Amalgam

Preclinical Dentistry, 1st. Year

Autumn Semestr

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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	40 - 70 %
Tin	26 – 30 %
Copper	2 - 30%
Zinc	0 - 2%

Particles of the alloy

- ✓ Irregulary shaped (filings - lathe cut)
- ✓ Microspheres
- ✓ 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:

Ag_3Sn - γ

Cu_3Sn - ε

Cu_6Sn_5 - η

Ag_4Sn - β

Production of irregular particles

Ingot 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

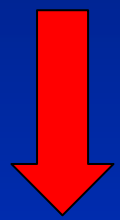
Production of spherical particles

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

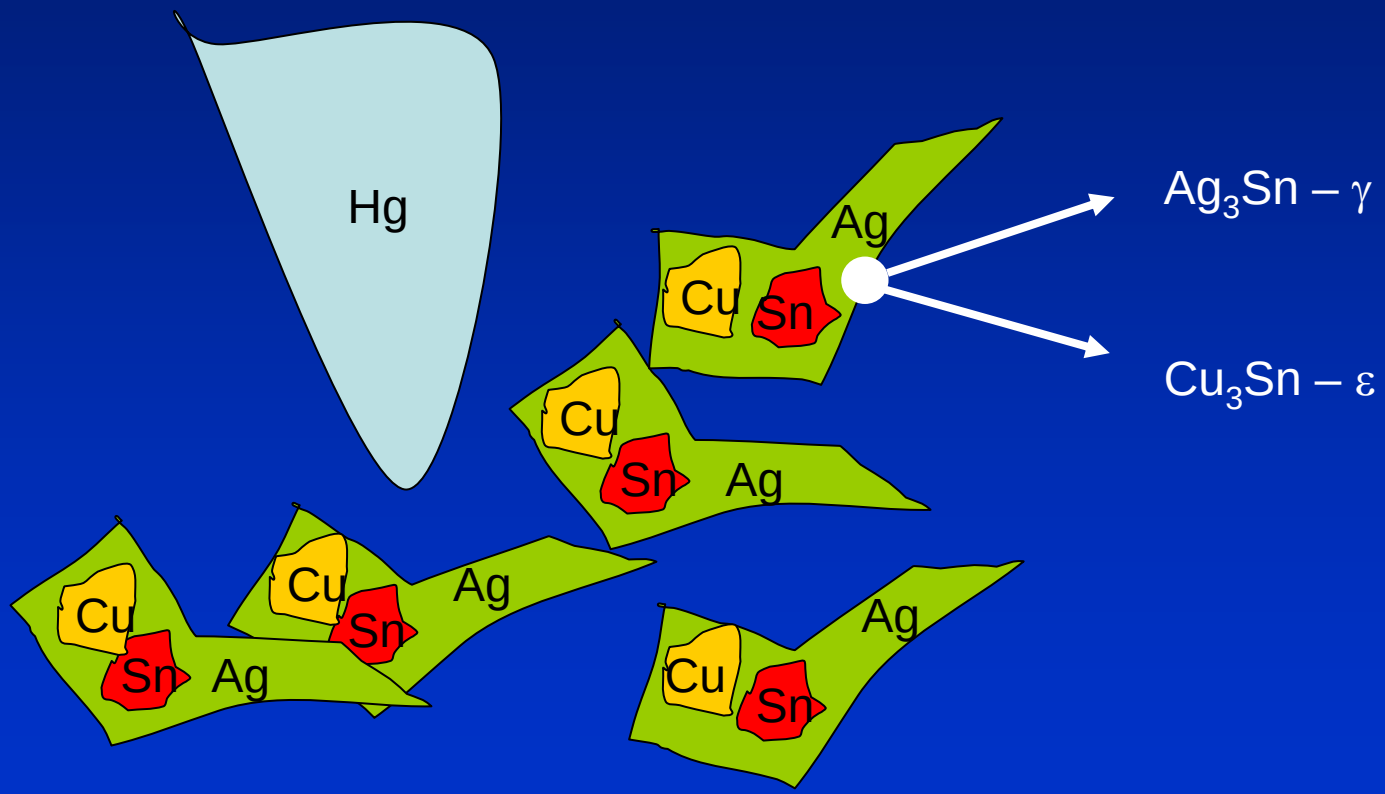
Amalgamation processes

Metal alloy is mixed with pure mercury



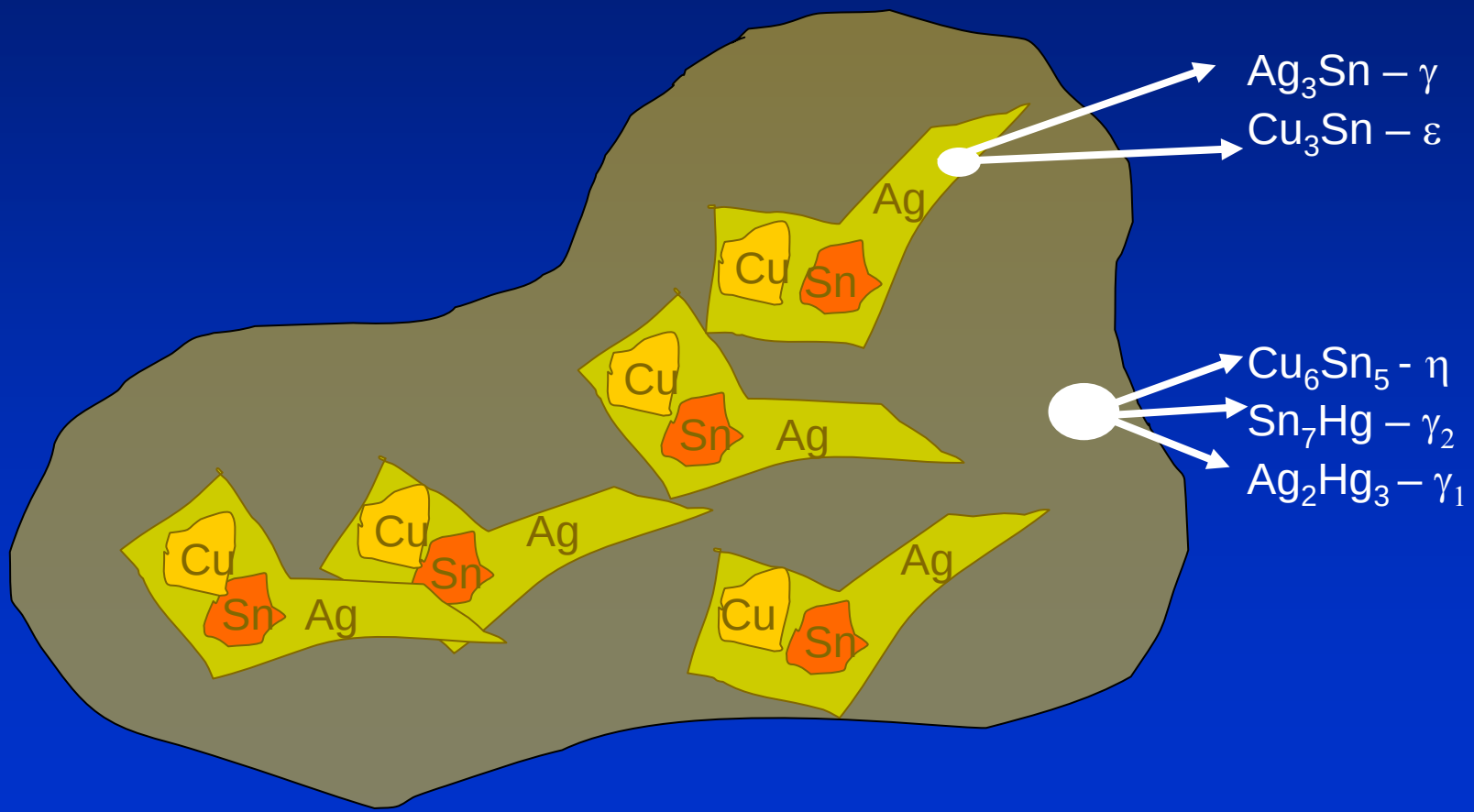
Trituration

Amalgamation processes



Amalgamation processes

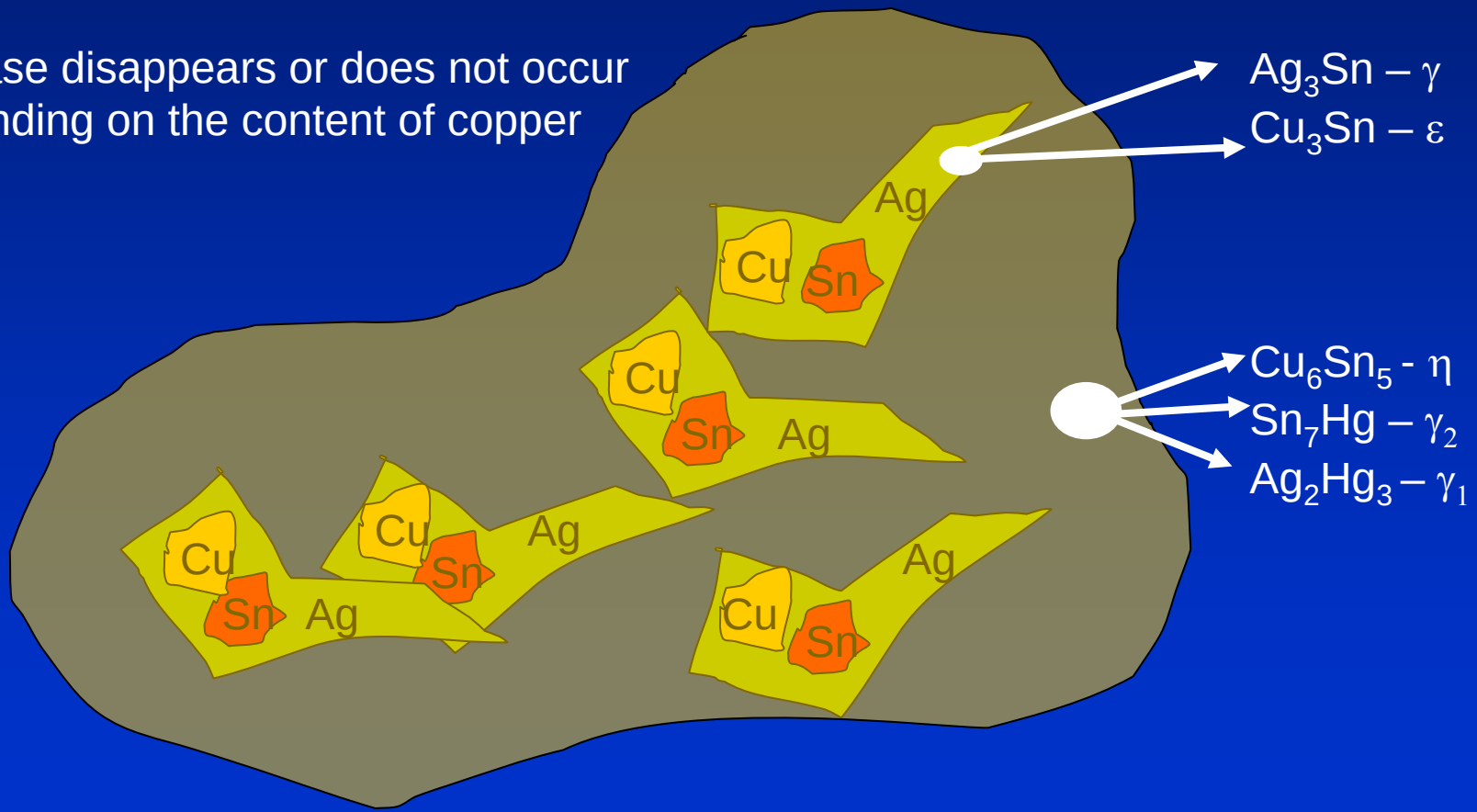
Low copper amalgam



Amalgamation processes

High copper amalgam

γ_2 phase disappears or does not occur depending on the content of copper



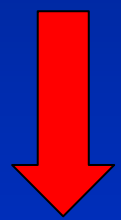
Amalgam - properties

Amalgam

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

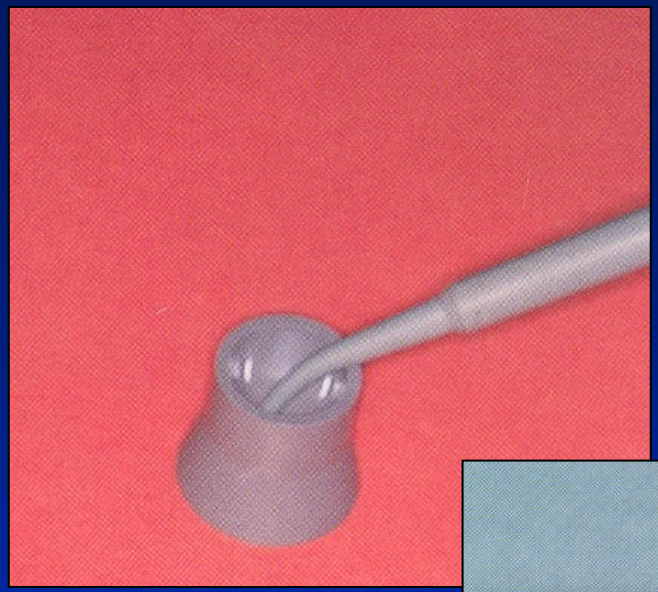
Trituration

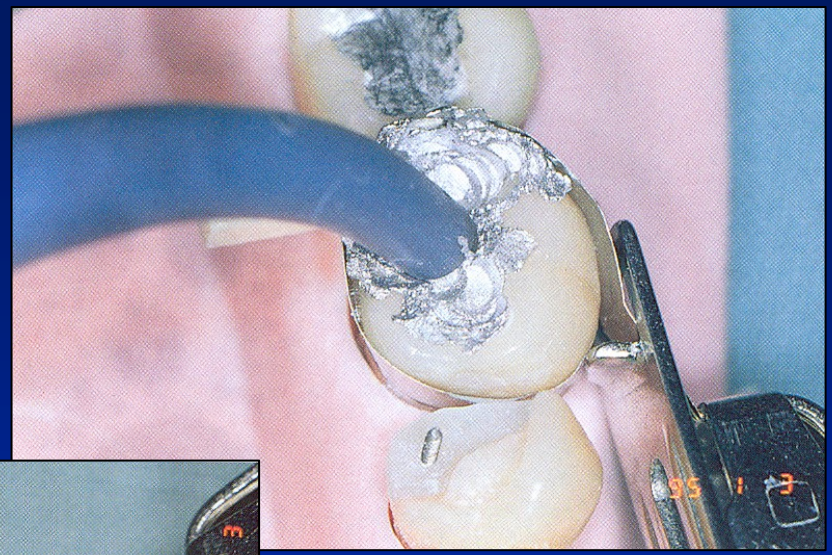
- **Hand mixing (obsolete)**
- **Power driven trituration**

