A History of Cataract Surgery

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The difficult art

John of Luxemburg brought up in Paris becoming French by education. 1310 married 14-year-old with Elisabeth, sister of the deceased King Wenceslaus III of Bohemia

In 1330, King John of Bohemia began to lose his sight.

A French doctor brought to Wroclaw failed to restore vision and by the king's command was tied up in a sack and dropped into the Oder.

Blinded in his left eye and failing vision in the right a Muslim doctor invited to court at Prague. He made the vision worse and also harmed several other patients; His safe conduct obtained from the King prior to his arrival saved him being drowned.

Blind, King John travelled to Montpellier c1339, with his son Charles, Saw Guy de Chauliac recommended a regimen of diet and drugs that excluded moist, rude, heavy foods, to play it safe: as he explains, "Do not be over confident about treating cataracts, because medicines do little good and the use of the needle is really treacherous". Unsuccessful surgery on the King came with the risk of being thrown into the Rhone; recommending conservative treatment was safer.

died fighting with the French at the battle of Crecy 1346; "Where is the lord Charles my son?' His men said: 'Sir, we cannot tell; we think he is fighting.' Then he said: 'Sirs, ye are my men, my companions and friends in this journey: I require you bring me so far forward, that I may strike one stroke with my sword.' obeying; they tied all their reins of their bridles each to other and charged into the fray to die together.

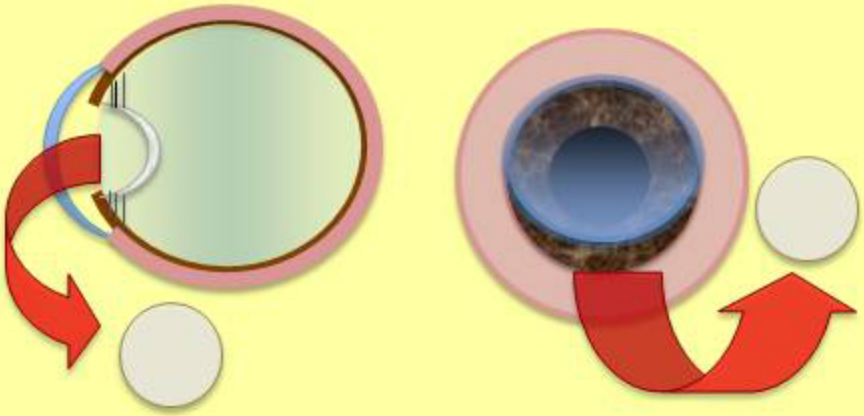
After the battle, John's personal crest (a pair of black wings) and motto *Ich dien ("I Serve")* modified and adopted by Edward, the Black Prince, the badge of the Prince of Wales since.

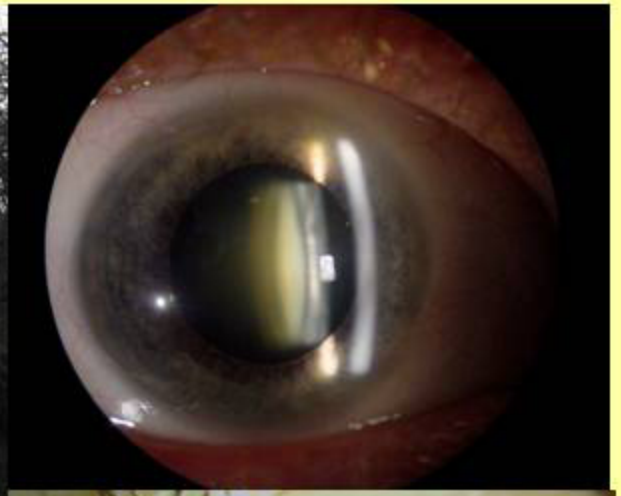
Cataract and its treatment

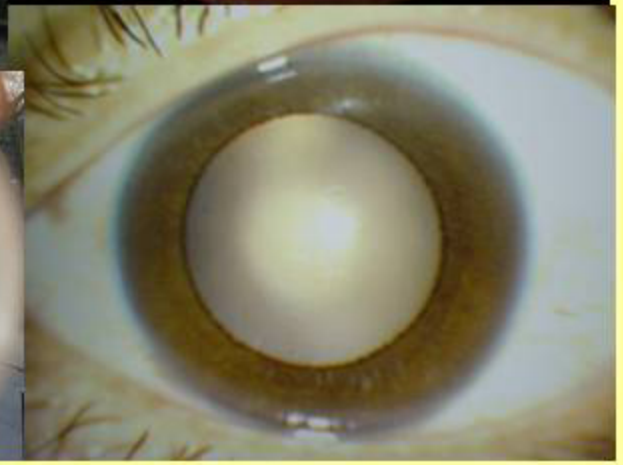
Cataract is an opacity of the lens. Treatment is surgical

Dislocating cataract in the eye (couching)

Removal of the opaque lens (extraction)

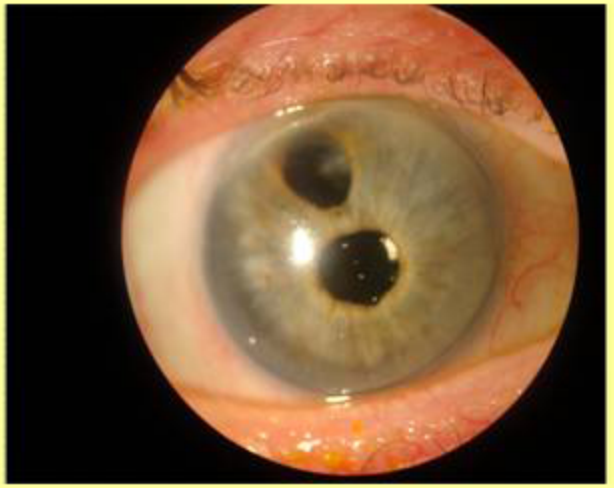


The history of cataract surgery

- The single most important invention.
- Susruta:
- Graeco-Roman Celsus Couching
- Arab translations
- Itinerant oculists
- Daviel first extraction
- Ridley IOL 1949
- Miracle of modern cataract surgery
- Small incisions 16-6mm
- Titanium (Croydon)
- Phaco-emulsification 3.5mm
- Micro-incision 1.6-2.0mm



Hammurabi code

Hammurabi, 6th king of the first Babylonian dynasty. 1795-1750 BC]). Code of laws, carved on stone monument, eight feet high, for public view. Found 1901, at ancient Susa. been taken as plunder by Elamite king, Shutruk-Nahhunte 12th century BC. begins and ends with addresses to the gods. a law code was a subject for prayer, cursings whoever shall neglect the law.

196. If a man has knocked out the eye of a patrician, his eye shall be knocked out. 198. If he has knocked out the eye of a plebeian or has broken the limb of a plebeian, he shall pay one mina of silver. 199. If he has knocked out the eye of a patrician's servant, or broken the limb of a patrician's servant, he shall pay half his value.

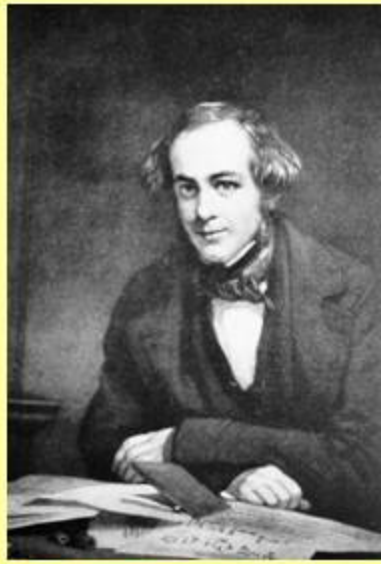
215. If a surgeon has operated with the bronze lancet on a patrician for a serious injury, and has cured him, or has removed with a bronze lancet a cataract for a patrician, and has cured his eye, he shall take ten shekels of silver. **Translated by L. W. King Yale School of law;**

215. If a physician make a large incision with an operating knife and cure it, or if he open a tumor (over the eye) with an operating knife, and saves the eye, he shall receive ten shekels in money. (yearly returns on 250 acres! Prof Blaiklock)

216. If the patient be a freed man, he receives five shekels

217. If he be the slave of some one, his owner shall give the physician two shekels.

218. If a physician make a large incision with the operating knife, and kill him, or open a



Tobit

Nineveh, Assyria: (later destroyed by Medes and Babylonians 612BC opposite Mosul on Tigris). Tobit Buried dead Jews cast out the walls.

One night he slept outside and his eyes became polluted by sparrow droppings.

I went to the physicians but they could help me not. Son Tobias travels on business to Rhages (Rey near Tehran) Media. In company with Angel Raphael. Whilst camping by the Tigris he captures a leaping fish. Instructed to remove gall and heart. The gall is good to anoint a man who hath white films in his eyes.

On his return he strakes the gall into his father's eyes. His eyes began to smart and he rubbed them and the white films scaled away. and he saw his son.

Bland-Sutton attributes the cure to dislocation of the cataract repeated by Swan J R Soc Med 1995;88:208-211.

Thompson&James BJO 1931 disagree, suggest corneal disease.

Ancient Egypt

5th dynasty sycamore Statue of Ka-aper: the chief lector priest, in charge of reciting prayers for the deceased in temples and funerary chapels. masterpiece of the private statuary of the Old Kingdom.

The eyes are inlaid; the rim is made out of copper and the white is of opaque quartz, while the cornea is made out of rock crystal.

White reflex in left eye

Possible reference to cataract is the Ebers papyrus 1525BC, 378 (60, 3– 6) and 44. Ebers 385 (60, 16 – 61, 1) 5. (Andersen Ry S. The eye and its diseases in Ancient Egypt. Acta). Ebbel translated the ch.t disease as cataract. However, other distinguished linguists interpreted it as discharge or accumulation of water in the eyes.

Painting in the tomb of the master builder Ipwy at Thebes (about 1200 BC) shows an oculist treating an eye. The scene has been interpreted as cataract surgery by couching of the lens into the vitreous cavity. However not in context.

Ipy's sarcophagus: ?Fb removal after chipping stone

Ptolomaic Egypt

Herodotus Book III: Egyptian eye specialists held in great regard: Because of request by Cambyses, son of Cyrus, King of Persia, Amasis, (Ahmose II of the 26th dynasty, 560 BC), sent the reluctant **Nebenchari** a famous eye doctor. Cambyses' mother, Kassandane, was blind. "Cutting the skin that covered the pupil of the eye" restored her sight.

Meanwhile Ahmose lost sight and was operated on by a rival, Pentamon. Nebenchari, convinced that Pentamon had had access to his manuscript, which described tretment for eye diseases which had been thought to be incurable sacred books of Toth, and by the old physicians of Byblos

temple of Kom Ombo, constructed by Ptolemy VI Philometor (180-145 BC) in the garrison town 50km N of Aswan. relief on the internal facade of the back wall that depicts a series of surgical instruments carved in stone, including several needles

Alexandria: Medical school founded c300BCE.

Herophilus 330-280BC. b.Chalcedon nr Istanbul;.student of Praxagoras of Cos (Hippocrates dead for 65 yrs) wrote from dissection including a book on the eye from which many modern terms are derived.

Galen states some surgeons devoted to cataract Sx

Philoxenes 270BC: Mentioned by Celsus

Antyllus: cataract operation in the 2nd century A.D, famous as a surgeon (Popliteal aneurysm). lived after Galen. Nothing is known about his life and his works have all been lost, but writings preserved in Oribasius, Aëtius and Rhazes.libiicap3 venet1529: cuts cornea, passes a needle turns it to draw out the lens through the opening. Dressed with rose oil and white of egg.

Oribasius (c. 320-400) was a Greek medical writer and the personal physician of the Roman emperor Julian the Apostate. He studied at Alexandria under Zeno of Cyprus. Mainly a compiler "the ape of Galen". **Described lycanthropy, a form of insanity in which the patient thinks himself a wolf, and leaves his home at night to wander amongst the tombs.**

Lathyrion: according to Rhazes operated on cataract in the same way as Antyllus.

India the birthplace of surgery

- Indus valley civilization Harrapa 2,600BC:
- Ancient sacred books Vedas compiled as poetic hymns in Sanskrit contain knowledge from 4,000-900BC.
- Rig veda praise, Sama veda songs, Yajur veda prayers and Atharva veda spells, The latter 700-800BC is source of ancient Indian medical lore, later transmitted through Brahmana texts. It was magico-religious in nature and incantations (mantras)
- At the time of Buddha, Ayurveda.'the science of (living to a ripe) age', without mantras. concept of humours or **dosas** is not part of Vedic literature and is different from Hippocratic or Galenic humoral theory. Ayurveda's emphasis on humoral 'balance', moderation reflects Buddha's 'Middle Path'. Disease causation in Ayurveda is not only because of humoral 'imbalance' (vaisamya) but for a variety of reasons like weather, food, emotional agitations, sins from past life and even 'sins against wisdom' (prajna paradha)
- Charak and Susruta put emphasis on direct observation. But unfortunately their texts and later commentaries have no anatomical or surgical illustrations Raju IndJOphth2003:
- **Charaka**, compliled Charaka Samhita. 600BC-200AD. Fame spread Trns into arabic; Avicenna quotes him as Scirak. .

॥ शुभमस्तु ॥

पारीण: शास्त्रसिन्धोरनुपमगरिमोद्धारिविद्याप्रचारो
दुर्बोधध्वाधितत्त्वावगमननिपुण: प्राणद: पोड़ितानाम् ।
पृथ्वीप्रख्यातकीर्त्तिर्जयति बुधवरोऽग्रेपविद्यावरेण्य:
श्रीमान् वैद्यावतंसो गुणिगणनिकषो द्वारकानाथसेन: ॥१॥
अनारतमध्यापयच्छास्त्राण्यशेषाणि हि वङ्क्षिथान् ।
अलभत पदवीं सार्थां यो महामहोपाध्यायेति ॥२॥
आयुर्वेदाब्धिमध्यादुरधिगमतमादुद्धृता येन यत्नात्
तास्ता: सिद्धान्तमुक्ता: सकलसुभिषजां कण्ठलग्ना विभान्ति ।
एतामिंलग्लभाषाव्यतिपरिणमितां संहितां सुश्रुतीयां
तस्मै भक्त्याऽवनम्रो वितरति गुरवे कुञ्जलालो द्विजन्मा ॥३॥

Susruta: the first cataract surgery

- **Susruta** Benares Treatise on Surgery **Susruta Samhita**. (सुश्रुतसंहिता) c250BC-500AD? Susruta referred to in 3rd person as worthy son of Visvamitra.
- Chedya (excision), Lekhya (scarification), Vedhya (puncturing), Esya (exploration), Ahrya (extraction), Vsraya (evacuation) and Sivya (Suturing). Rhinoplasty. And a later supplement, -Uttara Tantra on ophthalmology.
- Professional physician (vaidya) caste stopped surgery and this passed to barber surgeons Ambastha caste, originally in South India then migrating to Bengal.
- Description of cataract surgery in C9th Kalyanakarakam composed in eastern India by Ugraditya (C8th Jain monk).
- trs to Arabic by **Ibn Abillsaibial** C8th **Kitab Shah Shun al Hindi**. Rhazes was aquainted with it. Ibn Abi Usaybia (1203-1269. AD) and into Latin by Hessler 1844. 6 books 184 chapters.
- Also influenced muslims in India, blending of traditions and building of Hospitals. In 1595 Quli Shah had built a huge *Dar-us-Shifa (House of Cures) in Hyderabad.*
- The rhinoplasty operation performed in 1793 and witnessed by Thos Cruso and James Findlay the senior surgeons of the Bombay Presidency.
- No medical loan words from Greek but once wra (zodiac sign) is mentioned in a passage listing omens. So this compiler was aware of Hellenistic astrology.

