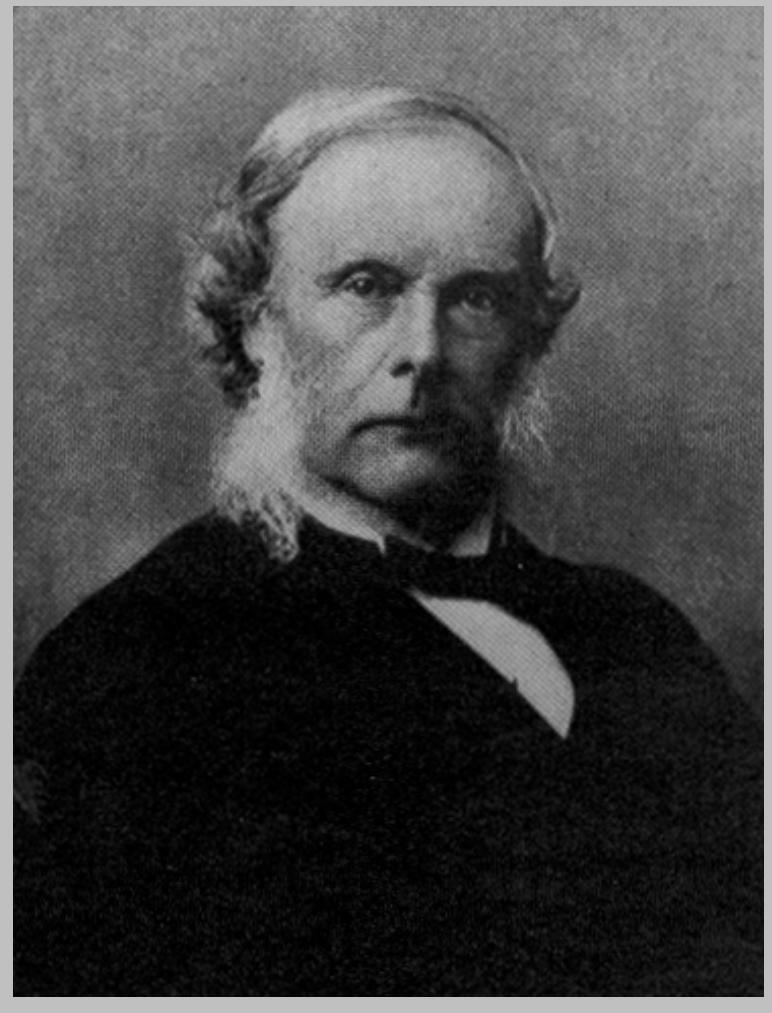


Historical Milestones in Orthopaedic Implant Development

Anesthetics

- Nitrous oxide
 - Humphrey Davy, 1800
 - Horace Wells, 1844
- Ether
 - Crawford Long, 1842
 - W.T.G. Morton, 1846
- Chloroform
 - Sir James Simpson, 1847



Sir Joseph Lister
(1827-1912)

Visualization

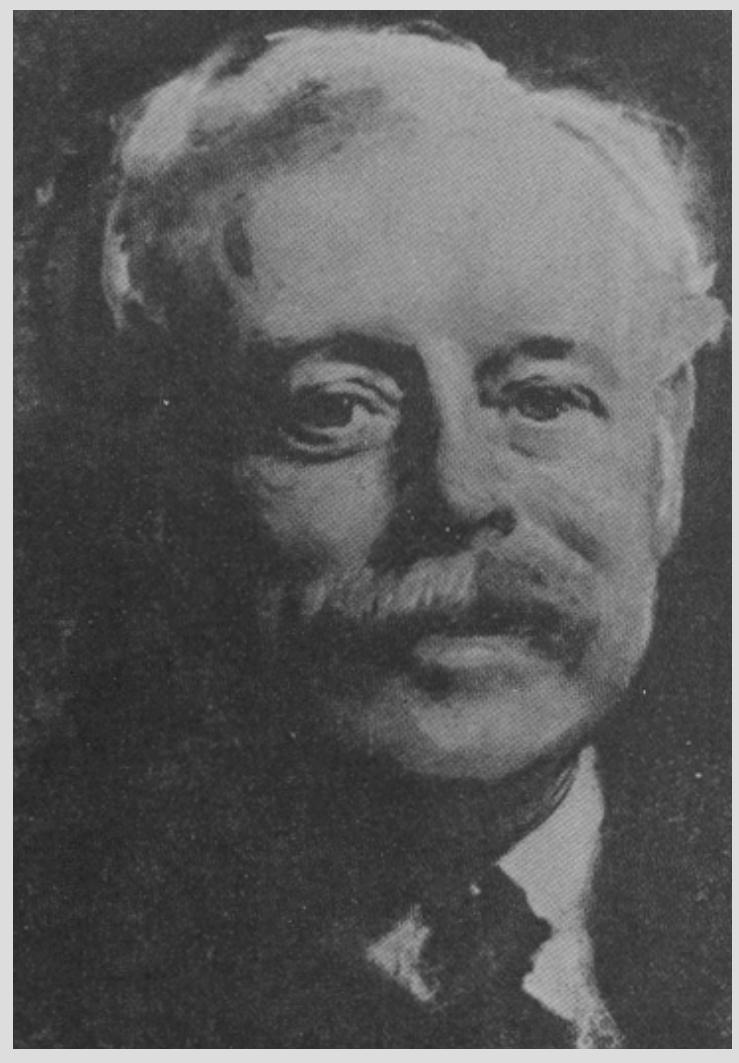
- Wilhelm Konrad Roentgen (1845-1923)
- Discovery of x-rays: 1895
 - Nobel Prize, 1901
- Fluoroscopy: Thomas A. Edison, 1896
- X-ray tube: William D. Coolidge, 1913

Suitable Materials

- Traditional Materials
 - Gold, silver, lead, aluminum: too weak
 - Iron, steel, copper, nickel, zinc: adverse response
- Stainless steel (18-8): 1926
- Vitallium: 1929
 - Tantalum: 1936
- Titanium & its alloys
 - Maurice Down, 1947

Pre-Implant Era War Experience

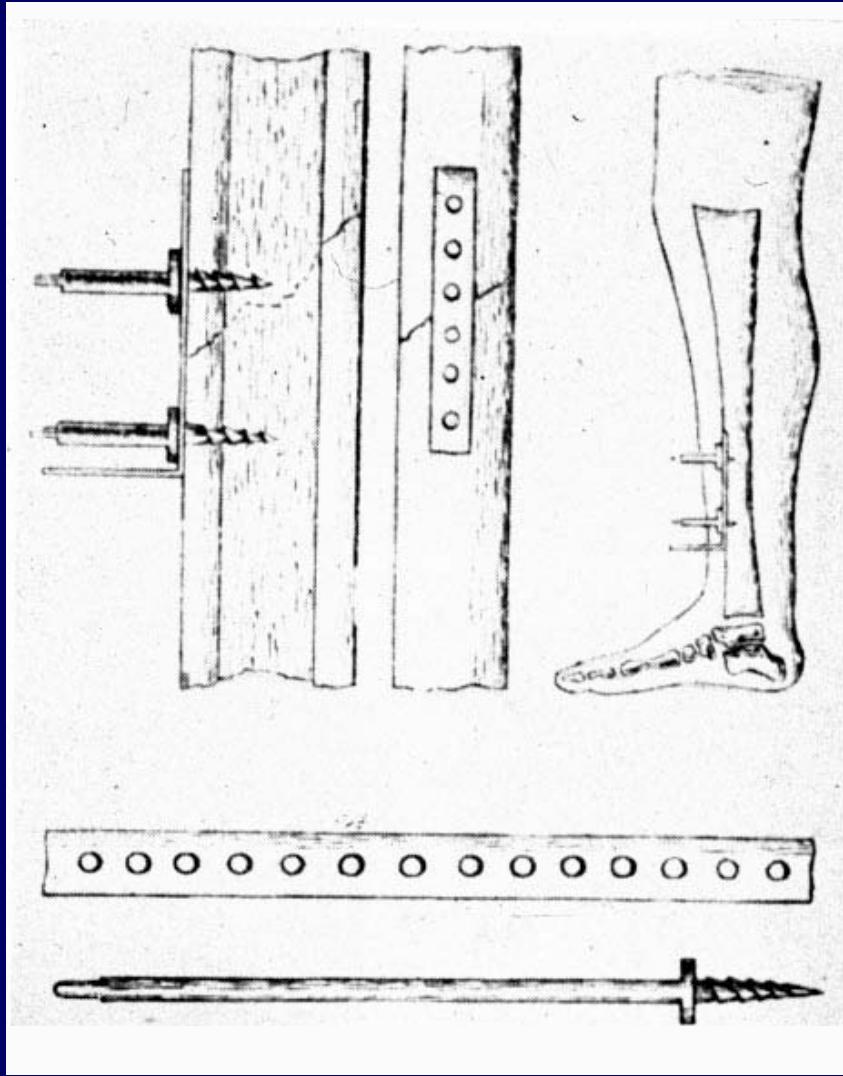
- Ollier (1870)
 - Immobilization
 - Plaster of Paris
- Friedrich (1898)
 - Proved efficacy of debridement of dead tissue
 - Earlier practice, empirically



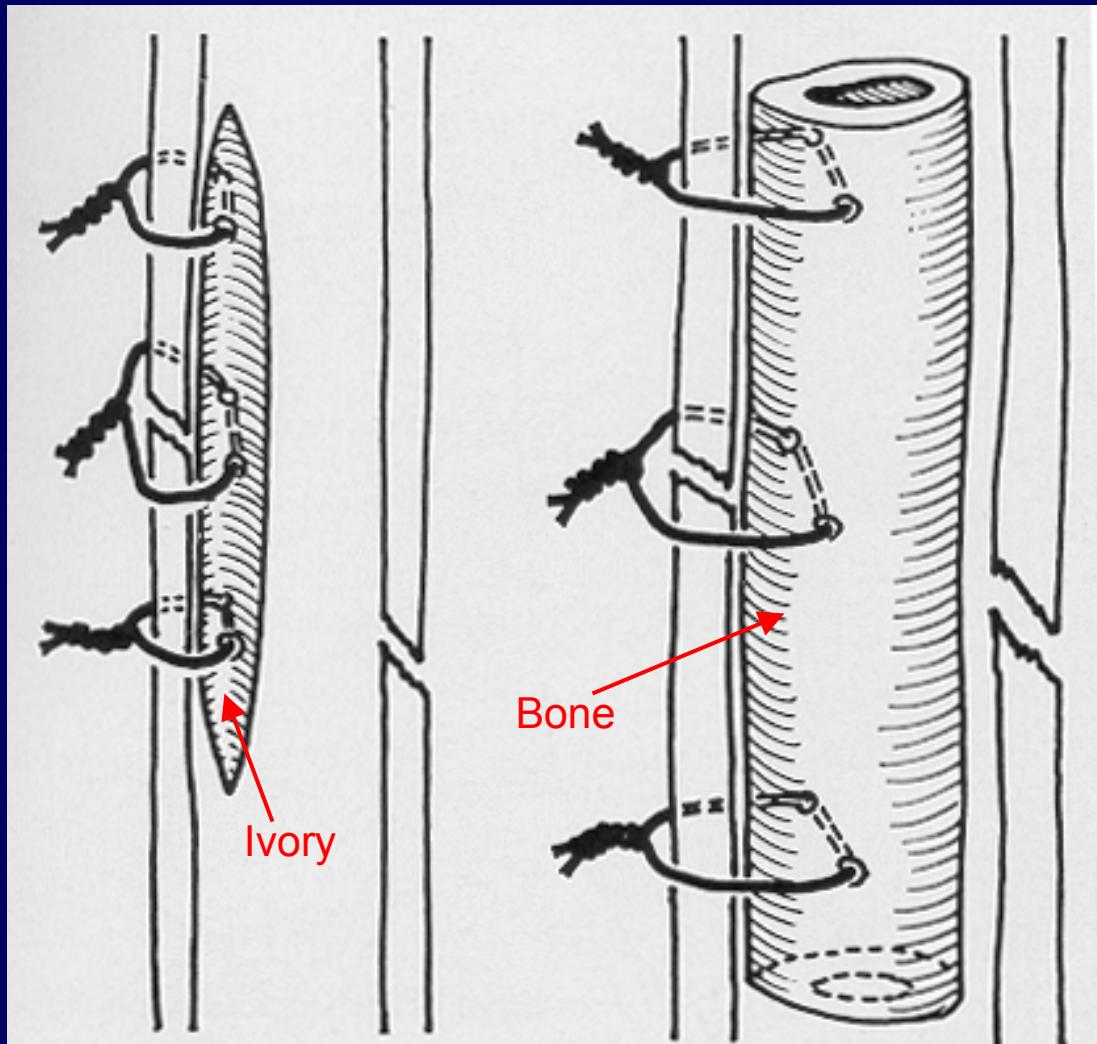
Sir Robert Jones
(1857-1939)

War Experience

- Joseph Truett
 - Debridement/immobilization (1936)
 - Laboratory studies of bone healing
 - Blood flow in bone



