Slit Lamp Evaluation

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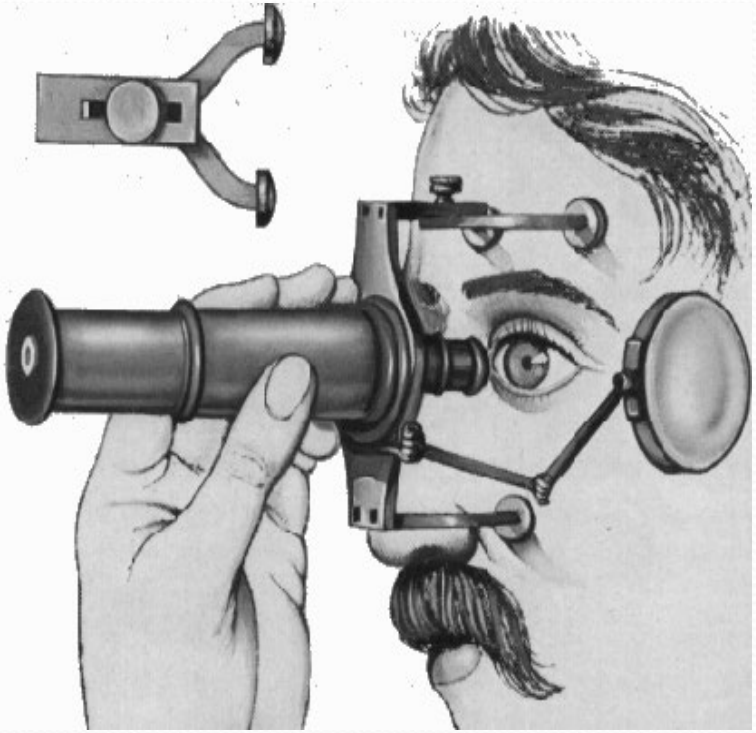
History



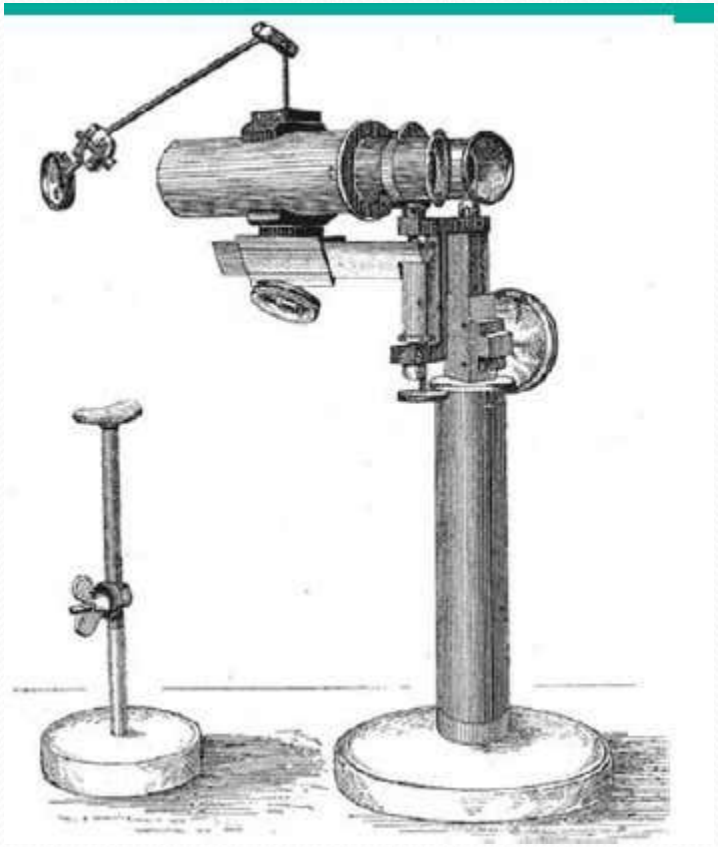
Early contributions but not credited with inventing the slit lamp

- Johannes Purkinje (December 17, 1787 - July 28, 1869, from Czechoslovakia, in the 1820s studied the iris with an adjustable microscope by illuminating the field of view
- Hermann von Helmholtz (August 31, 1821 - September 8, 1894) from Germany, in 1851 basically, revolutionized the field of ophthalmology with the invention of the ophthalmoscope; an instrument used to examine the inside of the human eye.

Wilhelm von Zehender

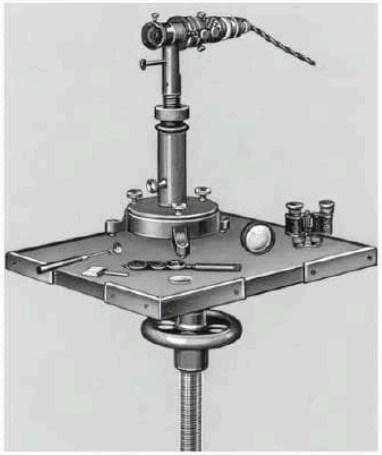
- May 21, 1819 – December 19, 1916

- Wilhelm von Zehender and the court mechanic Heinrich Westien constructed the first binocular microscope in 1887, calling it a “corneal loupe”

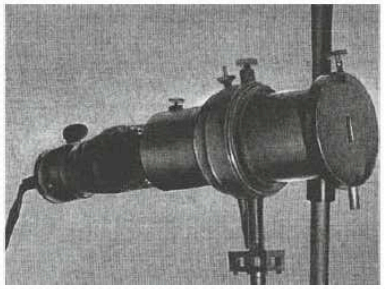


Allvar Gullstrand – June 5, 1862 - July 28,1930

- Credited with the invention of the slit lamp
- 1911 – introduced the illuminated slit



- The illuminated slit created an optical section through the anterior segment of the eye in which the refractive media could now be precisely assessed
  - Closed tube with adjustable slit at the other end



Combination of microscope and slit

- Otto Henker (while working with Zeiss) along with some others

- An illumination unit
- A binocular microscope
- The mechanics that connect the microscope to the illumination source

Slit lamp has 3 basic systems

- Patient system
- Viewing system
- Illumination system

- The Slit Lamp is actually comprised of a microscope (for binocular microscopic viewing) and a light source.

Benefits of slit lamp - biomicroscope

- Increased magnification
- Depth localization
- Stereopsis
  - 3-D viewing

- “Slit” is actually a misnomer as the instrument is capable of several beams, not just a slit
  - Biomicroscopy

Two basic types

- Haag Streit
- Zeiss

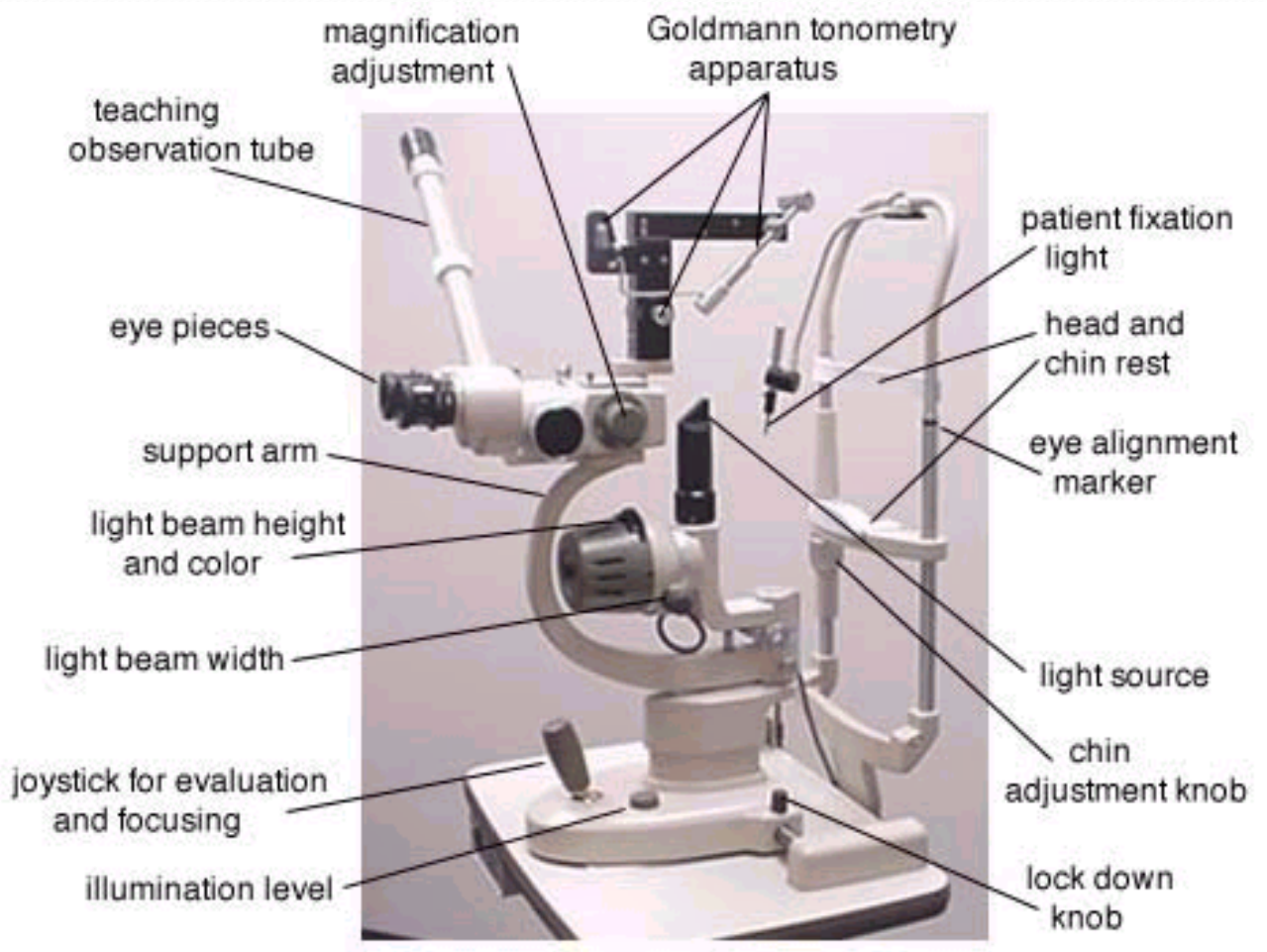
Haag Streit

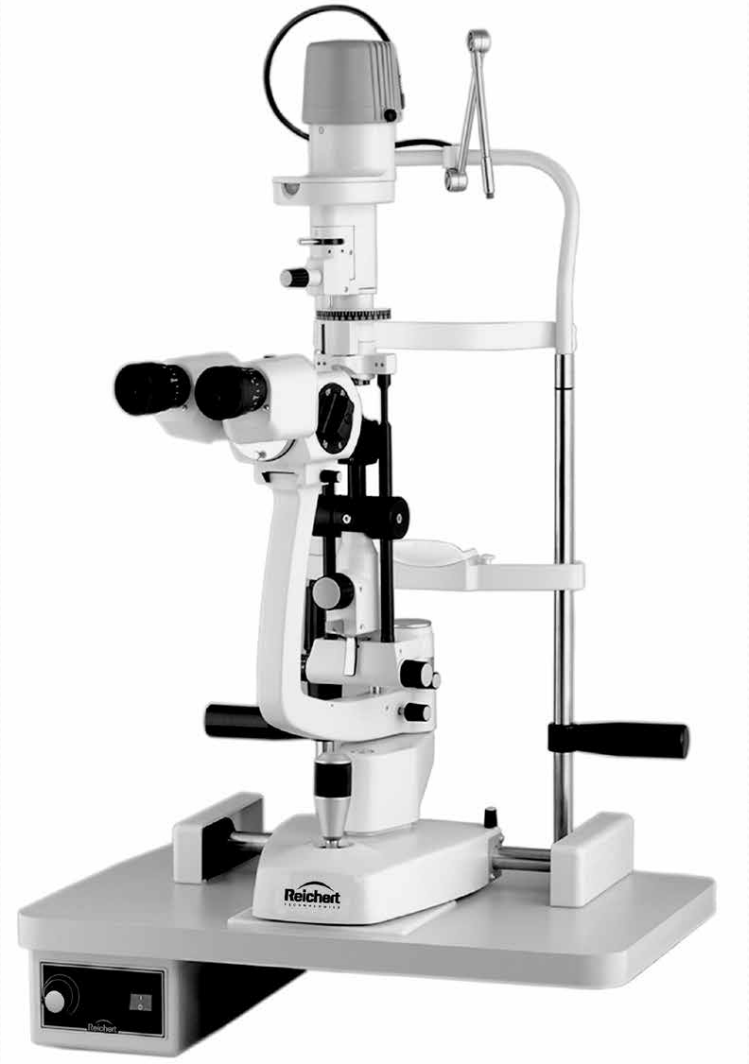
- In the Haag Streit type slit lamp, the illumination is located above the microscope.

Zeiss

- In the Zeiss type slit lamp, the illumination is located below the microscope.

The Biomicroscope – Slit Lamp




Reichert

Focus

Viewing Arm

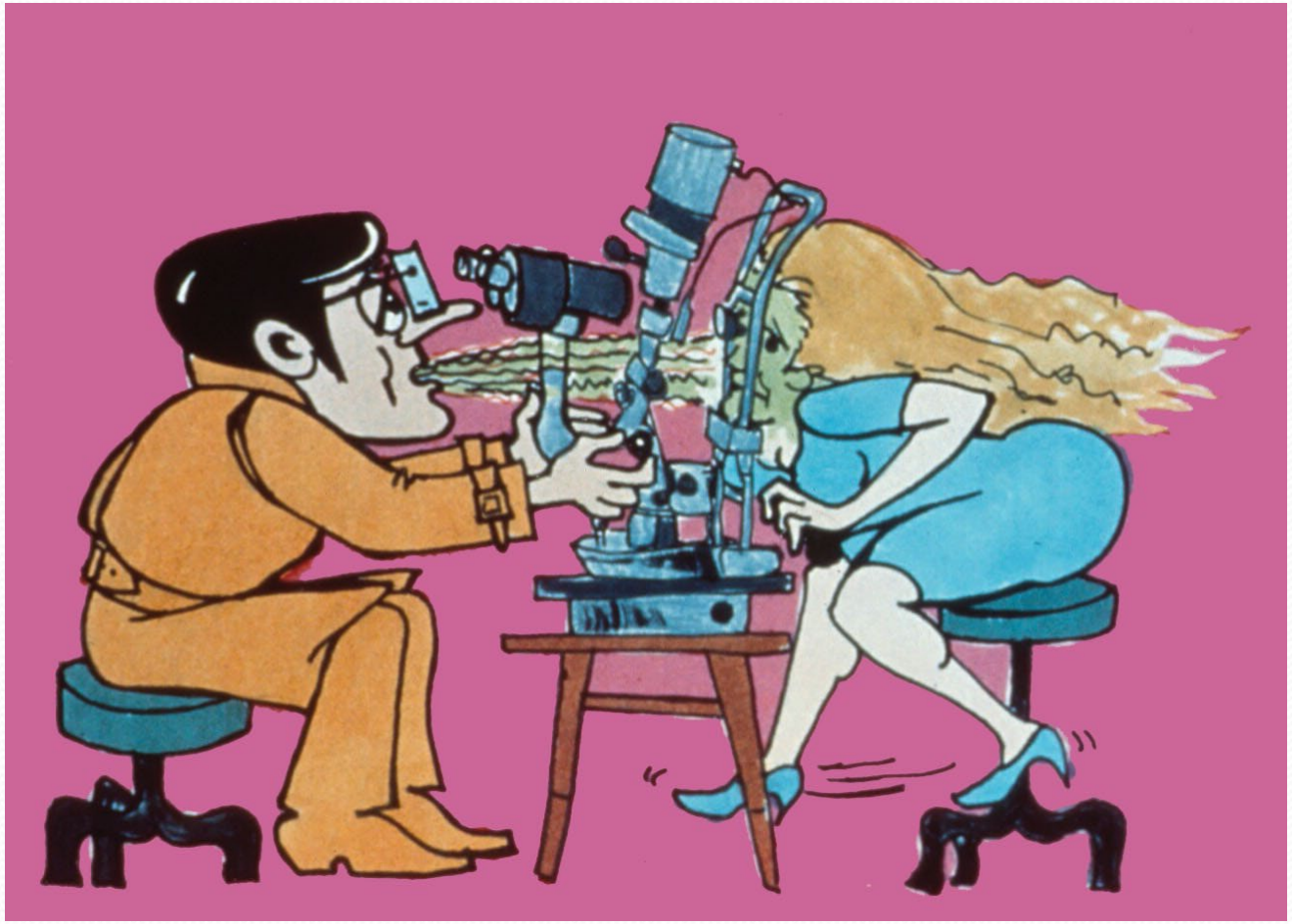
- Binocular eyepieces
  - Provide stereoscopic vision
  - Can be adjusted for examiner's PD
- Focusing ring can adjust to examiner's refractive error
- Magnification element can be adjusted

Oculars - PD

Illumination Arm

- Illumination arm can be swung 180 degrees side to side on it's pivoting base
  - Allows the examiner to direct the light beam from nasal to temporal viewing
- Size of the light beam can be adjusted for height and width.
- Cobalt blue, or green filters can be selected with this lever

Slit Lamp Manners



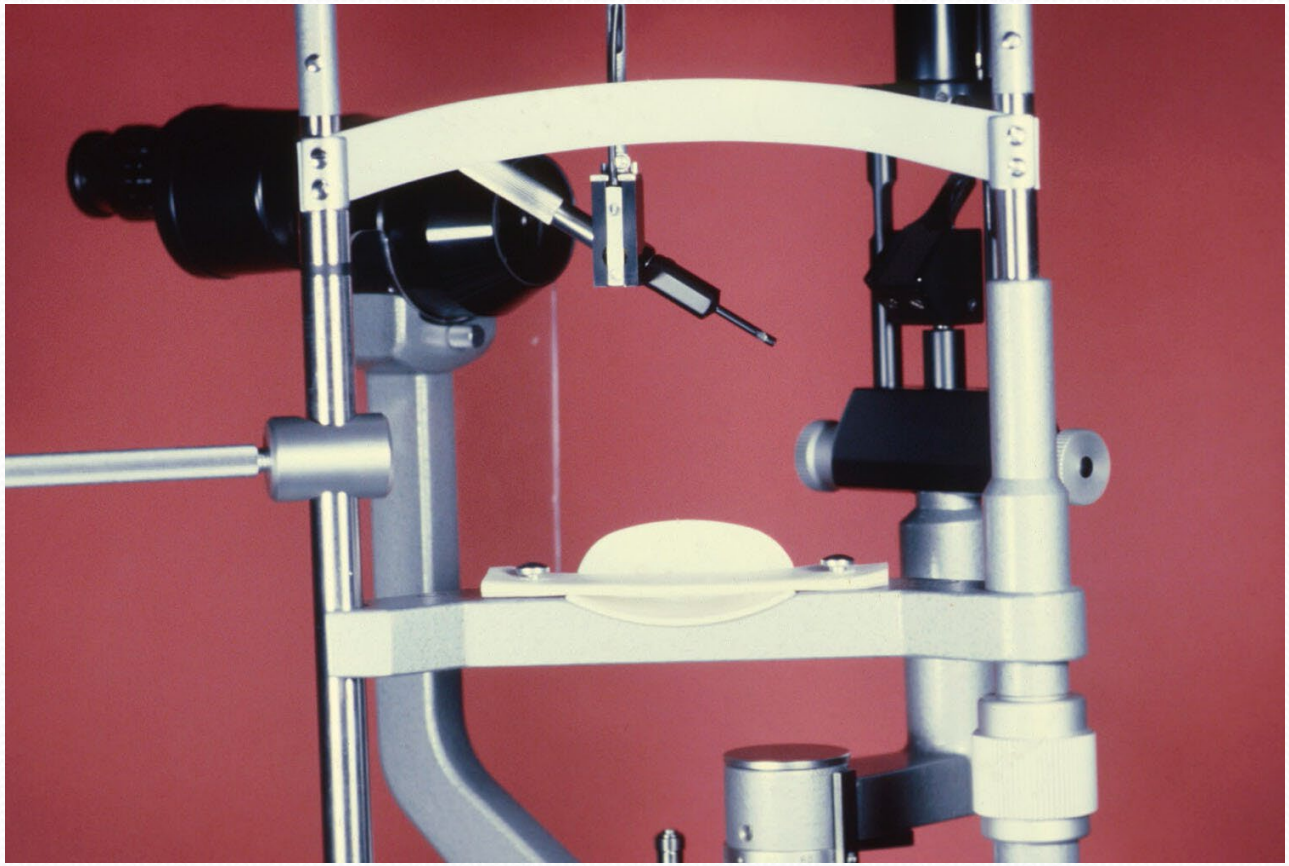
The Patient Positioning Frame

- Consists of two upright metal rods
  - Forehead strap and chin rest are attached
  - Should be cleaned before each use

The Patient Positioning Frame

- Chin rest height can be adjusted

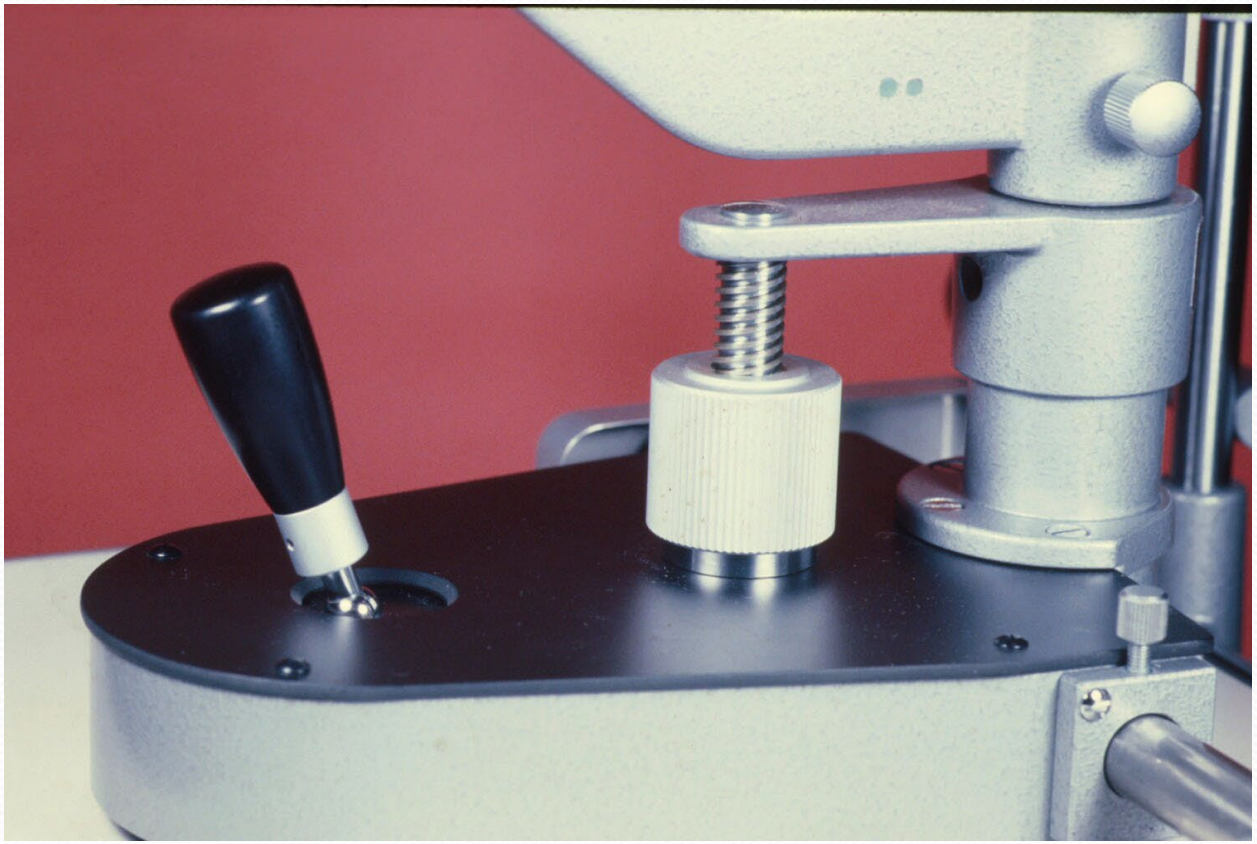
Chin/Forehead rest



The Joystick

- Joystick allows focusing by shifting forward, backward, laterally or diagonally
- Can be rotated to raise or lower the light beam.
- Locking screw at the base should be locked when not in use to prevent movement

Finite focus – Height - Lock



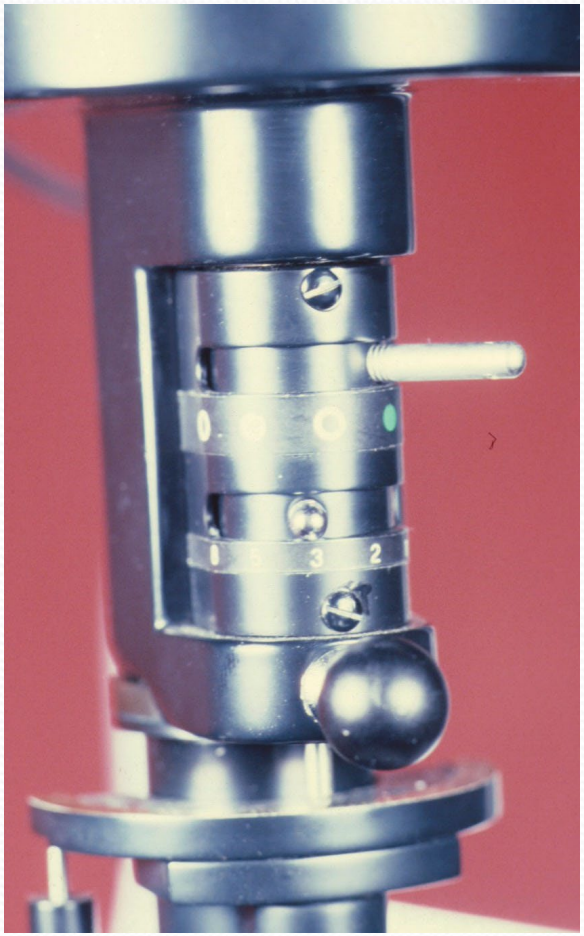
Below the Table

- The on/off switch is usually located below the table.
- Can be adjusted for high or low intensity
  - The low setting should be used most of the time

Below the Table

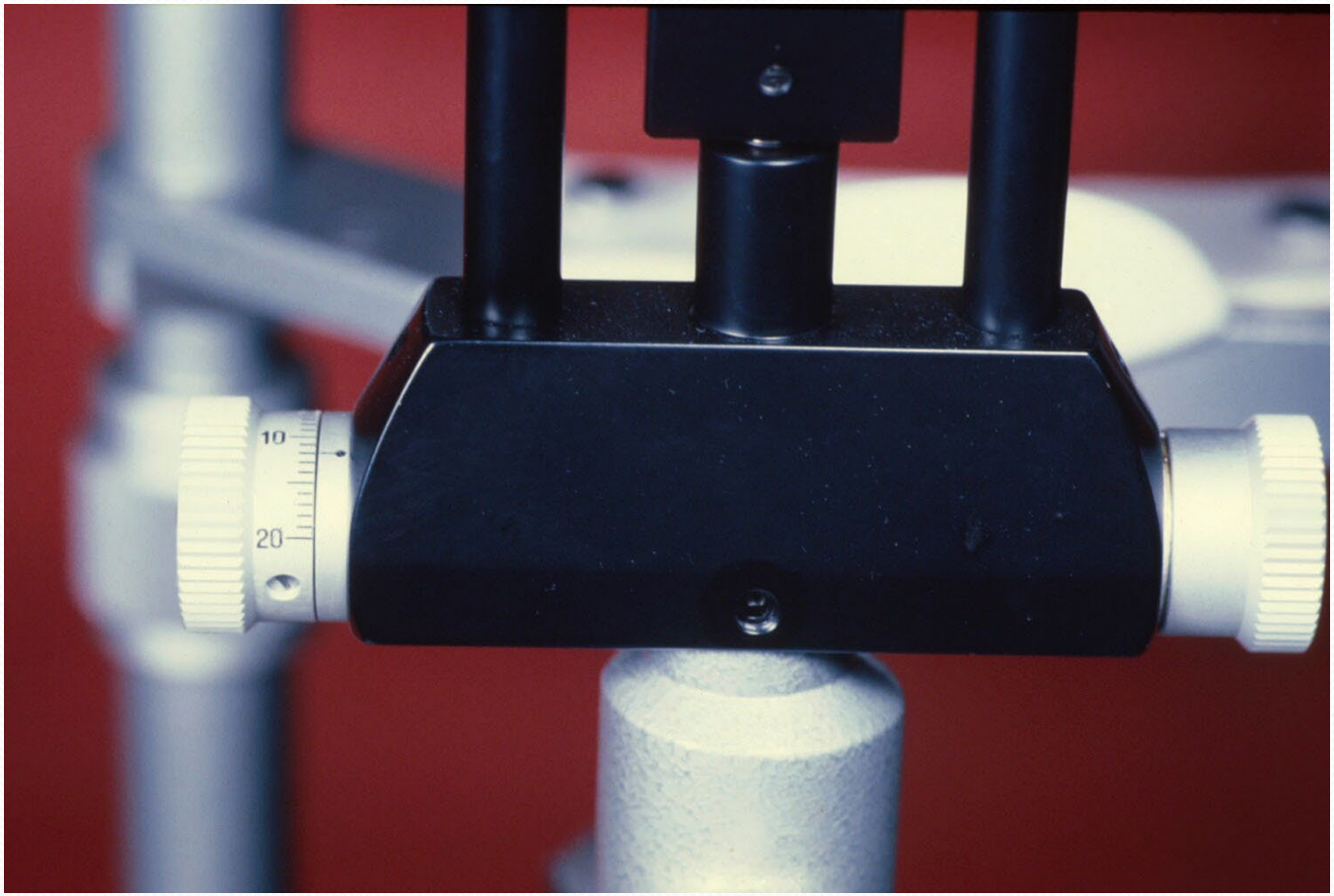
- The height of table can be adjusted and the lever is located below the table