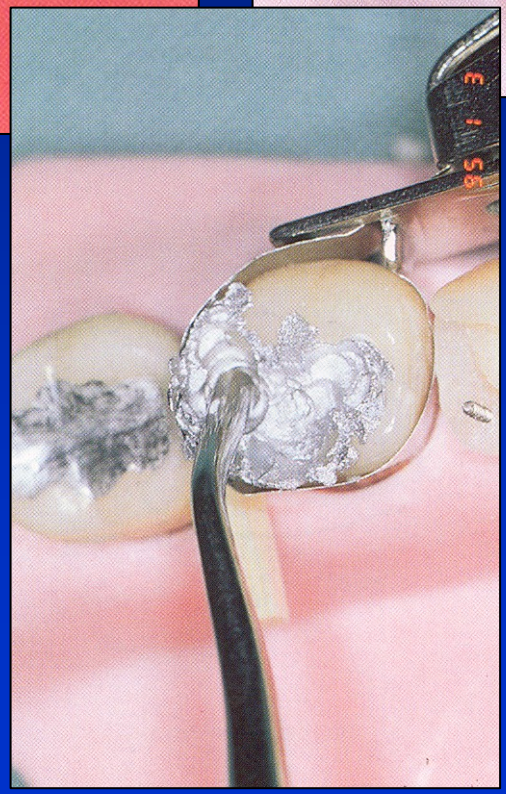


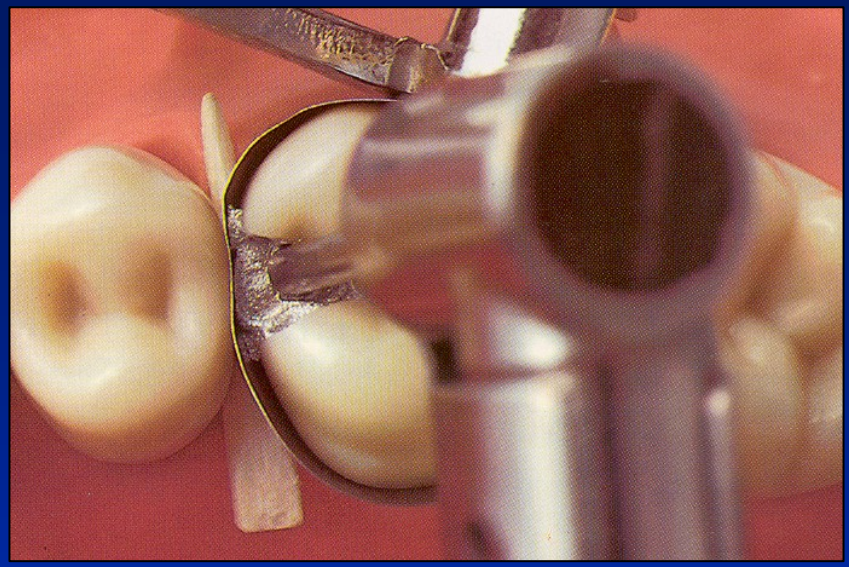
Amalgamators

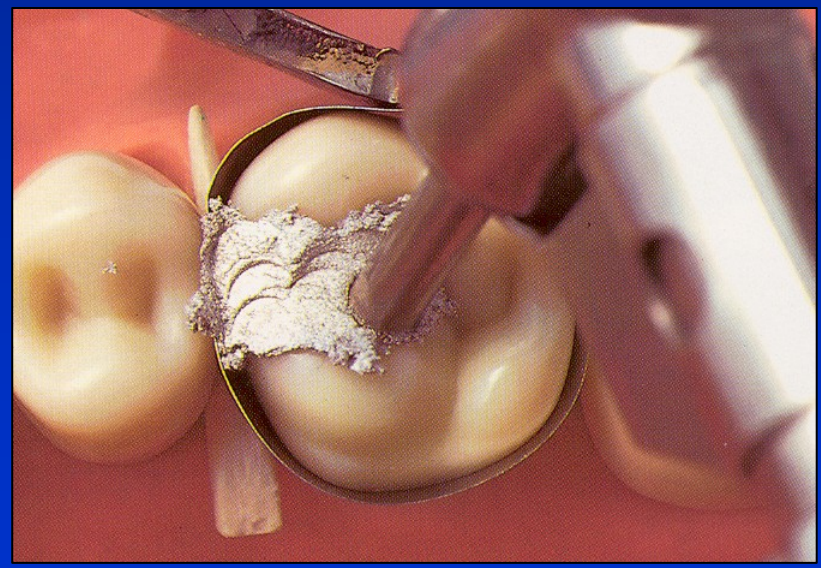

ADM
LARIOVIBRO
LABO MEDICAL
Ducomat 3
Degussa

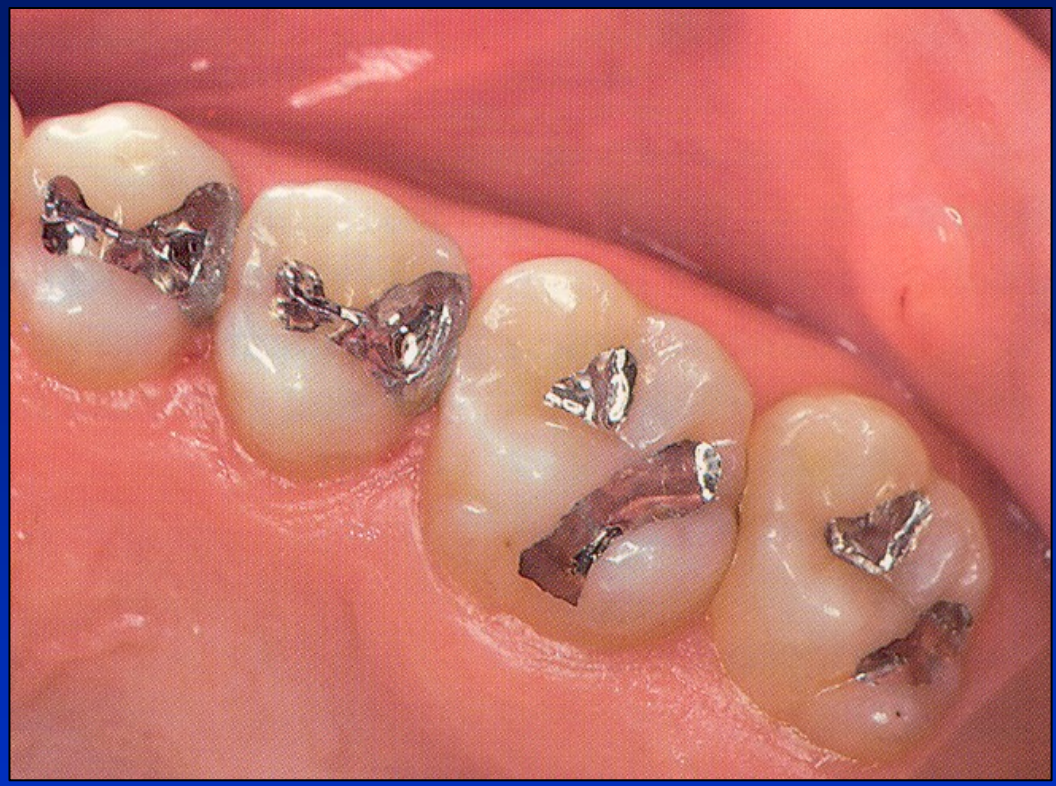












Instruments

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

Instruments

- **Preparation instruments - power driven**

  Burs

  Diamonds

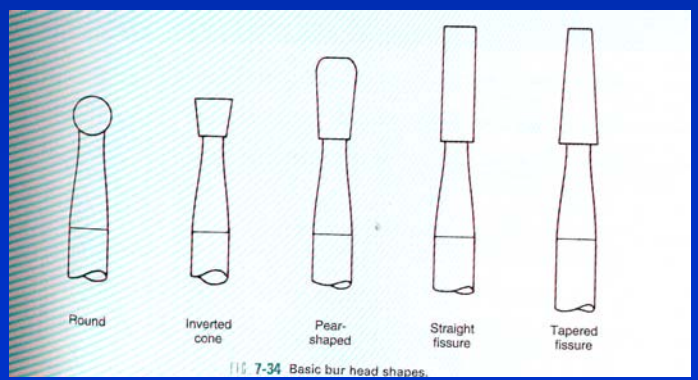
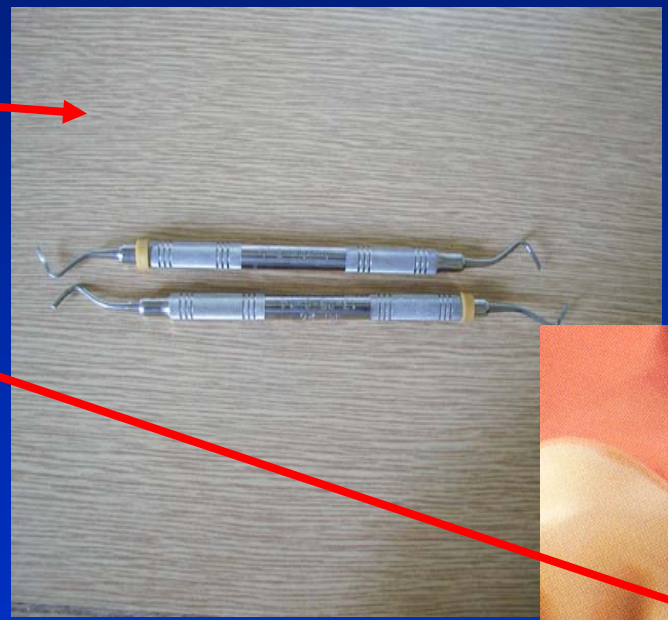


FIG 7-34 Basic bur head shapes.