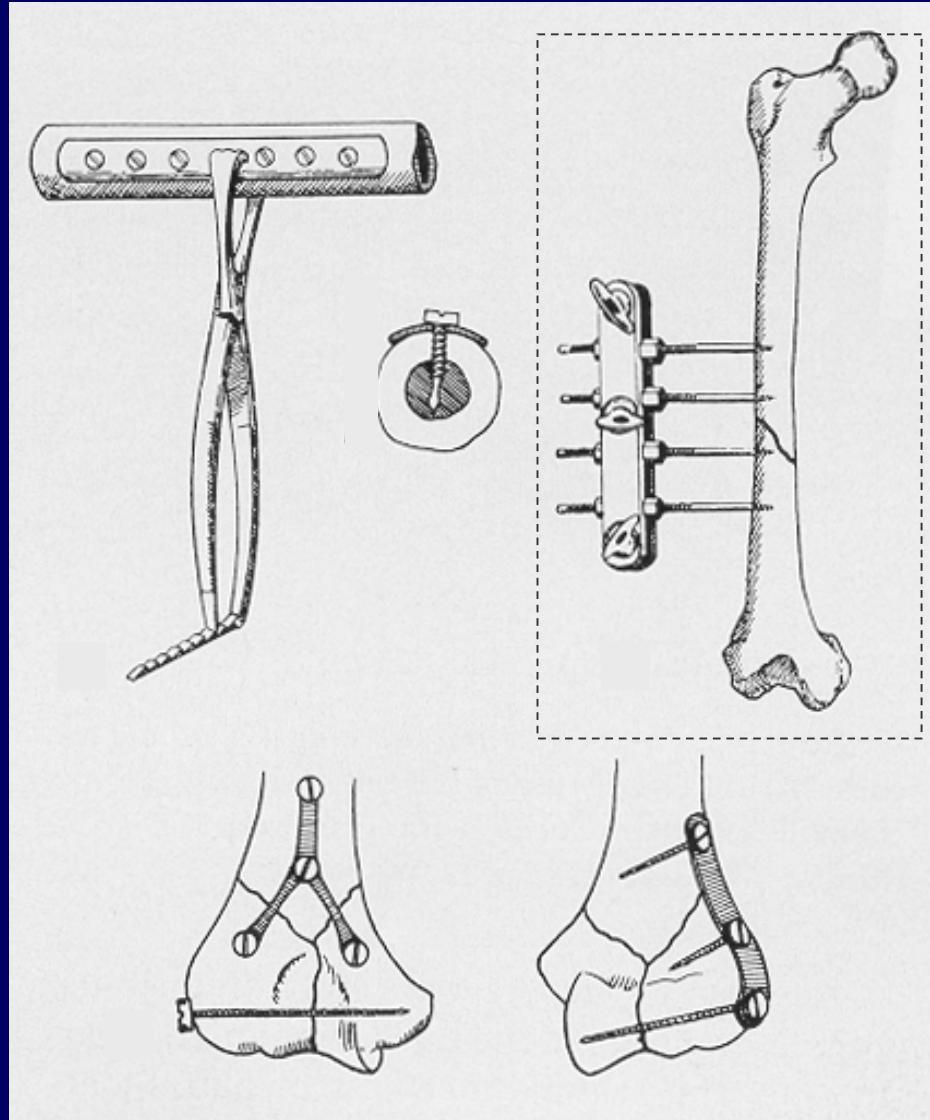
Hansman's
Bone Plate
(1886)



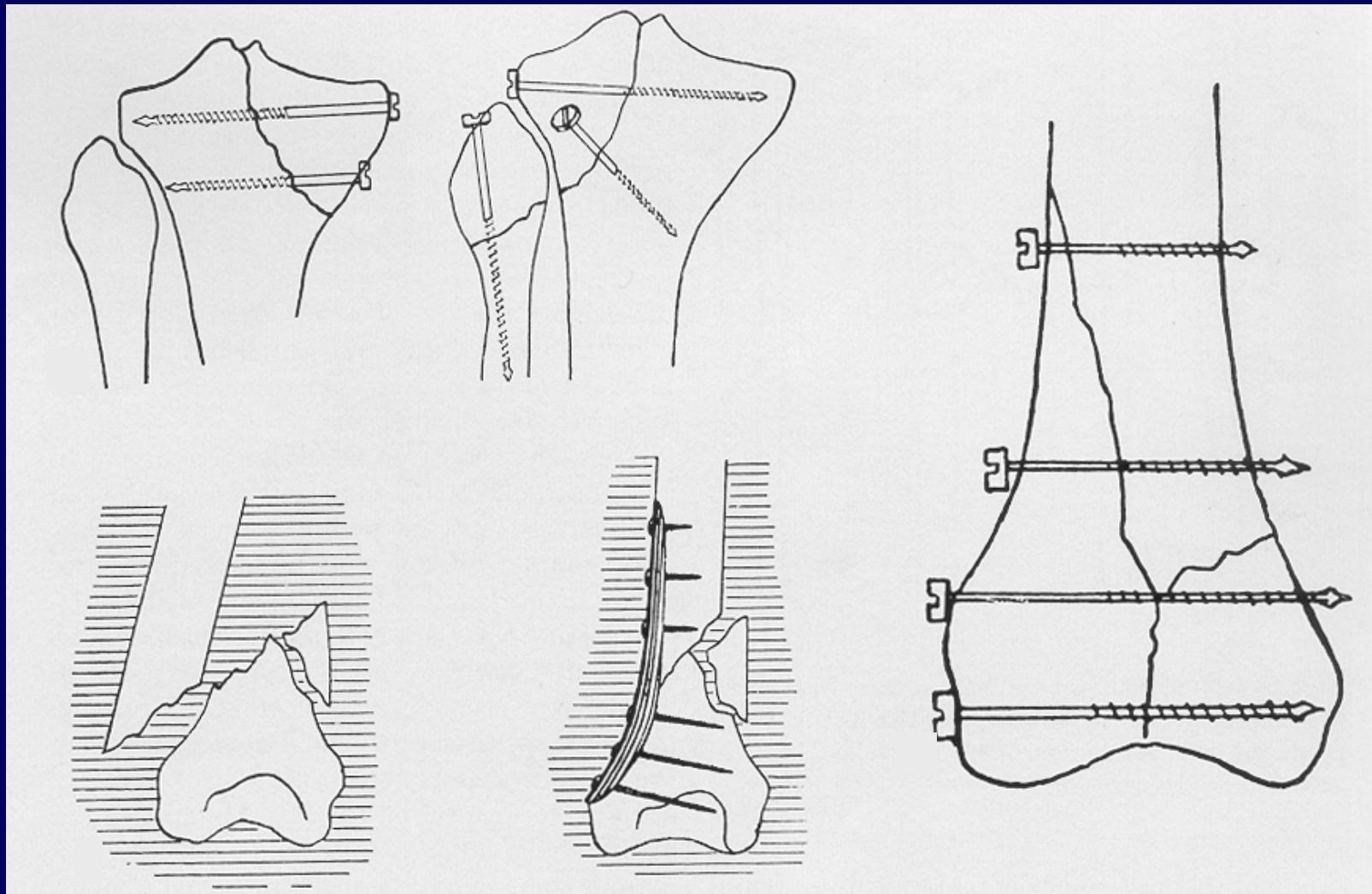
Bone Suture Stabilization Inserts (Koenig, 1905)



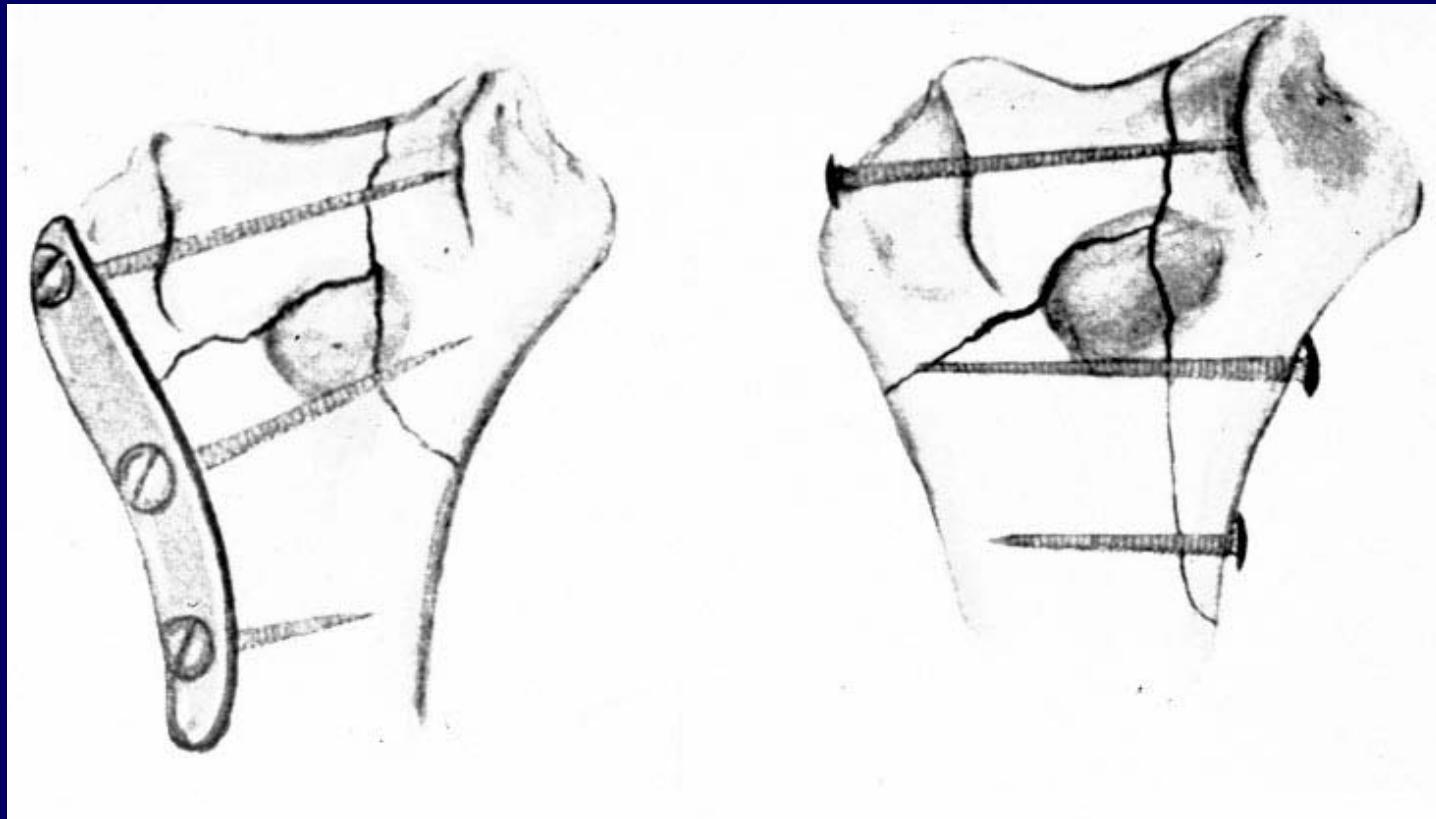
Albin Lambotte



Forceps and Bone Plates (Lambotte)



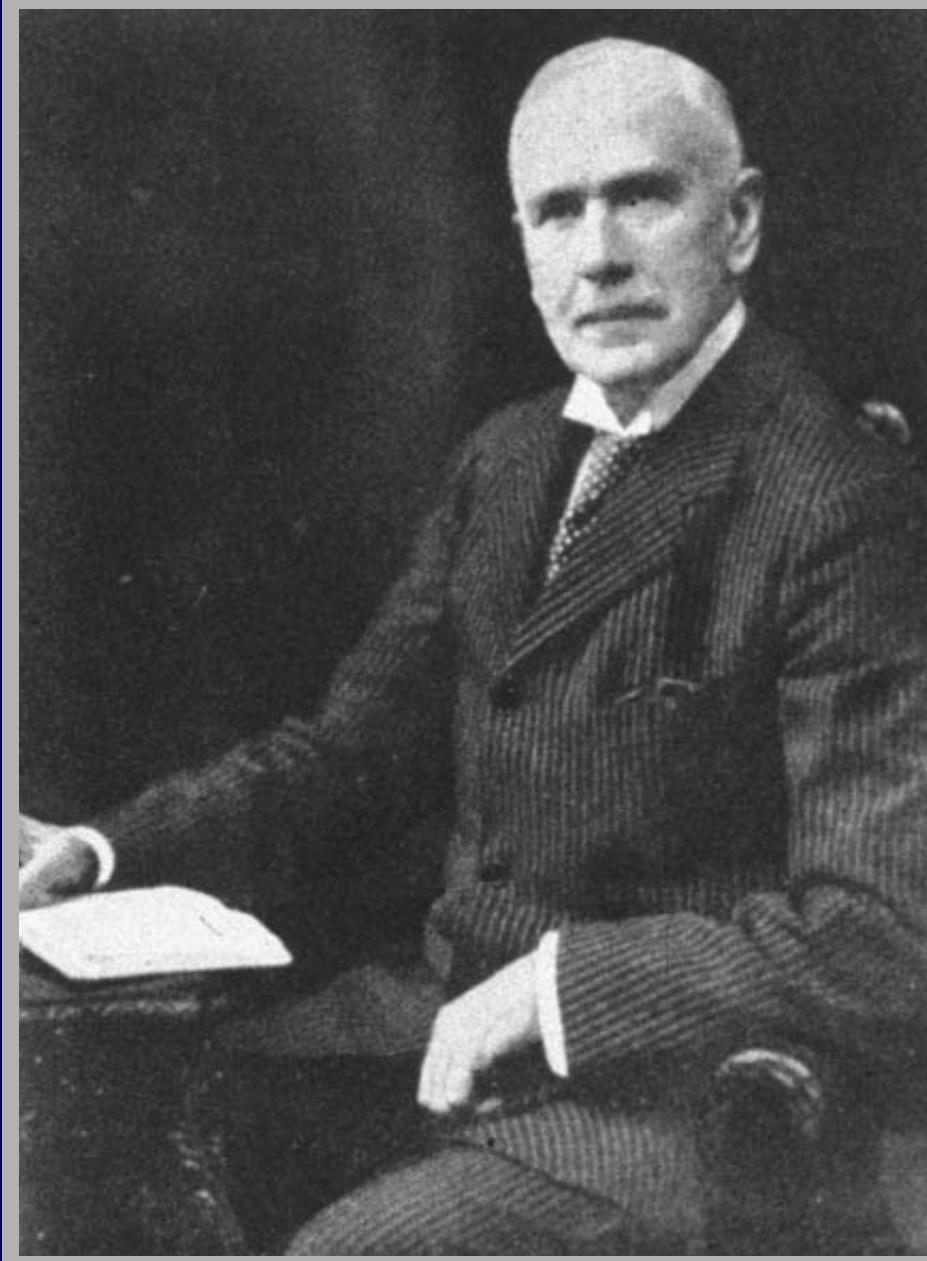
Intra-articular Fracture Fixation Constructs
(Lambotte)



