Classification acc. to Black

- Class I.

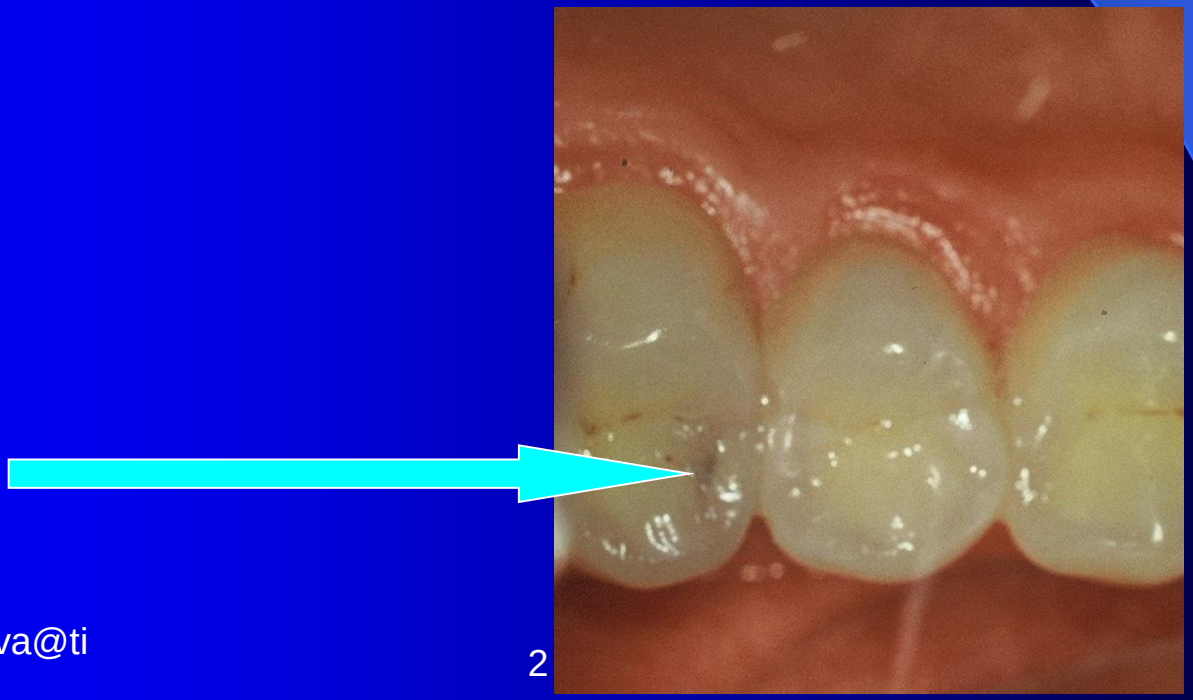
Pit and fissure caries

lenka.roubalikova@tiscali.cz

Classification acc. to Black

- Class II.

Proximal surfaces in premolars and molars



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Classification acc. to Black

- Class III.

Proximal surfaces of incisors and canines without lost any part if incisal edge

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Classification acc. to Black

- Class IV.

Proximal surfaces of incisors and canines with lost an incisal ridge

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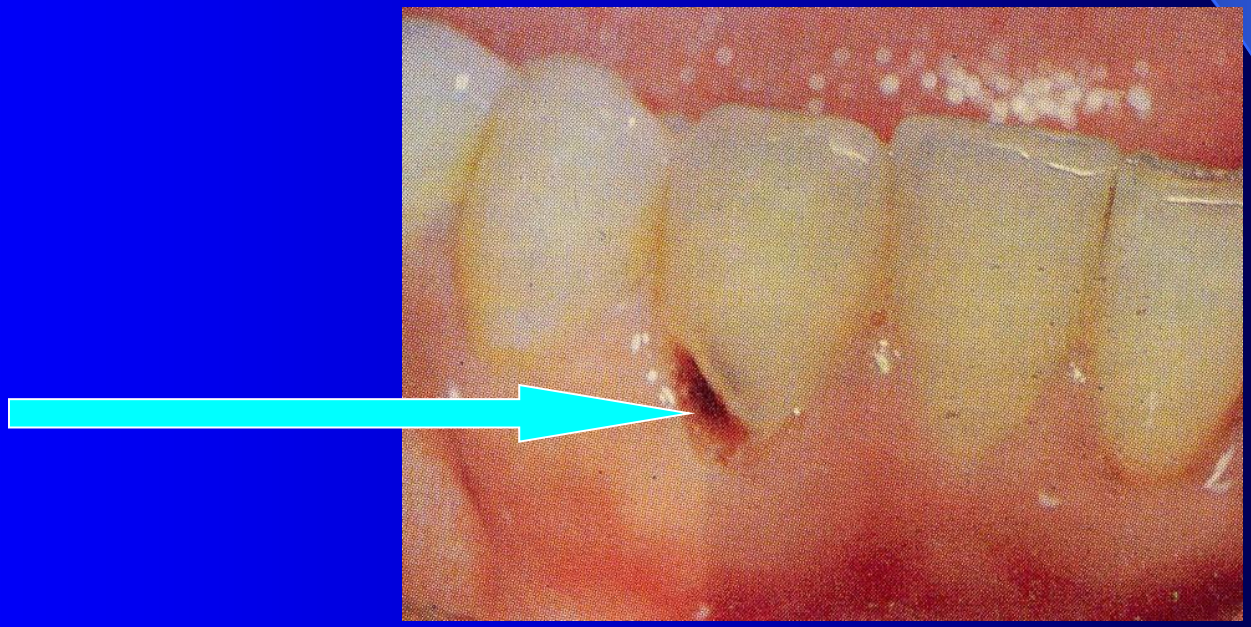
Classification acc. to Black

- Class V. cervical lesions



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Preparation of cavities
Basic rules

Access to the cavity

Outlines – cavosurface margin (extention for prevention)

Principles of retention

Principles of resistance

Excavation of carious dentin

Preparation of borders – finishing

Control

Protection of dentin wound

- Dentin wound should be covered – protection of dental pulp against irritation

Physicial

-thermal

-osmotic

Chemical

Combination

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Protection of dentin wound

Isolation

Filling (small cavities)

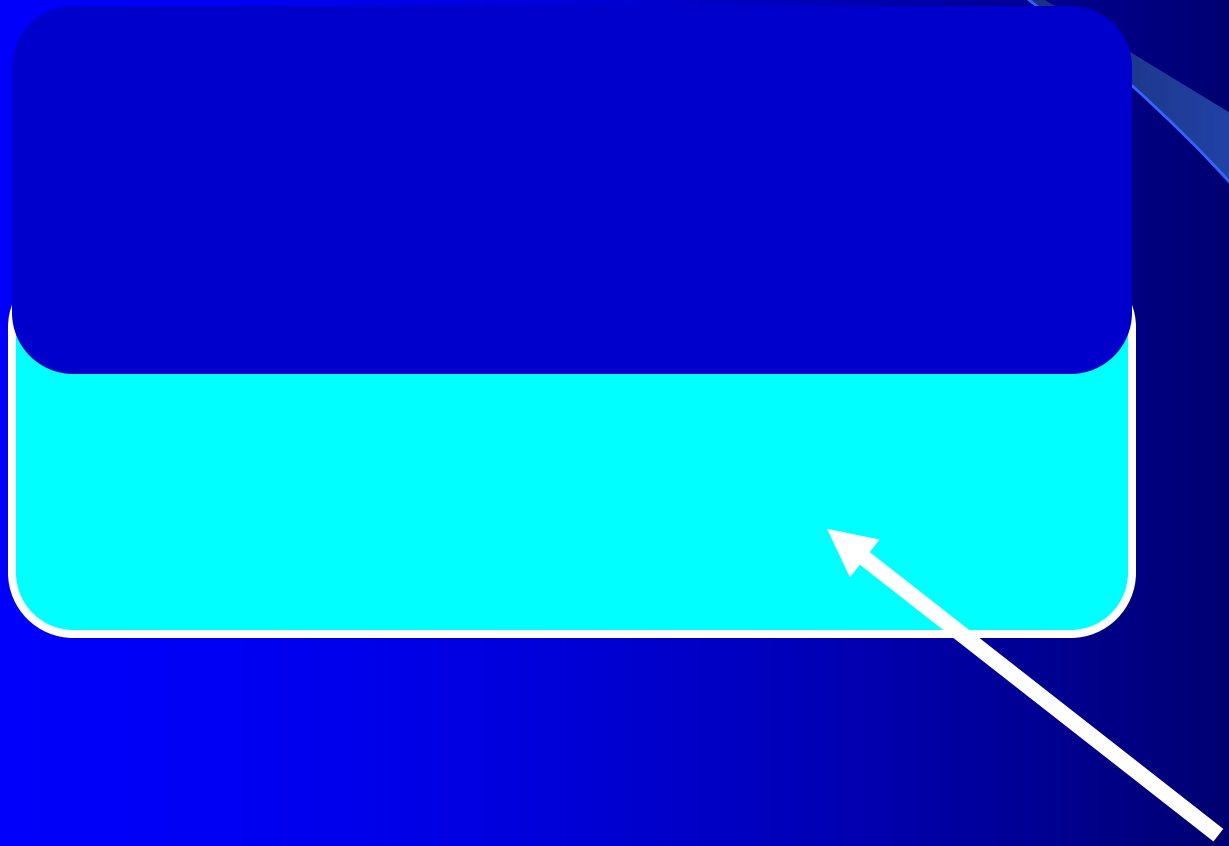
Base (moderate – large cavities- depth 2mm and more approx.)

Adhesive systems (composite materials)

Filling

- Filling replaces lost hard dental tissue anatomically and functionally
- Always different properties in comparison to hard dental tissues.

Base is made usually of zinkoxidphosphate cement It is placed only on pulpal wall



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Preparation of the cavity I.st class acc. to Black

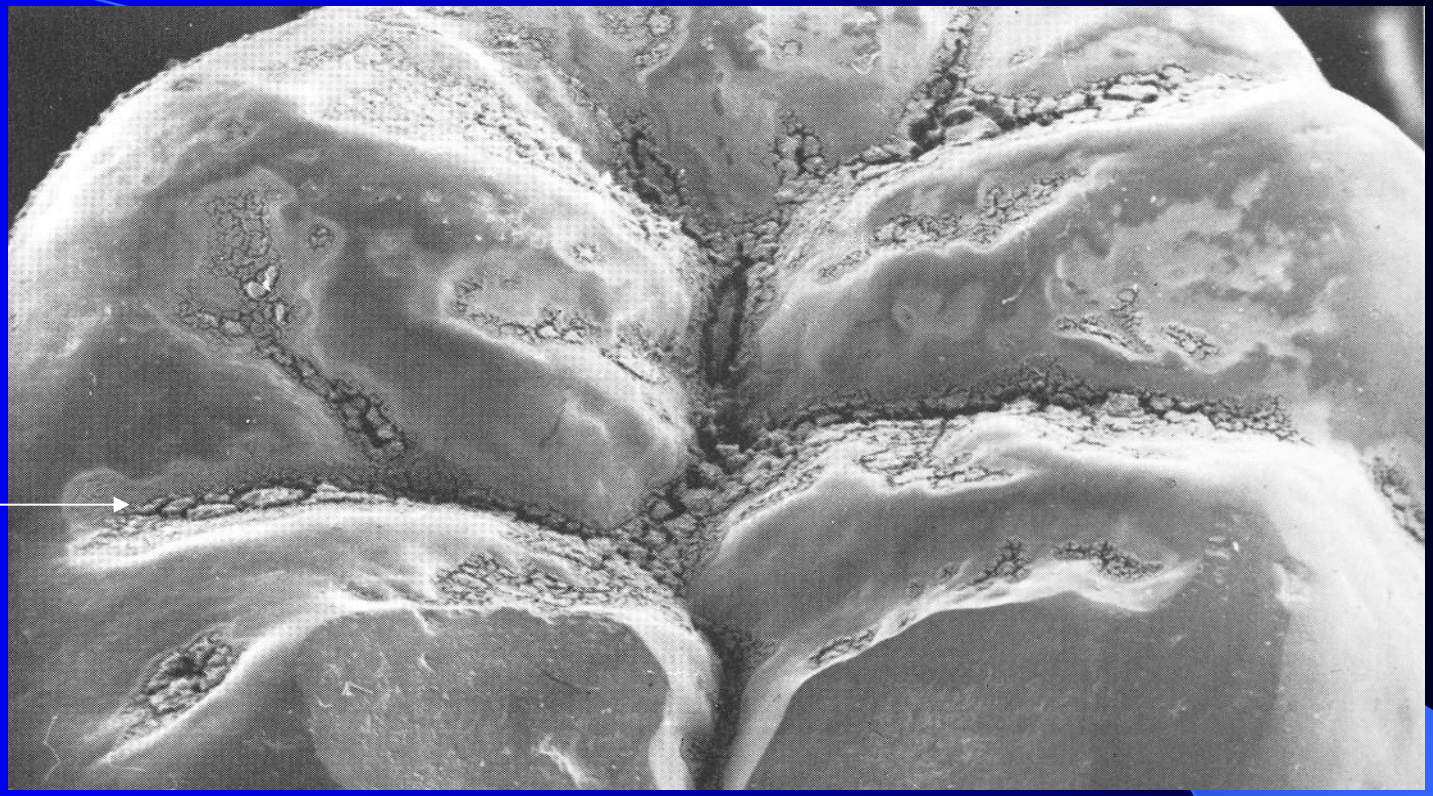
- Cavities in fissures and pits
- (Occlusal surfaces of premolars and molars and in f. coeca)