Filters, Slit Length

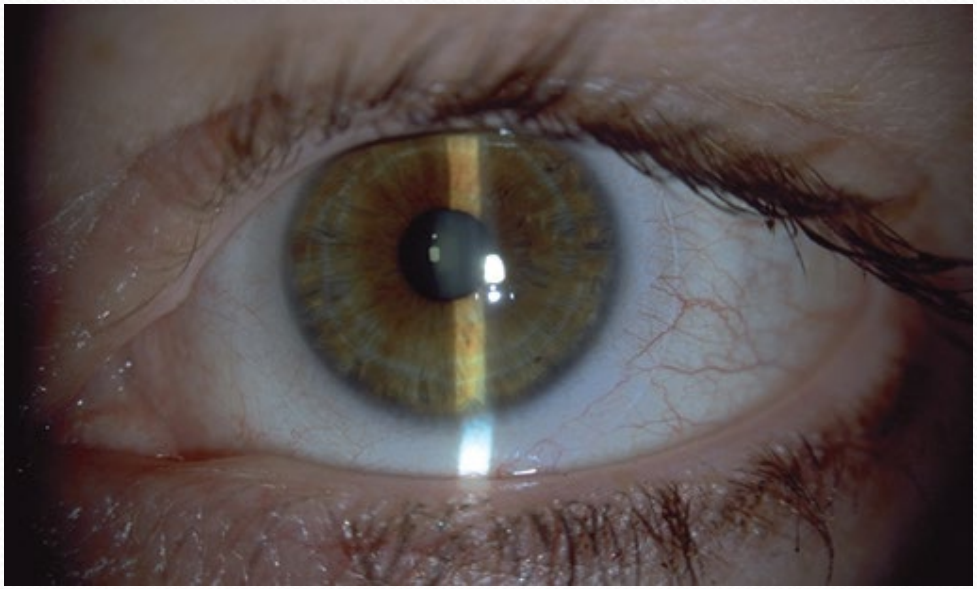


- Full intensity
- U.V.
- Neutral density (10% gray)
- Green (red-free)
- Cobalt blue
- Kodak wratten Nº. 12 *

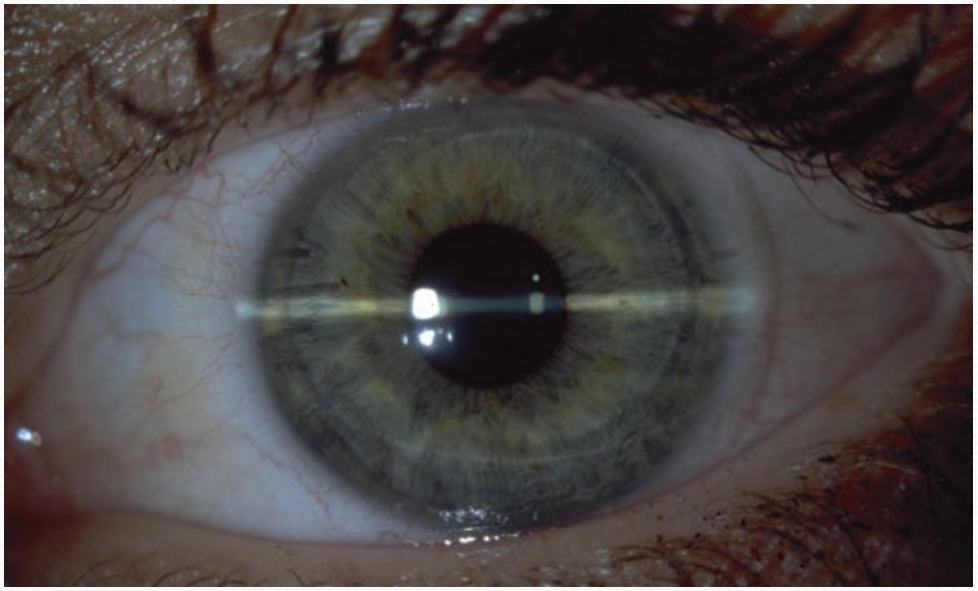
Slit Width



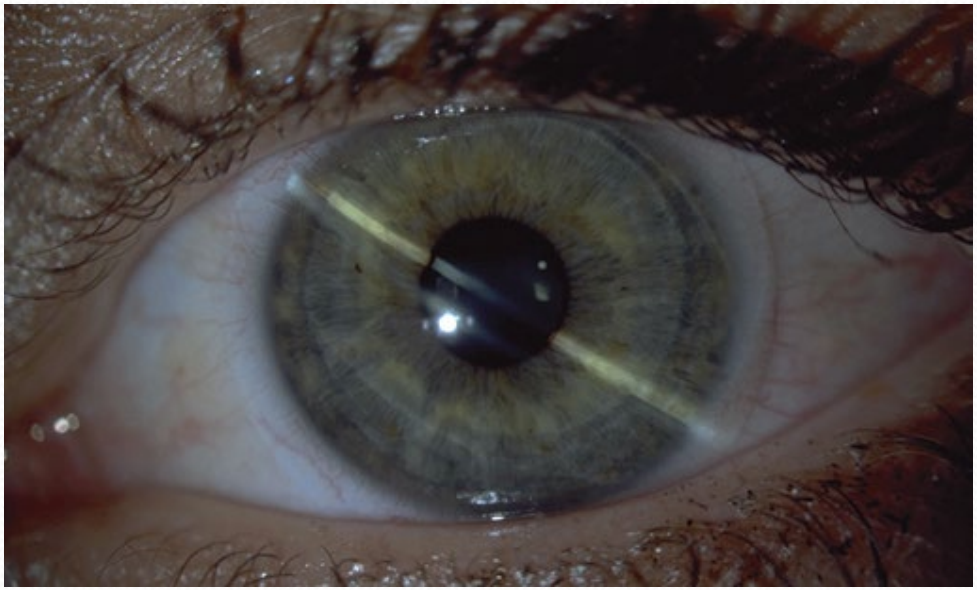
Slit beam orientation: Vertical



Slit beam orientation: Horizontal



Slit beam orientation: Oblique



Instrument Setup

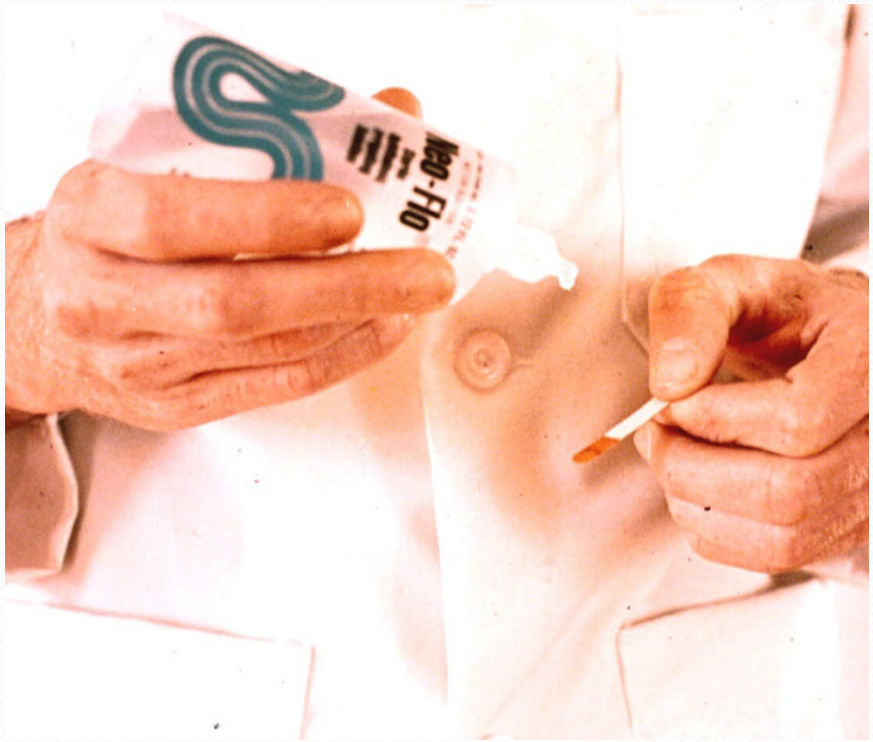
- Start with low magnification
- Microscope in line with control arm
- Elevation knob 1 inch above it's lowest point
- Chinrest 1 inch above is lowest point
- Medium intensity
- Lamp housing set to approximate angel of 45°
- Set slit length to longest length possible
- Slit rotation should be set in vertical position
- Narrow slit width, white light
- Set PD
- Focus eyepiece

Have a process - Order

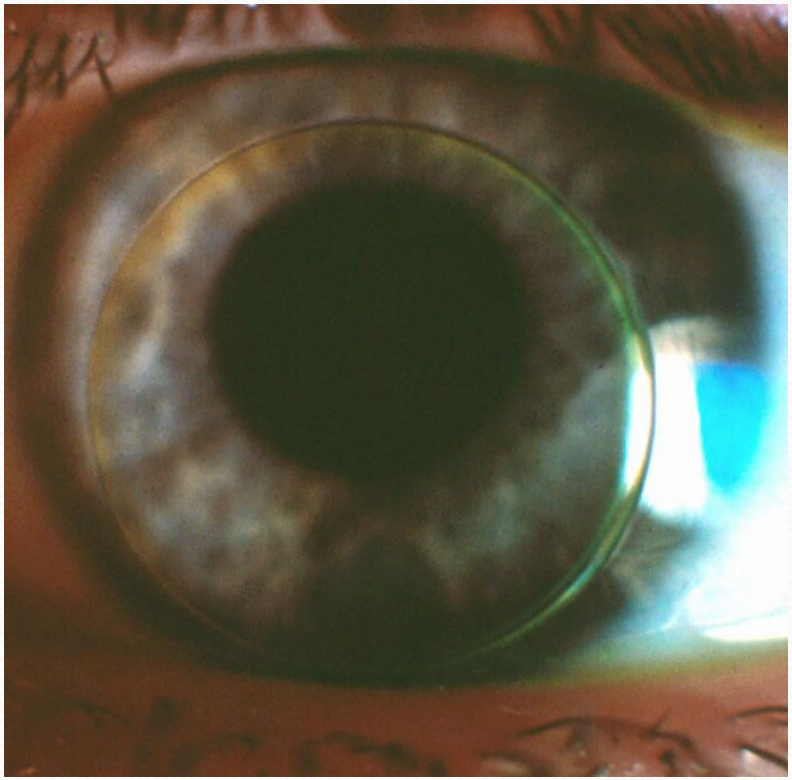
- Anterior
- Posterior

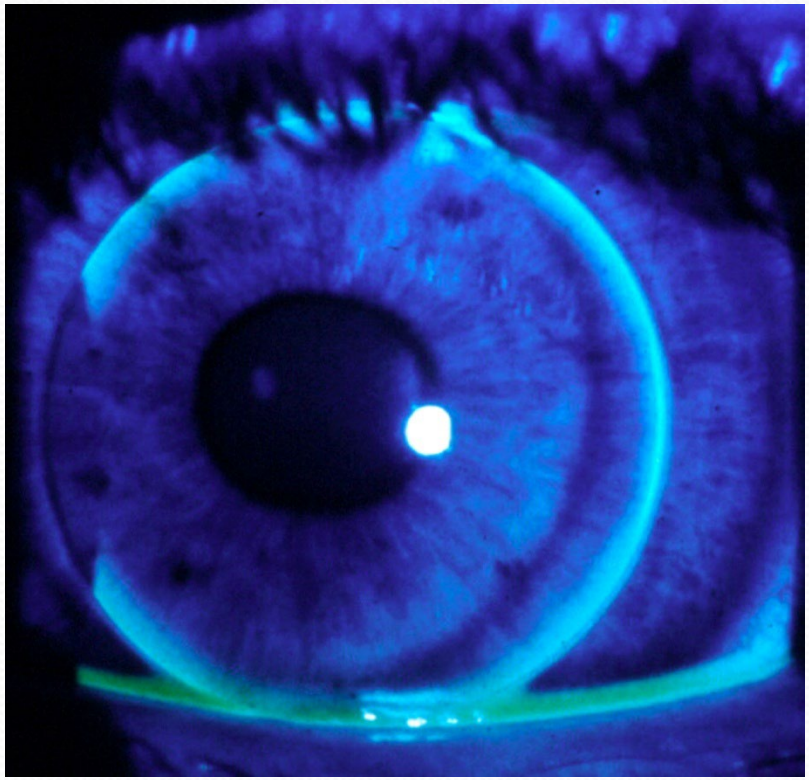
Sodium Fluoresccein

Sodium Fluorescein

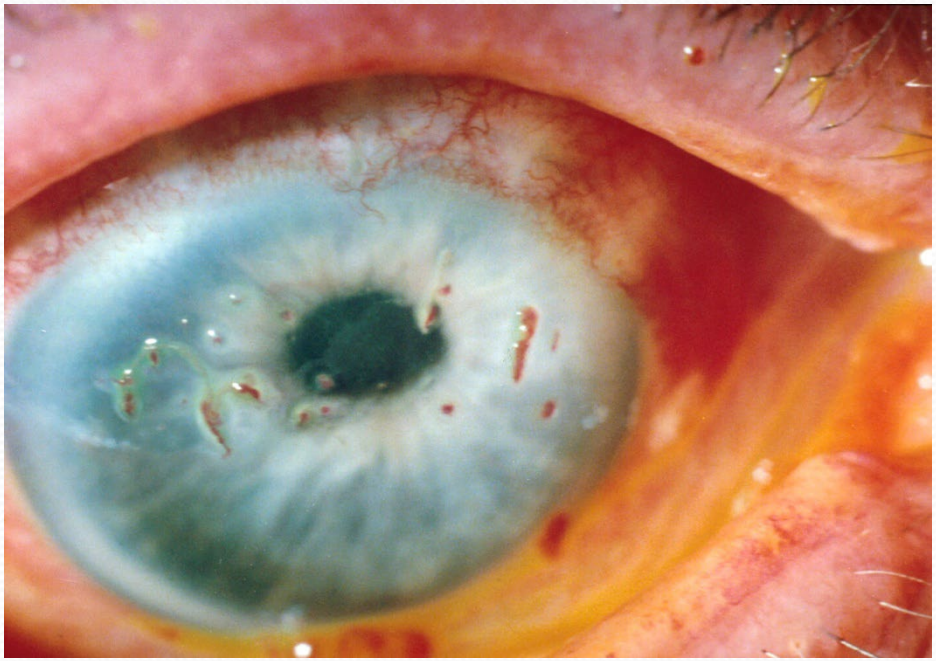


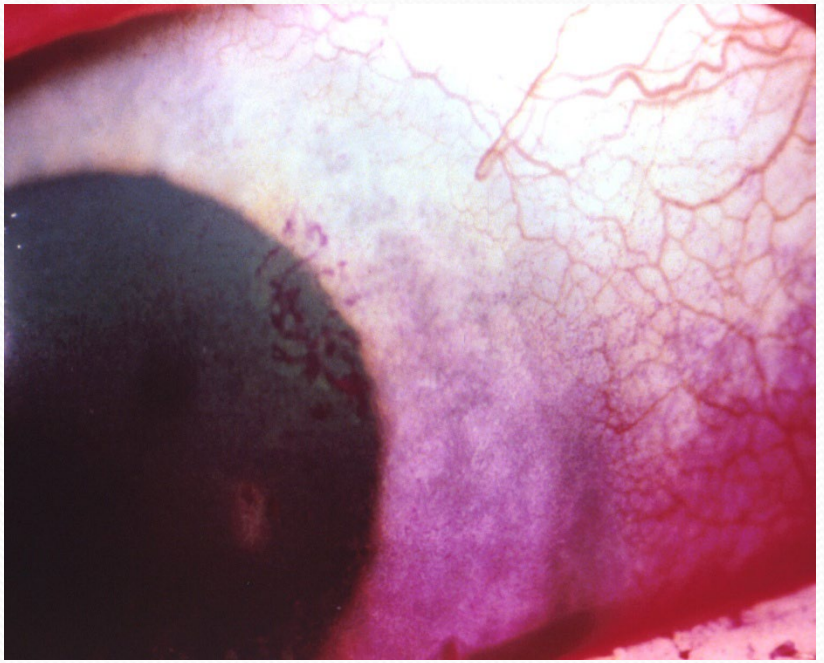
Sodium Fluorescein



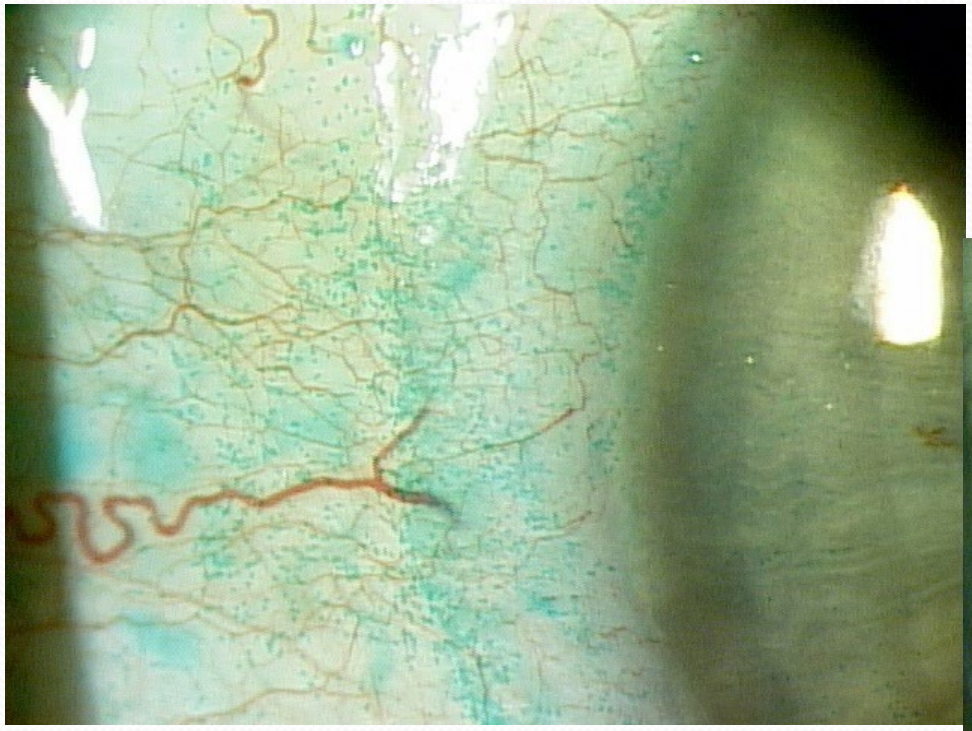


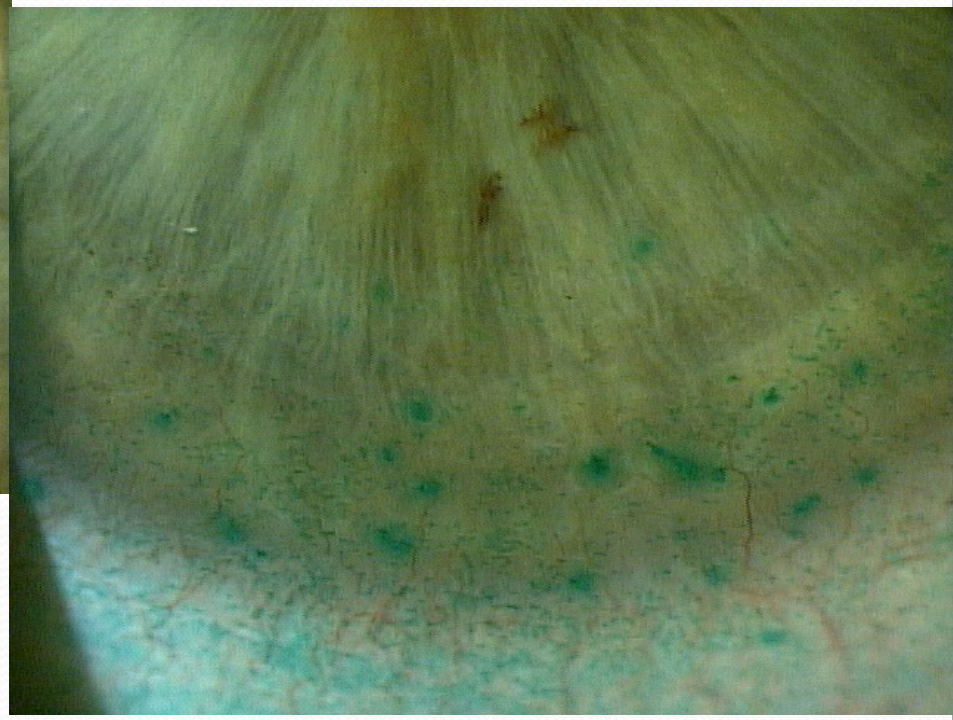
Rose Bengal



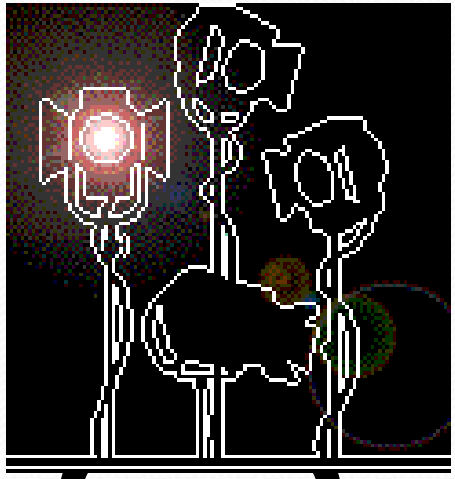


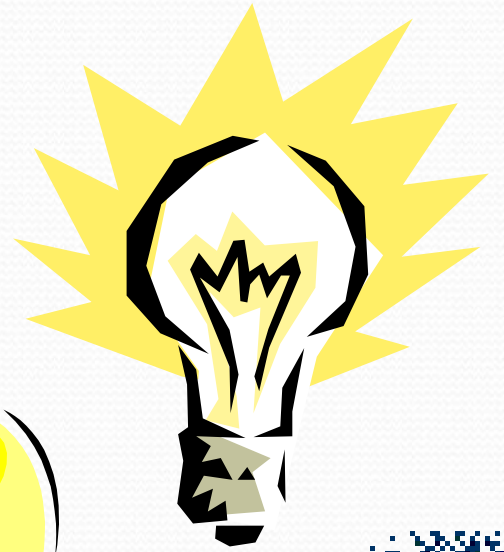
Lissamine Green

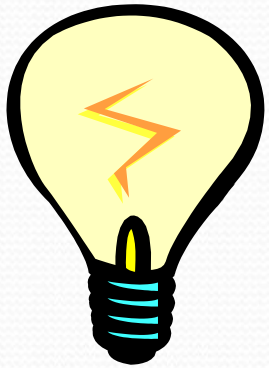




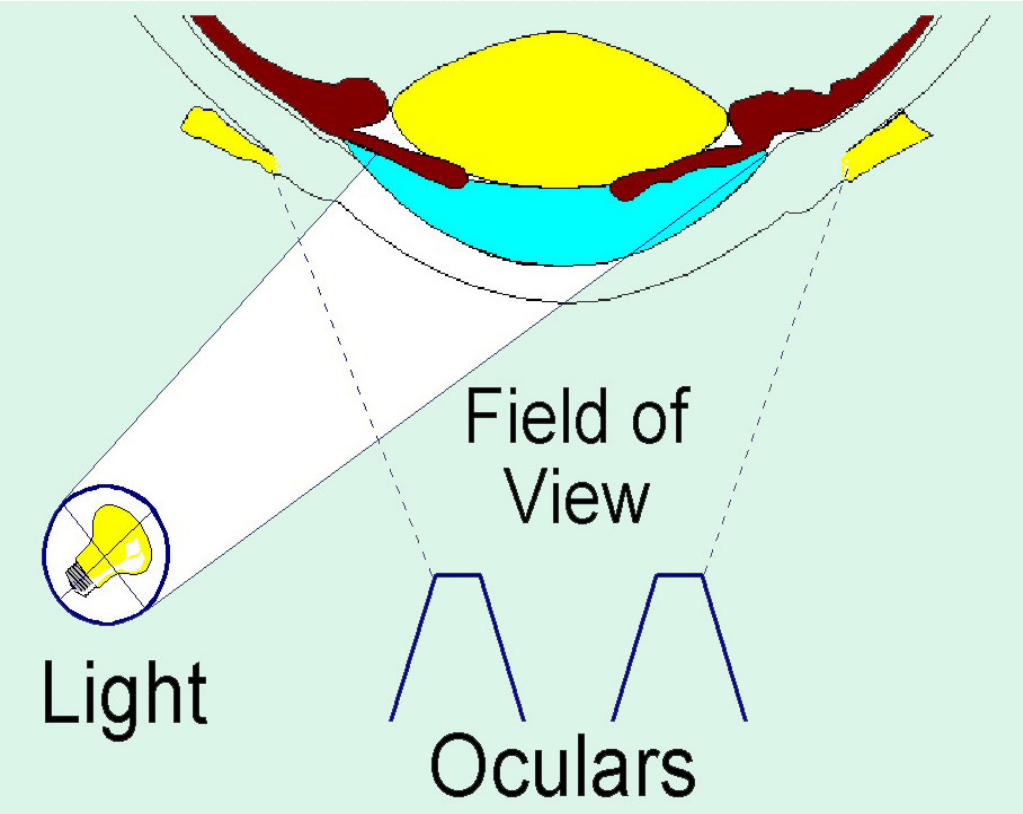
Illuminations & Techniques







Diffused Illumination



- Widest slit, longest aperture
- Light angle 40°-50°
- Views overall area
- Observe ocular adnexa
  - Cornea, sclera, lids, conjunctiva
  - Lens surface
  - Lens fitting characteristics

Anterior to Posterior

- Adnexa
  - Eyebrows
  - Eyelids
  - Eyelashes

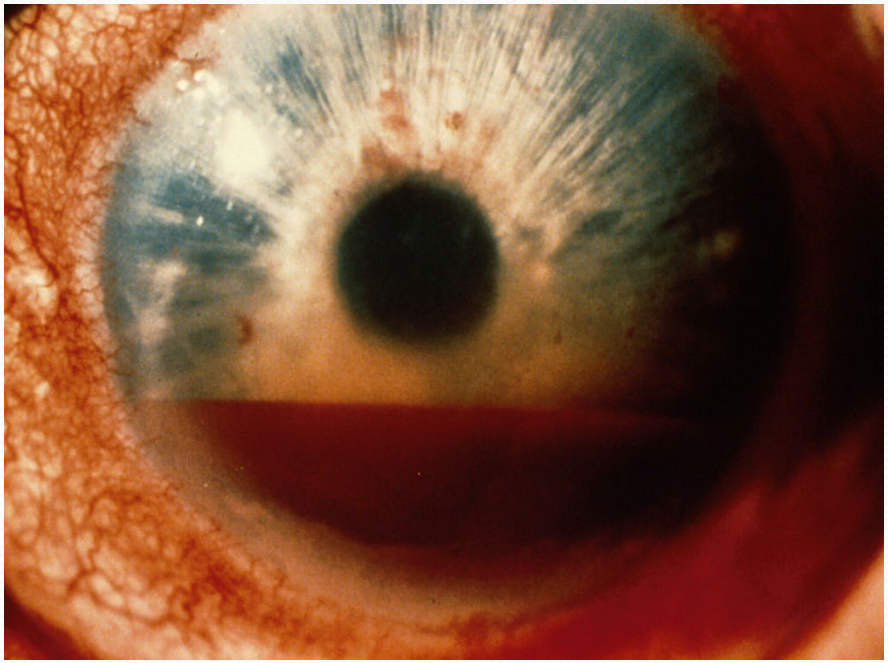
  - Note any abnormalities

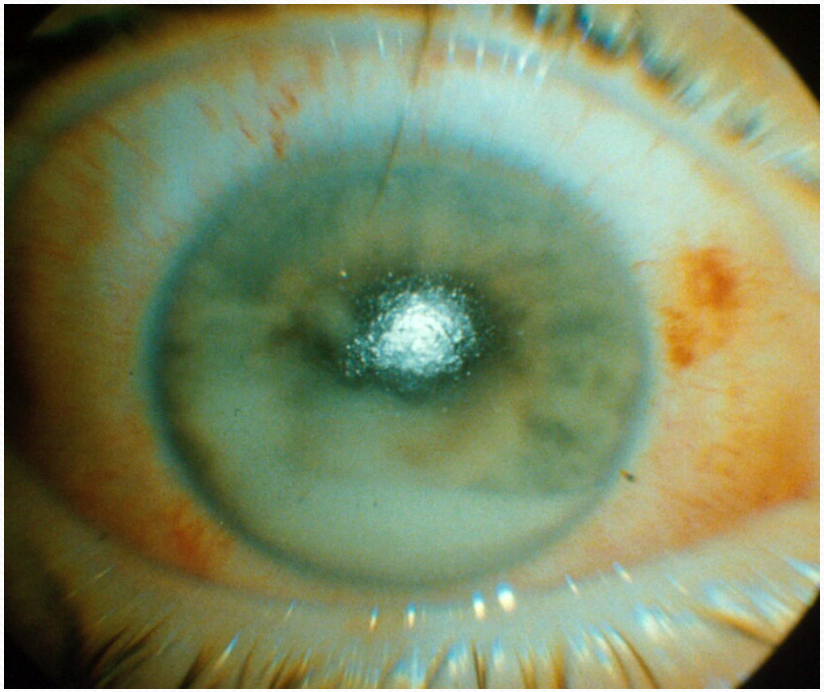
Tear film

- Precorneal tear film
- Tear meniscus
- Tear prism
- Tear Break Up Time (TBUT)

- Conjunctiva
  - Bulbar
  - Palpebral
    - Invert lids
- Overall cornea, limbus, sclera

Diffused Illumination





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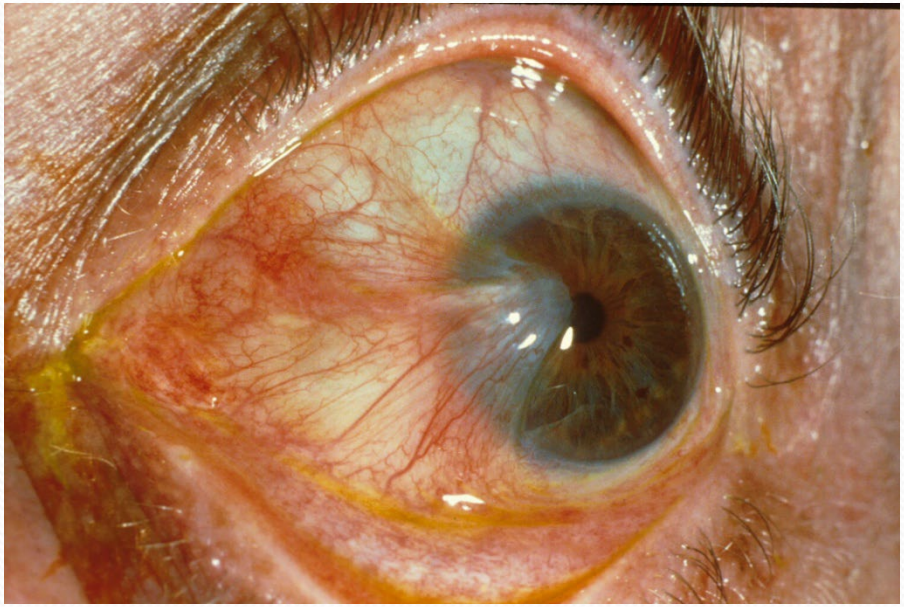