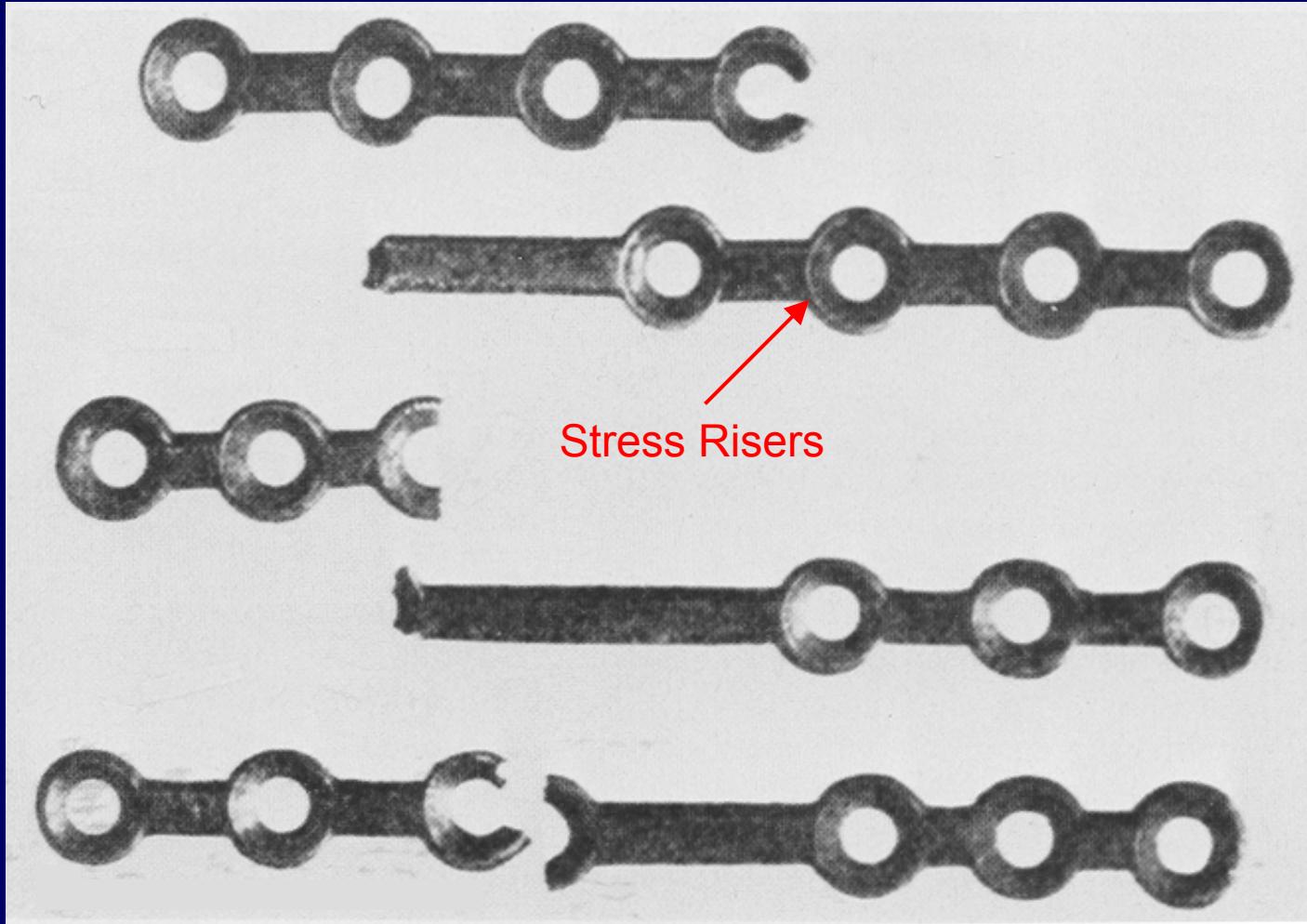
Lambotte Brass Plates & Screws



E.W. Heygroves (1916)



Sir William
Arbuthnot Lane
(1856-1942)

