

Retinal Examination

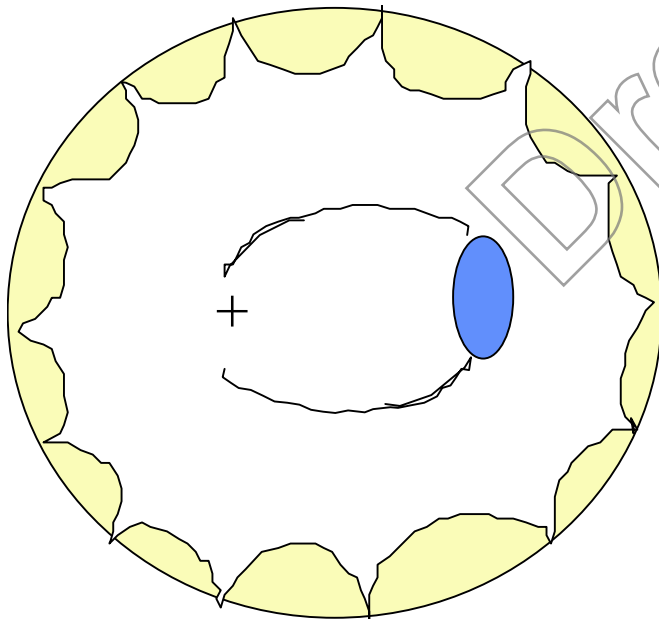
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University of Milan

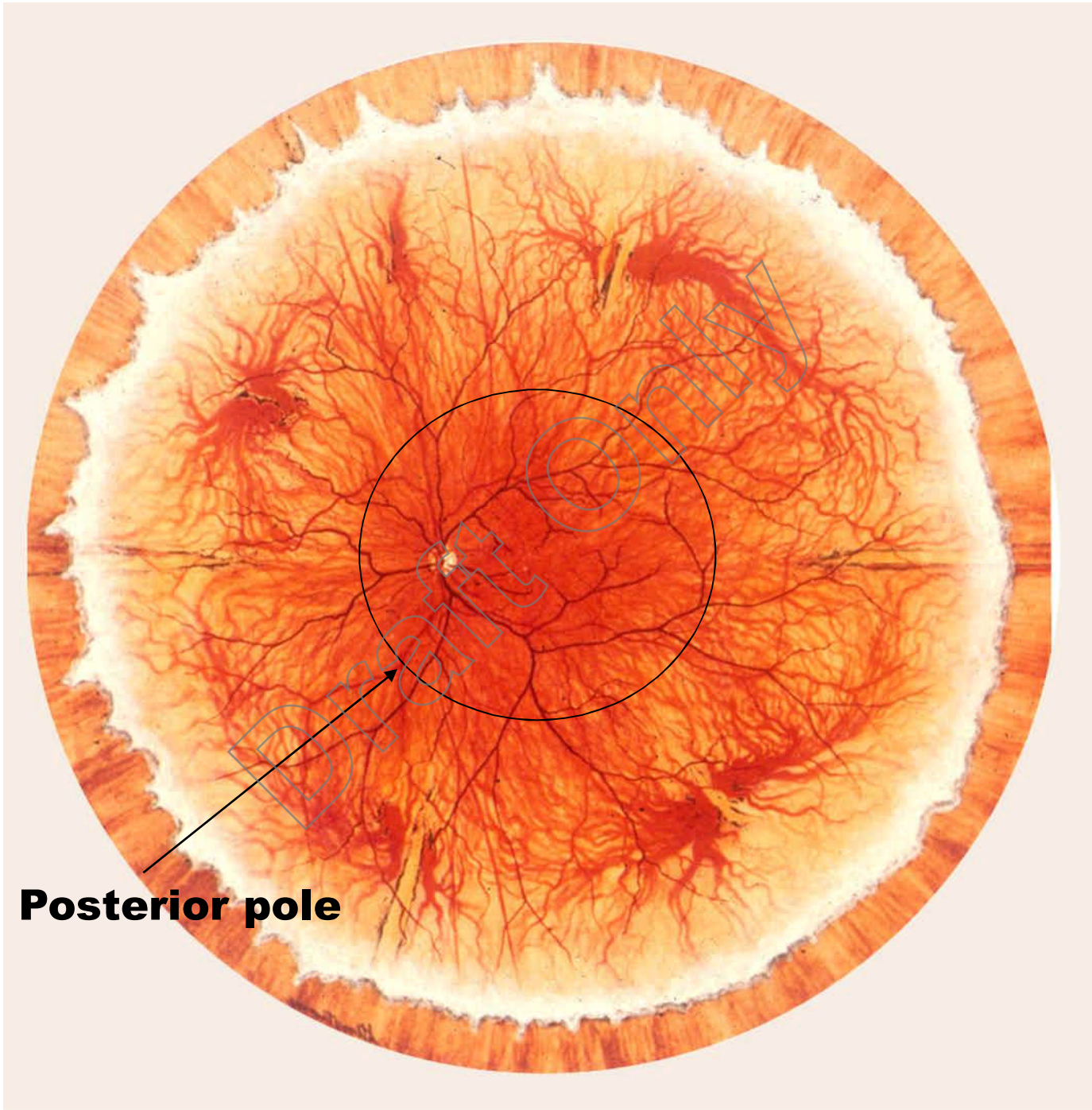
December 2003

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Fundus Anatomy and Landmark of the Retina

- **Posterior Pole:** -optic nerve
-macula
- Equator: vortex veins
- Peripheral retina:
ora serrata
long posterior ciliary nerves
short posterior ciliary nerves