Suttiah (oculist)

"It was a bright morning. The surgeon sat on a bench which was as high as his knees. The patient sat opposite on the ground so that the doctor was at a comfortable height for doing the operation on the patient's eye. After having taken bath and food, that patient had been tied so that he could not move during the operation. The doctor warmed the patient's eye with the breath of his mouth. He rubbed the closed eye of the patient with his thumb and then asked the patient to look at his knees. The patient's head was held firmly. The doctor held the lancet between his fore-finger, middle-finger and thumb and introduced it into the patient's eye towards the pupil, half a finger's breadth from the black of the eye and a quarter of a finger's breadth from the outer corner of the eye. He moved the lancet gracefully back and forth and upward. There was a small sound and a drop of water came out. The doctor spoke a few words to comfort the patient and moistened the eye with milk. He scratched the pupil with the tip or the lancet, without hurting, and then drove the 'slime' towards the nose. The patient got rid of the 'slime' by drawing it into his nose. It was a matter of joy for the patient that the could see objects through his operated eye and the doctor drew the lancet out slowly. He then laid cotton soaked in fat on the wound and the patient lay still with the operated eye bandaged. It was the patient's left eye and the doctor used his right hand for the operation."

The Sushruta Samhita, by Kaviraj Kunjalal Bhishagratna

- The Śaláká (rod) should be made to measure eight fingers in length, its middle part being covered with strings of thread and resembling the upper section of the thumb in circumference and its ends terminating in the form of a bud. The Śaláká should be prepared of copper
- Susruta prescribed a sprinkling with breast milk and clarified butter following surgery, bandaging with linen, and bed-rest.

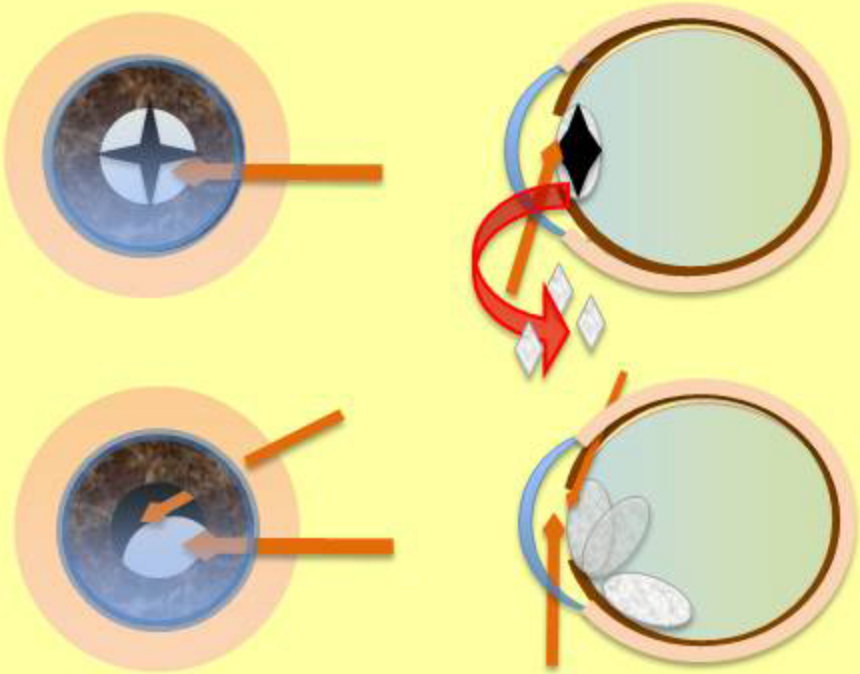
'शलाकया तामसव्या'

Dating the samhita

- 8th April 1888, Andrew Dalgleish the well loved 36yr old Scottish trader was camping in the Karakoram Mountains North of Kashmir. Age 23 was appointed manager of the Central Asian Trading Company to open up new trade routes for the commerce of India to Turkestan. Plied the route for 14 years and was the last British trader on the Leh-Yarkand trade. Unarmed he was shot then hacked to death by a 6' bankrupt trader in his camp called Dad Mohamed, a Karkar Pathan from Quetta. Brisbane Courier June 3rd 1888.
- Later on, Lt Hamilton Bower in Sinkiang on a hunting trip was ordered to track the murderer down. A long dramatic chase ensued across the Himalayas and Takla Makan Desert (trs "he who goes in will not come out"). Whilst staying in Kukla he was sold some manuscripts by treasure hunters.
- He passed them on to the Bengal Society where Dr. Hoernle translated them. 7 treatises, 3 ayurvedic medicine, 2 on divination with dice, 2 of incantations against snakebite. Show that Indian Medicine was practiced in ancient times in central Asia and China. Mentions Susruta's compendium so C6thAD is latest date. A grammarian Katyana c250BC mentions a rule meaning "statement by Susruta". The samhita is a composition of several historical periods and by several authors. The end of each chapter has Dhanvantari (King of Kasi/incarnation of Vishnu) teaching his pupil Susruta "Vathovaca bhagavan Dhanvantari Susrutaya". The compendium was re-edited by Nagarjuna, who added text including the whole of the 6th last part before 500AD. (Wujastyk)
- Dad Mohamed was later arrested in Samarkand and hanged himself in his cell. His brother out to murder Bower, travelling with a Gurkha escort, was found with his throat slit in mysterious circumstances. Dagleish's body was recovered by Younghusband and buried in Leh. Here fell Andrew Dalgleish, murdered by an Afghan, April 6th, 1888," being carved in English and Persian

Indian couching

- Roy et al 1975 dispute that ancient technique was couching. They state that the original text describes incision of the lens capsule and evacuation of the lens material by increasing intraocular pressure by asking the patient to exhale down one nostril. Wujastyk suggests that as cataract was viewed as excess phlegm (kapha), blowing the nose would be a mechanism of removing it from the eye via a (non-existent) canal connecting to the nose.
- Specialist oculists were of the barber class (as later in Europe). Their technique was the same as that described in the Sanskrit manual. For 1500 years they continued their trade. Hirschberg describes meeting (muslim) couchers in 1890's and having seen their successful results.
- A more comprehensive and scientific survey by Elliot (Madras) obtained 54 specimens of operated eyes which had become blind. Donated to the RCS but these were lost during Blitz.
- Couched lenses were found floating in the vitreous entangled in exudate and scar tissue. Retinal detachment was common. Only 20% of operations yielded any visual improvement. The instruments were antique and the trade passed from father to son.
- This convinced him of the superiority of extraction.



Ancient Greece and Rome

Couching is mentioned by several Roman writers. Technique is largely identical to that practiced by Susruta, except that a single instrument is used, and egg-white not ghee post-operation salve

Chrysippus of Soli c280-206 BC. Stoic philosopher. According to Simplicius a C6th commentator on Aristotle he is the 1st Gk author to mention cataract. Countering Aristotle's argument in *Cateories* from possession to deprivation, that you can go blind but blind cannot re-acquire sight There are hypochyma (cataract) sufferers called blind who can come again to sight after parakentesis.

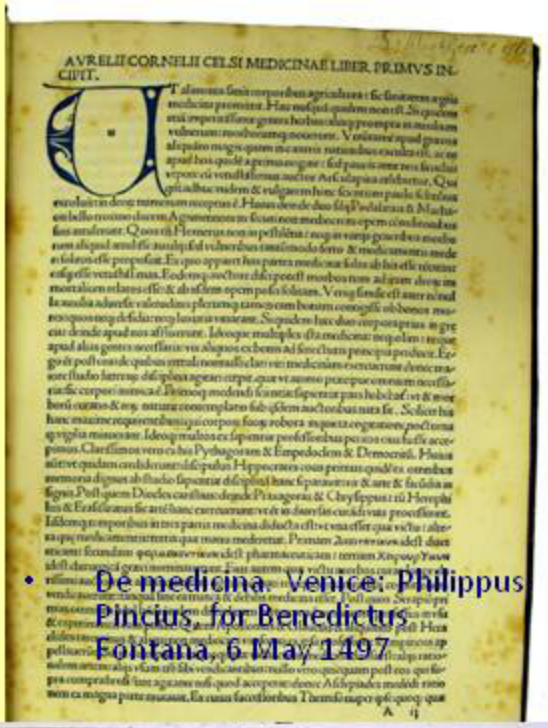
Aulus Cornelius Celsus (c25 BC-c50AD) Aristocratic (Cornelii) Roman encyclopedist, not a doctor living in the time of Augustus and Tiberius (*tristissimus hominum, "the gloomiest of men Pliny)*: Provides the first written description of the cataract and its treatment in the West; 29 AD ***De Medicina,*** On Medicine. surviving books of a larger encyclopedia.

a needle is to be taken pointed enough to penetrate, yet not too fine; and this is to be inserted straight through the two outer tunics at a point intermediate between the pupil of the eye and the angle adjacent to the temple, away from the middle of the cataract, in such a way that no vein is wounded. When the spot is reached, the needle is to be sloped against the suffusion itself and should gently rotate there and little by little guide it below the region of the pupil; when the cataract has passed below the pupil it is pressed upon most firmly in order that it may settle below After [the operation] the needle is drawn straight out; and soft wool soaked in white of egg is to be put on, and above this something to check inflammation; and then bandages. Subsequently the patient must have rest, abstinence, ointments.

"Si haesit, curatio expleta est: si subinde redit, eadem acu concidenda et in plures partes dissipanda est, quae singulae et facilius conduntur et minus late officiunt." Celsus. *De Medicina. Vol. 3.; 350.*"If it sticks there the cure is accomplished; if it returns to some extent, it is to be cut up with the same needle and separated into several pieces, which can be the more easily stowed away singly, and form smaller obstacles to vision. deducere . . . insidat: in this paragraph Celsus describes the operation for "couching" (med. English) or "pricking" a cataract. The word "pricking" is a translation of the Greek word παρακέντησις

Not popular and book disappeared until 1443 when Thomas of Sazanne (Pope Nicholas V) found a copy of **De Medicina** in Milan. Moved by the beautiful Latin. 1478 one of the first medical books printed and the 8 volumes become a standard medical text. Cited by Pare 1634 and Morgagni 1759

Galen (131-201BC:b Pergamon (Turkey) Moves to Alexandria then Rome. Describes Separation of Surgery from Medicine, including specialist eye surgeons in Alexandria ophthalmikos iatros and a cataract coucher parakentesis.Titus Julianus accompanied Caesr to Britain because of skill in clearing the sight.


AVRELII CORNELII CELSI MEDICINAE LIBER PRIMVS INCIPIT.

- De medicina. Venice: Philippus Pincius, for Benedictus Fontana, 6 May 1497

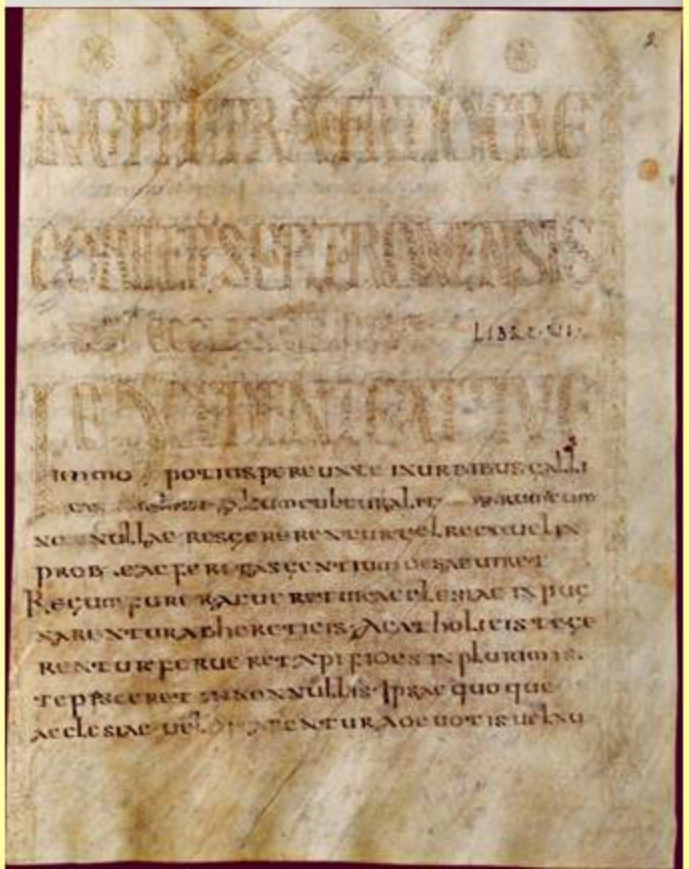
Clinic scene:1550, Venice edition of Galen's Opera Omnia. couching for cataract,

Roman attitude to ophthalmologists

- **Nuper erat medicus, nunc is uispillo Diaulus: uispillo quod facit, fecerat medicus.**
- *"Until recently, Diaulus was a doctor, now he is an undertaker. He is still doing as an undertaker, what he used to do as a doctor." (Martial, Epigrams 1.47)* **Oplomachus nunc es, fueras opthalmicus ante. Fecisti medicus quod fanis oplomachus.** *"You are now a gladiator, Although until recently you were an ophthalmologist. You did the same thing as a doctor that you do now as a gladiator." (Martial, Epigrams 8.74*
- lance (hasta) and a short sword held in the left hand, together with a small round bronze shield like the Greek hoplite,
- hoplomachus and the Thraex were matched against the murmillo, who carried the sword and shield of the Roman legionary.
- An imposter called Herophilus an eye doctor claimed to be

