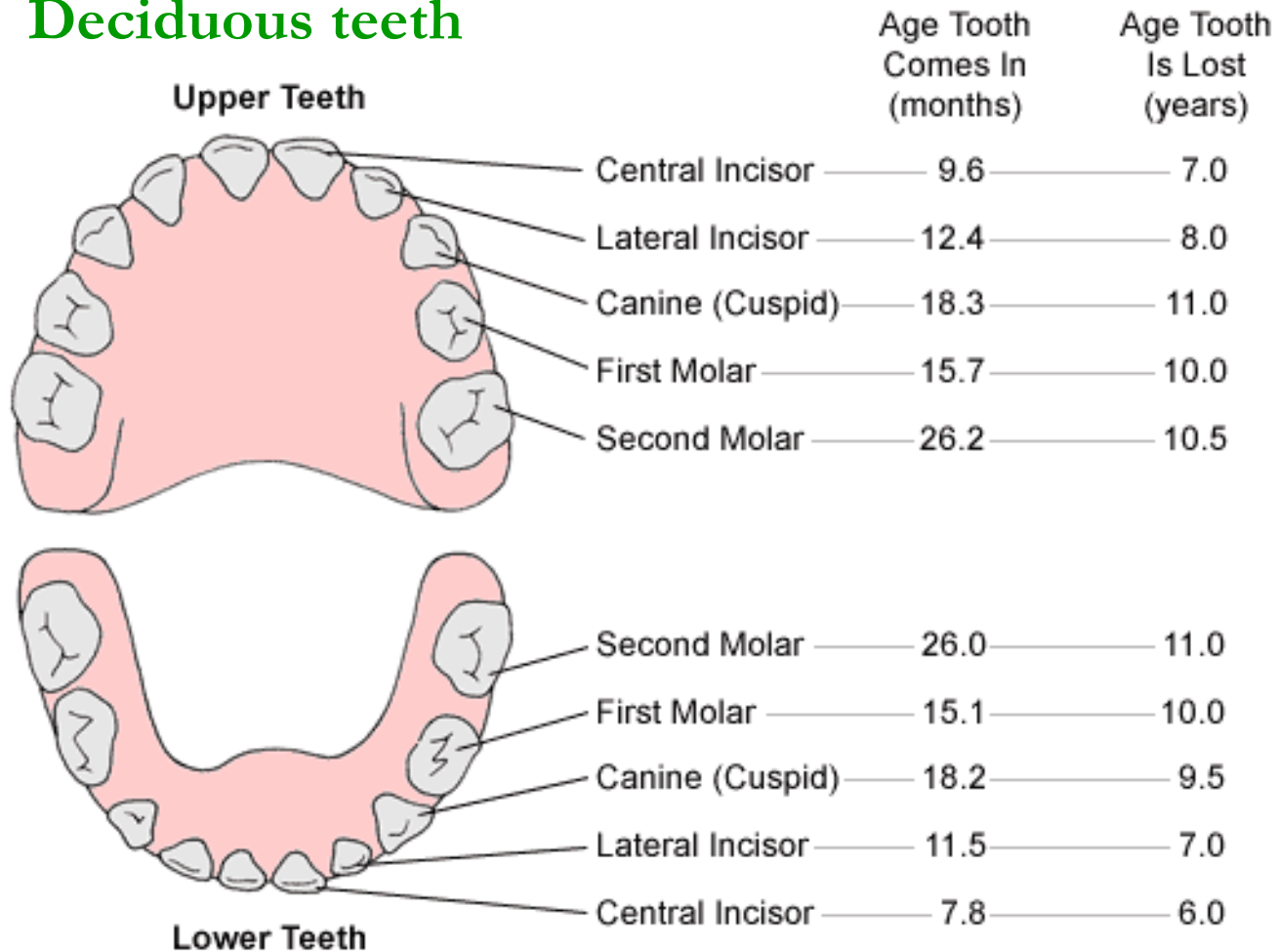
Right

Left

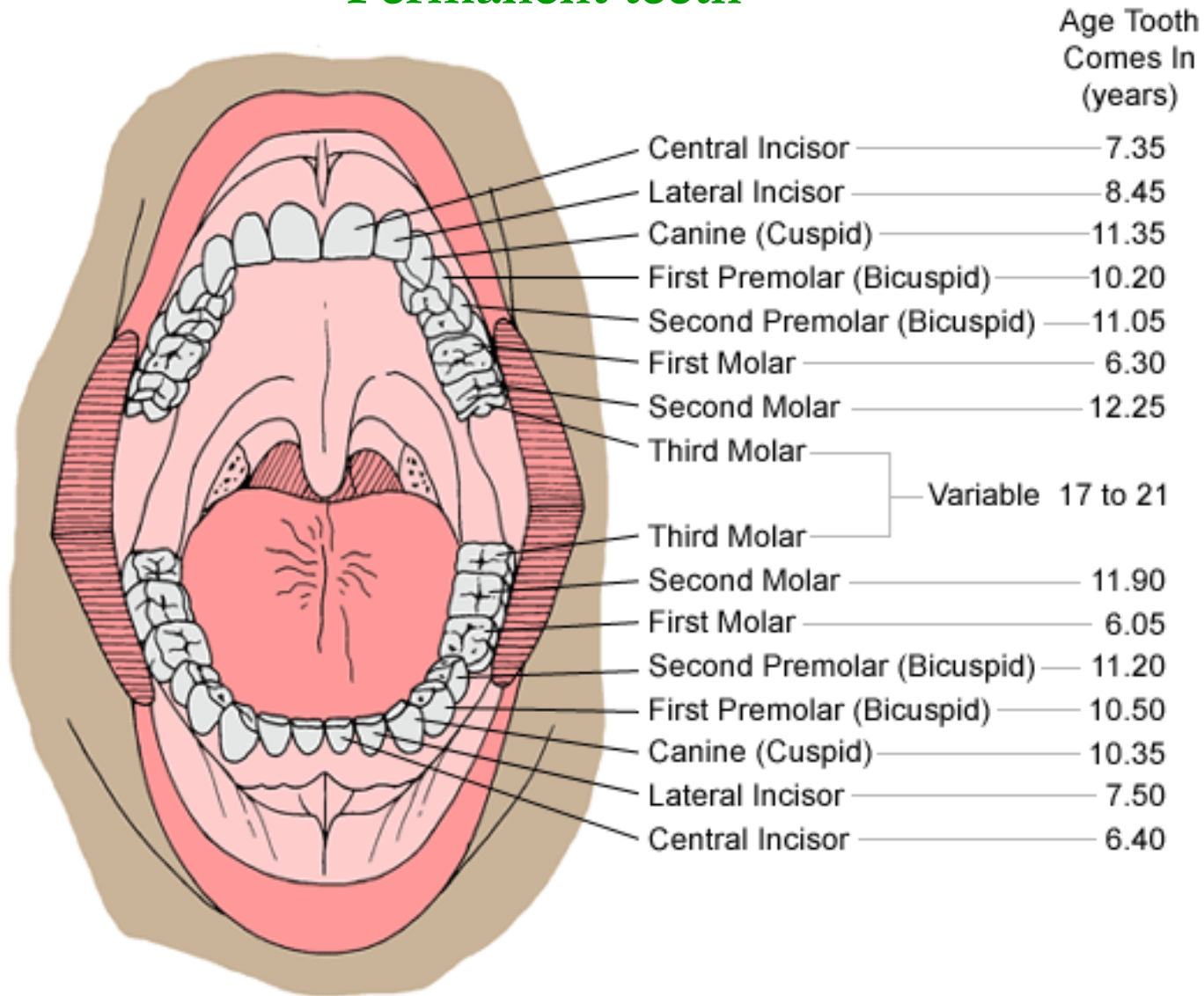
Lowers
(mandibular)

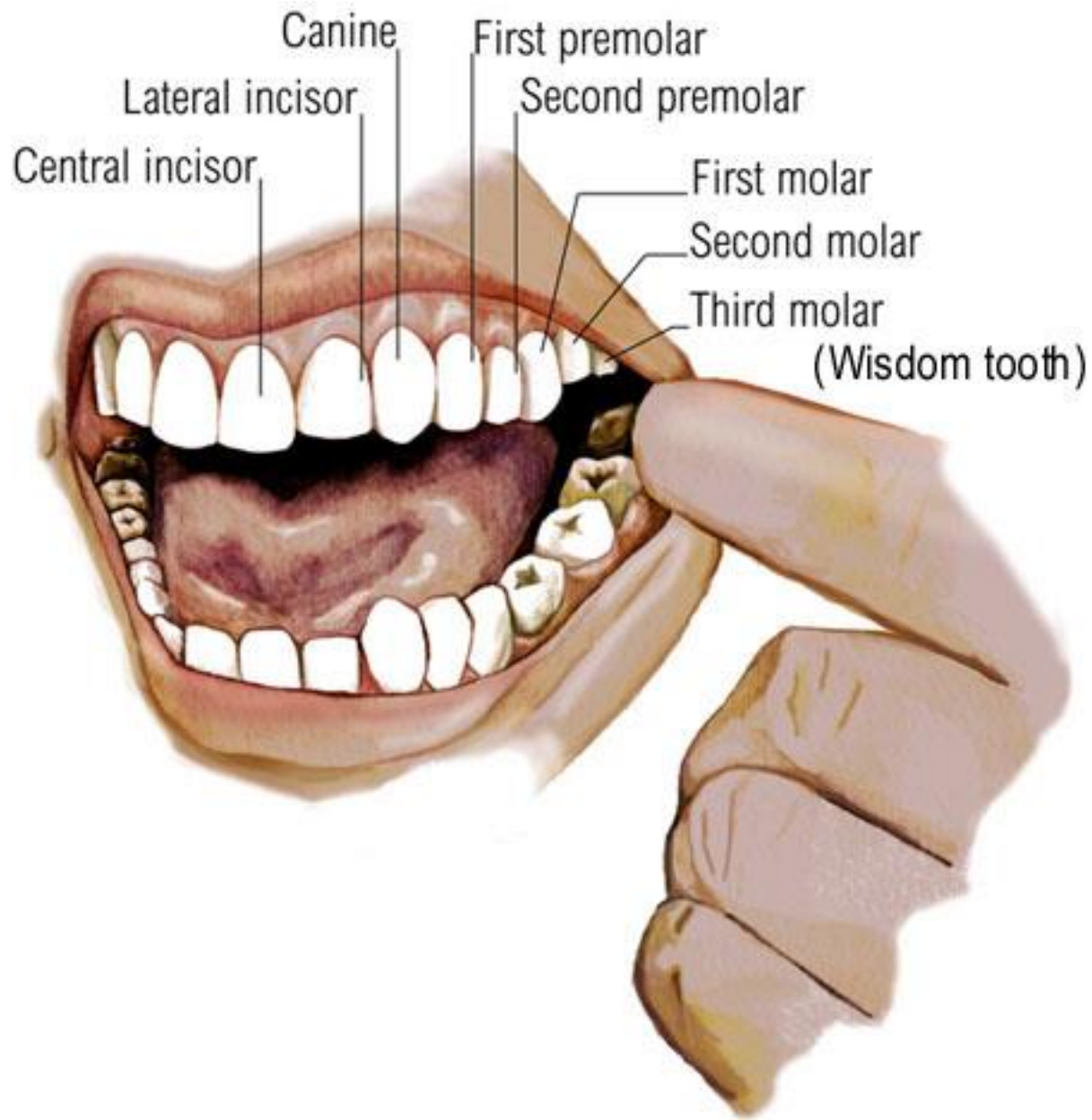


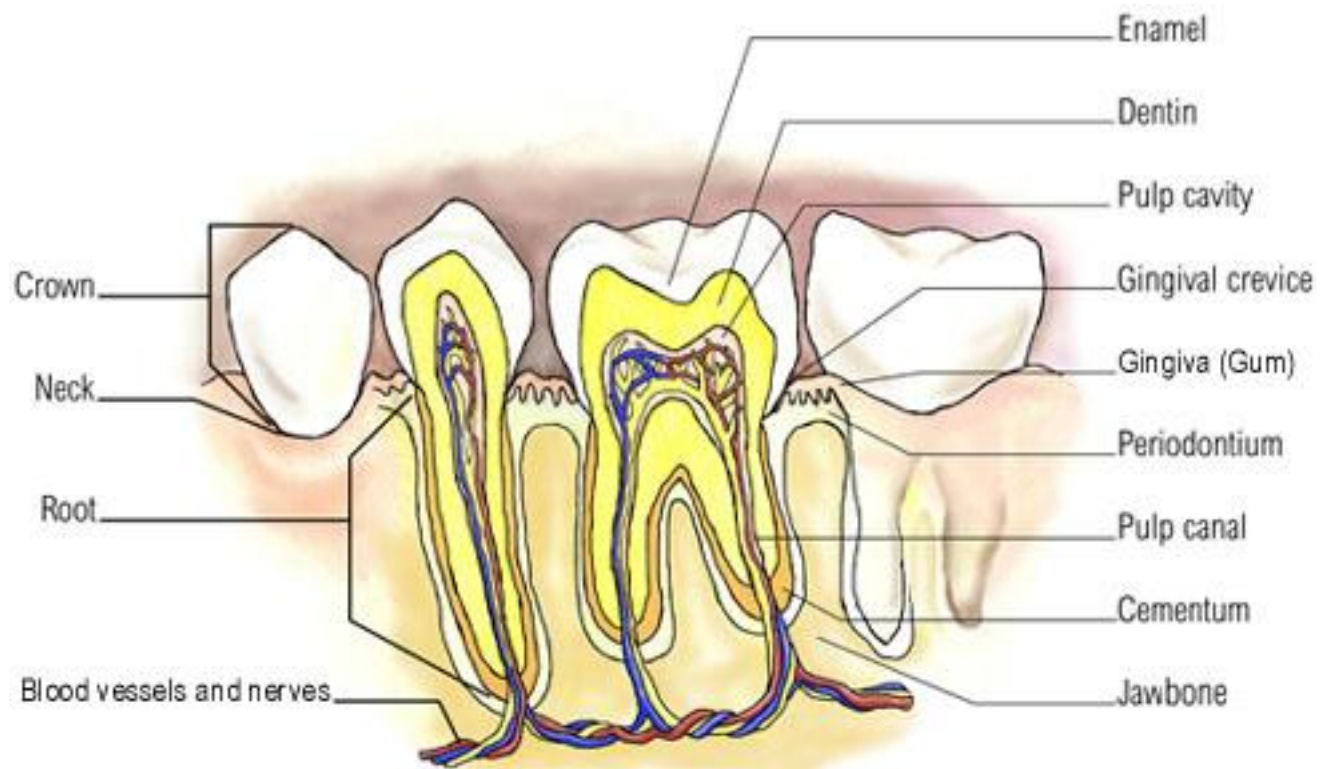
Deciduous teeth

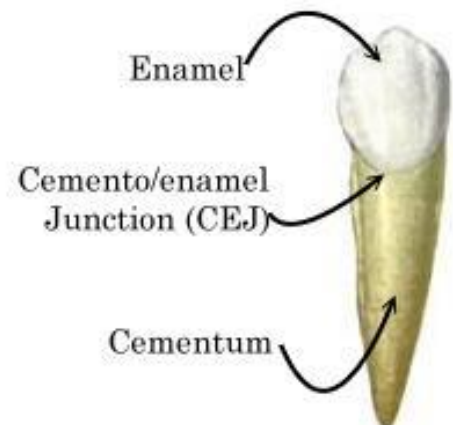
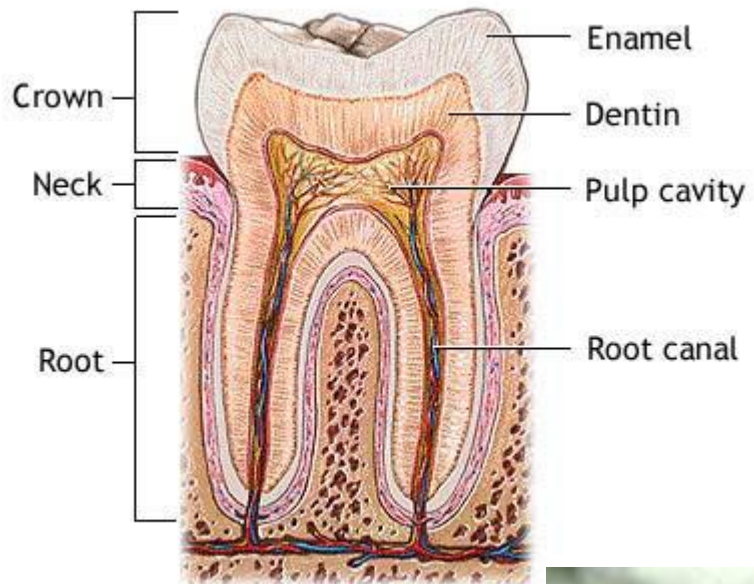