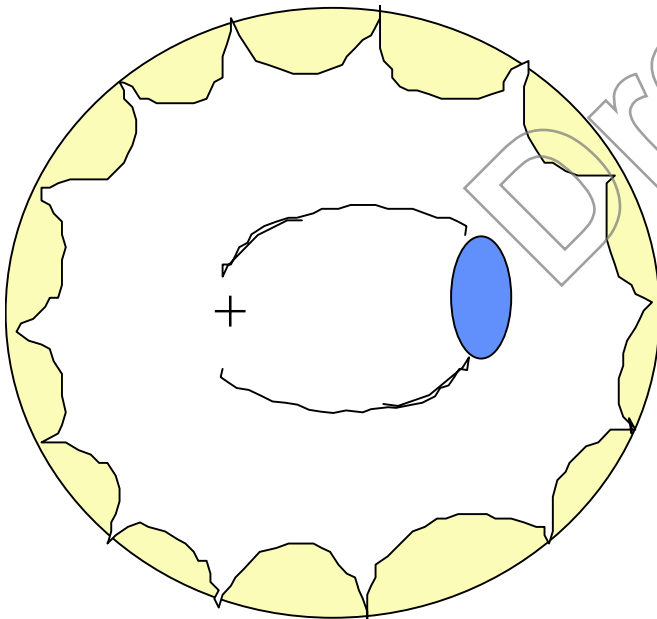


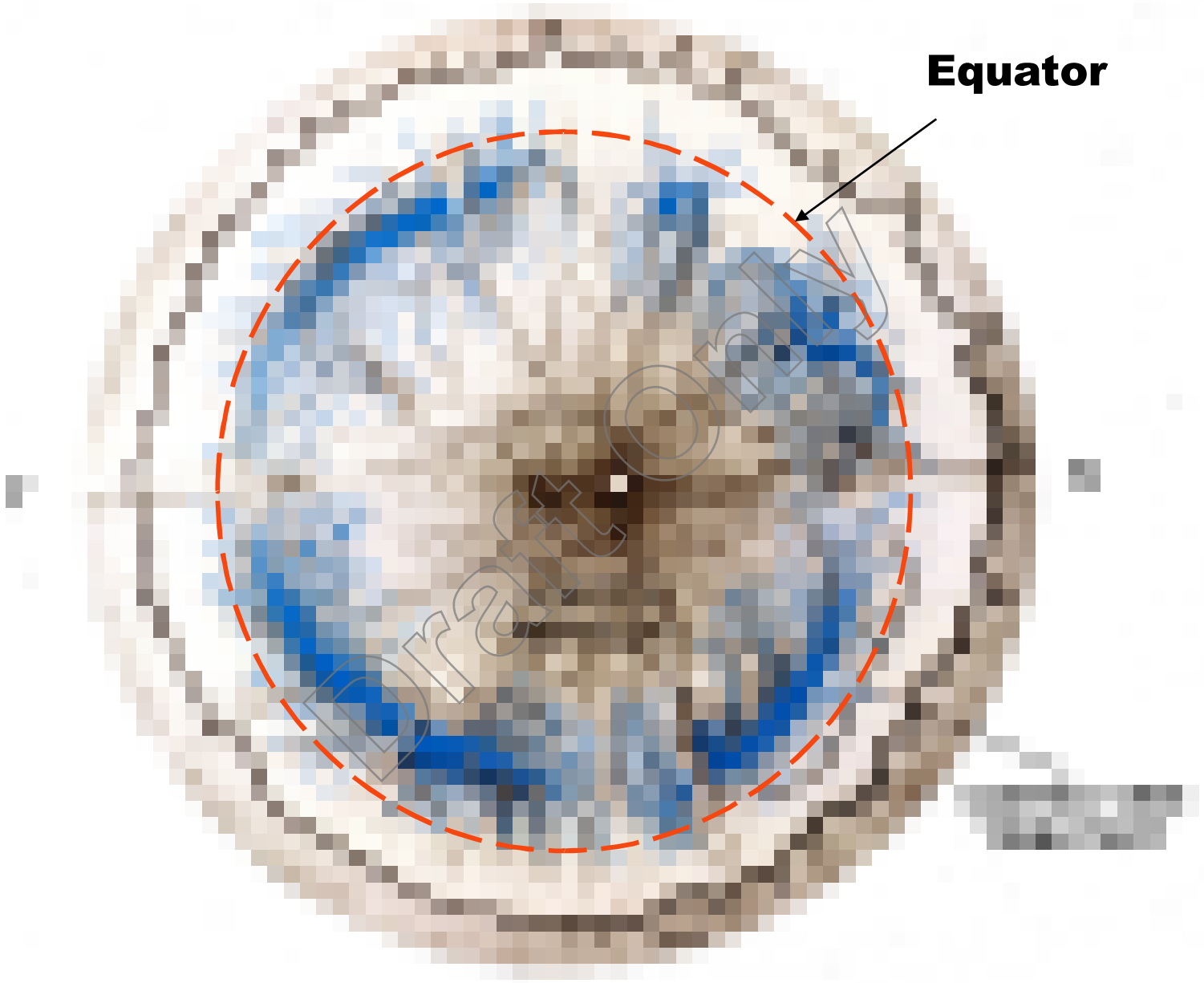


Posterior pole

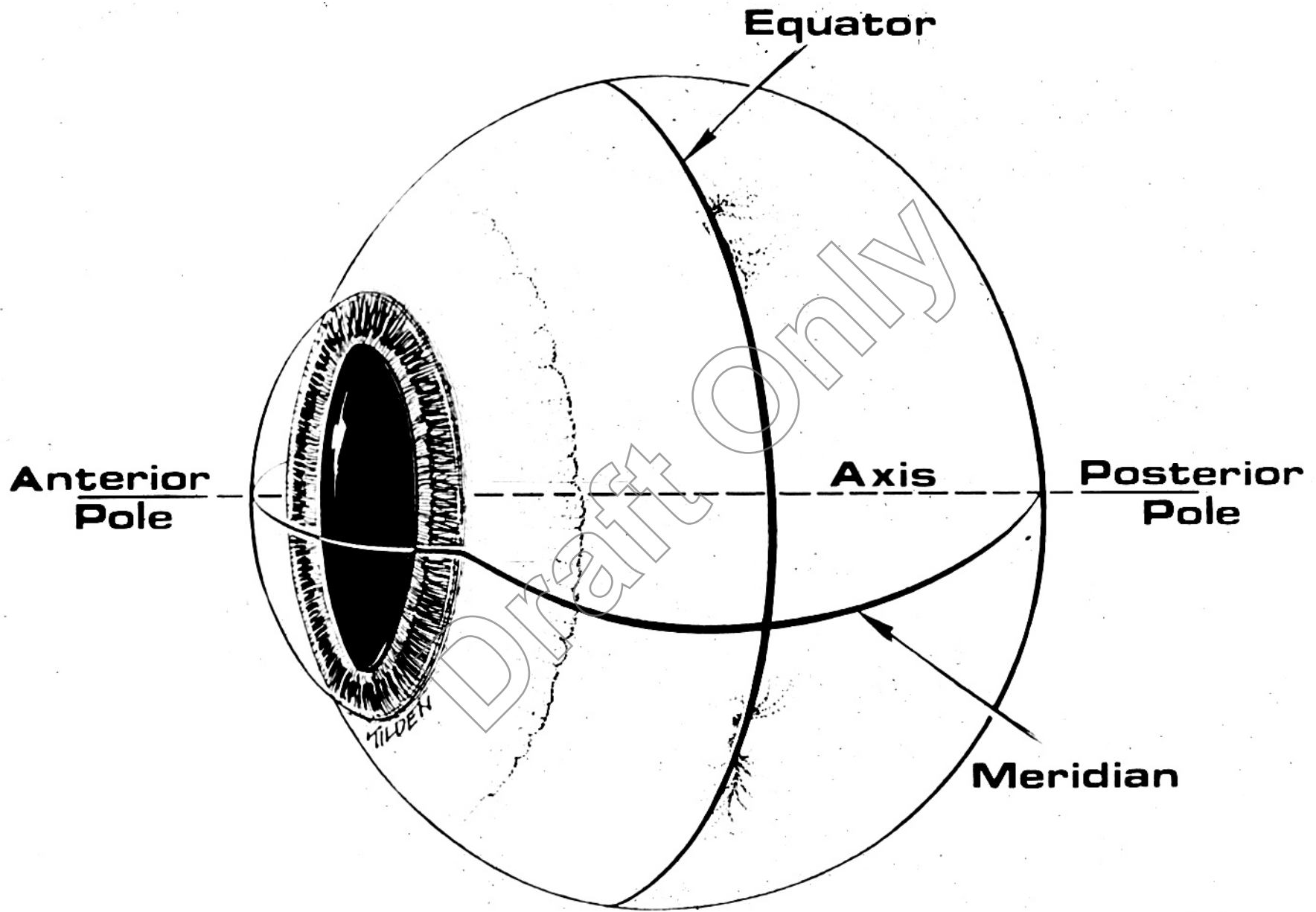
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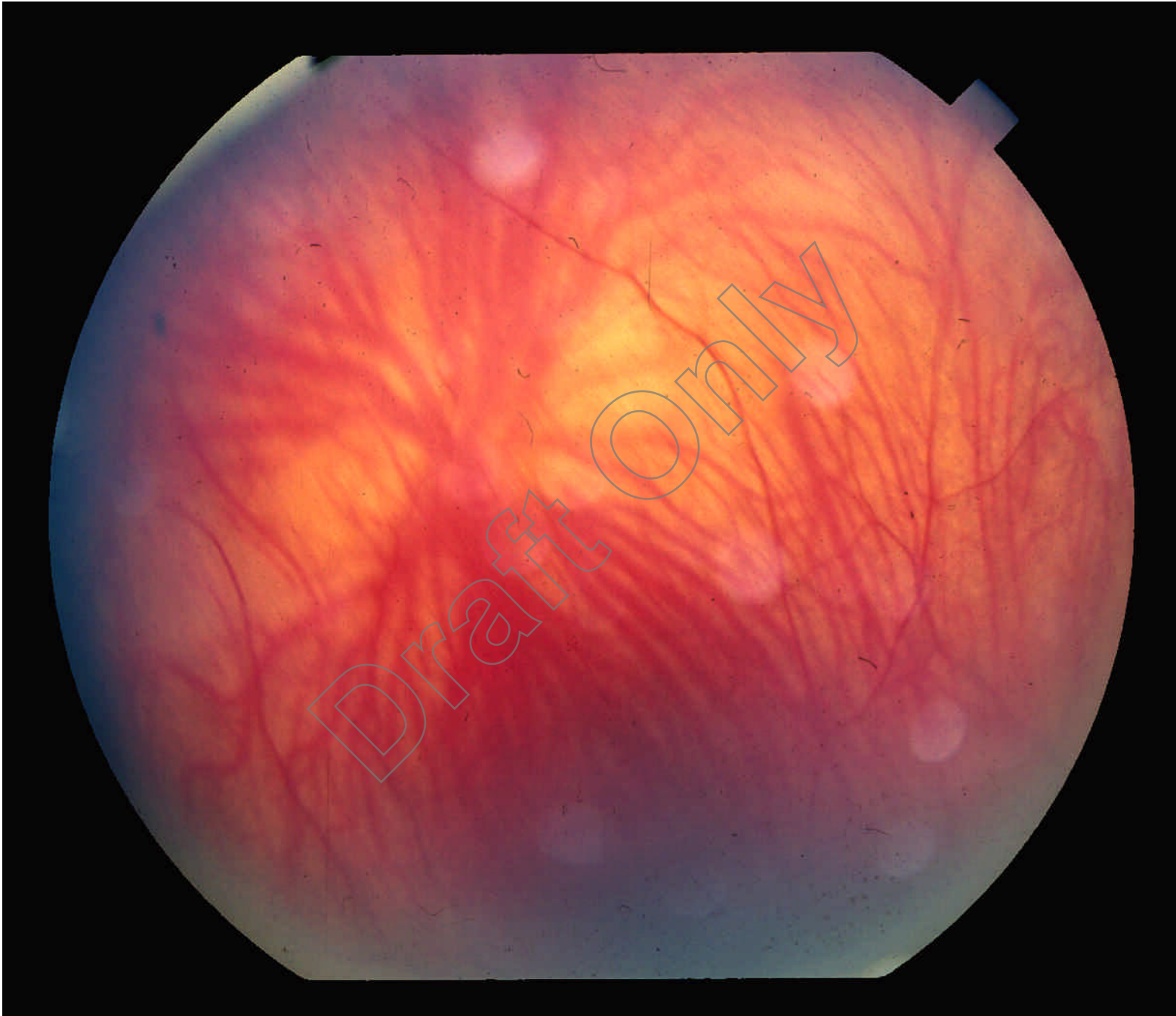




Equator

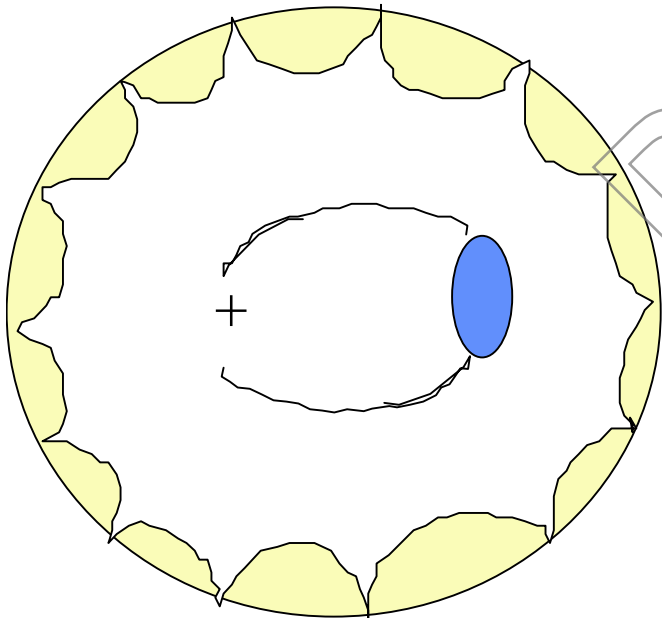


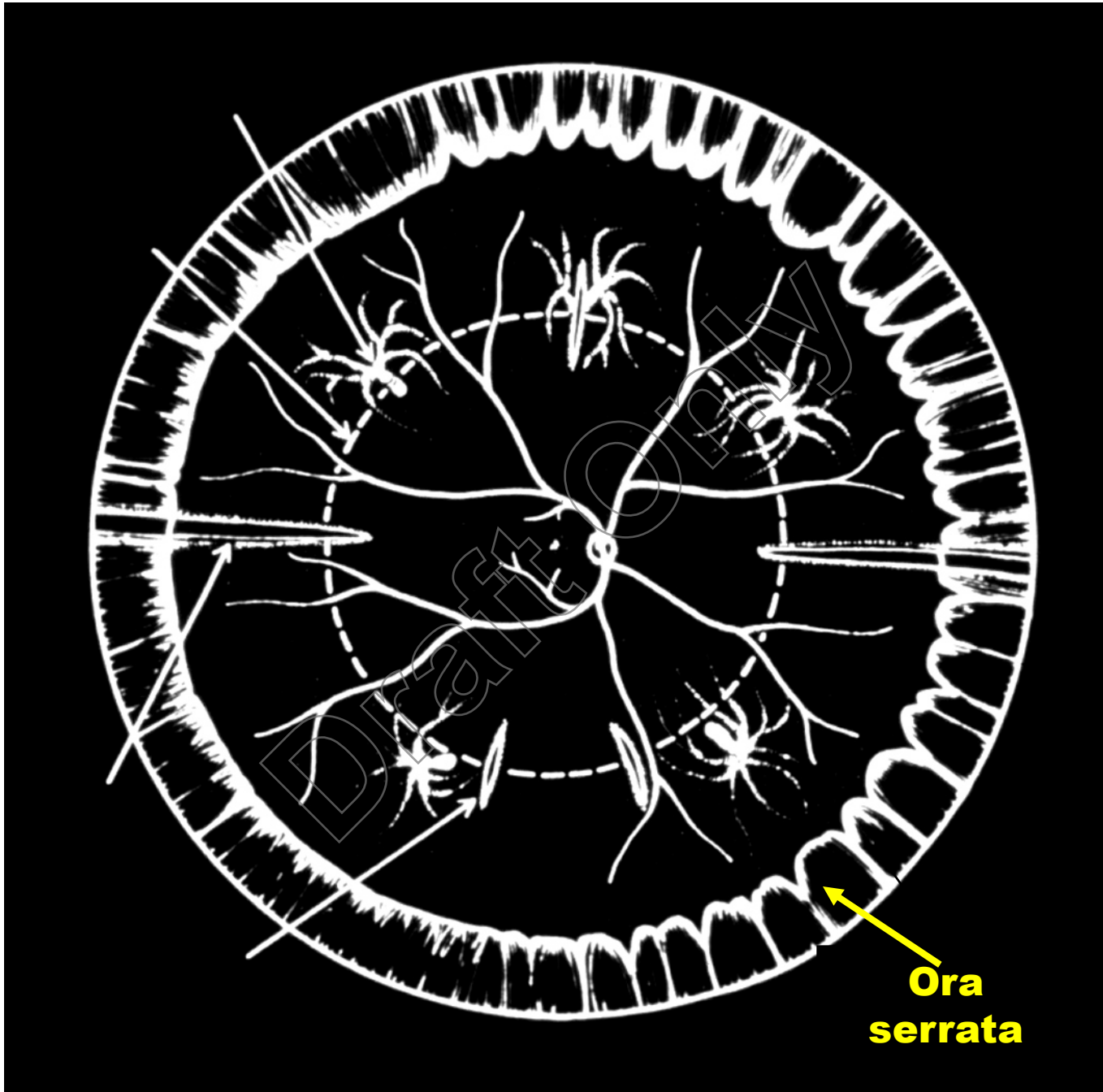




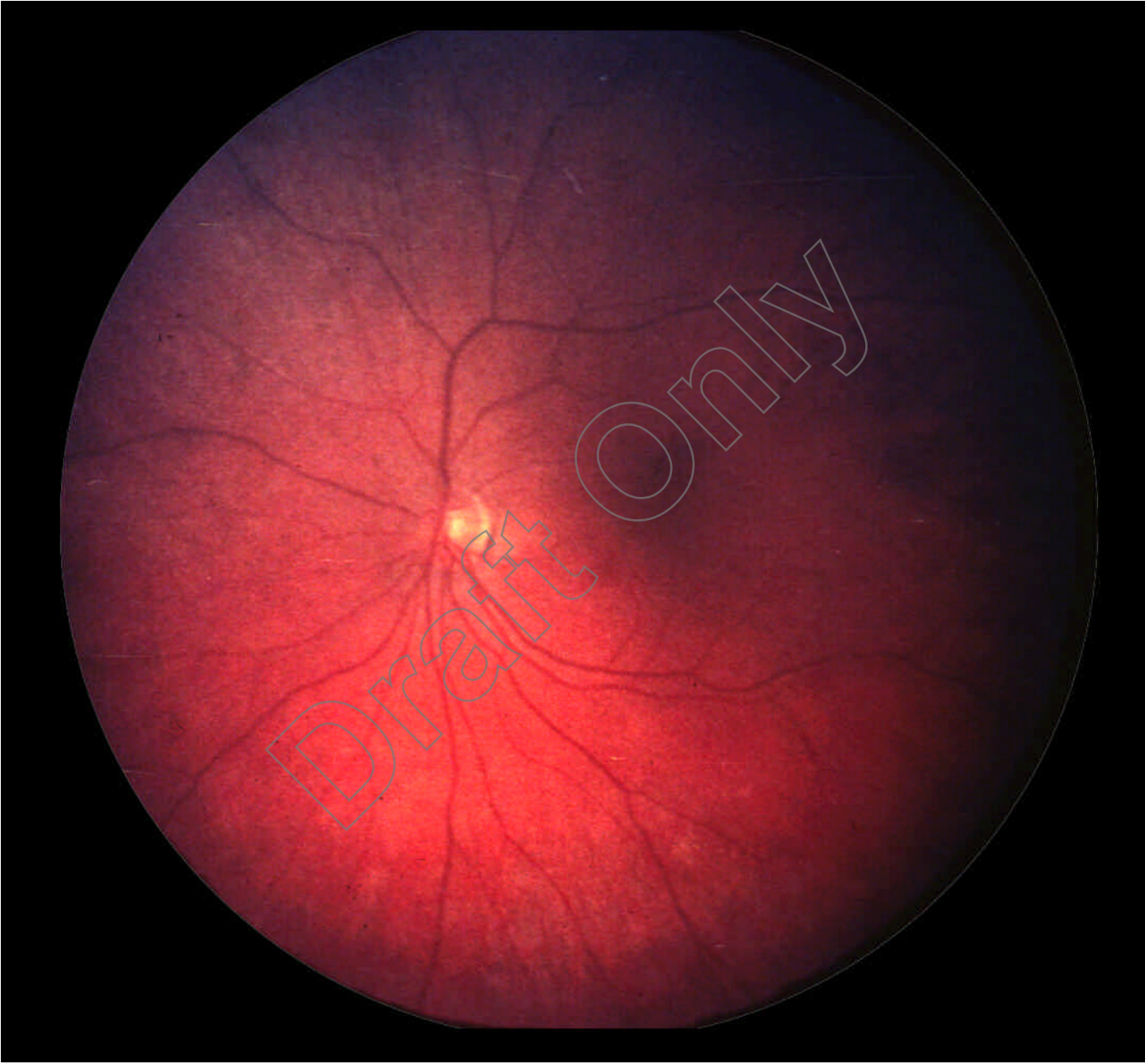
Fundus Anatomy and Landmark of the Retina