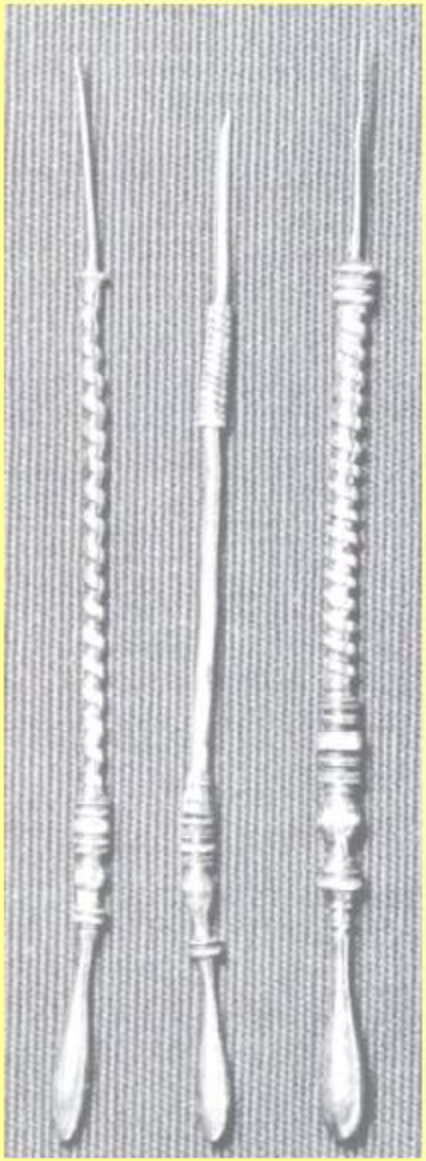
End of Empire

- Itinerant oculists provided salves (collyria)
- Block was stamped with name of oculist. Diluted with egg-white.
- 300 stamps found in empire 30 in Britain.
- Cup with inscription Lucius Iulius Senex found by Moorfields.
- Surgical instruments found in France, England, Sicily.
- At Wroxeter in Shropshire there may have been a particular focus on eye care with the discovery of two collyrium stamps in the names of Tiberius Claudius and Lucillianus together with a case of probable surgical instruments including an eye needle for cataract extraction (BBC feb2008)
- **Gregory of Tours:** 538-594 Gallo-Roman Bishop refers to cataracts being treated with needles
- *He went to the cell where St Martin had died. Lying down weeping he wet the earth with his tears, and warmed the old wood of the bed with his sighs. When day broke, the gates of his eyes lifted and he was allowed to see the light. Whenever did the physician's iron tools do anything comparable?-tools that lead more to pain than to healing, and which, after the eye has been exposed and pierced with needles, seem to induce the torment of death more than they admit the light.*



Byzantine

- **Aetius of Amida** early C6th: Mesopotanian studied Alexandria moves to Constantinople becoming *κόμης οψικίου*, (comes obsequi)i, chief officer in attendance on the emperor: 16 Books on Medicine; compilation from the lost Library of Alexandria: discusses hypochyma but not the operation fr its cure. Gk tradition two types of cataract γλαυκωμα morbid blueness υποχυμα water
- **Paulus Aegineta** c625-690. b. Island of Aegina nr Piraeus. he studied at Alexandra and travelled widely, little is known of his life. His fame rests on a Medical Compendium (rare until Islamic times) in Seven Books, (Latin: **De Re Medica Libri Septem**). This work is chiefly a compilation from earlier writers (Galen, Aetius). translated into Arabic by Hunayn ibn Ishaq. Book3 chap22 list of ophthalmic diseases, book6 chap6-22 discusses surgical treatments.
- Placed the patient in the light but not in the sun..mark the place..left eye use right hand and v/v..we push it strongly through the mark raise the perforator to the apex of the cataract (hypochyma) and push the cataract down.
- Also medical handbook or "pragmateia survived in Syriac and Arabic translations, becoming one of the cornerstones of the Islamic medical tradition
- two forms of the famous 'Kenteterion', dating from the Hellenistic period, used for the couching of cataract found on the island of Milos



Arab surgery

- On 8 June, A.D. 632, the Prophet Mohammed (Peace be upon Him) died. The Arabs assimilated the culture and knowledge of the peoples they ruled, Persians, Syrians, Copts, Berbers, adopted the Arabic language. The nationality of the Muslim thus became submerged, and the term Arab acquired a linguistic sense rather than a strictly ethnological one. Baghdad f.763 becomes capital. Gunde Shapur Persia centre for Nestorian Scholarship.
- Ophthalmology became a specialty. During the 12th and 13th centuries explosion of Arabic treatises on ophthalmology.
- **Muhammad ibn Qassum ibn Aslam al-Ghafiqi**, Spain; of whom nothing is known: **Guide to Ophthalmology**. illustrated with instruments
- The earliest known medical image of the eye, C12th copy of C9th **Hunayn ibn Ishaq**, manuscript.
- Many descriptions of cataract surgery. Mostly sitting and held from behind but exceptions recorded.
- **Tabit Ibn Qurra**: C9th Christian Arab surgeon. Advises operating on the carpet (low divan) on which the patient will lie down (sleep).
- **Fath al-Din al-Qaysi**; ,oculist in Cairo d.1259 **The Result of Thinking about the Cure of Eye Diseases (Natijat al-fikar fi `ilaj amrad al-basar)**
- **Khalifa al-Halabi** C13th: "I have heard of the most famous surgeon of our time operating on a lady of high rank while she was recumbent. God the sublime knows best what is right.
- In the 13th century, a Syrian physician, **Ibn al-Quff**, composed a specialized surgical manual, in which he omitted all ophthalmological procedures because he considered these the province of a specialist.

Arabic writing on cataract surgery

- Islamic medicine based on Greek medicine, with Persian, Syriac, Arabian. Indian and Chinese influences. Translations: Graeco-Arabic translations, sometimes via Syriac;
- **Yuhanna ibn Masawaih** 777-857: Christian court physician: Trained in Academy of Gundishapur, then moved to Baghdad. **Daghal al-'ayn (Disorders of the eye).** Earliest eye treatise in (bad) Arabic. Used as exam text. Translation but wrongly ascribed Aphorismi Johannis Damnseeni (Bologna, 1489)
- **Hunayn ibn Ishaq (Johannitus:** 809-877). Major translator. Native of Hira, son of Nestorian druggist. Studies under ibn Masawaih but annoys him with too many questions and is expelled "What have people of Hira to do with medicine. Go out on the streets and change money!" Went to Basra, learned Arabic. **Kitab al-'Ashr maqalat fi l-'ayn (The ten treatise of the eye)**. First systematic textbook. Based on Galen. Earliest anatomy of eye. Imprisoned for refusing to poison Caliph's enemy.
- **Ali ibn Isa** 940-1010 Baghdad: (Jesu oculist) Christian: **Tadhkirat al-kahhalin** (notebook for Ophthalmologists). Treatment of eye diseases based on Hunayn. Describes couching, including pre-op prep (speak kindly) Advises blowing nose during operation.
- **Ammar ibn Ali al-Mawsili**: Iraqi Christian. b. Mosul practiced in Egypt. **Muntakhab fi ilaj al-'ayn (Select work on the treatment of the eye)**. More original. 6 case description of cataract surgery, including one using hollow needle for the extraction of soft cataract. "Then I operated on him with the hollow needle and extracted the cataract; and he saw immediately and did not need to lie, but slept as he liked. Only I bandaged his eye for seven days. With this needle nobody preceded me. I have done many operations with it in Egypt" Conflicting evidence, rarely performed.

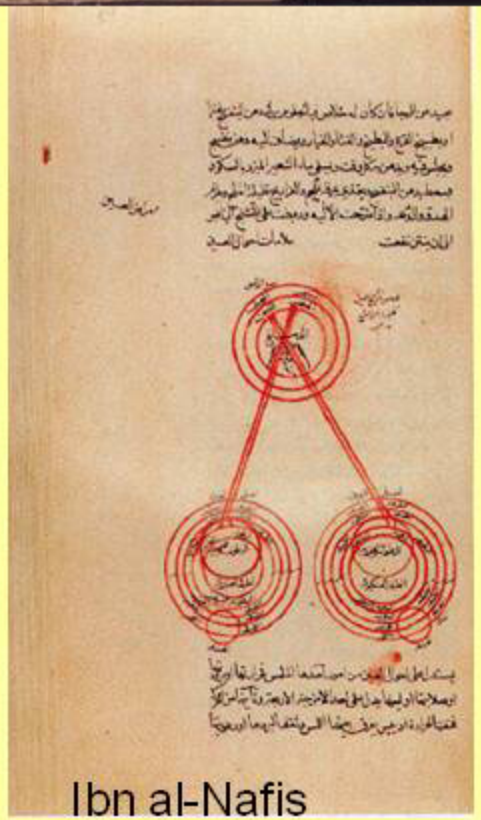
Chesm manuscript 1200CE, Al-Mutadibih (active ca. 1170-1199 Cairo National Library. The eye according to Hunain ibn Ishaq.

1. **Medieval Islamic Medicine: Peter E. Pormann + Emilie Savage-Smith. Edinburgh University Press 2007**

Writers in arabic

- **Abū Bakr Muhammad ibn Zakariyā Rāzī** ***Persian*** (AD864–930: ***Rhazes*** : wrote an account of a couching procedure in which the lens capsule was pierced by the needle and the cataractous lens core suctioned out by means of a hollow glass rod. Liber Almansoris and Liber divisionum, He refused to have his eyes pierced in his old age "No, I have seen enough of this world as to be bored with it. "(Ibnabi Usaibica, cUyan al-Anba'
- **Abu al-Qasim al-Zahrawi** (936-1013), **Abulcasis Andalusian**: father of modern surgery. led to the decline of the barber surgeons replaced by physician-surgeons in the Islamic world. ***Kitab Al-Tasrif Method of Medicine*** 30-volume medical encyclopedia 1000AD, transl Latin by Gerald of Cremona C12th used in European medical schools. The last edition was that of John Channing in Oxford (1778) contains original Arabic text with Latin translation.
- **Abū Alī al-Husayn Ibn Sīnā Avicenna: Persian** 980-1037. b.Bukhara (Usbek) Persia. Precocious polymath and physician. Appointed to Samanid court access to library. In his massive medical encyclopedia, ***Kitab Qanun fi al-tibb (The canon of medicine)***, summarized the Greco-Roman and early Islamic medical writings available during the C10th/11th. *used as a text-book in the universities of Montpellier and Louvain as late as 1650. May have stultified Western Medicine which was less aware of later developments in Arab World.* Latin word "retina" is derived from Avicenna's Arabic term. Proposed using 2 instruments for couching.
- **Ibn al-Nafis, (1213-1288)** b. **Damascus**, Muslim, educated at the Medical College-cum-Hospital founded by Nur al- Din Zangi.. personal physician to Sultan Baybars in Egypt. Criticised Ibn Sina and challenged Galen on Pulmonary circulation 3 centuries before Europeans. ***Kitab al-Muhadhdhab fi l-kahl The Perfected Book on Ophthalmology***
- **Abū Merwān 'Abdal-Malik ibn Zuhr** ***Avenzoar,*** 1091-1161. b. **Seville** educated Cordoba *Al-Taisir,* in which he introduced the experimental method into surgery towards the end of the classic Arabic period, sums up the Arabic position by stating that "the treatment of cataract by extraction is impossible and reclination only is permissible. "when a cataract cannot be got discussed it must be depressed. He gives directions to press it well down"


Zahrawi: Al-Tasrif


Ibn al-Nafis

The origin of the word cataract

al-ma' an-nazil fitl-cain, water descending into the eye

Rhazes: Liber divisionum I.31 De aqua descendente in oculo"

Albucasis: Chirurgia II23 (De curatione aque descendentis in oculum). Most detailed account of couching. Based on that of Paul of Aegina unknown to West.

The classical word for cataract was "suffusio" (Celsus, De medicina VI.6

The translation from Arabic was aqua

Constantine the African, translates Arabic phrase not as aqua but as cataracta. In Galen's De accidenti et morbothe word was translated as cataract

Cataracta: Greek something "falling down", (anything from a sluice gate to a waterfall) is hardly used in classical Latin, but is used on several occasions in the Vulgate, refering to heavenly gates that allow waters to pour forth from the skies, (not to the waters themselves).

Percy Flemming BJO 1927: The Hebrew equivalent is " areboth hasamim." " Arebah " derived from " arab," to knot or weave means a lattice, hence a window, Ecclesiastes, 12, 3; a dove house, Isaiah, 68; a chimney, Hosea, 13, 3; all of which were closed in with lattice work; hence "areboth hasamim," "the windows or flood-gates of heaven," which are opened when it rains, Genesis 7, 11; 8, 2; 2 Kings, 7, 19; Isaiah 24, 18

A single ancient author, Gregory of Tours c580 uses cataract in context of eye disease four times, the miracles of St Martin of Tours, History of France and Vitae Patrum:

Theudomer had the openings of his eyes severely obscured for four years, after a flux of the head caused cataracts to descend. Theudomeris diaconus cum prae humore capitis, decedentibus cataractis, oculorum aditus haberet per quatuor annos graviter obseratos,

recurs in the ninth- century compendium using many Greek terms "Sapientia artis medicinae : cataractam sic cura: ... oculum eius sinistrum cum manu tdextra paracintidas, oculum illius dextrum cum manu tua sinistra

C13th Montpellier surgeon William de Congenis , describes cataracts as heavenly gates which opened and shut. Cataracts optical barriers that appeared "in the doorway of sight". De cataracta in porta visus

1300: Montpellier physician Bernard Gordon Lilium medicine: equivalence "water and cataract, the same thing [aqua seu catharacta, quod est idem]

Picture of uncertain origin (in a style similar to Sabuncuoglu) shows a bearded Arabic doctor couching

Medical History, 2001 Michael McVaugh

Medieval Europe

- separation of surgery from medicine, 1215 by the Fourth Lateran Council, forbade physicians (most of whom where clergy) from performing surgical procedures, as contact with blood or body fluids was viewed as contaminating to men of the church. As a result, the practice of surgery was relegated to guilds Exceptions eg **Theodoric Borgognoni** cleric in major orders, at the papal court 1240.
- "craft status with training by apprenticeship
- **Roger Frugardi** Chirurgia nor Roland's commentary mention loss of sight, only mention pannus.
- The four Masters wrote Under "pannus" Roger means to consider ungula, macula, and catharacta. Pannus proper arises from a viscous humour that clings to a part of the ey and turns into a film that can be separated with a fine hook and cut off with a lancet.... Catharacta, ... arises from humours flowing into the space between the crystalline and aqueous humours , and it is sometimes curable and sometimes not.'
- 1377 **John of Arderne** De cura oculorum, manuscripts in Latin and in 15th- century English exist among the Sloane Manuscripts at the British Museum, Emmanuel College, Cambridge. This booklet is a mere compilation of other people's views, much of it being taken from Lanfranc.
- Increasing interest in diagnosis and treatment: 1250:***Compendium medicine*** of **Gilbertus Anglicus**, "cataract consists of a collection of humours between the tunics"
- **Bruno's** Surgery copies cataract in the recently translated Arabic texts of Rhazes, Albucasis, Haly Abbas, Regalis dispositio II.9.28.