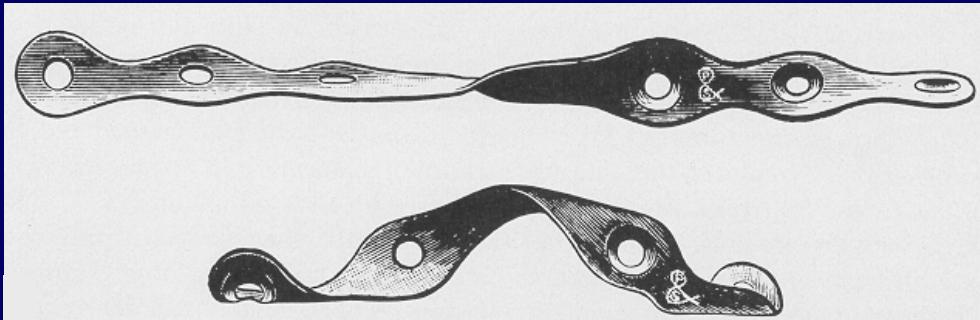


Broken Lane Plates

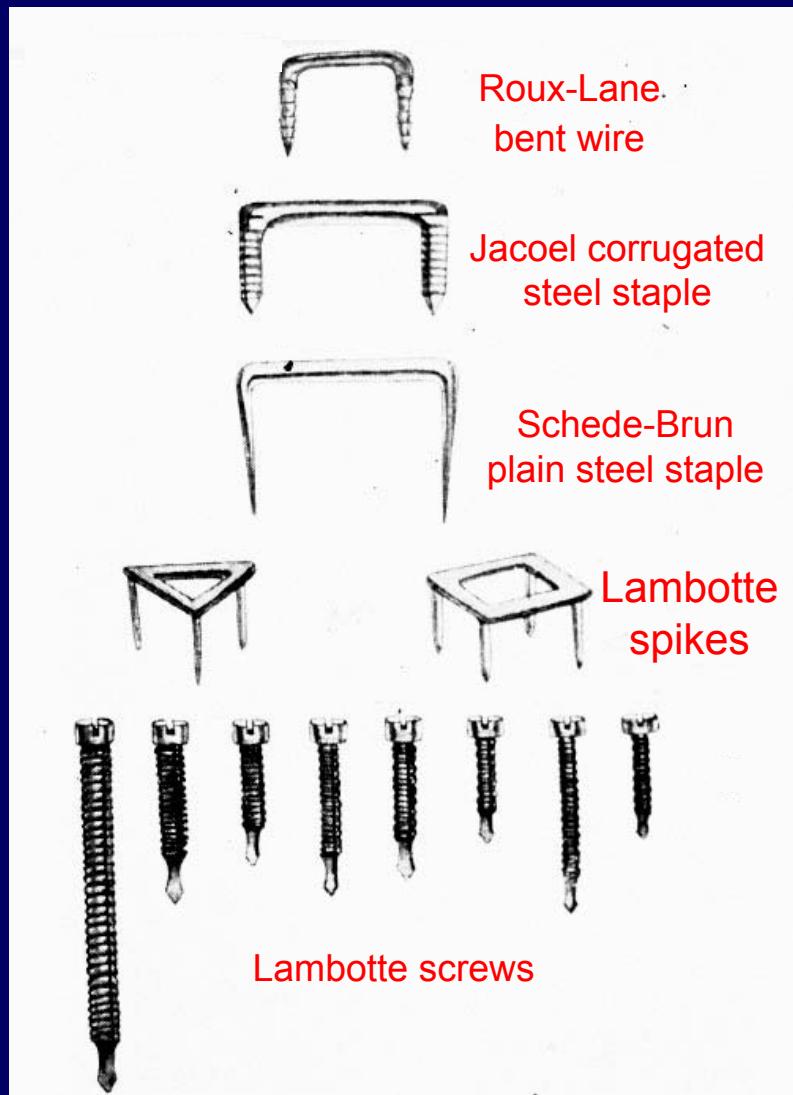


William O'Neill
Sherman

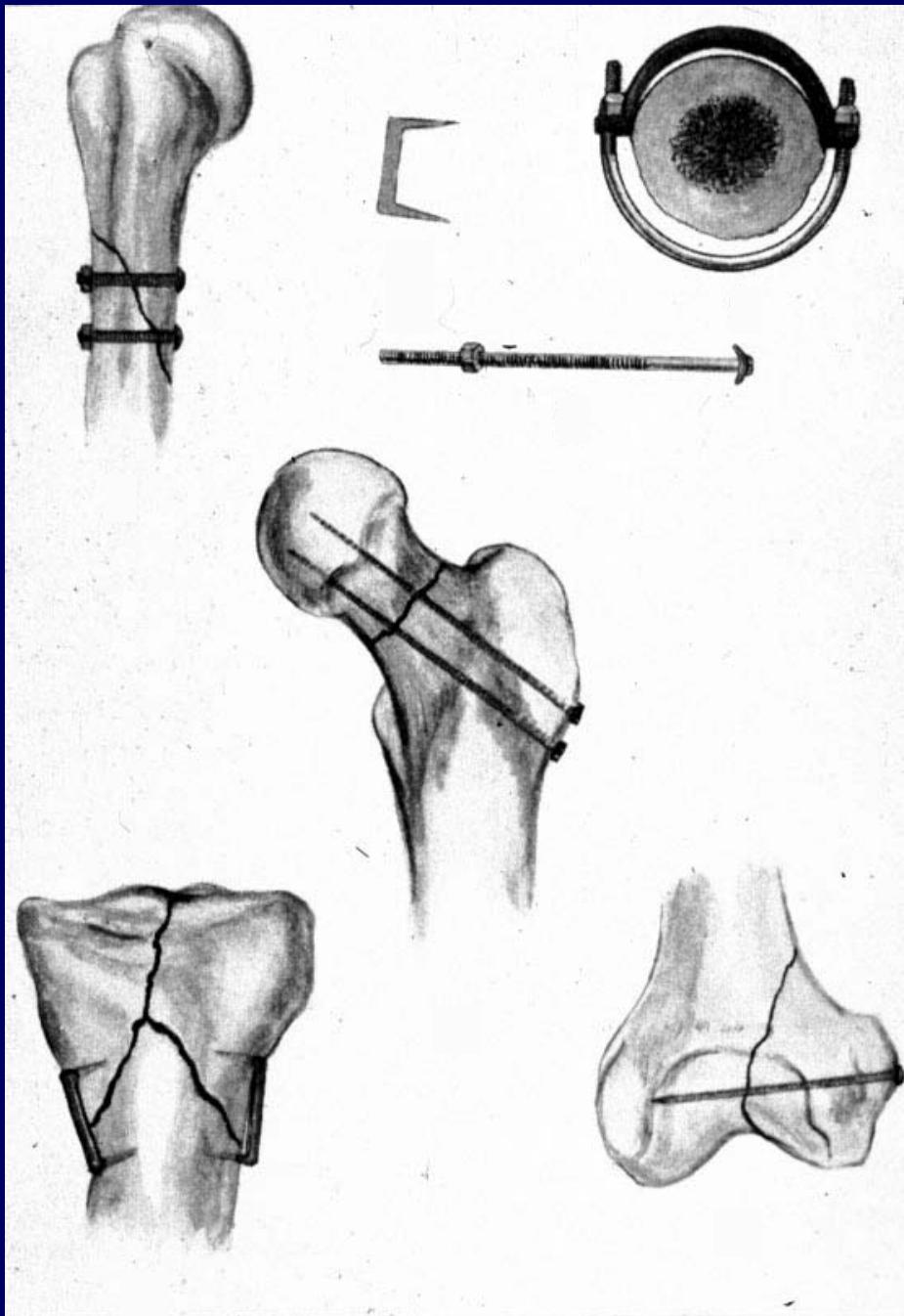
ca. 1880



Sherman Plates

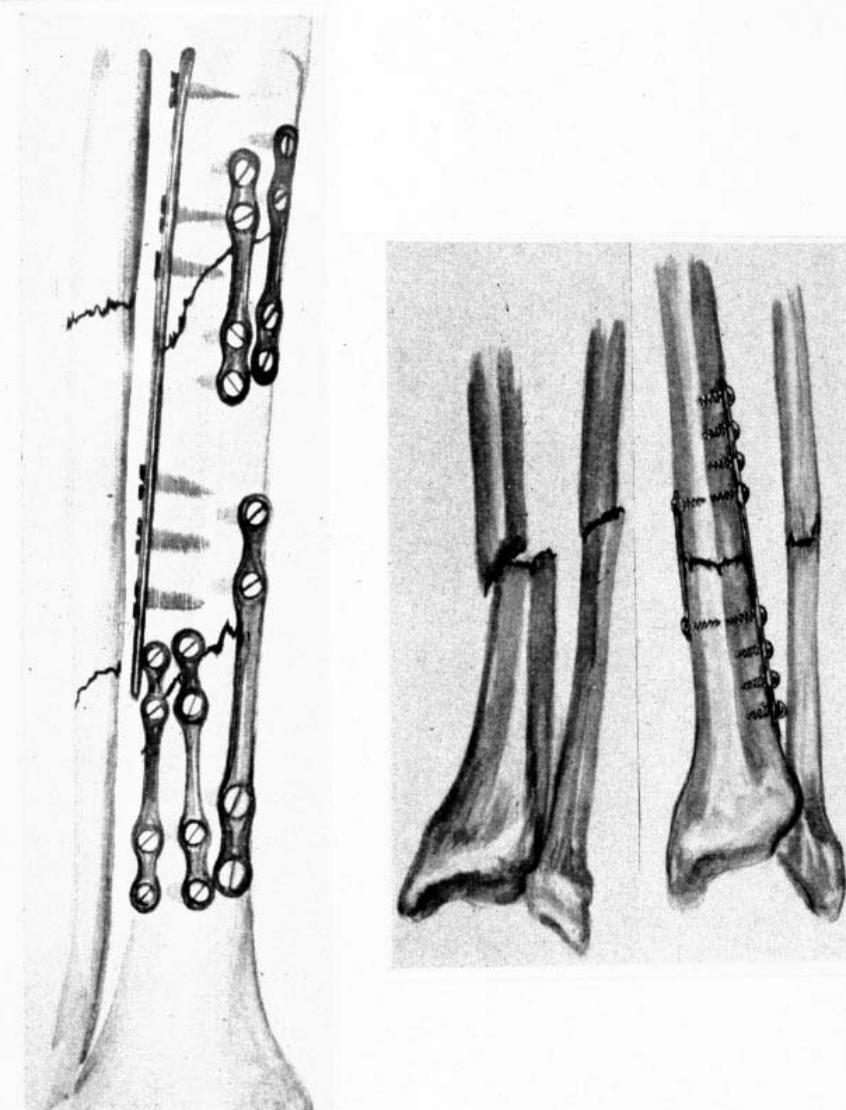


Metallic Internal Fixation



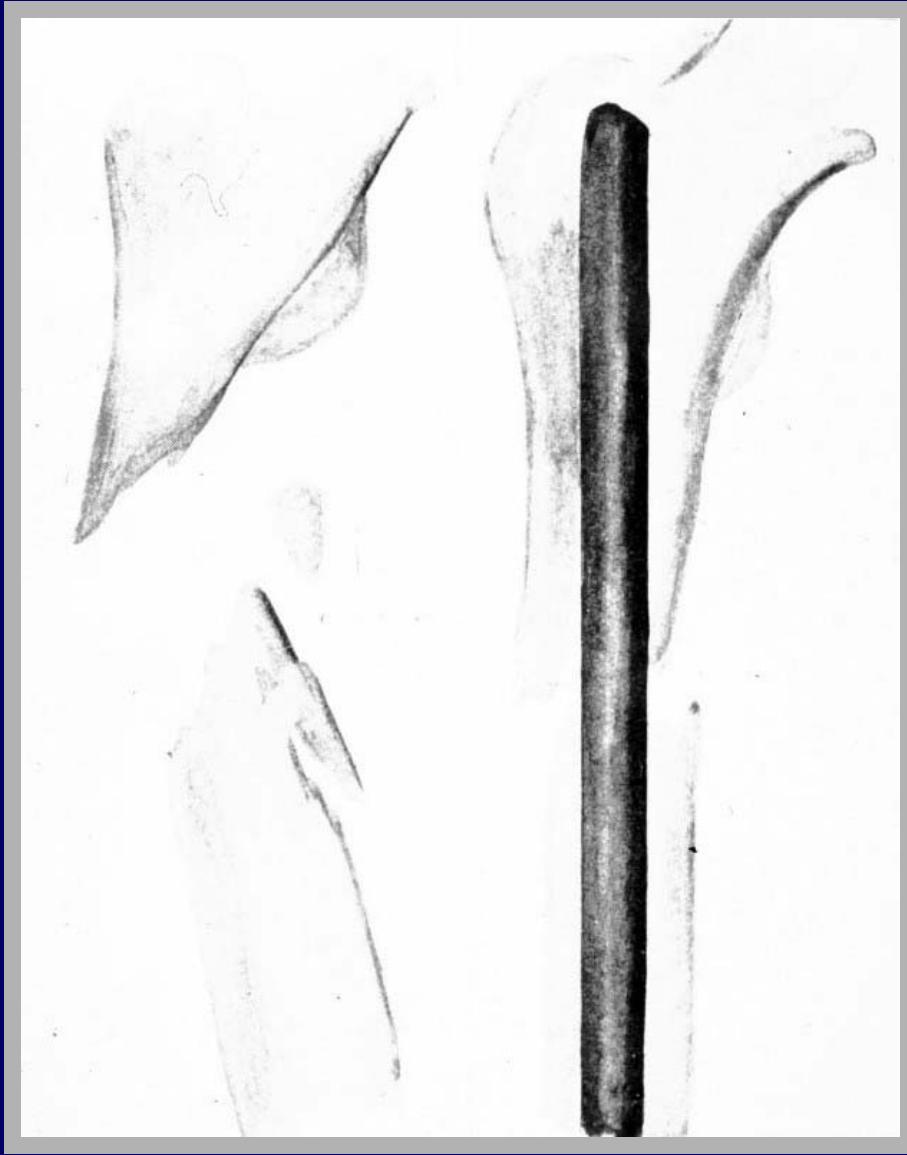
Intuitively-Based Fracture Fixation Constructs (ca. 1920)

Redundant usage of Lane Plates

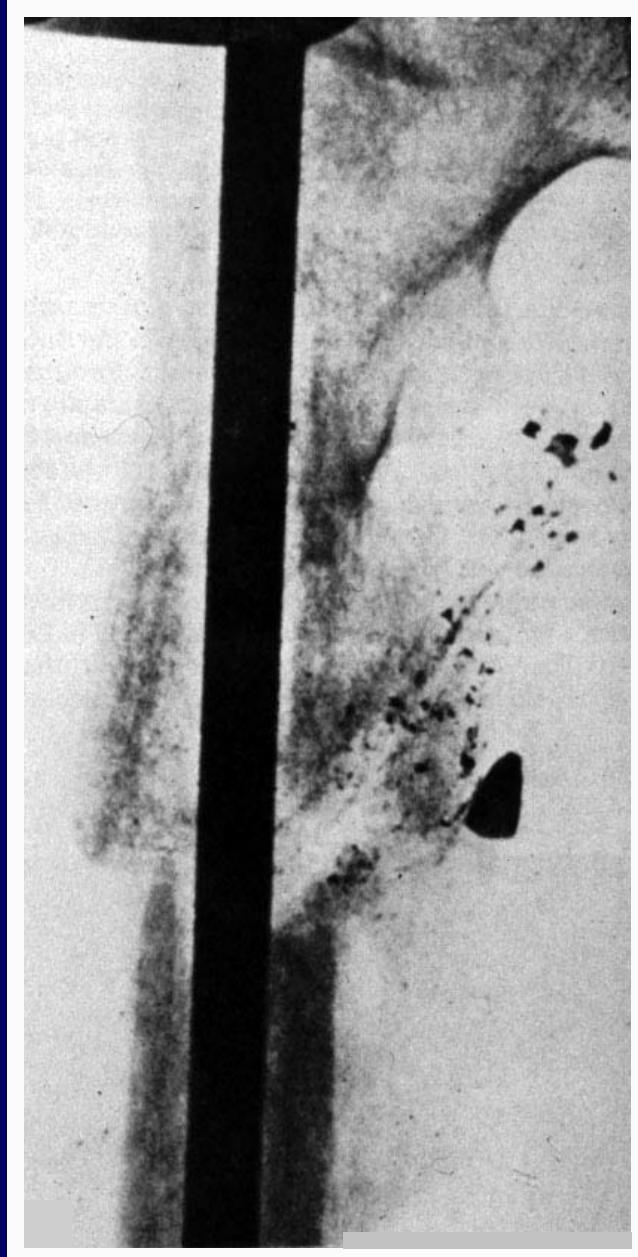


The Era of Disfavor

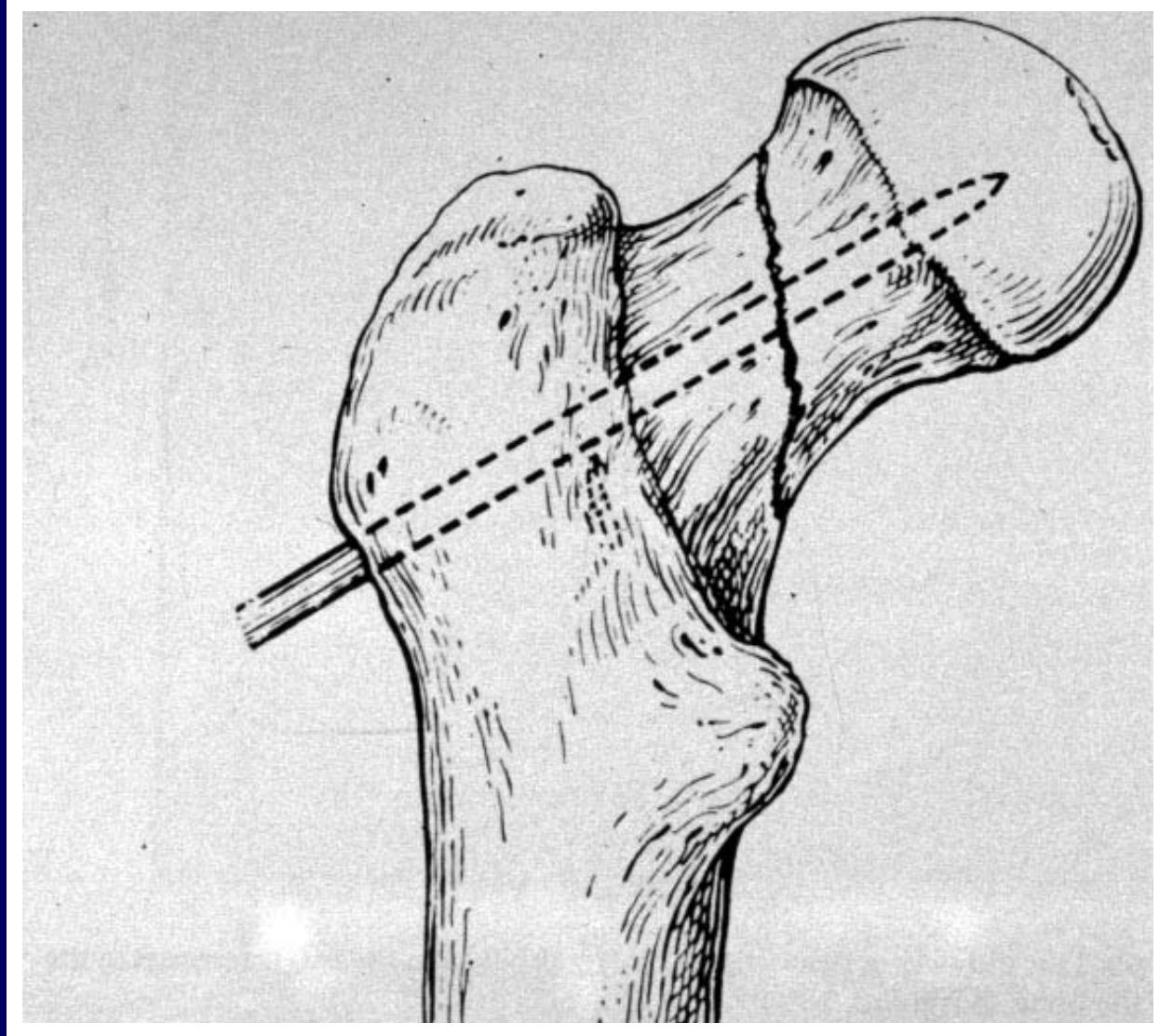
- 1920's → 1950's
- High incidence of bone destruction, delayed union, non-union
- Confusion re: failure & corrosion of metals
- Confusion re: fracture healing biomechanics