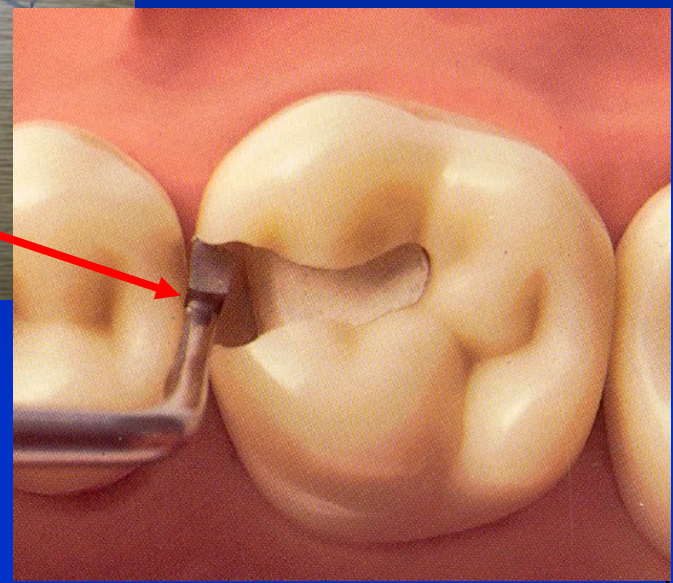
Instruments

- **Preparation instruments - hand**

Chisel

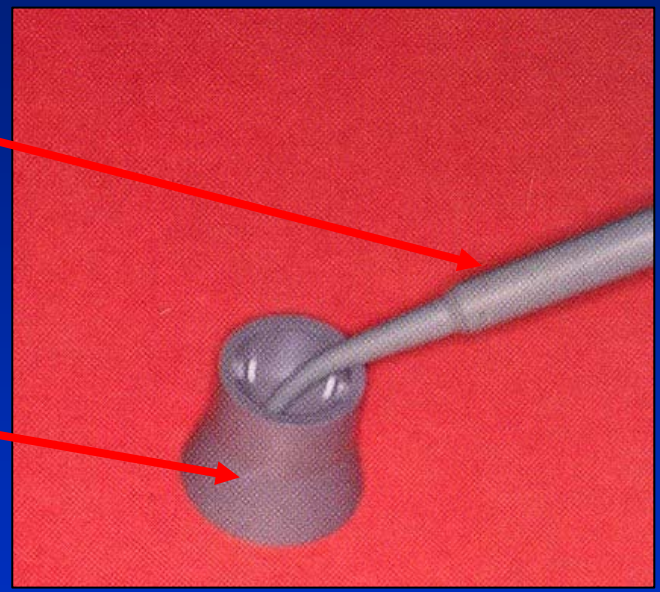


Excavator

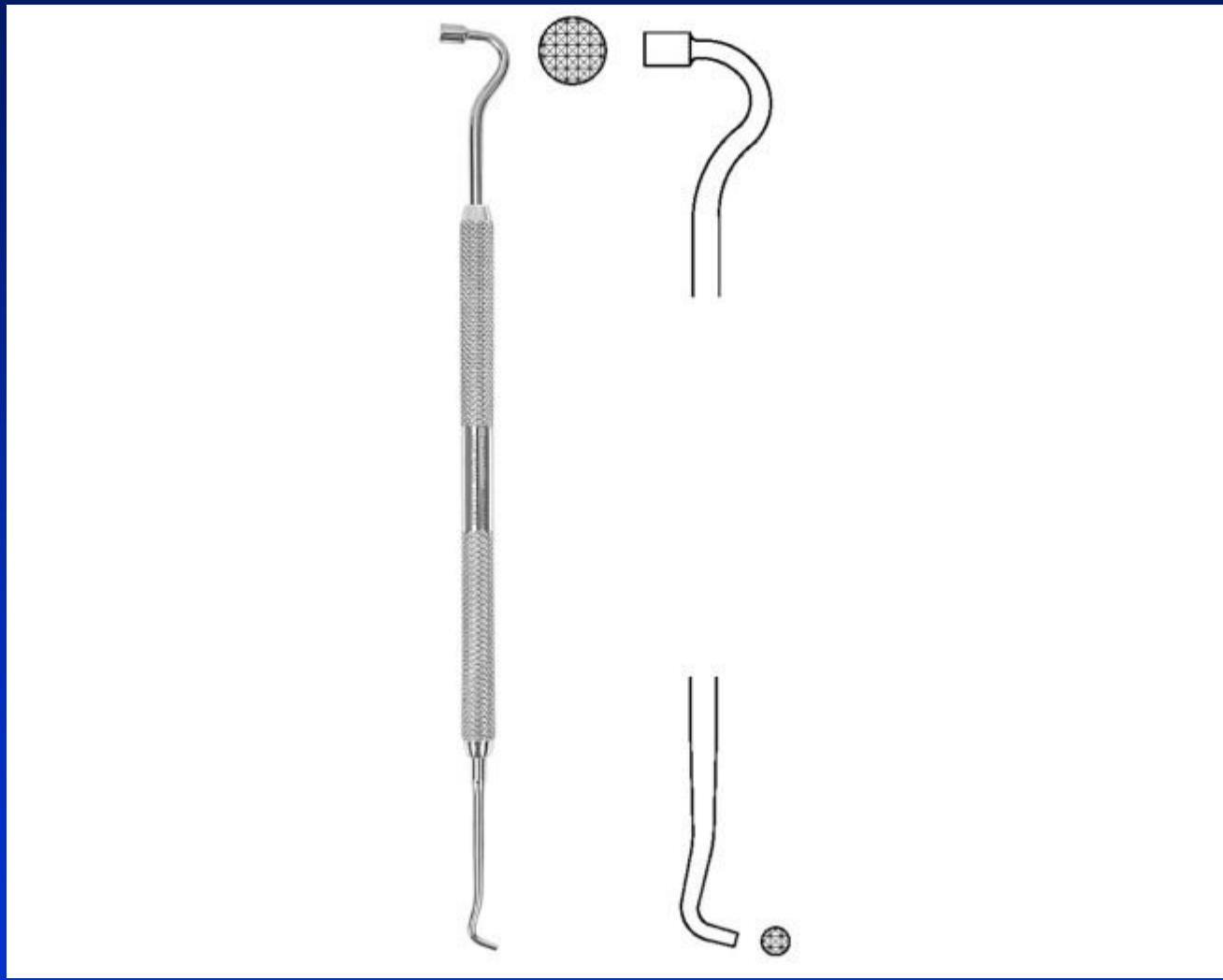


Amalgam gun

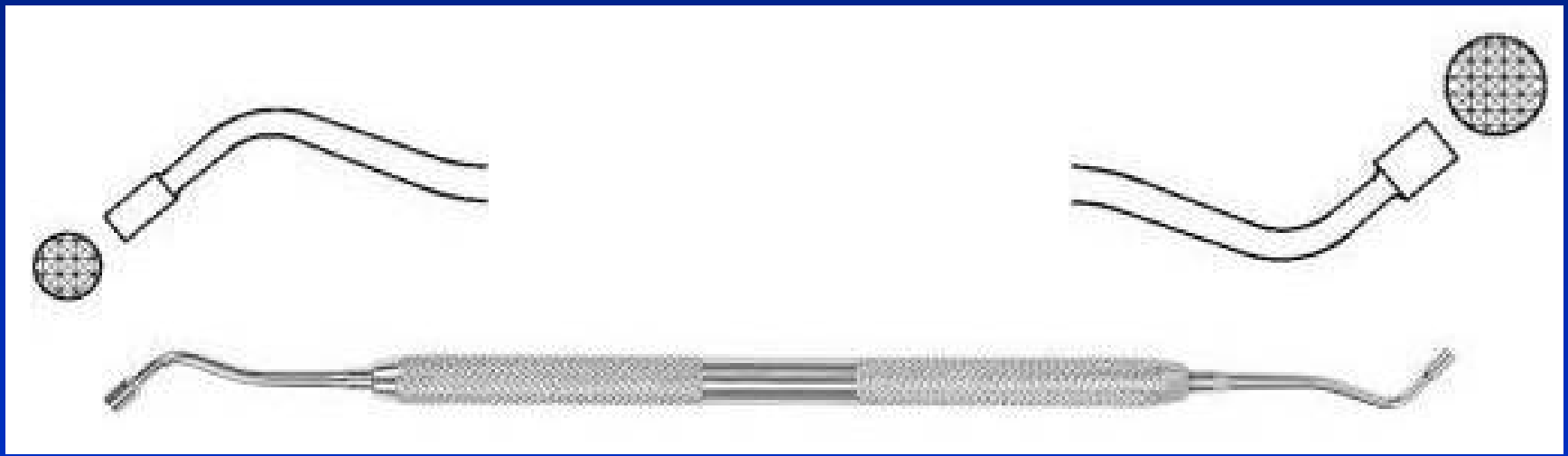
Crucible



Amalgam carrier



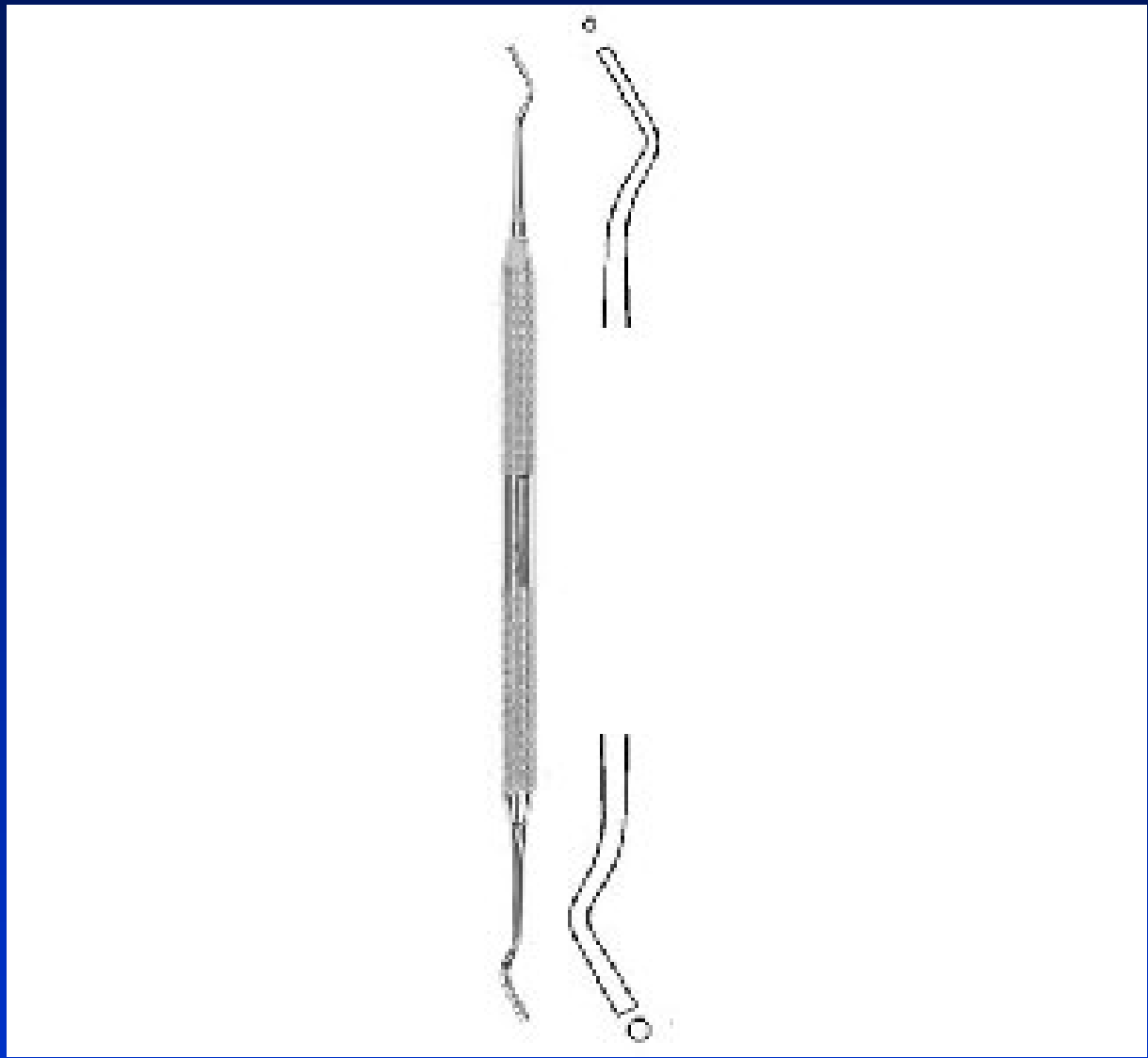
Amalgam carrier