Catharacta quidem provenit ex humoribus reumatizantibus, id est aliquando fluunt ad locum illum qui est intus fluentibus ad oculos, et isti cristallinum humorem et vitreum et faciunt

Arnald of Villanova: Montpellier teacher 1300 "blockage of the pupil by water that has coagulated there unnaturally is called cataract because of its similarity to clouds in the sky or air.

Benevenutus Grassus

- Benevenutus Grassus. B. Judea during the 11th century, Hebrew, an itinerant oculist, travelling Italy, Sardinia, Sicily, and North Africa.
- Writes the most popular ophthalmic manual of the Middle Ages **De Oculis;** begins with a simple account of the anatomy and physiology of the eye then a description of twenty eye conditions starting with cataract.
- Uses Latin, but is not University Educated. Quotes once from a simple medical text, Johannitius' Isagoge, vaguely aware of Galen and Hippocrates, has not seen Arabic surgical texts,
- De probatissima arte oculorum "The wonderfull art of the eye" translated into vernacular including middle english Hunter v.8.6 Glasgow and Sloane 661. "amici mei carissimi". pride in his Jerusalem origin by naming his pills, drops, and ointments the popular Jerusalem eye drops (collyrium hierosolimitanum)
- "The needle should be made of gold or silver. I am opposed to the use of steel, which has at least three disadvantages: First, it is much harder than silver and on that account injures every part it touches…a steel instrument is also very heavy…take note, also, that a gold instrument especially clarifies objects with which it comes in contact because of its inherent

A late-medieval operation for cataract

from a medical picture book by Henricus Kullmaurer and Albert Meher, BrMuseum MS Prints and Engravings 197.d.2 (c. 1510).

Medieval case report

- Gilles le Muisit, abbot of St Martin in Tournai, in 1351, three years after he went blind. Records
- "a German master came through Tournai, and after he looked at my eyes he promised he could cure me, with God's help. Having thought over all he had told me, in the end-against the advice of my family and friends-I accepted his offer, and on the Sunday after the exaltation of the Holy Cross [14 September] I let him work on one eye and the following Thursday on the other. He operated with a tool like a needle, restoring light to the eyes quickly and with little pain. I recovered my sight and could see-not like a young man, but as well as could be expected for the 80-year-old that I am-and I saw the sky, the sun, the moon, the stars (though I could not recognize people very well), and I could take care of myself pretty well except that I could not read or write"

Halt die Nadel ja gewiß im eindrehen / vnd gieb mit fleis achtung darauff / das du mit der spitze der Nadel jmmer nach der

Itinerant surgeons

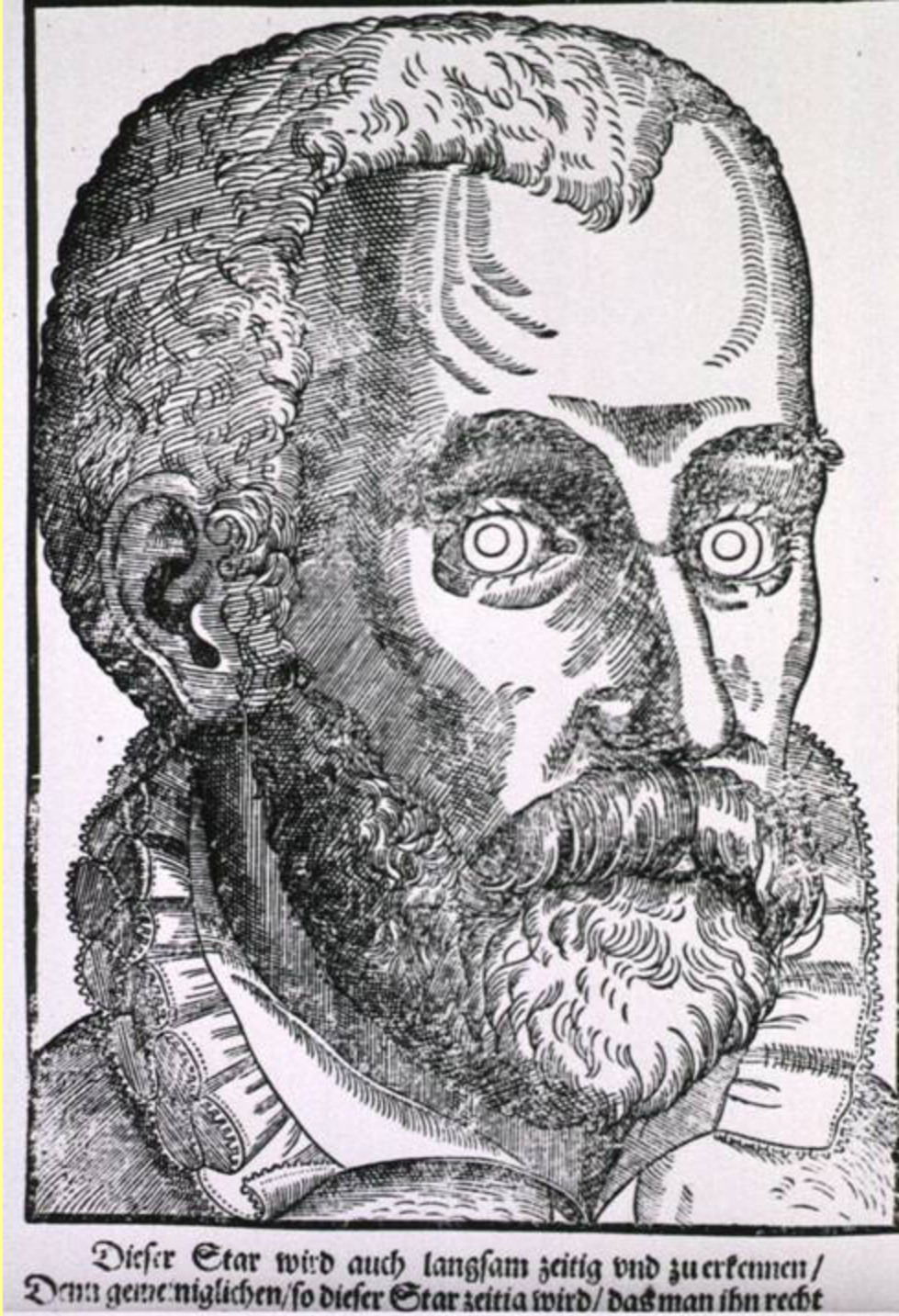
- Oculists travelled throughout Europe, advertising with handbills, announcements and booklets.
- death of the "flying" doctor **Charles Bernoin**. Famous for his expertise in lithotomy and cataract surgery, offered sensational performances designed to showcase his supernatural medical prowess. Audiences would watch him ingesting hot oil and melted lead, and then treating himself onstage with his patented medicines. the 58-year-old showman and surgeon fell to his death from a tightrope in 1673 onto the paving stones of a square in Regensburg when his firework-powered flying act went tragically wrong (johan Beer 1683)

Bertisch

- 1583: Bertisch "nor is there any lack of old women, vagrant hags, therica sellers, tooth-pullers, rat and mouse catchers, knaves, tinkers, hog-butchers, hangmen, bum-bailiffs and other good-for-nothing vagabonds, all of whom body try to perform this noble cure

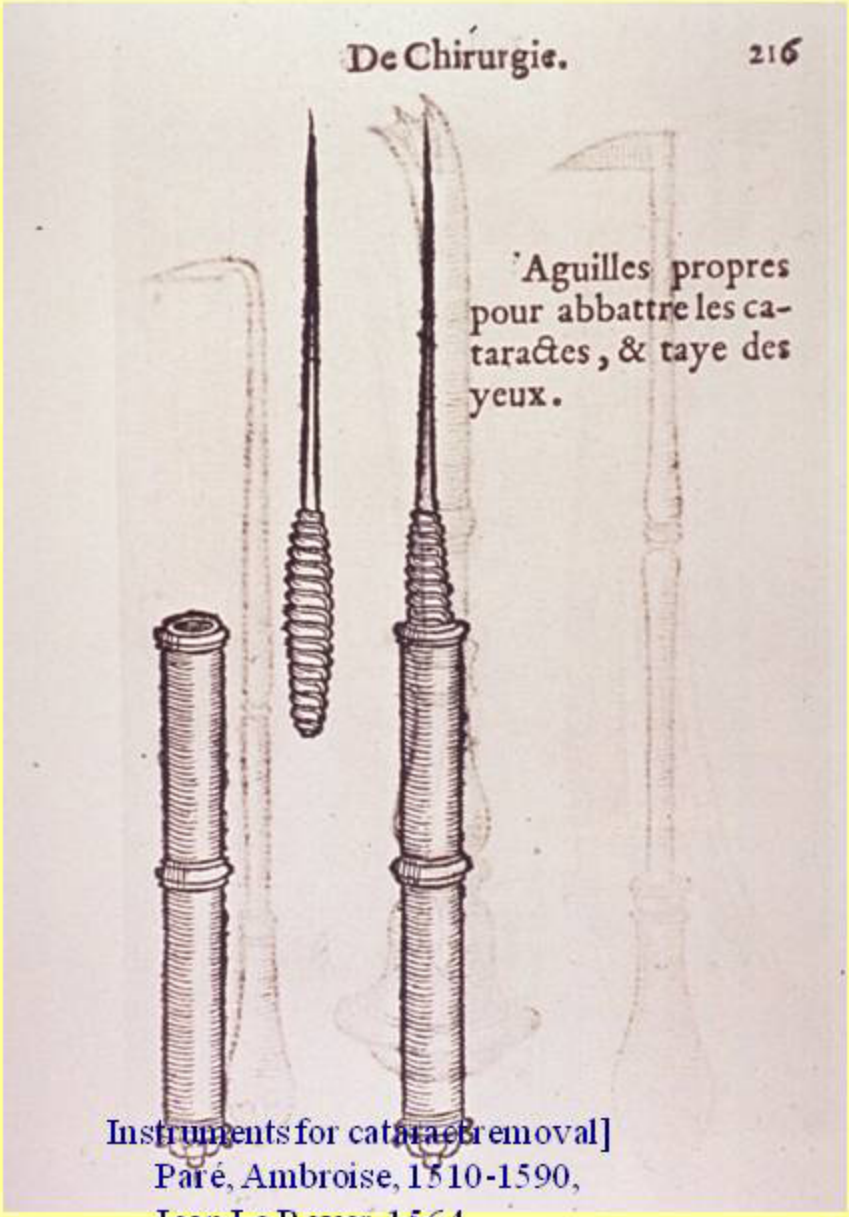
Man with blue cataract Ophthalmodouleia, das ist,

Augendienst, l. 51 recto.



Renaissance

- **Ambroise Paré:**
- "It must be made of iron or steel, and not of gold or silver, it must also be flatted on the sides, and sharp pointed, that so it may better pierce the eye, and wholly couch the cataract once taken hold of; and lest it should slip in the surgeon's hand, and be less steady, it shall be put into a handle"
- Army barber-surgeon, devised innovative military surgical procedures. Noted that the usual practice of treating gunshot wounds with boiling oil was detrimental: instead he tried applying ointment and bandaging the wounds. ligation (tying blood vessels) not cautery.
- 26 books, including Des Monstres, a book filled with stories about sea devils and other monsters, were compiled into a large volume, translated into several languages, including Latin.
- That Paré did not know Latin irritated the learned physicians of France, who feared that lowly surgeons untrained in classical languages might become their rivals.



Instruments for cataract removal]
Paré, Ambroise, 1510-1590,
Jean Le Royer, 1564.
Dix livres de la chirurgie, p. 216.

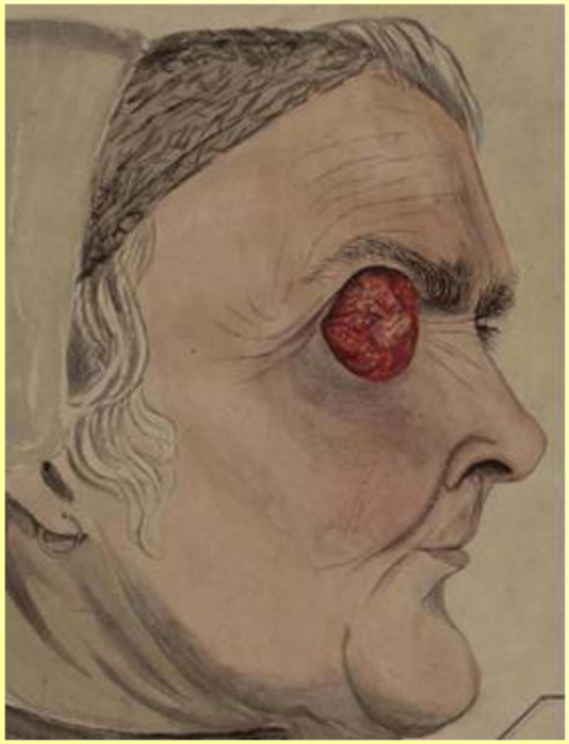
Qualified surgeons

John Woolhouse: 1666-1734. Son of an oculist. Q Trinity Cambridge. Oculist to King James II. Moved to Paris. surgeon to the Hopital des Quinze-Vingts
"***A Treatise of ye Cataract & Glaucoma***. Dictated by Mons. Woolhouse, Occulist to ye French King, begun April 29, 1721." Incorrect old fashioned views. Gassendus and Rohault who opened a couched eye theAcademy of Sciences and found no crystalline humour, "to believe yt ye crystaline humour was deprest in ye operation by ye needle, and that there was no other cataract, but ye opake crystaline, an ill founded tradition caused by ye sophistry and cherelattanery or quackery, of oculists of all ages, whose interest it was, to confound glaucomas and cataracts together, 'twas but ye prick of a needle and they gained their money right or wrong."
Mountespan's Hospitall, Gabriel Cox of above 60 years old, recovered his sight by couching. I open'd his eye at his death and found ye crystaline humour trans- parent and in ye natural place and ye cataract coucht as aforesaid."