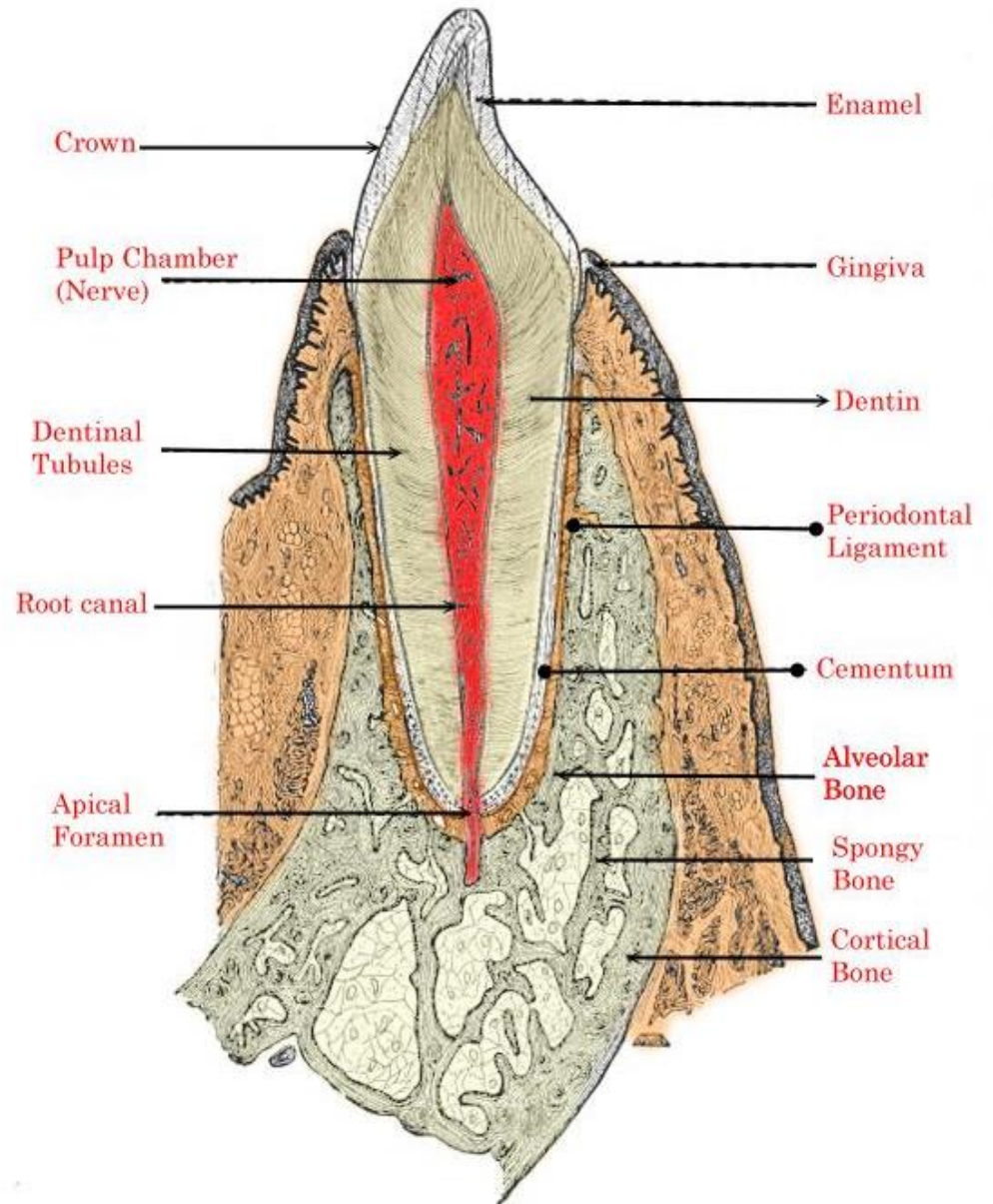
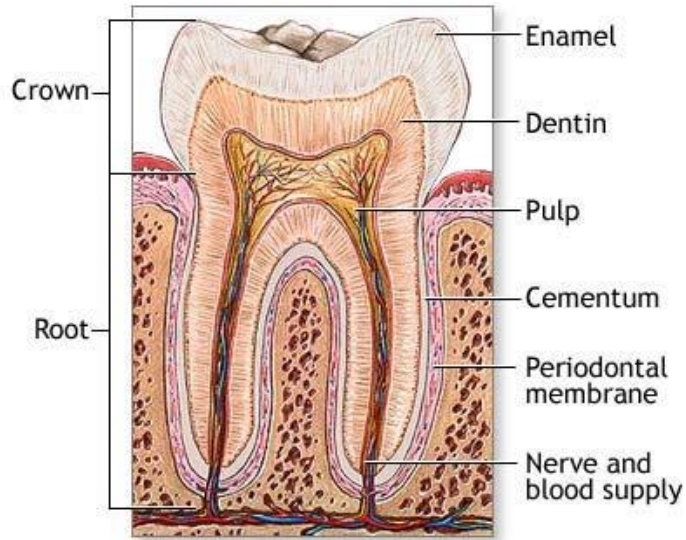
Permanent teeth

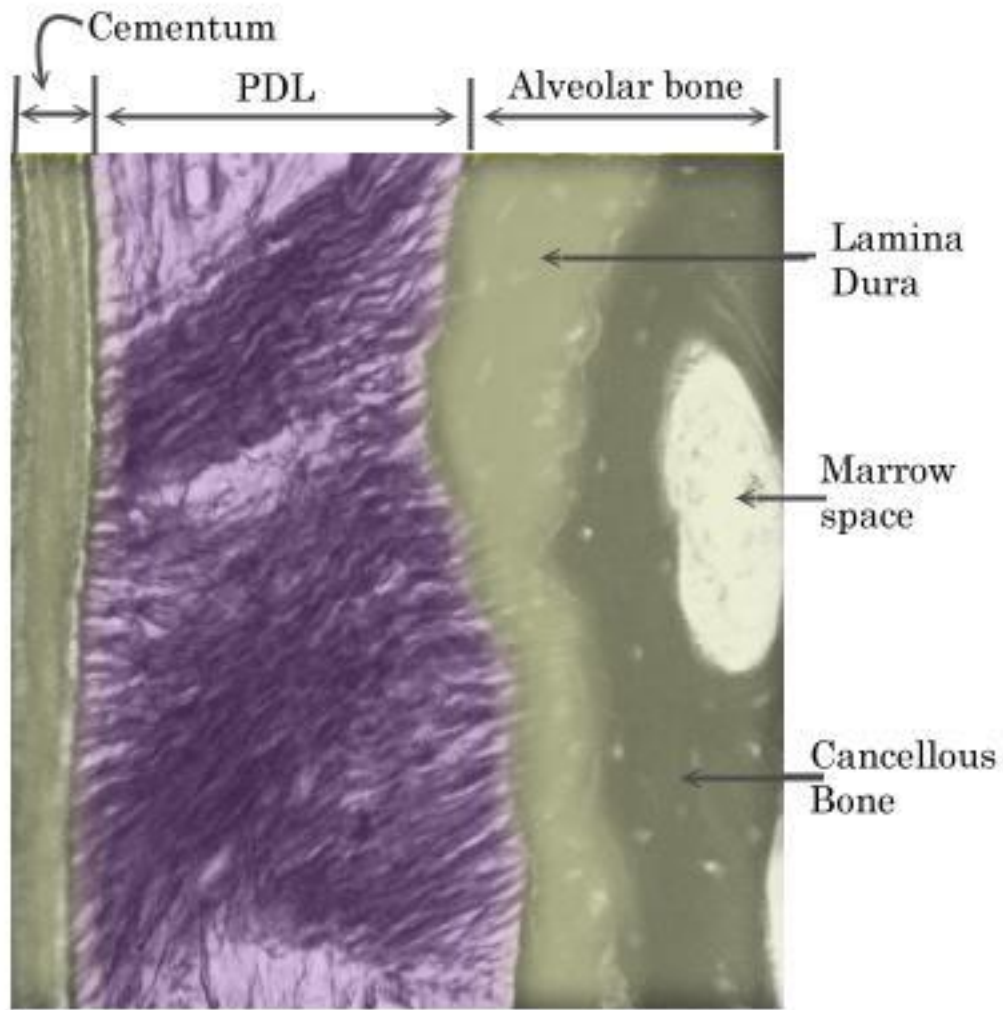


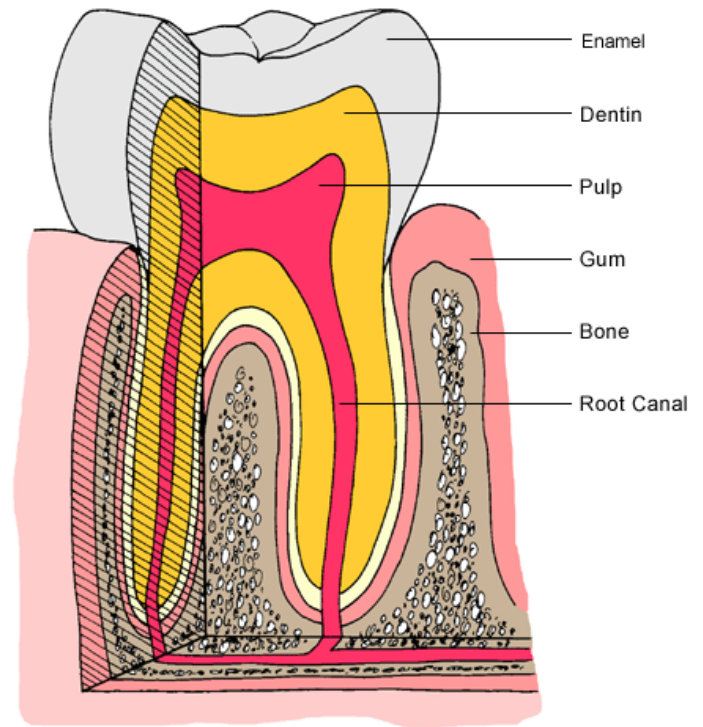
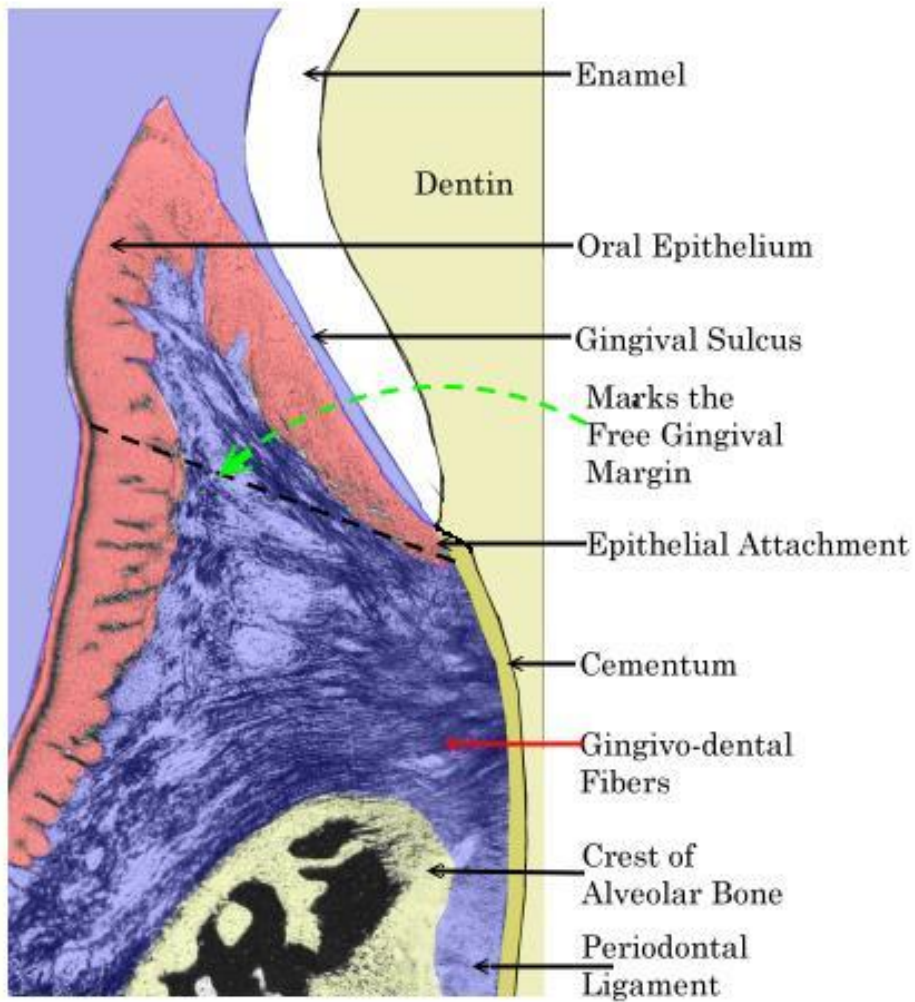


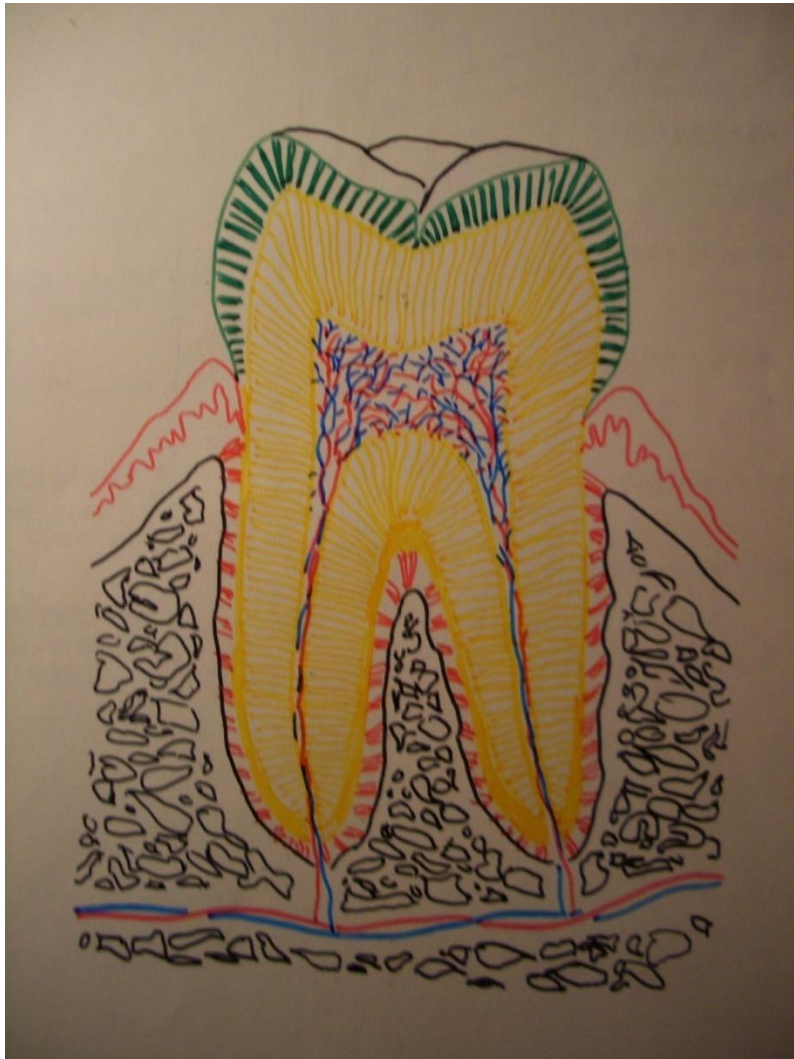


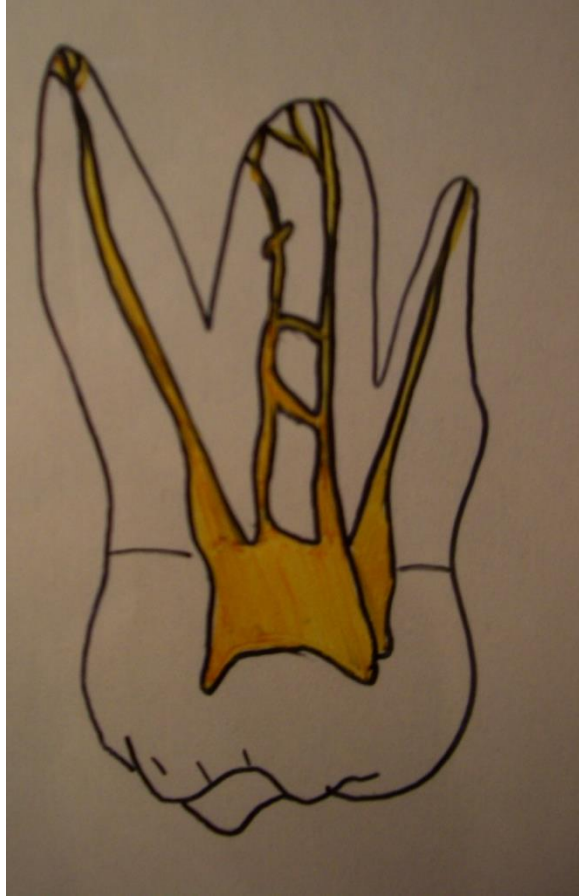
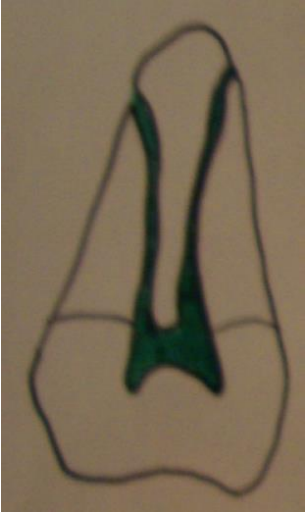