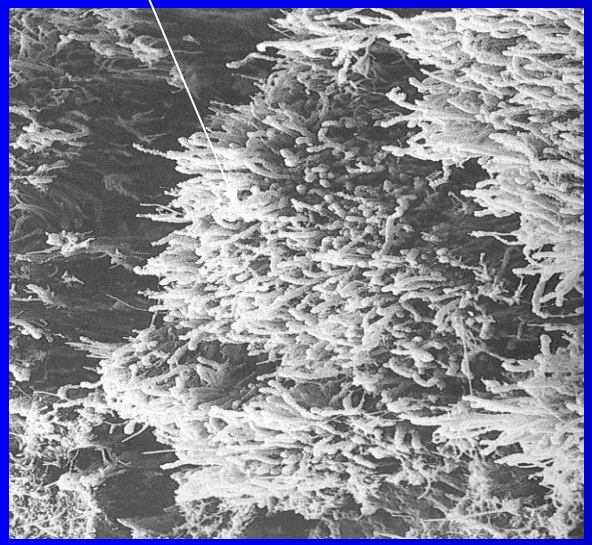
F. Coeca: buccal surfaces of lower molars,

Palatal surfaces of lower molars, palatal surfaces of upper incisors (mostly lateral)

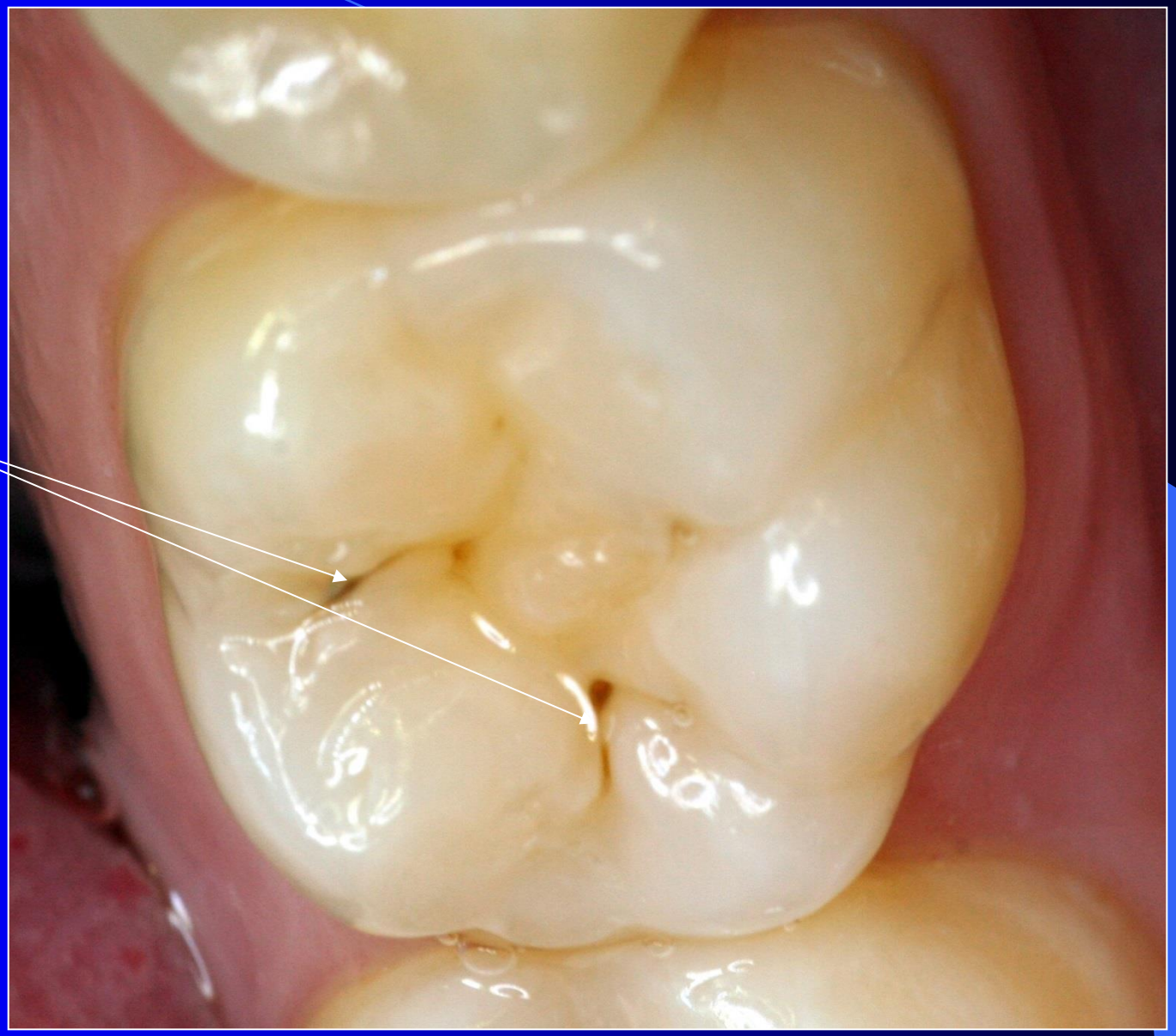
Morphology of fissures

Biofilm





Caries



All pit and fissure restorations (fillings)

They are assigned in to three groups.
R. on occlusal surface of premolars and molars

R. in foramina coeca – usually on occlusal two thirds of the facial and lingual surfaces of molars.

R.on lingual surface of maxillary incisors.

Materials: Amalgam, composite.

Amalgam:

Pertinent material qualities and propeties

Strength

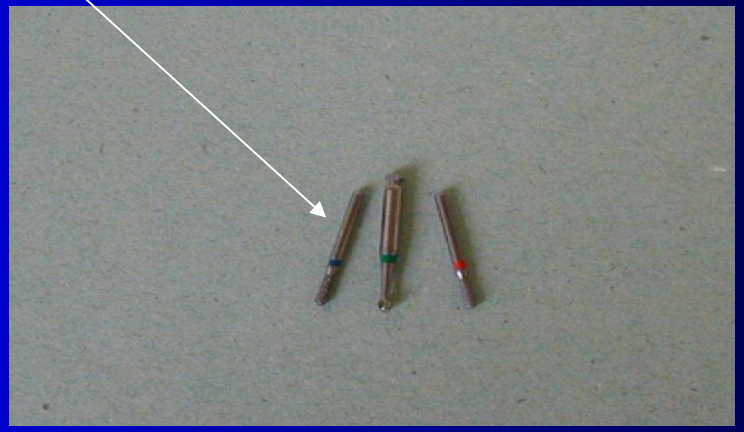
Longevity

Easy of use

Clinically proven sucess

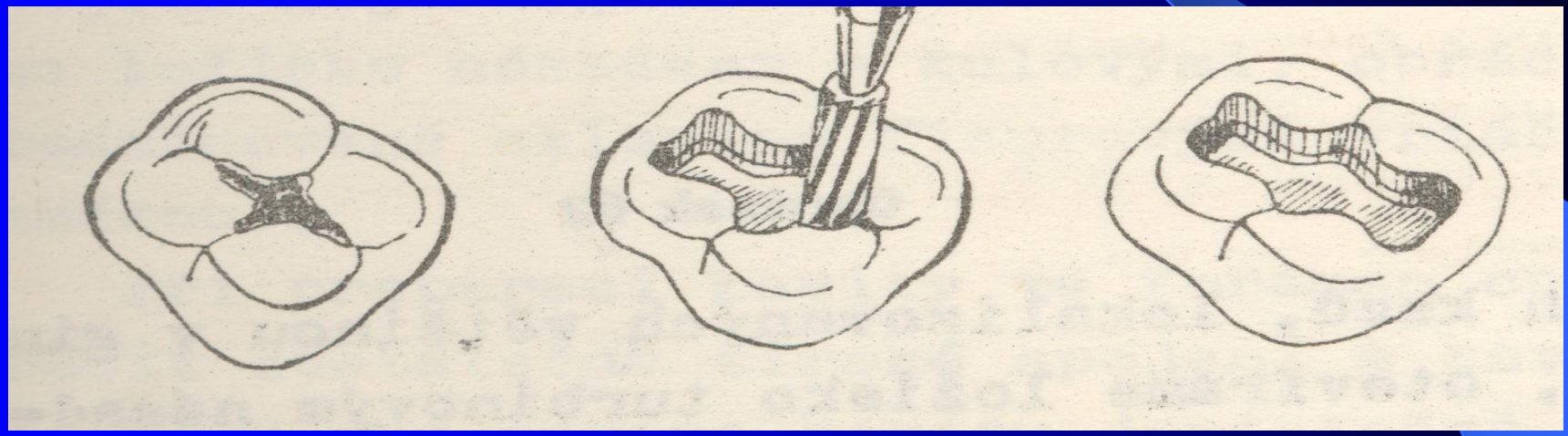
Access to the cavity

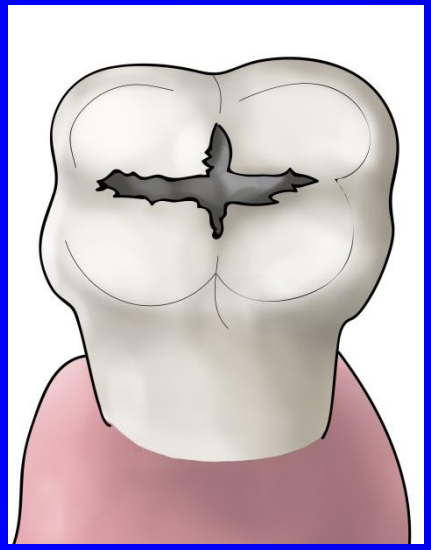
- From the occlusal surface using the fissure bur (or diamond burs, see below).