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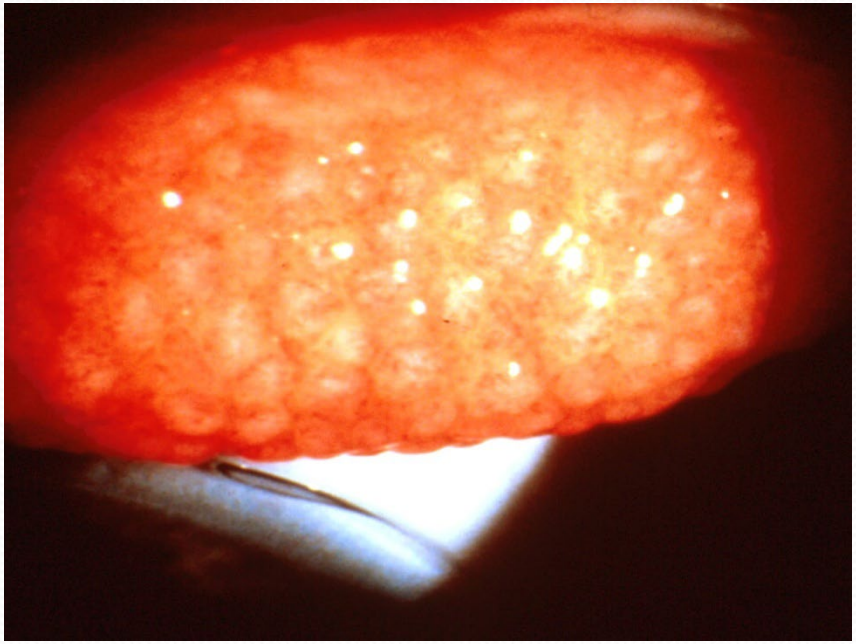

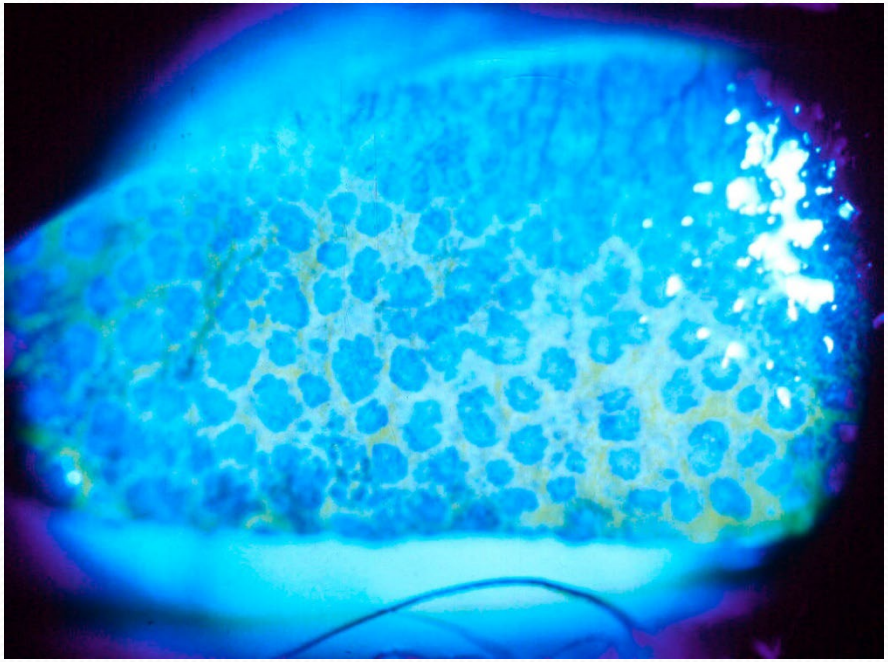

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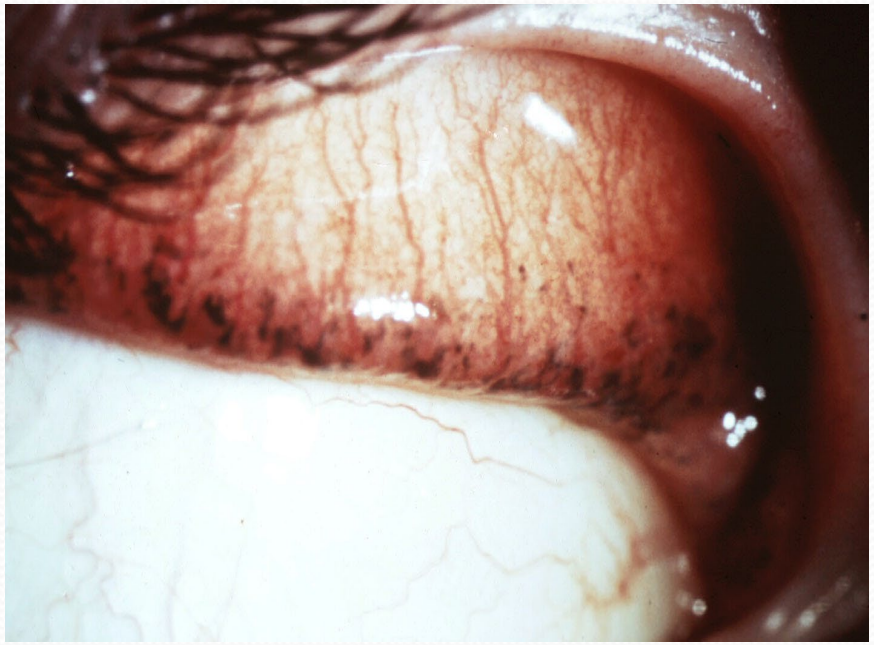

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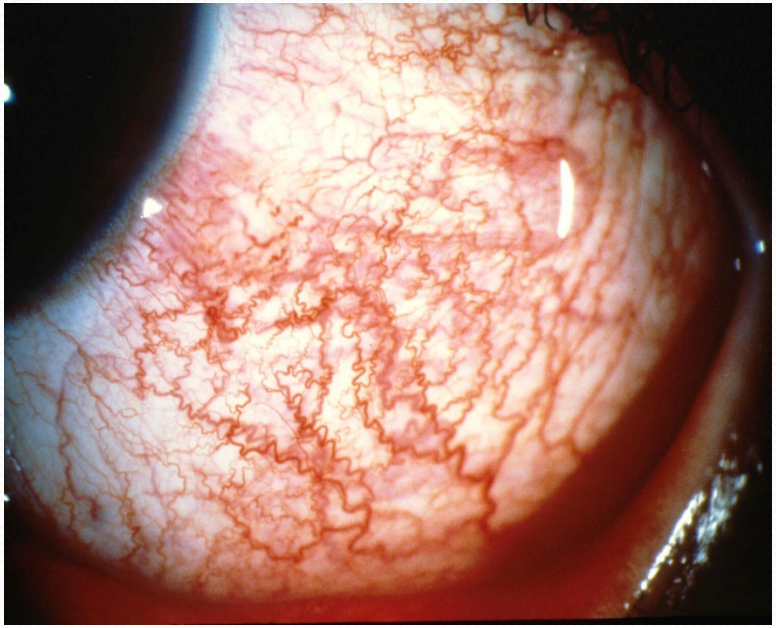

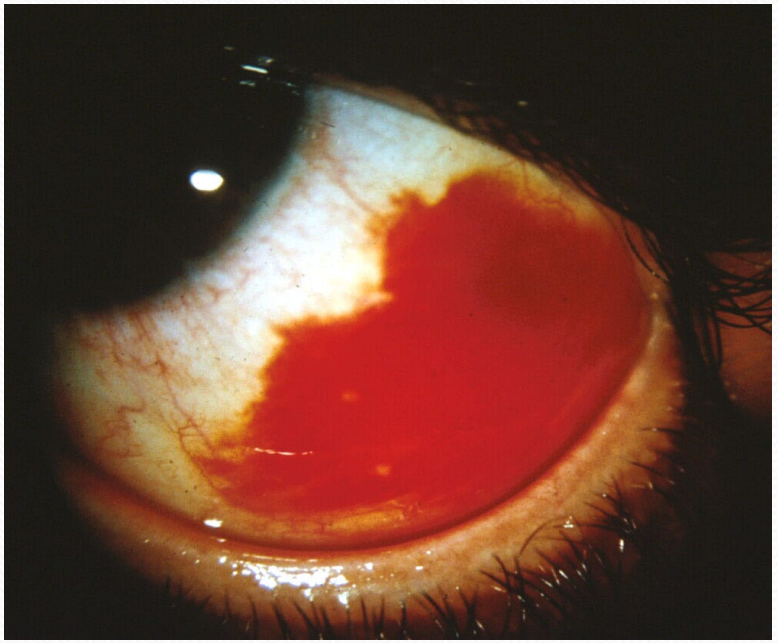

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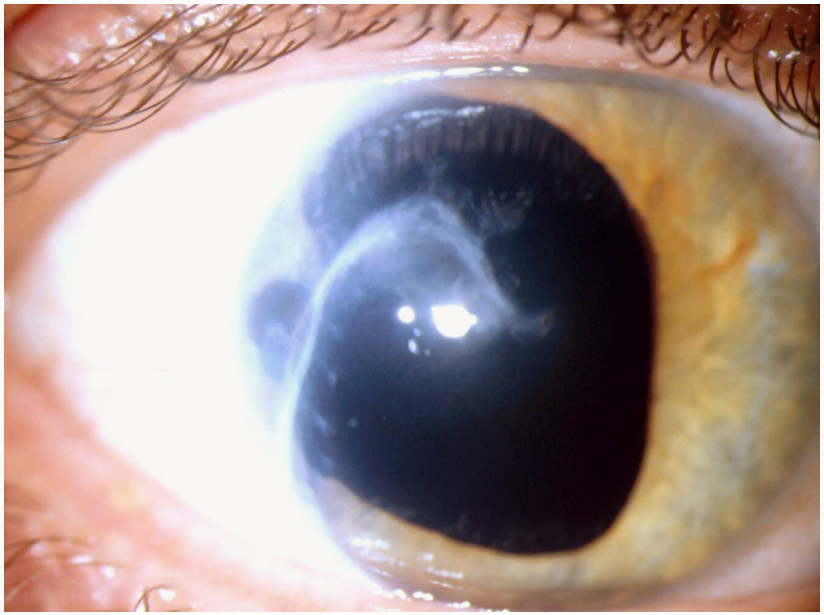

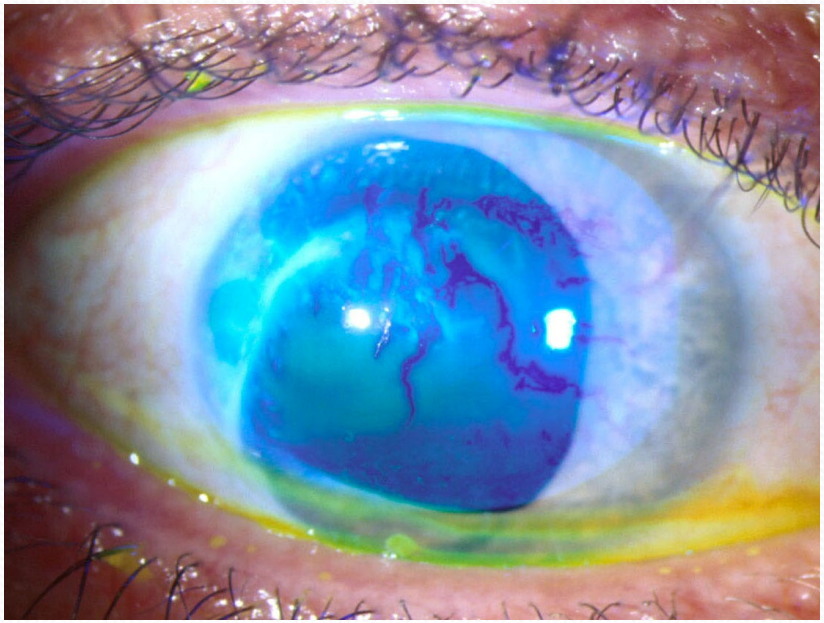

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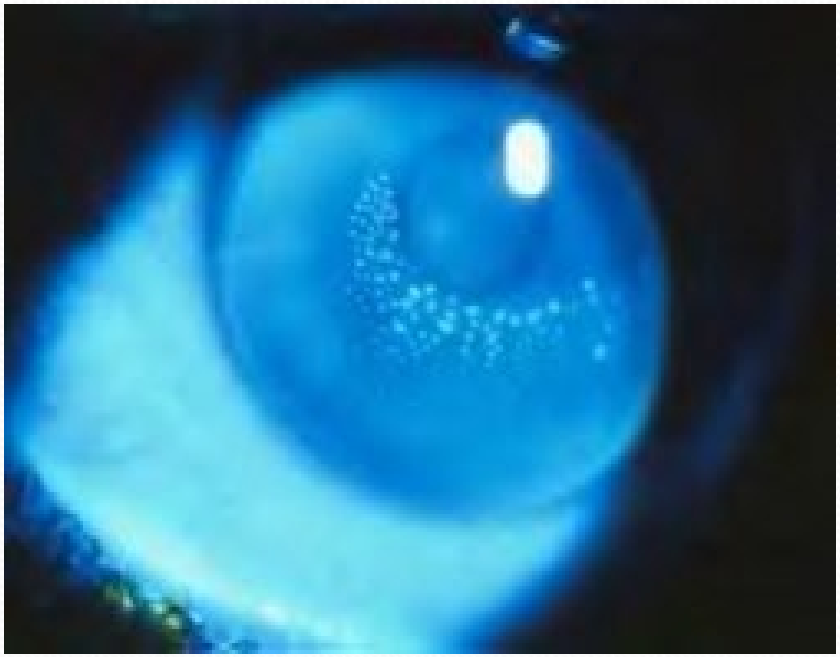

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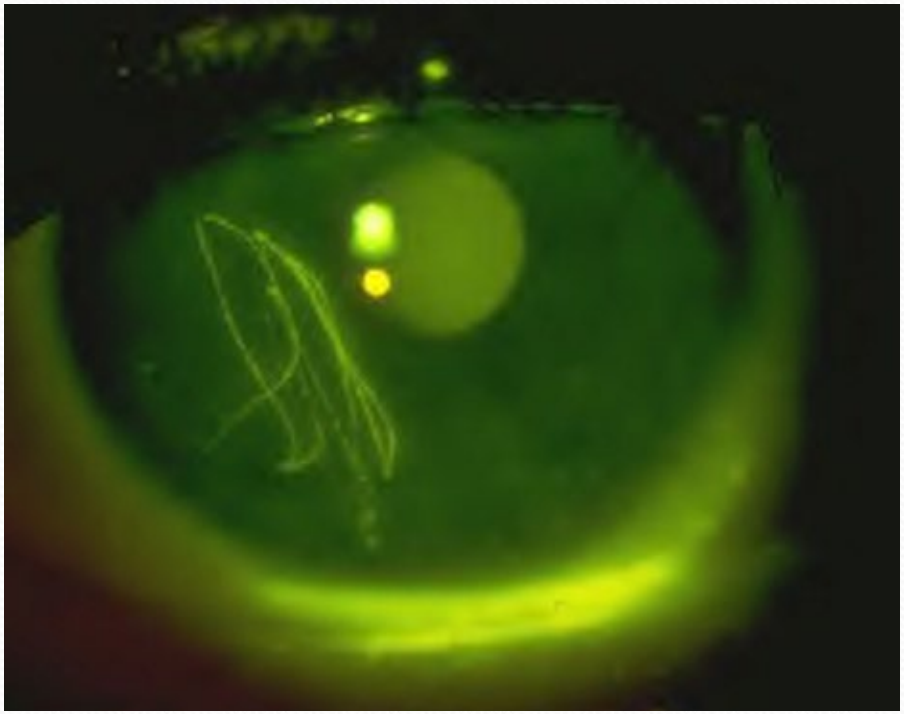

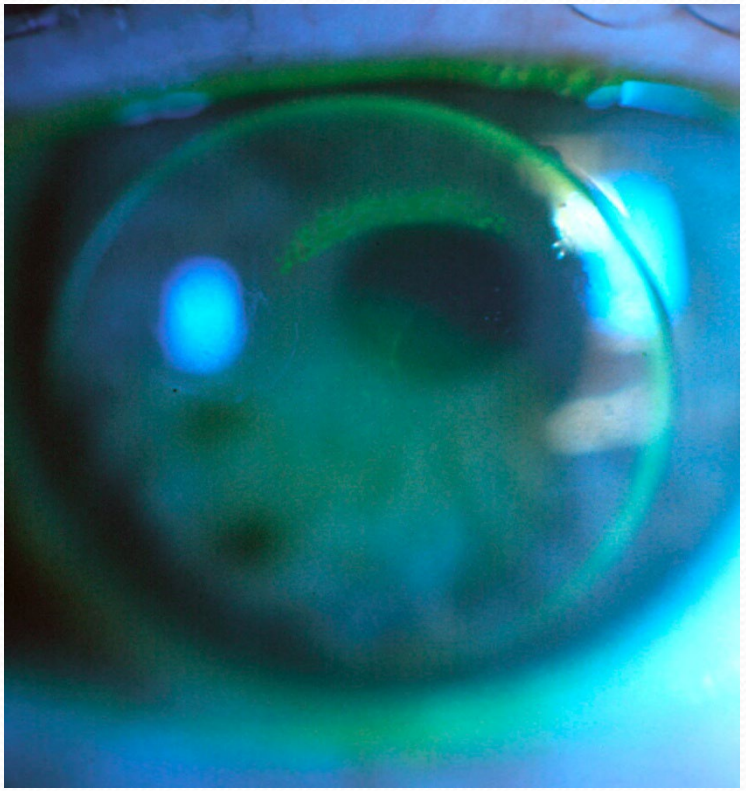

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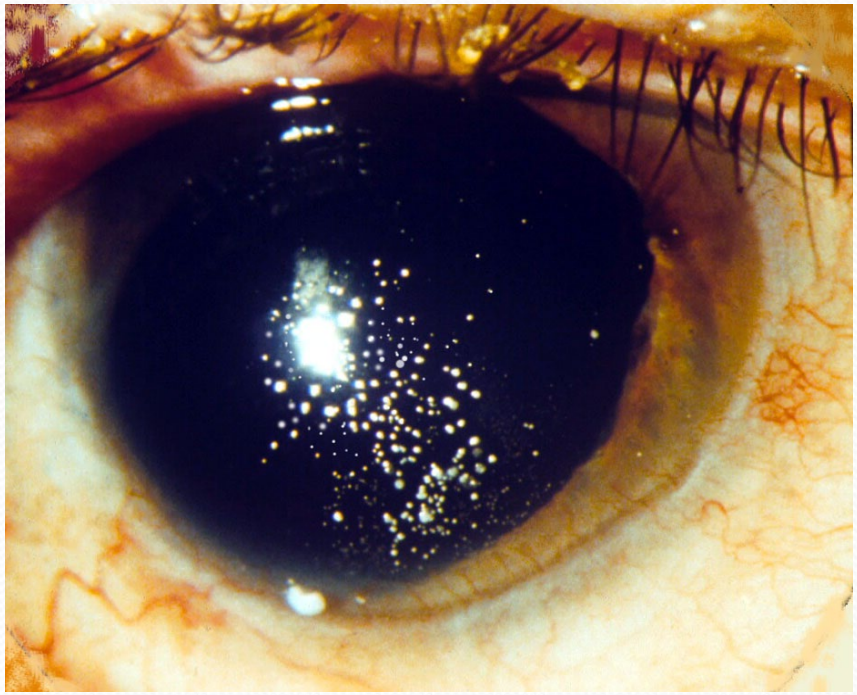

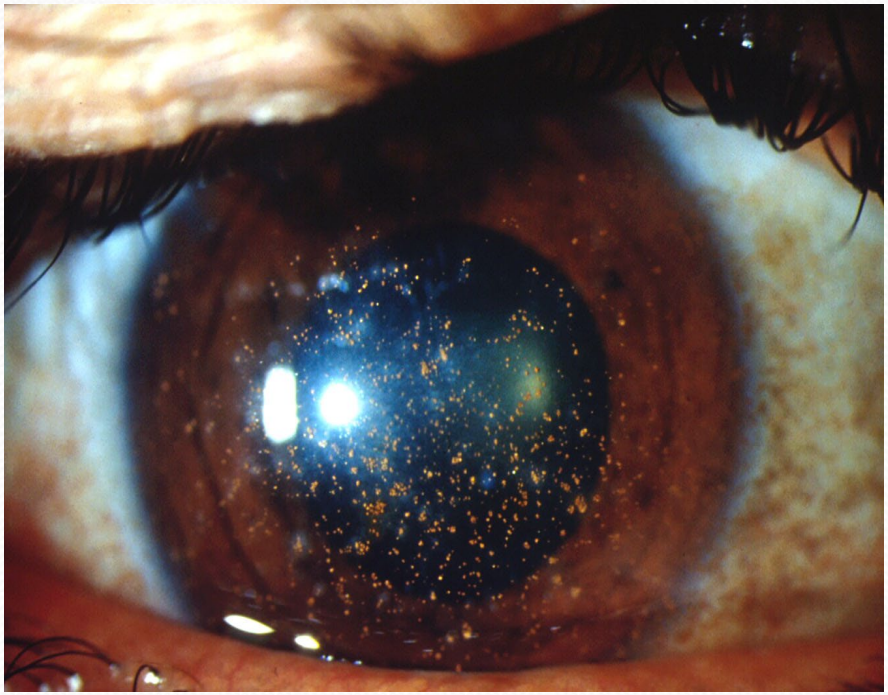

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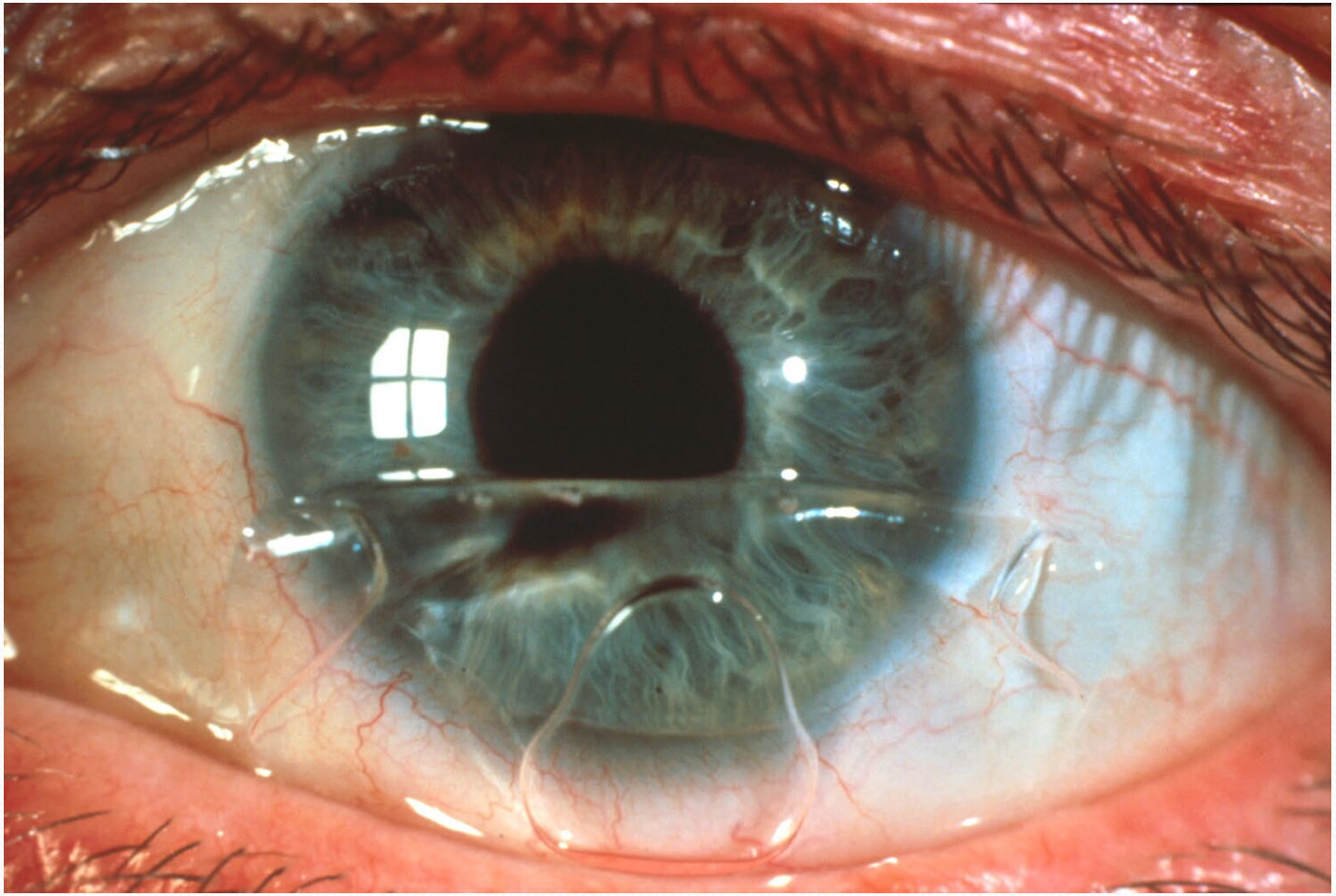

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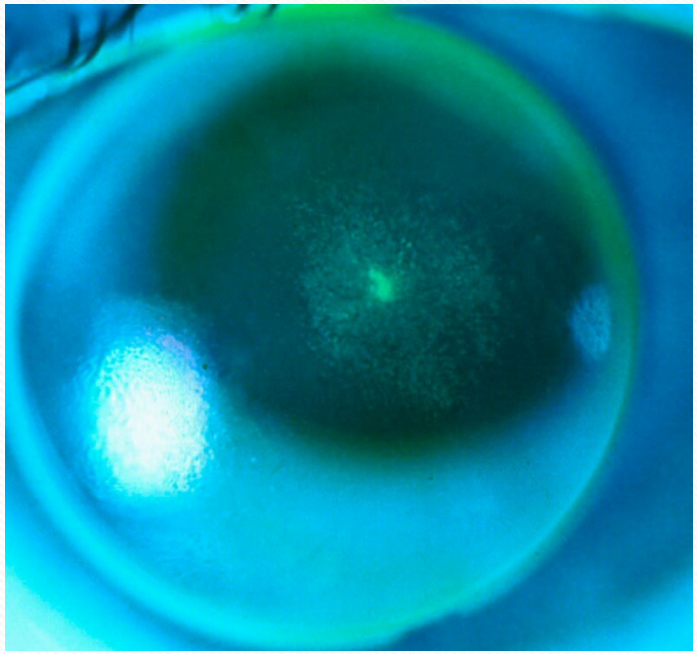

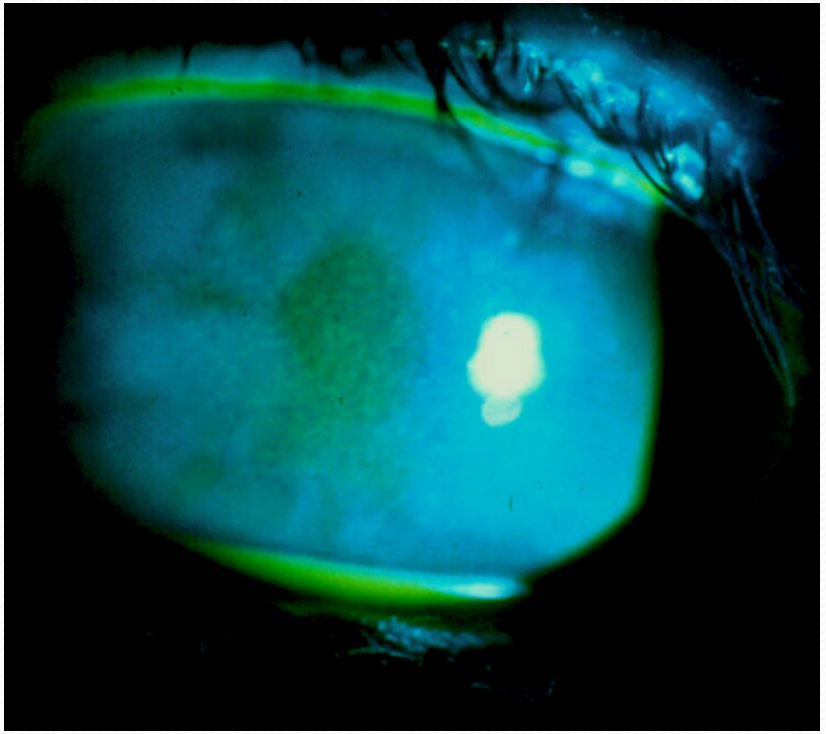

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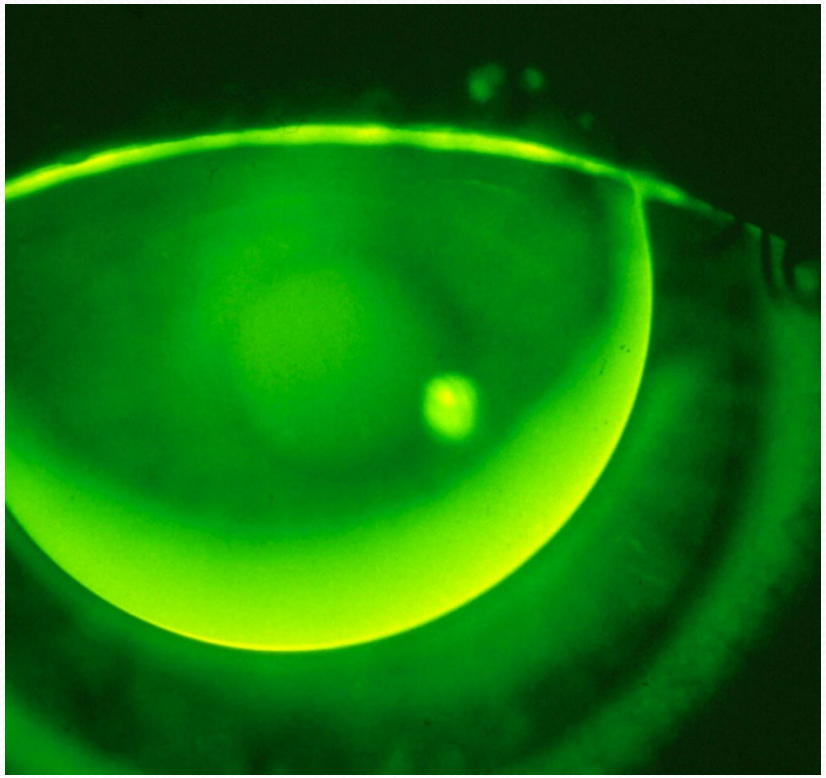