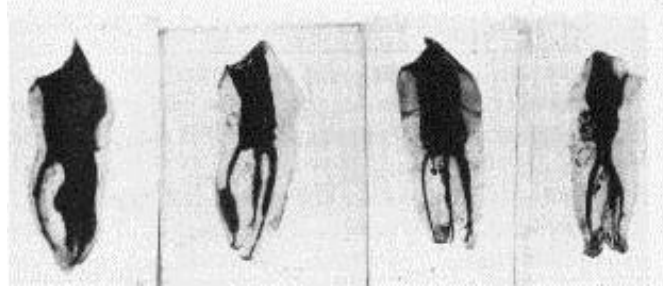
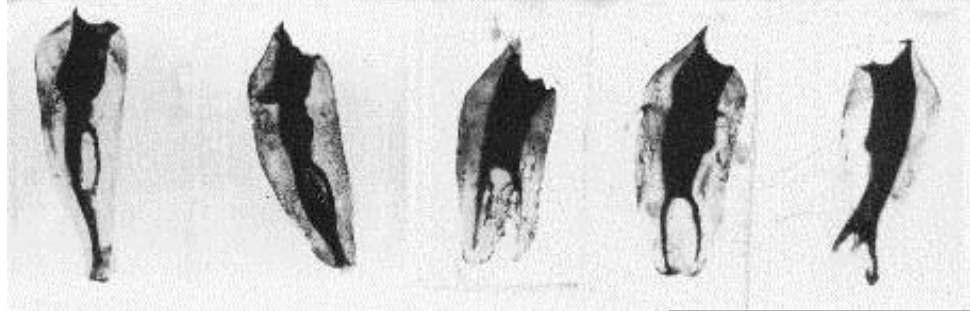
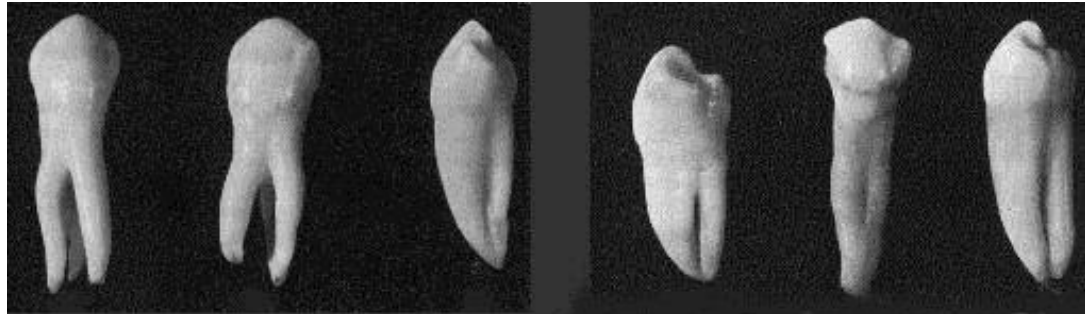




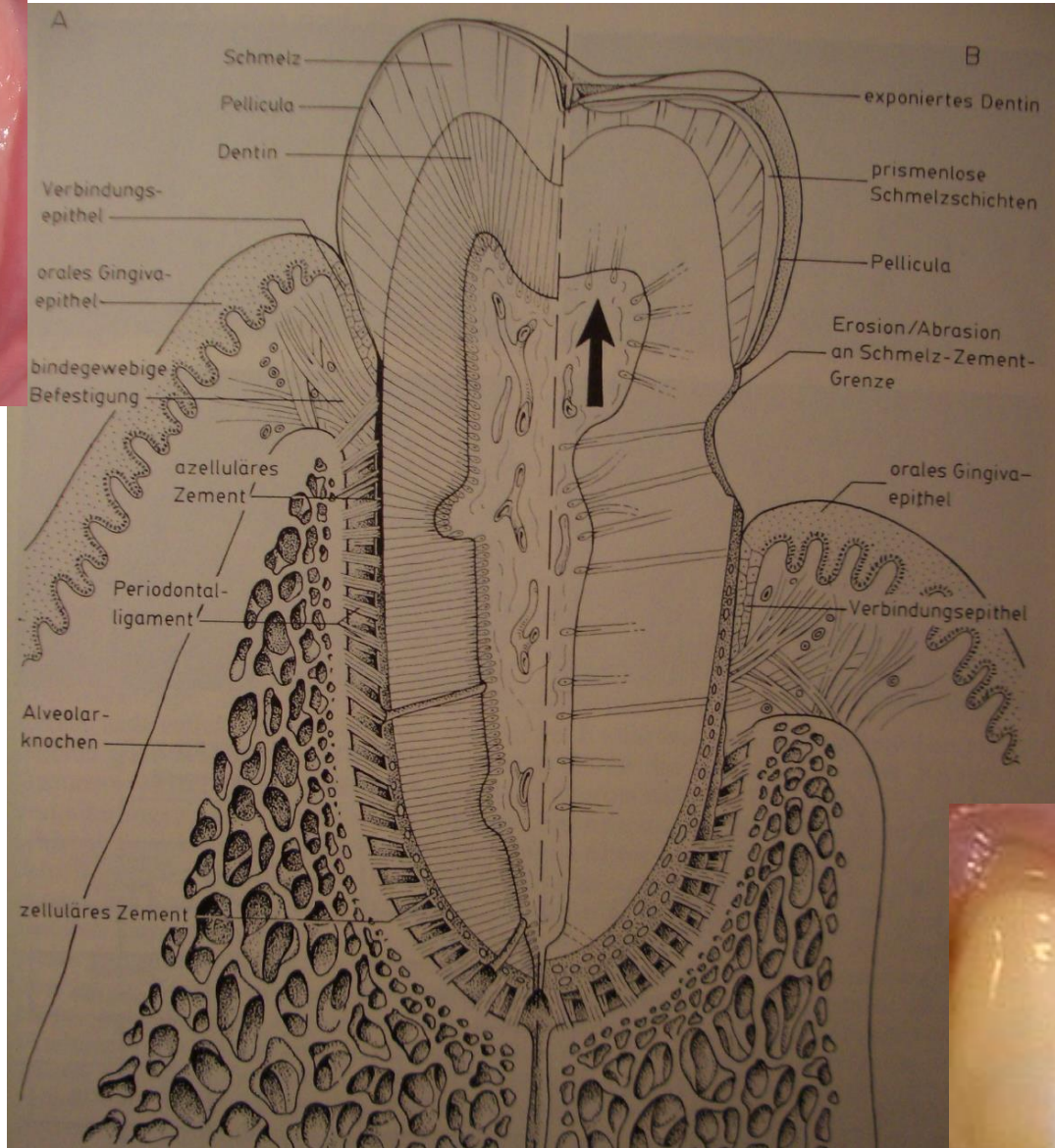


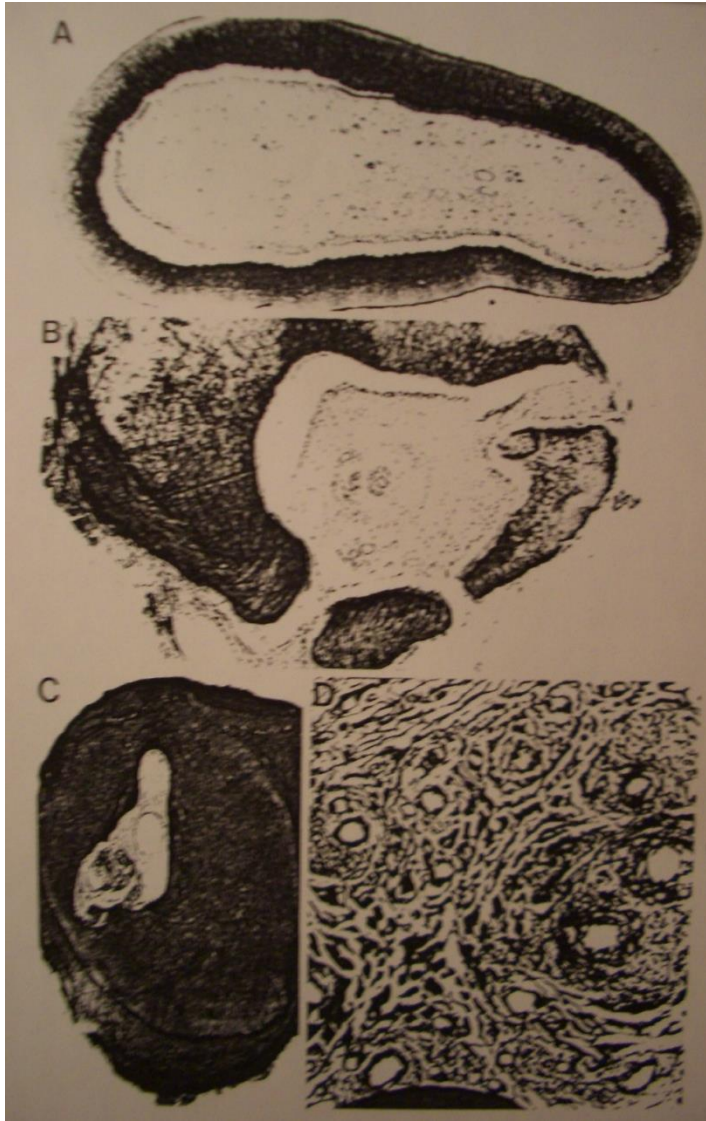


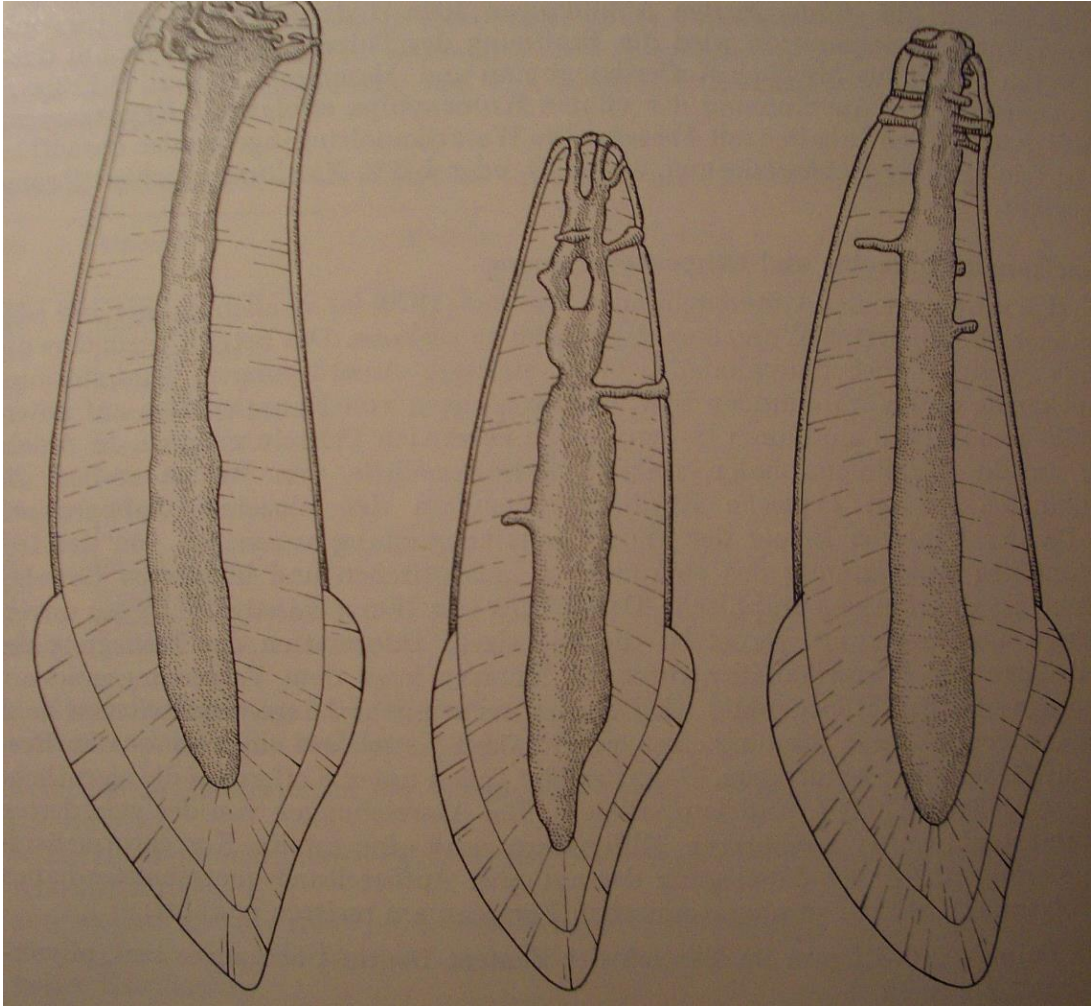




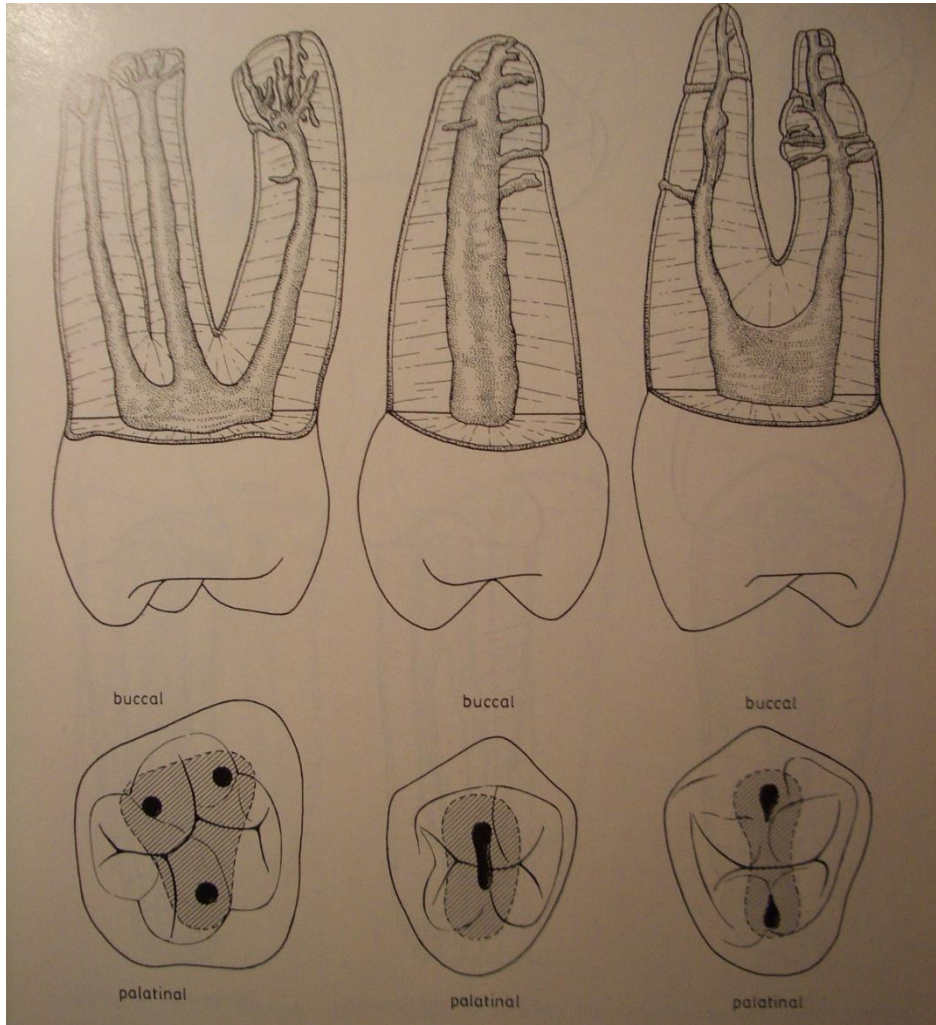








This case was submitted by Dr. Giuseppe Cantatore



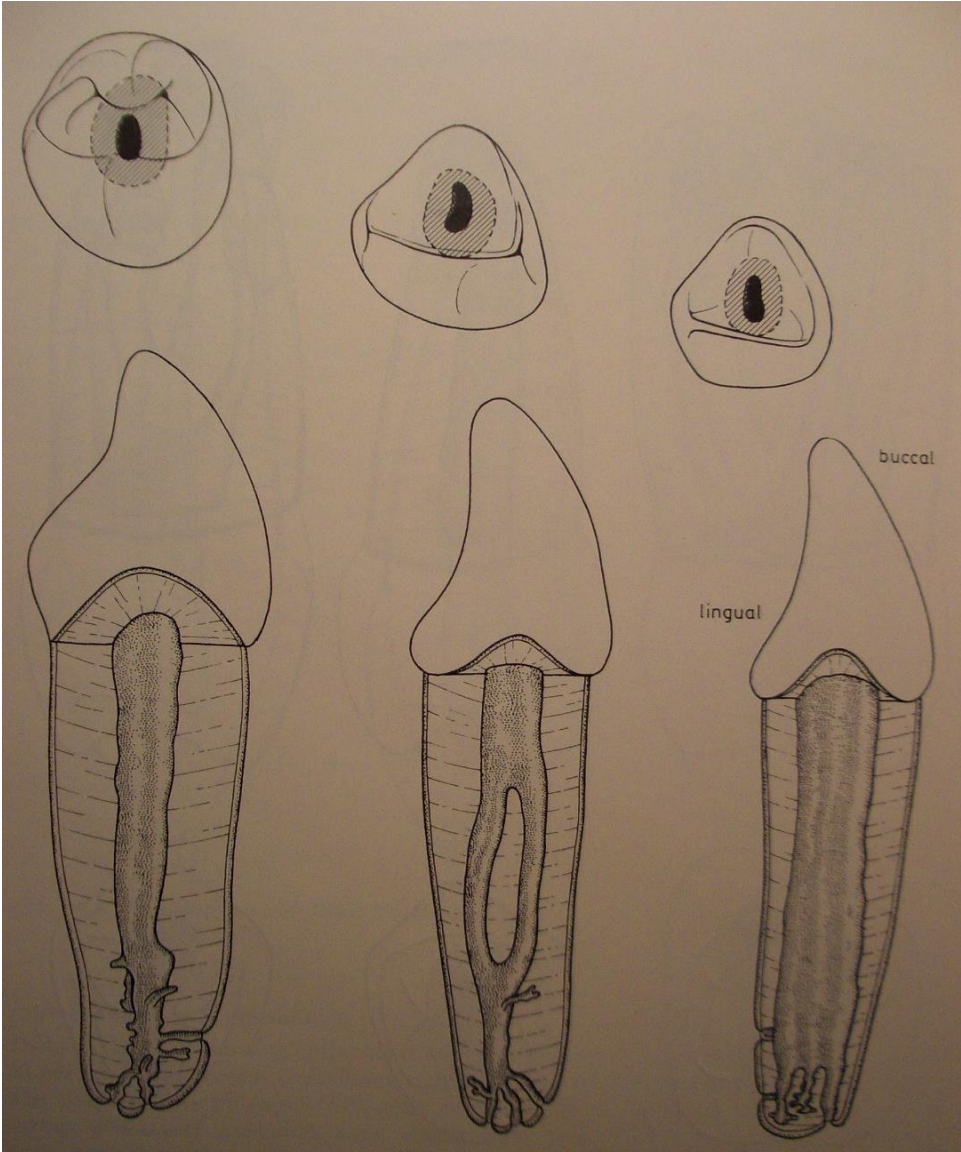
This case was submitted by Dr. Clifford Ruddle