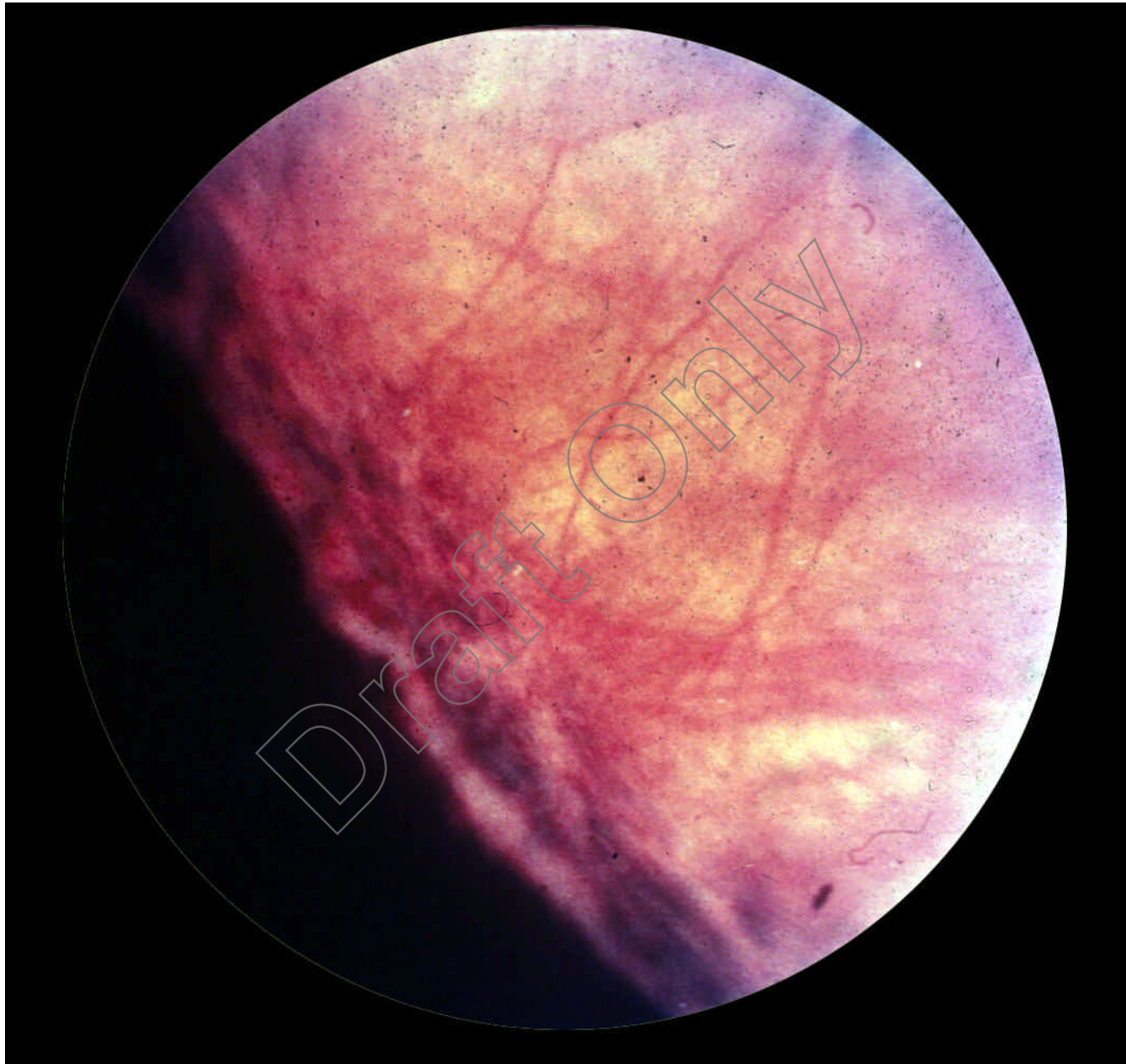
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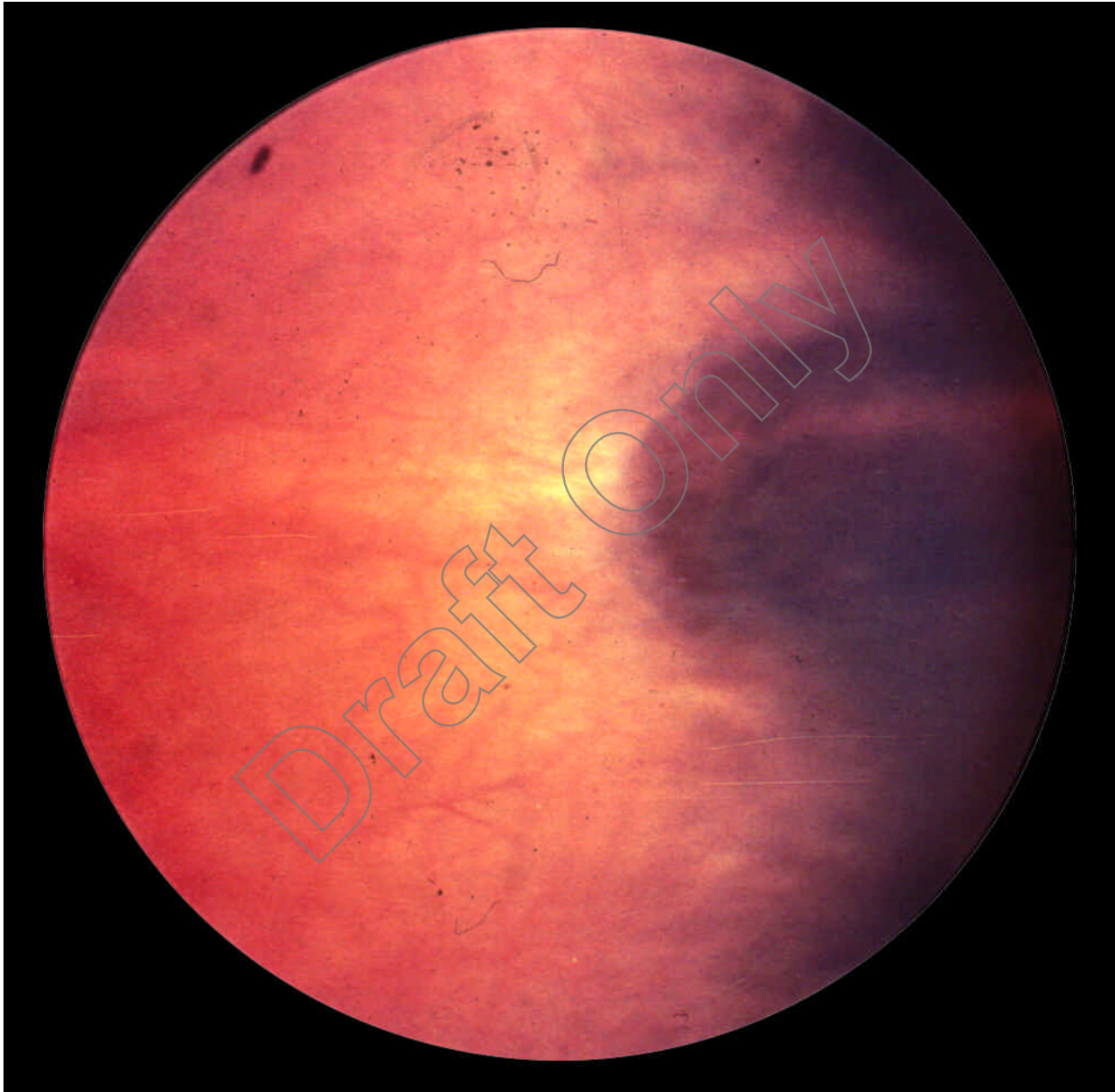








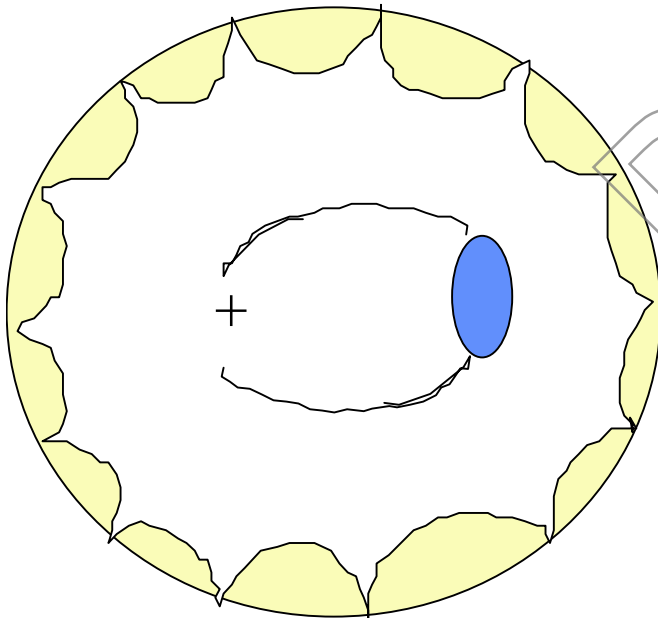




Fundus Anatomy and Landmark of the Retina

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long posterior ciliary nerves
short posterior ciliary nerves



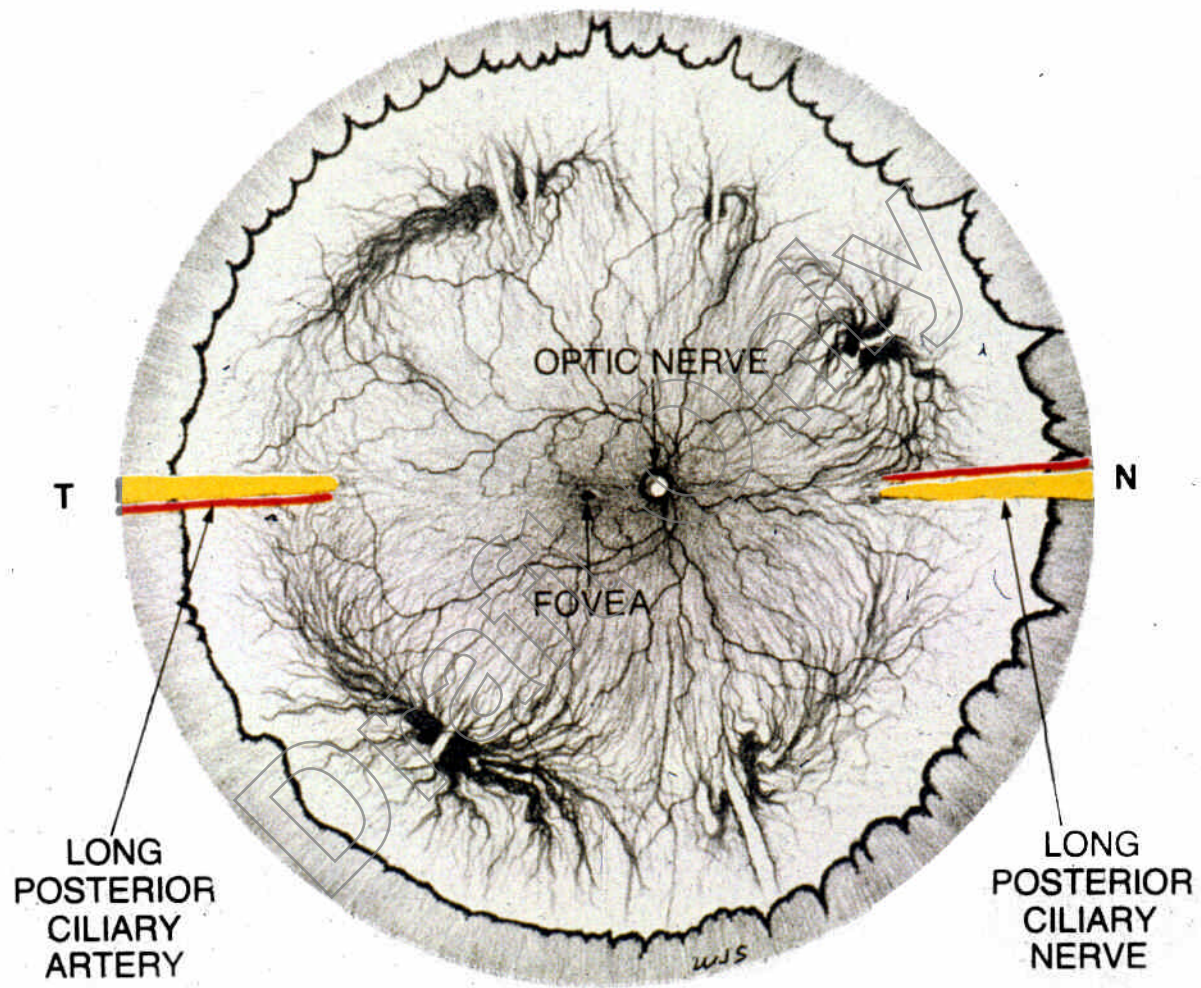
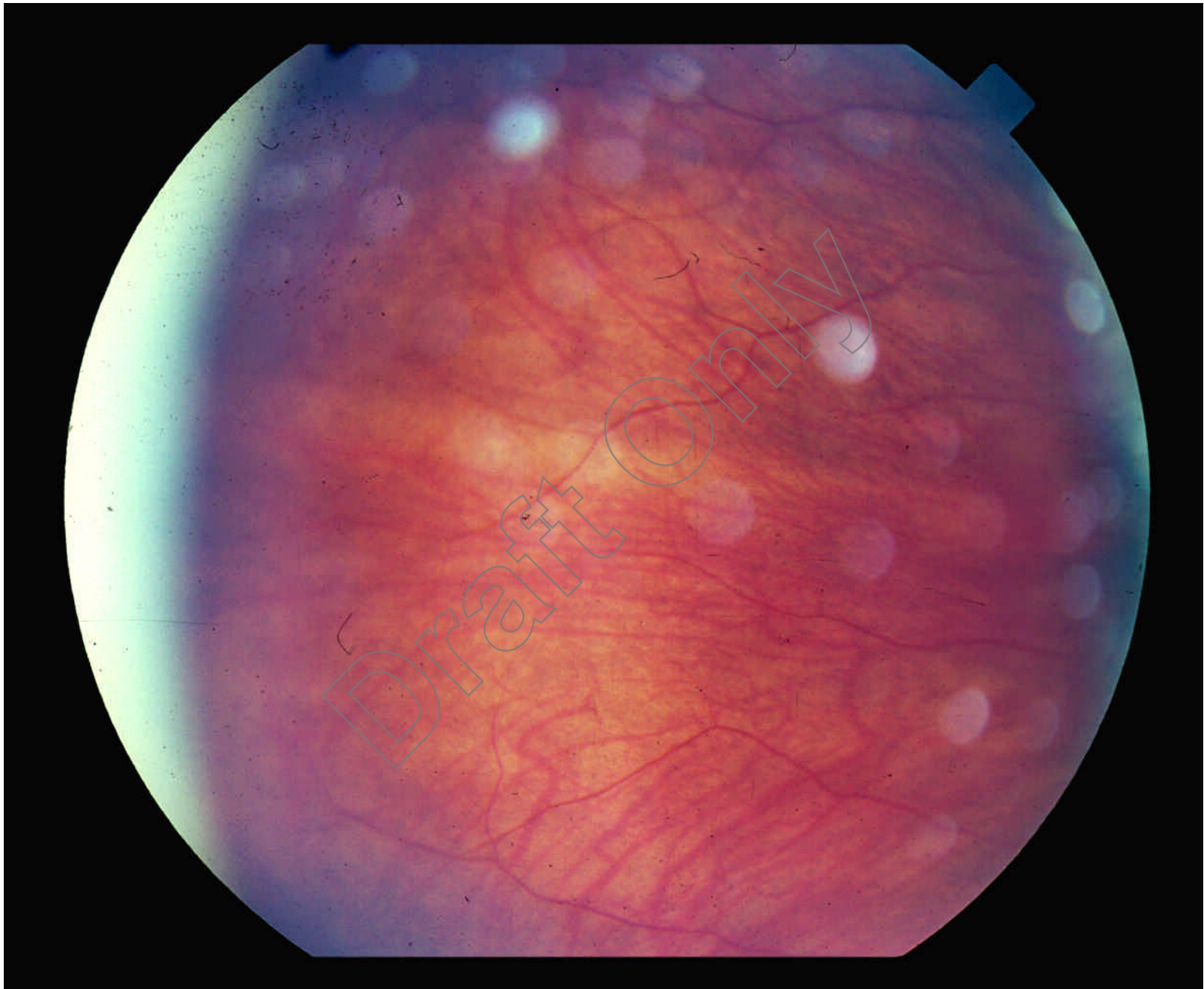