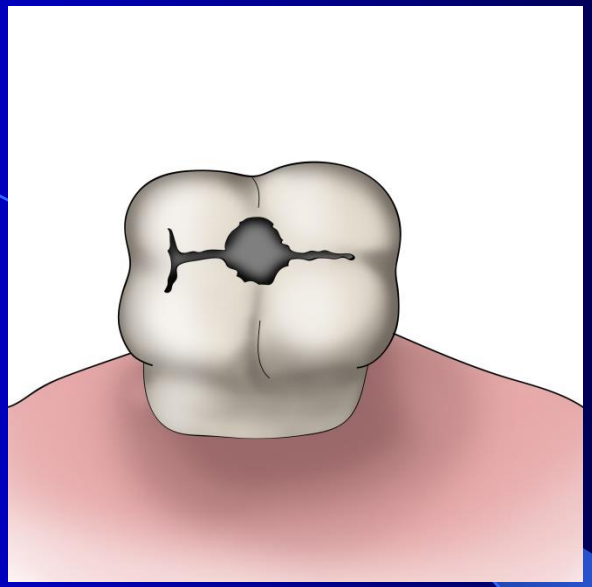


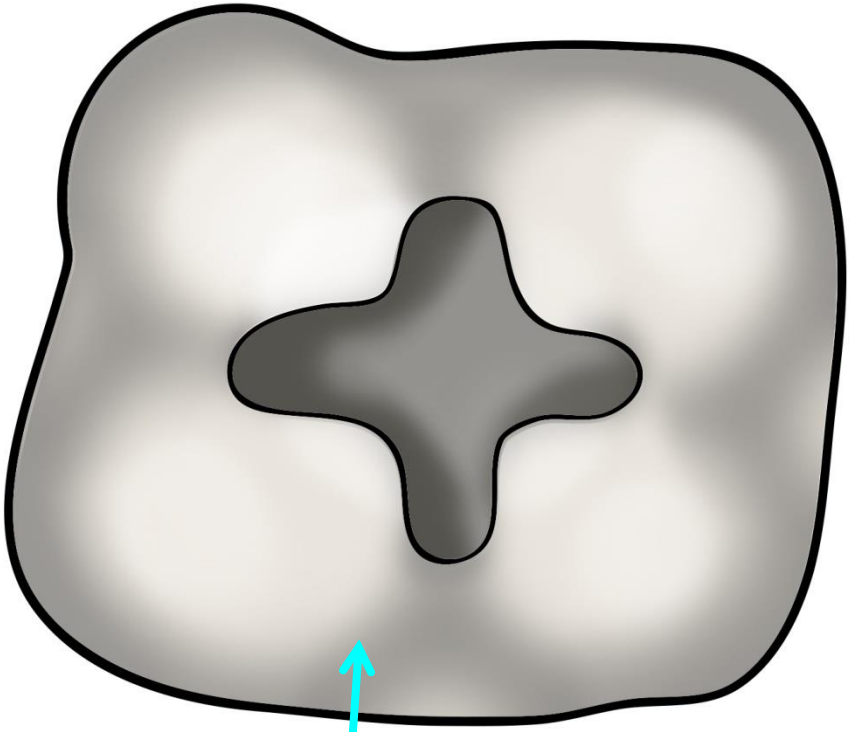
Cavosurface margin

- Ideal outline includes all occlusal pits and fissures. If crista transversa (1st lower premolar)or obliqua (1st and 2nd upper molar)are not affected, it is strongly recommended no to prepare them.





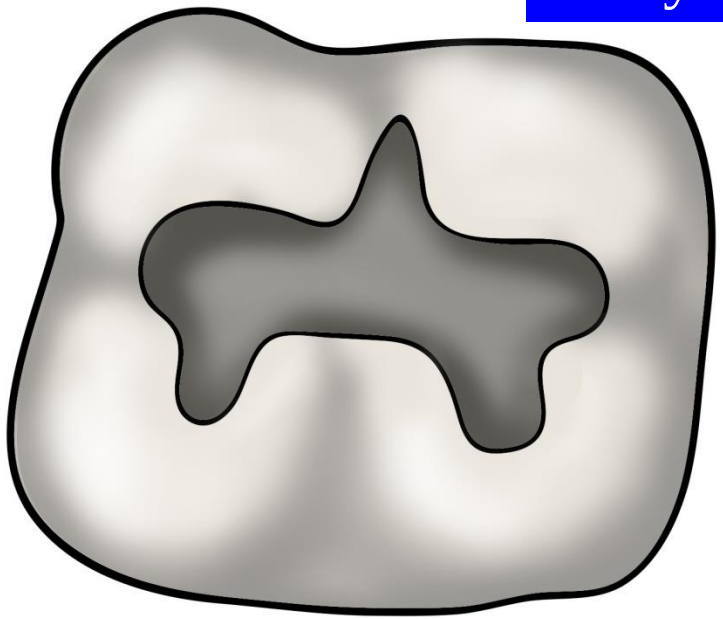




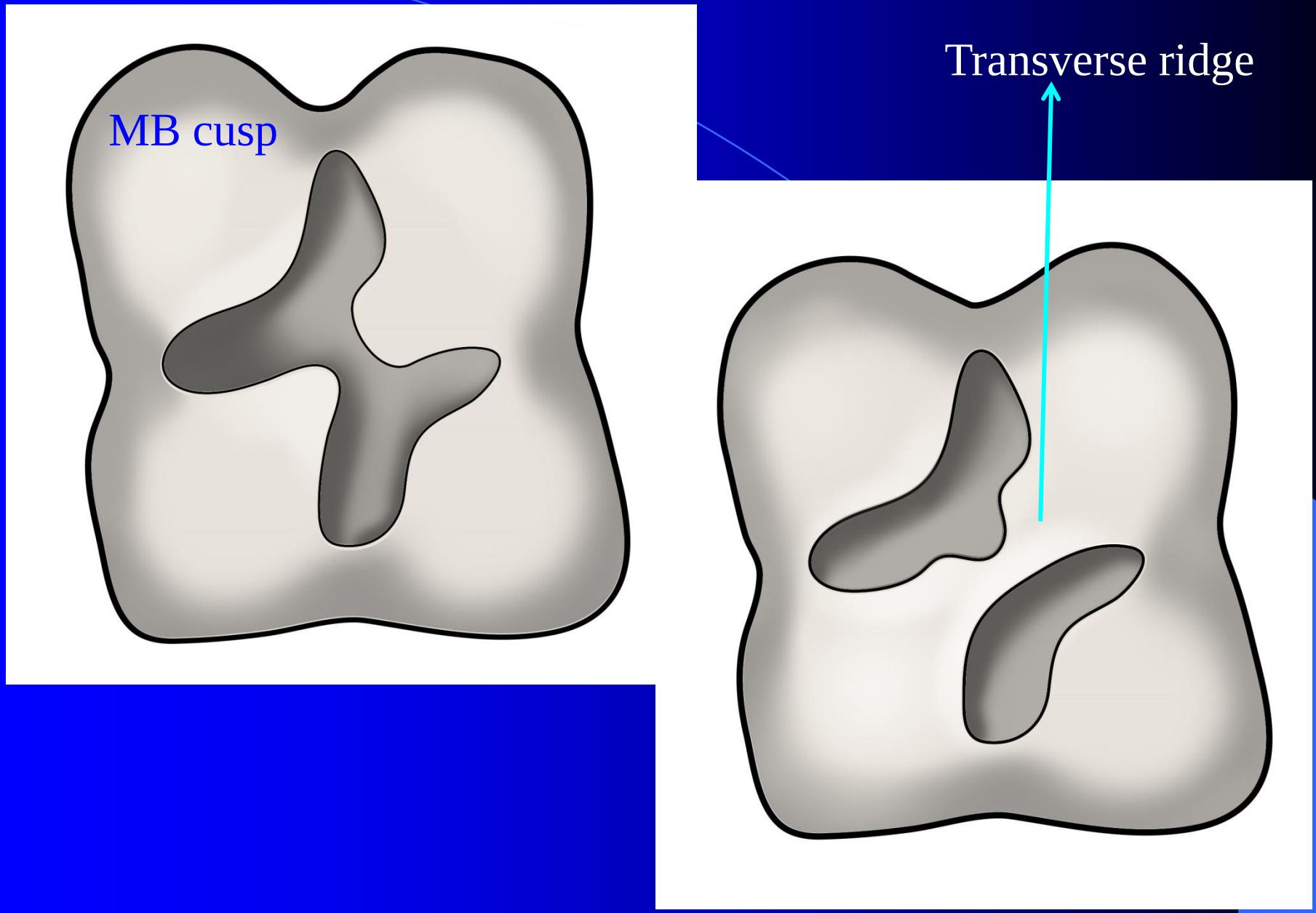
Mandibulary 7

Mandibulary 6

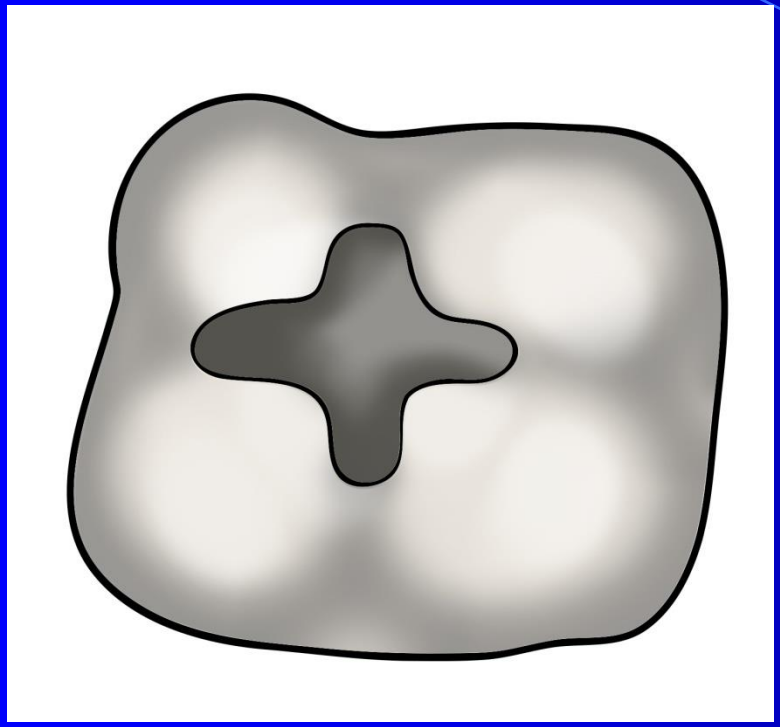
orally

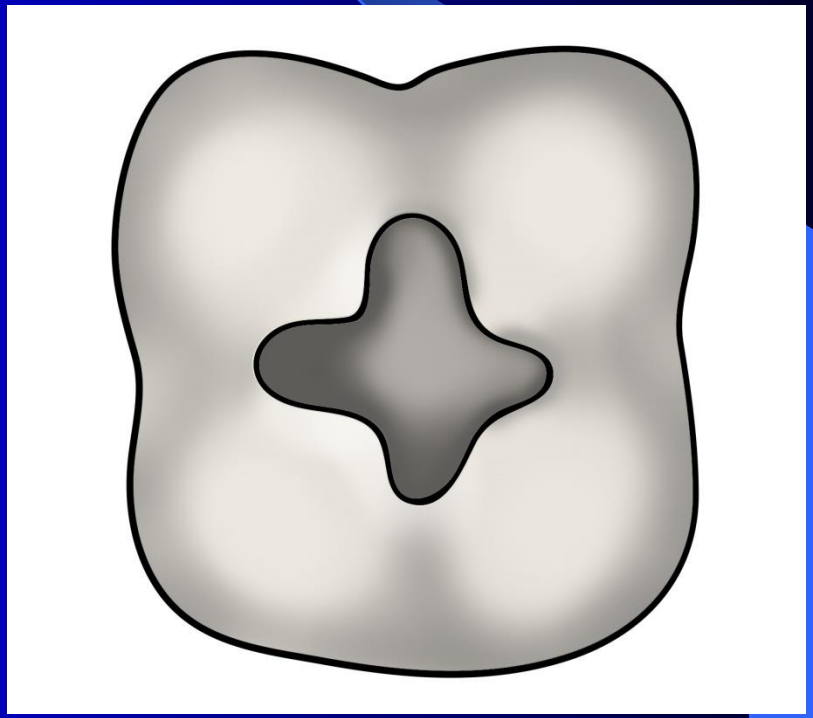


vestibulary


MB cusp
Transverse ridge

Third molars - variable





½ distancw between the botom of the fissure and the cusp

Retention

- Box – undercat (1,5 – 2 mm deep).