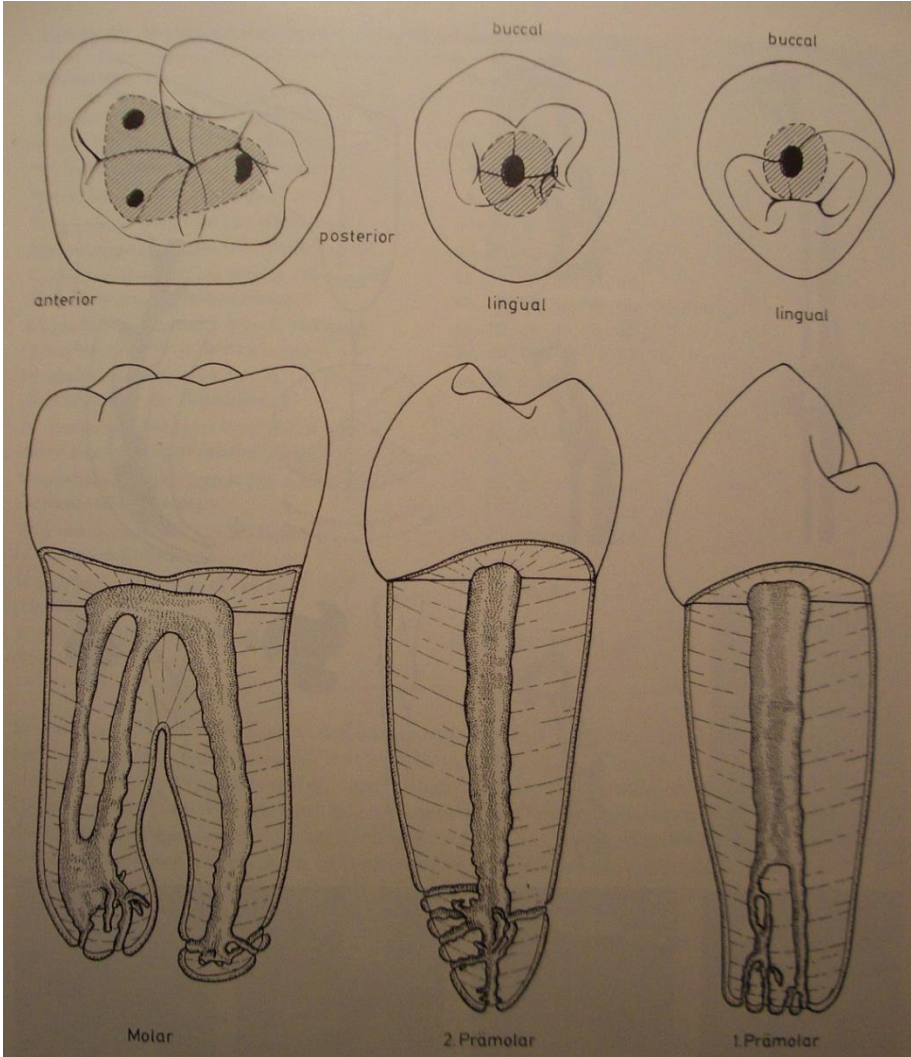
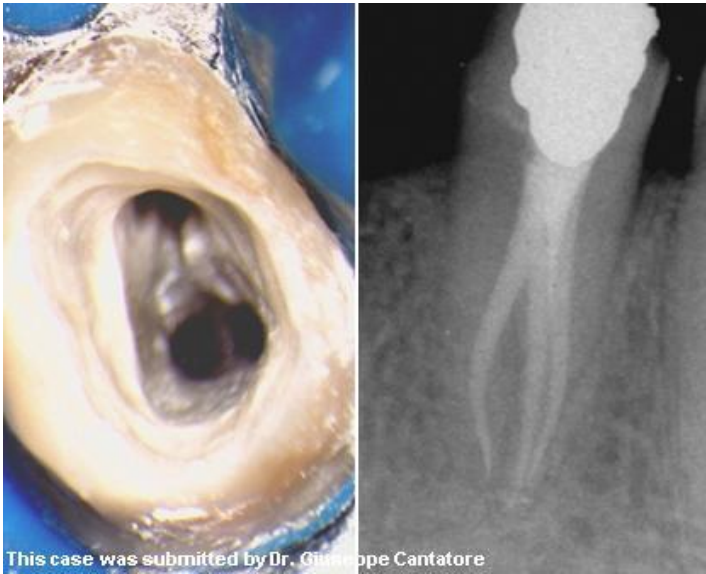


This case was submitted by Dr. David Hatcher



This case was submitted by Dr. Clifford Ruddle







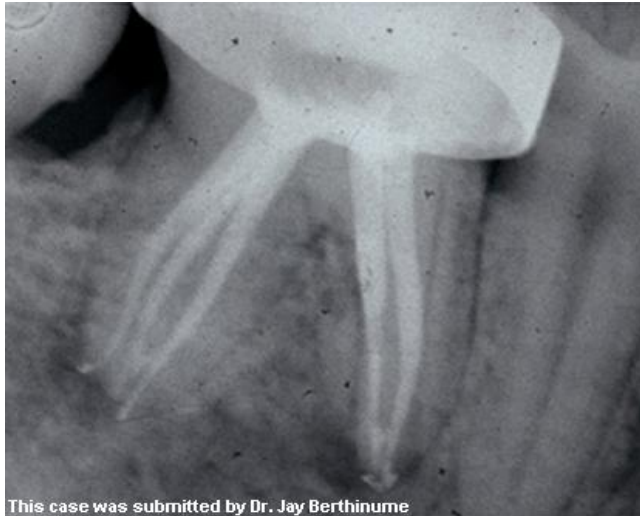
This case was submitted by Dr. Clifford Ruddle



This case was submitted by Dr. Bruce Fogel



This case was submitted by Dr. Richard Rubinstein



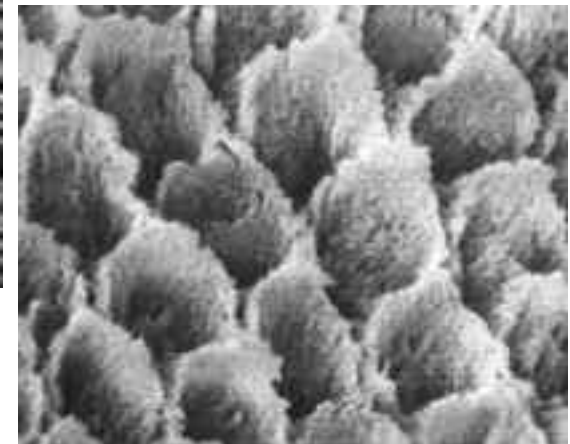
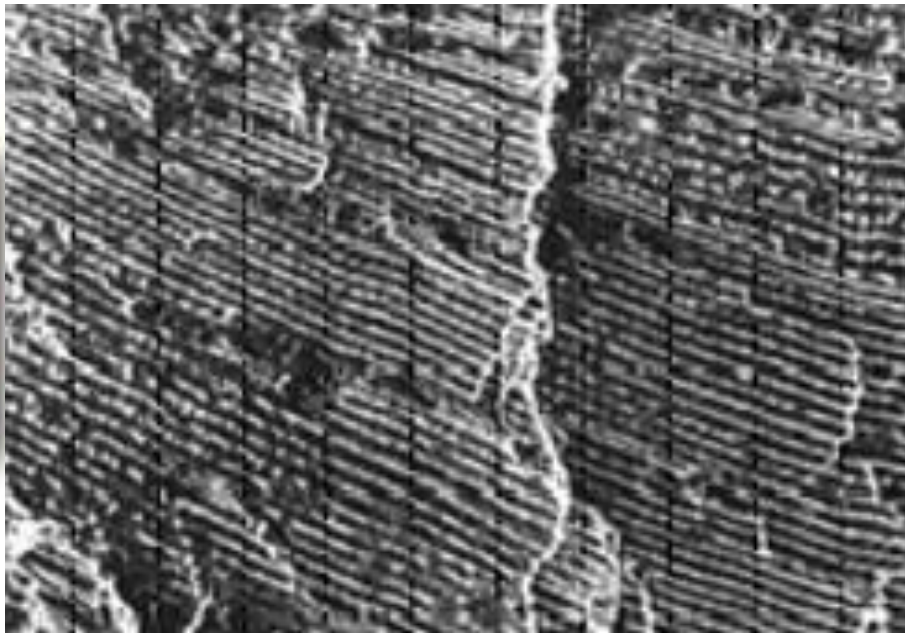
This case was submitted by Dr. Jay Berthinume

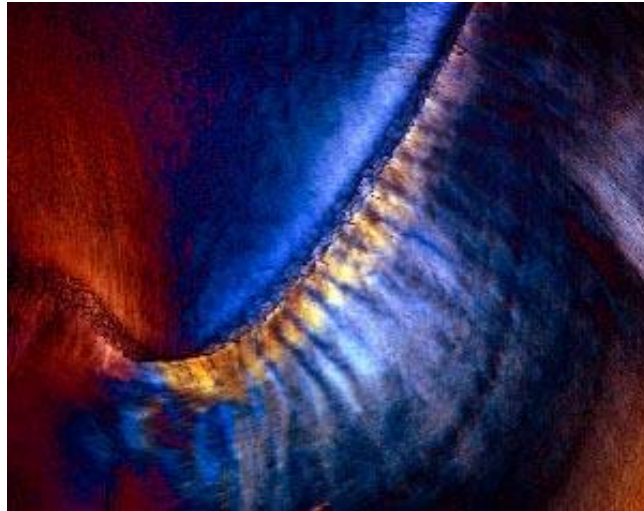
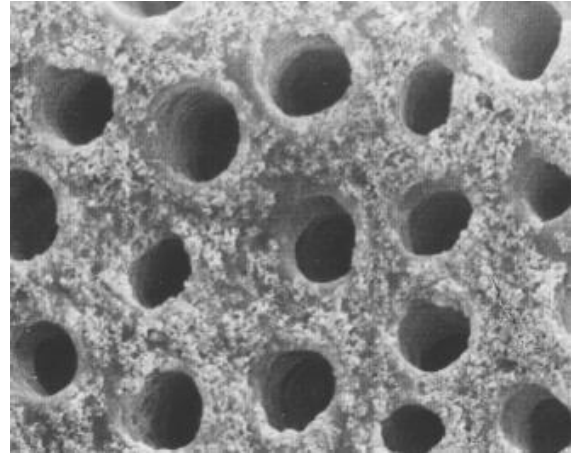
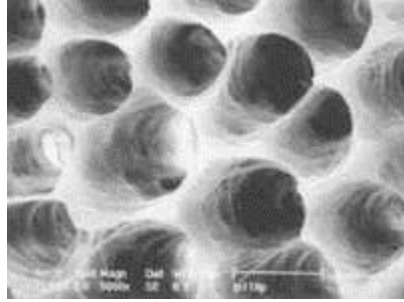
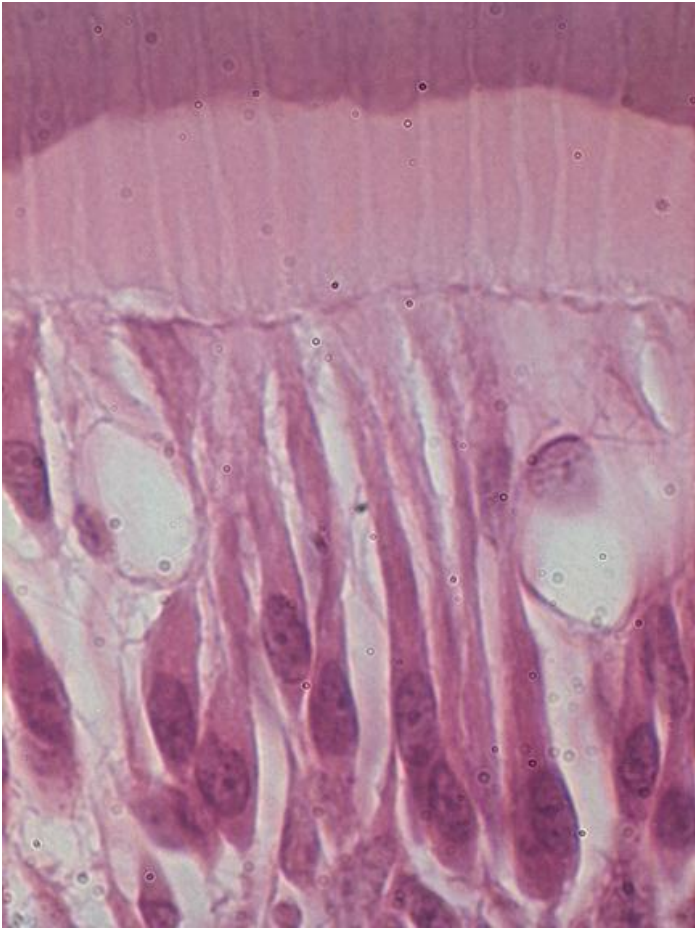


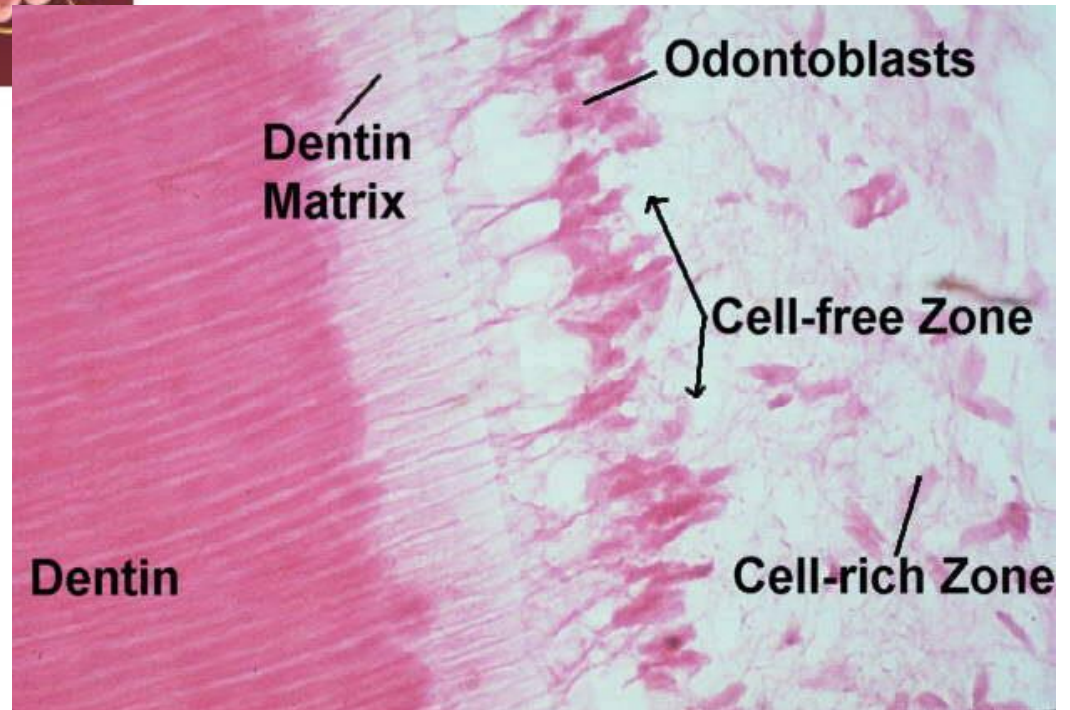
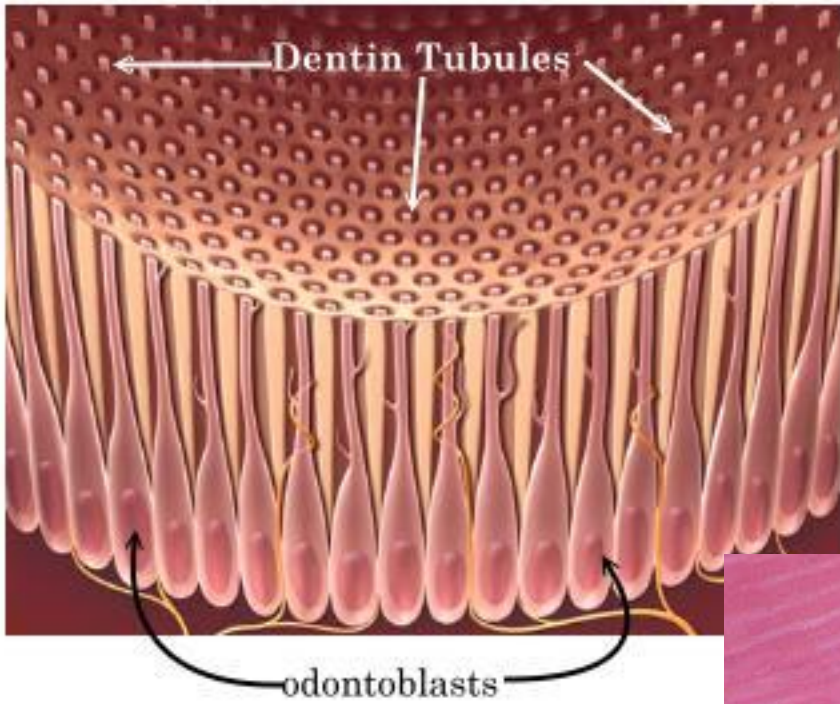
This case was submitted by Dr. Richard Rubinstein