Operation to remove cataracts]
Bartisch, Georg, 1535
Ophthalmodouleia, das ist, Augendienst,

Specialisation in C17th oculists

Dawbigney Turberville b1612.old English family Sir Payan D'Urberville, Norman knight
Oriel Oxford, MD 1660.
Moved to London. Then Salisbury. sent for by the Duchess of York to cure the child Princess of Denmnark (Queen Anne), whose inflammation unsuccessfully treated by "Court fysicians." They despised Turberville, looking on him as a country quack.
The Duke ordered him a fee of £600.
"He generally prescribed to all, shaving their heads and taking tobacco, which he had often known to do much good, and never any harm to the eyes. He cured the poor gratis, 'without doubt this is a married man otherwise 'twere impossible he should be so patient'; overhearing in the midst of his torment laughed, replying, 'No indeed, I am but a batchelor".
treated Pope, who says: "It was he who twice rescued me from blindness, when both my eyes were so bad. Adieu my dear friend, a rivederci, till we meet and see one another again with eyes which will never stand in need of a COLLYRIUM. Epitaph: Near this place, lies interred the most expert and successful oculist that ever was, perhaps that ever will be, - DR. DAWBIGNEY TURBERVILLE. he removed to London, intending to settle there, but not having his health he left it and lived in Salisbury more than 30 years, doing good to all, and being beloved by all. His great fame caused multitudes to flock to him, not only from all parts of this Kingdom, but also from Scotland, Ireland, France, and America. He died April 21st, 1696, in the 85th year of his age.
Philosophical Transactions 14: "About six or seven years since I had a gentm. (Mr. Oyliff) in cure for his eye, which was as large as my fist, black and fleshy, and full of bluish bladders, this I judged to be a cancer. After bleeding and purging I cut out ihe ball and ulcered flesh by many cuts, which were all insensible to him, till I came to the optic nerve; at the last cut he complained, and bled a little; the wound was healed in about a fortnigllht; he now wears a black patch over the place.
Also treated Pepys 1688:"My business was to meet Mr. Boyle, which I did, and discoursed about my eyes: and he did give me the best advice he could, but refers me to one Turberville of Salisbury, lately come to town, who I will go to." . . to an alehouse: met Mr. Pierce, the surgeon, and Dr. Clarke, Waldron, Turberville, my physician for the eyes, and Lowe, to dissect several eyes of sheep and oxen, with great pleasure and to my great information. But strange that this Turberville should be so great a man, and yet to this day had seen no eyes dissected, but desired this Dr. Lowe to give him the opportunity to see him dissect some."



- RICHARD BANISTER c1575-1626
- editor of the second edition of the English translation of Jacques Guillemeau's Des Maladies de l'Oeil qui sont en Nombre de Cent Treize aux quelles il est Subject,
- author of the 112 page Breviary attached to this edition, "something of mine owne, that through my experience they may finde at first, what I was learning long." "in 1622 I could couch the Cataract, and so began to gaine some name of an Oculist,
- *Of proud quacksalving Mountebankes: (Montare banco: those who sit on benches and sell medicines)* "In the methodicall practice and cure of blind people, by couching of Cataracts, our English Oculists have alwayes have an expeciall care, according to Arts, to couch them within doores, out of the open aire, to prevent further danger. Yet some of these Mountebanks take their patients into open markets, and therefore vaineglories sake, make them see, hurting the Patient, only to make the people wonder at their rare skill. Some other make Scaffolds, on purpose to execute their skill upon, as the Frenchmen, and Irish man did in the Strand, making a trumpet to be blowne, before they went about their work. But these were not long suffered to use these lewd courses, before they were called before the company of the Chirurgions: being sharply reprooved, soone left the City, and their abusive practice.
- author of Sloane Manuscript, 3801 BM on customs of the itinerant charlatans of this date. Several named, Luke of Erith, Mr. Surphlete of King's Lynn, and Henry Blackborne.
- first account of hardness of the eye as a diagnostic and prognostic sign in "gutta serena"

Age of quacks

- " quack-salver " came into common use in the reign of Charles I, referred to the noisy chatter of medicine vendors at fairs. Singleton's golden eye ointment was in vogue over three hundred years ago and sold at fairs by these quacks. Red mecurial oxide made in Lambeth from C16th-1970s
- **Henry Blackbourne** "who travelled contynuouslye from one market towne to another, who could couche ye Cataracke well..soe wickedlye gyven that he would cousen & deceave men of great som of moneys by taken incurable diseases in hand. He was lust amorously gyven to seueral women so that his coseninge made him fearfully to flee from place to place and often changed his name and habits in divers places & was often imprisoned for women. His skille was excelente, but his vices ... *longus, his practeste was this, yf he made a blinde man see; after he had couched ye Cataracke.* 1605 received the Archbishop of Canterbury's licenceto practise in diseases of the eyes
- **Sir William Read** fl c1675 -d1715; illiterate son of a Suffolk cobbler couldn't sign, formerly a tailor, set up in the Strand as an oculist in 1694 successful found favour with Queen Anne, whose weak sight led her to seek relief from anyone. She knighted him " Her Majesty's Oculist and Operator in the Eyes in Ordinary." Published a book unable to read, containing strange ideas. " putting a louse into the eye when it is dull and obscure. and wanteth huniours and spirits. This tickleth and thatittheeye moist and rhumatick and quickeneth the spirits."
- **Roger Grant**: Also illiterate, succeeded Read. pretensions to practise ophthalmology on the fact that he had lost an eye in the German Emperor's service in the continental wars. Set up as an oculist in Mouse Alley, Wapping, and succeeded Read as oculist subsequently to George 1st.

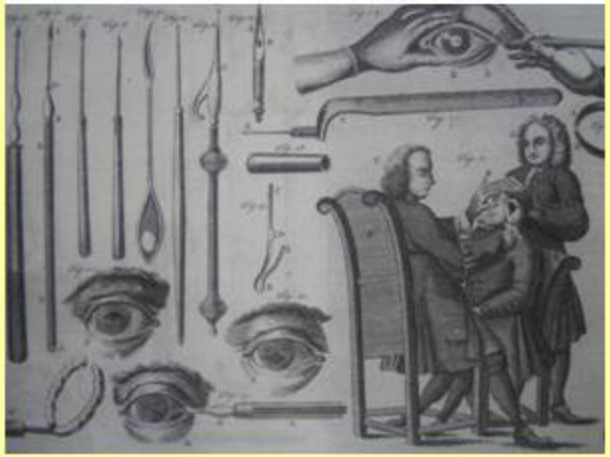
Age of enlightenment age of charlatans

- **Joseph Hillmer** (b c1720) Vienna appointed by Frederick II of Prussia appointed as ordinary professor for ophthalmiatrics at the Berlin Collegium Medico-Chirurgicum 1748.
- **Eisenbarth:** Put animal eyes into enucleated orbits, critised Taylor's charlatanism, called his century the "Okulisten-seculum".
- Connection between death and doctors (et plurima mortis imago the general images of death. crossbones)
- The centre figure, arrayed in a harlequin jacket, with a bone, in the right hand, is Mrs. Mapp of Epsom, a masculine woman, whose strength of arms was matched by her strength of language daughter of Mr. Wallin, a bone-setter, Hindon, Wiltshire. Called herself Crazy Sally
- Dr. Ward, generally called Spot Ward, from his left cheek portwine stain. Formerly a footman invented a pill cured the King and was allowed to drive his carriage through St.James' Park.
- eye in the head of his cane identifies oculist, Chevalier Taylor, autobiography published in 1761,

Chevalier John Taylor

- John Taylor: b Norwhich 1703 son of a surgeon. "Trained as an apothecary's assistant and as a surgeon at St. Thomas's Hospital, moved to Norwich where he was hated. Published "An account of the mechanism of the eye" 1727 age 24 then became an itnerant oculist styling himself ophthalmiatros" grammatically correct. Spent 30yrs travelling Europe acquiring many honorary degrees.
- George II appointed him at court and thus he gained access to the nobility of Europe. Ophthalmiater, Pontifical, Imperial, and Royal. Travelled in a coach painted with eyes and bearing the motto 'qi dat videre, dat vivere'. Pulled by 6 black horses, 5 of which were blind due their master having practiced on them. He gave a ball in Dresden, teaching the ladies contre-dance. Changing his shirt 20x he left town without paying the bill.
- Extraordinary man, derided as a charlatan by his peers. Dr. Johnson said " Taylor was the most ignorant man I ever knew," However a skilled orator, gave lectures on the eye, drew the true nature of the hemi-decussation of the chiasm, spoke and wrote in French. He had some successes. Sir William Smyth was charged 60gns and could see till the end of his days.
- He advertised his arrival by leaflets including his degrees and as An Englishman without being addicted to drinking. In 1751 on his first day in Amsterdam 170 people came to see him.
- Johann Sebastian Bach's (1685-1750) In addition to the cataracts, his worsening vision may have been due in part to some other eye problem. In 1750 Bach's vision became so poor that he had his eyes operated on by John Taylor. Initially standard couching procedure. According to the newspaper account, after the operation Bach 'recovered the full sharpness of his sight'. A second operation was done,23 though the newspaper accounts do not mention it. This was probably between 4 April, when the Spenersche Zeitung referred to his 'cure', and 8 April, for Taylor left Leipzig about then to arrive in Berlin on 14 April. His stay there was brief, for on 23 April the King ordered him to leave because of his failures. About one week after the first operation, Bach was operated on again because of the reappearance of the cataract. After the second operation Bach was blind. He died less than four months later.
- An opera called the "Operator" 1740 features Dr. Hurry. It ends with his creditors being left at a tavern to pay the bill. "But let us be gay, and our losses despise, And rejoice that we've safely escaped with our eyes!"

JOANNES TAYLOR, MEDICUS,
In Optica expertissimus.



Casanova and Intraocular lens

- Italian itinerant oculist Tadini, travelled Europe advertising in newspapers. came to Warsaw in 1794 and denigrated the established ophthalmologist who was german saying he didnt know how to remove cataracts. Asked Casanova to vouch for him, refused "operibus credite". At dinner hosted by a lady with cataract, the two met. The old German started to berate the charlatan in Latin which he did not know. Advising the lady that the operation was not certain and vision might not return because of the loss of the crystalline lens. Tadini pulled out a box containing crystal lenses. Vat are zose? They are what I possess the skill to put under the cornea. Laughed at. Subsequently the establishment hauled Tadini in to take an exam on the anatomy of the eye (in Latin which he did not know). Attacked the Dr. with drawn sword and left for Spain where he was drafted in the army.
- Casanova informed Dresden court doctor Casaamata who in 1795 introduced a glass lens but it dislocated. according to a publication of 1795 by the Swiss surgeon Rudolph Schiferli (1773-1837), the Court Oculist Casaamata had tried to insert a glass lens underneath a corneal wound but this had fallen into the bottom of the eye.

Francesco Fontebasso
Portrait of the Oculist F. Tadini 1761

John Freke 1688-1756

- The first ophthalmic surgeon in Great Britain was appointed to the position by the Governors of St Bartholomew's Hospital in 1727
- John Freke, son of a surgeon of the same name, was born in London in 1688. He was apprenticed to Mr. Blundell, whose daughter he married. In 1726, he was made assistant-surgeon to St. Bartholomew's Hospital, and the same year was made curator of the museum when it was started. This museum was in a single room under the "cutting ward," and among other things it contained the stones which surgeons had removed, which previously had been placed in the counting room when patients paid their bills.
- In 1727, he was put in charge of the blind patients, and the governors passed a resolution:
- Through a tender regard for the deplorable state of blind people, the Governors think it proper to appoint Mr. John Freke, one of the assistant surgeons of this House, to couch and take care of the diseases of the eyes of such poor persons
- The four stages of cruelty Hogarth 1751. Tom Nero begins by torturing animals then is hanged for murder. The skeletons in the niches: James Field notorious pugilist and Jame MacClaine gentleman highwayman recently hanged. It takes place at the newly formed Surgeons Company under Freke

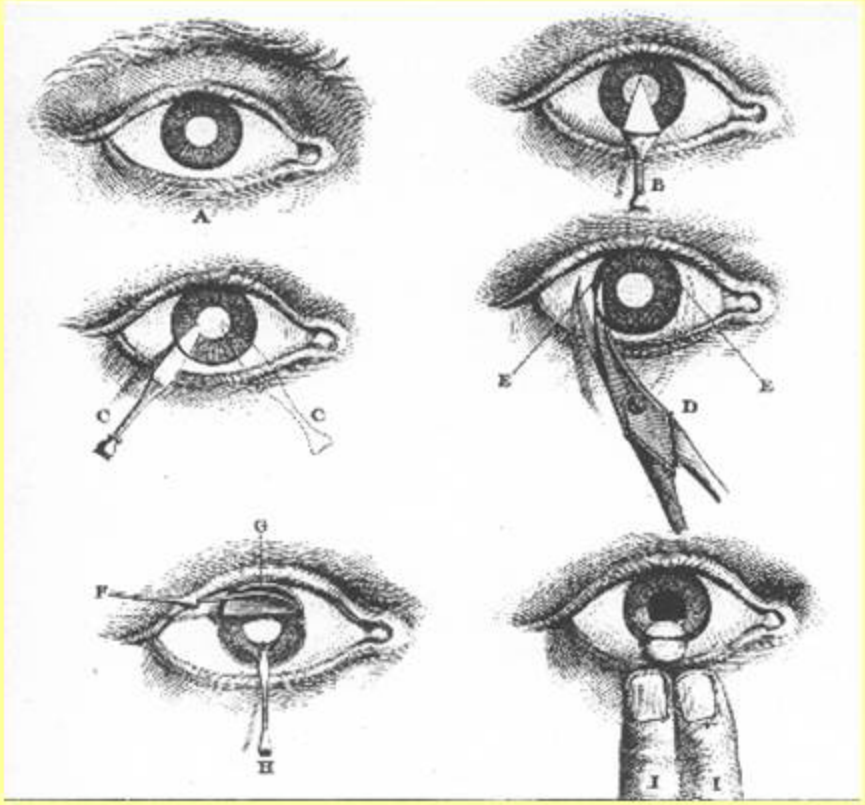
The end of couching

- Accidents in couching sometimes led to the lens coming forward. Occasionally a mature cataract can also dislocate.
- Freytag: Zurich, extracted such a lens 1690.
- 1685 Maitre-Jean had two patients in whom the couched matter was accidentally displaced into the anterior chamber instead of the vitreous, and turned out to be the lens.
- Michael Brisseau found that the lens was opaque at a post-mortem in a soldier with cataract, and when he communicated his findings to the Royal Academy of Sciences in Paris, Maitre-Jean supported him. That cataract was actually an opacity of the lens was a major breakthrough in the knowledge and treatment of cataract in general. Prior to this, the medieval world believed that the opacity termed "cataract", was an opaque humor which fell down in front of the lens, obscuring the vision.
- 1707, Charles Saint-Yves, the great French ophthalmologist, removed a cataract through a corneal incision after it had been displaced anteriorly during a couching attempt.
- 1708 M. Petit (surgeons in France also Mr. in those days) operated on a priest who had been successfully couched some years before but after exertion had come thru the pupil. St Yves saw the operation and reviewed the patient a year later in Paris "when he could read perfectly well with a cataract glass". *Memoires de l'Acadamie Royale des Sciences anne 1708.*
- Opening of cornea was not new. Rhazes wrote that 100AD Antyllus opened the cornea and drew out the cataract with a fine needle. Lathyrion also.
- Haly notes extraction and depression
- Avicenna says this is dangerous.