Box

Undercut

The cavity with undercuts at the bottom

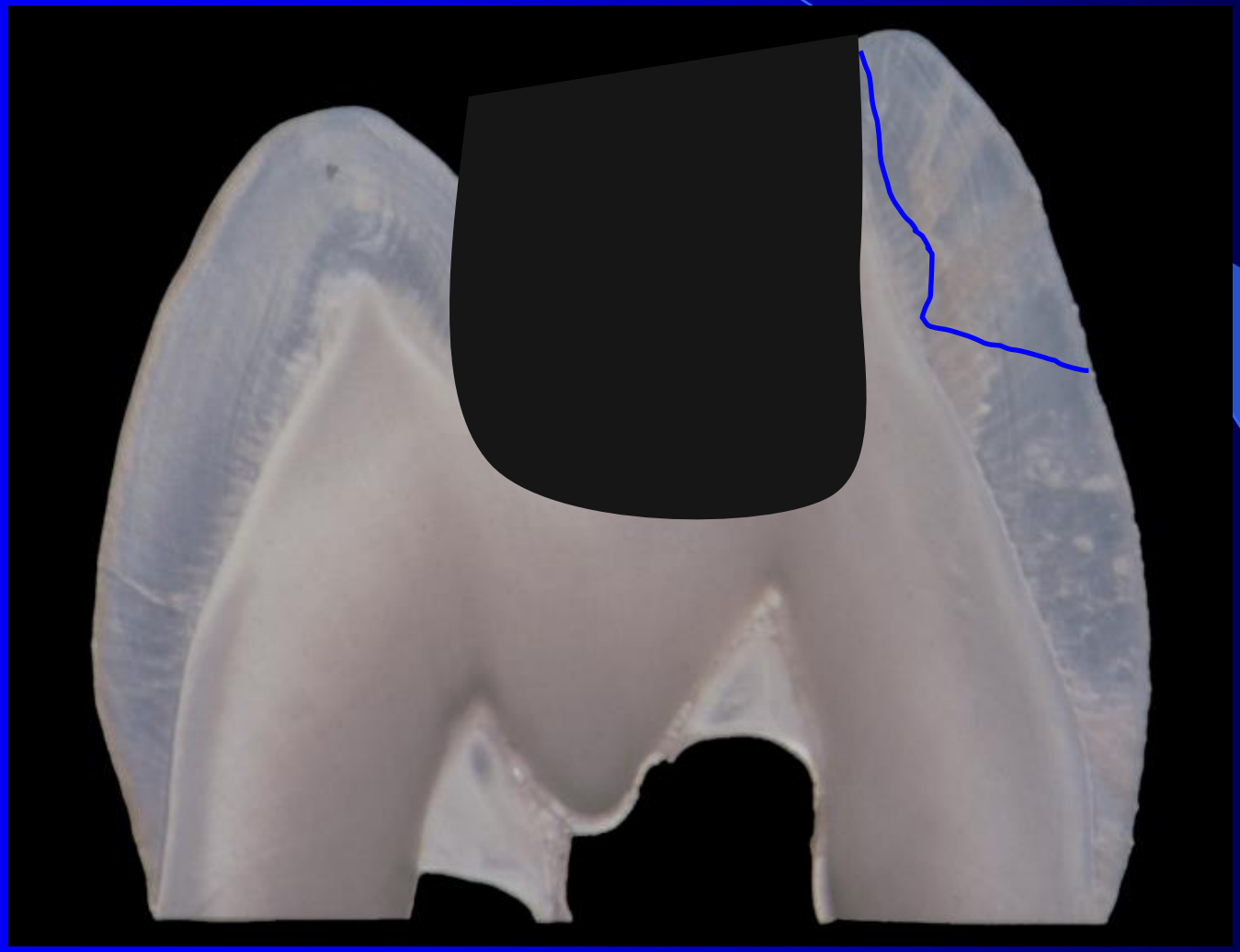
Resistance

Depth 1,5 – 2 mm

The enamel is always supported with

The cavosurface margin till ½ distance of the bottom of the fissure and the cusp

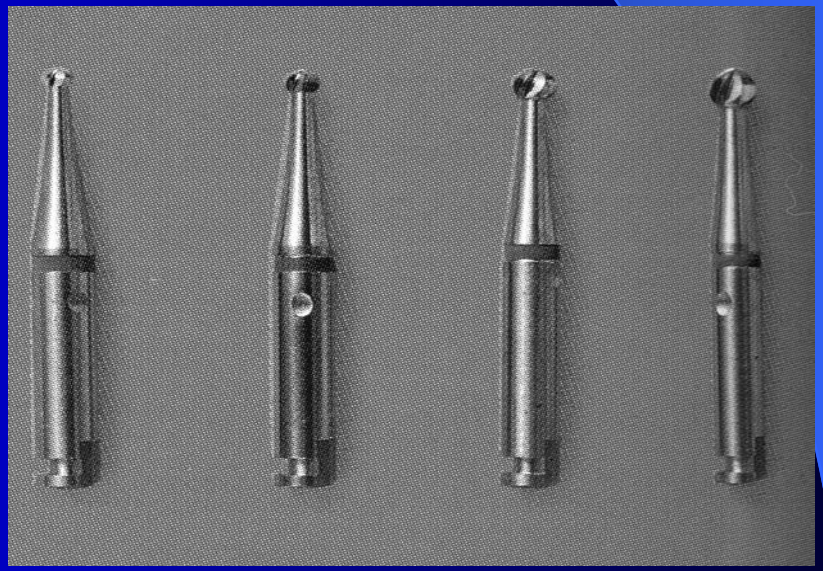
No sharp edges



Excavation of carious dentin

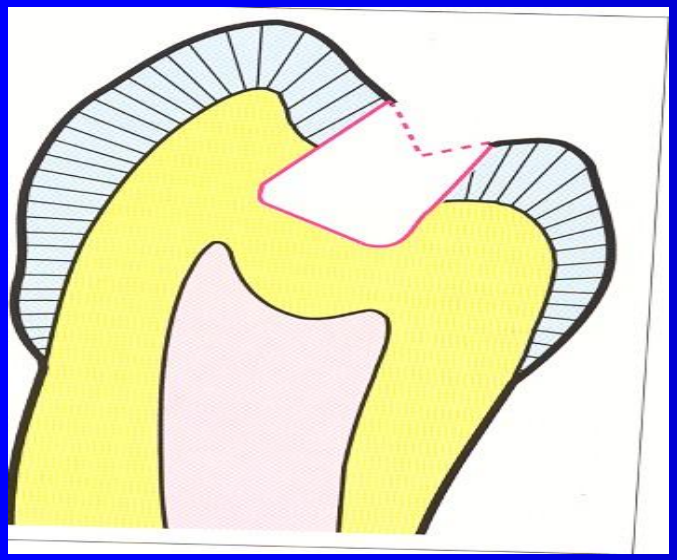
Nízké

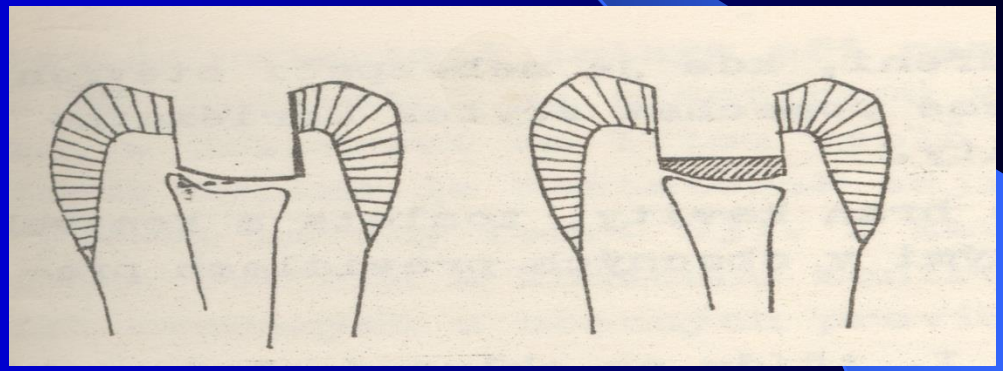
- Round burs : 3000/min
- Excavators



Orientation of the pulpal wall

Protection of dentin wound





Finishing

Fine diamonds

Final check

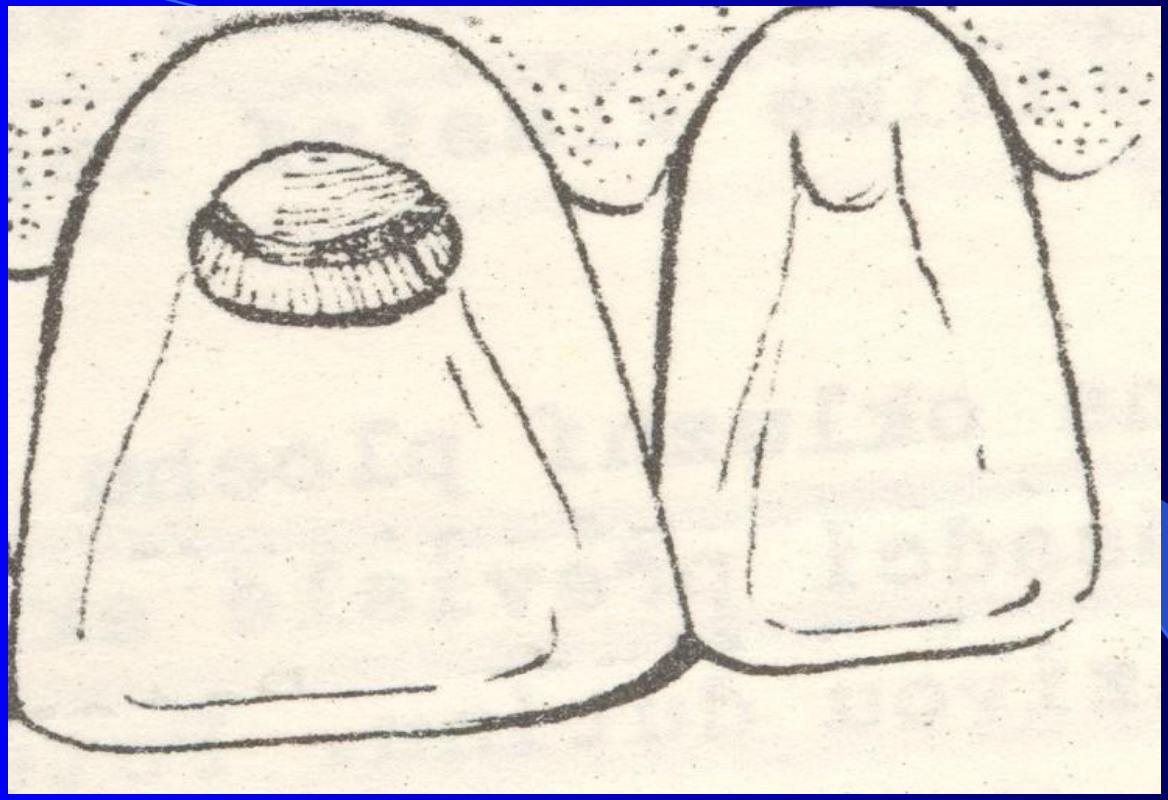
Good illumination, dry field, magnification.
Direct and /or indirect view