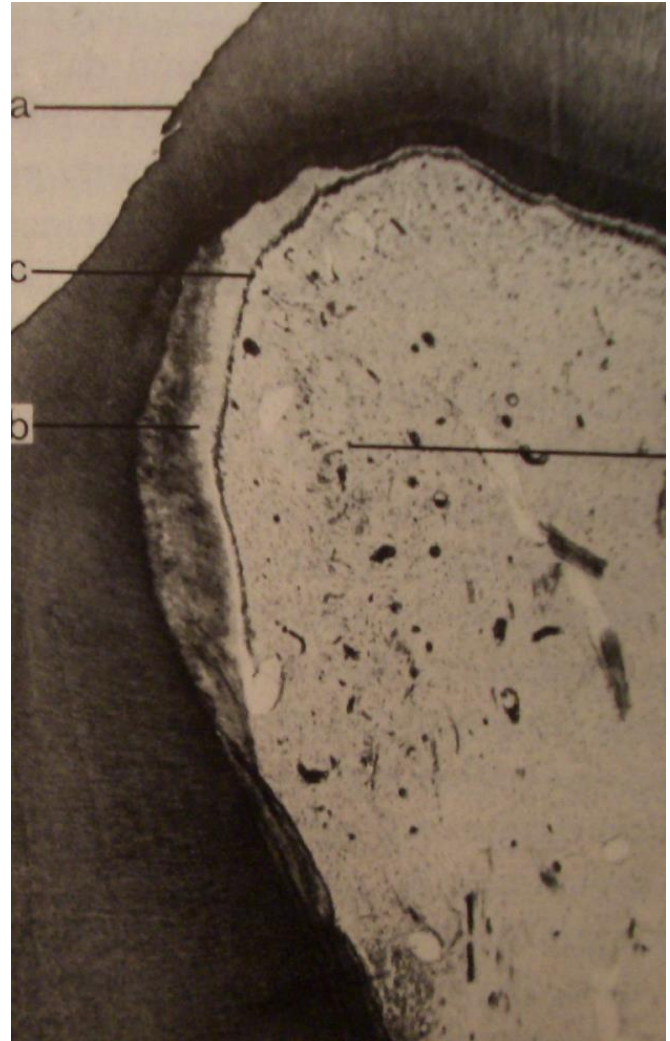


Human enamel



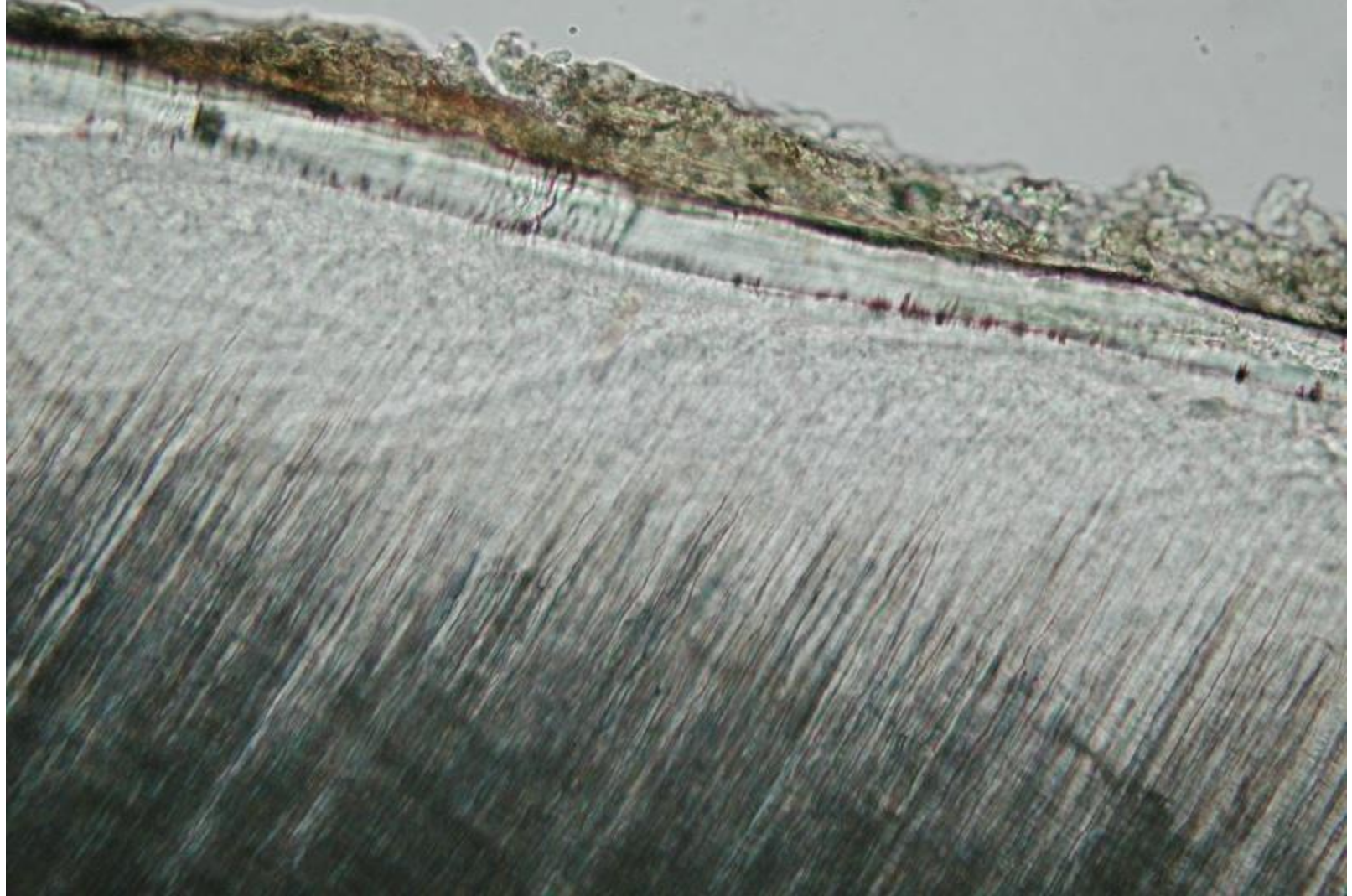








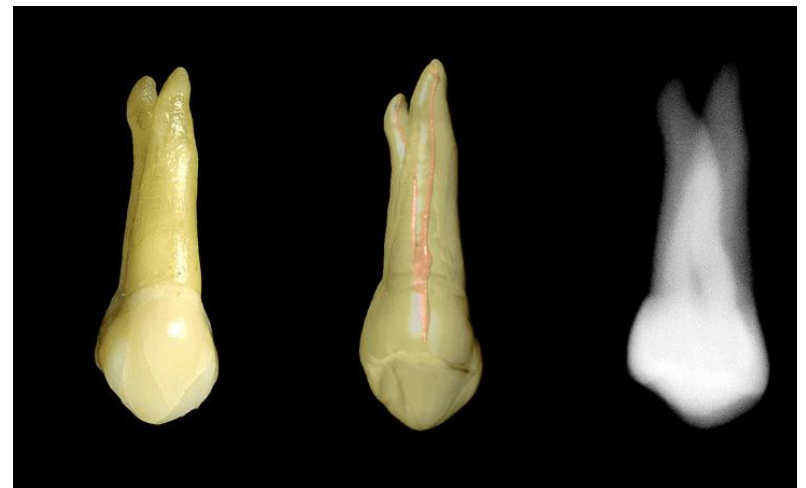
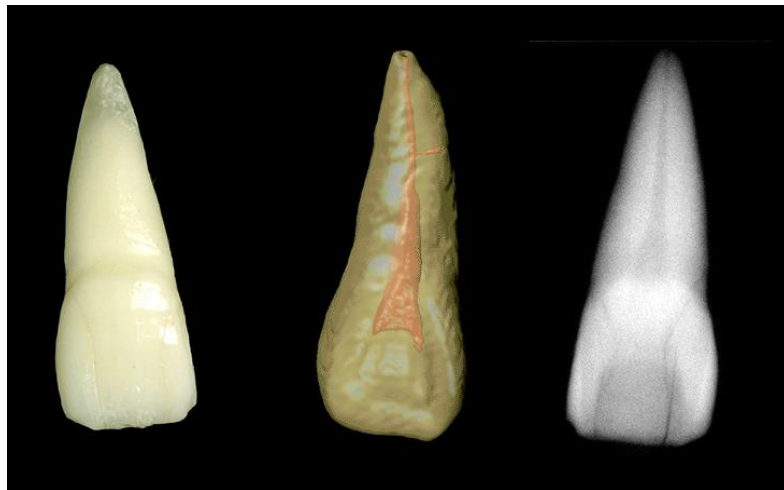
Department of Histology ©
Jagiellonian University, Medical College



Brown & Herbranson

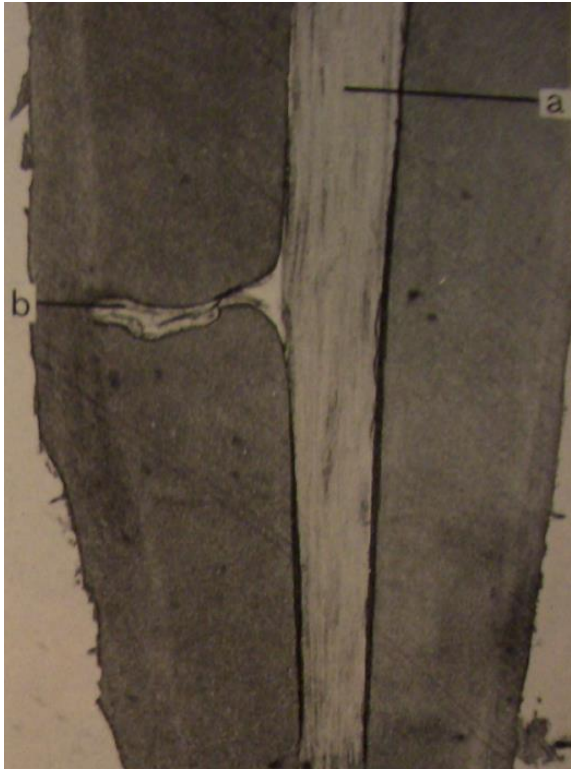


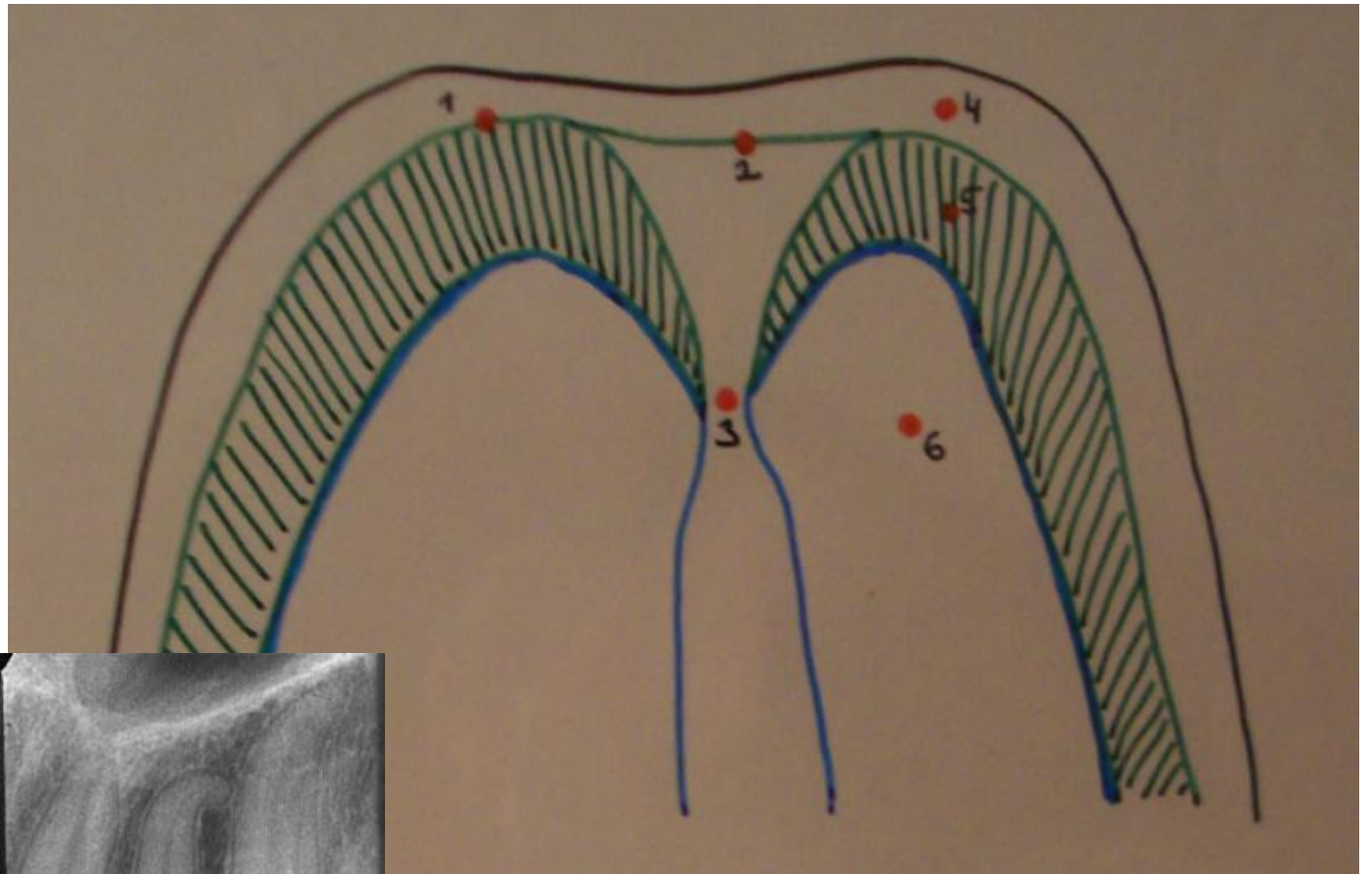
Dental Anatomy & Interactive 3-D Tooth ATLAS



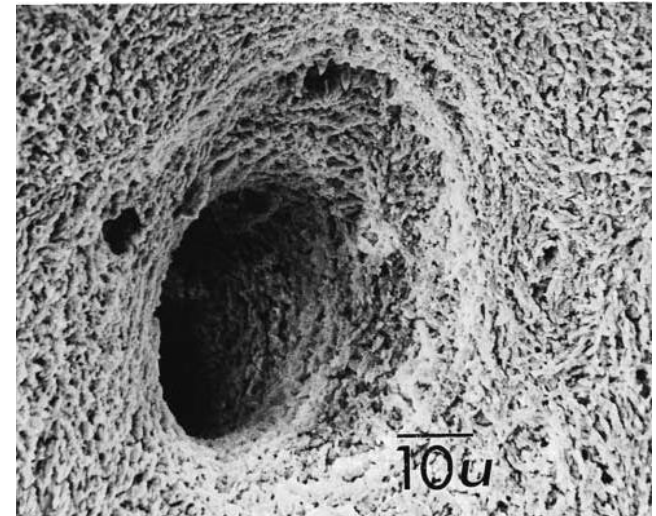
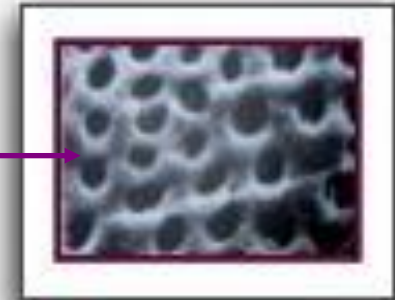
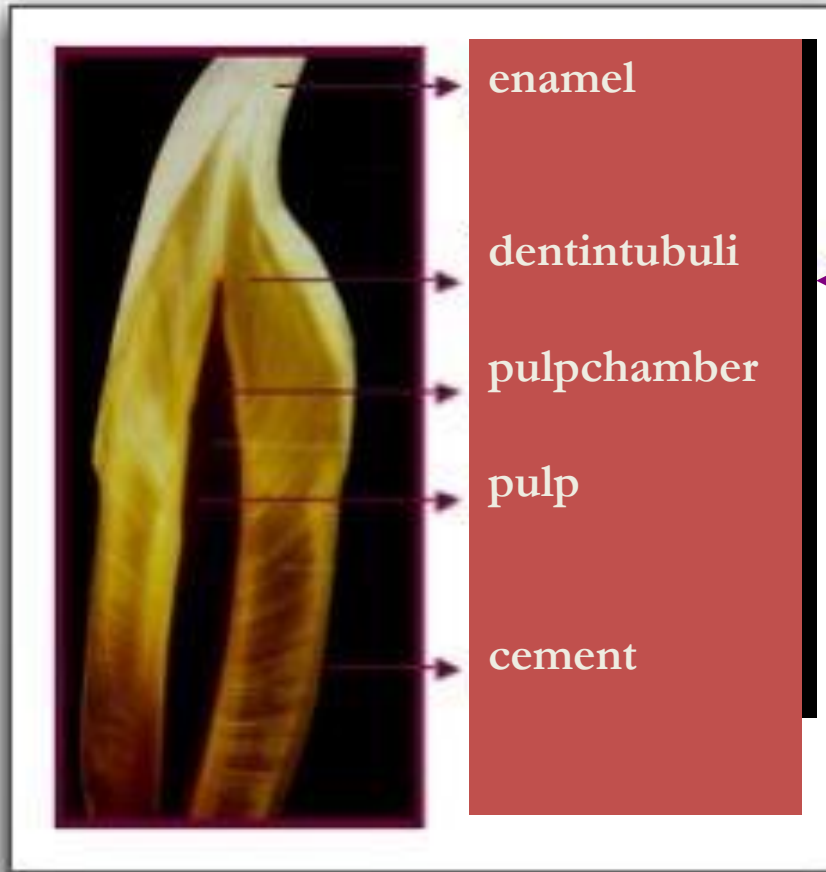
www.toothatlas.com