Eye maladies: Louis-Jacques Goussier.
Denis Diderot Recueil de planches, sur les sciences 1772

Daviel

- On April 8, 1748, Dr Daviel prepared to operate on one of his patients, a wigmaker named Mr Garion. When the traditional couching method didn't work, Daviel decided to try something different. He made an incision through the cornea and then used a spatula-like tool to extract and scrape the cataracts and much of the inner lens out, leaving the posterior lens capsule intact as well as the zonules that secure it. Daviel's so-called extracapsular procedure
- An opening was first made into the anterior chamber at the bottom of the cornea with a "myrtiform" or triangular-shaped knife, the incision was enlarged using, blunt-ended, double-edged knife, and completed with right and left directed corneo-scleral scissors to a "little above the pupil," . the cornea lifted using a spatula and the capsule of the lens was incised with a sharp-edged needle. The lens was then delivered, and the corneal flap was allowed to fall into place.



Samuel Sharp 1700-1778 ICCE

- B. Jamaica. His indentures were for an apprenticeship of seven years, and were signed on March 2, 1724. £300.paid by Mrs. Elizabeth Sale, "a widow living in Hertford. Cheselden well connected, dextrous (lithotomy in 54 secs)
- 1754 Philosophical Transactions "A New Method of Opening the Cornea" . He first used his knife on April 7, 1753, before de la Faye.
- creating an incision and then using pressure applied by his thumb to remove the lens through the hole.
- 19 cases April 7th and Oct 22. "The state of the success stands thus: AC, AD, AF, AG, AL, all which had the operation performed on both eyes, have every one of them recovered the sight of both eyes, to as great a perfection as can be supposed, without the help of the crystalline humour; that is, they can read and write, with proper spectacles. "The first of them, AC, has found so much benefit, as to be able to carry on the exercise of his profession, that of a surgeon. "AH sees with both eyes, but not so well as the other five. AI, another patient, at a distance from London, had the operation done on one eye only; which he recover'd, as my correspondent informs me, so as to see tolerably well.
- "AE had it performed on both; one of which was lost, and the other recovered; but continues inflamed, and cannot bear much light. "AB had it done on one eye only, which was lost . . . the ill success was partly owing to the imperfection of my instrument,
- 13/19 results were good, 2/19 were questionable, the sight at first being good, but deteriorating later, and 4/19 were failures: A great surgical triumph. Sharp operated without fixing the eye, without any form of speculum, and delivered the lens without opening the capsule.
- Anna Williams began boarding with Johnson. She was a minor poet who was poor and becoming blind, paying for cataract surgery by Sharp. Failed, abd still blind became Johnson's housekeeper.
- Also advised Handel not to be operated. Later couched by Brompton

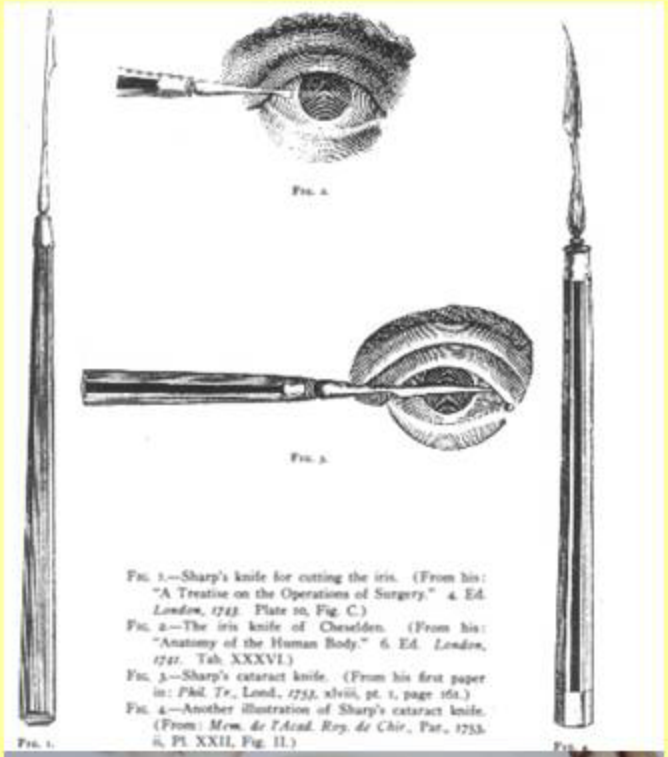
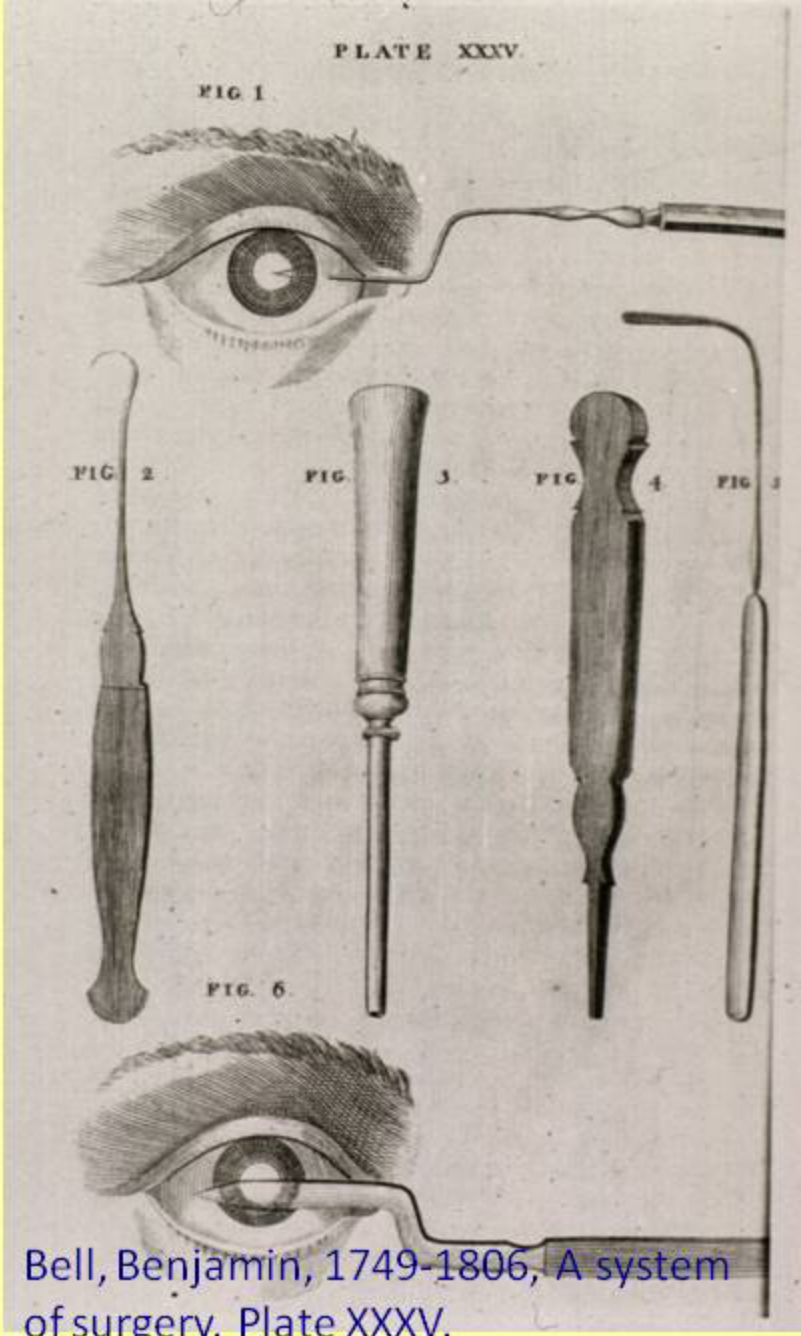


Fig. 1.—Sharp's knife for cutting the iris. (From his: "A Treatise on the Operations of Surgery." 4. Ed. *London, 1743.* Plate 10, Fig. C.)
Fig. 2.—The iris knife of Cheselden. (From his: "Anatomy of the Human Body." 6. Ed. *London, 1741.* Tab. XXXVI.)
Fig. 3.—Sharp's cataract knife. (From his first paper in: *Phil. Tr.*, Lond., *1753*, xlviii, pt. 1, page 161.)
Fig. 4.—Another illustration of Sharp's cataract knife. (From: *Mem. de l'Acad. Roy. de Chir.*, Par., 1753. ii, Pl. XXII, Fig. II.)

Couching to extraction

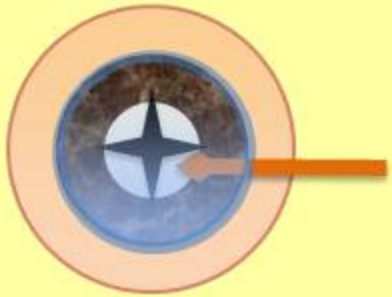
- The Baron de Wenzel, is reported to have said that he had 'spoiled a hat full of eyes' before he had learned to extract (Travers)Wenzel in 1765 was summoned to London to operate for cataracts upon an English duke, and he records that the resistance of his noble patient was so violent under the use of the knife that the assistant was nearly knocked down.
- Benjamin Bell, writing in 1785, had to complain that the difficulty in deciding whether couching or extraction is the better operation, is due to the fact that operations are left to itinerant practitioners.
- Guthrie: when the cataract is hard puncturing leads to an unfortunate result

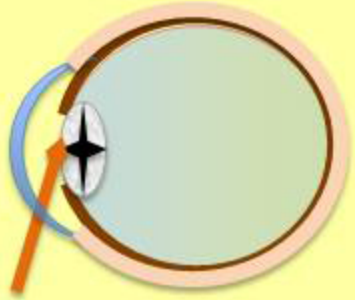


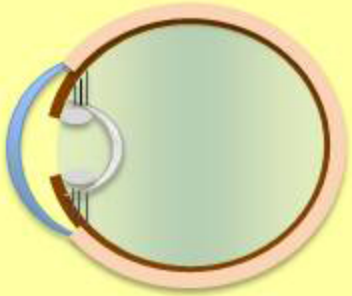
Bell, Benjamin, 1749-1806, A system of surgery, Plate XXXV. Worcester, Massachusetts: Isaiah Thomas, 1791

Congenital cataract

- 1775 **Percivall Pott** St. Barts Couching is a better operation, and could be performed in childhood. Also described needling.
- James Ware: Before performing an extraction, read over a list his " 24 mementos," he says, " of the accidents to which surgeons are liable in the operation of extracting the cataract, and the means by which such accidents may be either obviated or rectified:" Royal Society 1801 describes operating on a 7yr old for congenital cataract! In 1800 had attempted extraction in a 14 year old portuguese boy, extreme restlessness, tried couching, too soft so needled like Pott. Astounding result within days.
- Saunders records that at the London Infirmary for Diseases of the Eye, between June, 1806, and December,, 1809, sixty cases of congenital cataract were under his care, all of which he needled. He was the first ophthalmic surgeon in this country to use extract of belladonna