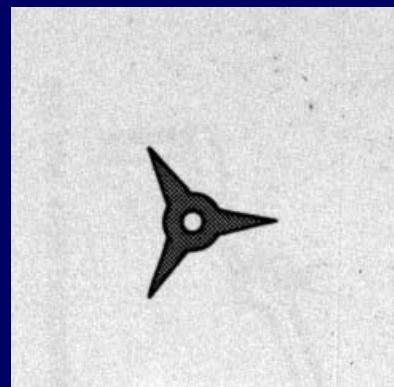
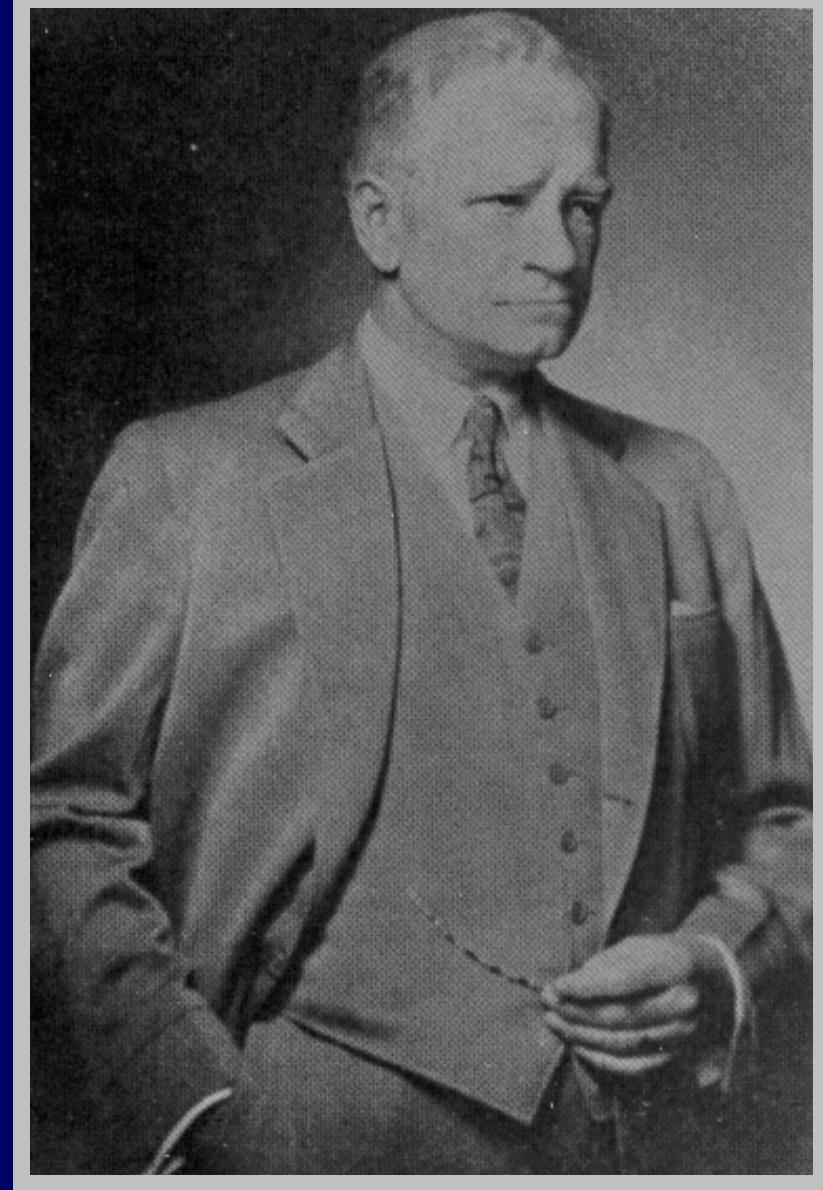
Heygroves' "Long Steel Strut" (1921)



Heygroves' Splint for Gunshot Injuries



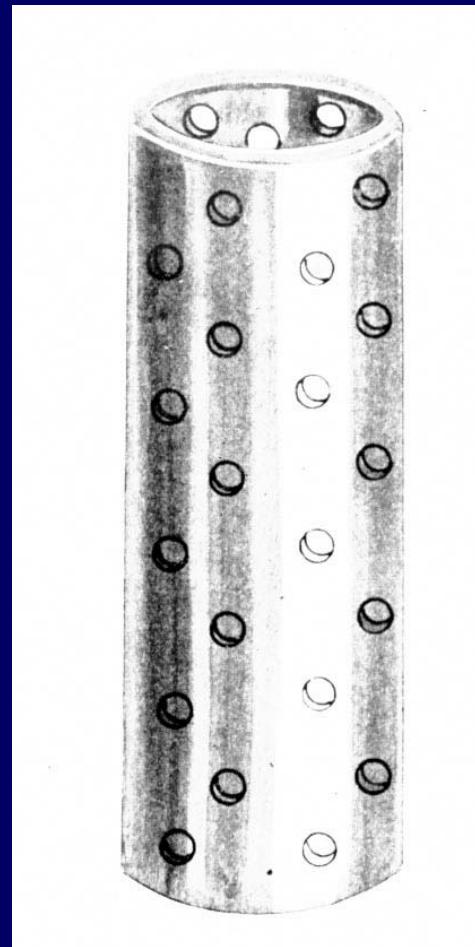
Burghard's Screws



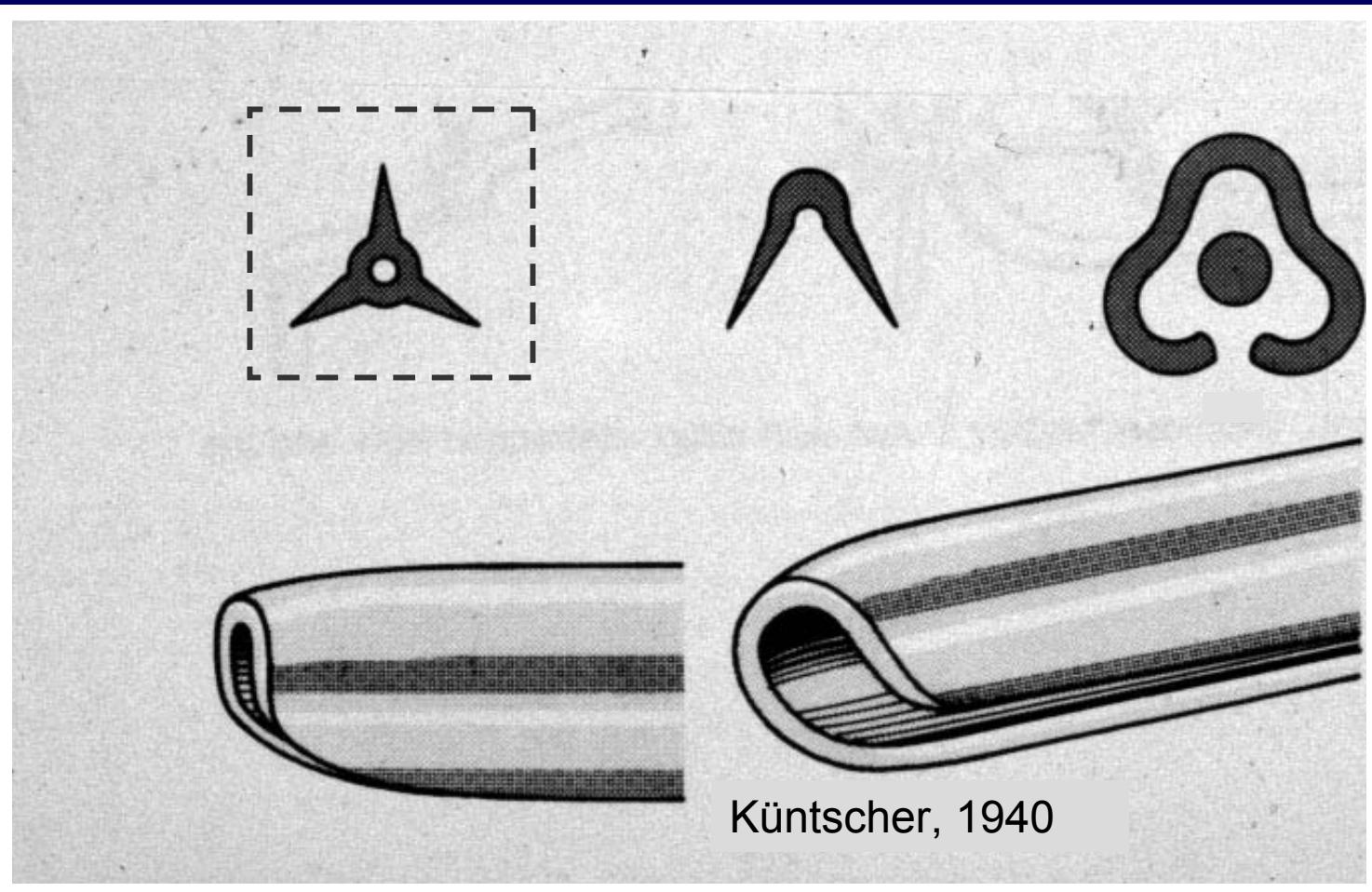
Marius N. Smith-Petersen
(1886-1953)



Nicholas Senn



Decalcified Bone
Ferrule



Küntscher, 1940

Intramedullary Nails



Subtrochantere Fraktur. Nagelung mit starrem Marknagel.

Epilese:

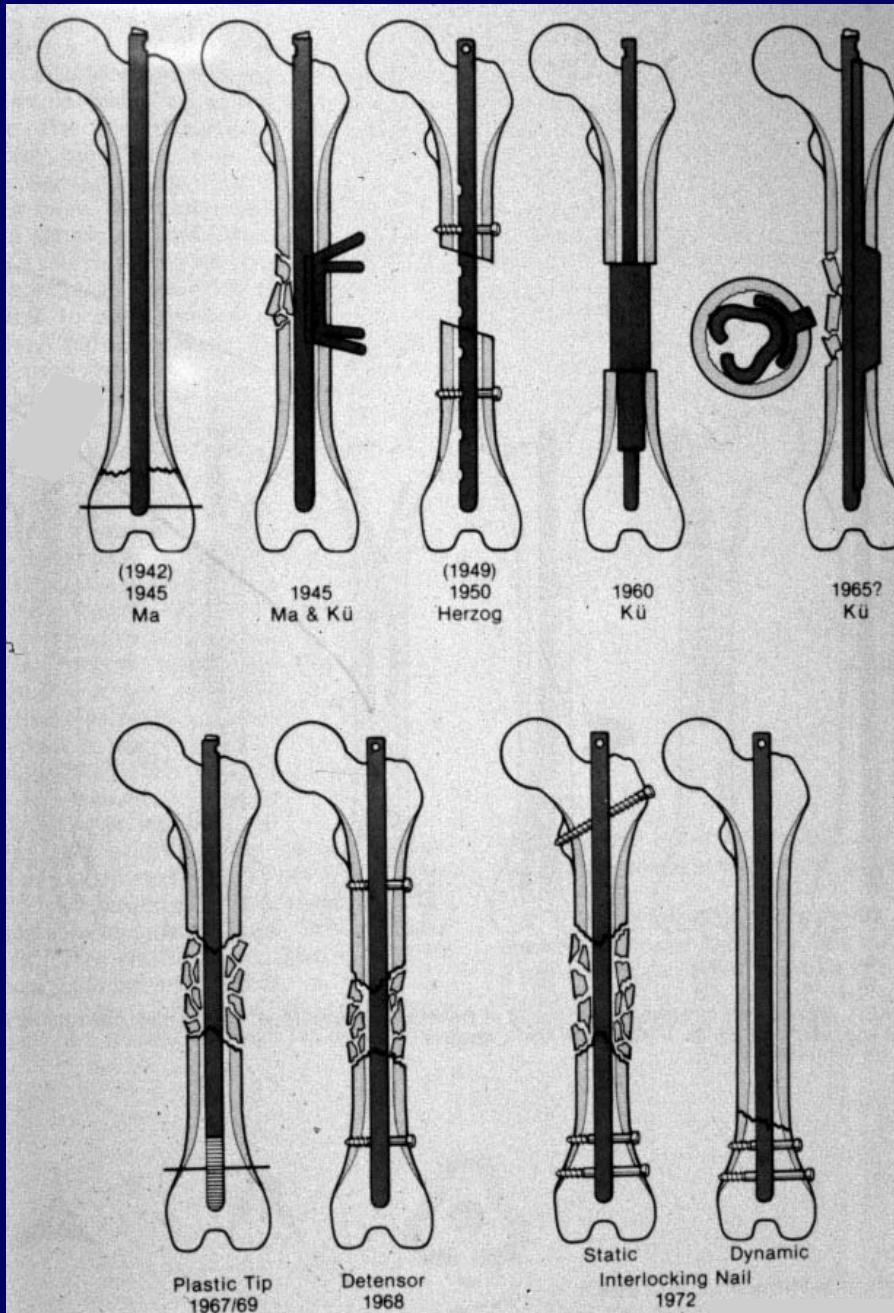
1. Fall von Marknagelung der Oberarmh. (Küntscher)
für Epiphysen.