FIGURE 1-8





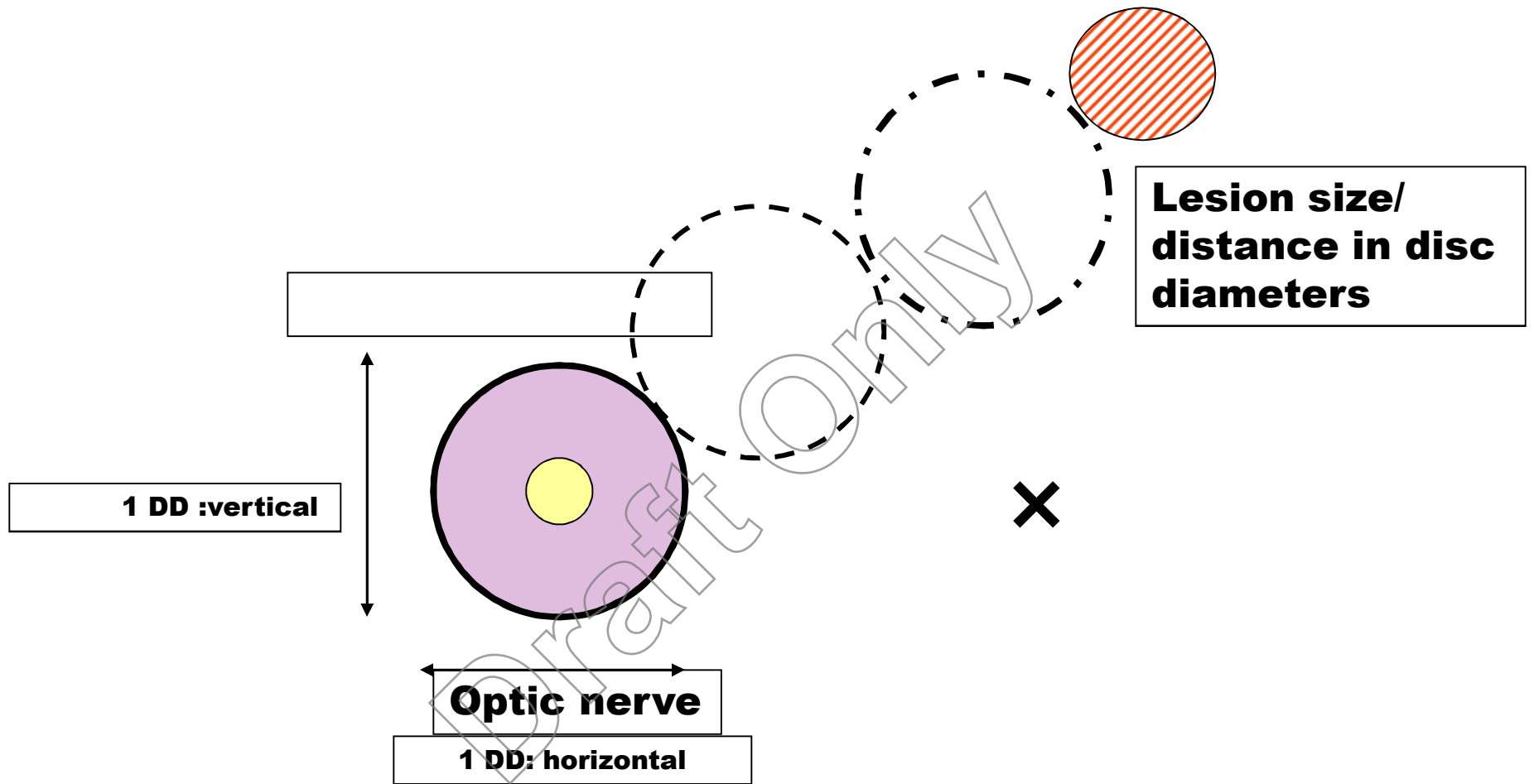
There are various methods of examining the retina.

These include:

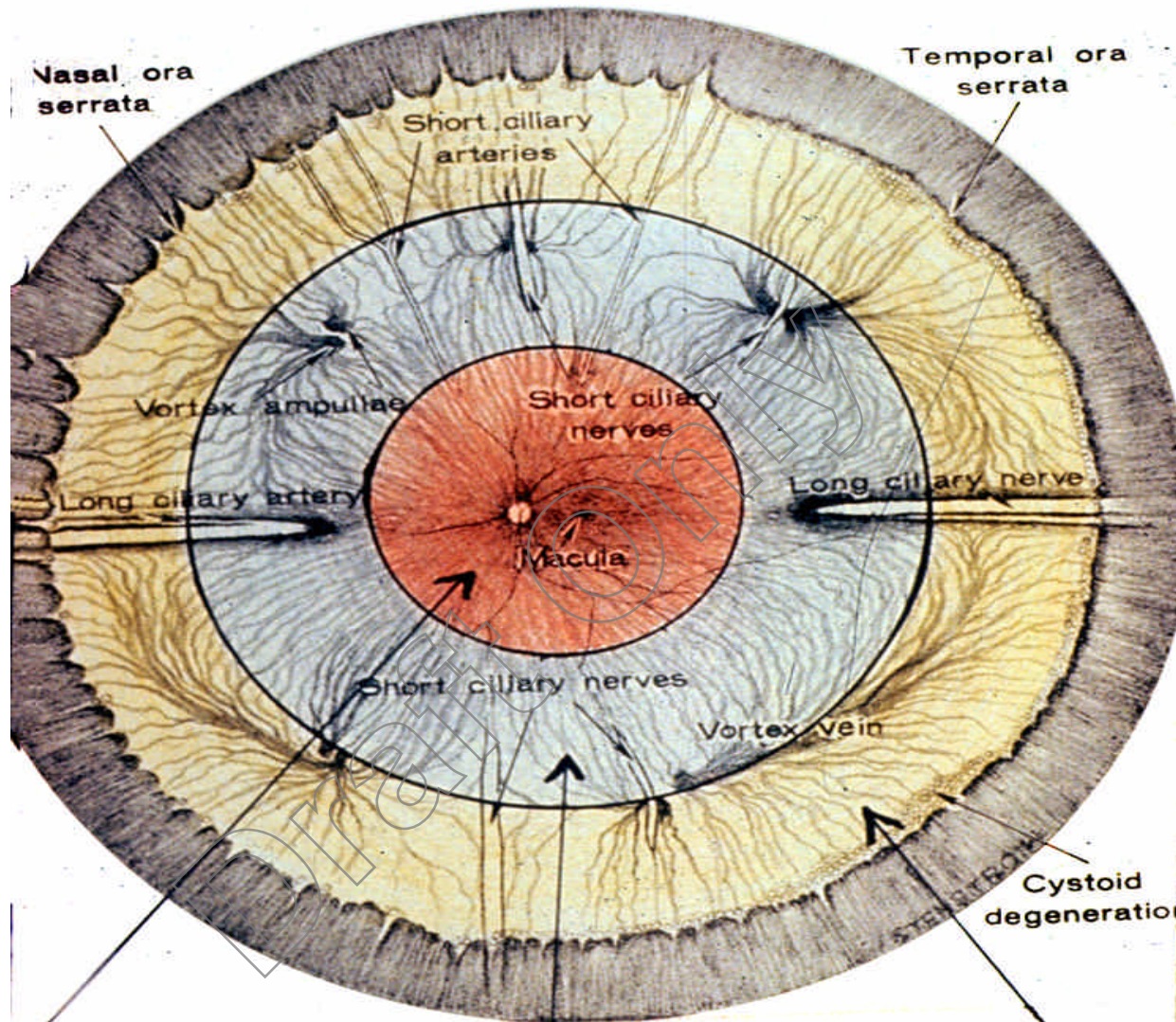
- direct ophthalmoscopy
- monocular indirect ophthalmoscopy
- binocular indirect ophthalmoscopy

A comparison chart of the 3 instruments can demonstrate the advantage and disadvantages of the 3 instruments





Eg: lesion is 1/2DD in size Hx V and 2DD away superior temporal from the optic nerve head



Cystoid degeneration

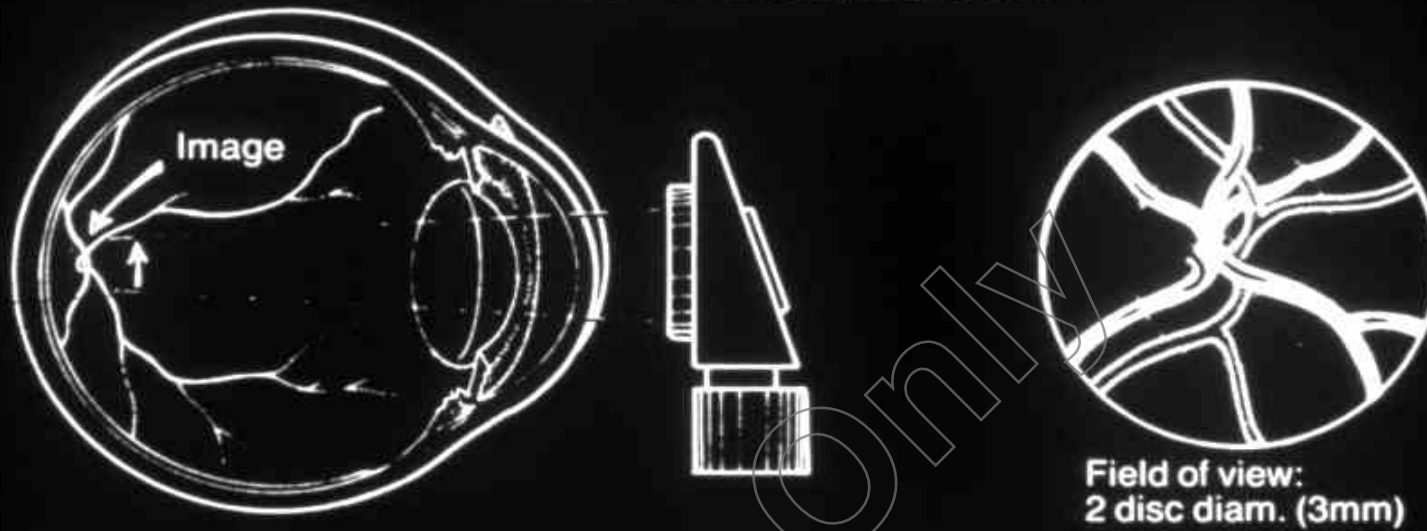
Area Viewable
with dilated
PUPIL

Area Viewable
with dilated
PUPIL

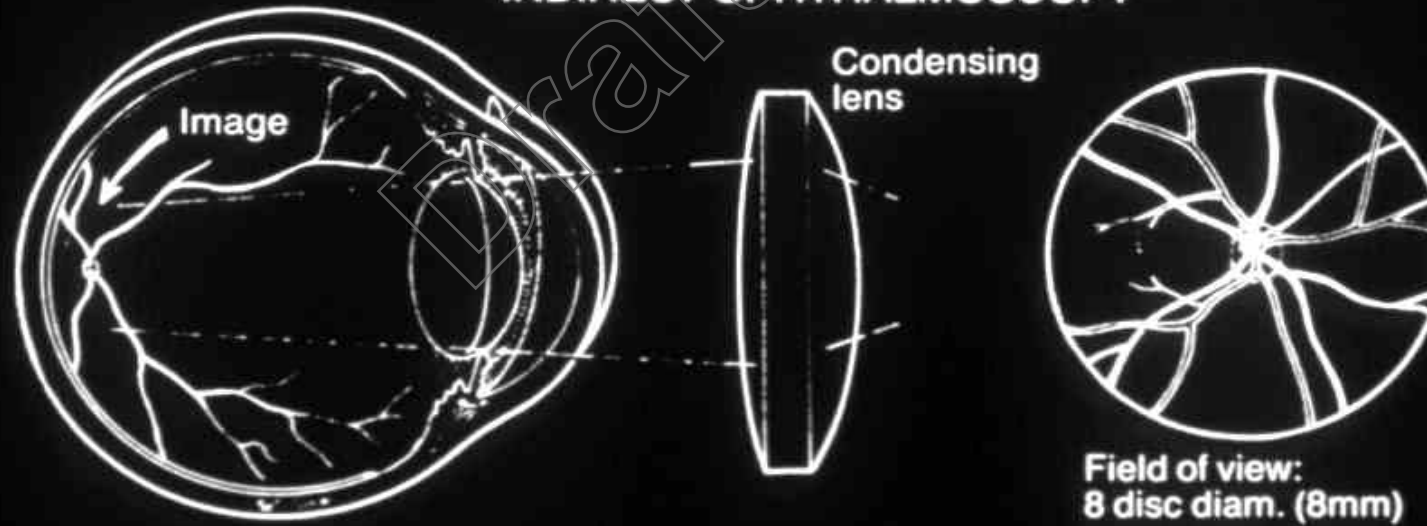
Area Viewable
with dilated
PUPIL +
INDIRECT
O'SCOPE