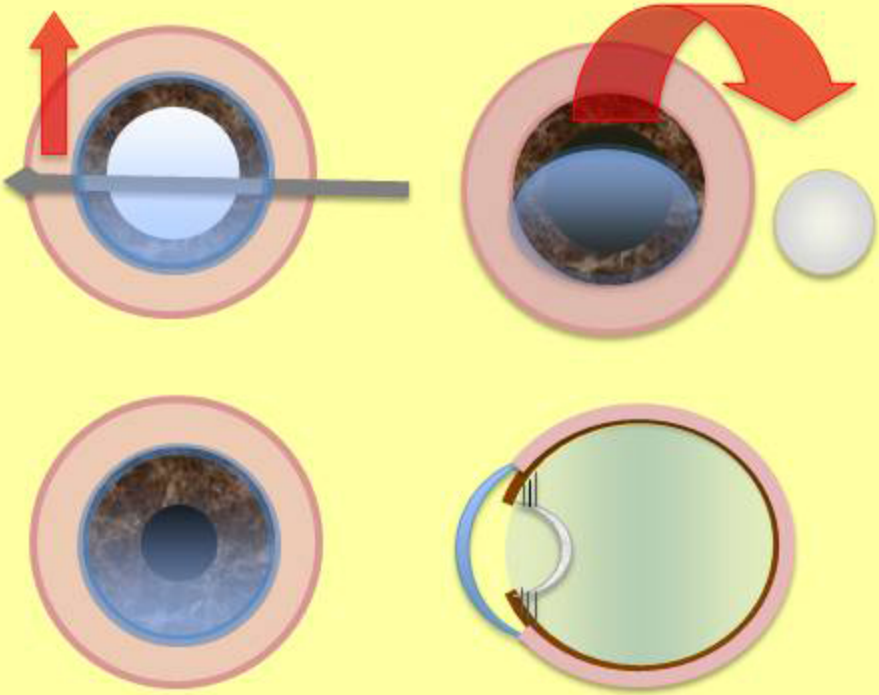






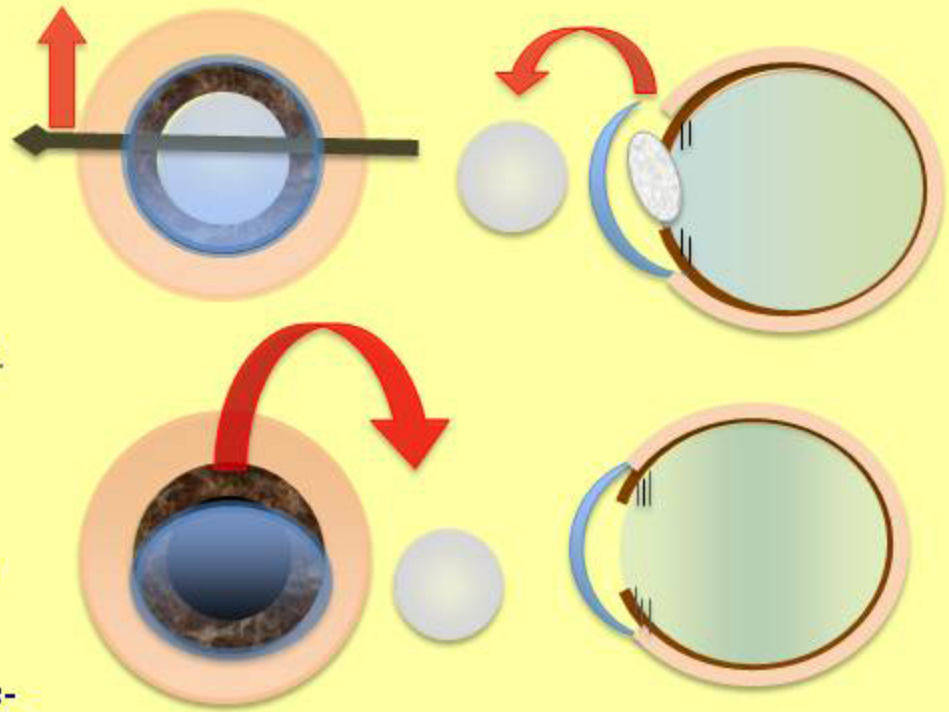
Extracapsular 1740-1990

- Von Graefe knife.180° incisions.
- Capsule opening with forceps
- Expression of nucleus by pressure over cornea with a hook. (No red reflex so material left behind).
- Hospital stay 2weeks. Morbidity (prostatic, PE) Mortality.
- 10d of absolute bed rest. Pad removed 5d and the unoperated eye on day6.
- 25% returned to theatre for cortical lens material clean up.
- 3m new specs



David Little operating for cataract. Harold Speed 1919: courtesy Nicholas Jones

Intracapsular 1750-1980



- Introduced by Sam Sharpe.
- 1799: Beer impaled the lens then hoiked it out.
- 1866: Breaking the zonules DiLuca, Pagenstecher brothers
- **Colonel Henry Smith** IMS , Jullundur 1890s, eye surgery during the Punjab eye-operating season, a period of 5 to 6 weeks of cooler weather. (increased postoperative infection, endophthalmitis during warmer weather). success with ICCE. 21,000 operations are done annually in the Punjab and Trans-Indus territory 30million population.
- major figure in the history of cataract surgery – and in cigar smoking. He smoked a cigar while operating. When asked about the dangers to the patient's eye possibility of ash falling into the eye he replied, "There is nothing as sterile as cigar ashes!": Indian Medical Gazette of Calcutta, Col Henry Smith 1859-1948. India 8% complication rate. Lower than ECCE. American surgeons travelled to India for training, including Vail (later Ed AJO).
- 1870: Terson, 1880 Knapp & Kalt: Capsule forceps improved
- Chemical zonulysis: a chymotrypsin: Barraquer 1960's
- Cryo-probe: Krwawicz, Kelman.

Modernisation of cataract surgery

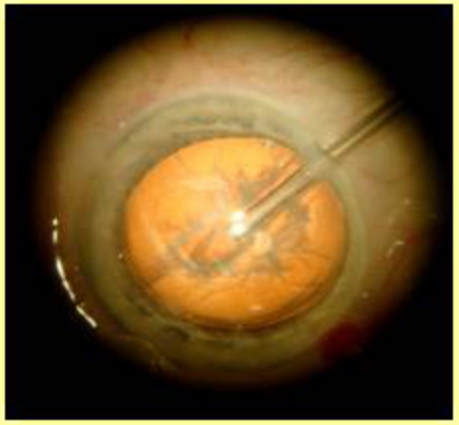
- 1924 Am. Academy meeting Greenwood suggested to avoid the term cataract as it struck fear into the patients.
- Reverse cutting needles in 1940's allowed wound closure. Reduced hospital stay to about 1 wk.
- Monofilament nylon
- Intraocular lenses
- Loupes used Microscopes, Kelman Carl-Zeiss, Dermot Peirce Croydon. Titanium instruments.
- Viscoelastics: Healon®
- Low-risk high quality outcome
- Day-case surgery

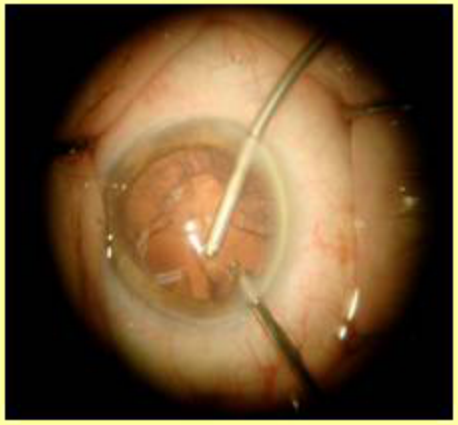
Phacoemulsification

- Visiting Dentist Kelman. Practised in secret.
- 1969: presented results. The nucleus was dislocated into the chamber and then liquified with ultrasound.
- 1973 Academy symposium chairman concluded, “it will not replace standard surgery (ICCE)”
- Incision about 3mm. Stable operating conditions. Same day discharge!
- Wound enlarged to 7mm if IOL was to be inserted
- Hostility from establishment (yet again). “you blind 50 eyes while learning it; It causes glaucoma”
- Kelman responded you need to be under 30 to learn it.

OERTLI OS3 Co-MICS

- Dual pump true peristaltic and venturi using same cassette
- Dual linear footpedal
- multi-phaco modes
- 1.6 co-axial phaco





Alcon intrepid micro-coaxial

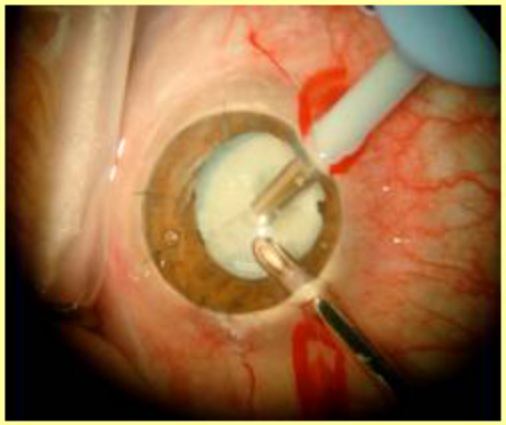
- Based on infiniti
- Ozil torsional technology
- 2.2mm
- Monarch IIID cartridge
  33% smaller than C cartridge
- SIA

  2.2mm 0.01D

  3.0mm 0.32 $D_{p0.0002}$

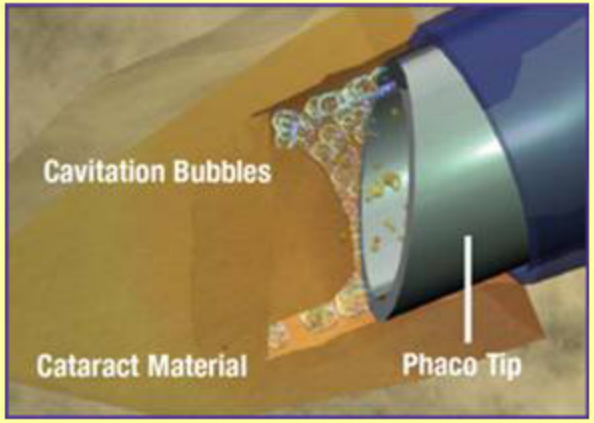
Stellaris B&L

- MICS or CMICS
- 1.6-1.8mm
- Increased stroke length compared to Millenium more efficient
- Small incision lens Akreos MI60



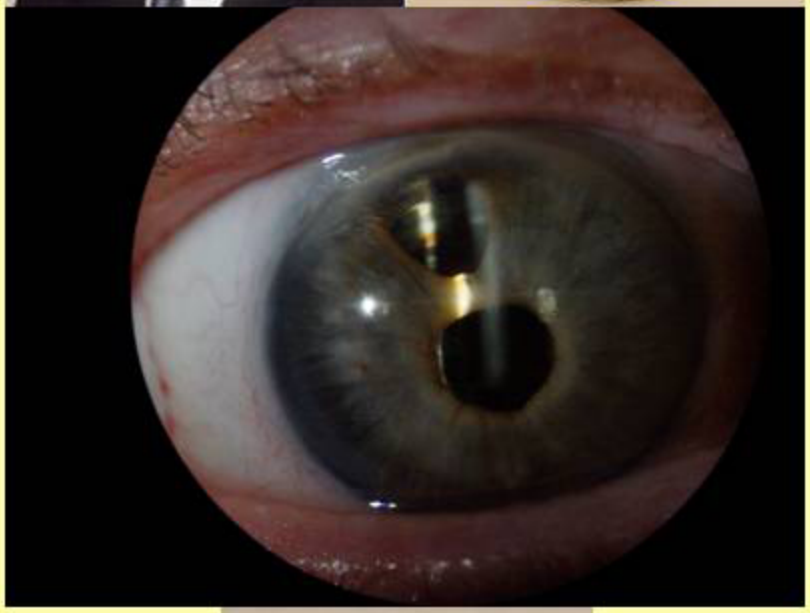
AMO: Sovereign: Whitestar Signature

- Cold phaco short burst 4msec on then cooling (cf 50msec standard)
- 1 msec punch at beginning of pulse acts as cavitation accelerator
- Reduced energy
- Automatic fluidic adjustments Fusion Fluidics.
- Peristaltic: Venturi pack to be available same cartridge
- Bimanual 1.6mm
- 2.2 co-axial



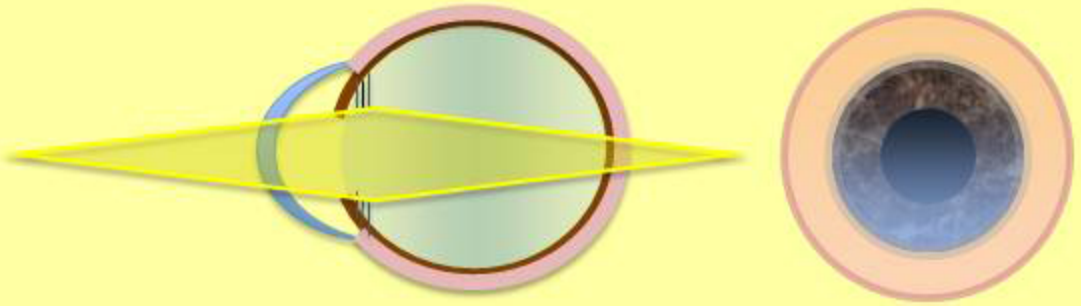
Intraocular lens

- Annals of Barraquer institute 19In 1947 a medical student, Steve Parry, commented to Ridley that it was a shame he couldn't replace the cataract with a clear lens.
- On the 29th November 1949, at St Thomas' Hospital, London, Ridley performed the first IOL operation on the eye of a 45-year-old female patient. The operation was done in two stages with the artificial lens permanently implanted three months later.Rayner of Brighton Perspex Polymethylmethacrylate (PMMA) made specially synthesised no residual monomer by ICI
- Presented results to Oxford congress with patients but Sir Stuart Duke-Elder refused to look at them.
- Opposition by establishment in USA. In spite of Mr. Ridley's remarkably successful run of cases here reported, the operation is one of considerable recklessness. Its hazards far exceed the little that is gained. Vail 1952 (Ed AJO)
- Peter Choyce enthusiast despite a severe warning from Duke-Elder and lost the opportunity for a consultant post at Moorfields. Organised first international conference in 1966 only 16 surgeons attended. Arnott and Pearce
- Quality issues "better as IUD than IOL"

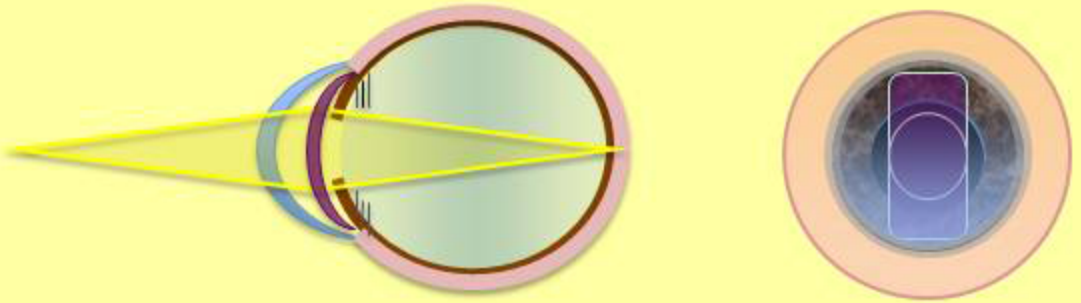


The correction of aphakia

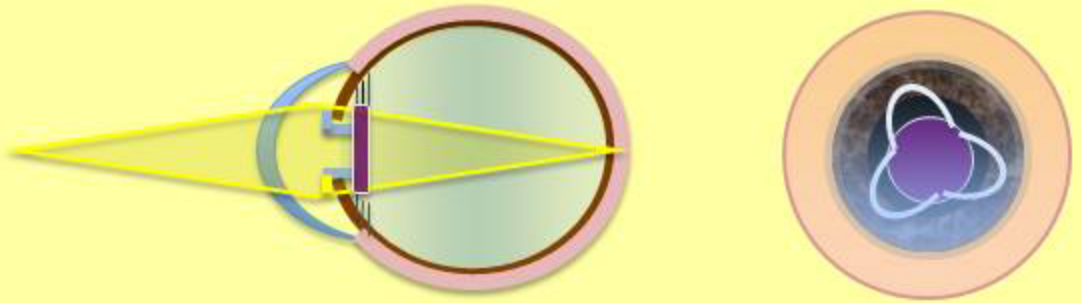
- Aphakia: Non-focused image behind eye.