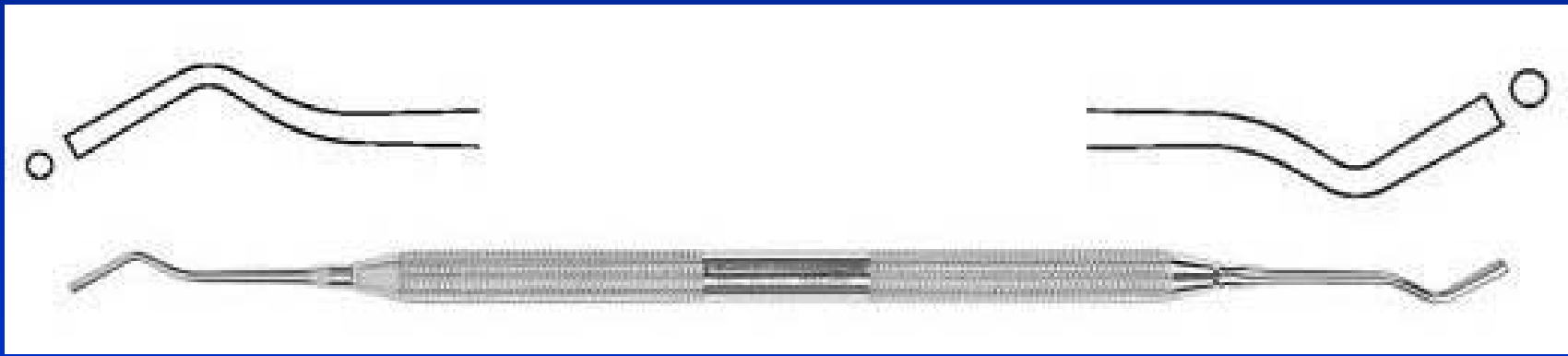
Instruments

- **Filling instruments condensors and spatulas**

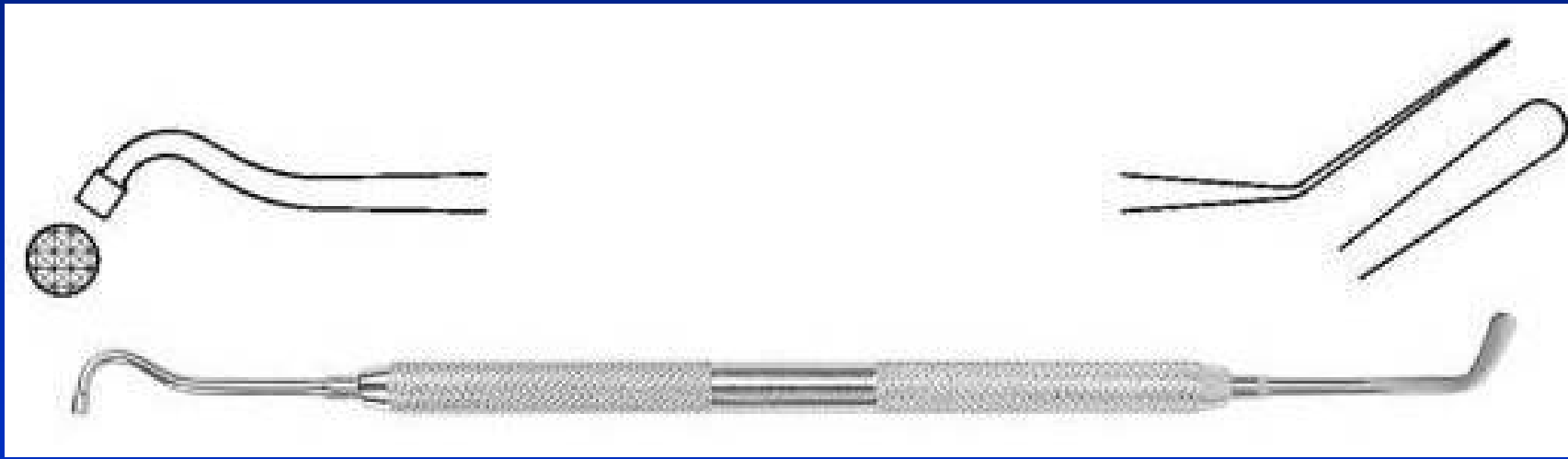
Condensor - stamen



Condensor –stamen

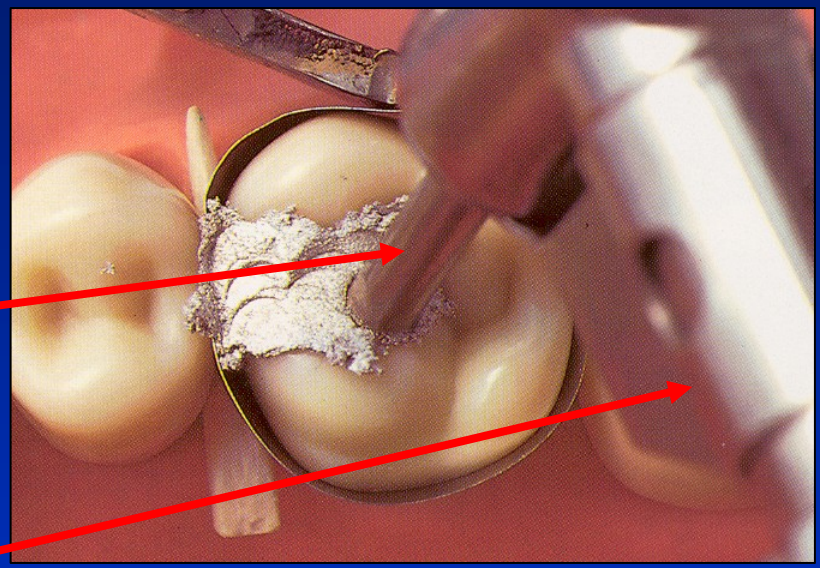


Condensor and burnisher - spatula combined

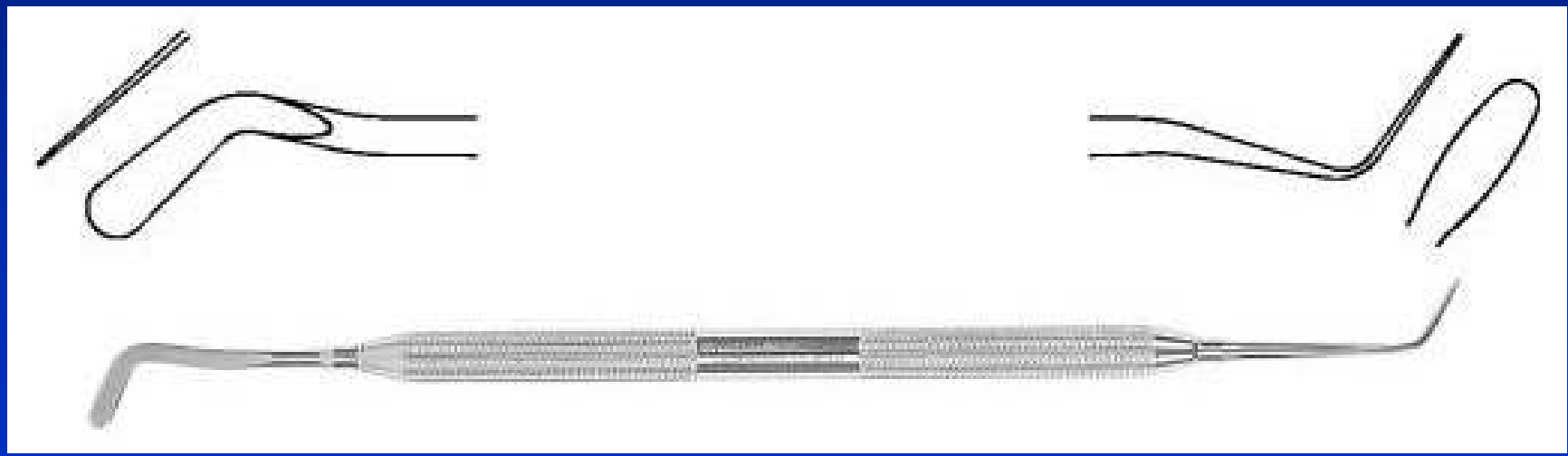


Power driven condensor
- stamen

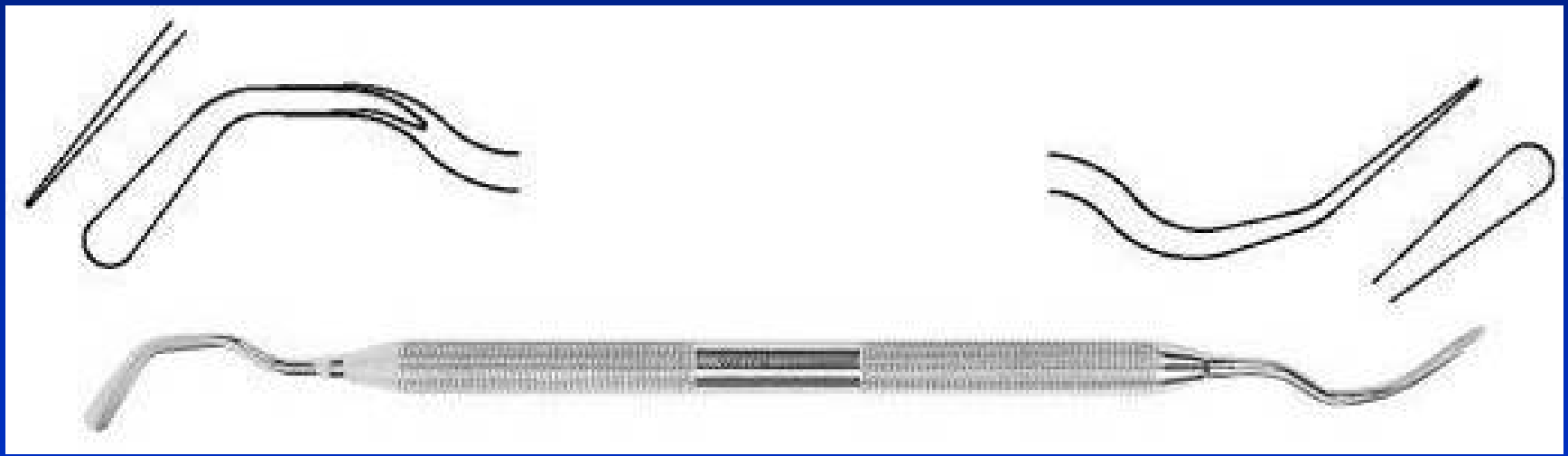