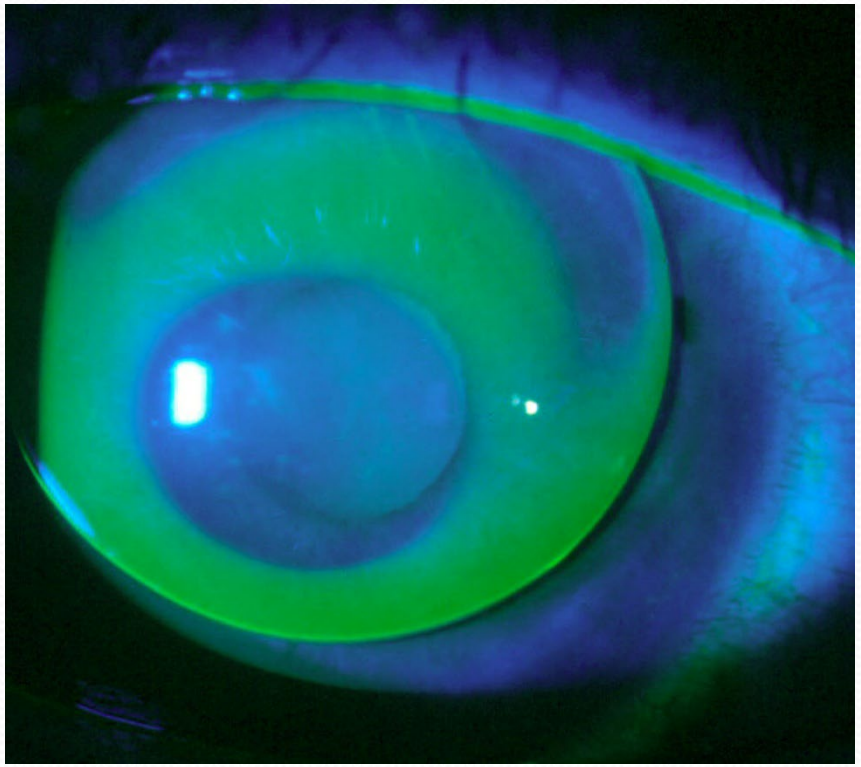

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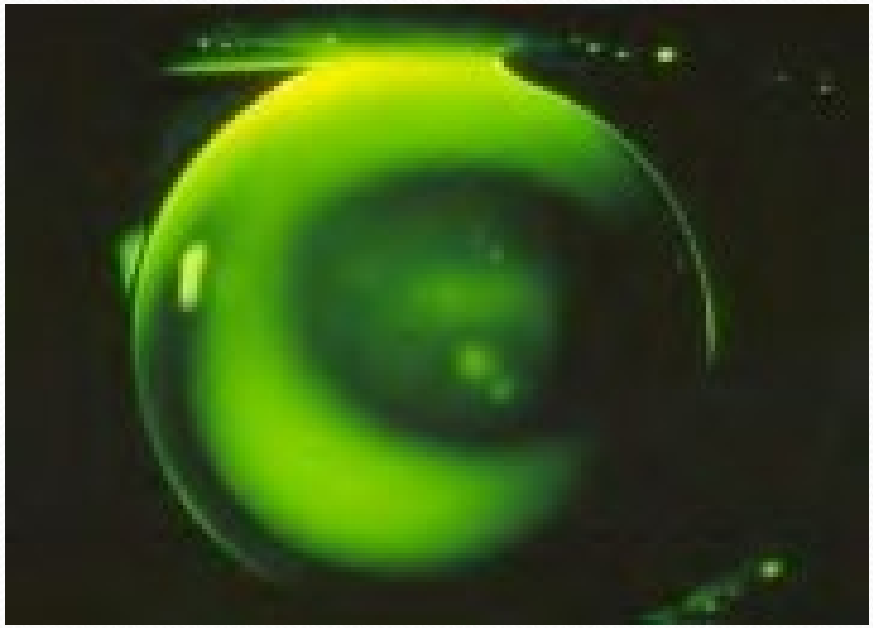

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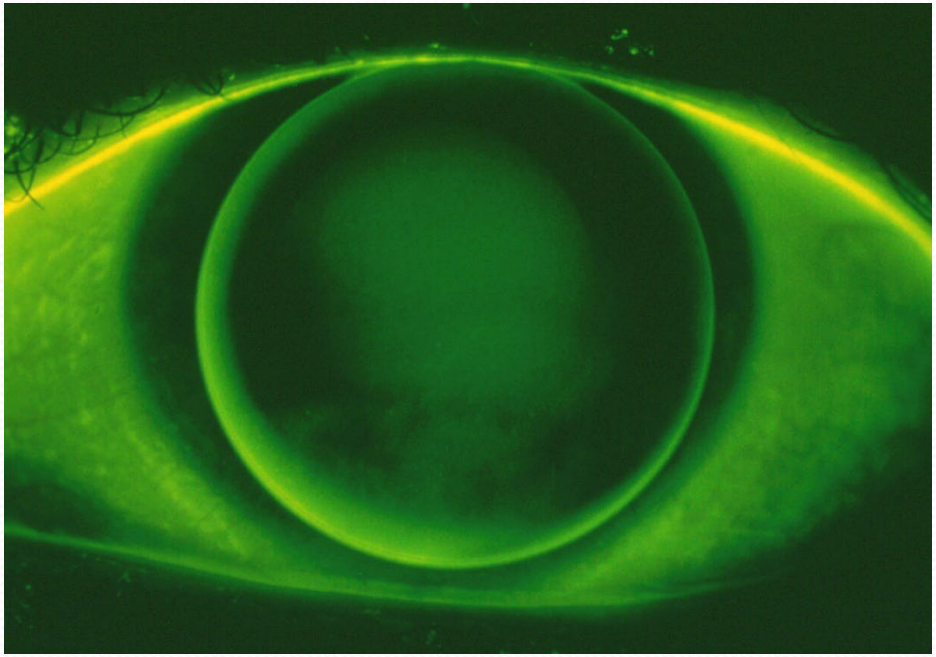

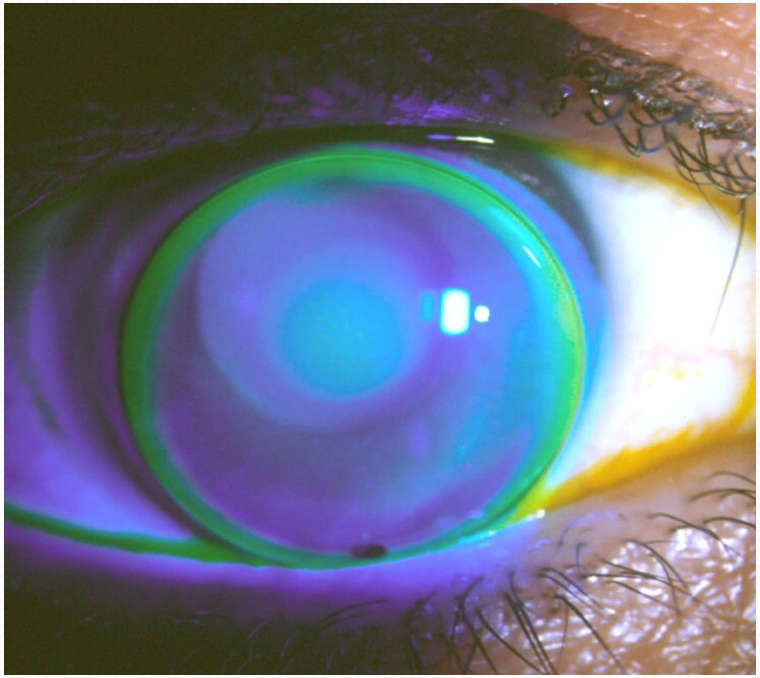

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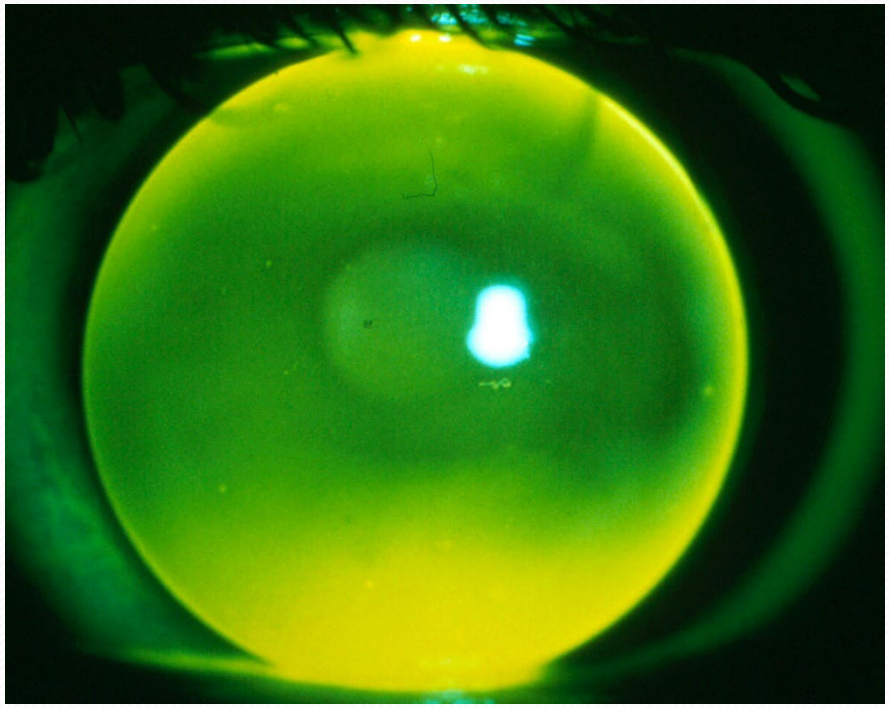

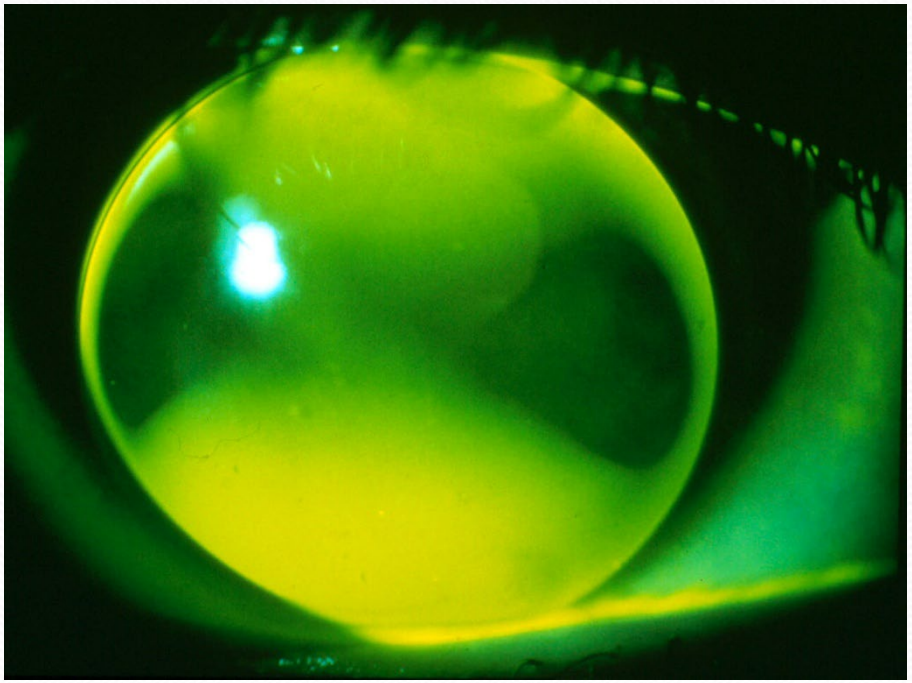

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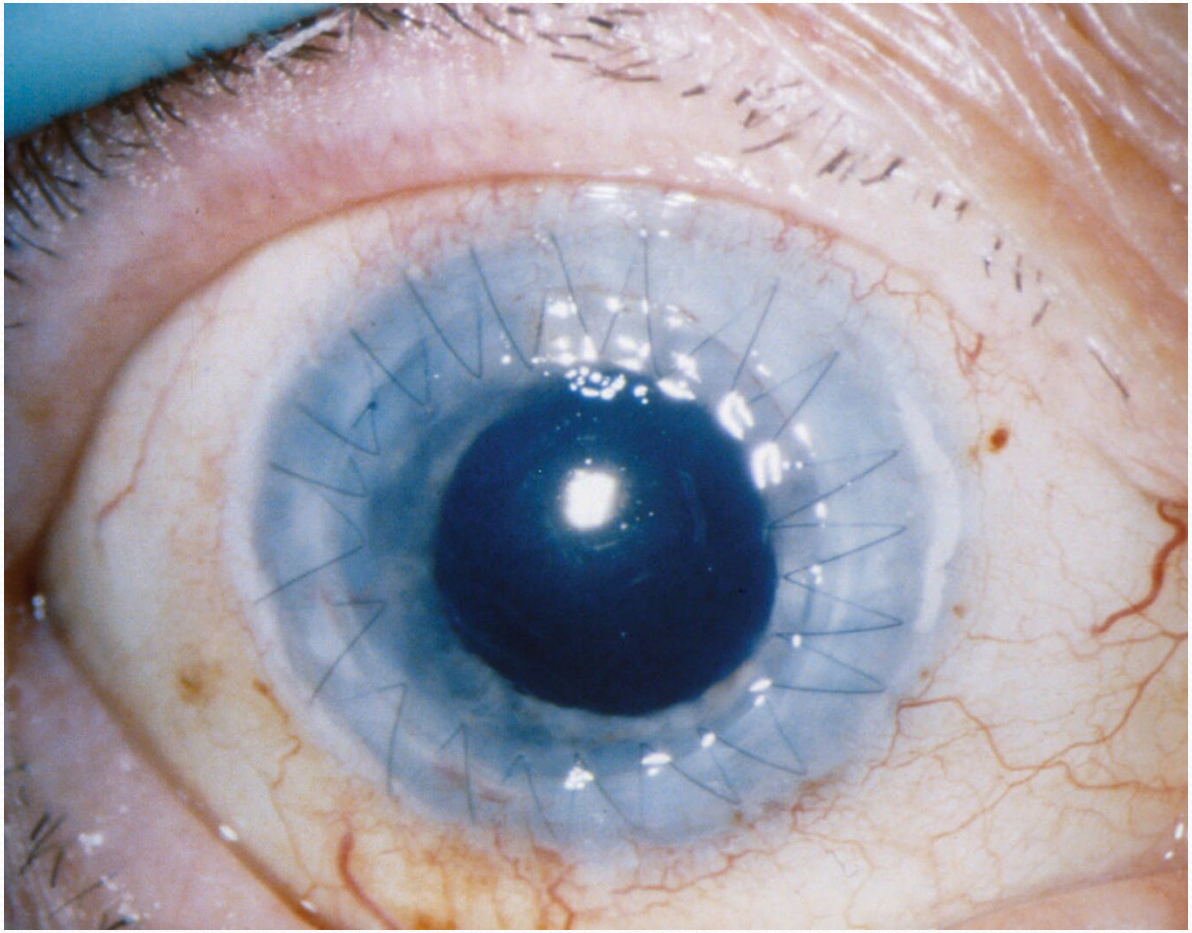

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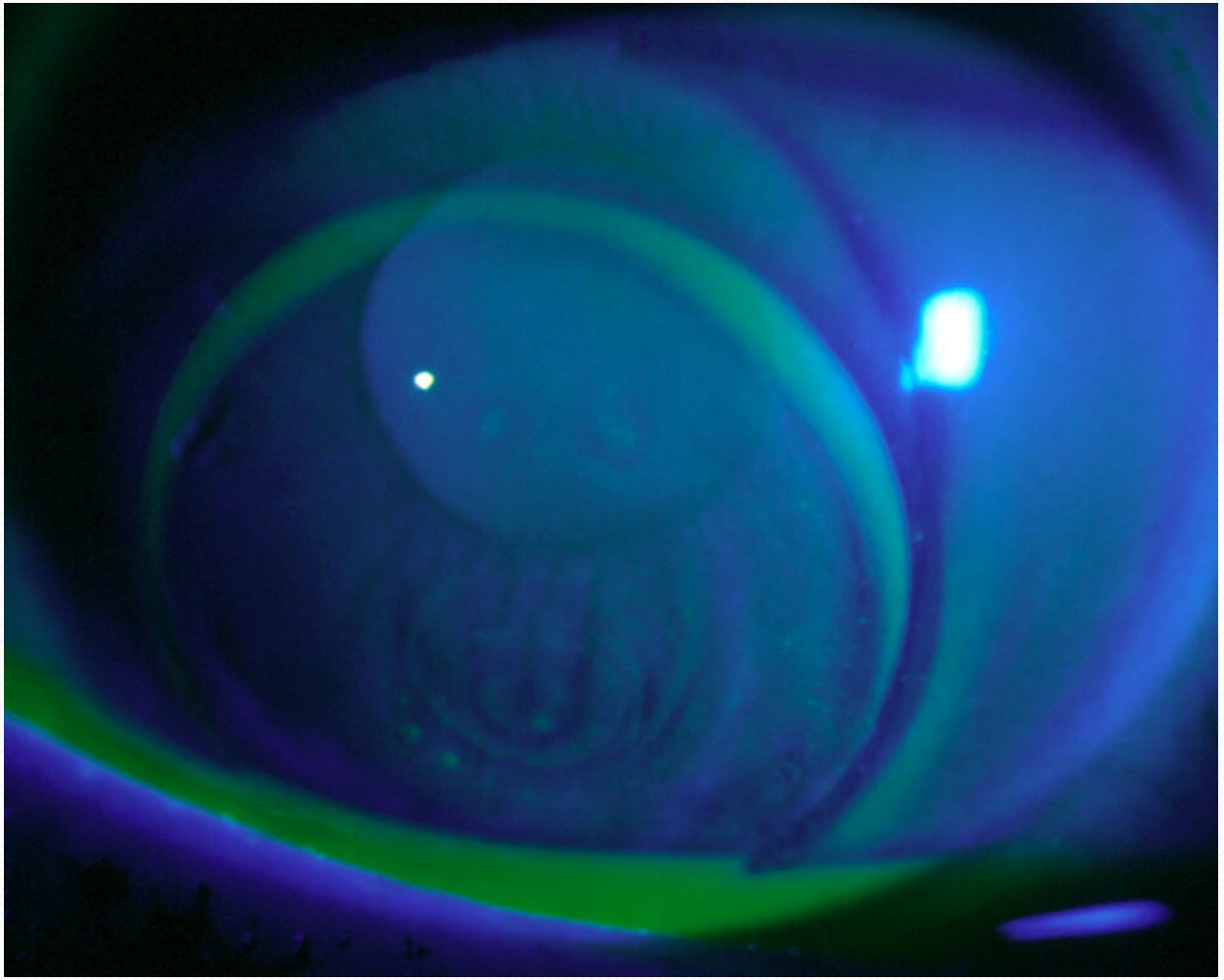

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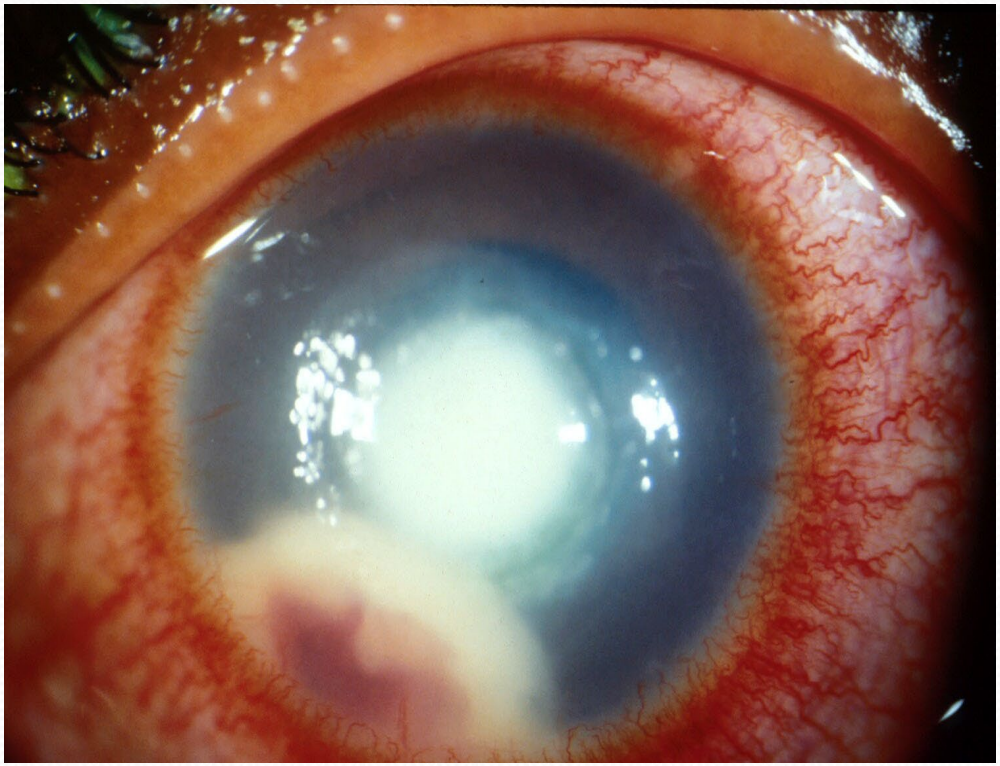
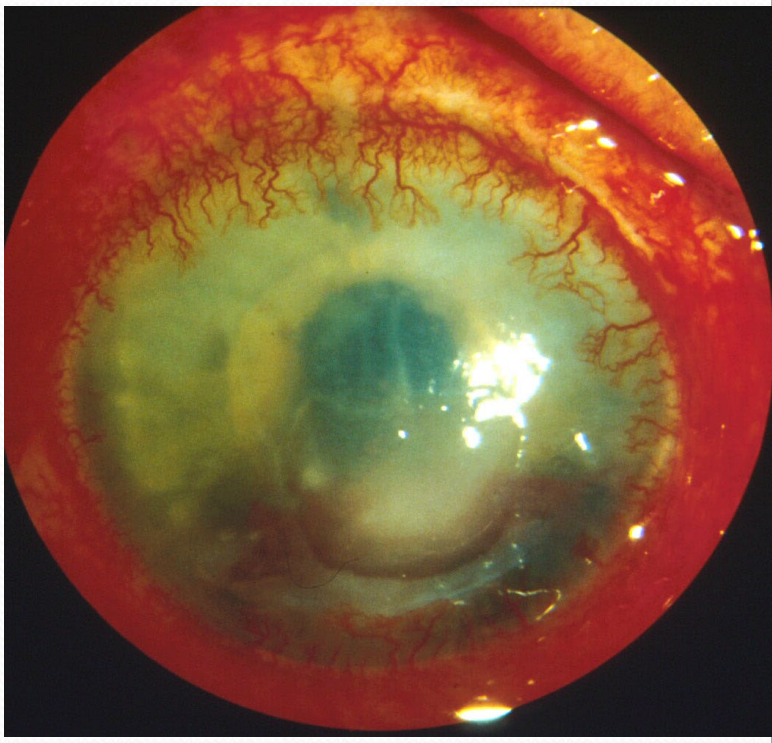
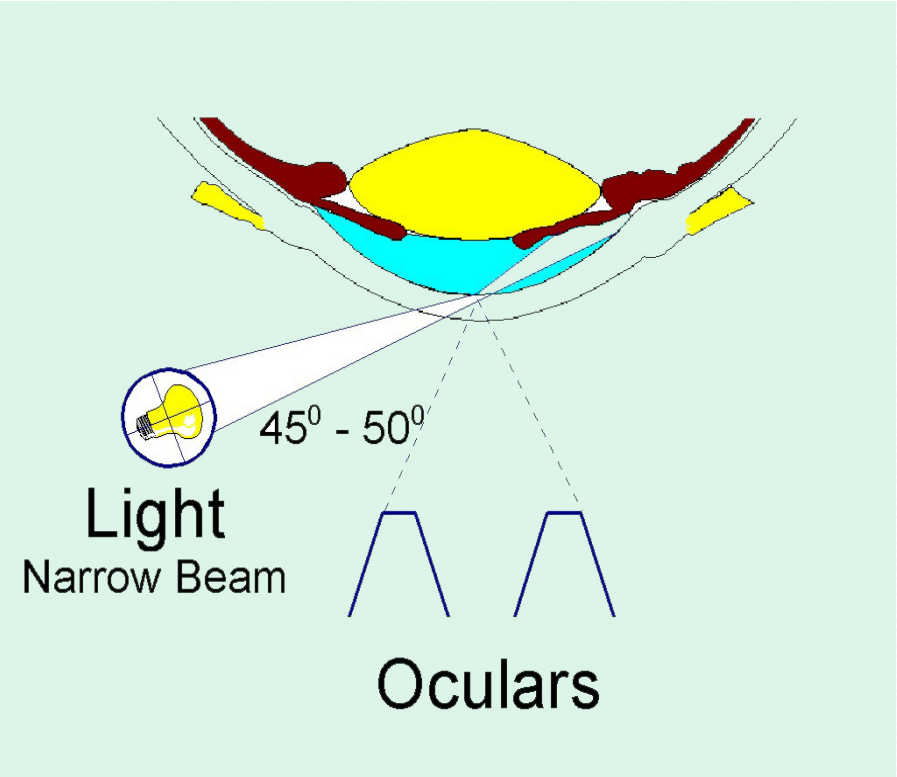


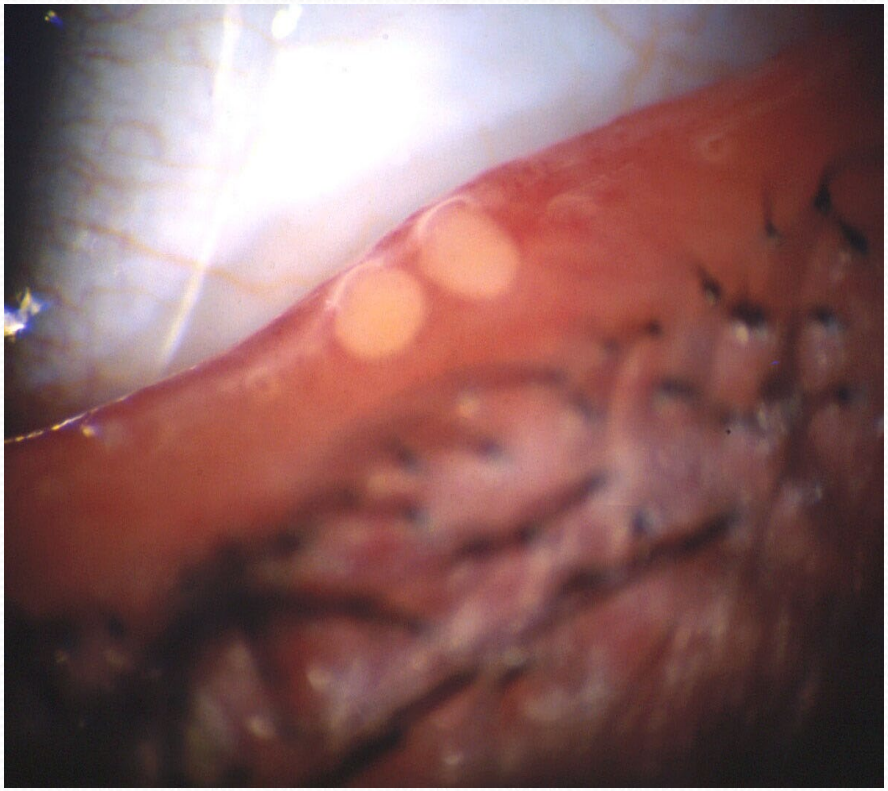


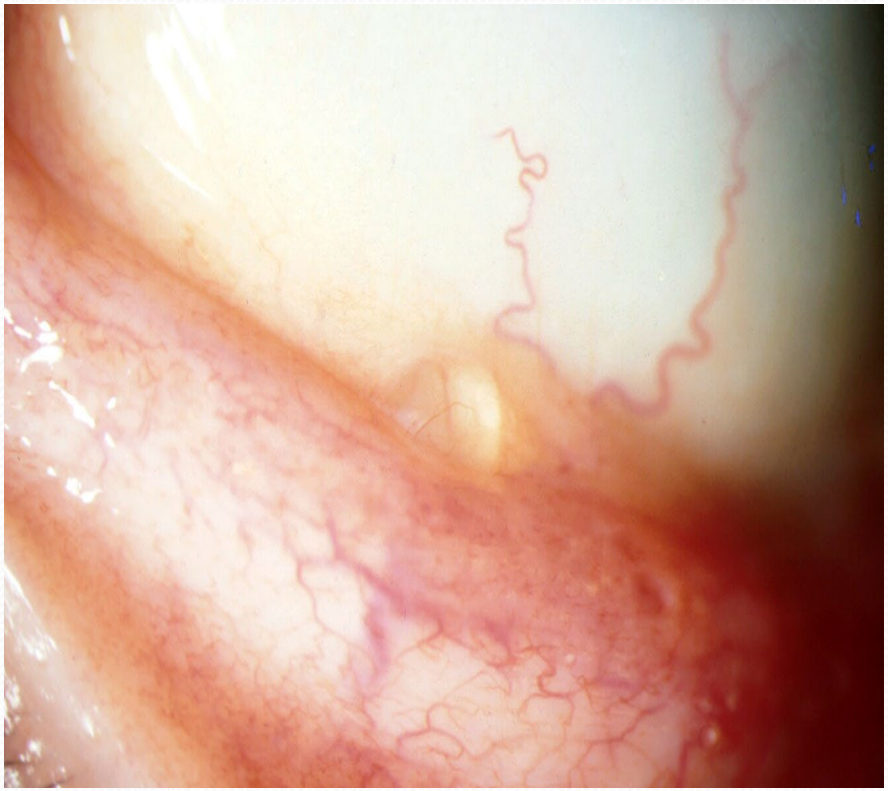
Direct Illumination



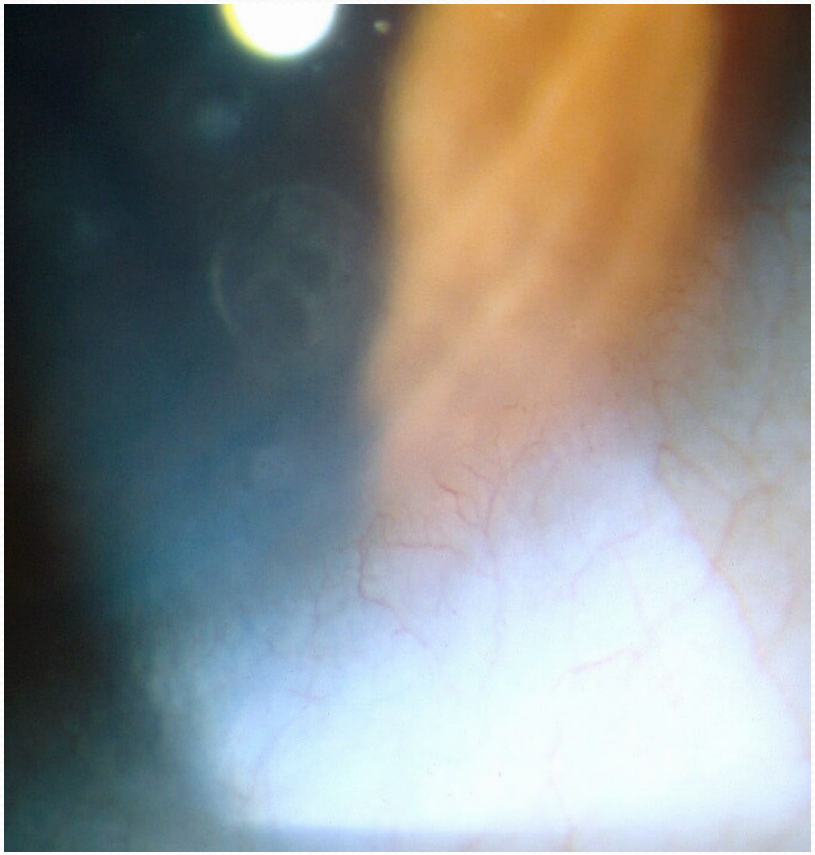
- Most important and useful illumination
- Light angle 45⁰-50⁰ degree to oculars
- Light beam and oculars focused in coincidence
- Varying width and aperture creates different illuminations