Molars

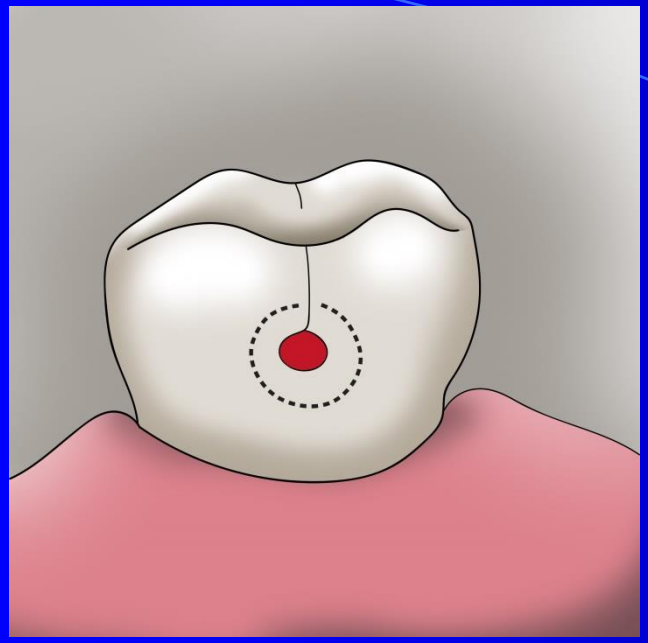
6 7 8

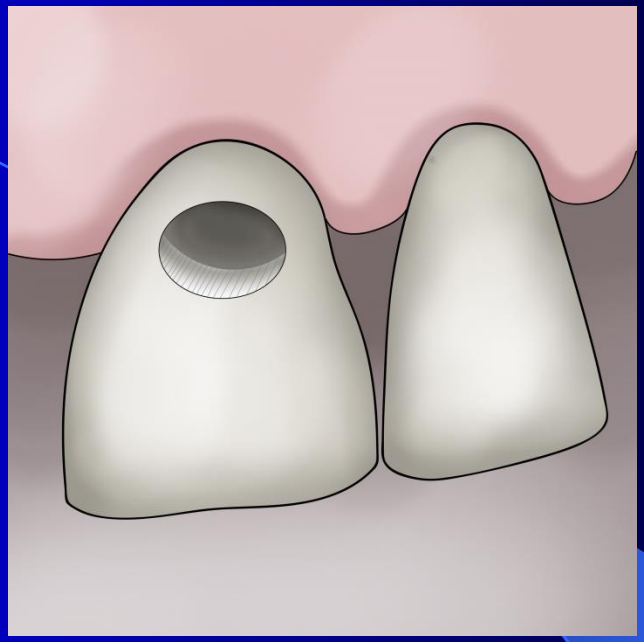
Oblique ridge

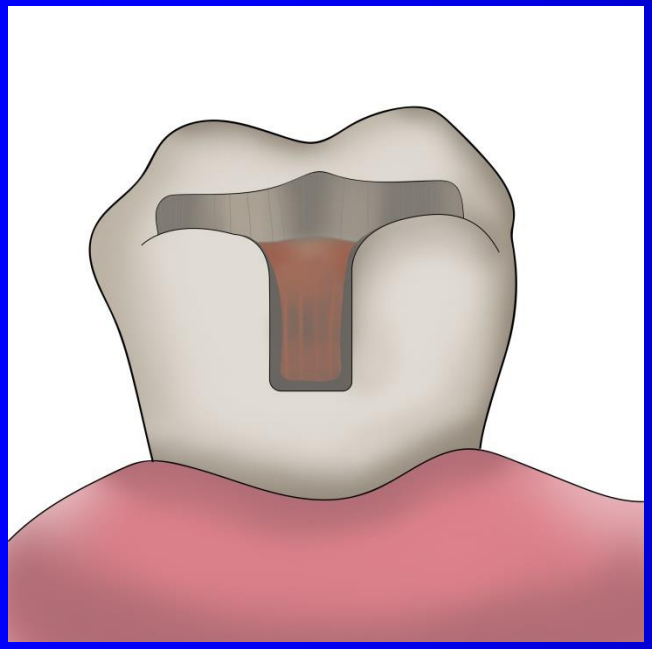
6 7 8



Foramen caecum:
Preparation is limited on carious lesion
The bottom is located in dentin
Undercuts
Finishing of cavity borders





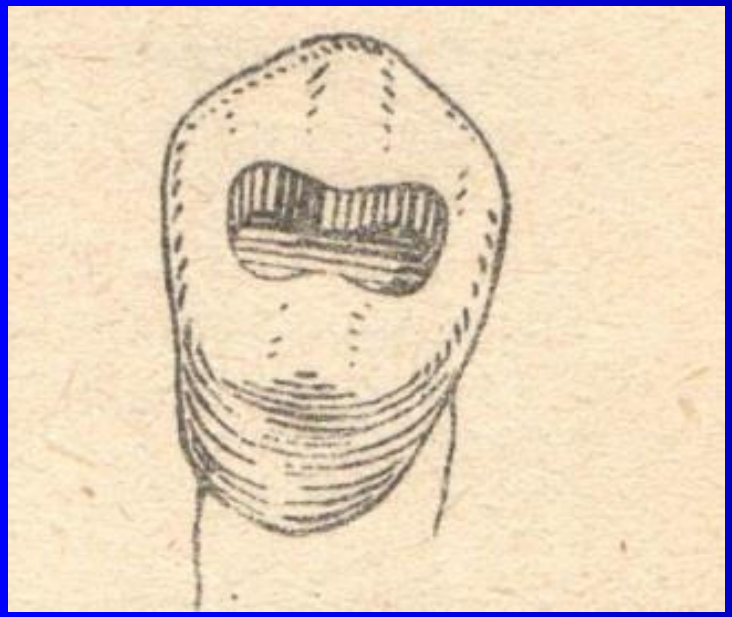


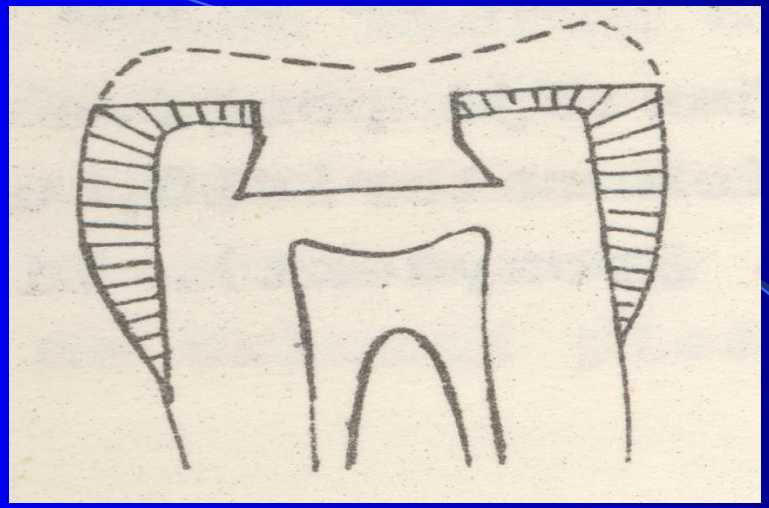
If the enamel is undermined occlusally – extention on occlusal surface

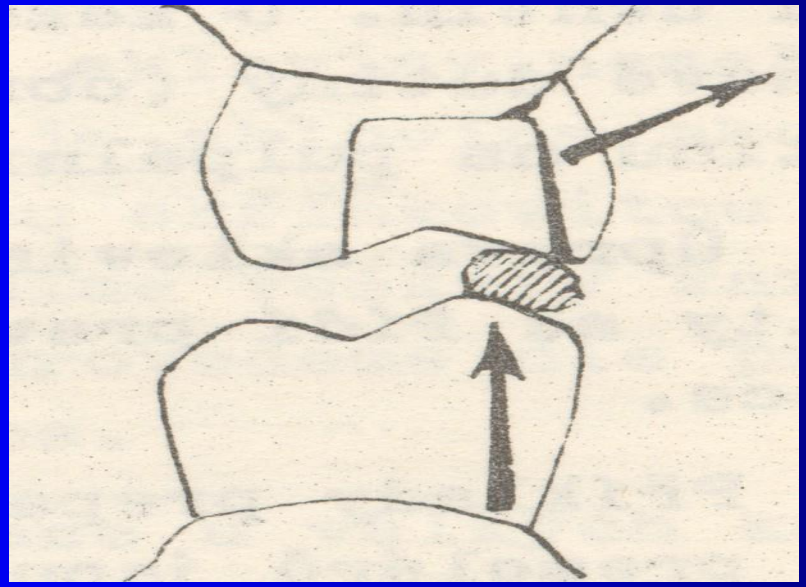
Preparation with preservation of the transverse ridge

Premolars

Crista transversa
Lower P1







Amalgam

Metal-like restorative material composed of silver-tin-copper alloy and mercury.

Types of amalgam restorative materials

Low – Copper Amalgam (5% or less copper)

Composition – wt%

Silver	63 - 70 %
Tin	26 – 28 %
Copper	2 - 5%
Zinc	0 - 2%

Types of amalgam restorative materials

High – Copper Amalgam (13% - 30%) copper

Composition – wt%

Silver	52 - 70 %
Tin	14 %– and less
Copper	12 - 30%
Zinc	0 - 2%

Particles of the alloy

- Irregulary shaped (filings - lathe cut)
- Microsphers
- Combination of the two.

Particles shape

High – Copper Amalgam

Microsphers of the same composition (unicompositional)

Mixture of irregular and spherical particles of different or the same composition (admixed)

Production of irregular particles

Metal ingrediences heated, protected from oxidation, melted and poured into a mold to form an ingot.

Phases of the alloy: (intermetallic compounds)

Ag_3Sn - γ

Cu_3Sn - ε

Cu_6Sn_5 - η

Ag_4Sn - β

Production of irregular particles

cooled slowly

Ingot heated at 400°C (6 – 8 hours)
(homogeneous distribution of Ag_3Sn)

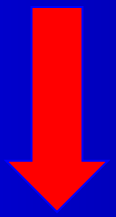
Ingot cut on the lathe, particles passed trough a fine sieve and ball milled to form the proper particle size.

Aging of particles (60 - 100°C, 6 – 8 hours)

Particle size: 60 – 120 μm in length
10 – 70 μm in width
10 – 35 μm in thickness

Production of irregular particles

Molten alloy is spraying into water under high pressue



Irregulary shaped high-copper particles

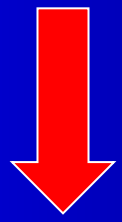
Production of spherical particles

Molten alloy is spraying under high pressue of inert gas through a fine crack in a crucible into a large chamber

Diameter of the spheres: 2 – 43 μm

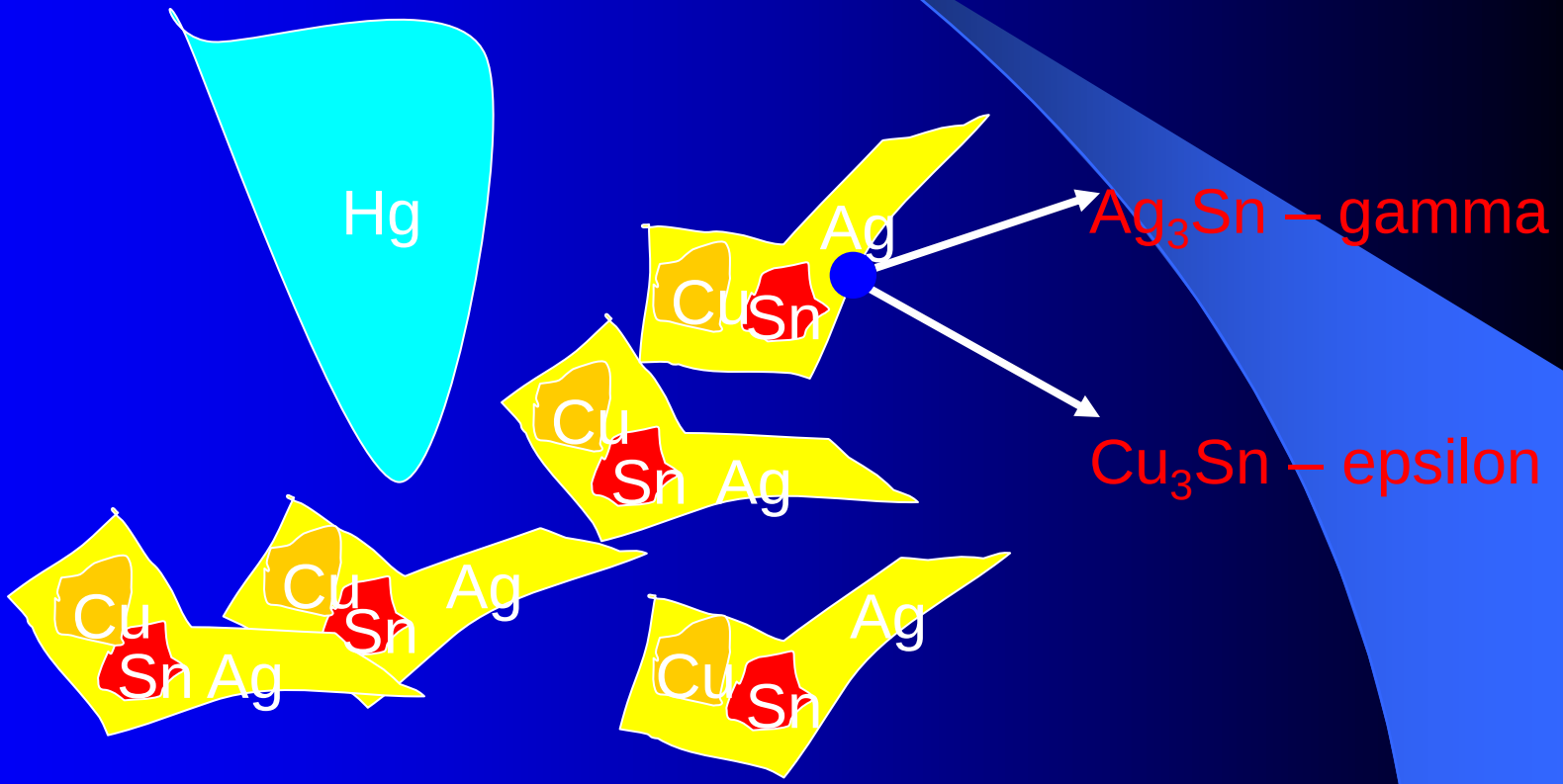
Amalgamation processes

alloy is mixed with pure mercury



Trituration

Amalgamation processes



Setting of low copper amalgam

Principle of setting is crystallization

Structure of the amalgam filling

Ag-Hg: gamma 1

Sn-Hg: gamma 2

} These phases crystallized

Gamma phase (Ag-Sn) does not dissolve completely

Risks of the gamma 2 phase

- Non stable
- Tin is released due to electrogalvanism in oral cavity and mercury from this phase reacts with remaining gamma phase that has not been dissolved yet.
- This is external electrochemical corrosion.