	Direct Ophthalmoscopy	Monocular Indirect Ophthalmoscopy	Binocular Indirect Ophthalmoscopy
Image	Upright		
Magnification	15x (high)		
Field of View	10 degrees		
Equivalent in DD size	2DD		
Pupil size	Undilated		
Stereopsis	None		
Resolution	good		
Working Distance	Very short		
Media Evaluation	Excellent		

DIRECT OPHTHALMOSCOPY



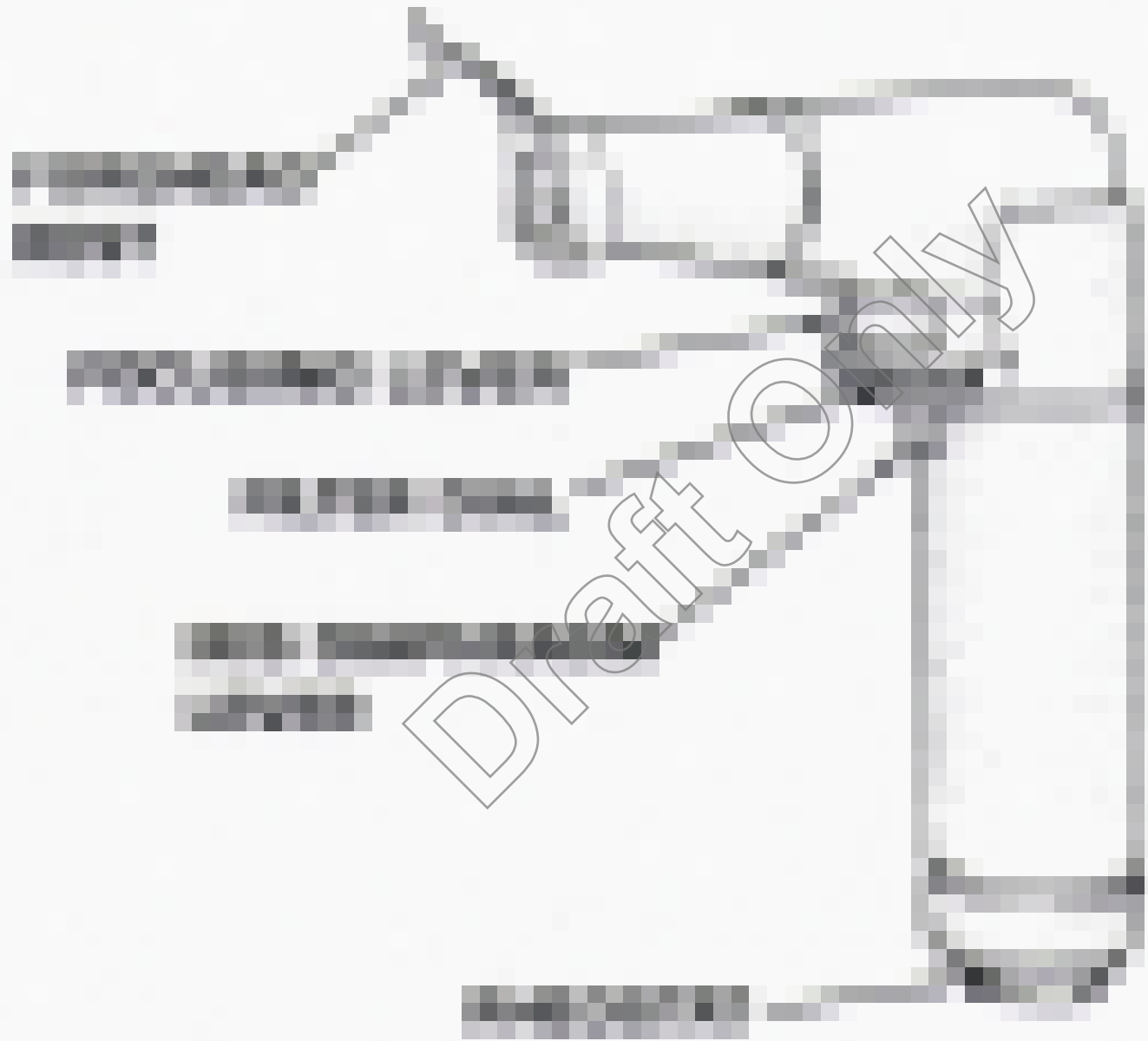
INDIRECT OPHTHALMOSCOPY

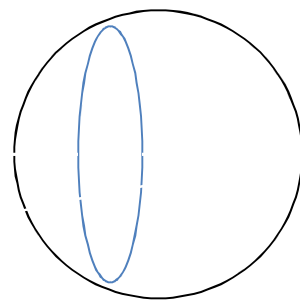
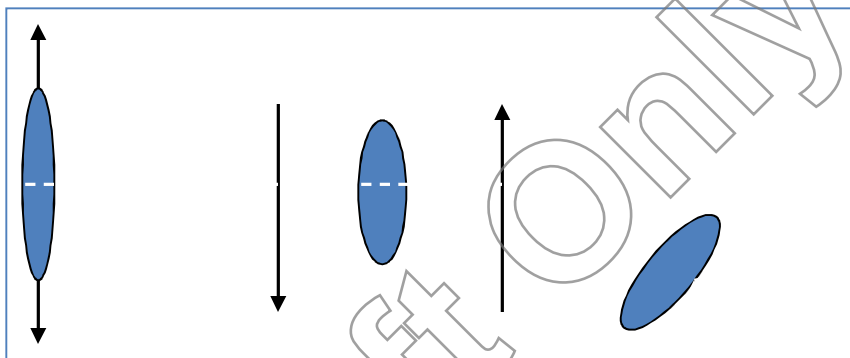
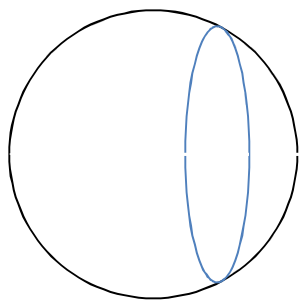


Monocular Indirect Ophthalmoscope

Instrument:

- Magnifying eyepiece
- Relay system re-inverts image to a real one
- Image is focused using eye piece





Indication of use:

- Small pupils
- Uncooperative children
- Patients intolerant to bright illumination
- One handed technique
- Person who is monocular

**Direct
Ophthalmoscopy**

**Monocular
Indirect
Ophthalmoscopy**

**Binocular Indirect
Ophthalmoscopy**

Image

Upright

Magnification

5x fixed mag

Field of View

40-45 degrees

**Equivalent in
DD size**

8DD

Pupil size

Undilated

Stereopsis

No stereopsis

Resolution

Fair

**Working
Distance**

Short distance

**Media
Evaluation**

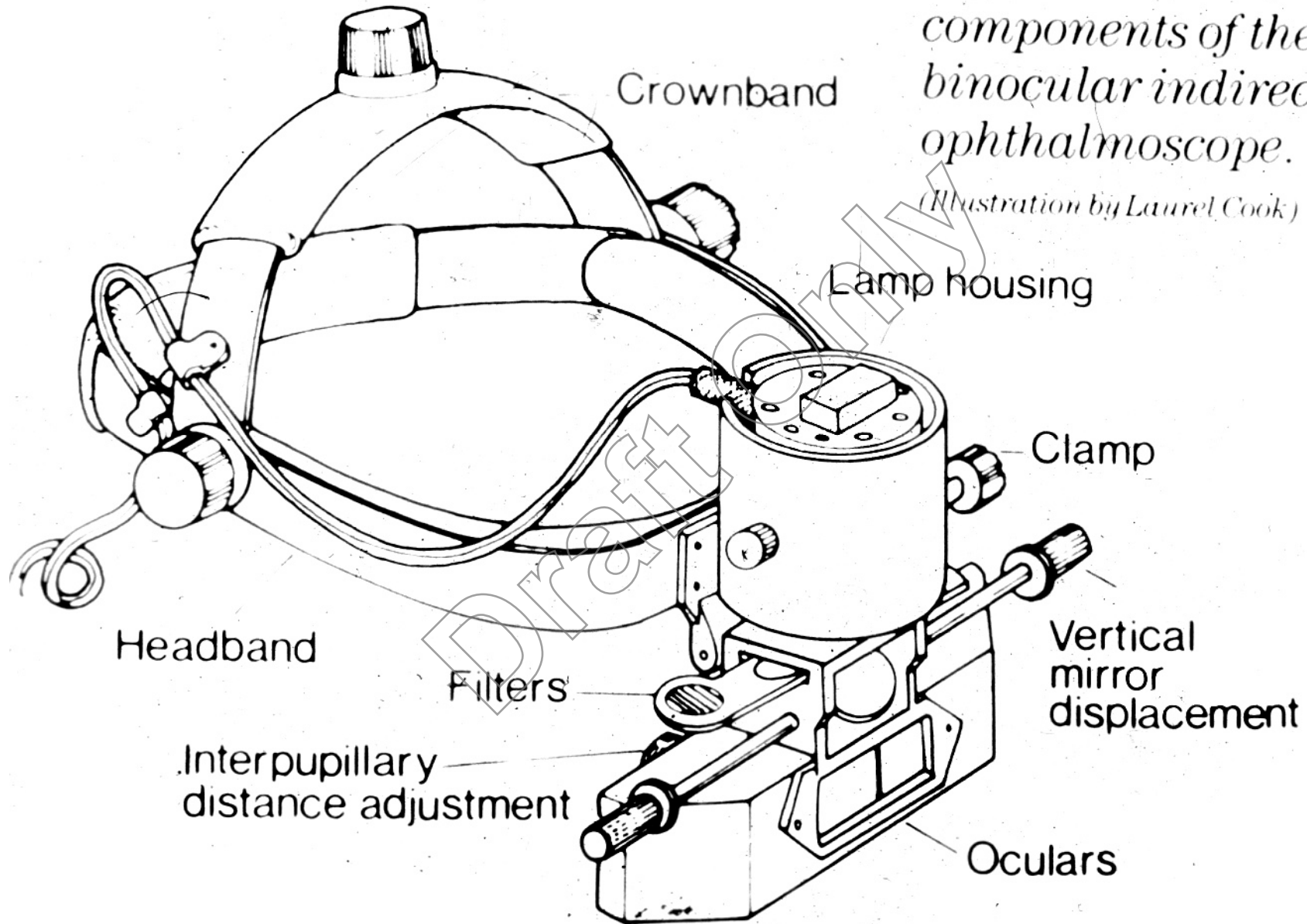
Binocular Indirect Ophthalmoscope

Instrument: consists of a:

- optical viewing system
- rheostat illuminating system
- headband

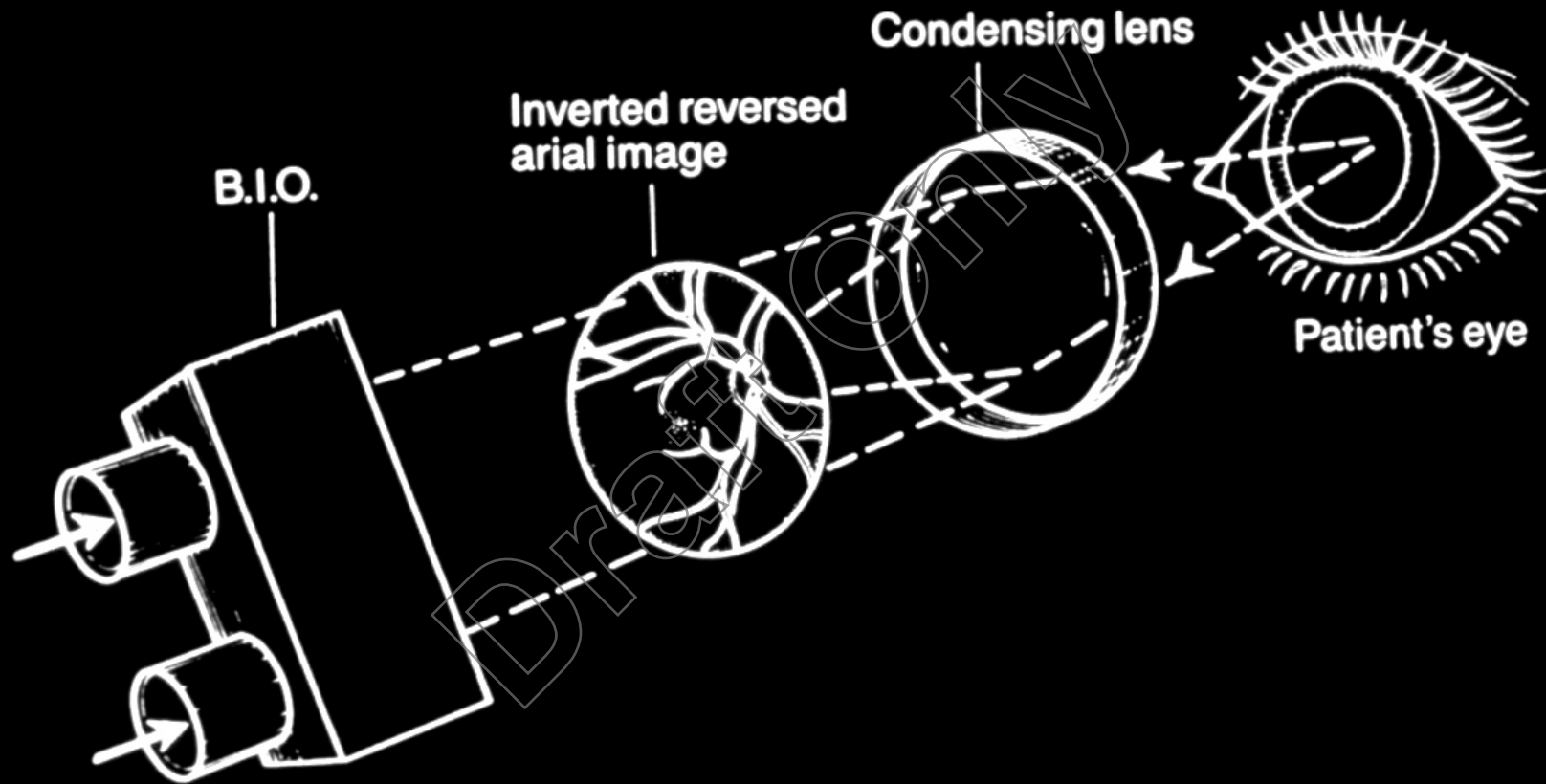
Fig. 7: Standard components of the binocular indirect ophthalmoscope.

(Illustration by Laurel Cook)



Optics:

- Light from B.I.O. directed into patients eye
- Reflected beams from retina are focused using a high plus lens
- Aerial image produced



**Direct
Ophthalmoscopy**

**Monocular
Indirect
Ophthalmoscopy**

**Binocular Indirect
Ophthalmoscopy**

Image

Inverted

Magnification

2.5x (variable)

Field of View

40-45 degrees

**Equivalent in
DD size**

8DD

Pupil size

Dilated

Stereopsis

yes

Resolution

Excellent

**Working
Distance**

Arms length

**Media
Evaluation**

No

Draft Only



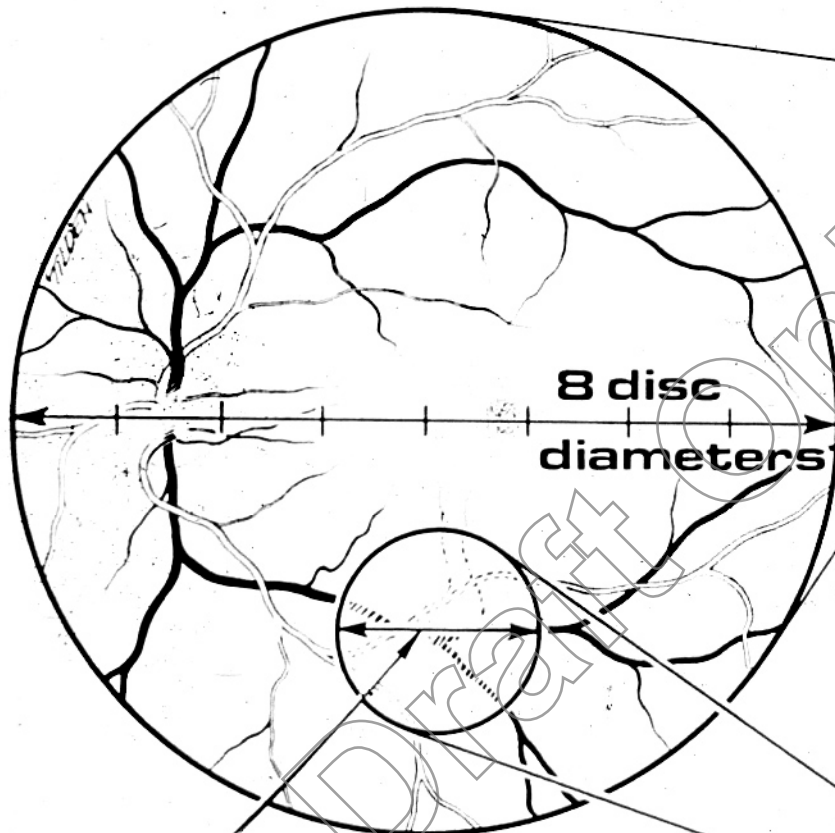
Condensing Lens:

Magnification: $F_{\text{eye}} / F_{\text{condensing}} = \text{Mag} \times$

Magnification versus field of view

<u>Lens size</u>	<u>Magnification</u>	<u>Field of View</u>
20D	3x	less than 30D lens
30D	2x	greater than 20 lens
15D	4x	less than 20 and 30D lens
2.2D	mag equivalent of 20D	field of view equivalent of 30D

Indirect Ophthalmoscopy



2 disc diameters

Direct Ophthalmoscopy

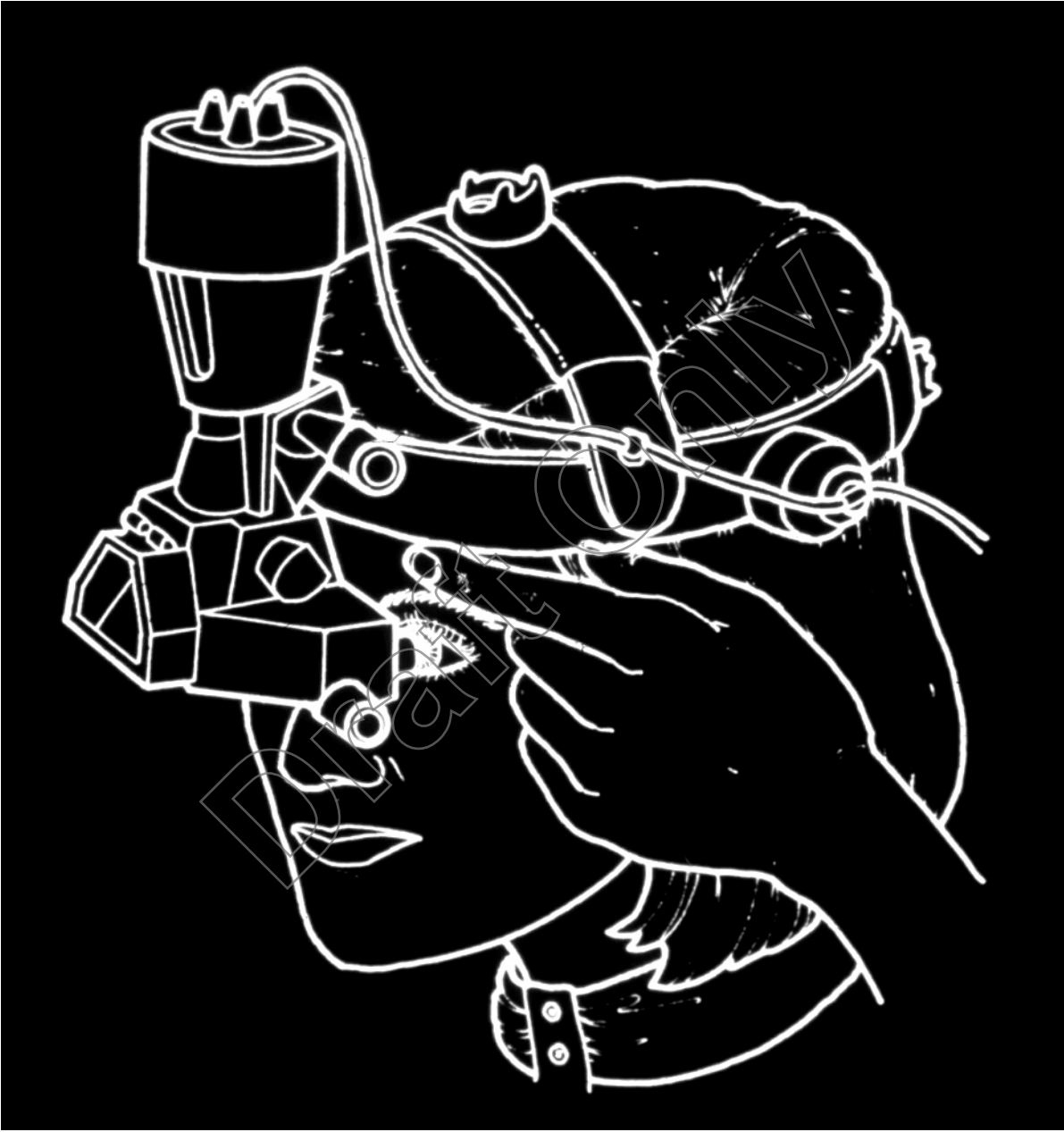


Technique

- **PD measurement**
 - Location of light source
 - Headband fit vs. spectacle
 - Obtain stereopsis
 - Holding the condensing lens
 - Examiner and patient position

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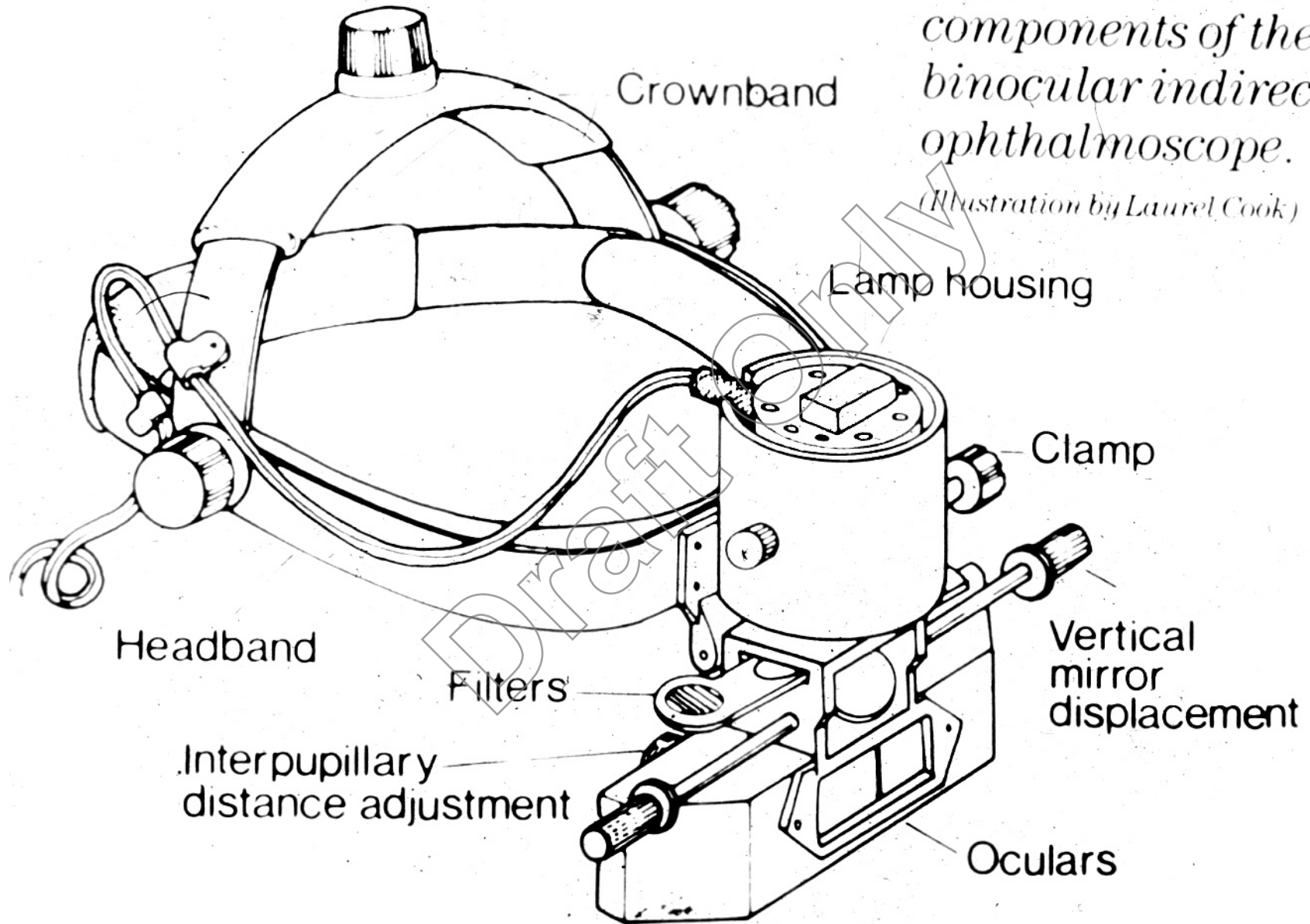


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Fig. 7: Standard components of the binocular indirect ophthalmoscope.