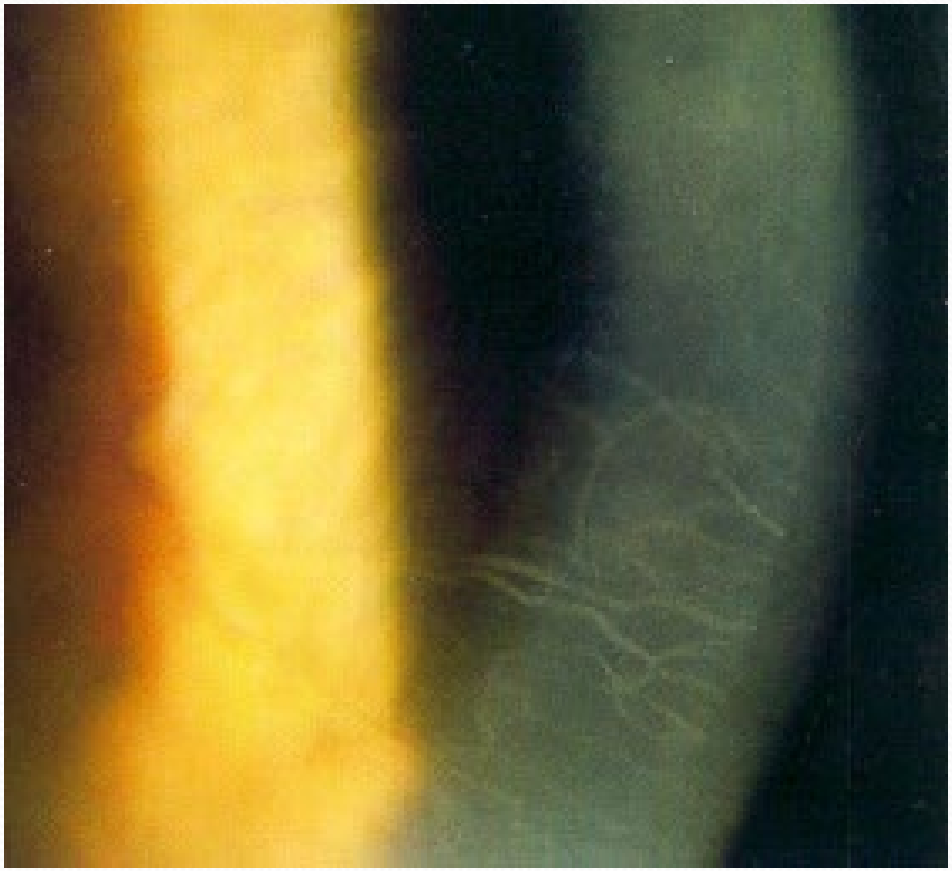
Direct Illumination



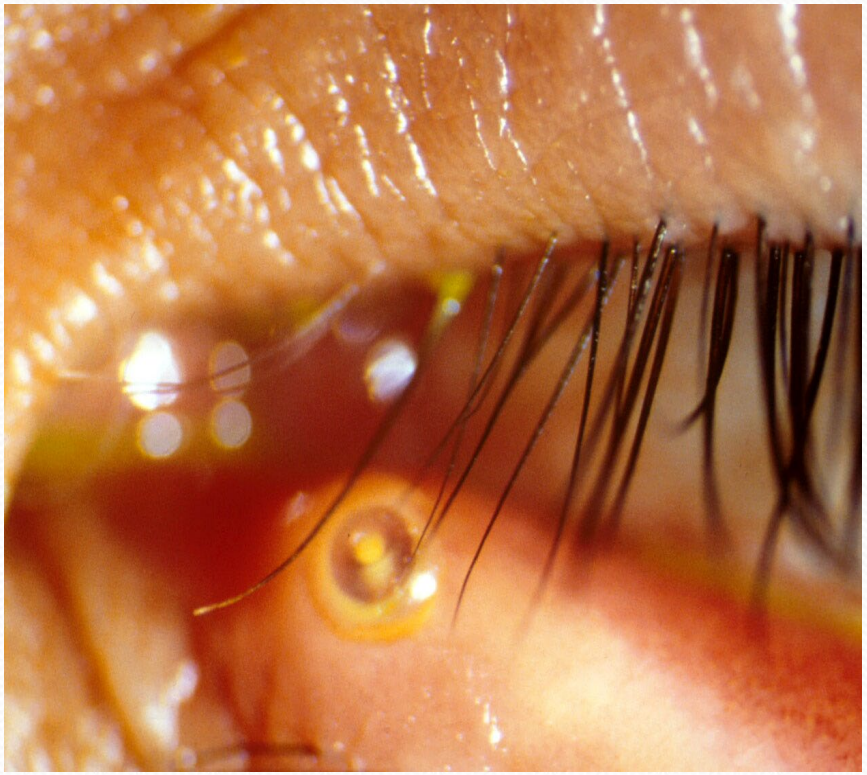


Direct Illumination

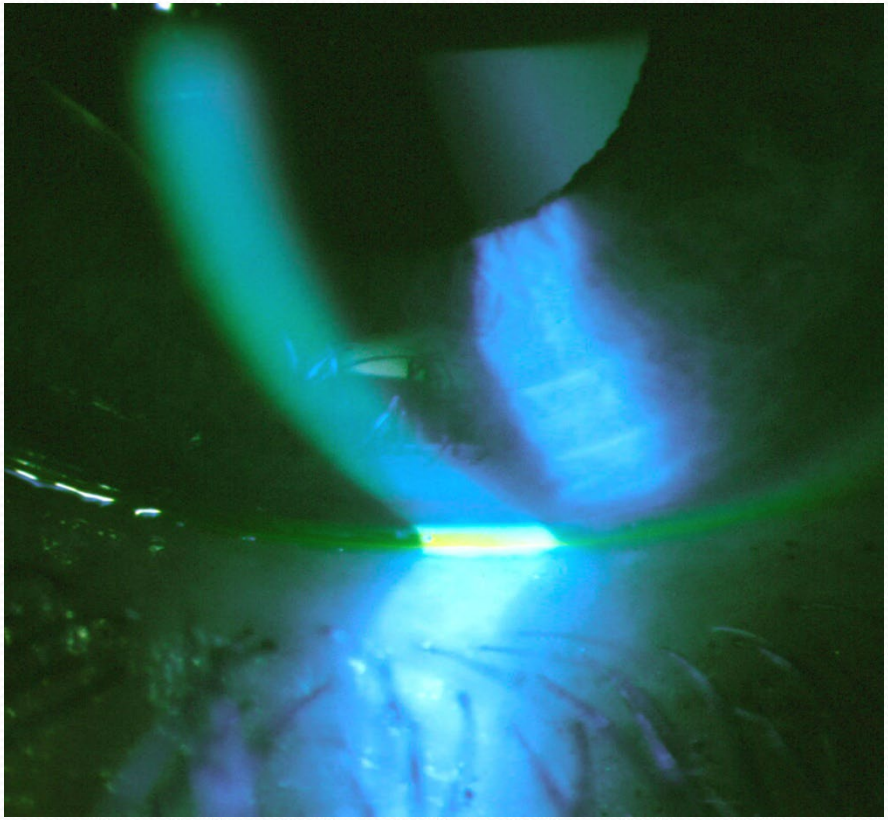


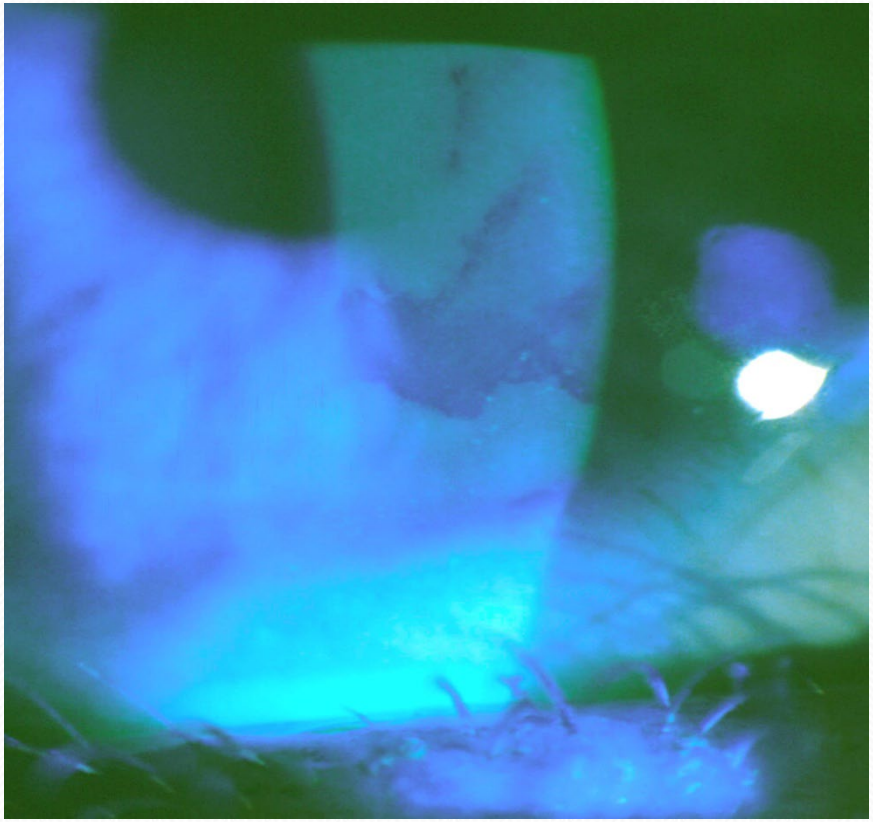


Direct Illumination

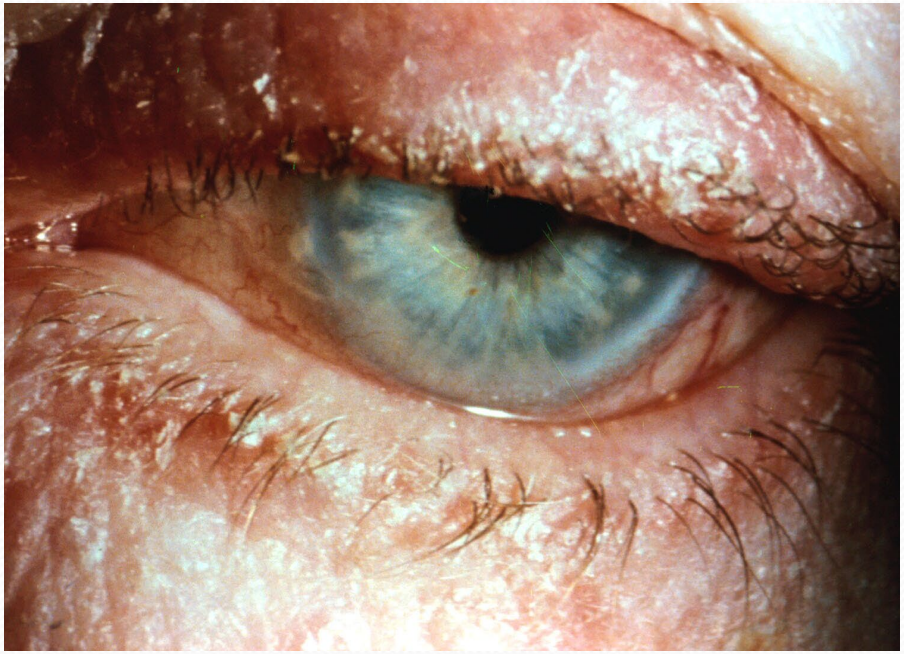


Direct Illumination

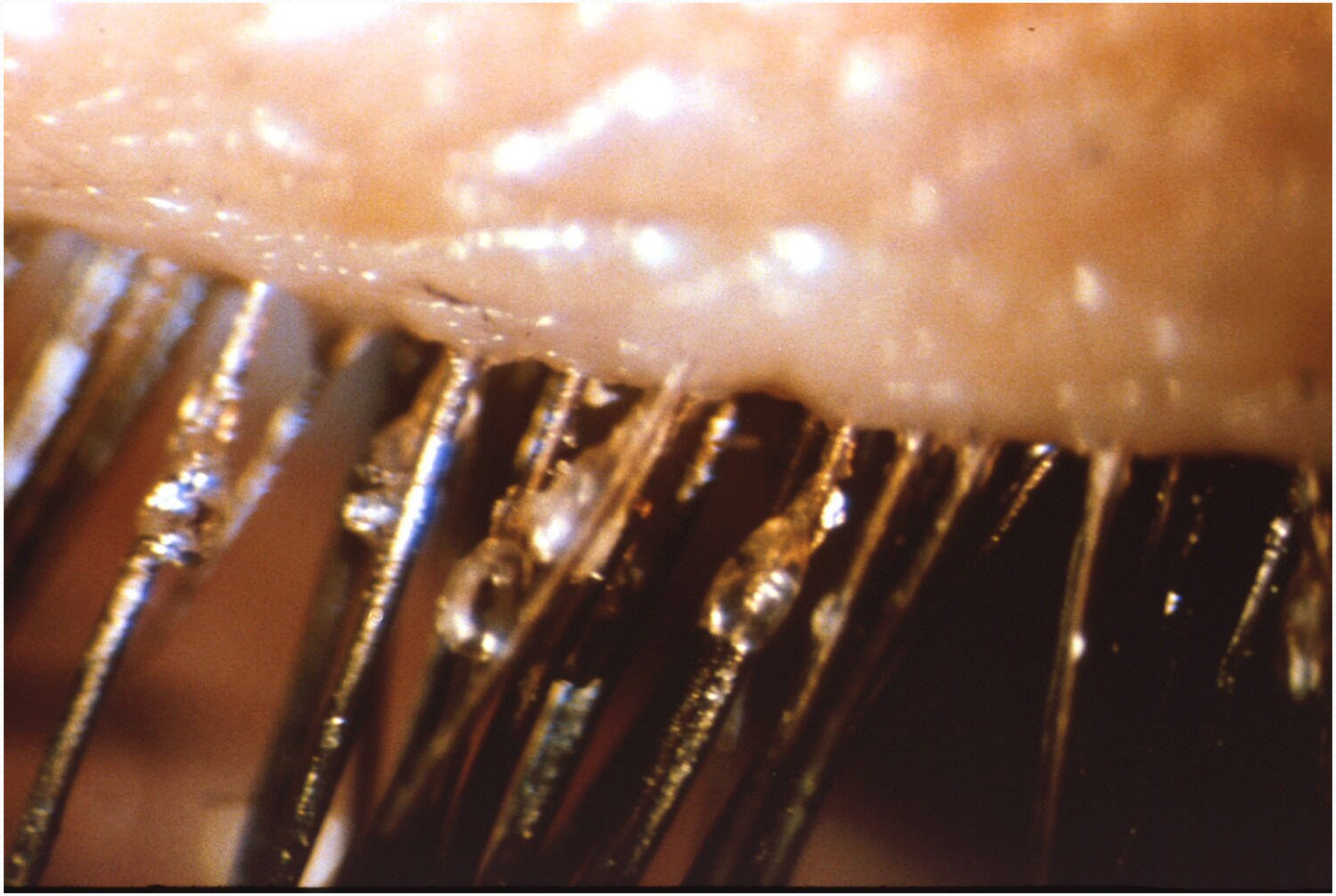




Direct Illumination

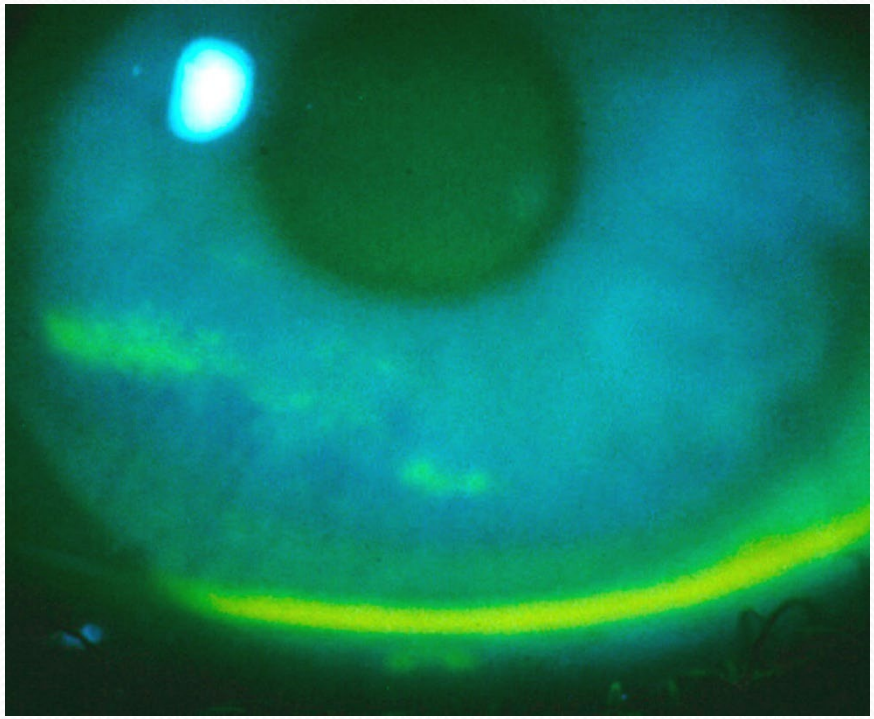


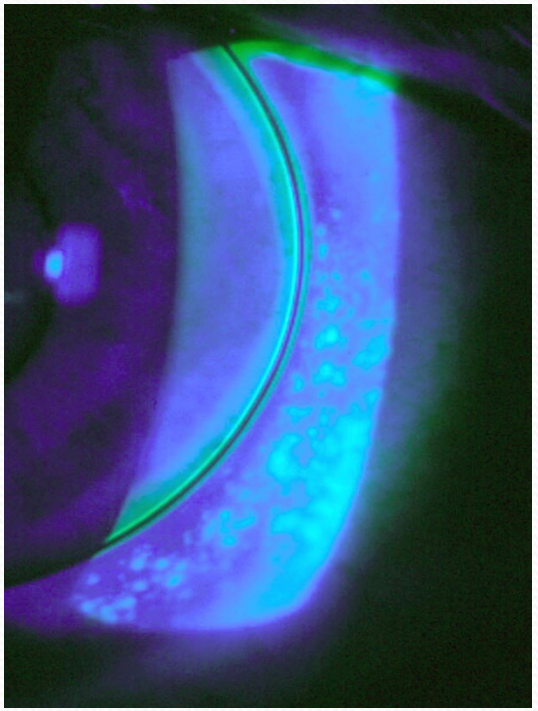
Direct Illumination



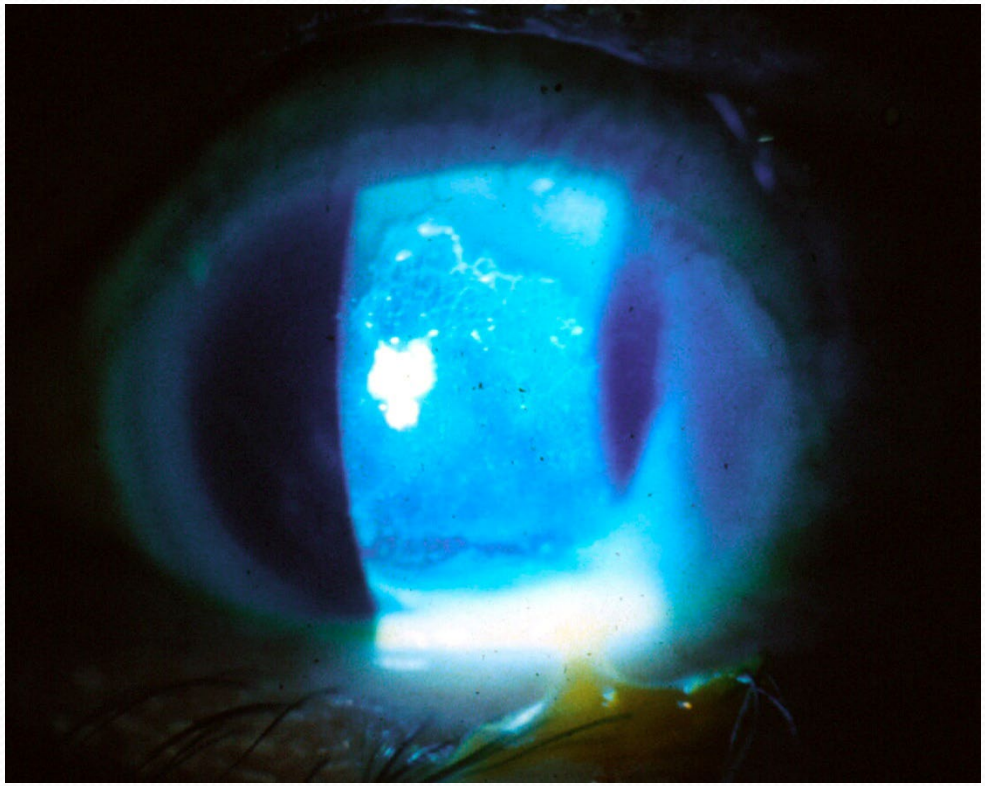
Direct Illumination

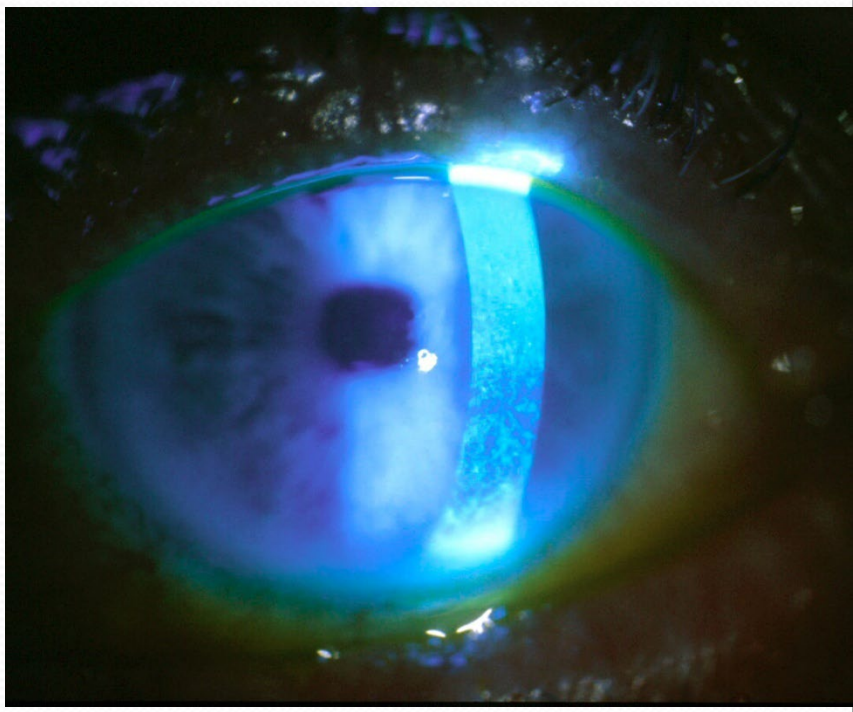
Direct Illumination



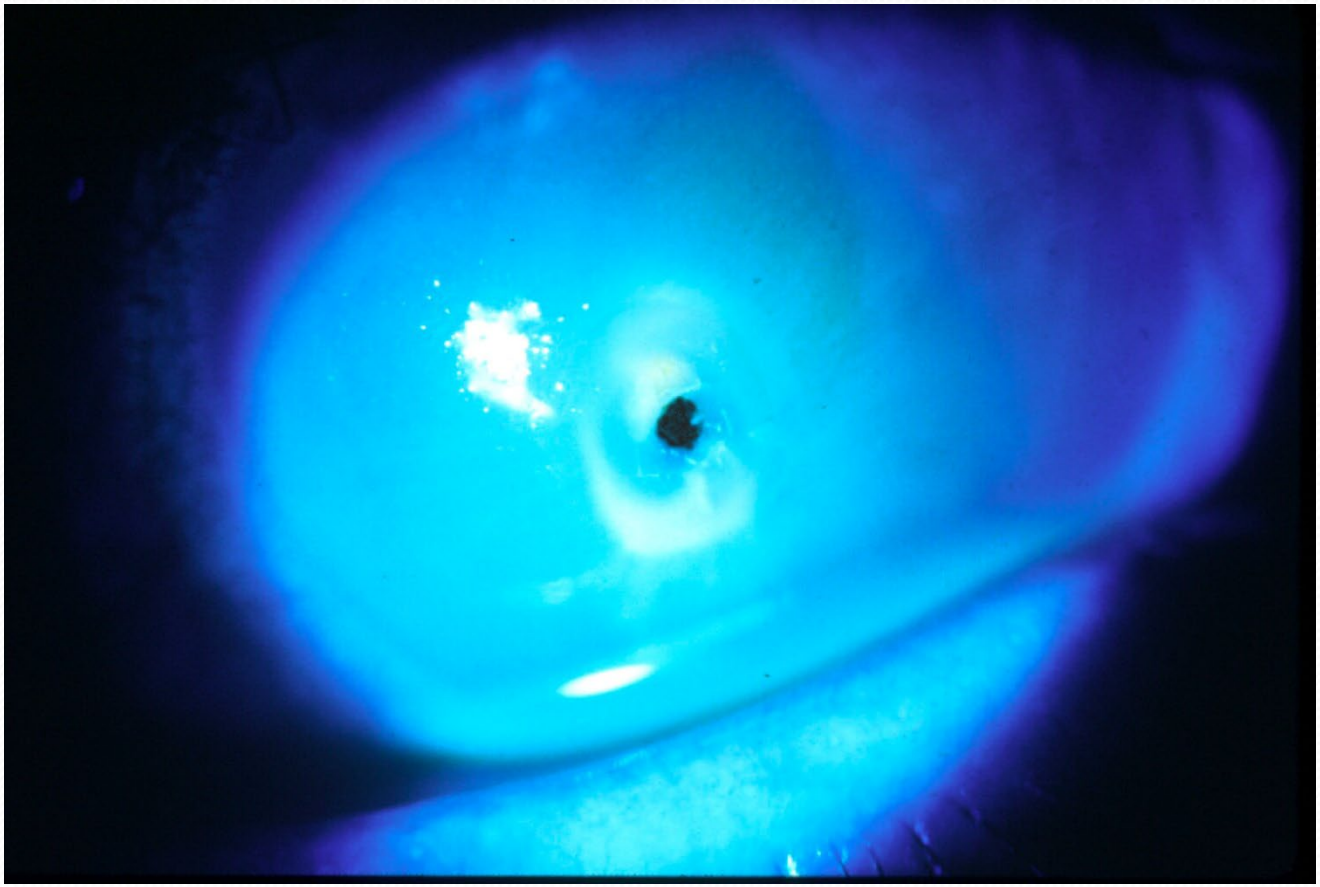


Direct Illumination

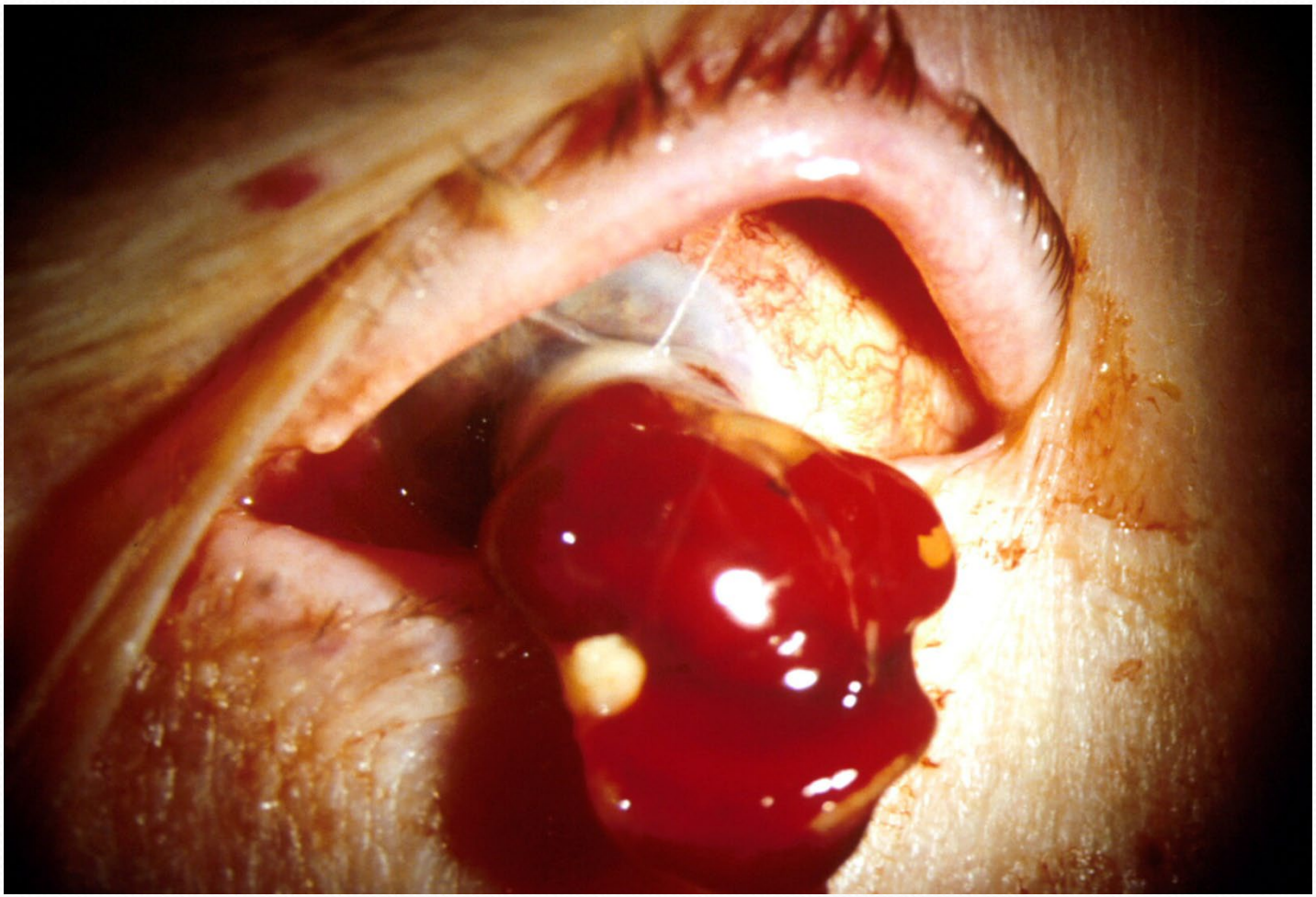




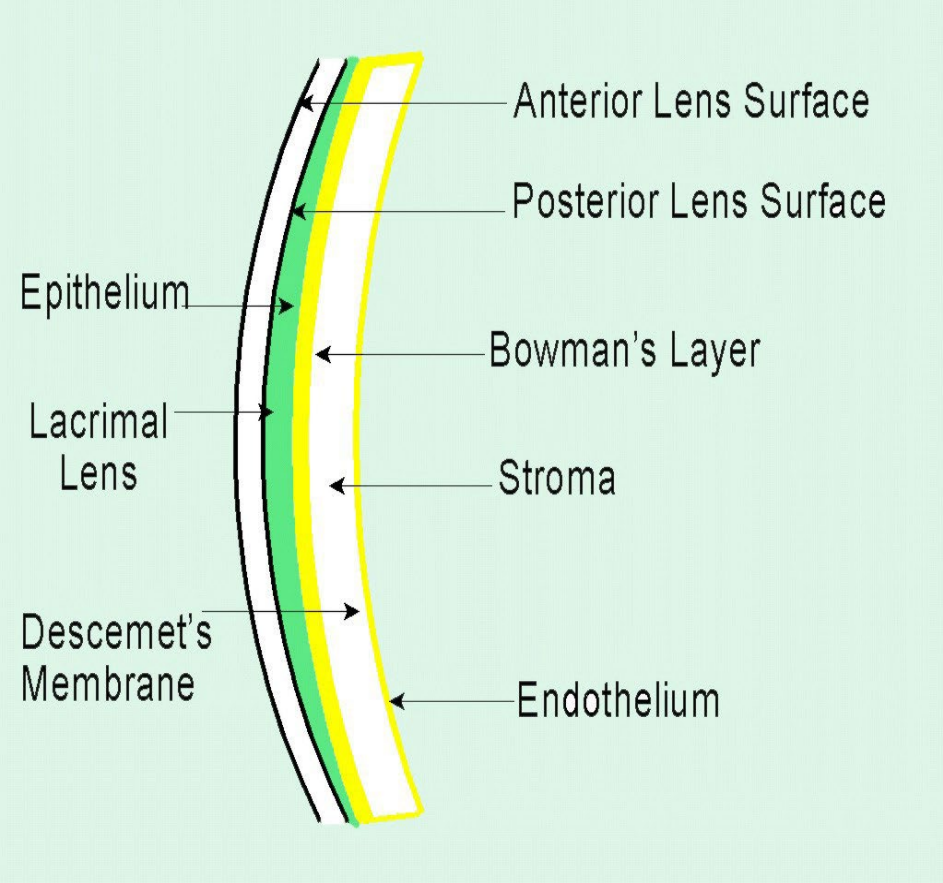
Direct Illumination



Direct Illumination

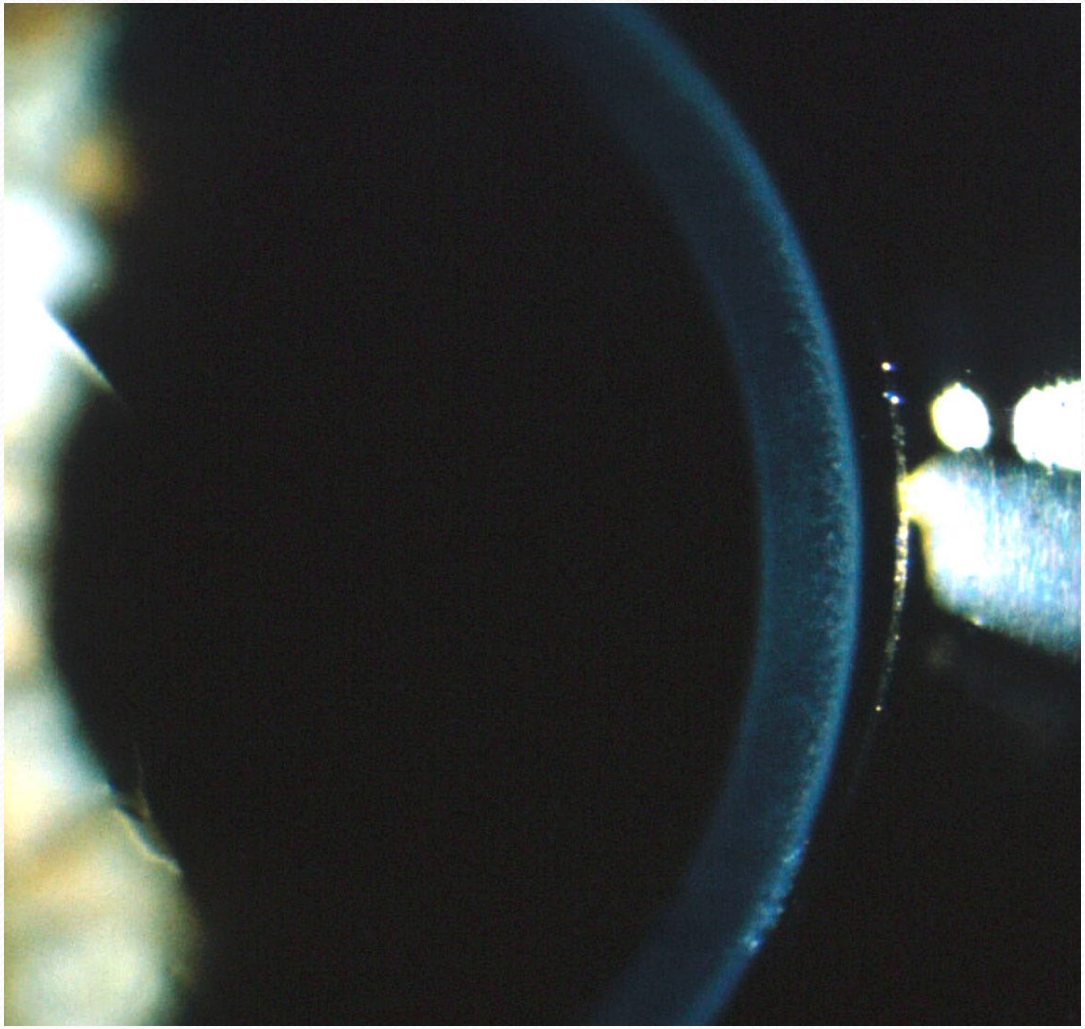


Optic Section