Low copper amalgam has worse mechanical and corrosion resistance than high copper

High copper amalgam

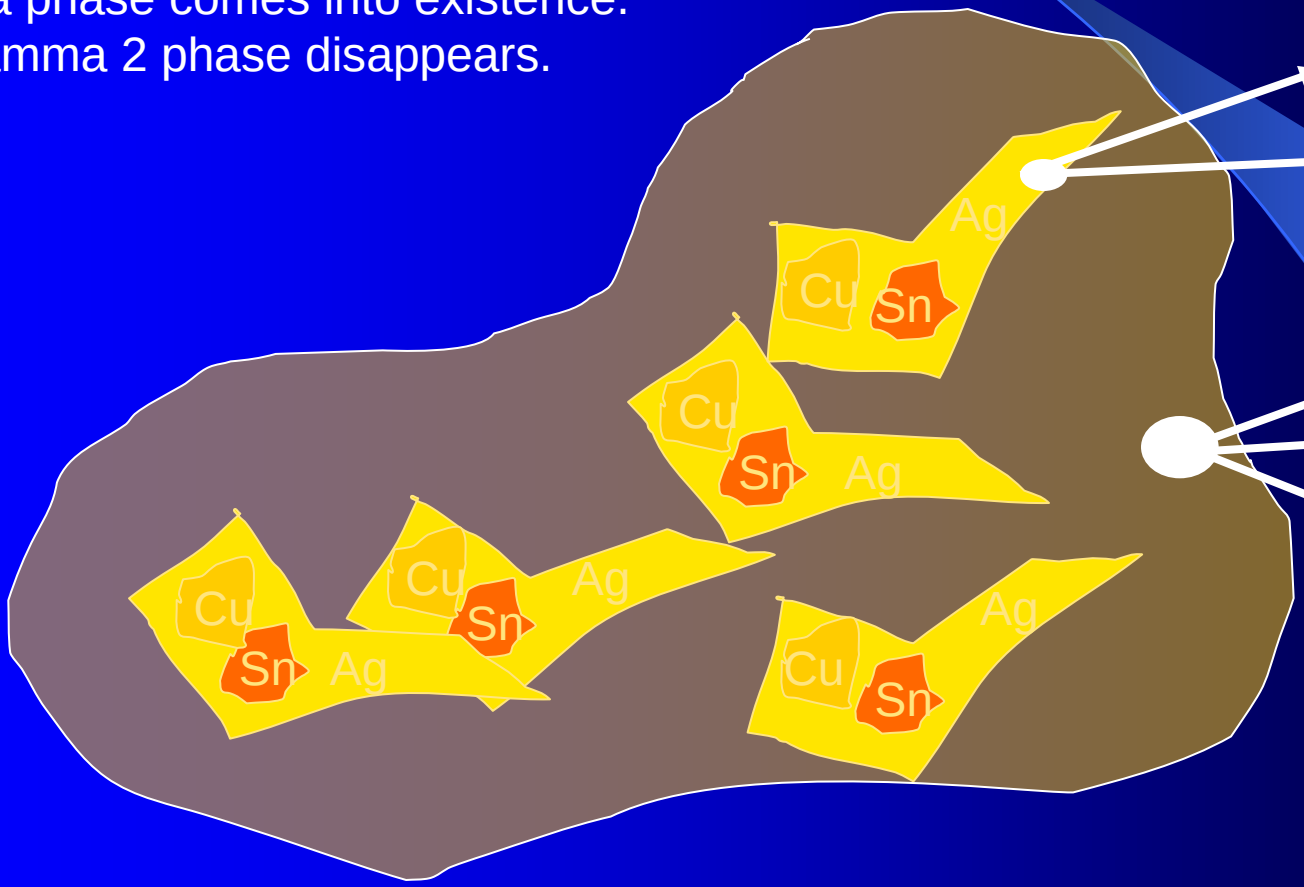
- Content of copper increased: 12 – 13%
- (less tin)

- Or up to 25% (Less tin and silver)

Better mechanical and corrosion resistance

Amalgamation processes

High copper amalgam – copper dissolved in mercury has high reaction afinity to tin that is also dissolved in mercury. It reacts with tin in gamma2 phase and eta phase comes into existence.
The gamma 2 phase disappears.



Ag_3Sn – gamma

Cu_3Sn – epsilon

Cu_6Sn_5 – eta

Sn_7Hg – gamma

Ag_2Hg_3 – gamma1

Amalgam - properties

Amalgam

- **Wear and pressure resistance (2mm thickness ast least**)- brittleness
- **Easy handling**
- **Low price**
- **Thermal and electrical conductivity**
- **Corrosion**
- **Bad aesthetics**
- **Creep**
- **Flow**

Biocompatibility

- More than 160 years, more than 200 milions Ag fillings every year in USA.
- Allergy rare
- Precautions in children and in pregnancy.

AMALGAM IS STILL A MATERIAL OF CHOICE

Toxicity

- Organic compounds

Vapours, aerosol

Precautions

- Ventilation
- Rests of amalgam in water
- Amalgam separators
- Dangerous waste (180 110)

Indications and contraindications of amalgam

Indications

- Moderate and large cavities in posterior area (class I., II. V)

Contraindications

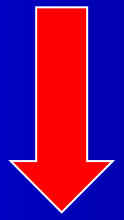
Fillings in frontal area

Pregnancy, children till the age of 15

Allergy

Mixing of amalgam

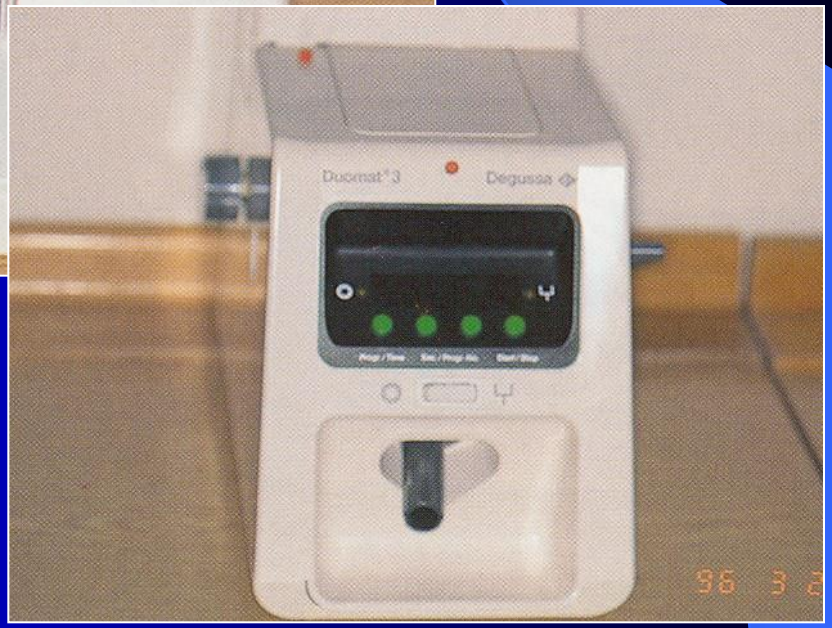
- **Hand mixing (obsolete)**
- **Power driven trituration**