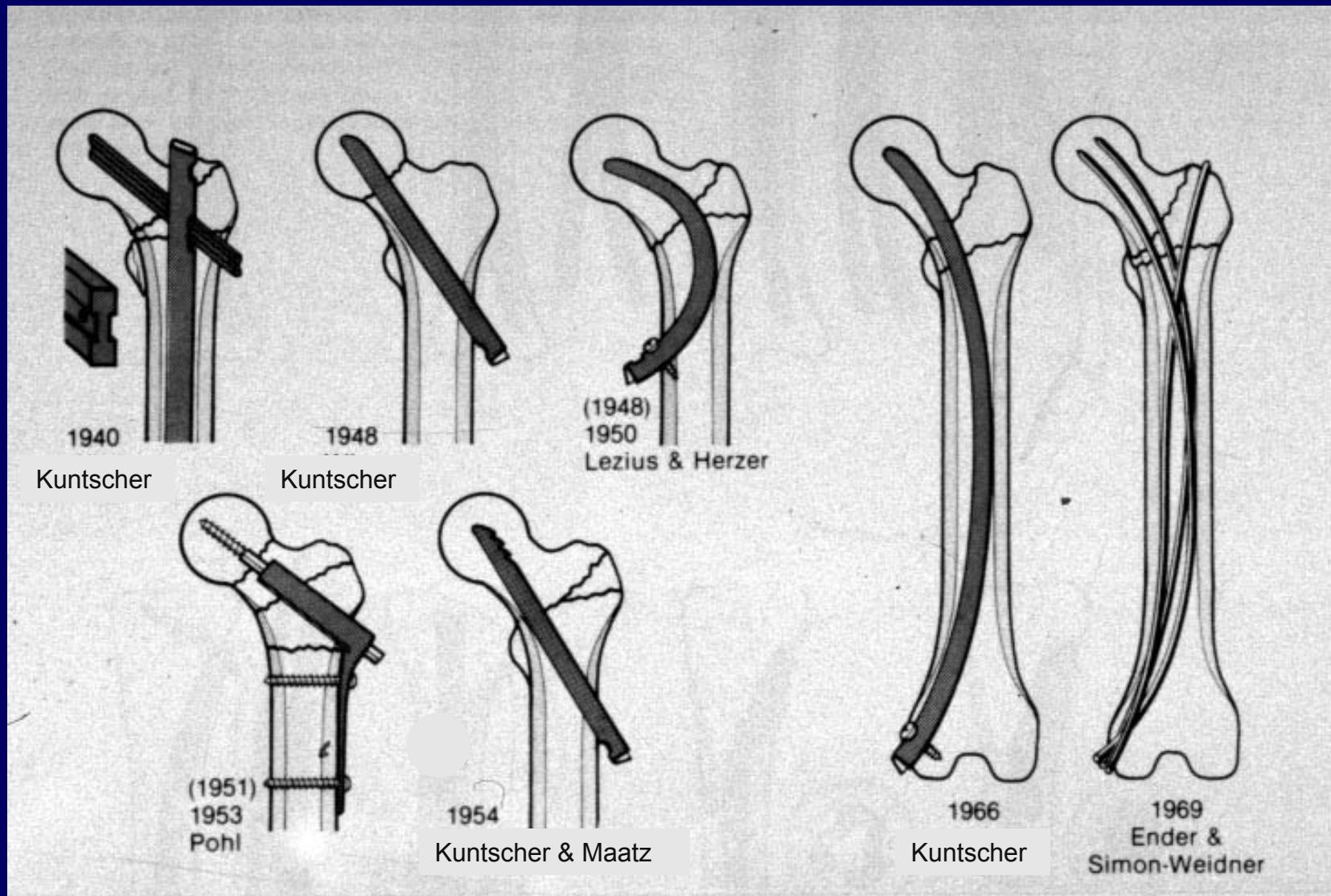
fm

2. im Entfernen des
Nagels, Wundheilung n. p.

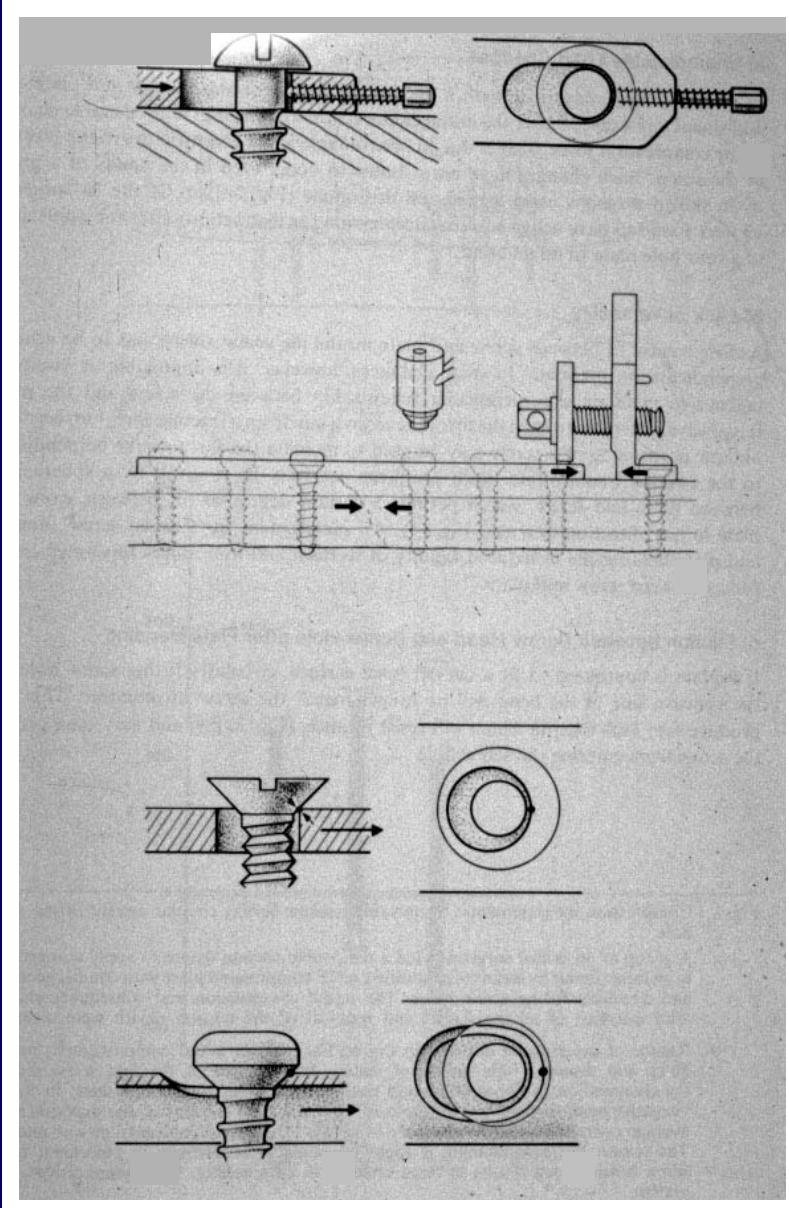
Küntscher's 1st IM Nailing

Development of Femoral Intramedullary Nailing





Nails for Proximal Femur Fractures



Compression Plating

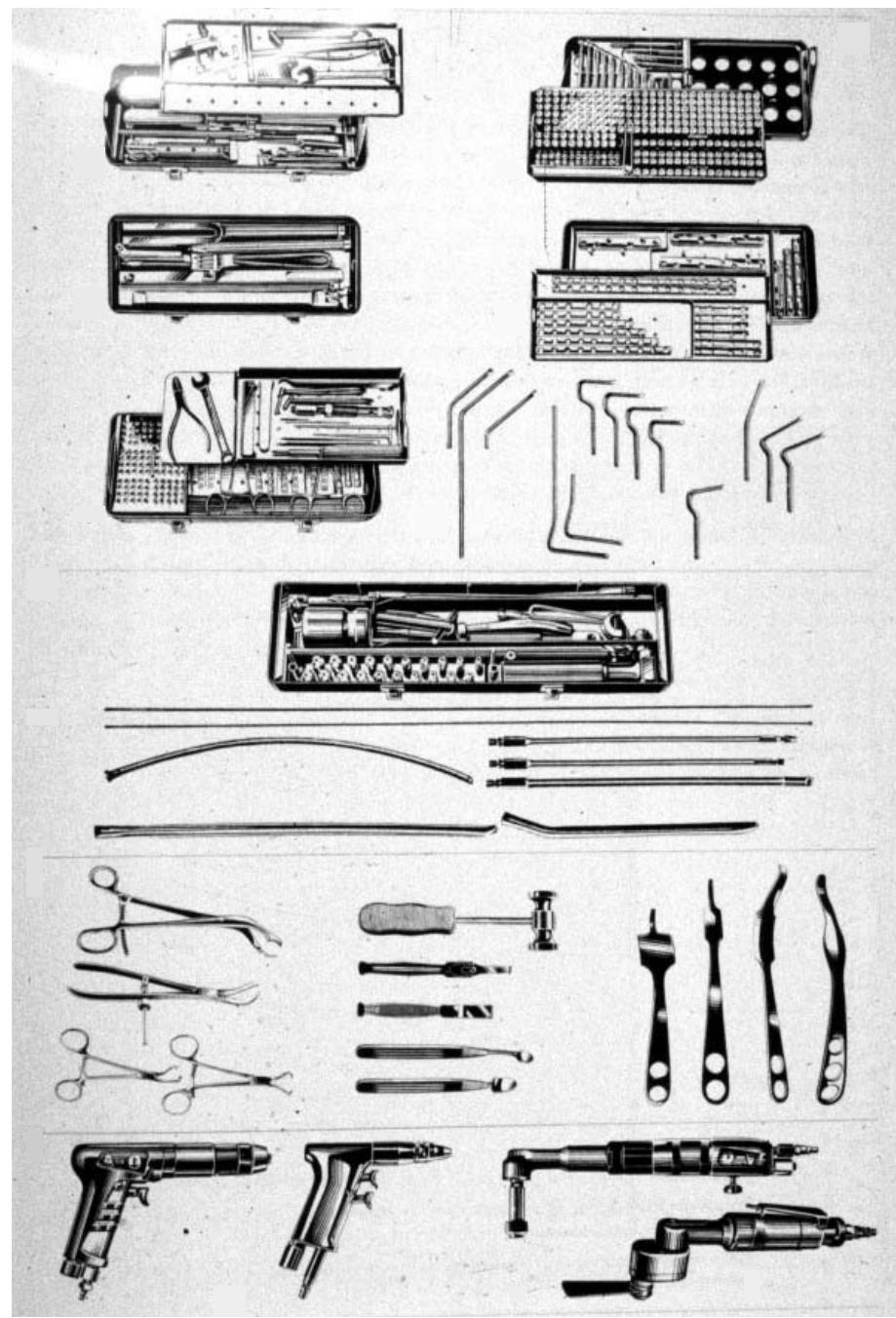
(Danis, 1947)

The Swiss Era

- 1951: Müller – Allgower – Willeneger
 - Scientific/clinical collaboration
- 1954: Straumann Institute
 - Fabrication of implants
- 1958: Arbeitsgemeininschaft
fur Osteosynthesfragen
 - Fifteen Swiss surgeons (AO)

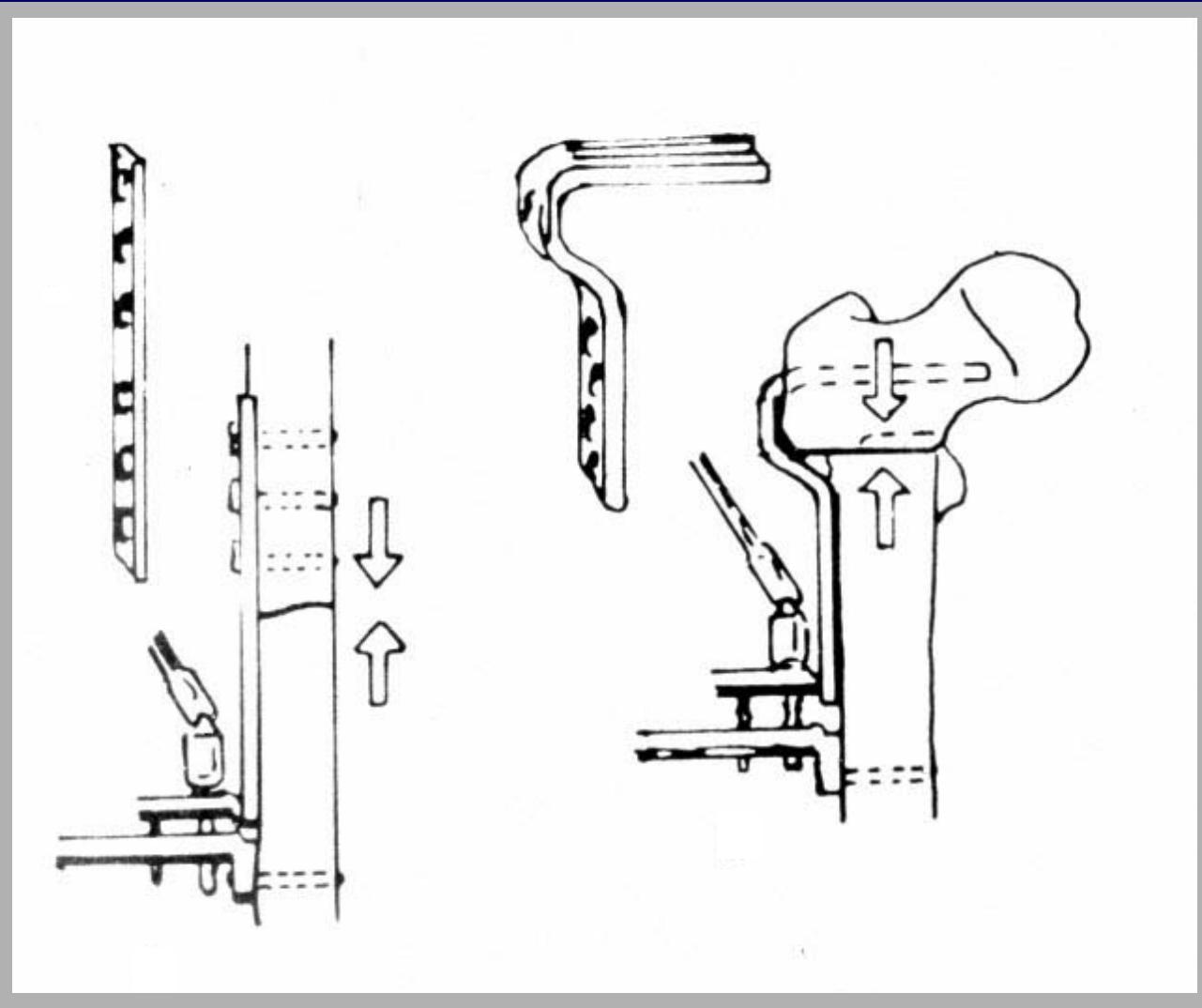
Standardized Instrumentation Set

(AO, 1958)