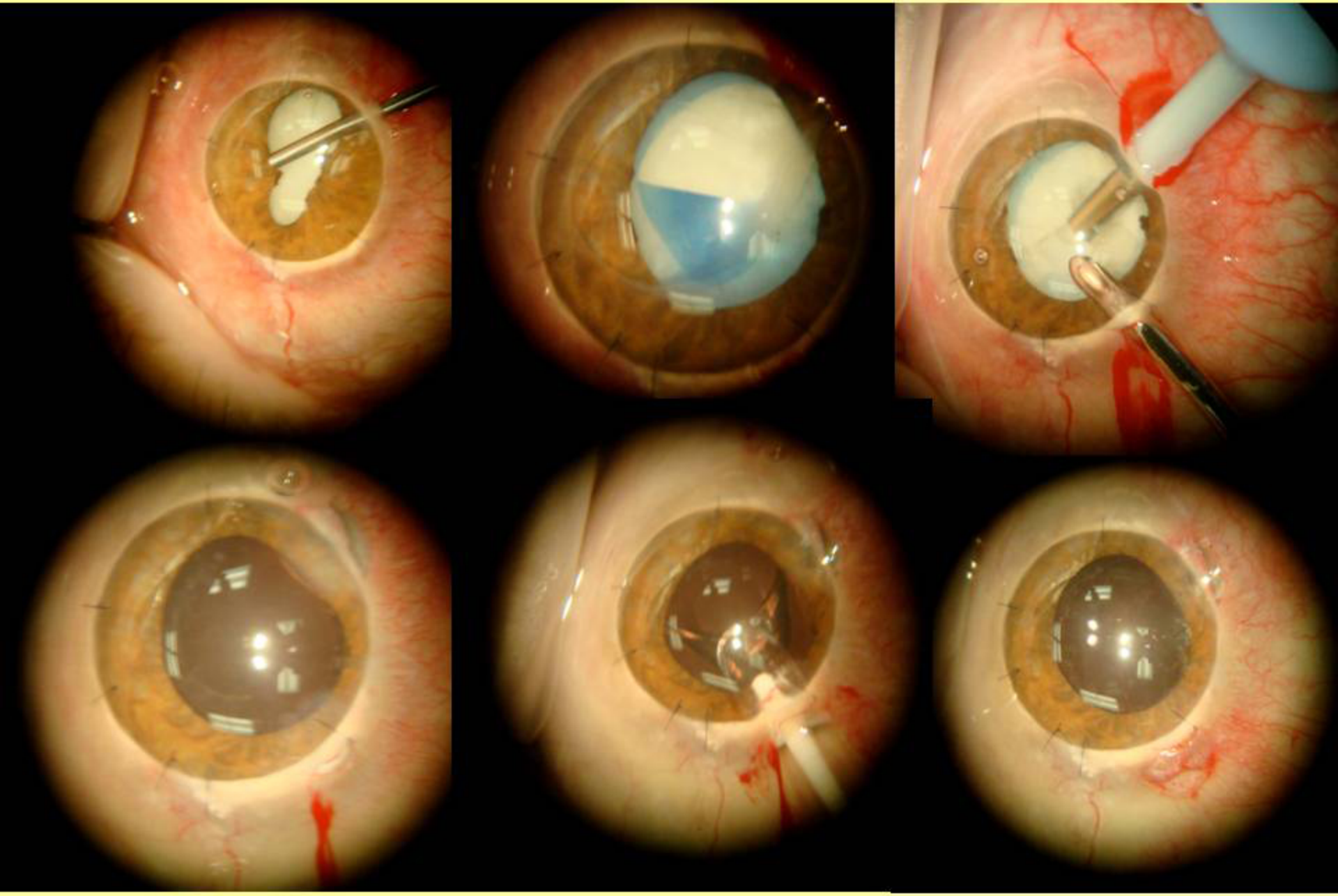


- Anterior chamber lens: Plate Haptic



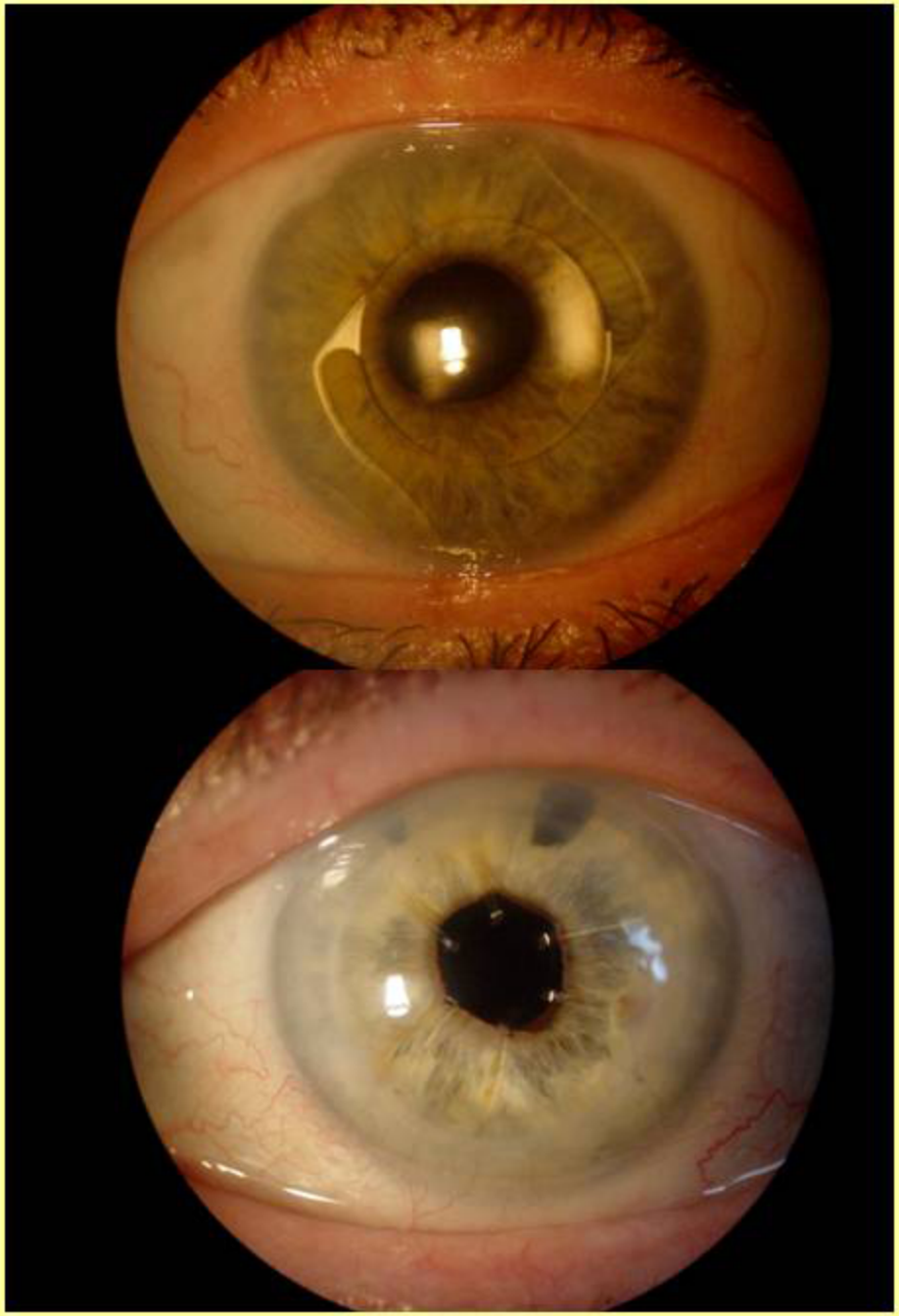
- Anterior chamber lens: Pupil supported





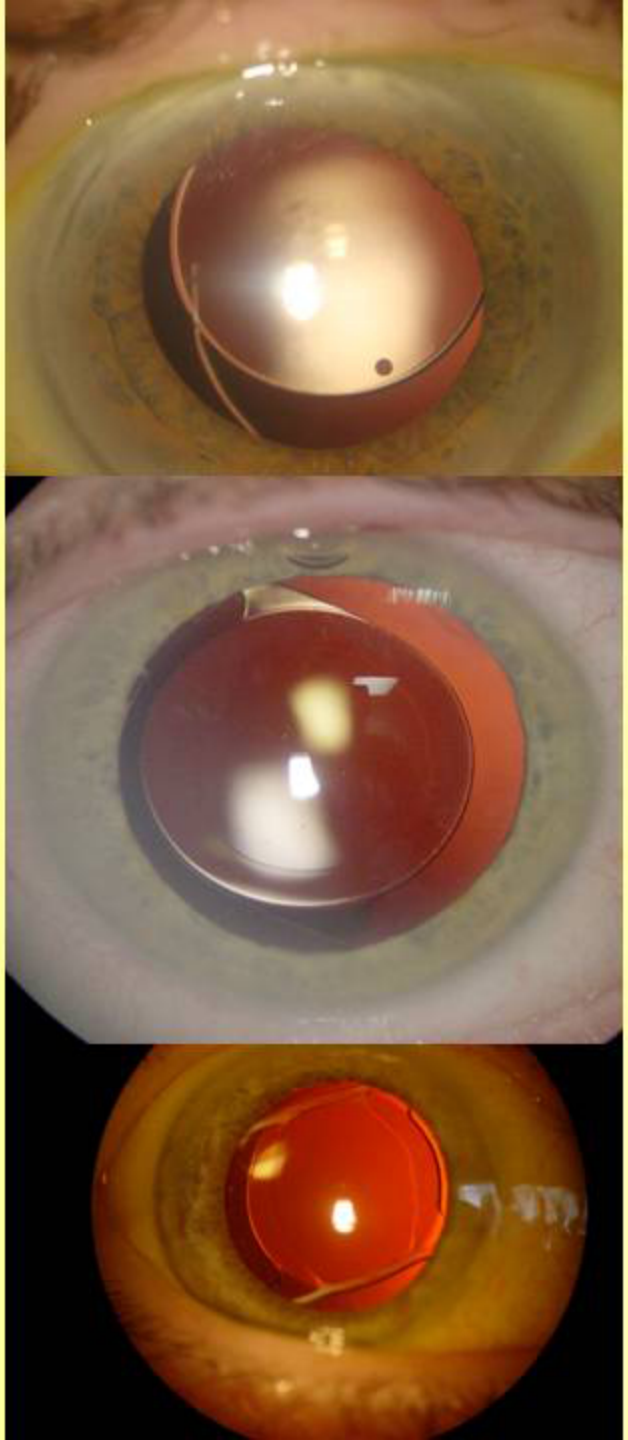
Intraocular lens

- Intracapsular surgery left no support so design altered for pupil or anterior chamber fixation.
- Iris fixation: Cornelius Binkhorst. Morcher Germany 1957. Coined the term pseudophakia to indicate presence of IOL (Oxford Congress 1959).
- Modified by Fyodorov Moscow.
- Anterior chamber fixation: plate haptics Choyce, flexible loops Kelman.
- Problems corneal endothelial damage, corneal opacity and need for corneal transplantation.



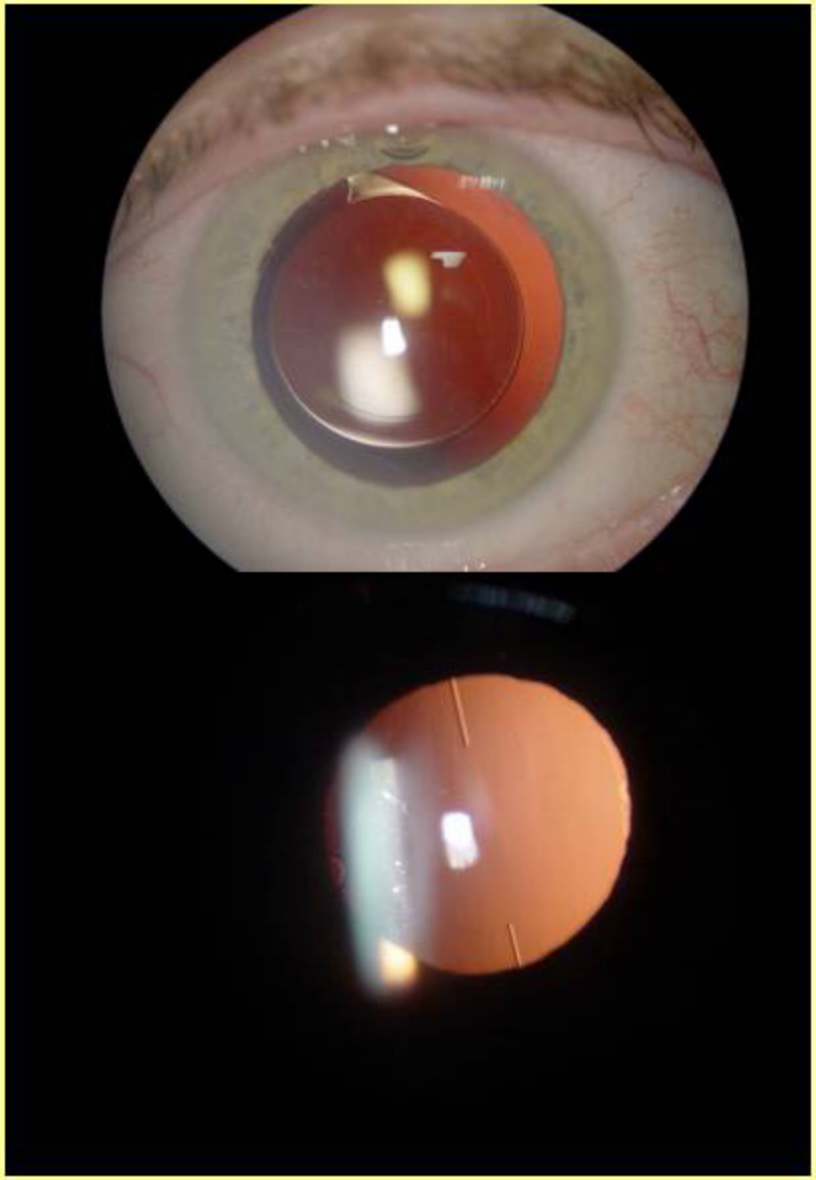
Modern IOL

- John Pearce 1975, led the return to ECCE with a tripod lens implanted into the capsular bag.
- ICCE still dominated
- Phaco gradually becoming more popular. 3.5mm. Incision then enlarged for IOL. ECCE using phaco now dominant technique 99%
- To reduce enlargement of small incisions, foldable lenses. Silicone then acrylic



Specialist lenses

- Yellow blue-blocking
- Astigmatic
- Multifocal
- Accommodating
- Adjustable with light irradiation



Brief list of References and further reading

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