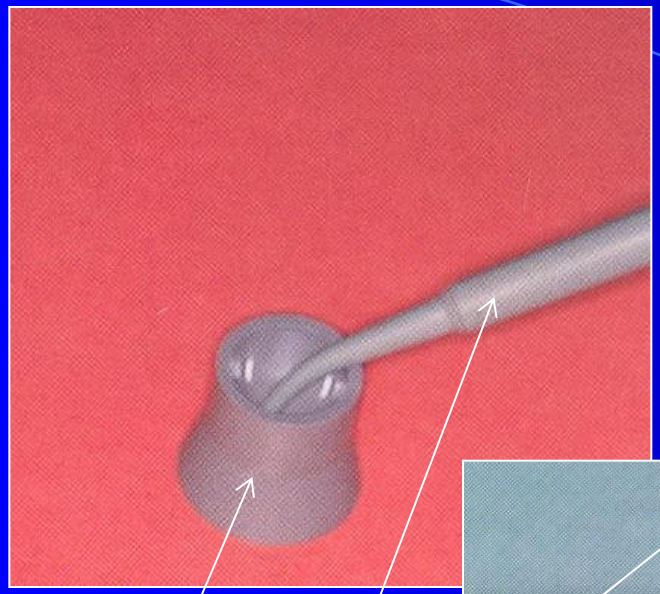


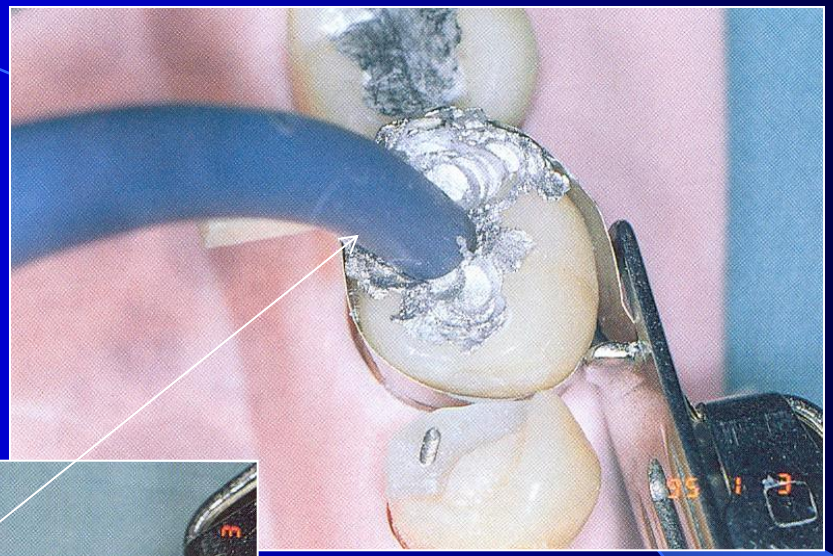
Amalgamators

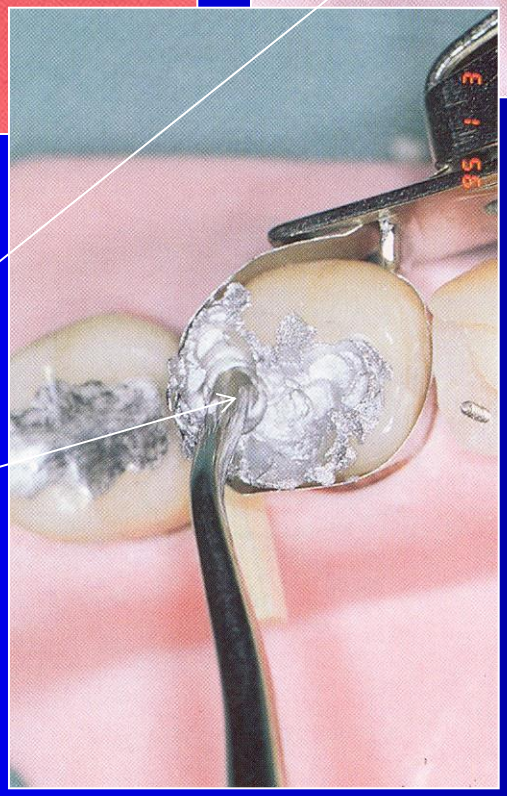

ADM


LARIOVIBRO
LARIO MEDICAL


Dulomat*3
Degussa



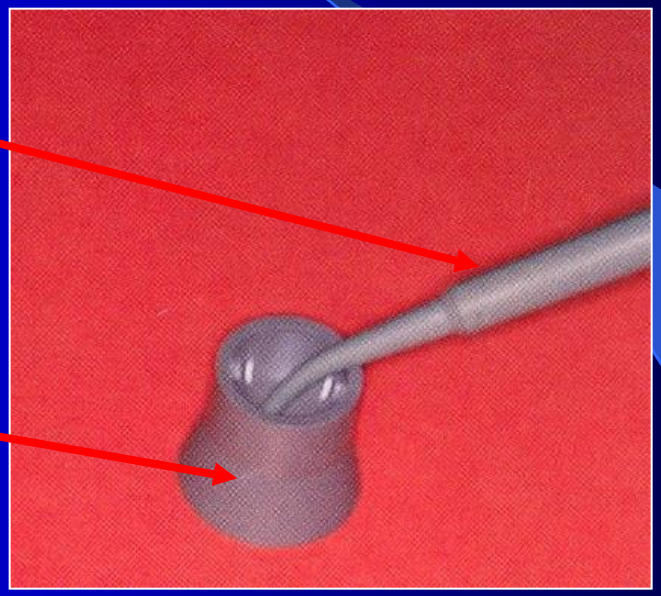


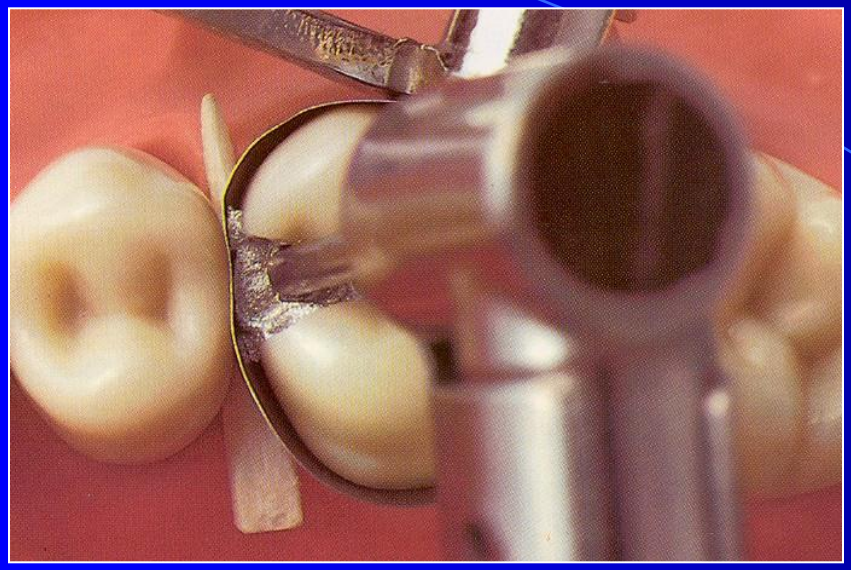


Cup
Amalgam gun
Condensor

Amalgam gun

Crucible (cup)





Power driven condensation

handpiece
condensor

Instruments

- **Preparation instruments**
- **Filling instruments**
- **Carvers**
- **Burnishers**

Instruments

Preparation instruments - power driven

Burs

Diamonds

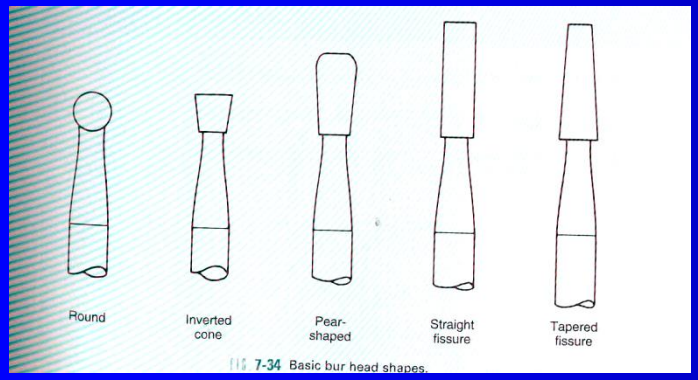
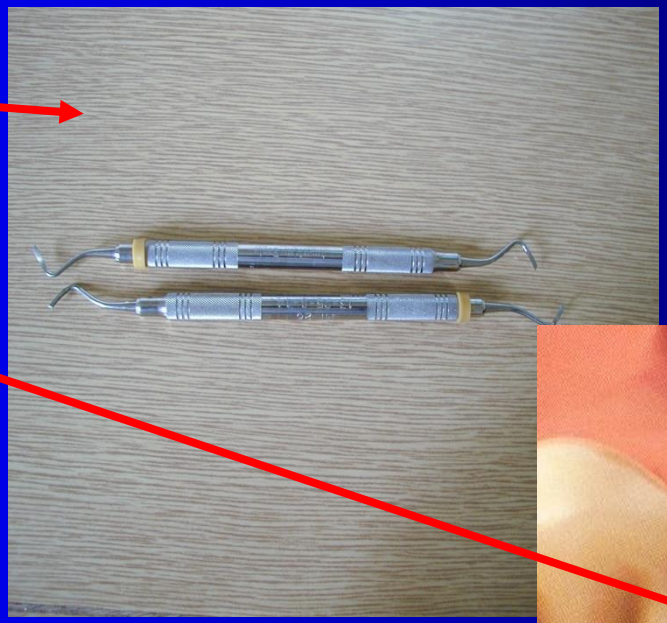


FIG 7-34 Basic bur head shapes.