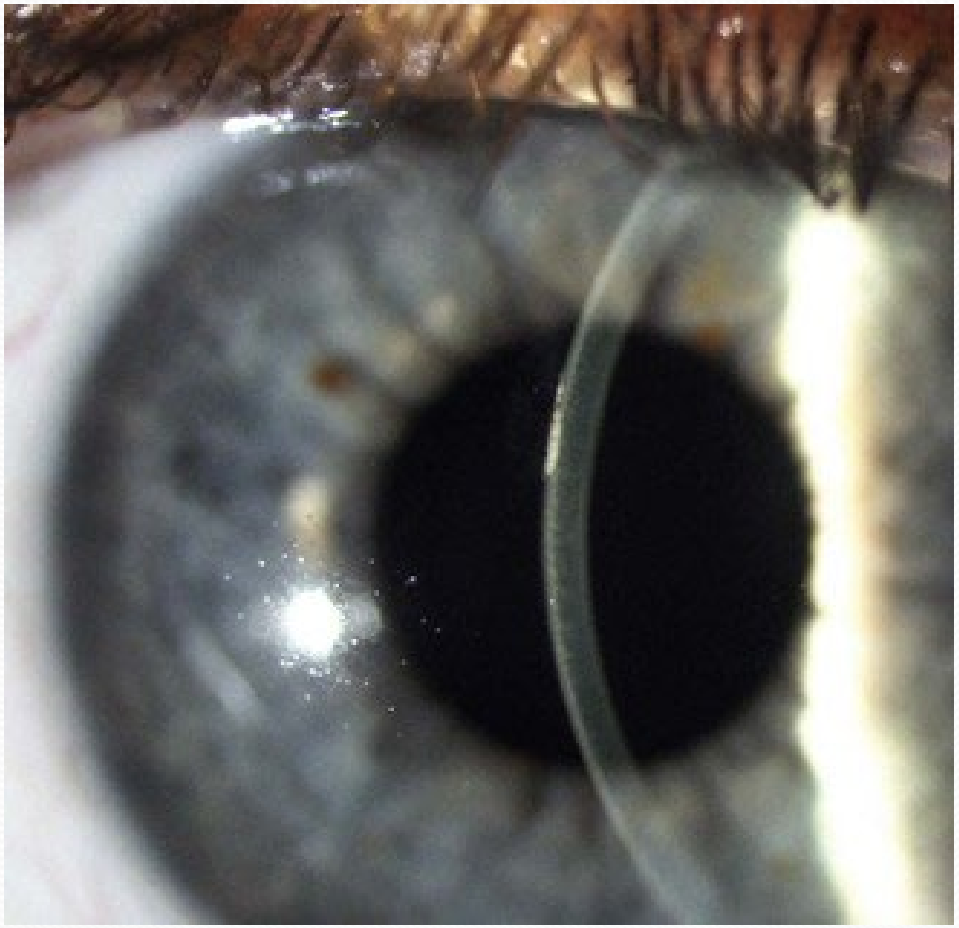


- Beam at narrow width (0.2mm)
- Creates "cross-section" slice of cornea
- Observe layers of cornea
- Evaluate corneal thickness
- Depth of FB
- Lens/corneal relationship

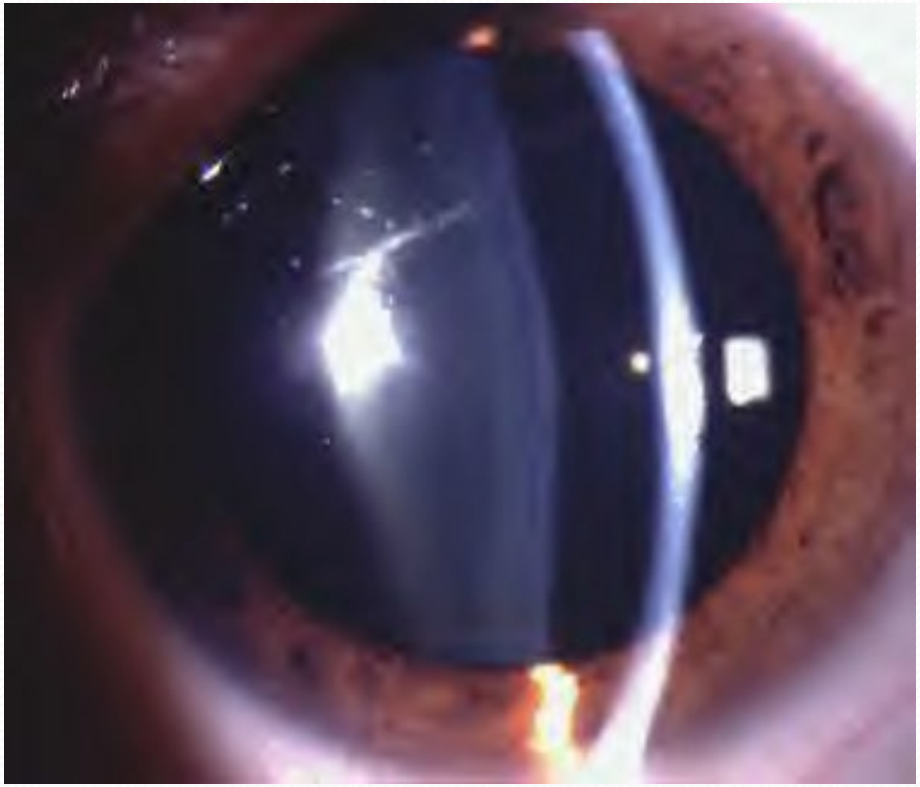
Optic Section

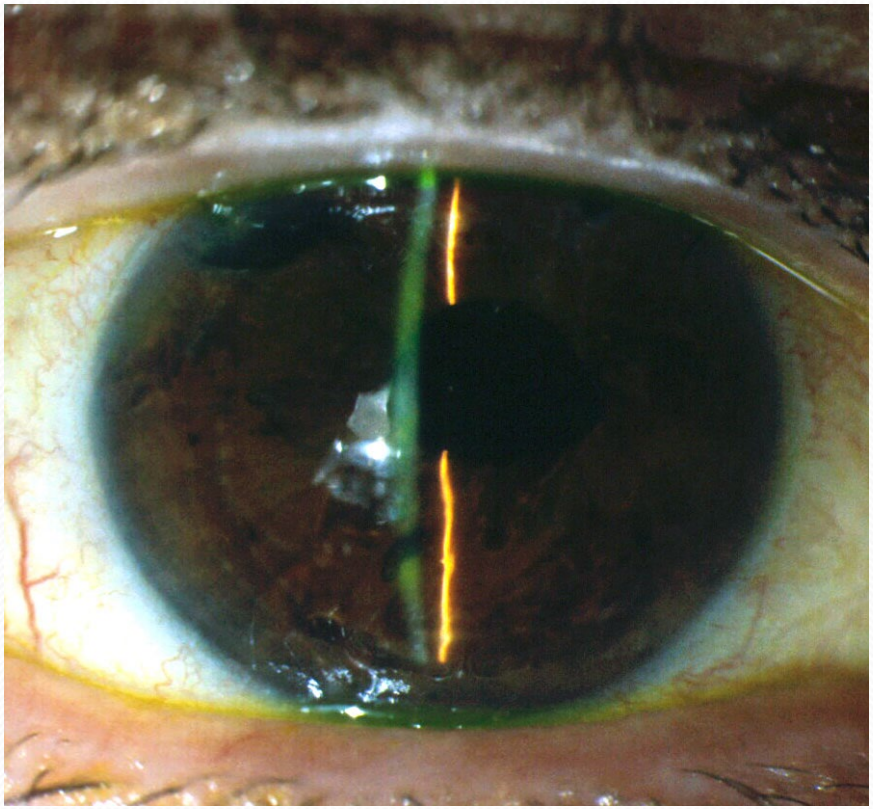


Optic Section

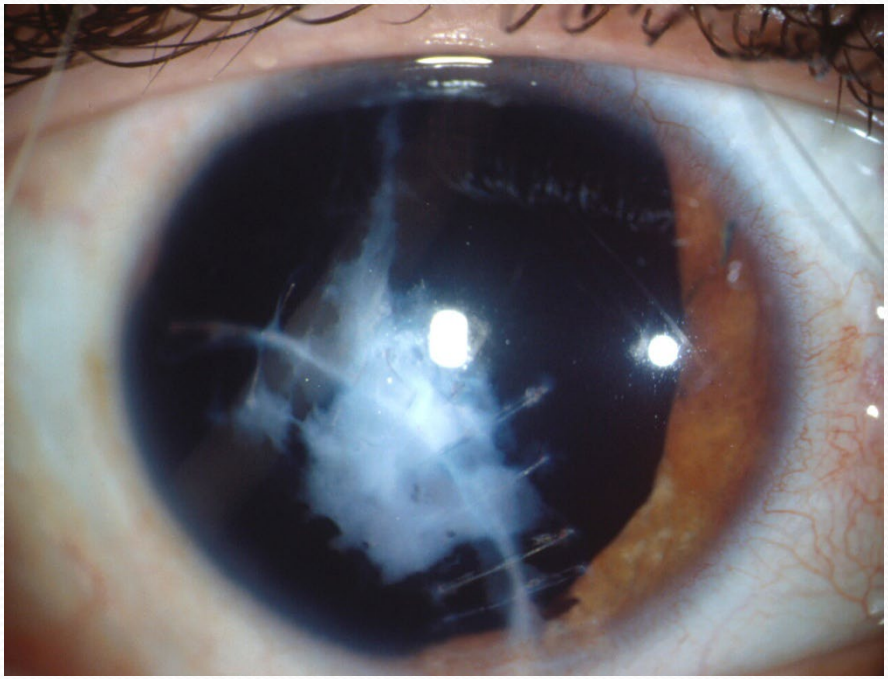


Optic Section

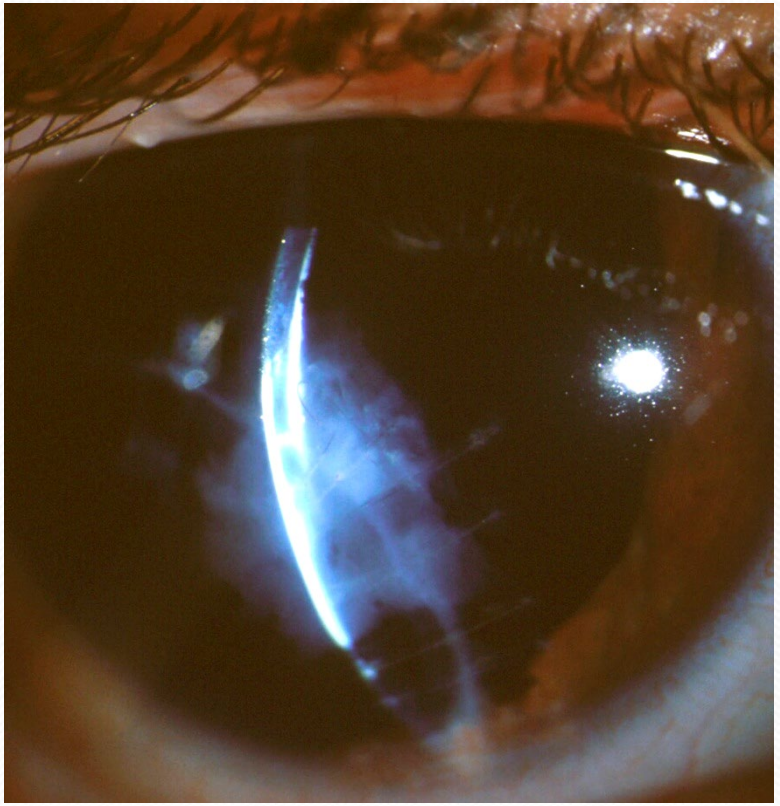


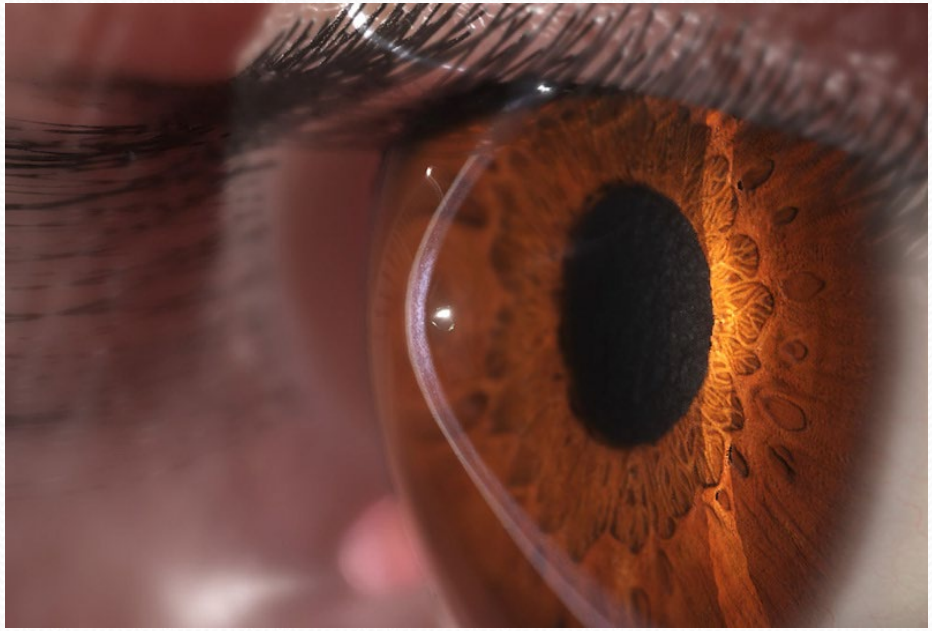


Optic Section

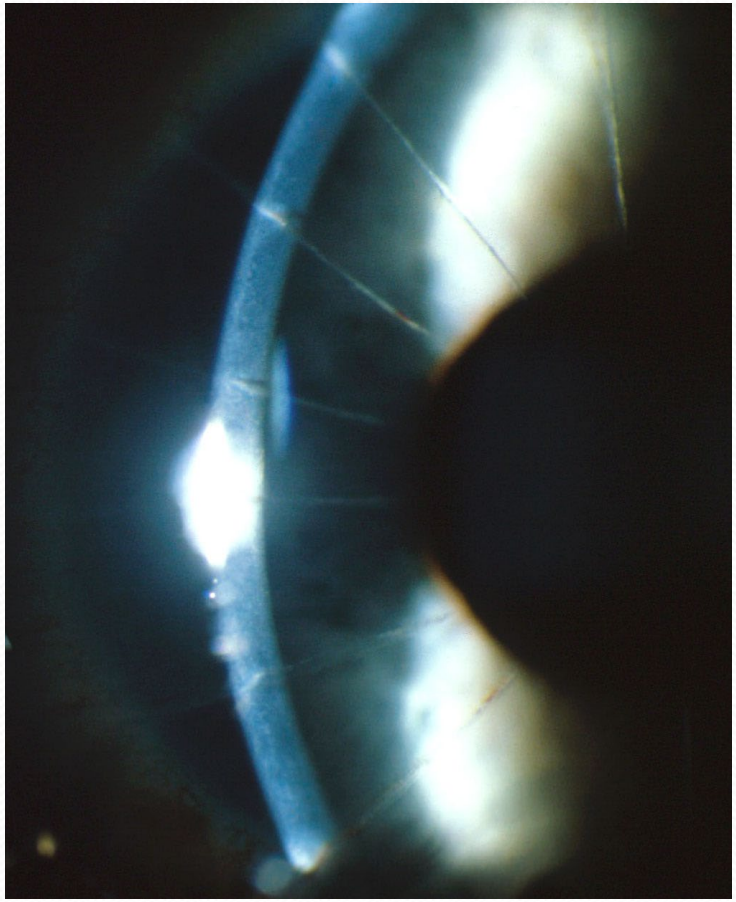


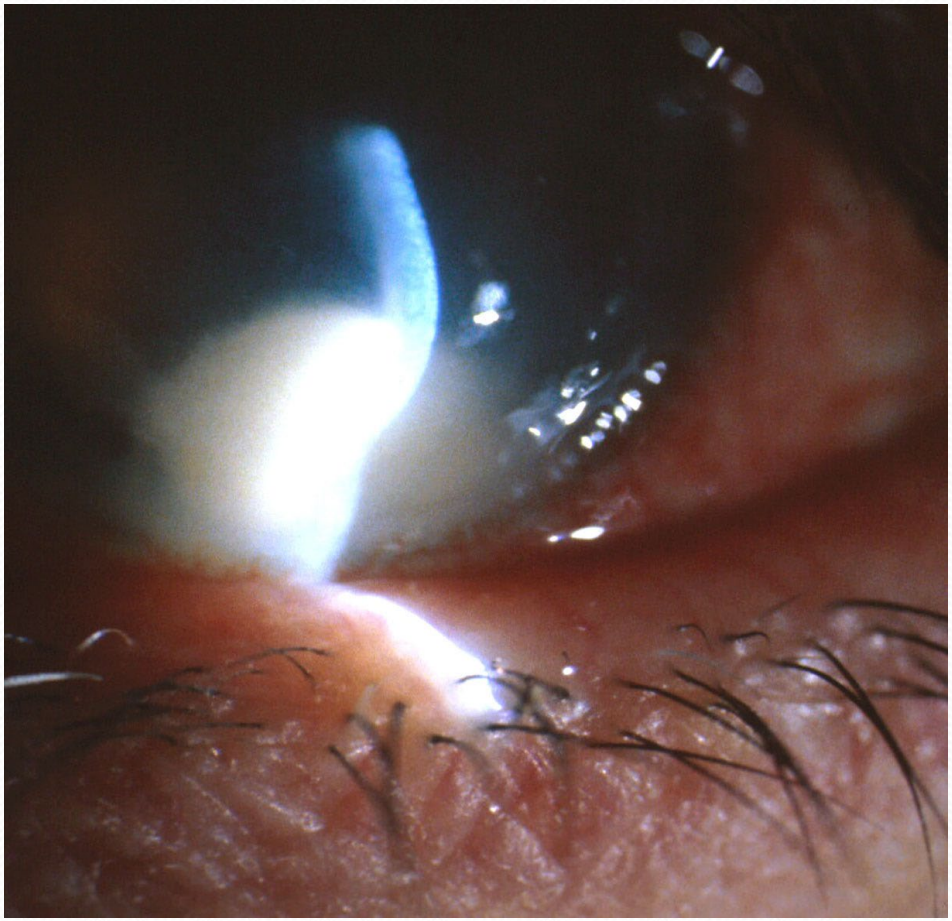
Diffused Illumination





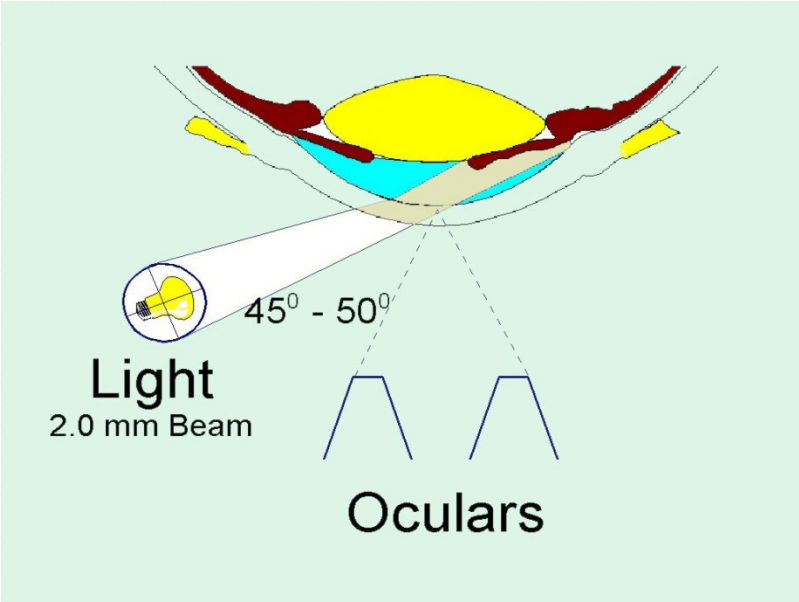
Direct Illumination



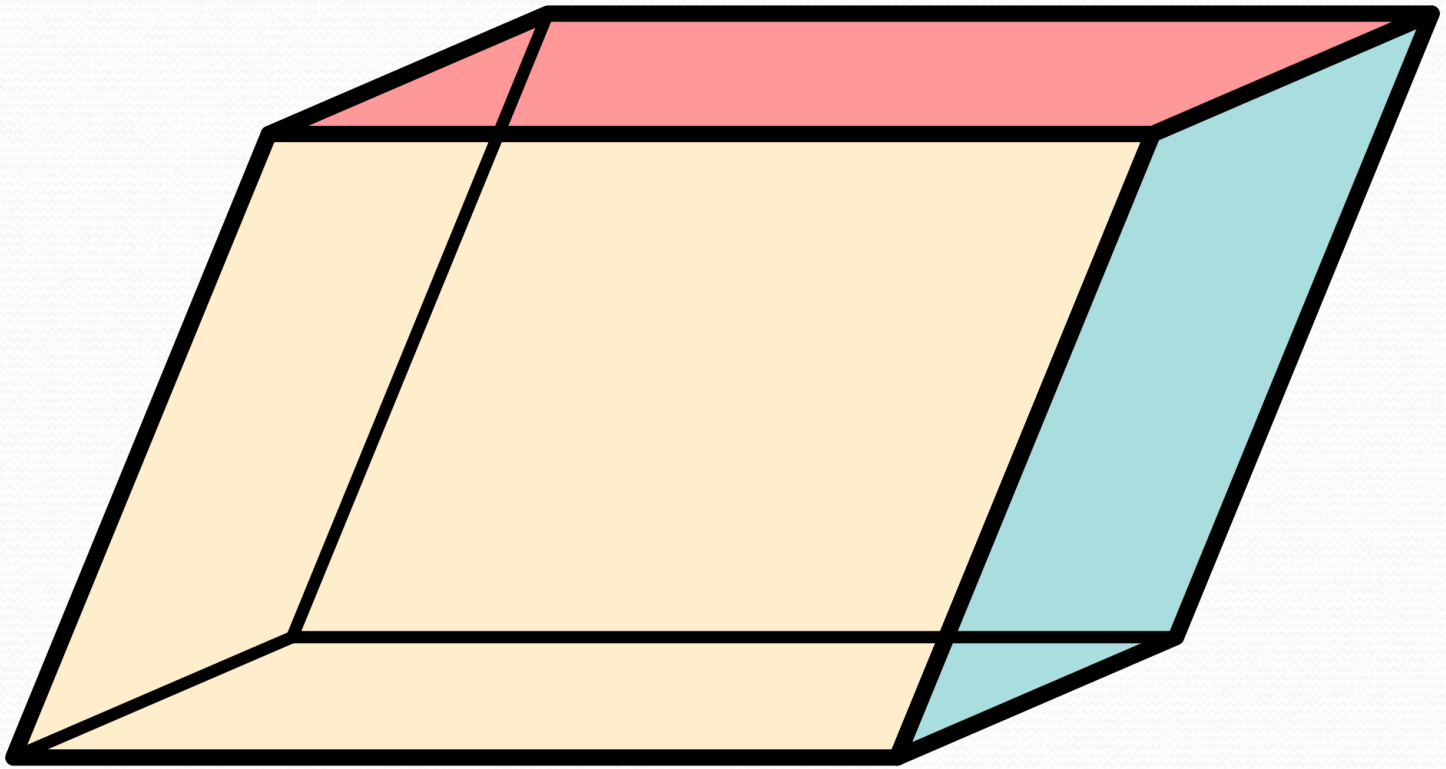


Parallelepiped

- 0.5 - 2.0 mm *Direct Illumination*
- Creates a 3-D cube
- Assess width, depth, height of object within cornea
- Observe scarring, infiltrates, staining