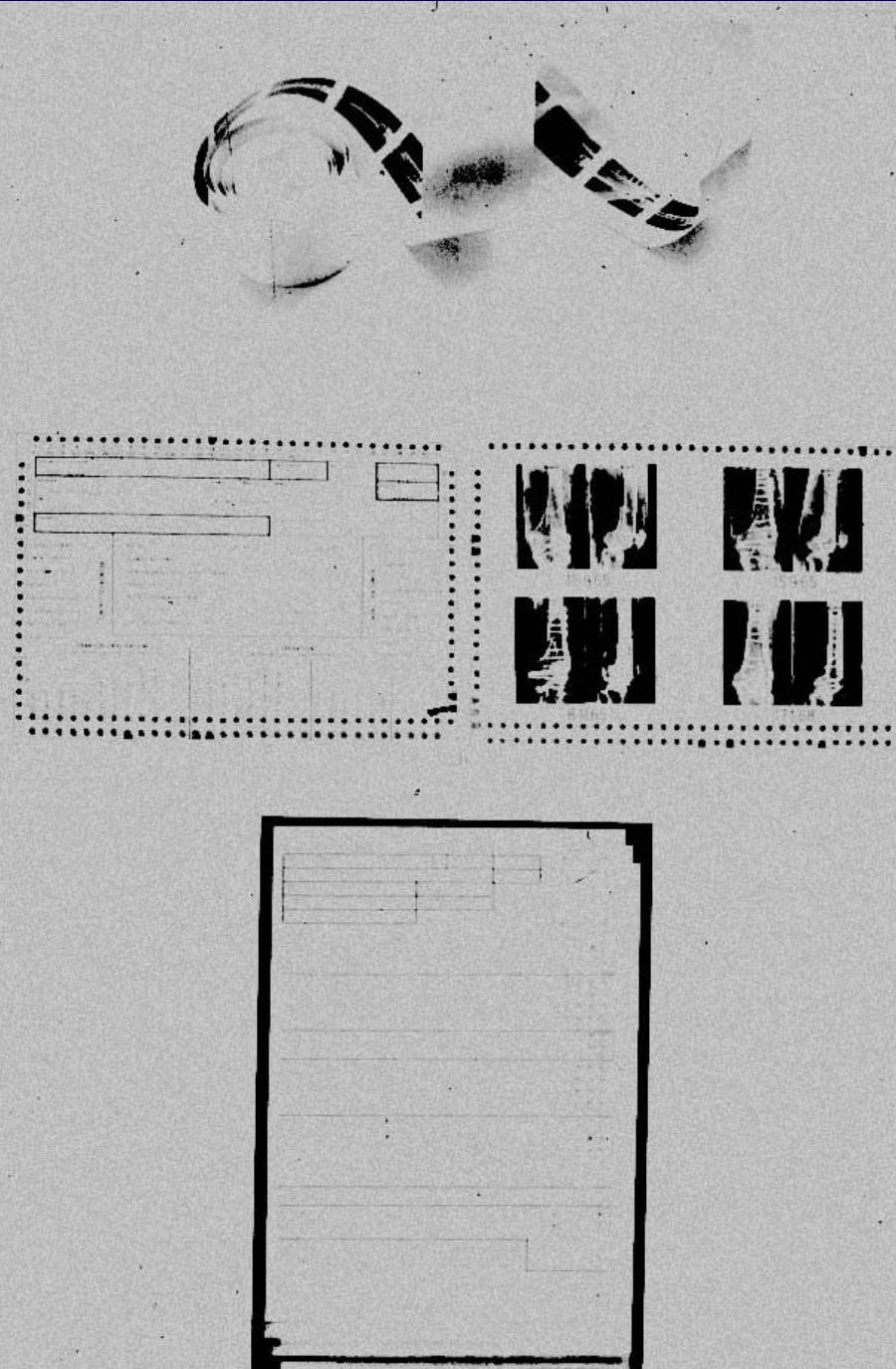


Cornerstones of AO Technique

- “Technique of Internal Fixation of Fractures” (1965)
 - Rigid compression to achieve primary bone union
 - Use of austenitic stainless steel
 - Pre-threading of screw holes
 - Reduced-shear thread profile
 - Dynamic compression plate (1973)
 - AO Documentation Center (Berne)



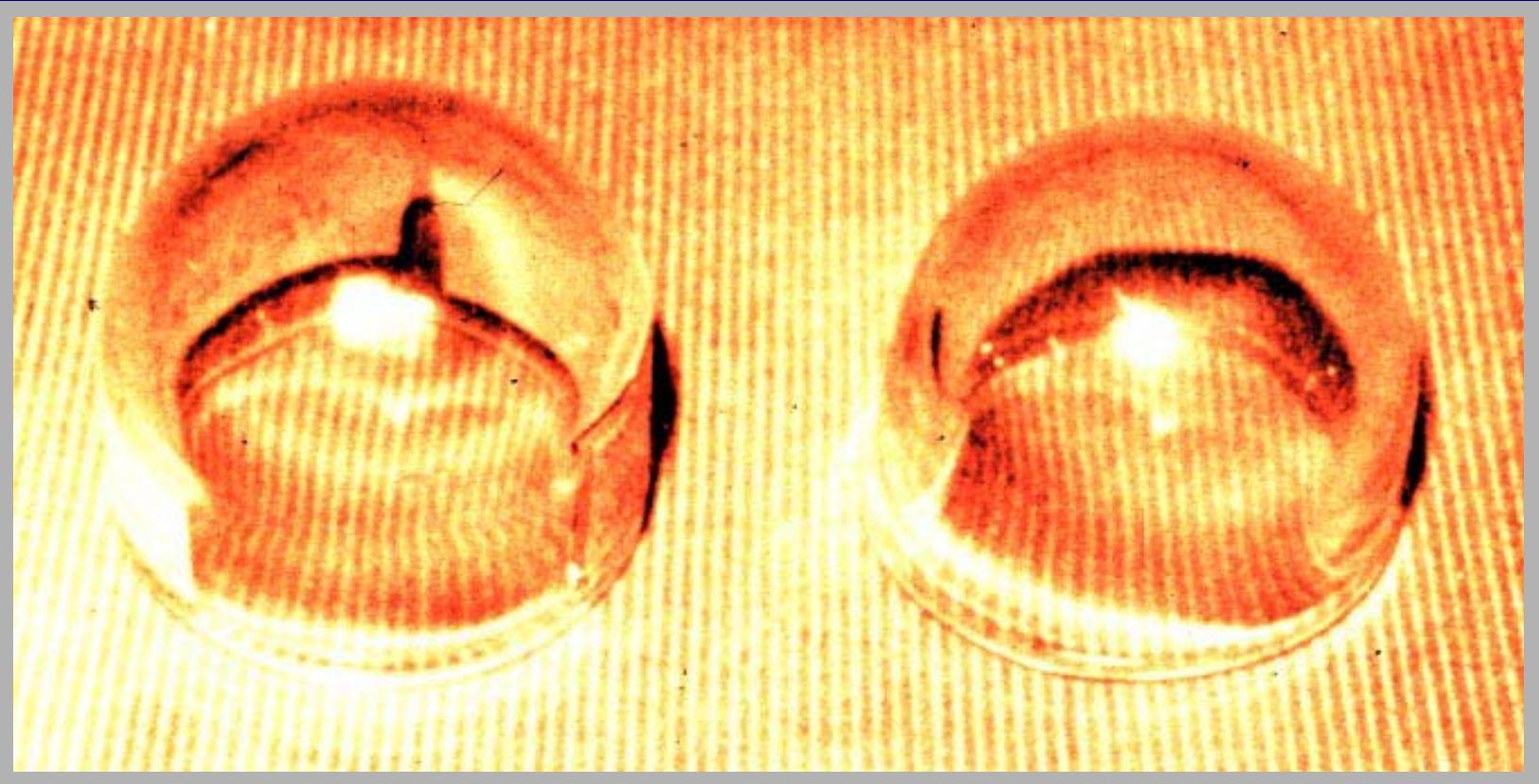
Dynamic Compression Plate
(Müller)



Standardized Fracture Documentation (AO)

Articular Joint Reconstruction and Replacement

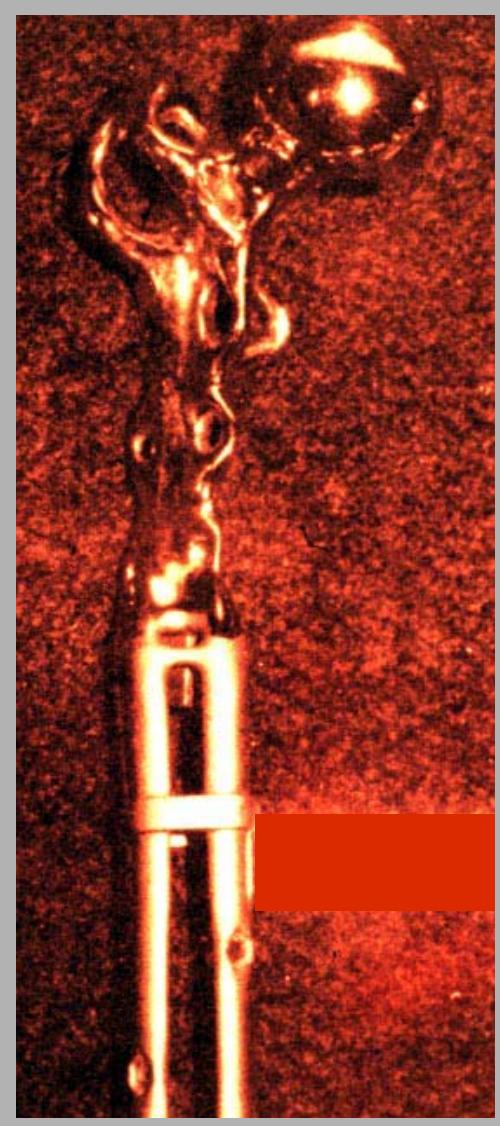
- Interpositional arthroplasty
 - Chulmsky (1880's: tin, zinc, silver, rubber, fascia)
 - Jones (1895: gold foil)



Interpositional Cups (Pyrex)