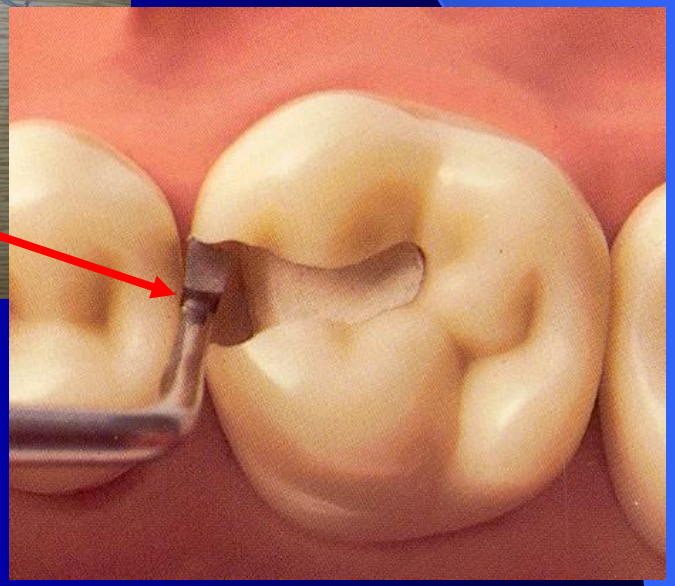
Instruments

- **Preparation instruments - hand**

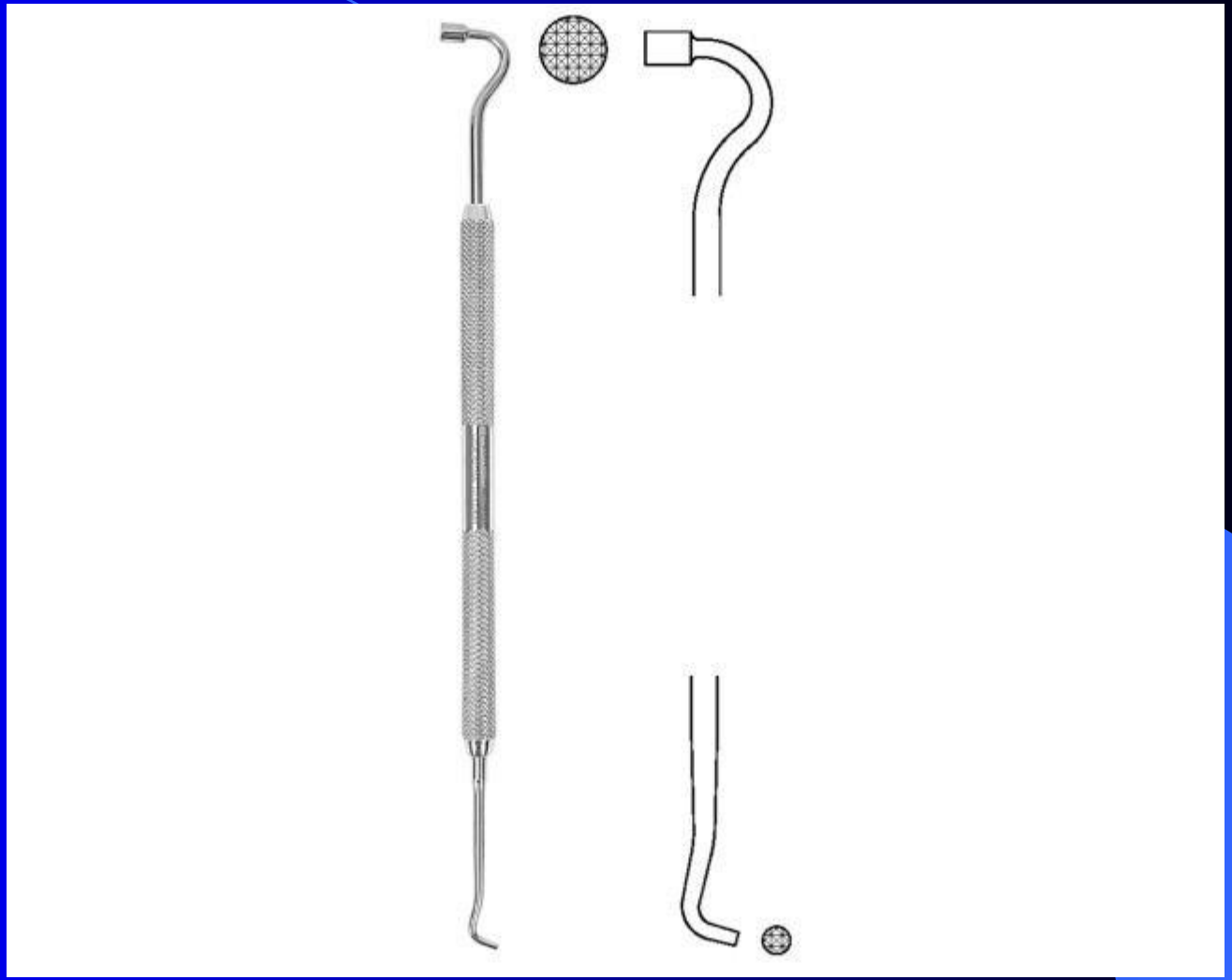
Chisel



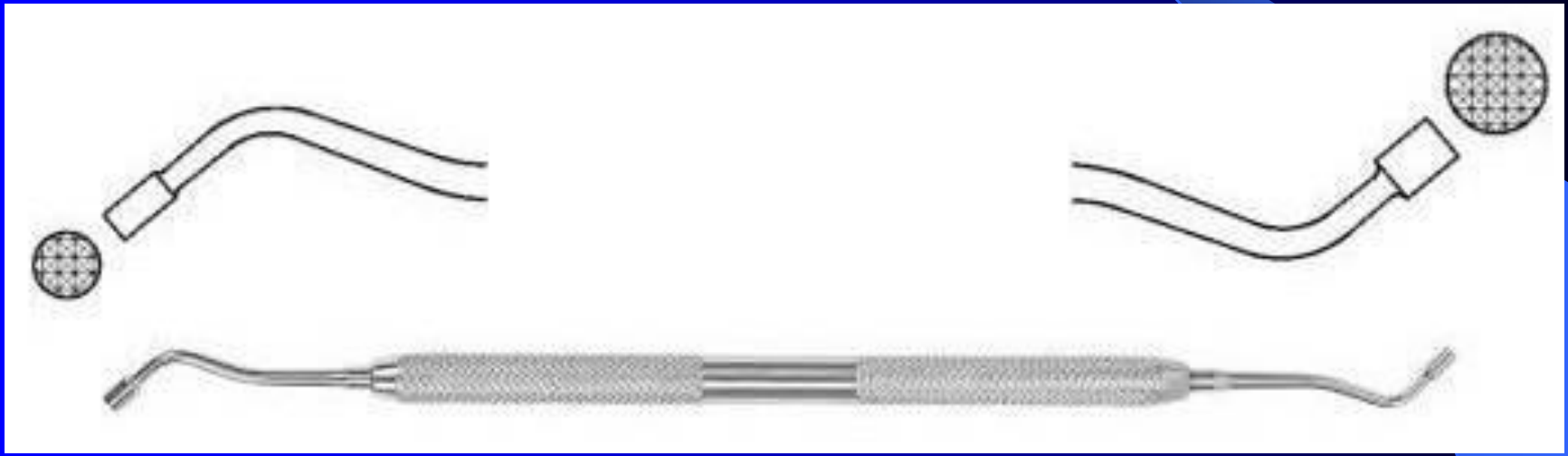
Excavator



Amalgam carrier



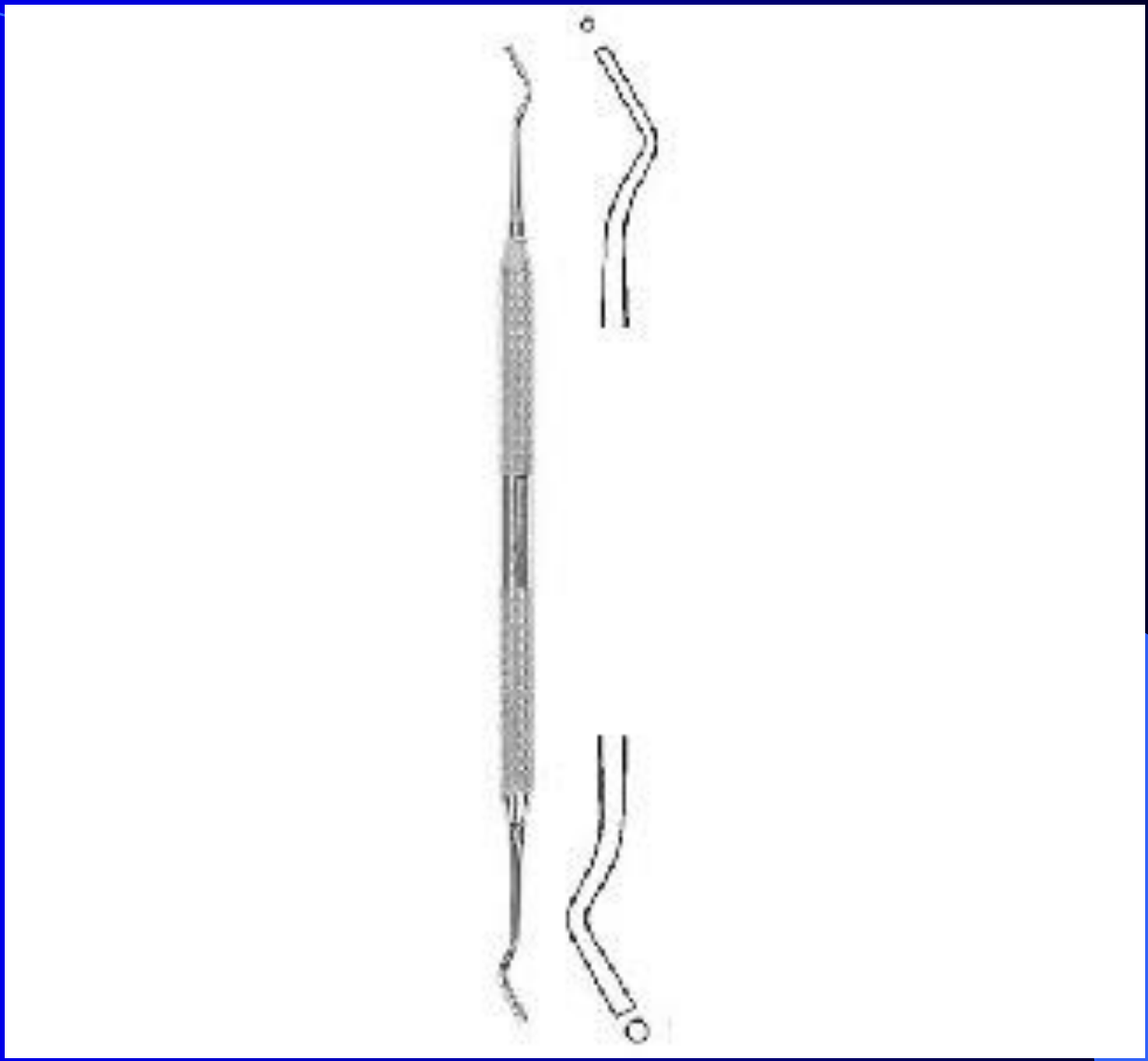
Amalgam carrier



Instruments

- **Filling instruments condensors and spatulas**

Condensor with flat front

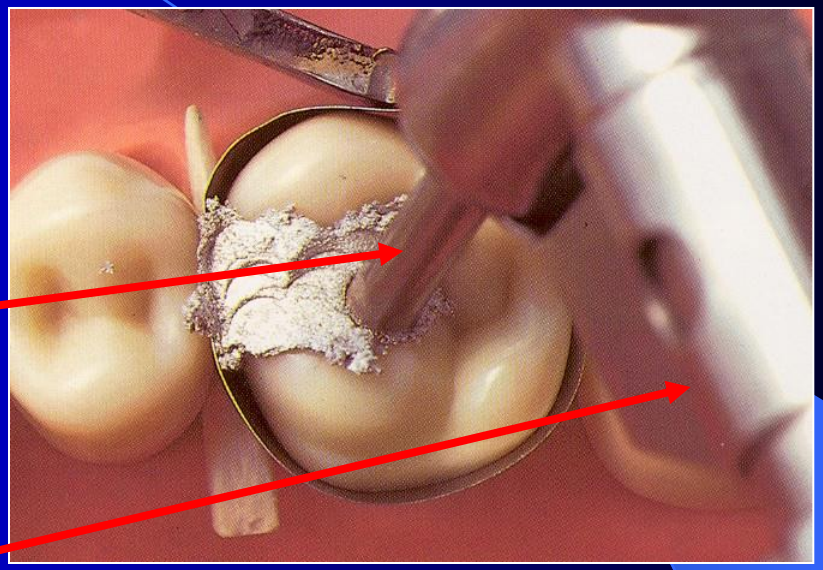


Condensor with flat front

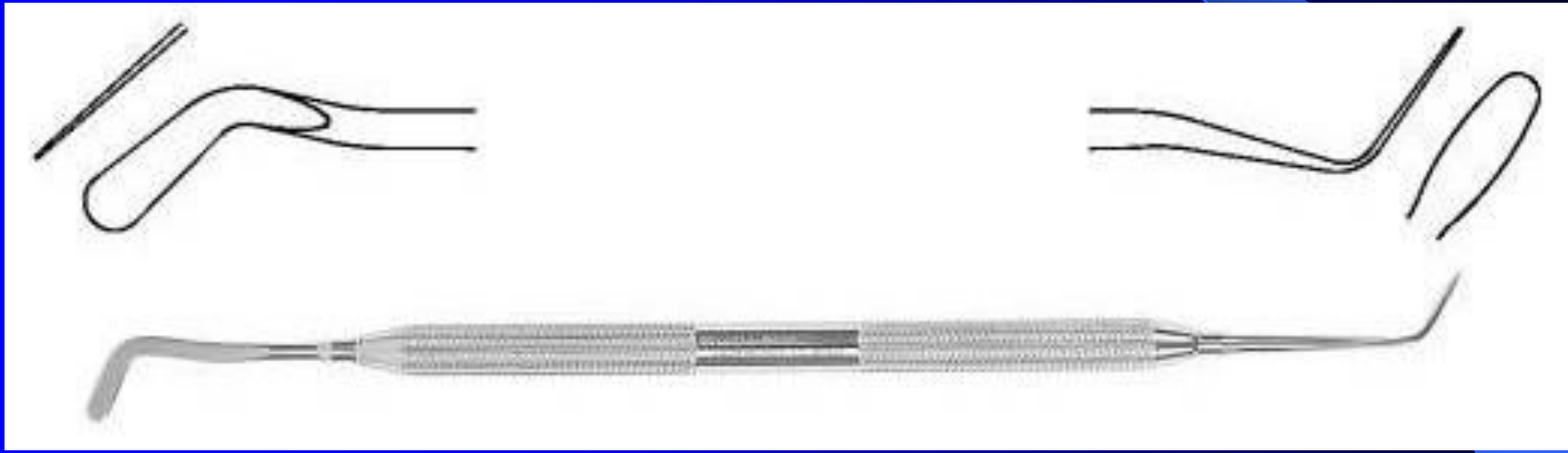
Condensor and burnisher - spatula combined

Power driven condensor

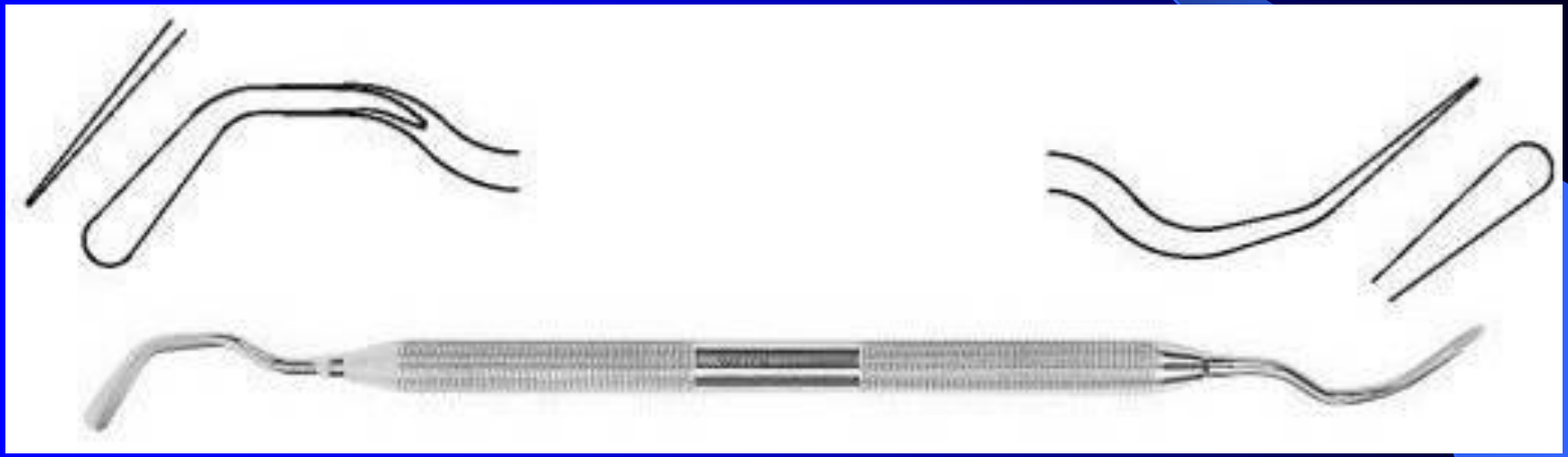
Special handpiece



Burnisher - spatula
Angular- trough edge trough face



Burnisher – spatula, angular three face



Instruments

- **Burnishers**

Ball condensor – used as a burnisher