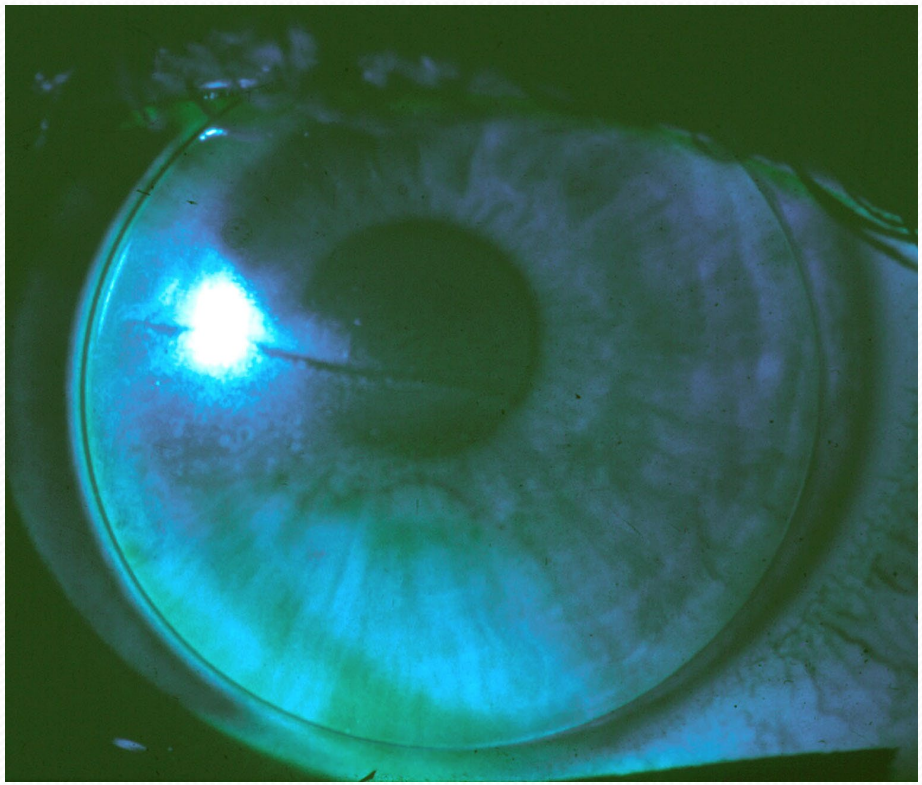


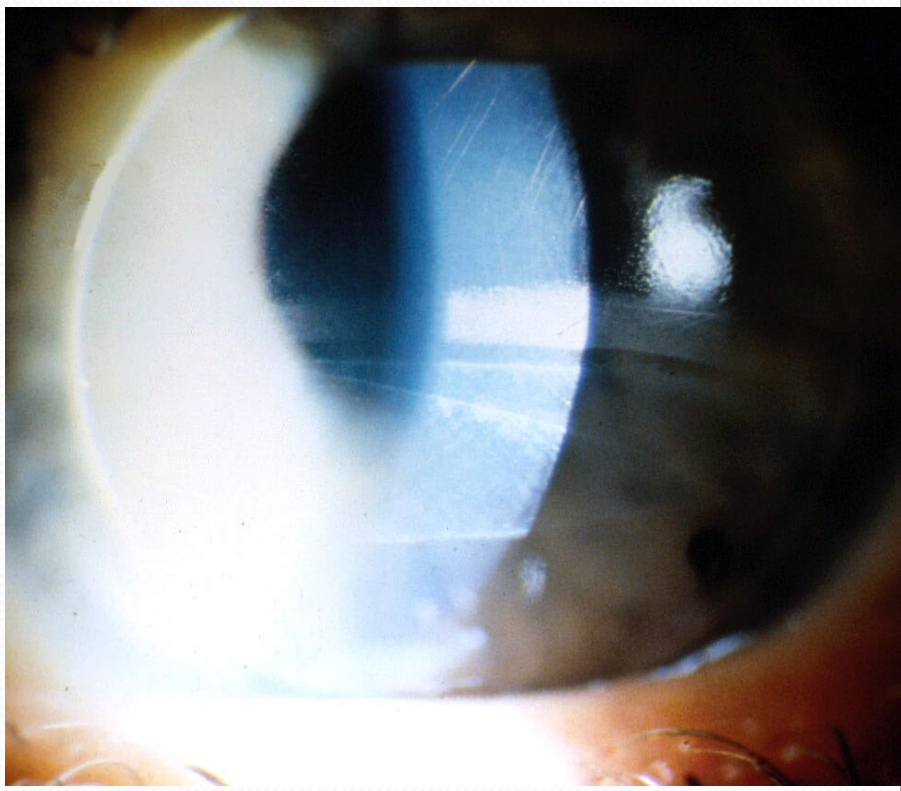
Parallelepiped



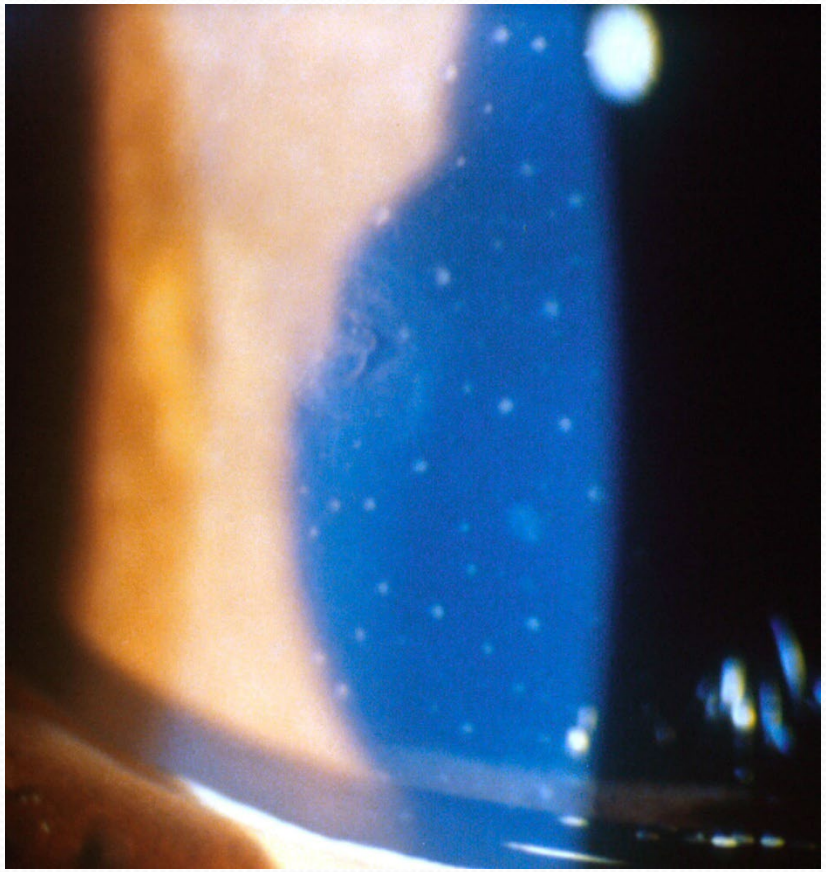
Parallelepiped

Parallelepiped

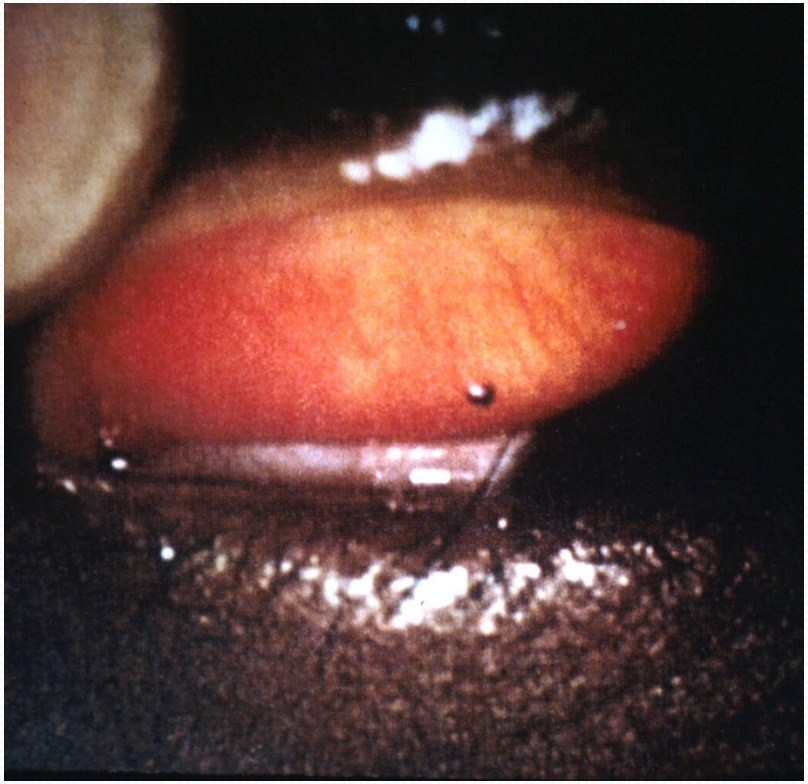


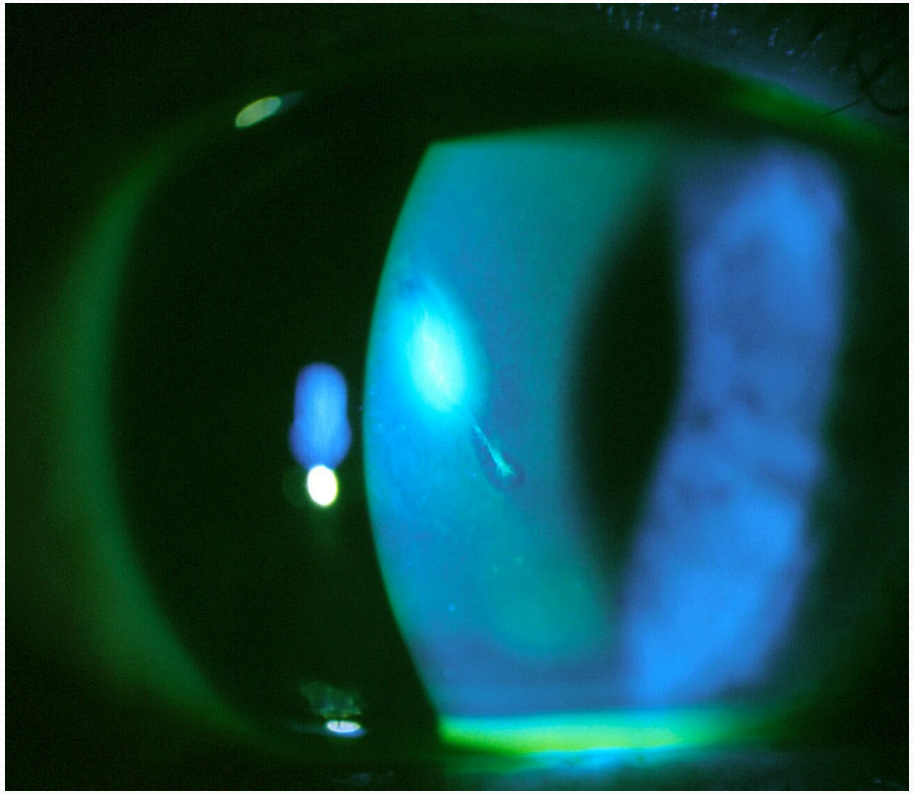


Parallelepiped

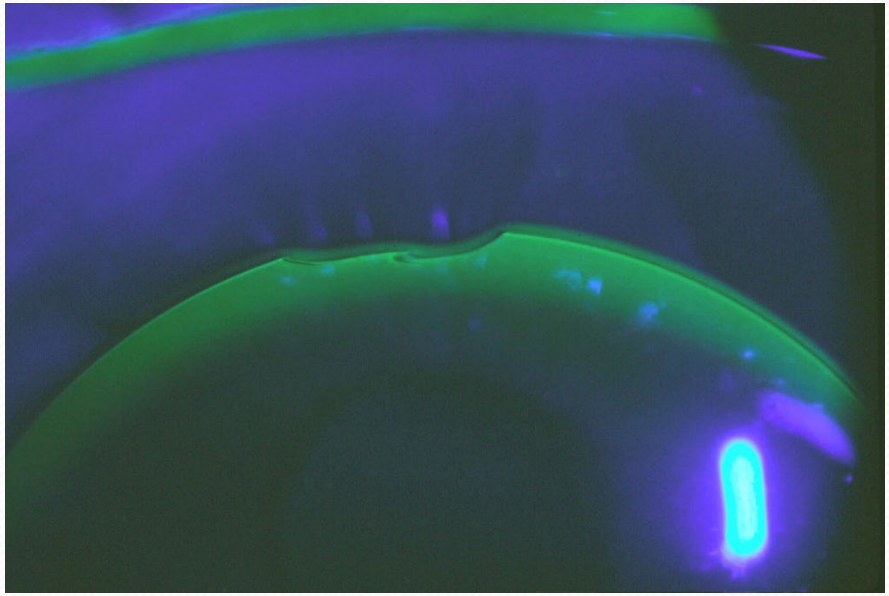


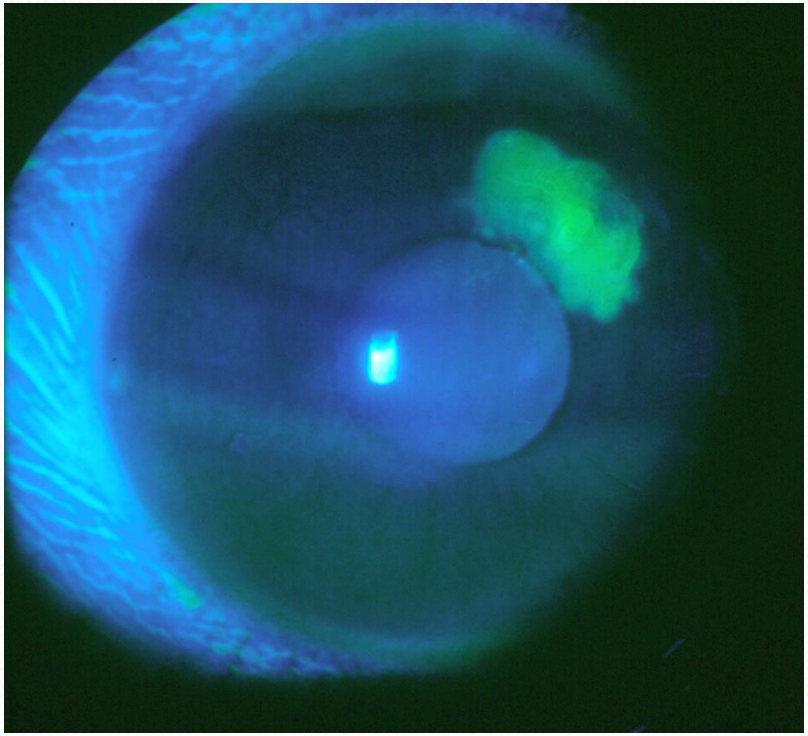
Parallelepiped





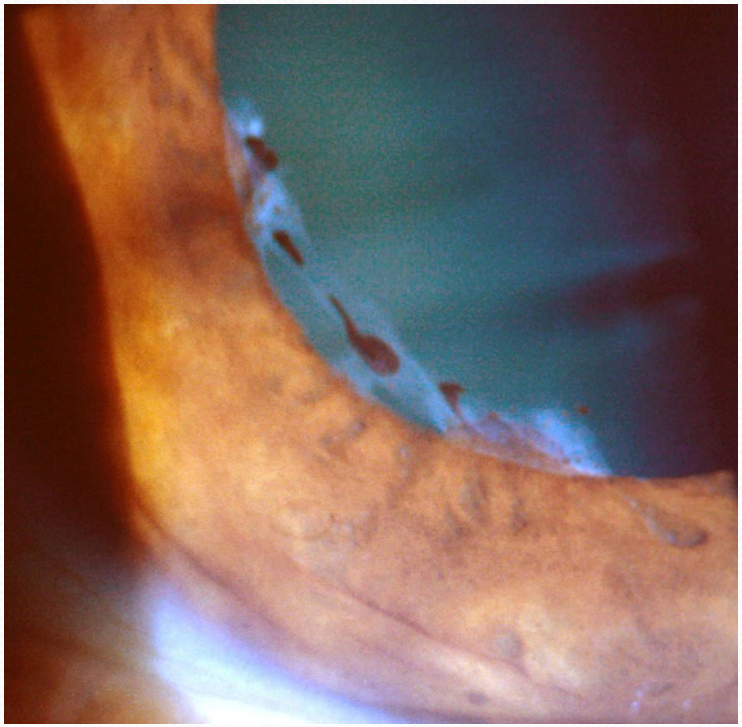
Parallelepiped

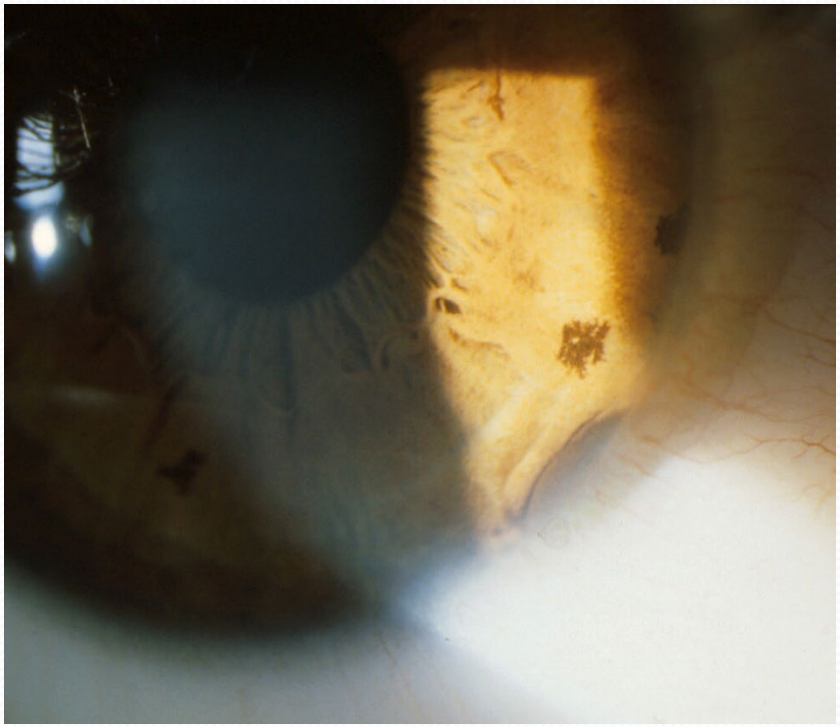




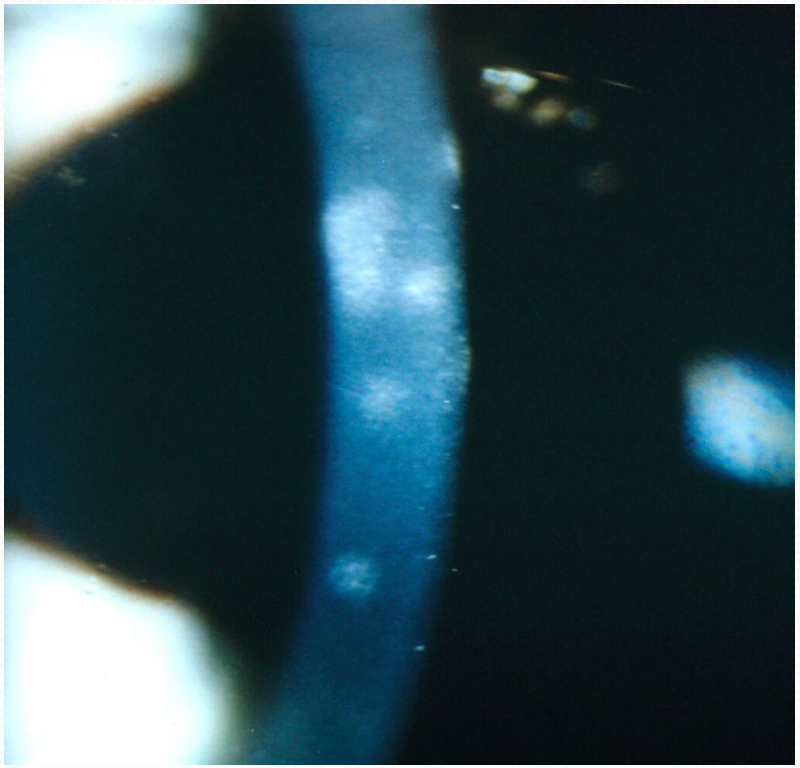
Diffused Illumination

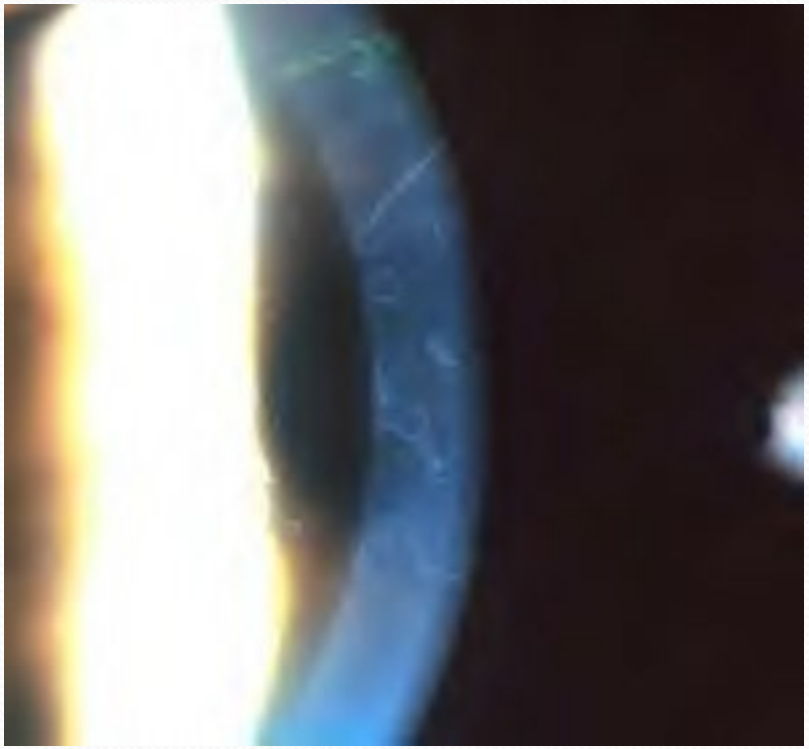
Parallelepiped



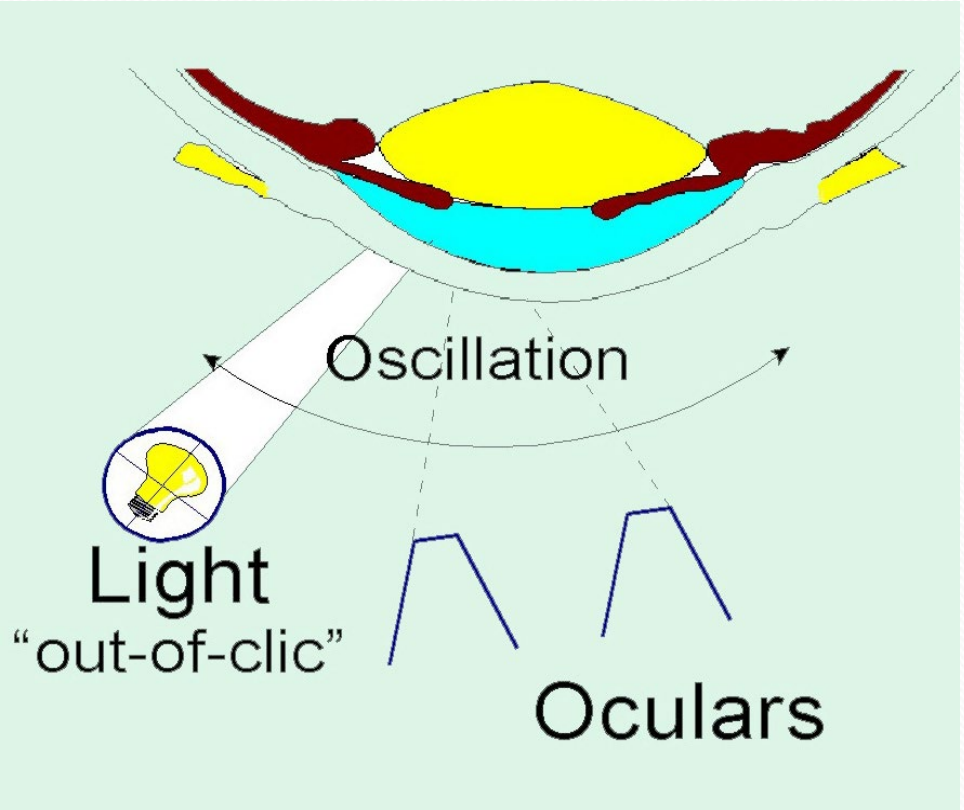


Parallelepiped



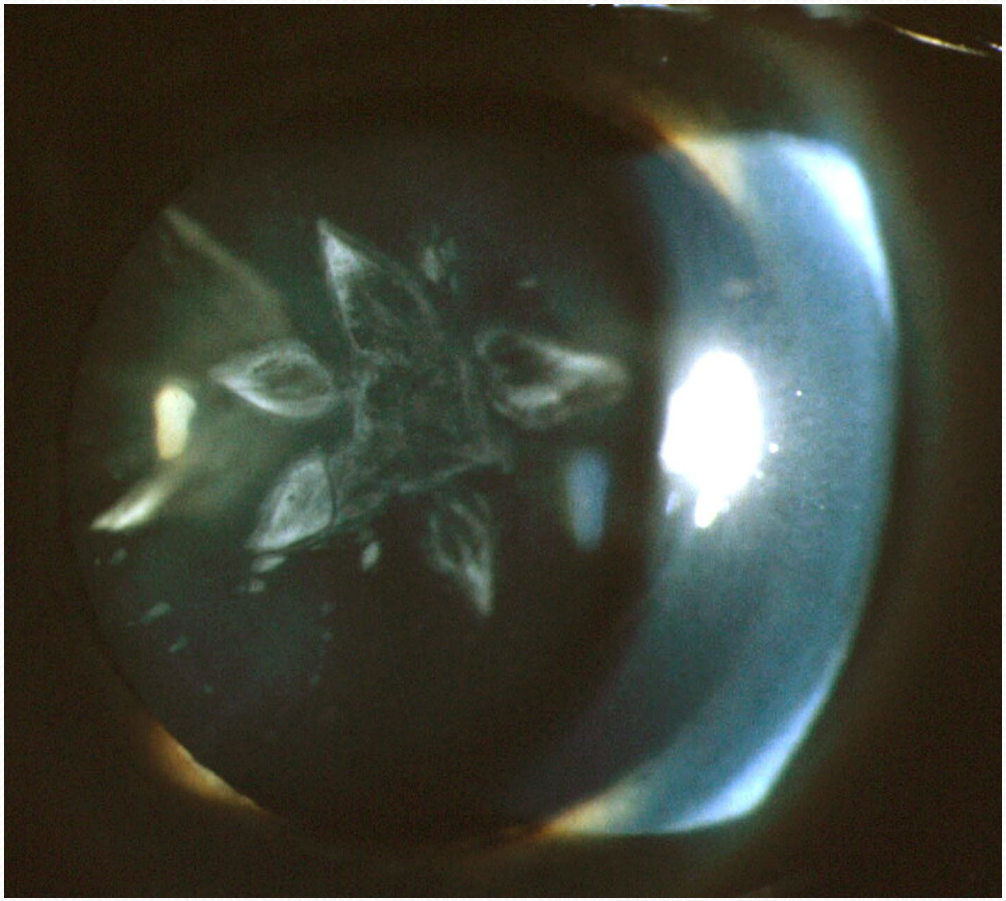


Indirect Illumination



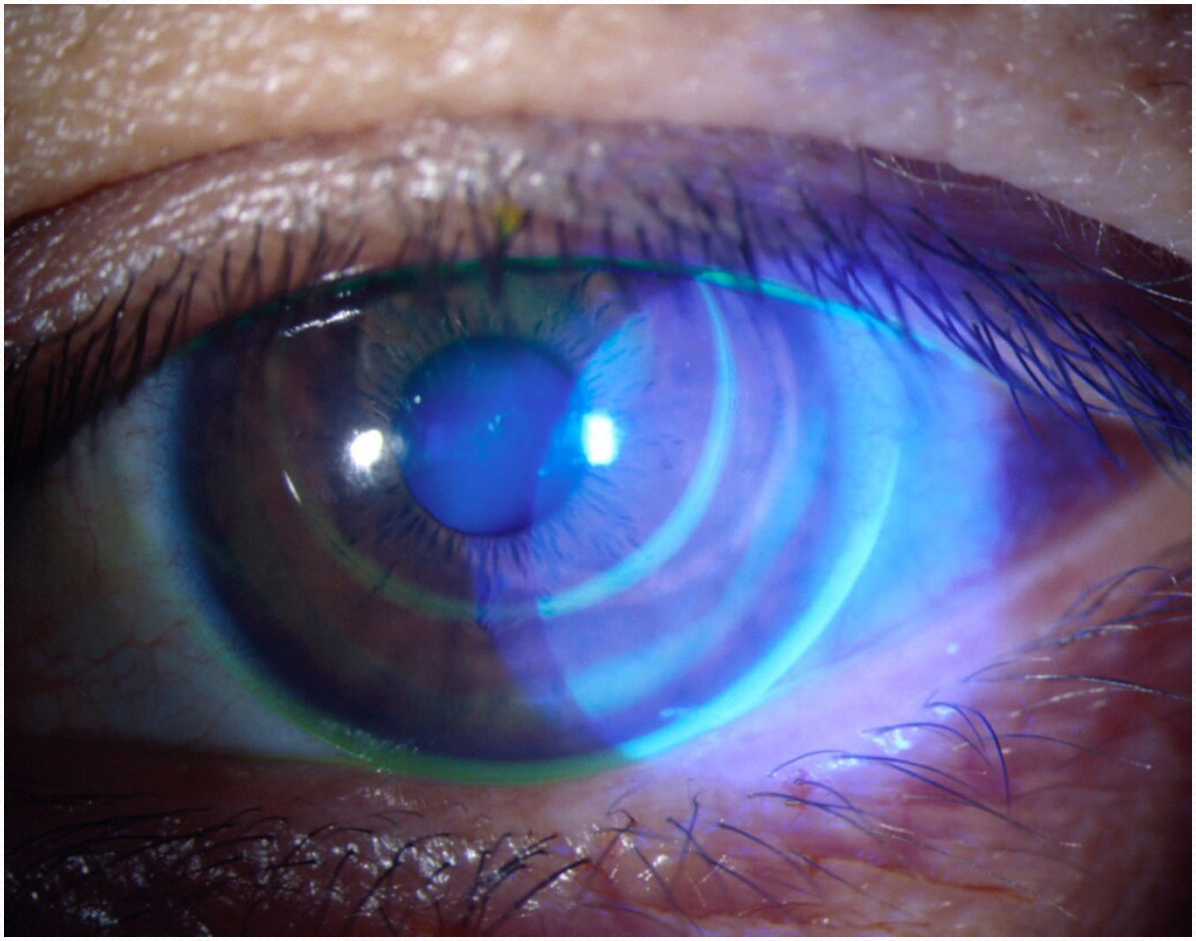
- Light moved *out-of-clic*
- Observation adjacent to illumination
- Good to observe FB, corneal nerves, opacities
- Oscillation of light accentuates details