Special handpiece



Burnisher - spatula
Angular- trough edge trough face



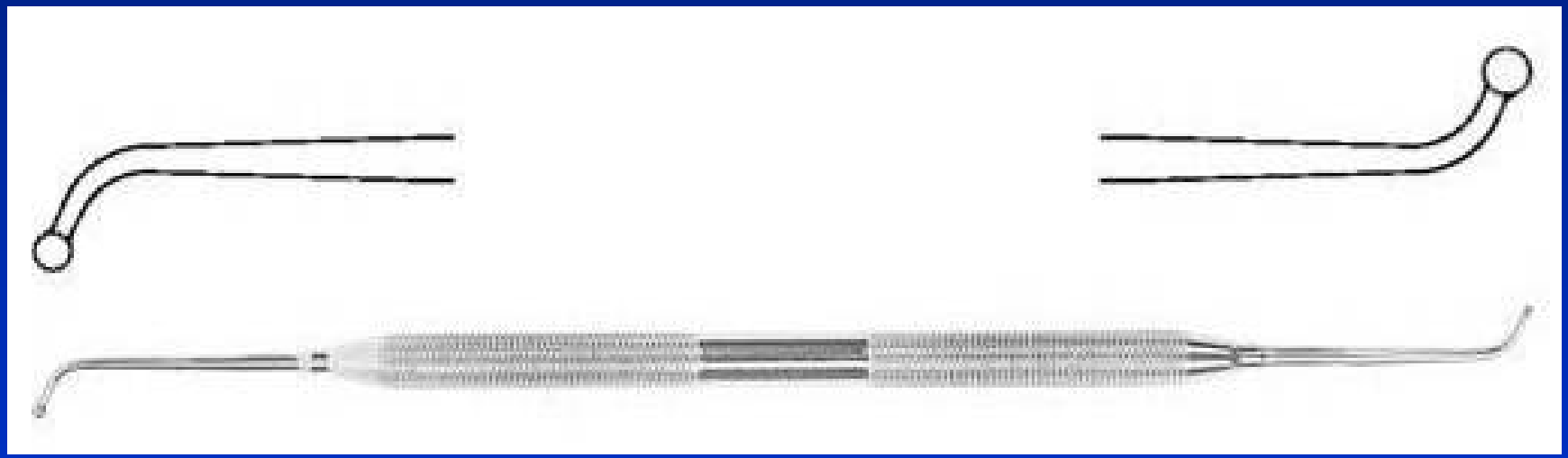
Burnisher – spatula, angular three face



Instruments

- **Burnishers**

Ball condensor – used as a burnisher at most



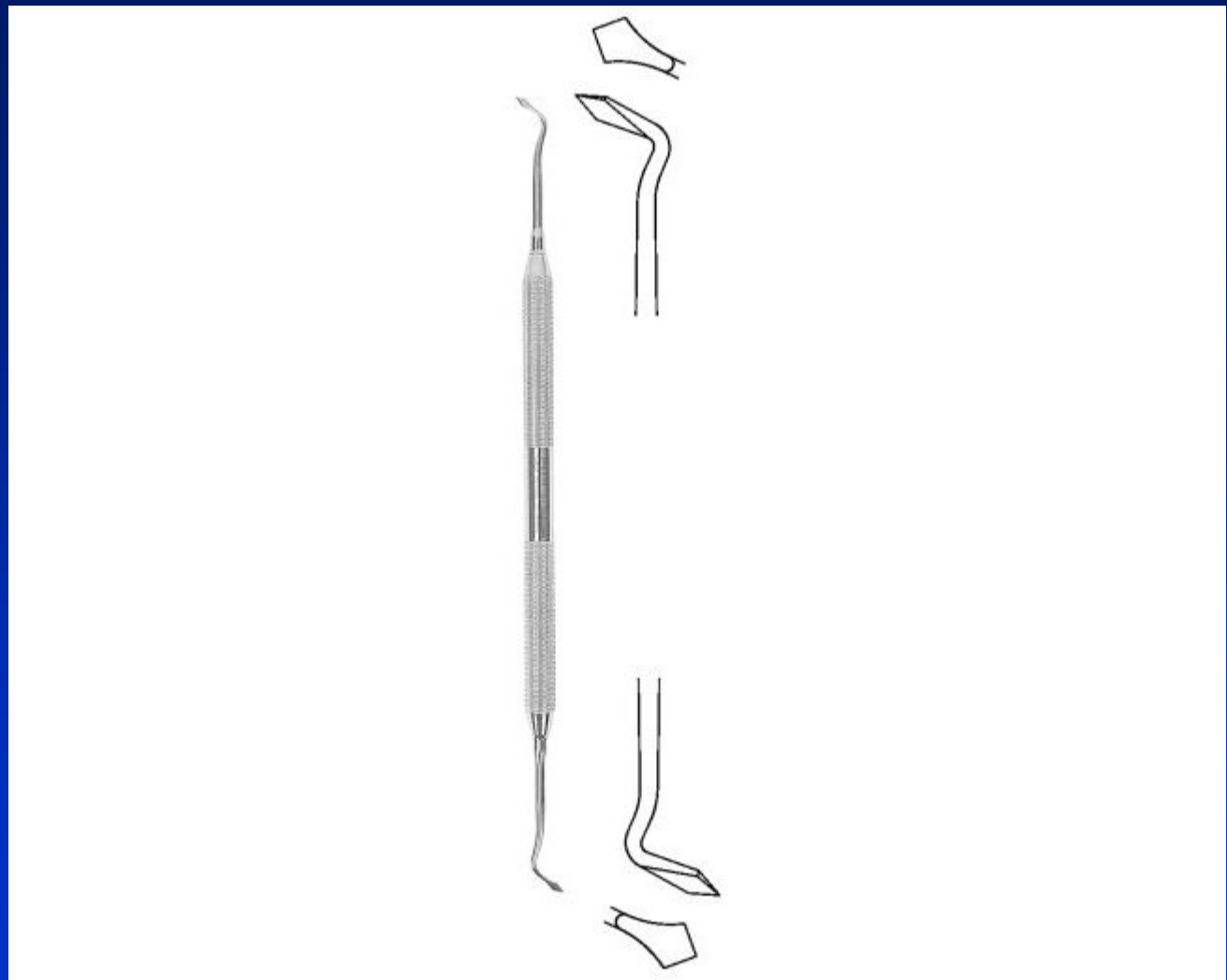
Instruments

- **Carvers**

Frahm

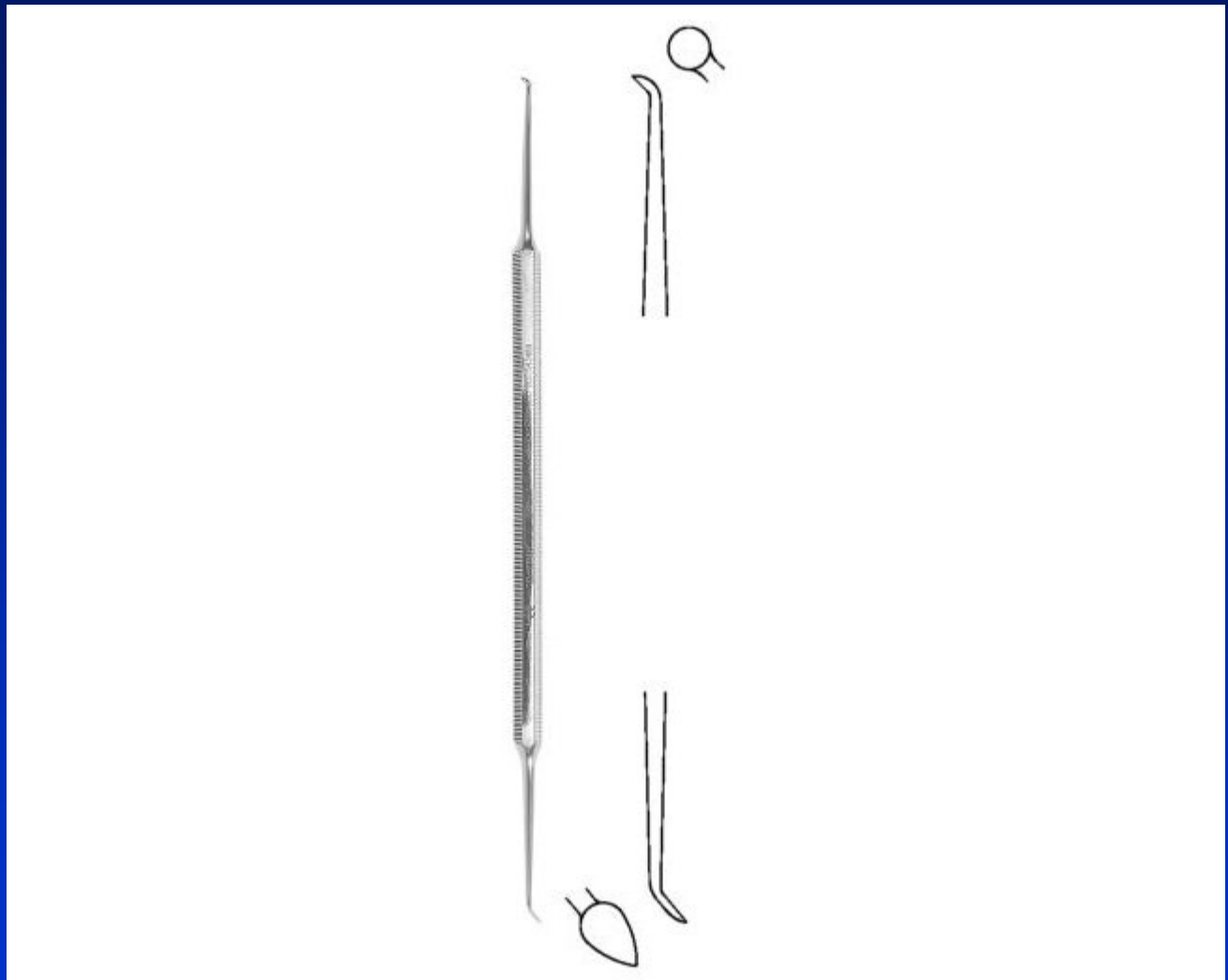