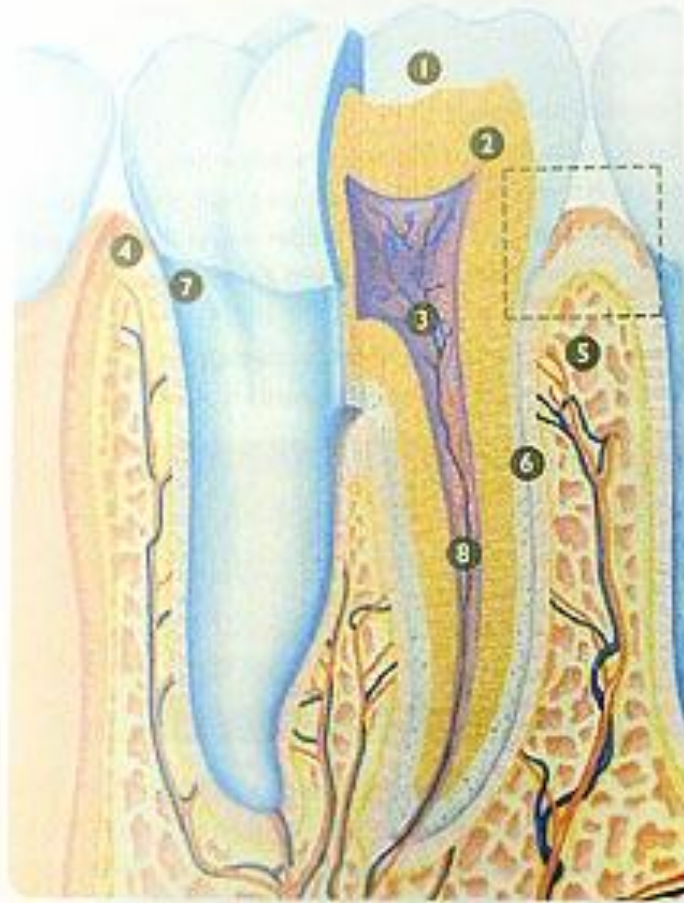


This case was submitted by Dr. David Hatcher



MORPHOLOGY of the PULP

Gesunder Mahlzahn im Schnitt



1. Zahnschmelz
2. Zahnbein (Dentin)
3. Zahnerv (Pulpa)
4. Zahnfleisch (Gingiva)
5. Kieferknochen
6. Zahnhalteapparat
7. Zahazement
8. Nerven und Blutgefäße

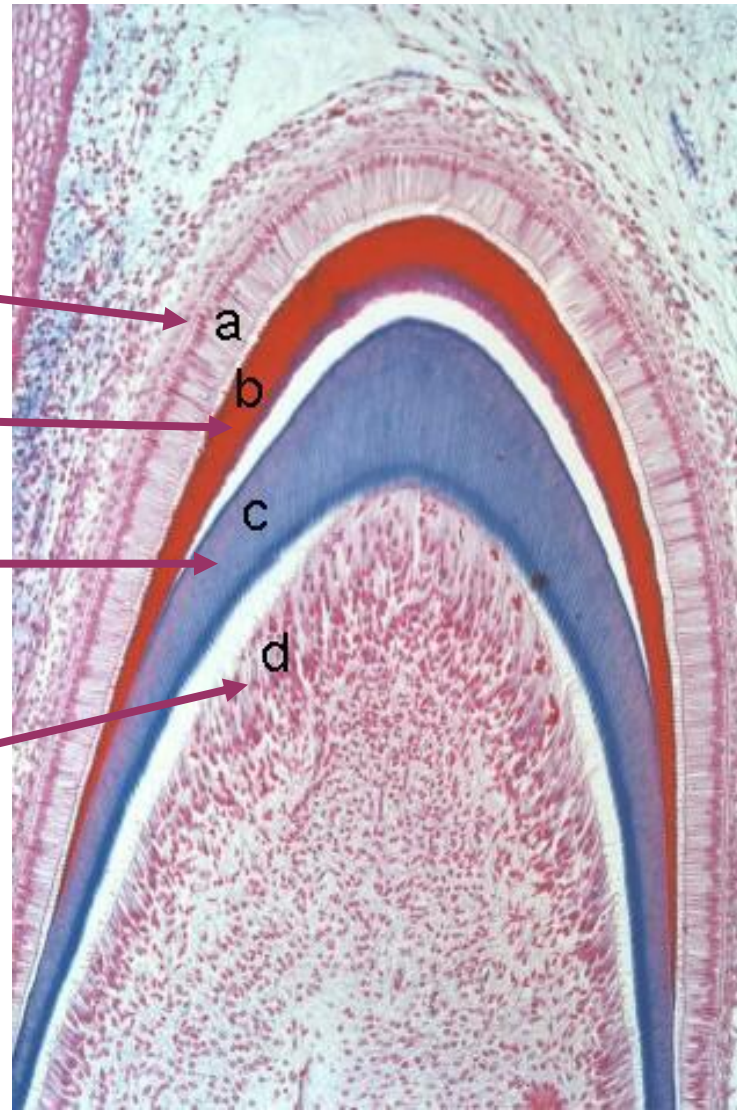


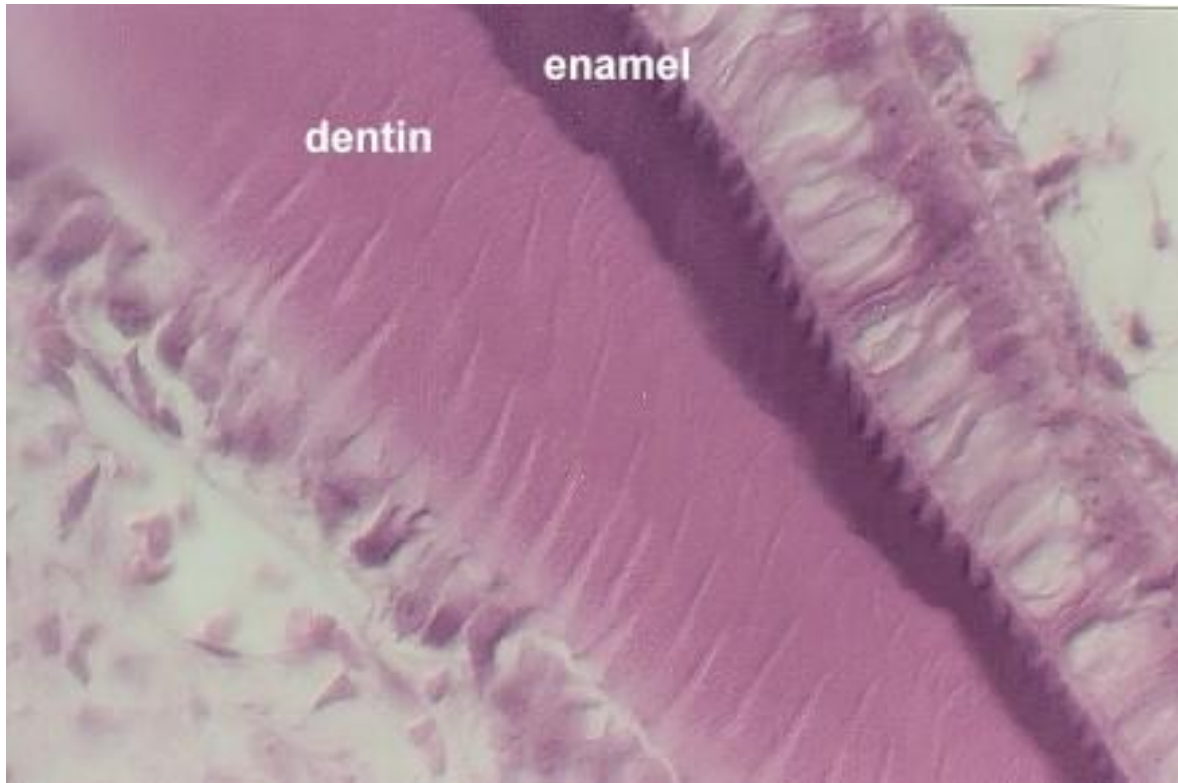
ameloblasts

enamel

dentin

odontoblasts





Dentin Structure

- dentin is a calcified connective tissue penetrated by millions of tubules;
- their density varies from 40,000 to 70,000 tubules per square mm
- tubules are from 1 μm in diameter at the dentinoenamel junction to 3 μm at their pulpal surface and contain fluid that has a composition similar to extracellular fluid

FUNCTION of the PULP

The pulp lives for the dentin and
the dentin lives by the grace of the pulp

- Nutrition of the dentin
- Innervation of the pulp and dentin
- Formation of the dentin
- Defense of the tooth and the pulp



PULP TISSUE

- **connective tissue**
- **obviously rich in fluid**
- **highly vascularized**
- **cells**
- **collagen fibres**
- **vessels**
- **nerves**

Supportive Elements

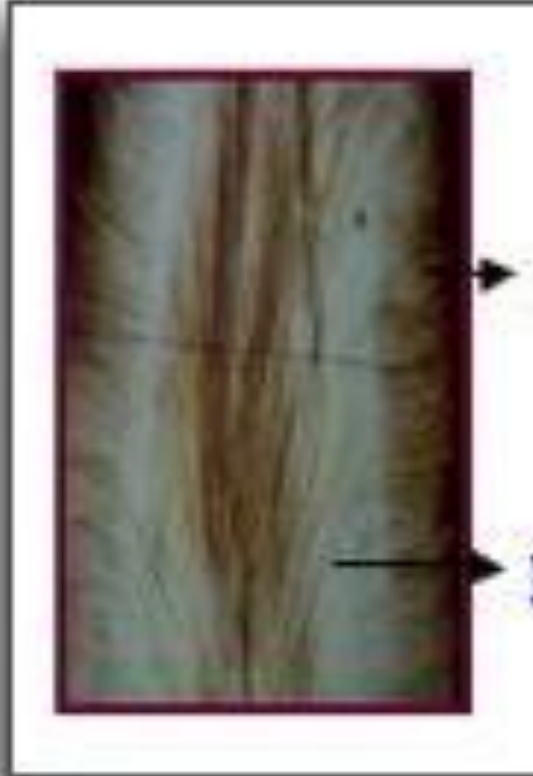
- *Pulpal Blood Supply.*
- pulp blood vessels do not reach a large size.
- At the apex and extending through the central pulp, one or more arterioles branch into smaller terminal arterioles or metarterioles that are
- directed peripherally
- Before the arterioles break up into capillary beds, arteriovenous anastomoses
- often arise to connect the arteriole directly to a venule. These arteriole-venule shunts are identified by the presence of irregularly oriented myoepithelium-

PULP TISSUE



- principal support system for the peripheral pulp, which includes the large vessels and nerves from which branches extend to supply
- Plexuses of capillaries and small nerve fibers ramify in this subodontoblastic layer
- pulp showing major support systems, including arterioles with a muscular wall, thin-walled lymphatics, venules, and nerve bundles containing myelinated and unmyelinated nerve