(Illustration by Laurel Cook)



Technique

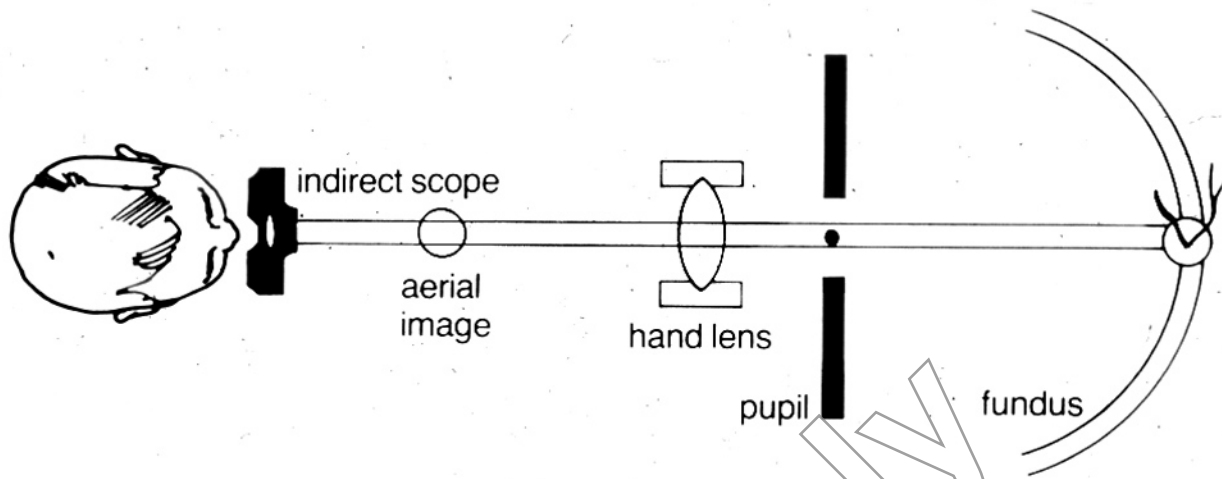
- PD measurement
 - Location of light source
 - Headband fit vs. spectacle
 - **Obtain stereopsis**
 - **Holding the condensing lens**
 - Examiner and patient position



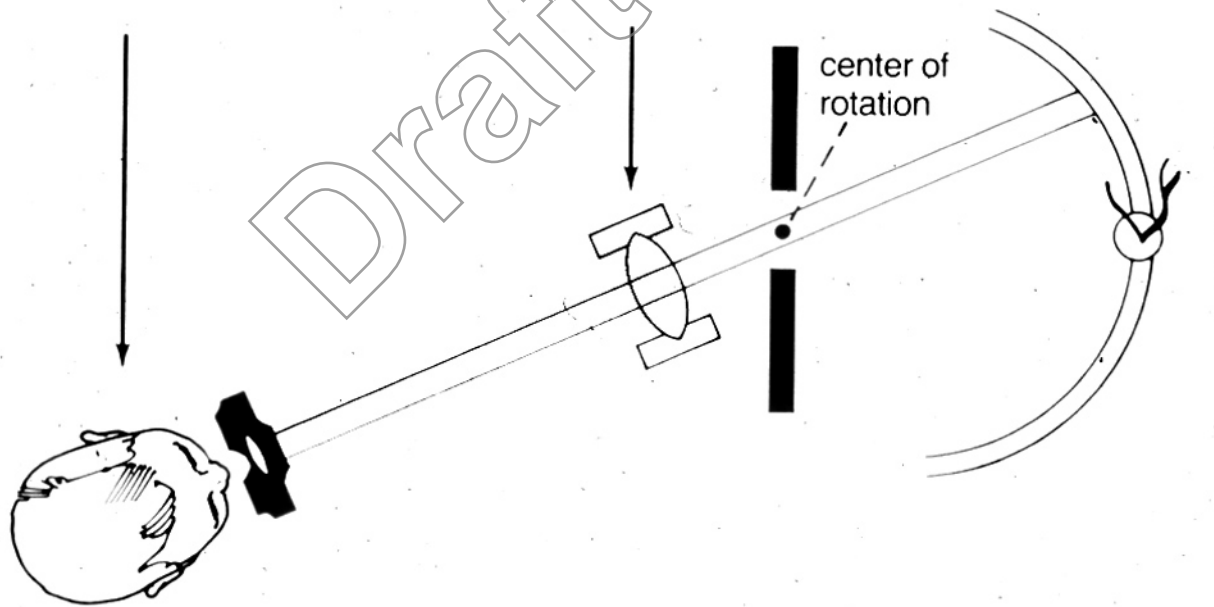
**More convex side
faces examiner**

Technique

- PD measurement
 - Location of light source
 - Headband fit vs. spectacle
 - Obtain stereopsis
 - Holding the condensing lens
 - **Examiner and patient position**



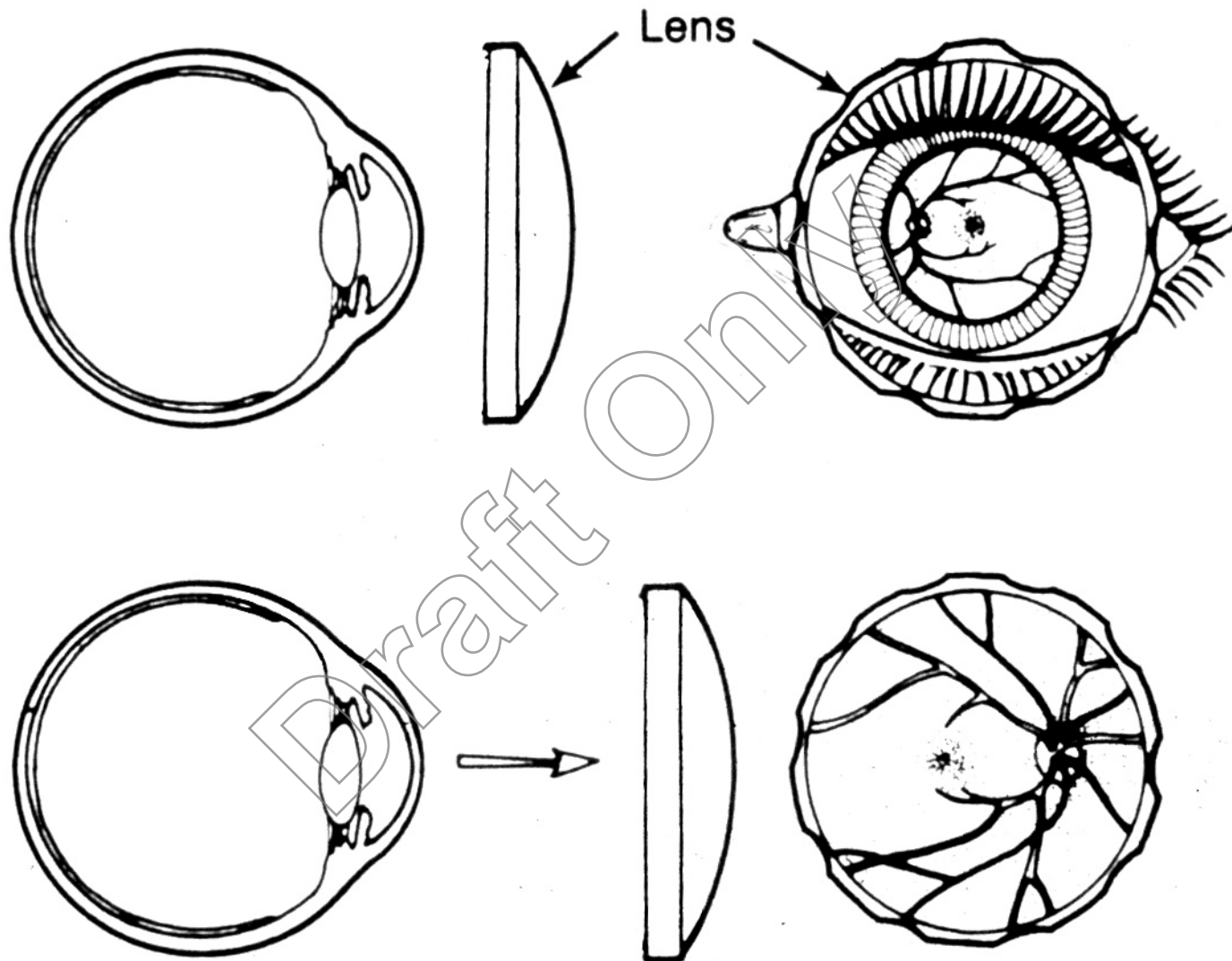
A

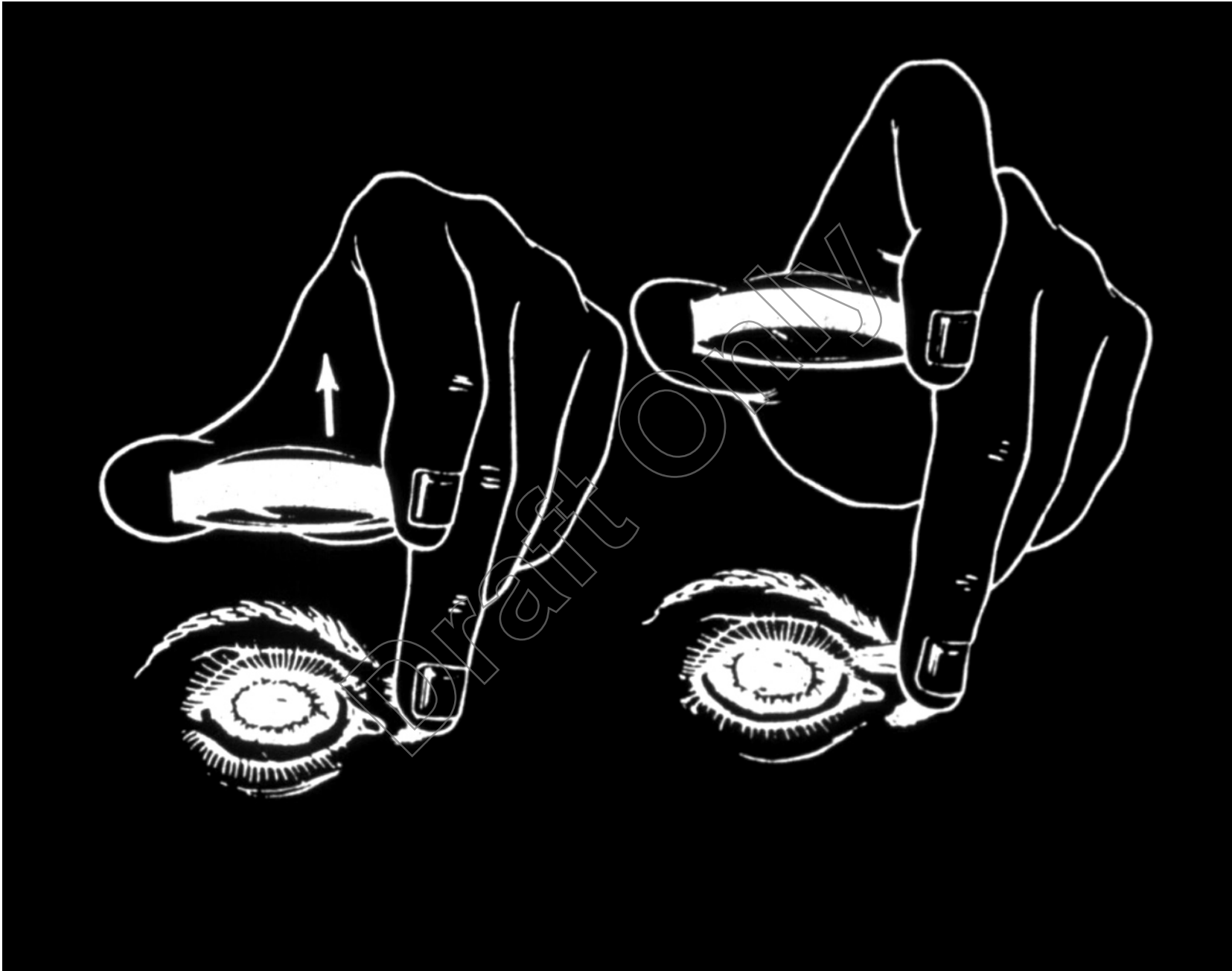


B

Binocular Indirect Ophthalmoscopy

- Holding the condensing lens
- Distance of condensing lens and eye
- Red reflex
- Filling the condensing lens image