Discoid Cleoid

Carver - Frahm

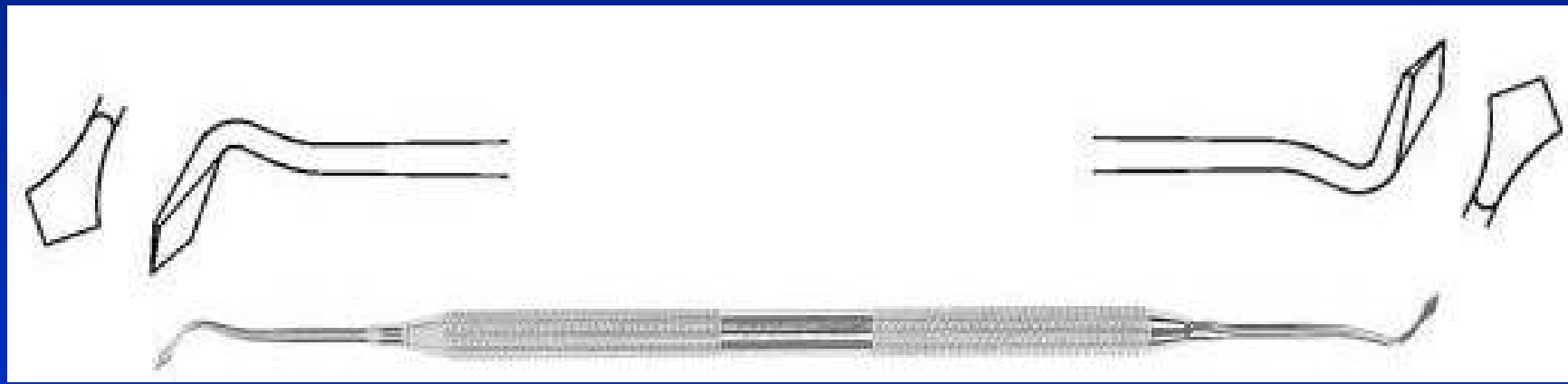


Carver - Sapin

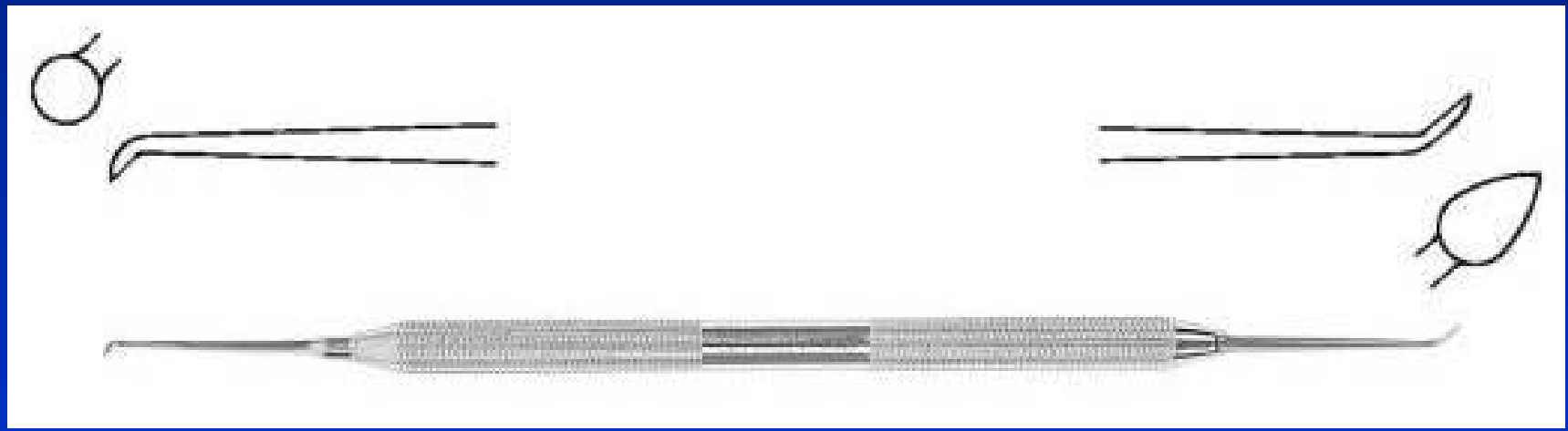
Carver
Discoid-cleoid

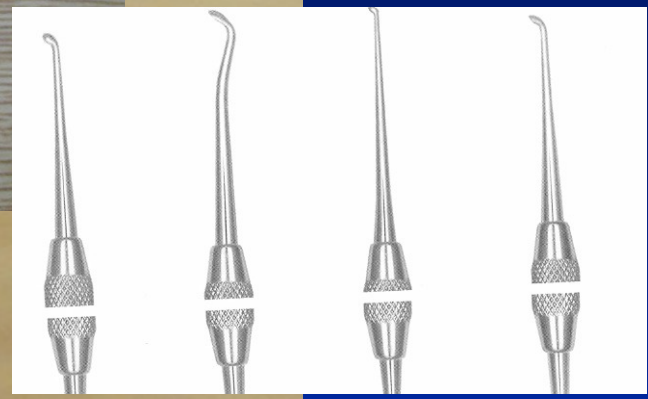


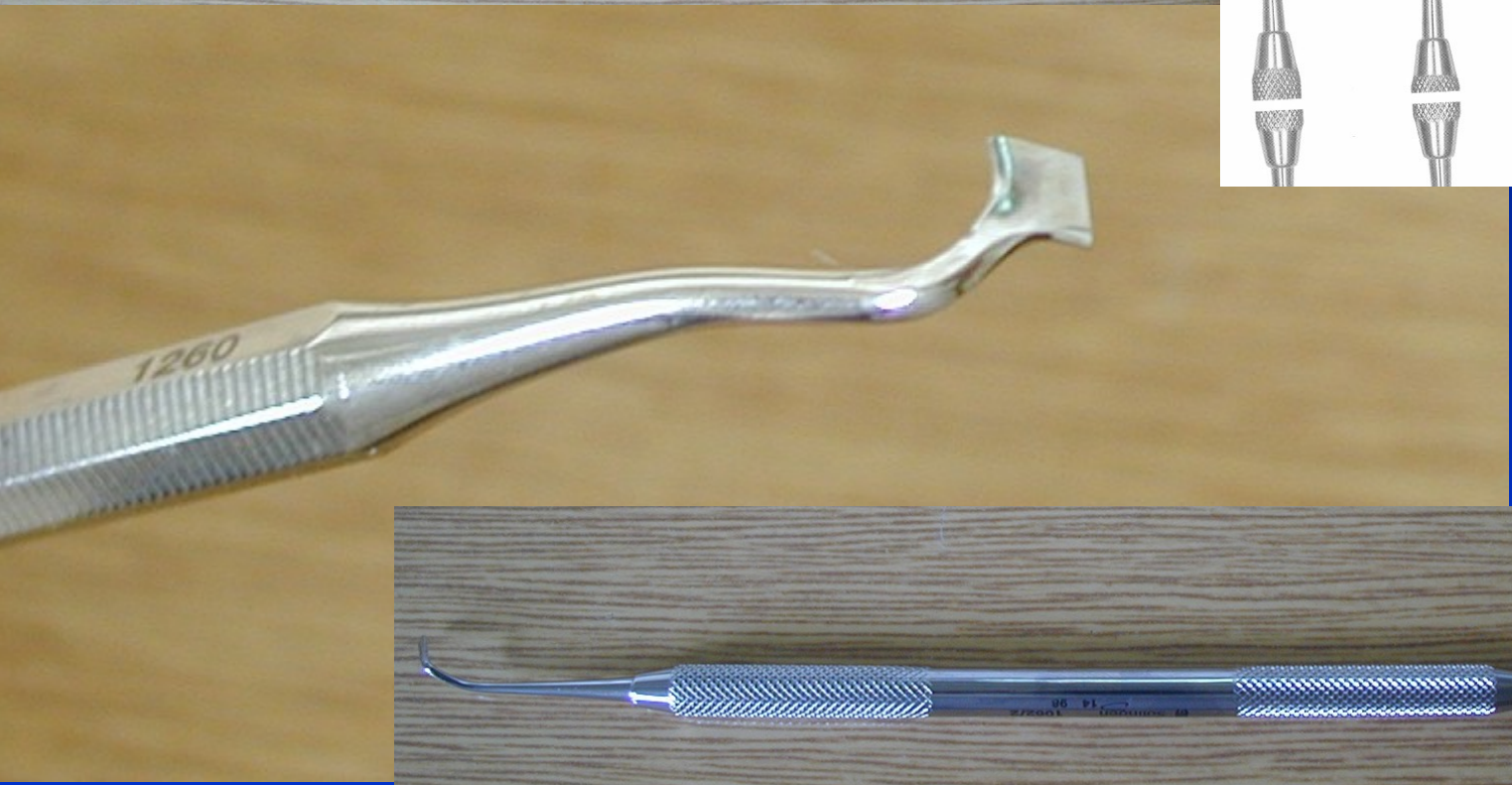
Carver: Frahm



Carver: Discoid - Cleoid



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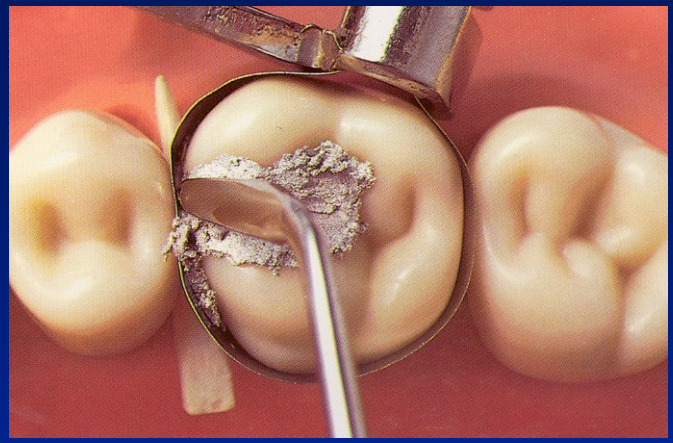