The development of dentin

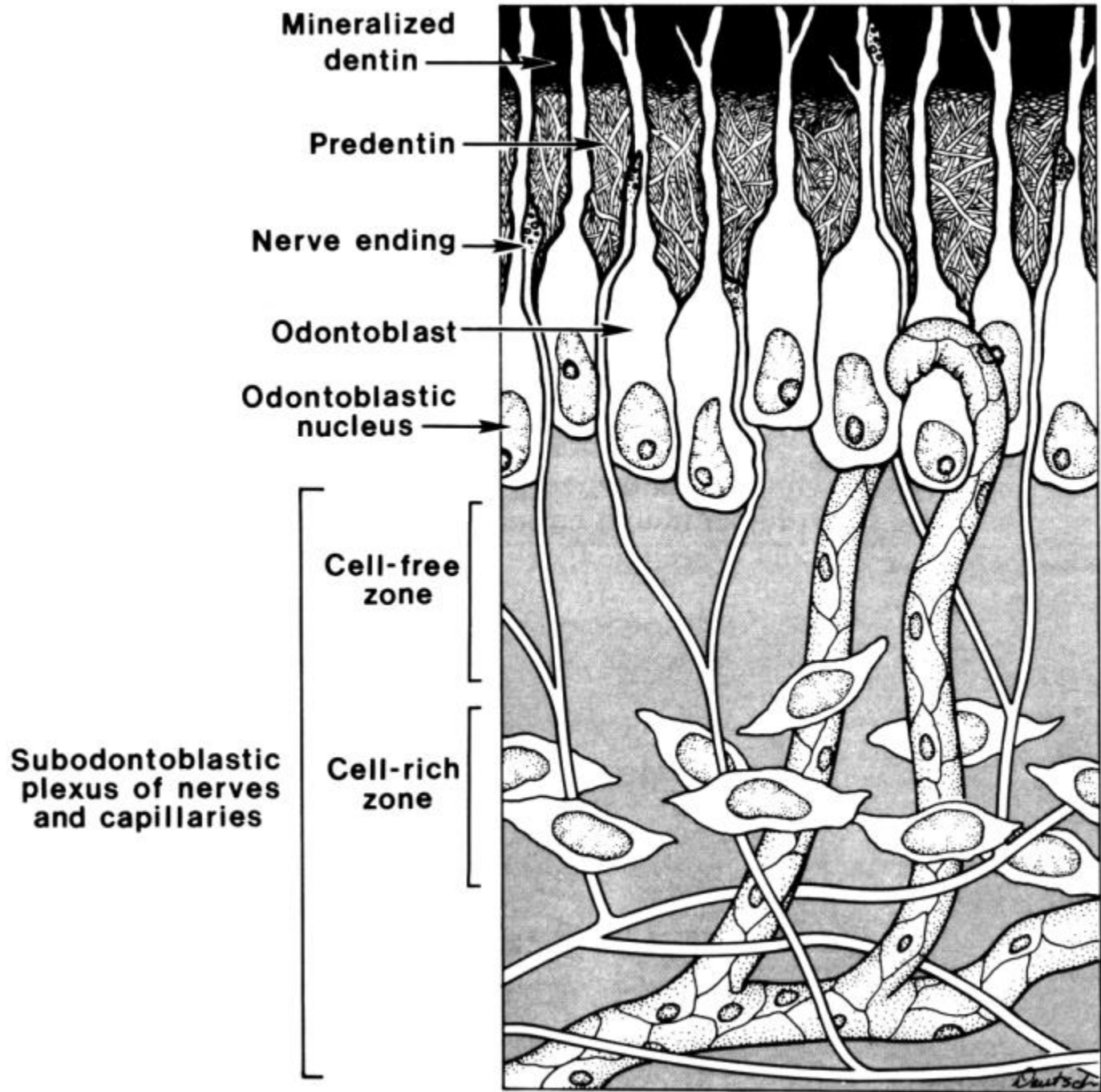


- **Primer**
- **Secunder**
- **Tertier**

The development of dentin



- **Primer**
- **Secunder**
- **Tertier/irritation dentin**



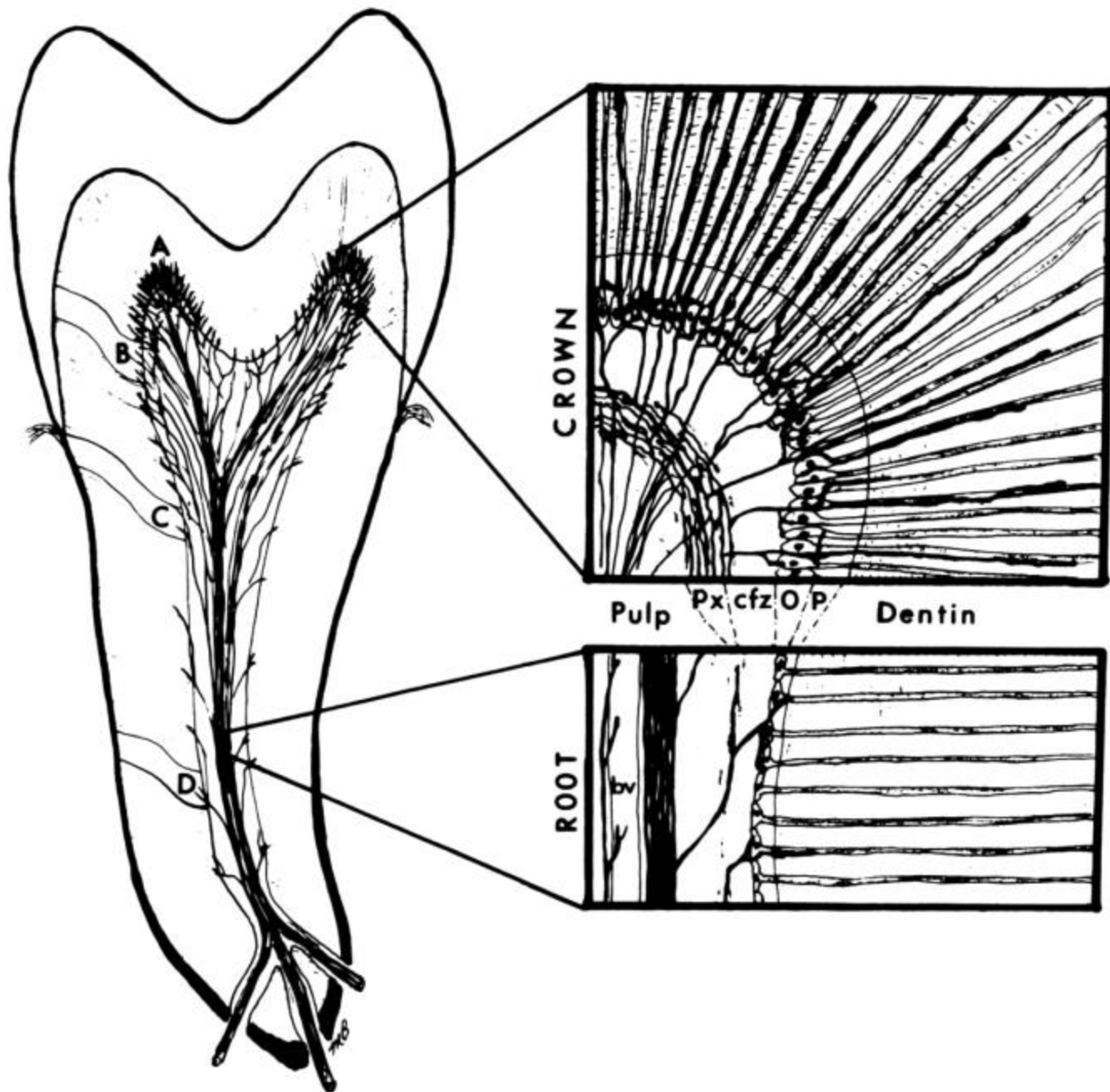
**Percent Innervated
Dentinal Tubules**

A: > 40

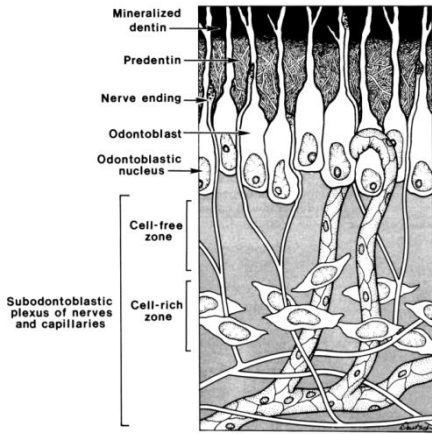
B: 4.1 - 8.3

C: 0.2 - 1.0

D: 0.02 - 0.2

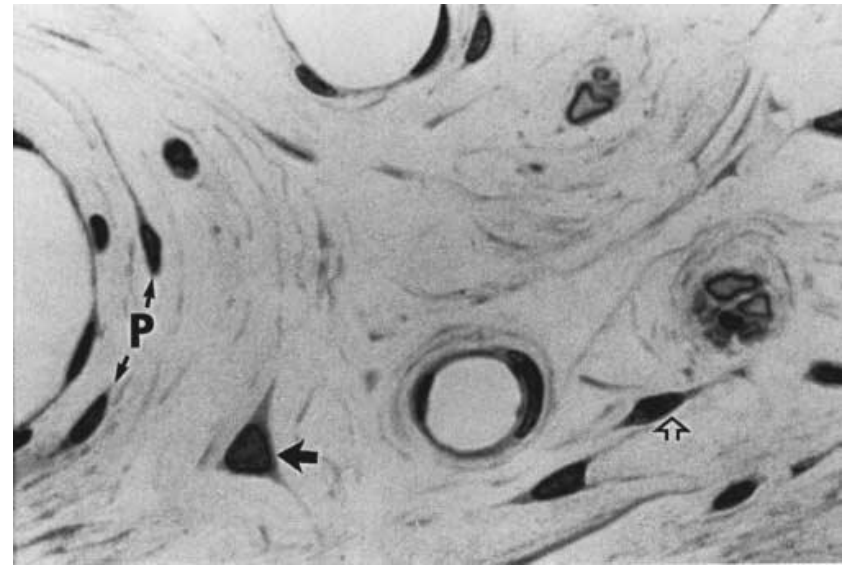


Reserve Cells



The pulp contains a pool of reserve cells, descendants of undifferentiated cells in the primitive dental papilla. These multipotential cells are likely a fibroblast type that retains the capability of dedifferentiating and then redifferentiating on demand into many of the mature cell types.

Fibroblasts



Most of the cells of the pulp are fibroblasts. Pulpal fibroblasts are spindle-shaped cells with ovoid nuclei. These cells exhibit wide variation in their degree of differentiation.

Principal producers of collagen

Defense Cells

- **histiocytes and Macrophages**
- **undifferentiated mesenchymal cells**
- **polymorphonuclear Leukocytes.**
- **lymphocytes and Plasma Cells**
- **mast cells**
- **odontoblasts**

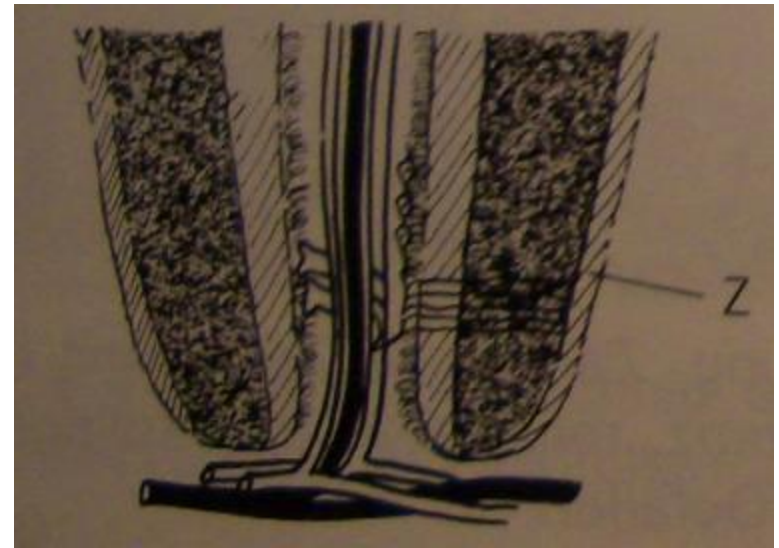
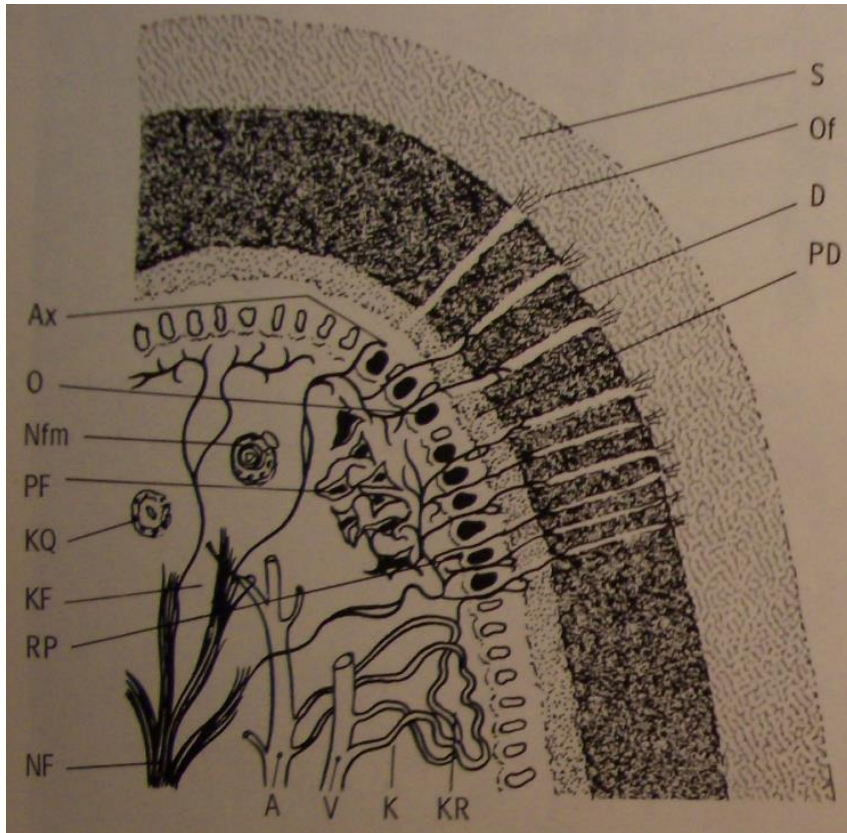
Odontoblasts

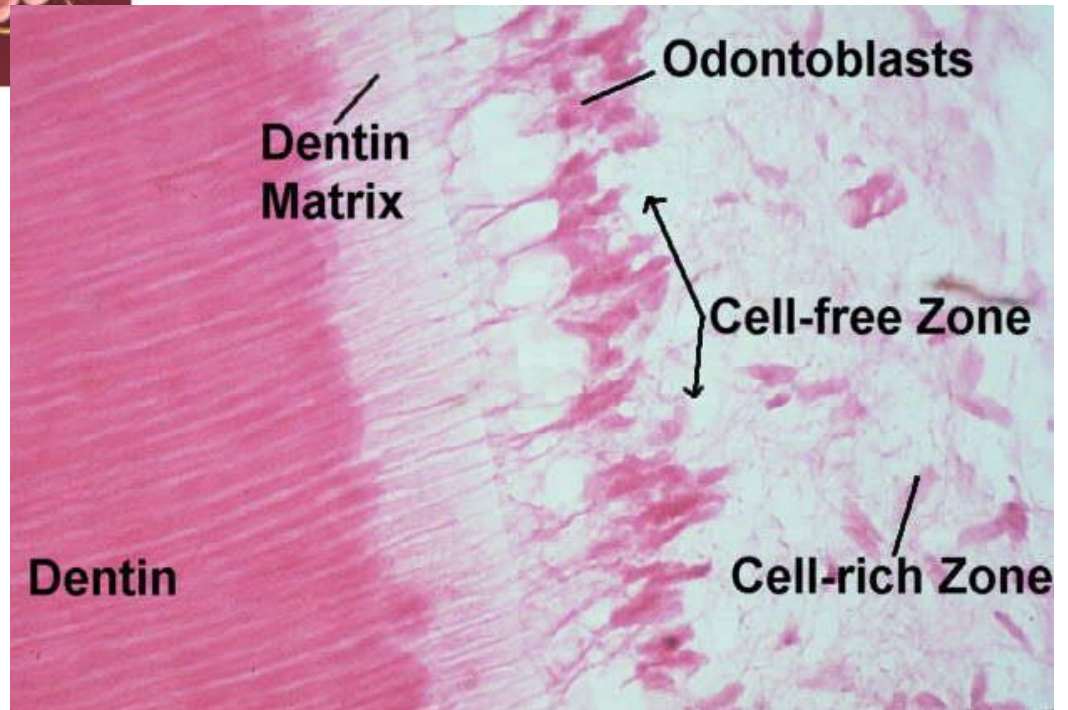
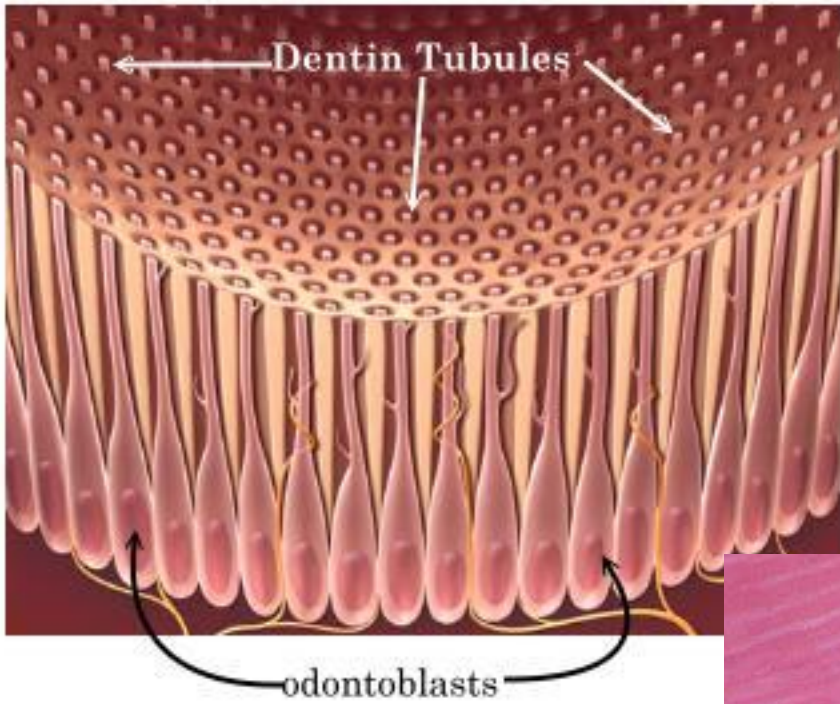
- **In the pulp chamber**

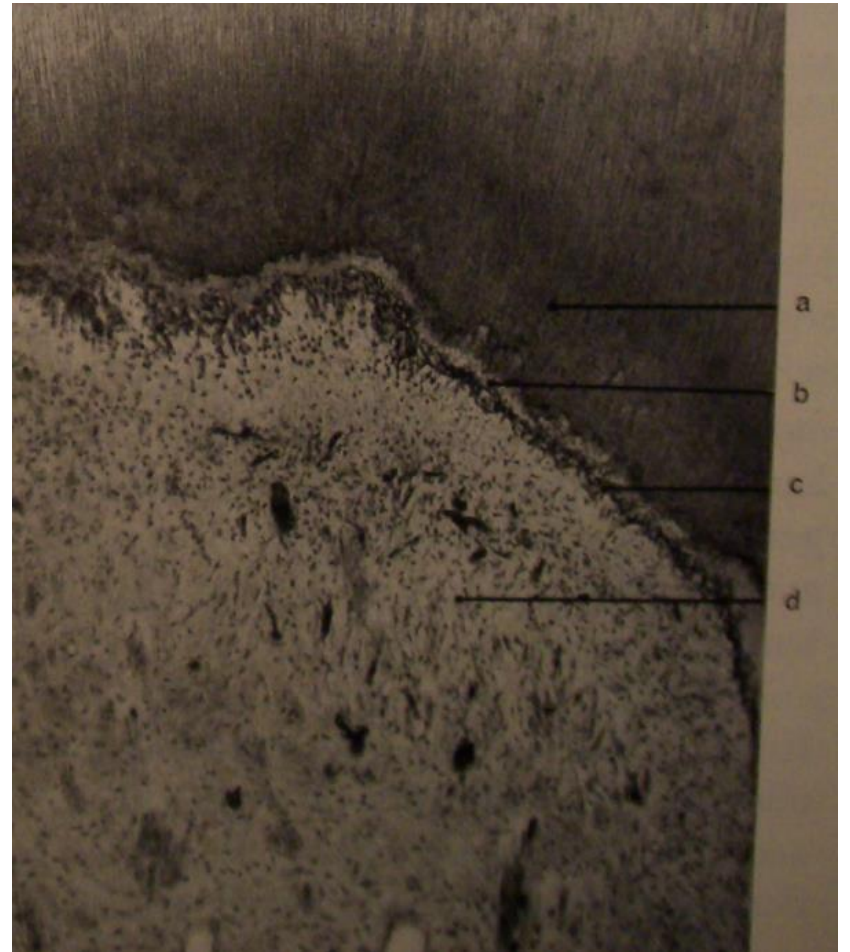
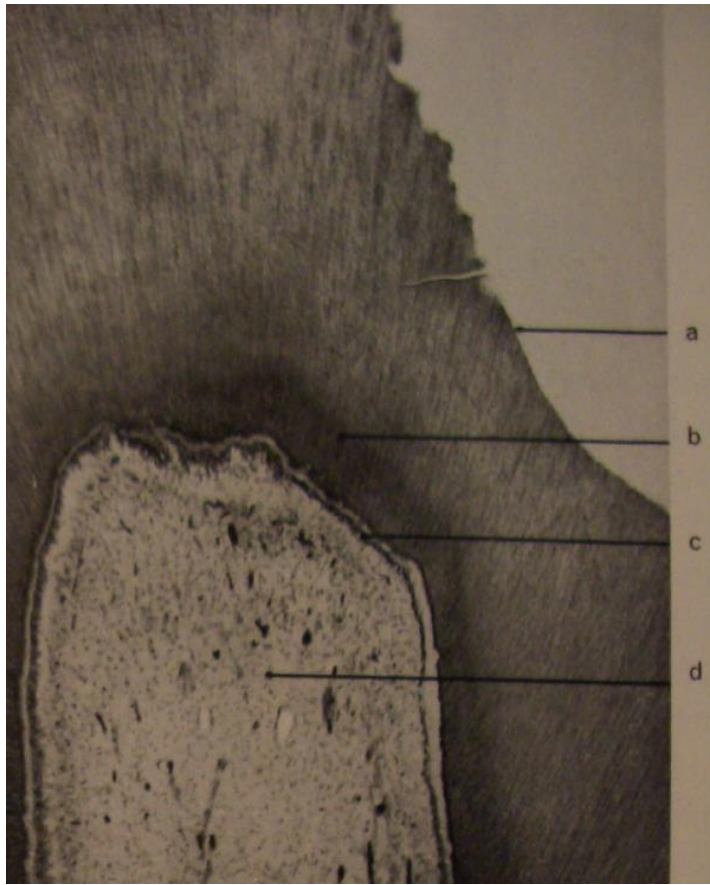
50 000 cells / mm²