Medullary Fixation

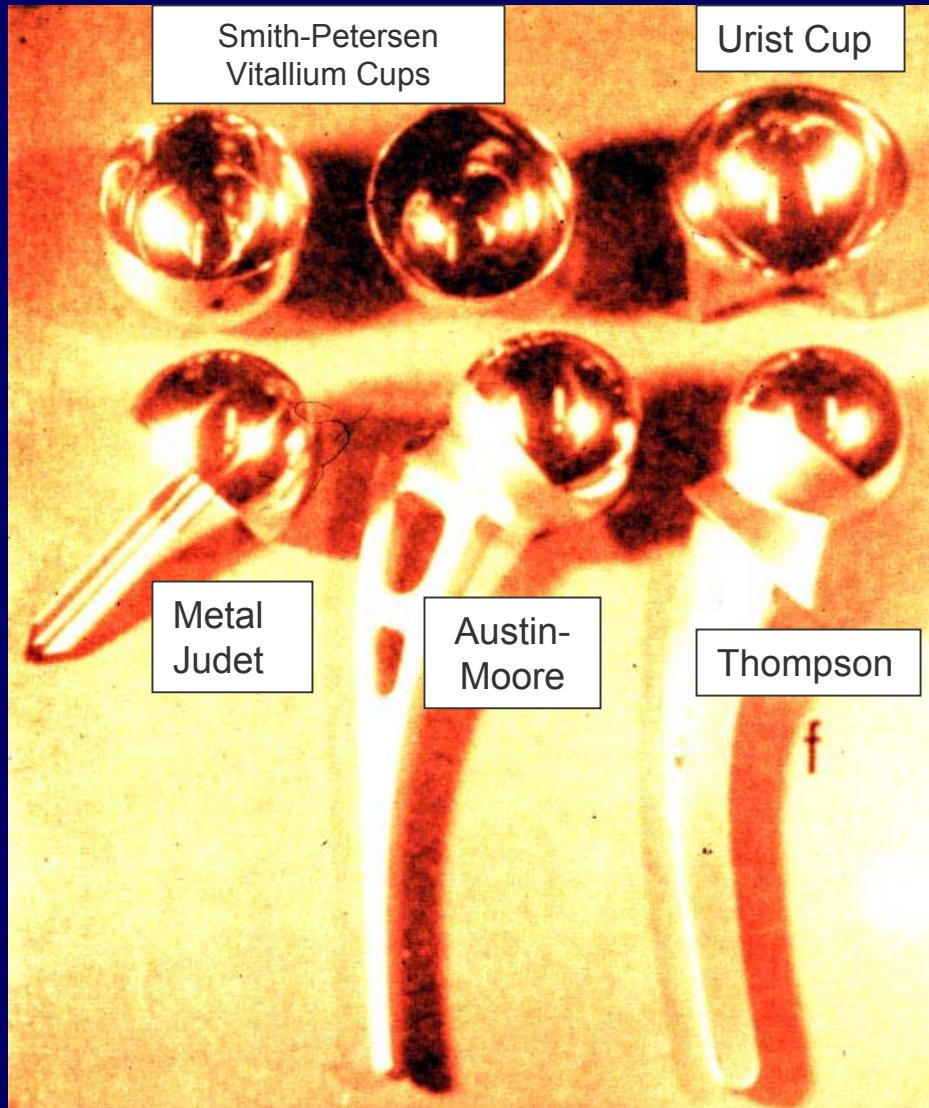
- Medullary fixation
 - Gluck (1891)
 - Ivory implants: hip, finger, thumb
 - Experimented with cement fixation

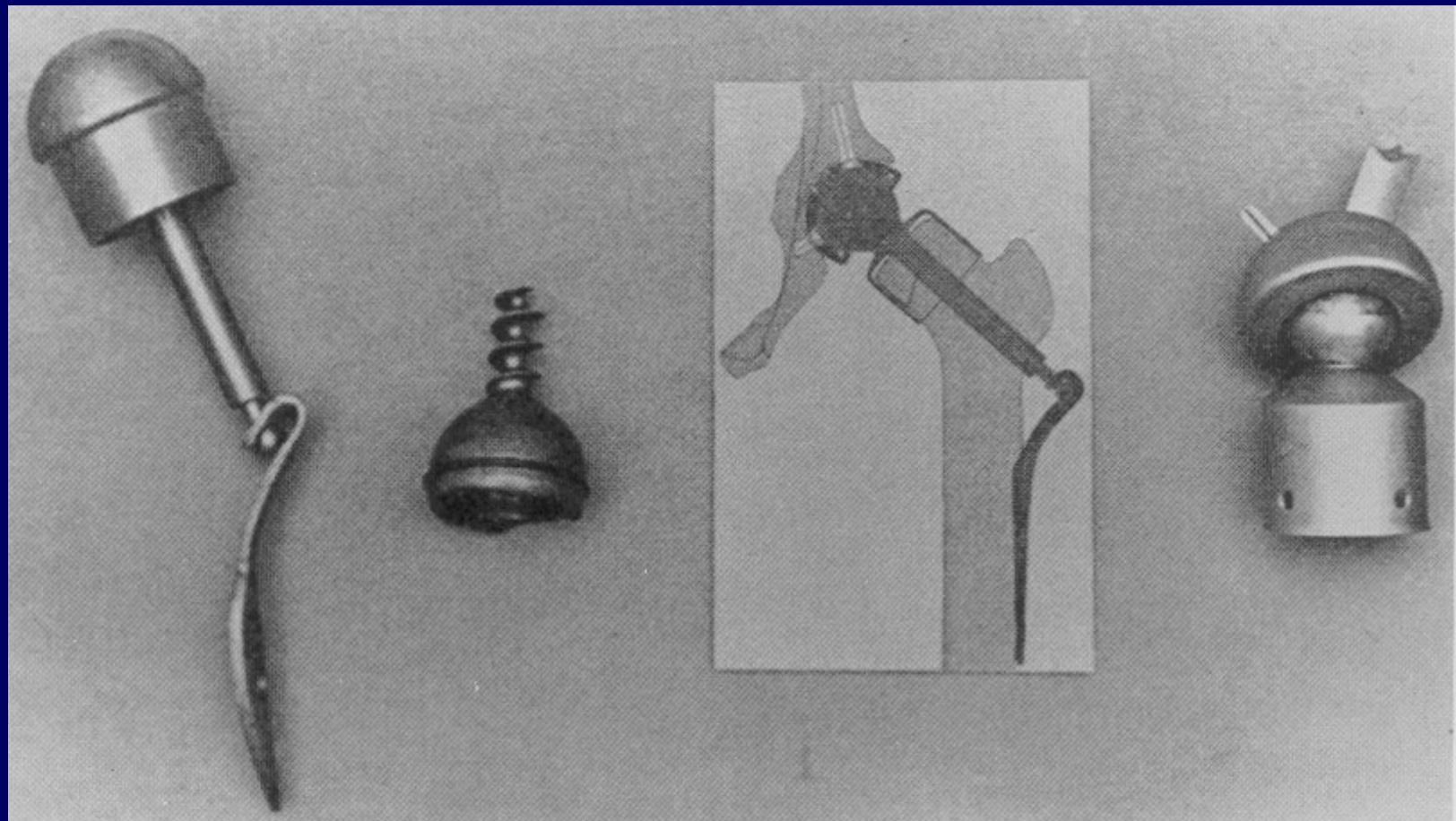


Moore-Bohlman Upper Femur

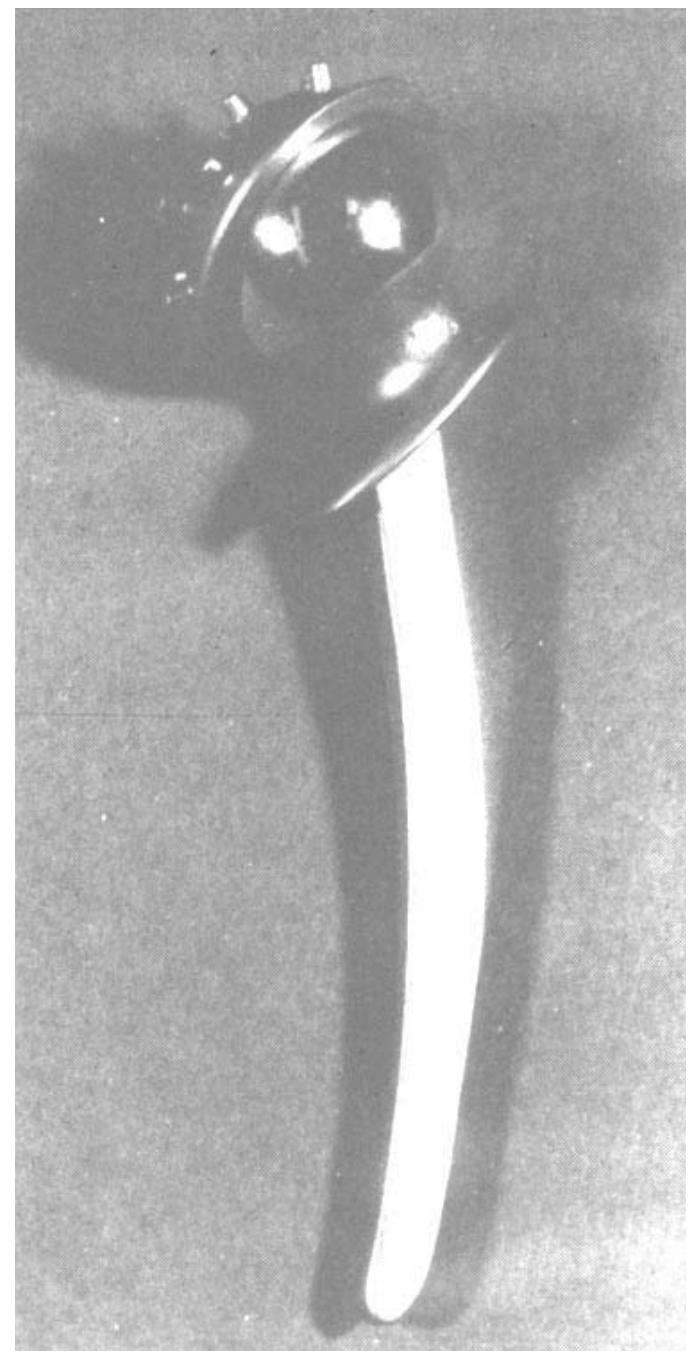
(1941)

THA Precursors

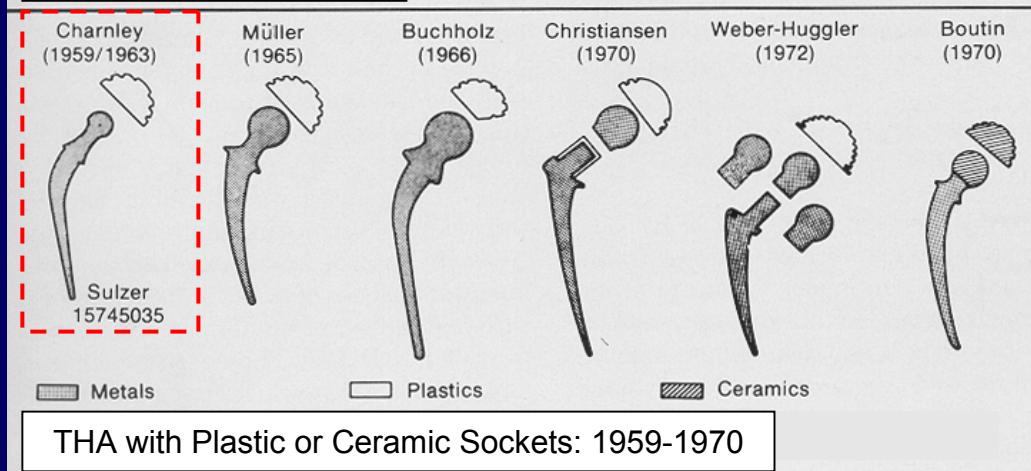
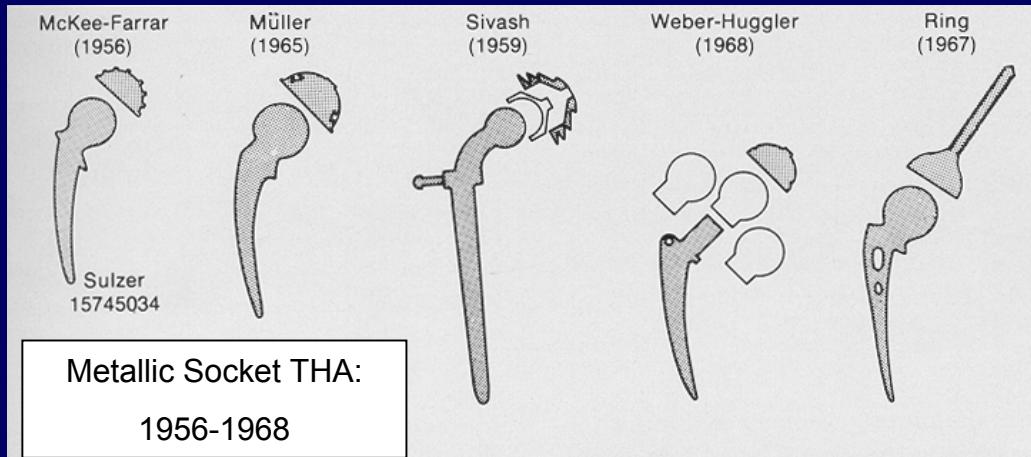
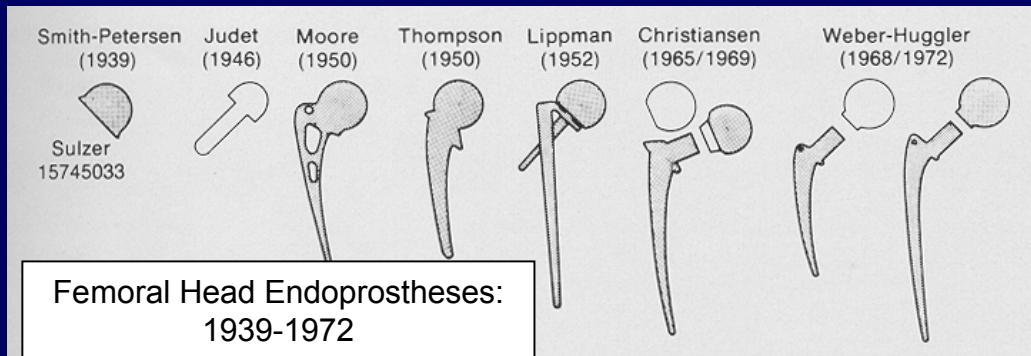




McKee THA, circa 1940



McKee-Farrar Total Hip Prosthesis



Development of Early Devices for Hip Arthroplasty



Sir John Charnley
(1911-1982)