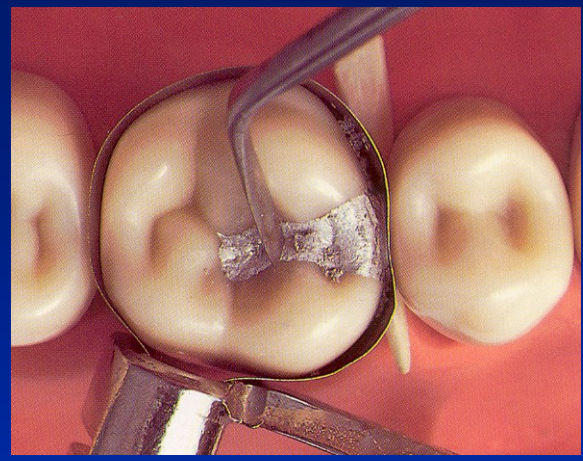

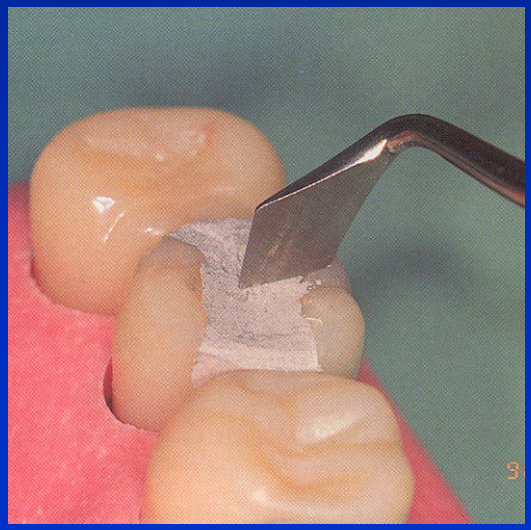

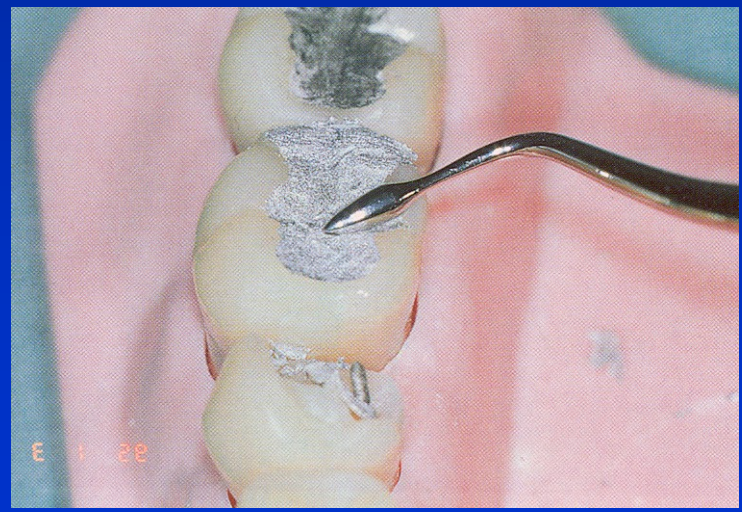

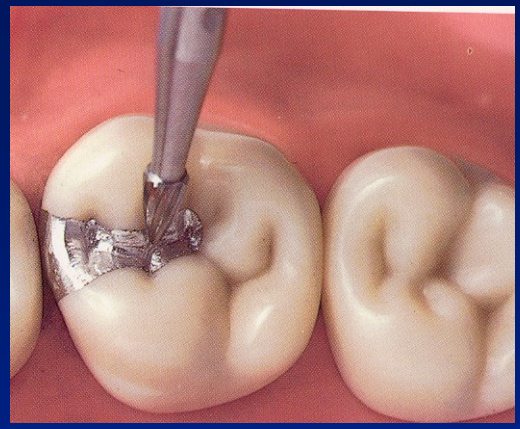

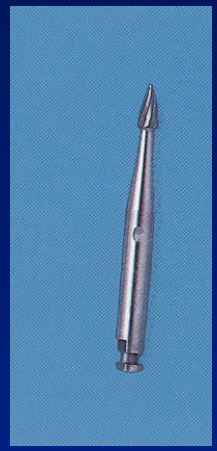

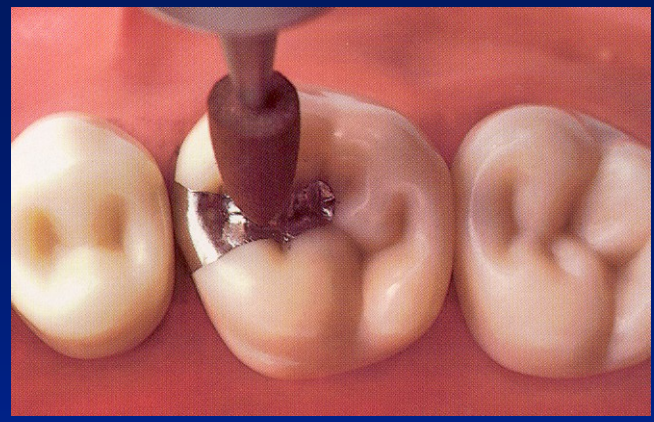

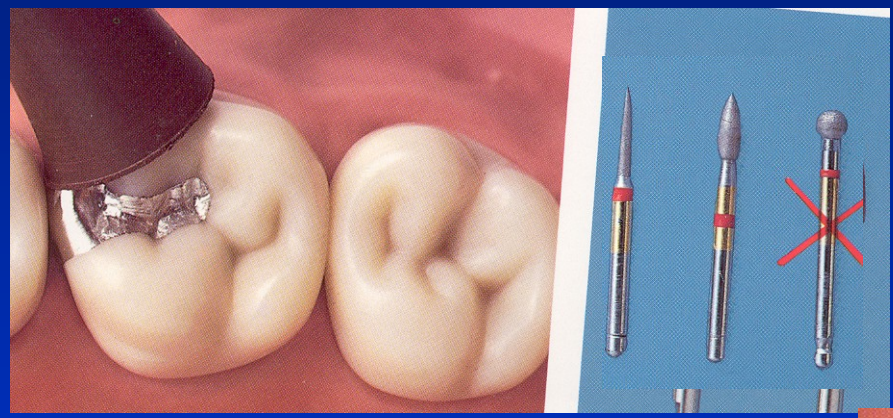

Finishing

Polishing