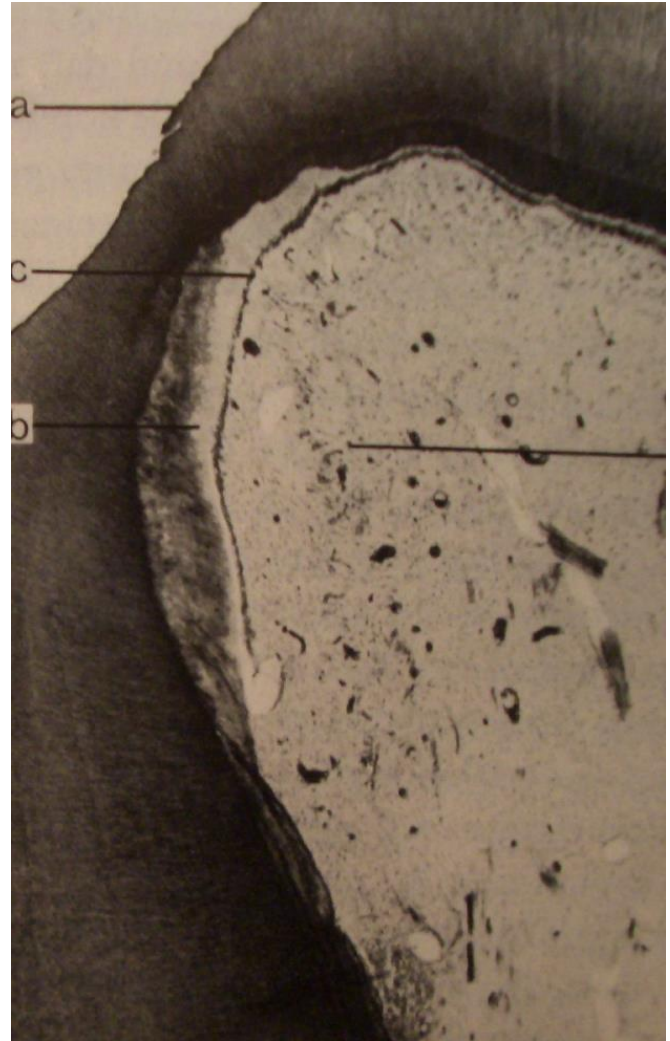
- **In the root**

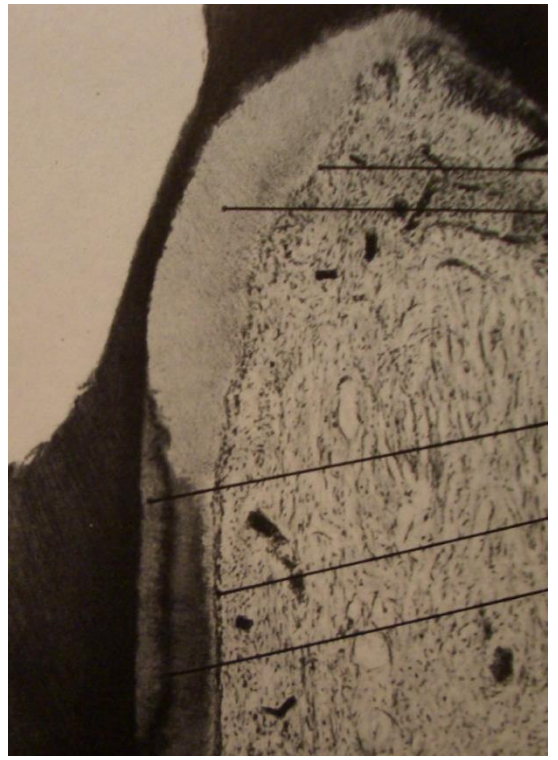
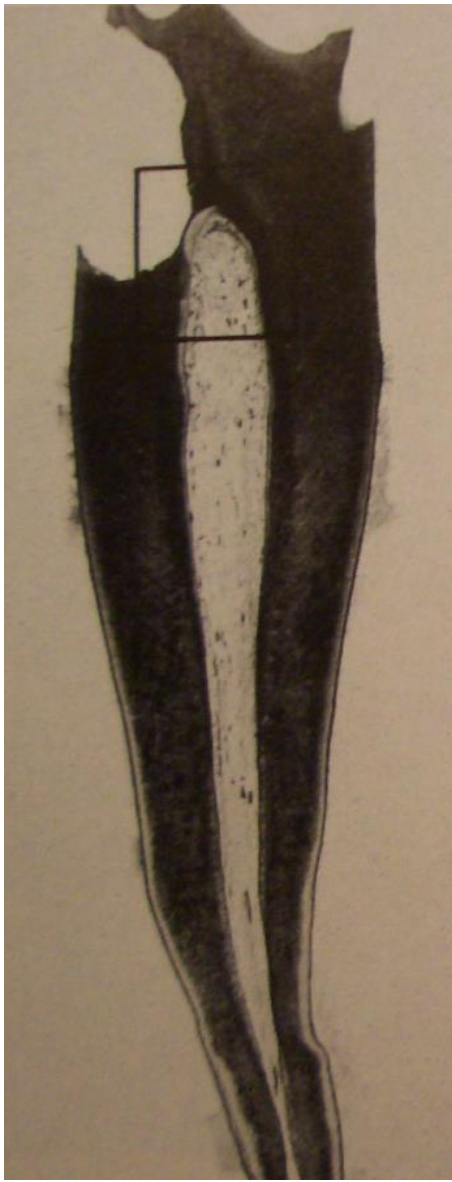
significant less



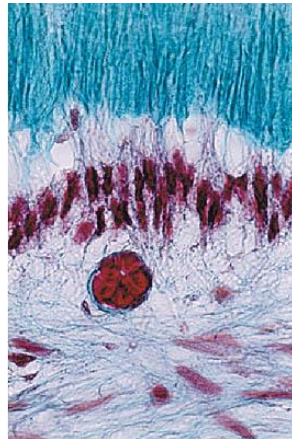
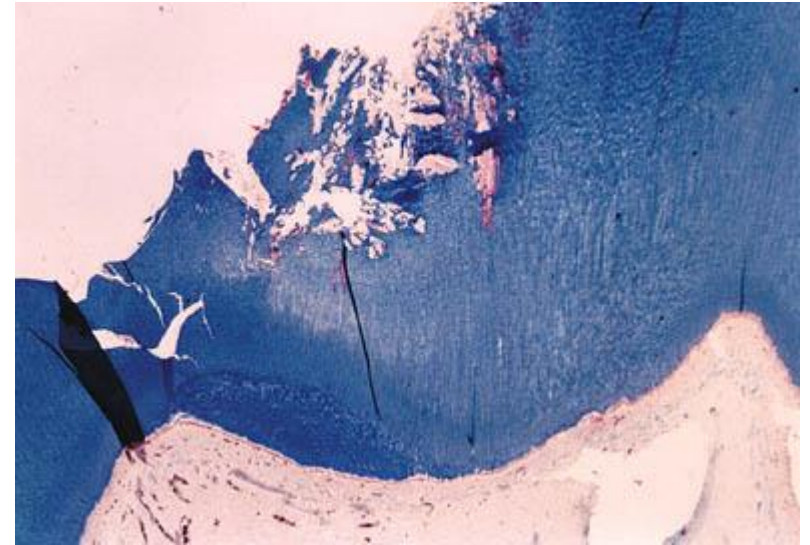
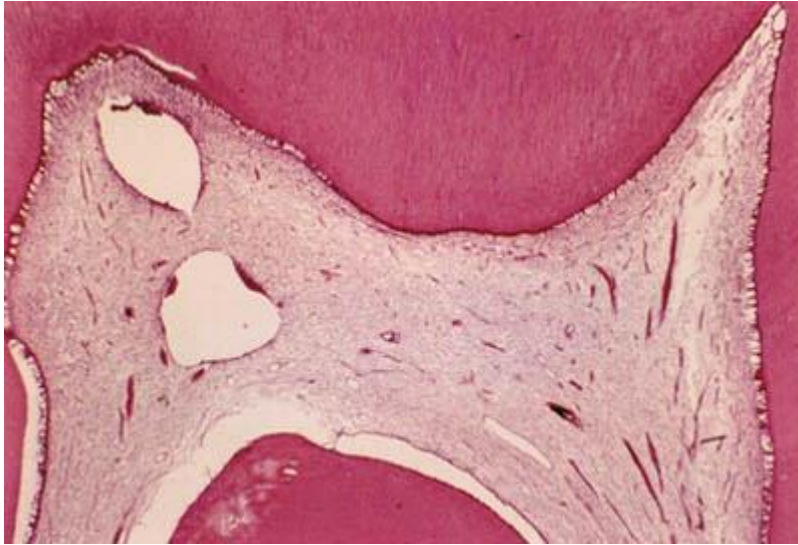




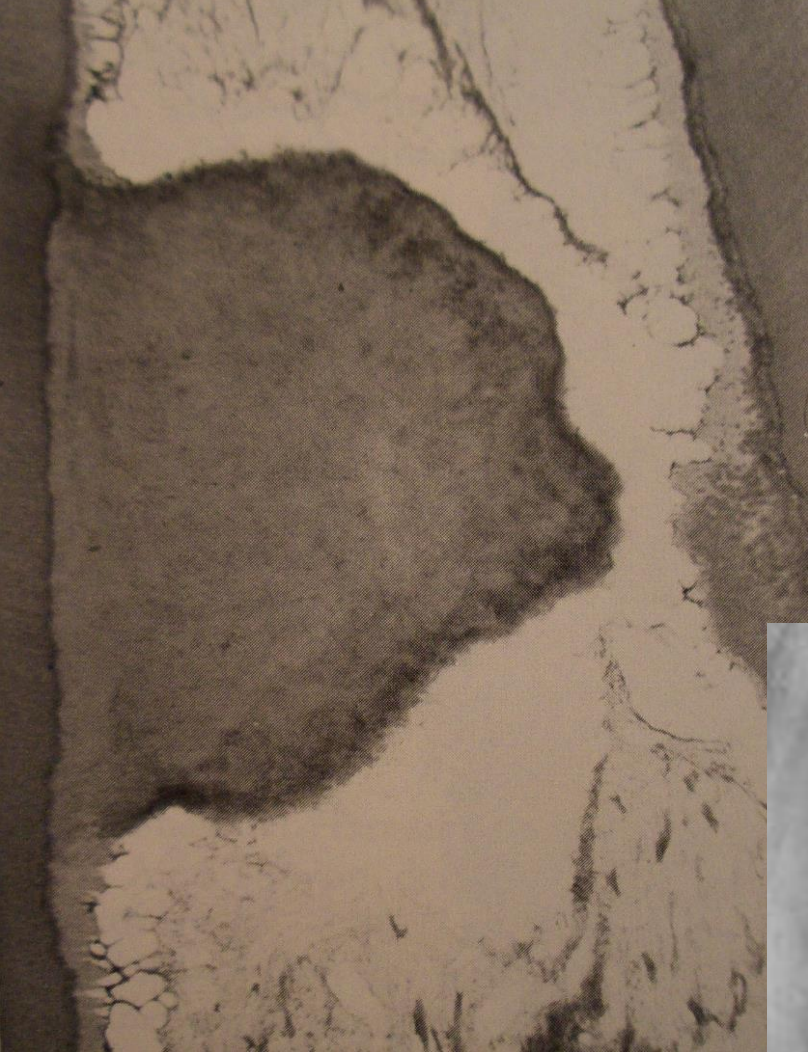


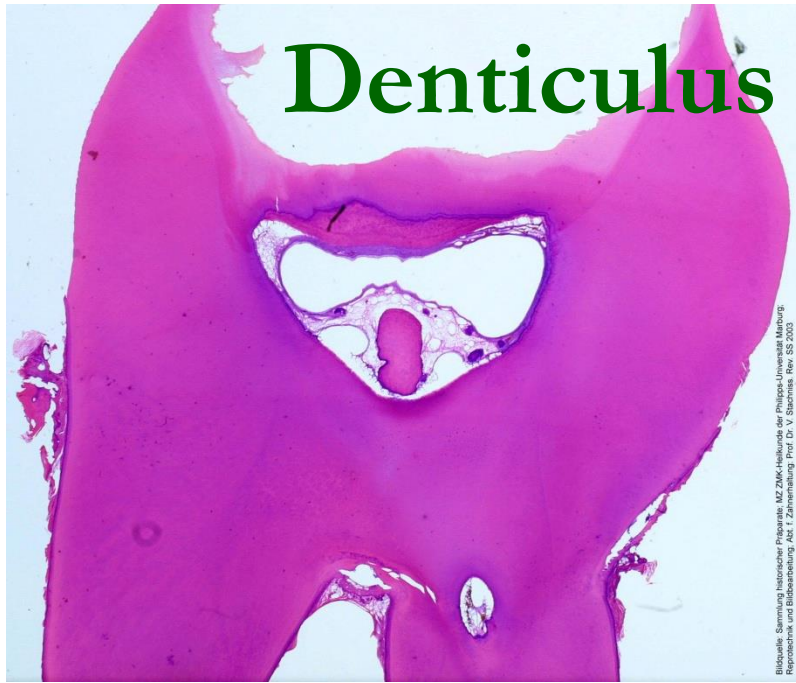


Caries media

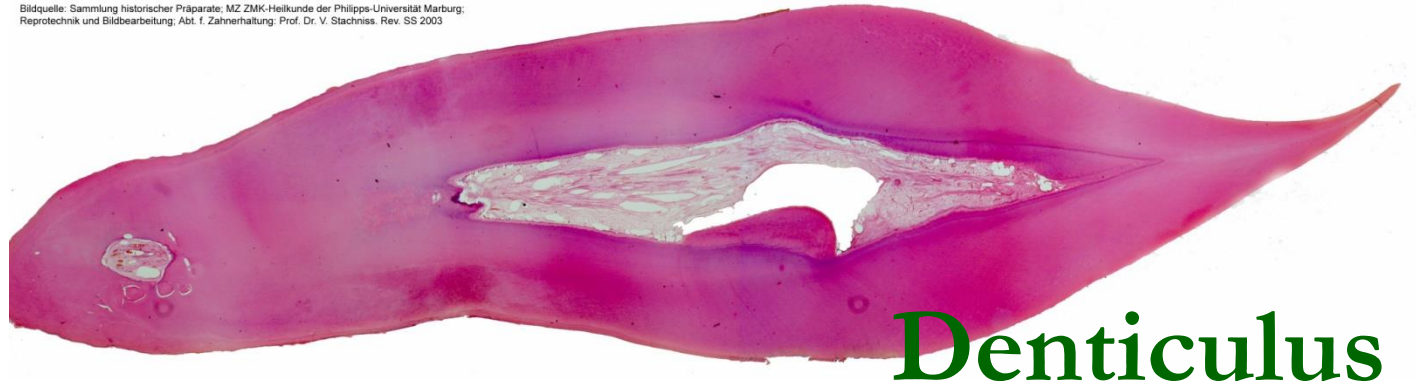


**localized irregular
irritative dentin**





Bildquelle: Sammlung historischer Präparate, MZ ZMK-Heilkunde der Philipps-Universität Marburg; Reprotechnik und Bildbearbeitung, Abt. f. Zahnheilkunde, Prof. Dr. V. Stachniss, Rev. SS 2003



Tooth notation

- **Zsigmondy-Palmer, Chevron,
Set-Square system**
- **The FDI two-digit system
(international method)**
- **European, Scandinavian,
Haderup system**
- **American (universal) system**

FDI Federation Dentaire Internationale

WHO World Health Organization

**IADR International Association for Dental
Research**

Zsigmondy-Palmer, Chevron, Set-Square system

8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	--	---	---	---	---	---	---	---	---

8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---	--	---	---	---	---	---	---	---	---

Right

Left

V	IV	III	II	I		I	II	III	IV	V
---	----	-----	----	---	--	---	----	-----	----	---

V	IV	III	II	I		I	II	III	IV	V
---	----	-----	----	---	--	---	----	-----	----	---

FDI

18 17 16 15 14 13 12 11

21 22 23 24 25 26 27 28

48 47 46 45 44 43 42 41

31 32 33 34 35 36 37 38

Right

Left

55 54 53 52 51

61 62 63 64 65

85 84 83 82 81

71 72 73 74 75

European, Scandinavian,

Haderup system

8+ 7+ 6+ 5+ 4+ 3+ 2+ 1++1 +2 +3 +4 +5 +6 +7 +8

Right

Left

8- 7- 6- 5- 4- 3- 2- 1-

-1 -2 -3 -4 -5 -6 -7 -8

USA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17

Right

Left