Direct Illumination

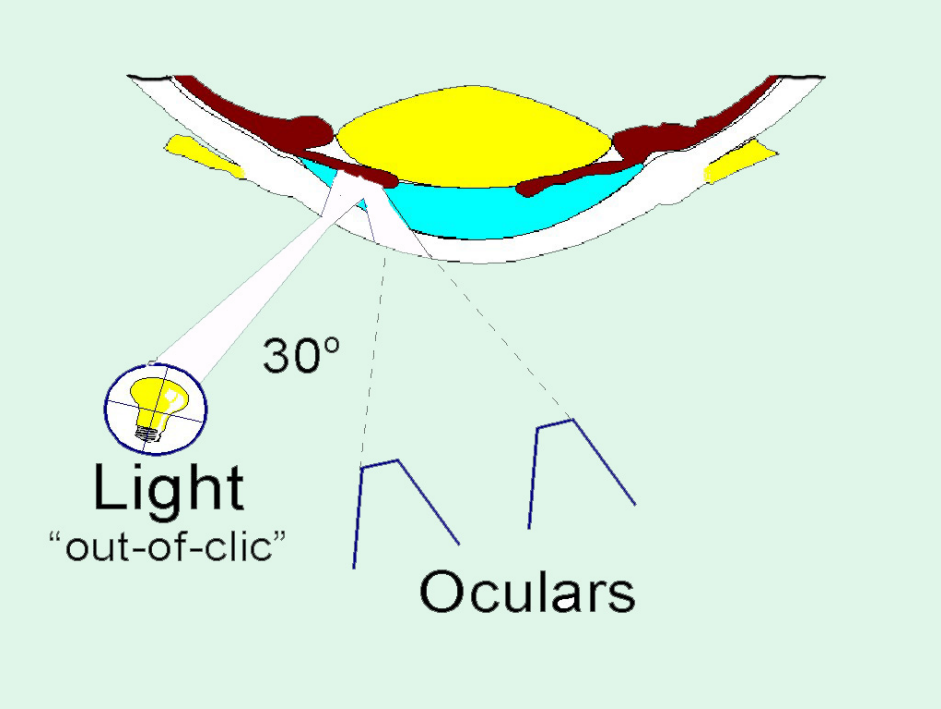


Indirect Illumination

Indirect Illumination

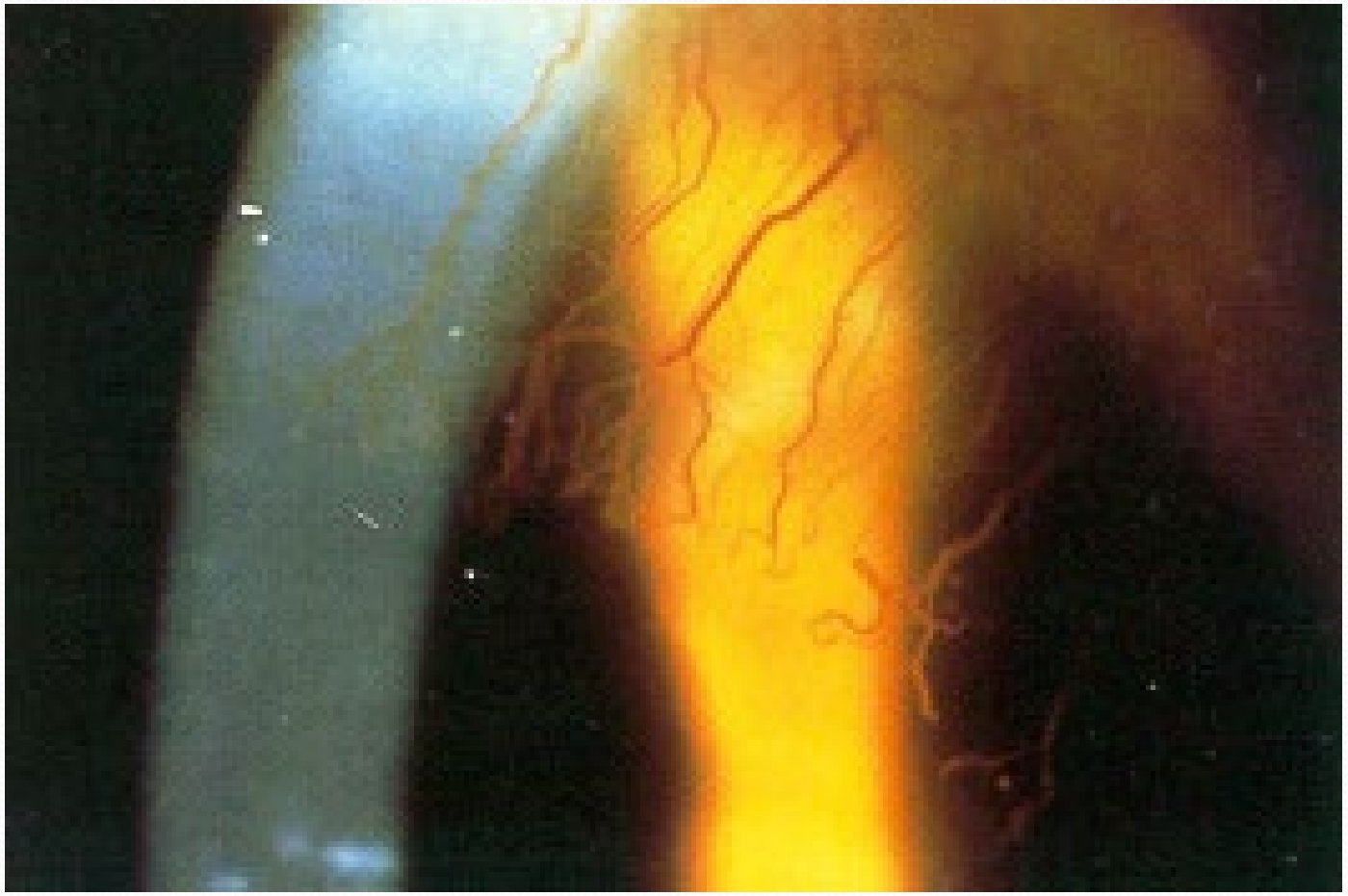


Retro Illumination

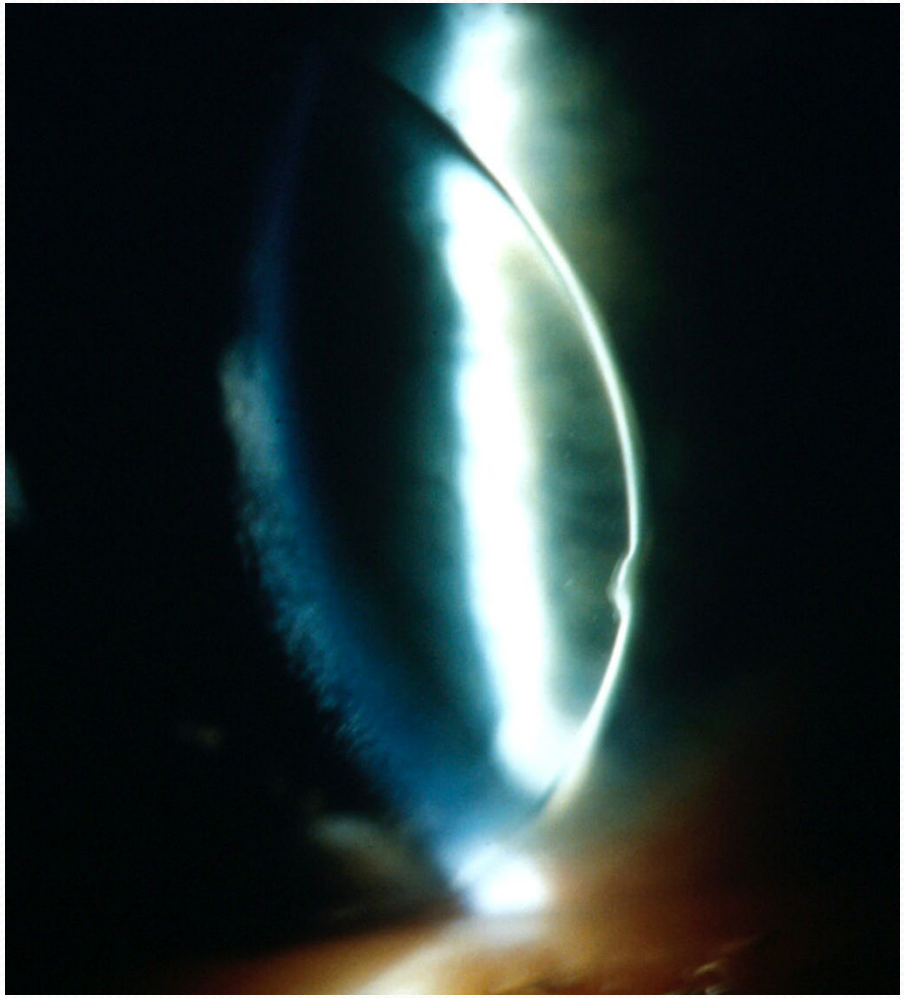


- Light *out-of-clic*, moved to side of area observed
- Beam width 1.0-2.0 mm
- Light reflected off iris
- Useful to examine
  - Corneal scars
  - Debris
  - Microcysts
  - Scratches on lens

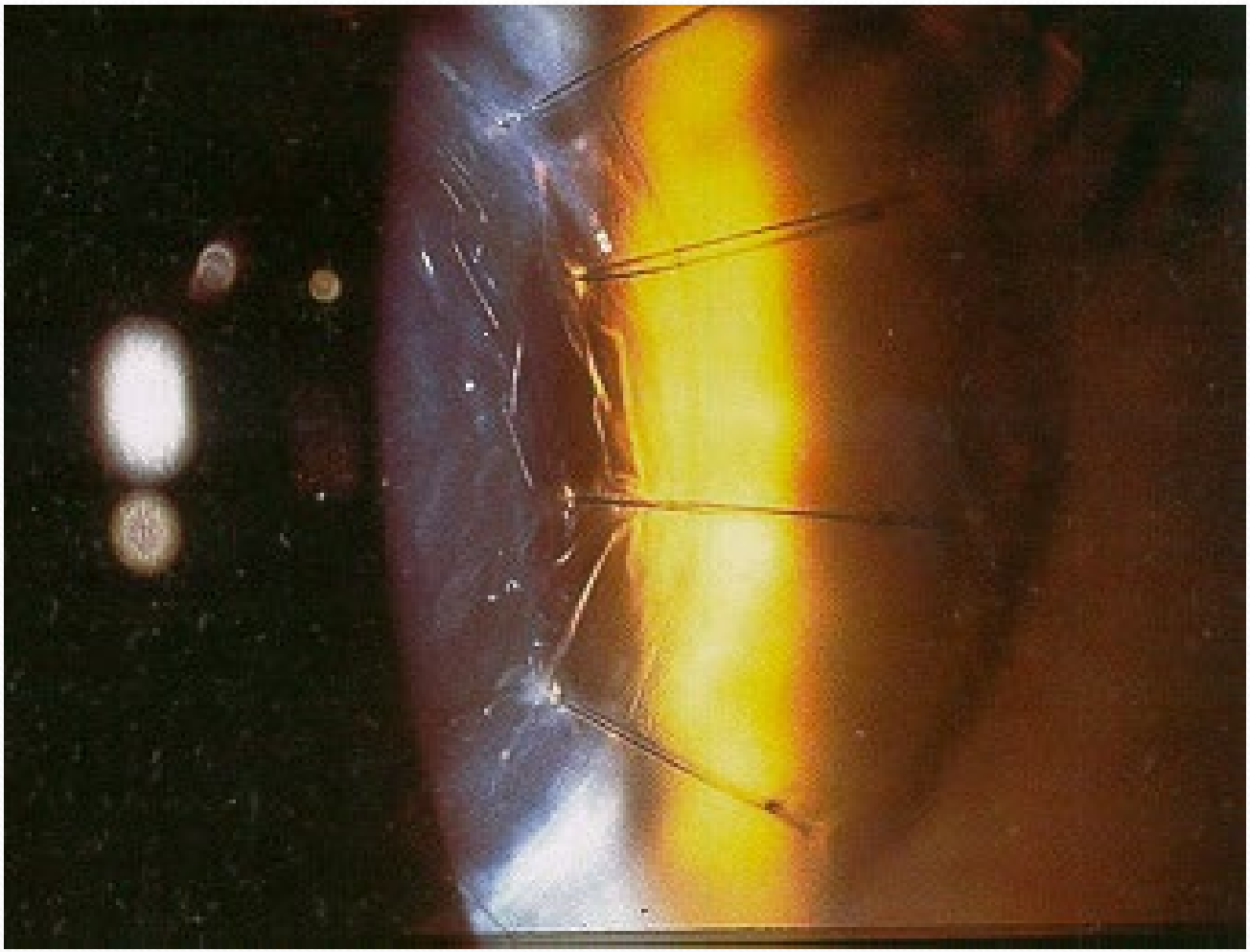
Retro Illumination



Retro Illumination

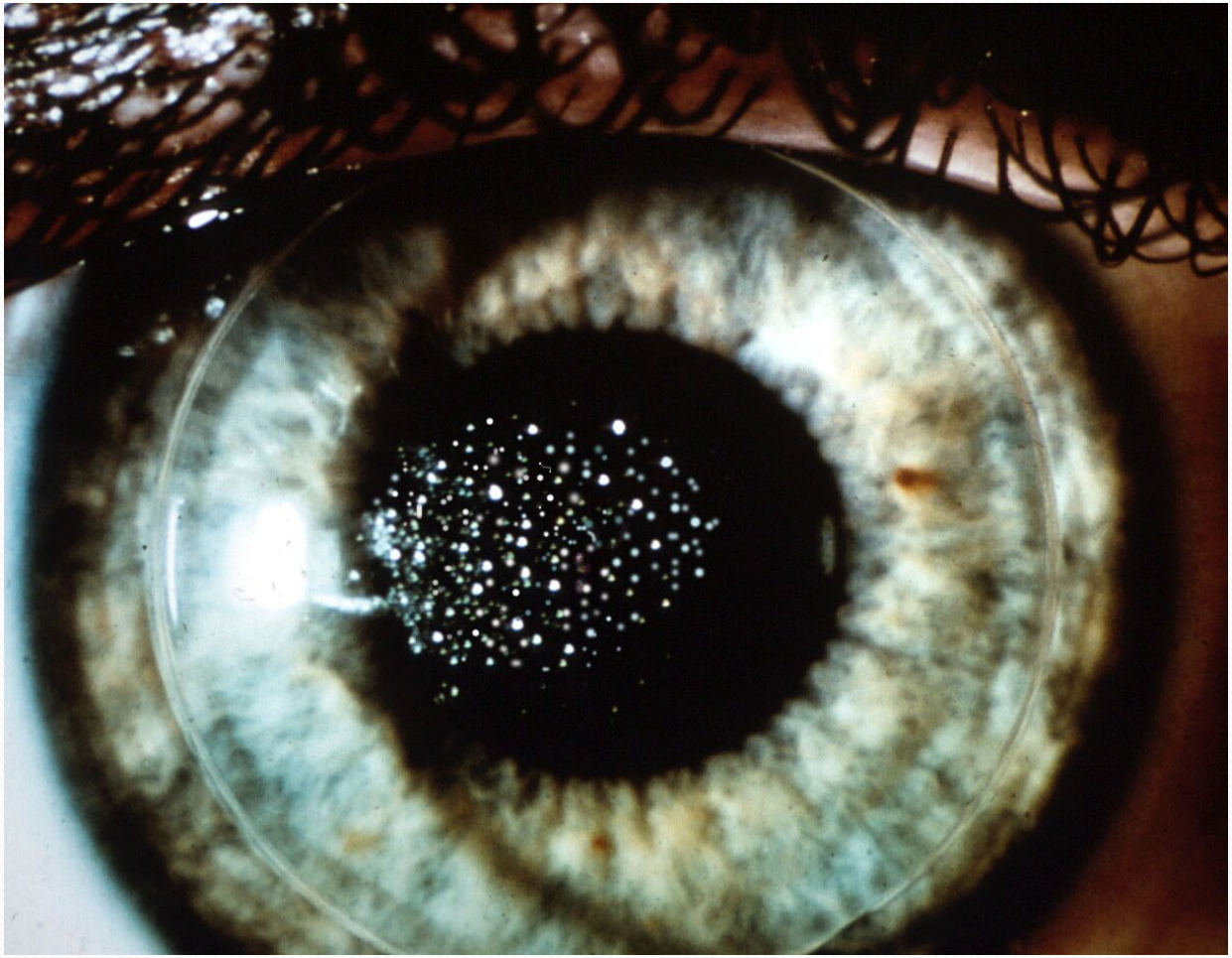


Retro Illumination



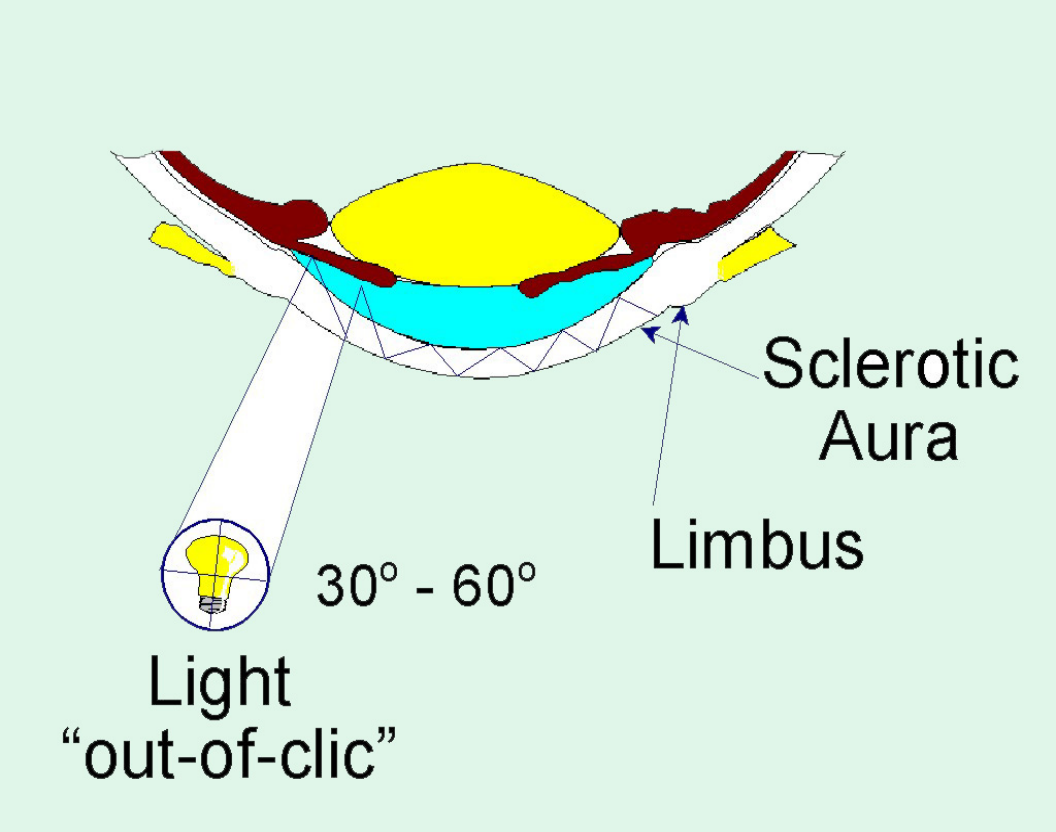
Retro Illumination

Retro Illumination

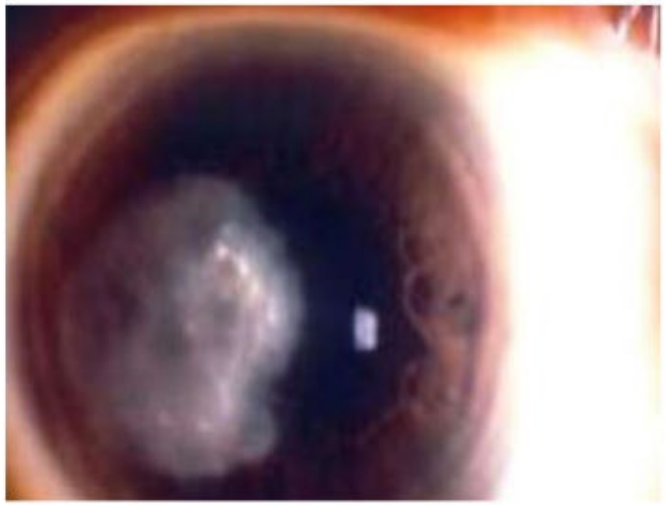


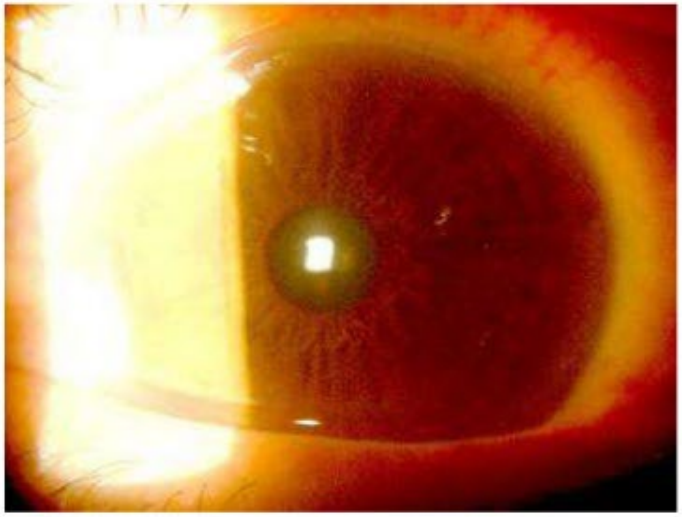
Sclerotic Scatter

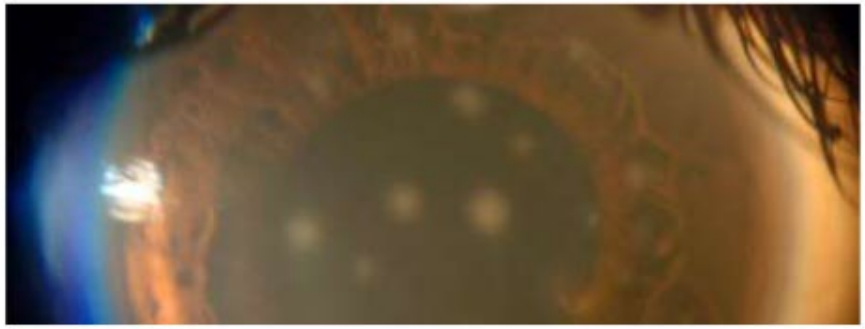
- Focused parallelepiped placed *out-of-clic* directed at limbus
- Light is dispersed at limbus, reflected through cornea
- Do not use oculars
- Observe edema, stromal folds, lens deposits, scratches



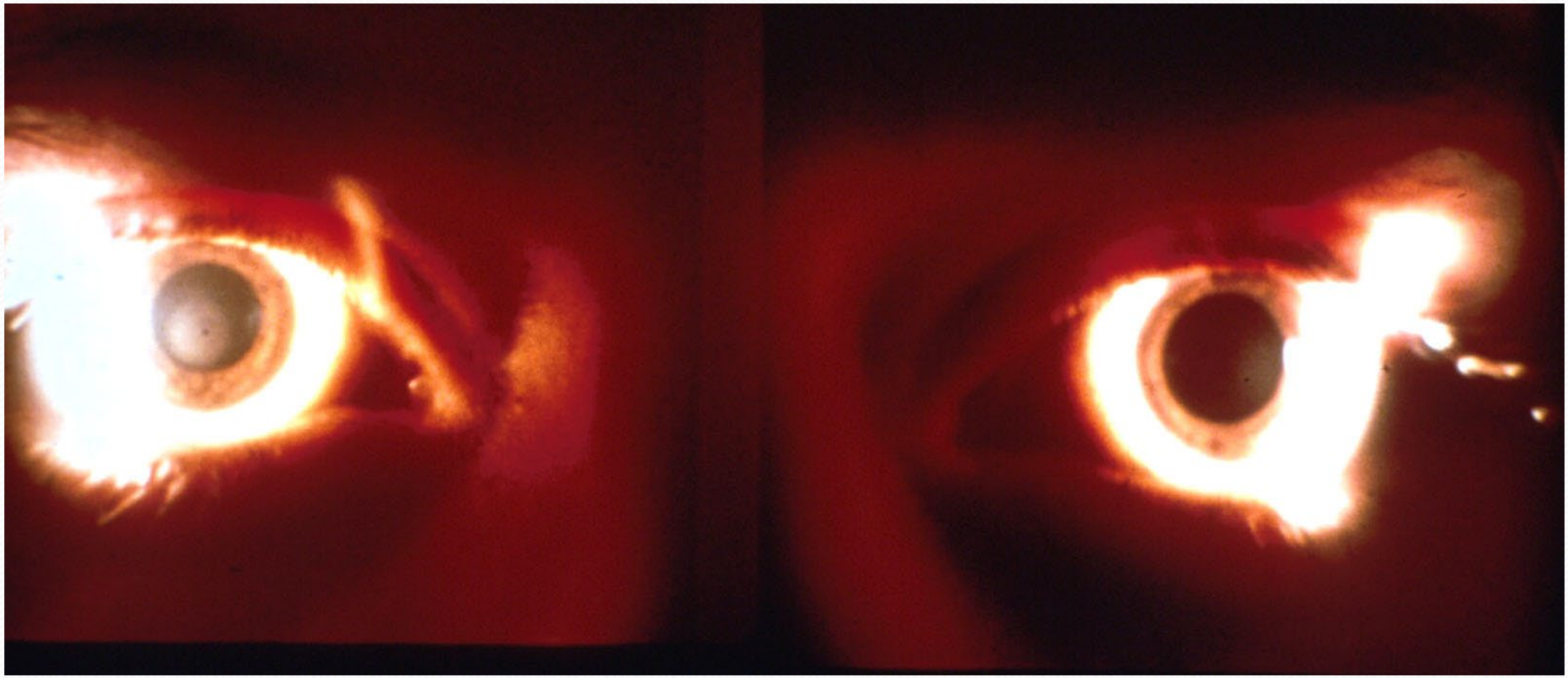
- **Applications**
  - ✓ Scars, foreign bodies, corneal defects
  - ✓ Irregularities in the cornea
  - ✓ Localized epithelial oedema.







Sclerotic Scatter

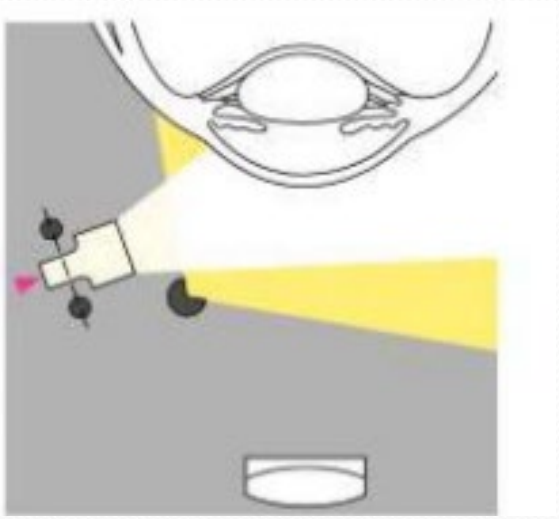


Additional illuminations

- Conical beam
  - Small circular beam used to detect cells, pigment or proteins in anterior chamber aqueous humor
  - Angle is generally 45°
  - – 90°
    - Best viewed at 90°
  - Beam 0.1 – 1.0 mm
  - High intensity
  - High magnification

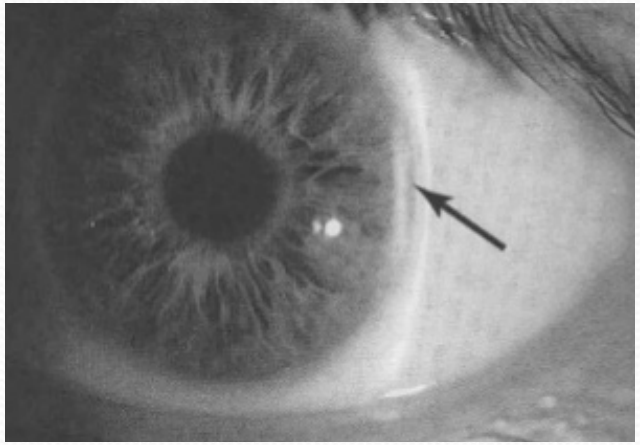
Additional illuminations

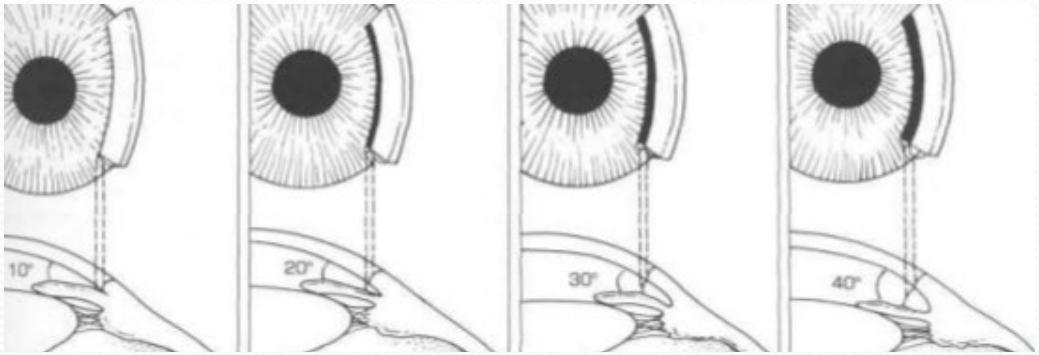
- Tangential illumination
  - Used to observe surface texture - cornea
  - High illumination
  - Medium-wide beam of moderate height
  - Angle 60^{o}– 80^{o}
  - Specially useful for viewing pseudoexfoliation



Additional illuminations

- Van Herrick Technique
  - Used to evaluate anterior chamber angle without gonioscopy
  - Medium illumination
  - Medium magnification
  - Narrow beam close to limbus
  - Angle 60°





Summary:

- Become an astute slit-lamp observer
- Take your time !
- Document all findings
- Recognize and manage complications

Conclusion/questions/answers

Thanks !