Reflection



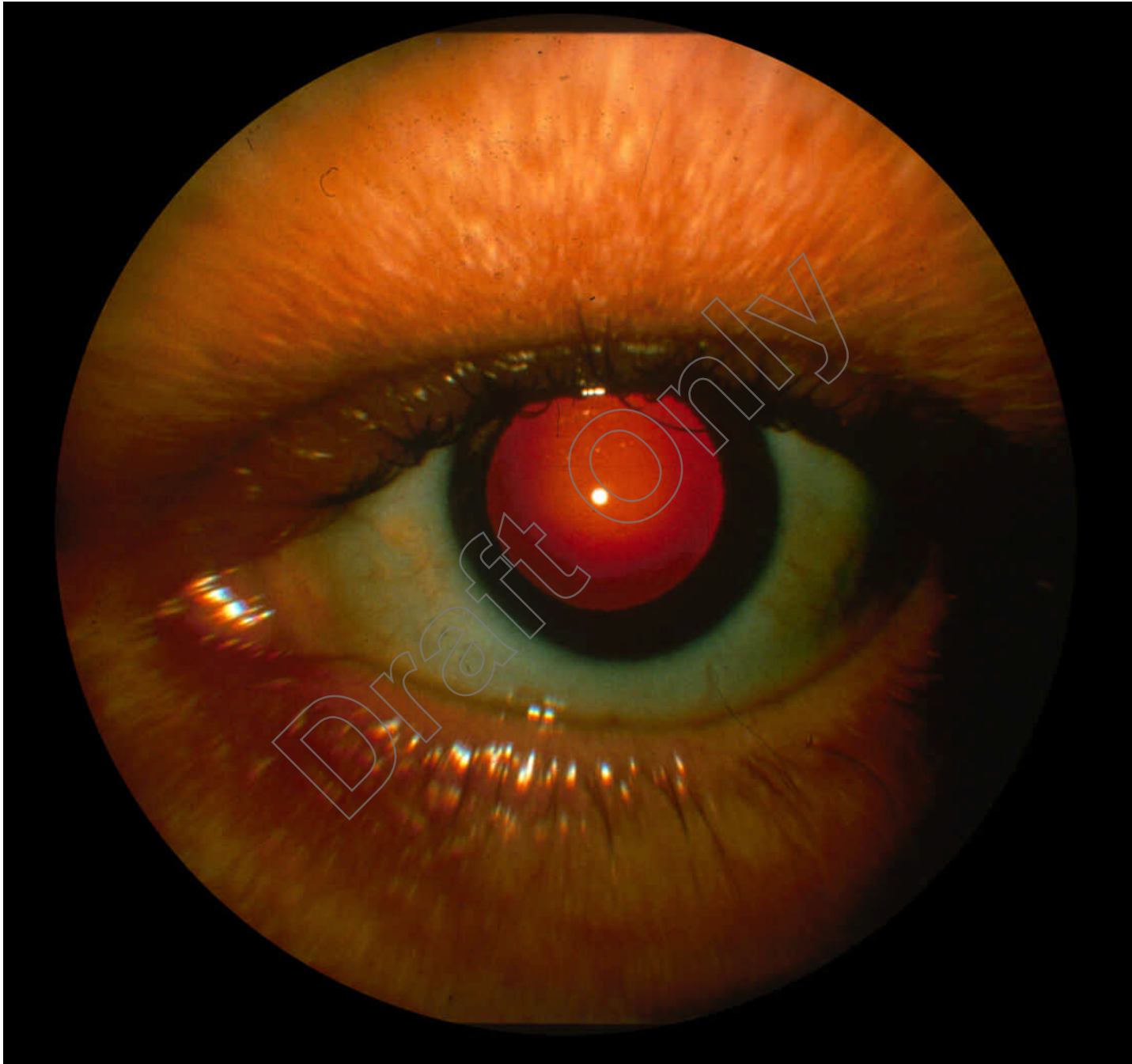
Lens tipped

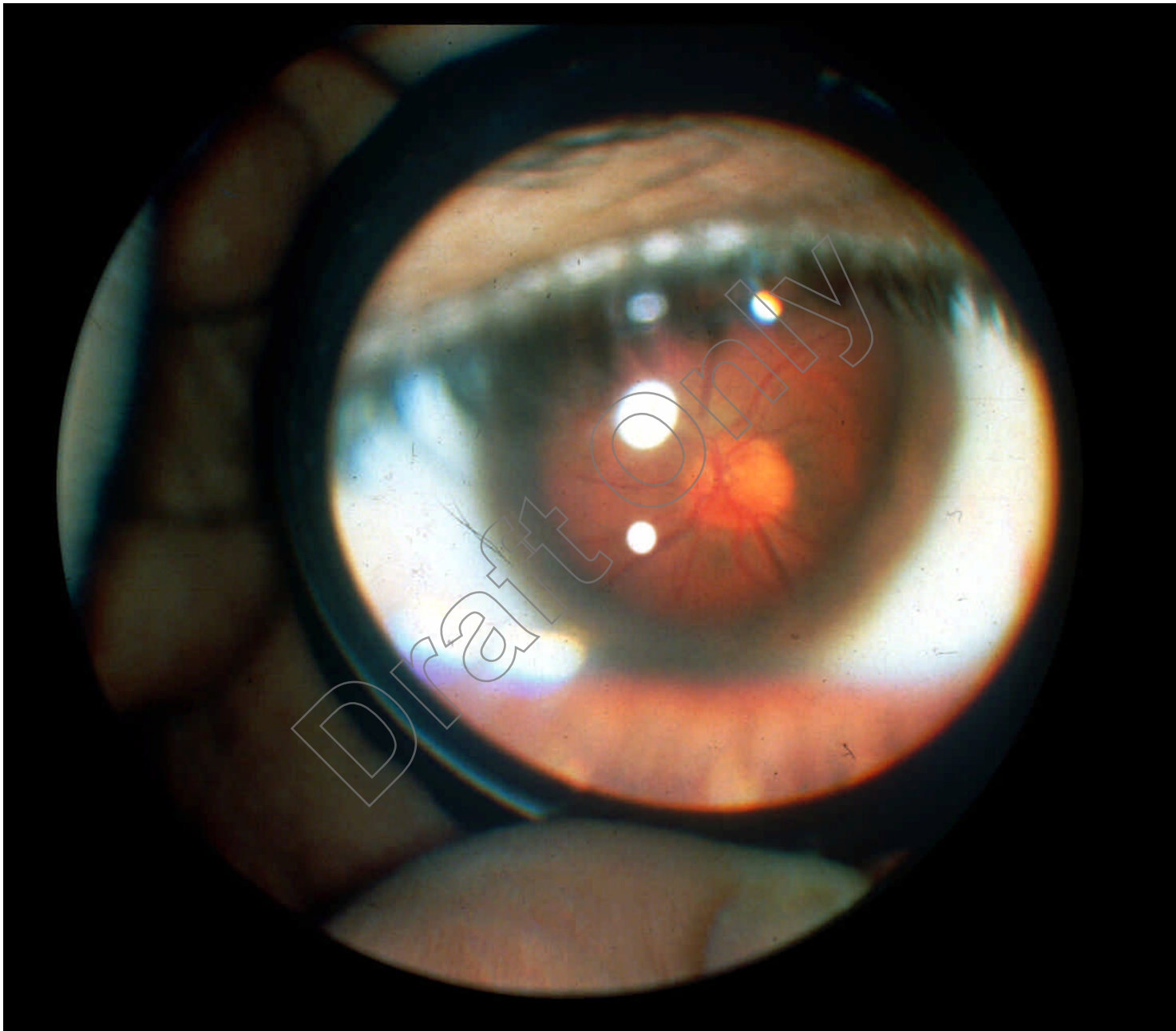


Reflection



Reflection

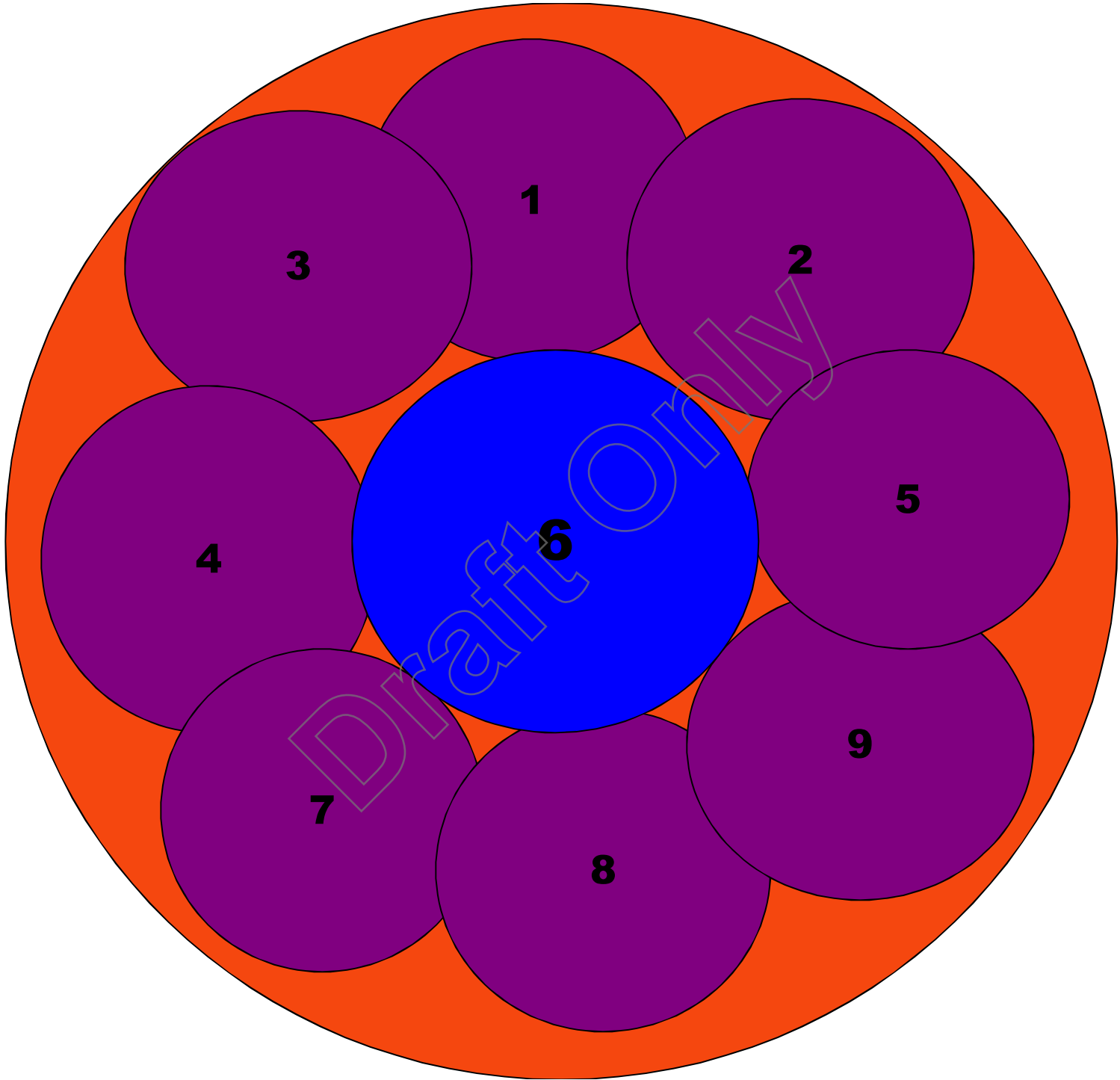






Binocular Indirect Ophthalmoscope

- Examine the retina in a chronological order
- Obtain overlapping views
- 9 positions to examine

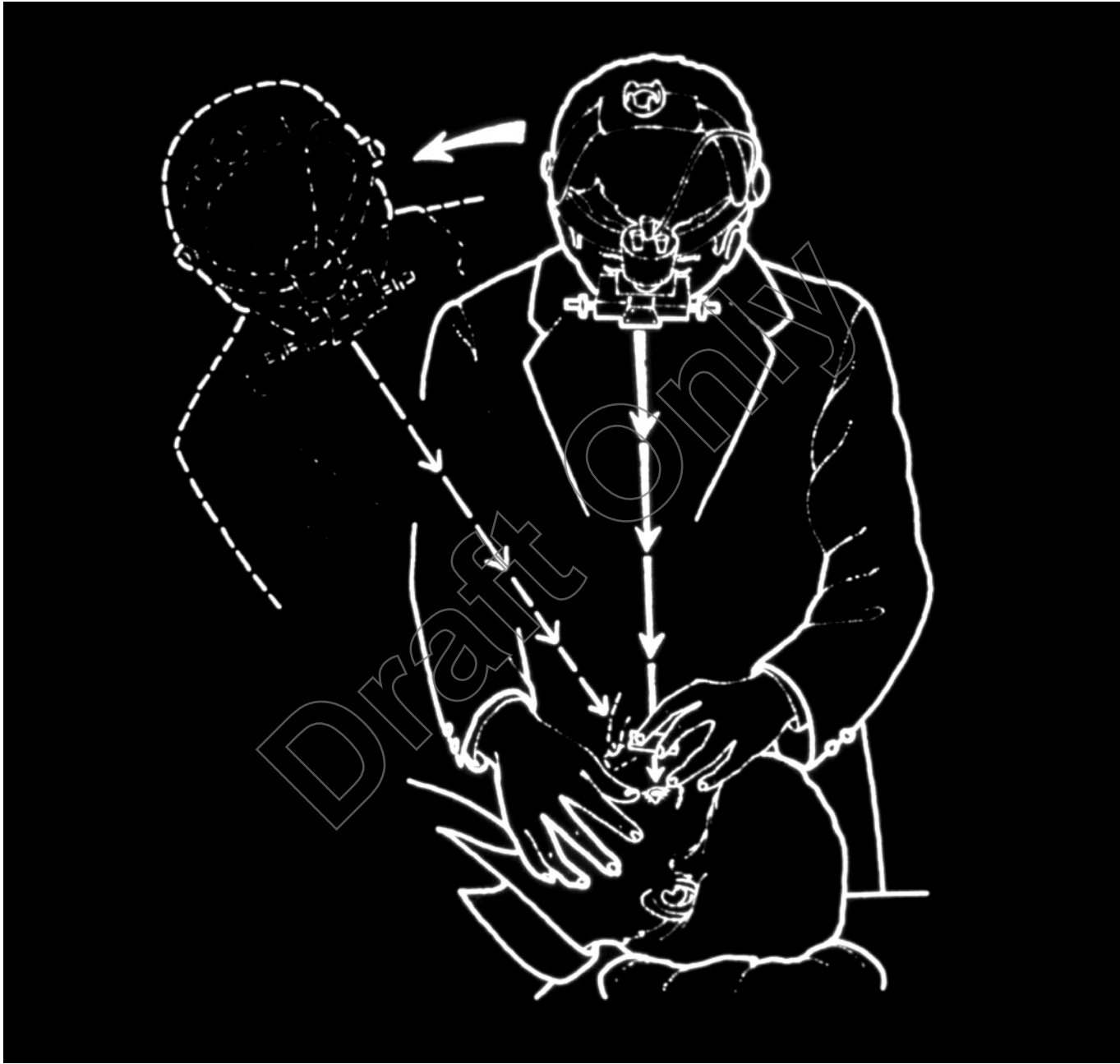


eg. To examine the patient's right eye at the 3 o'clock position, direct the patient's gaze to that position (3 o'clock)

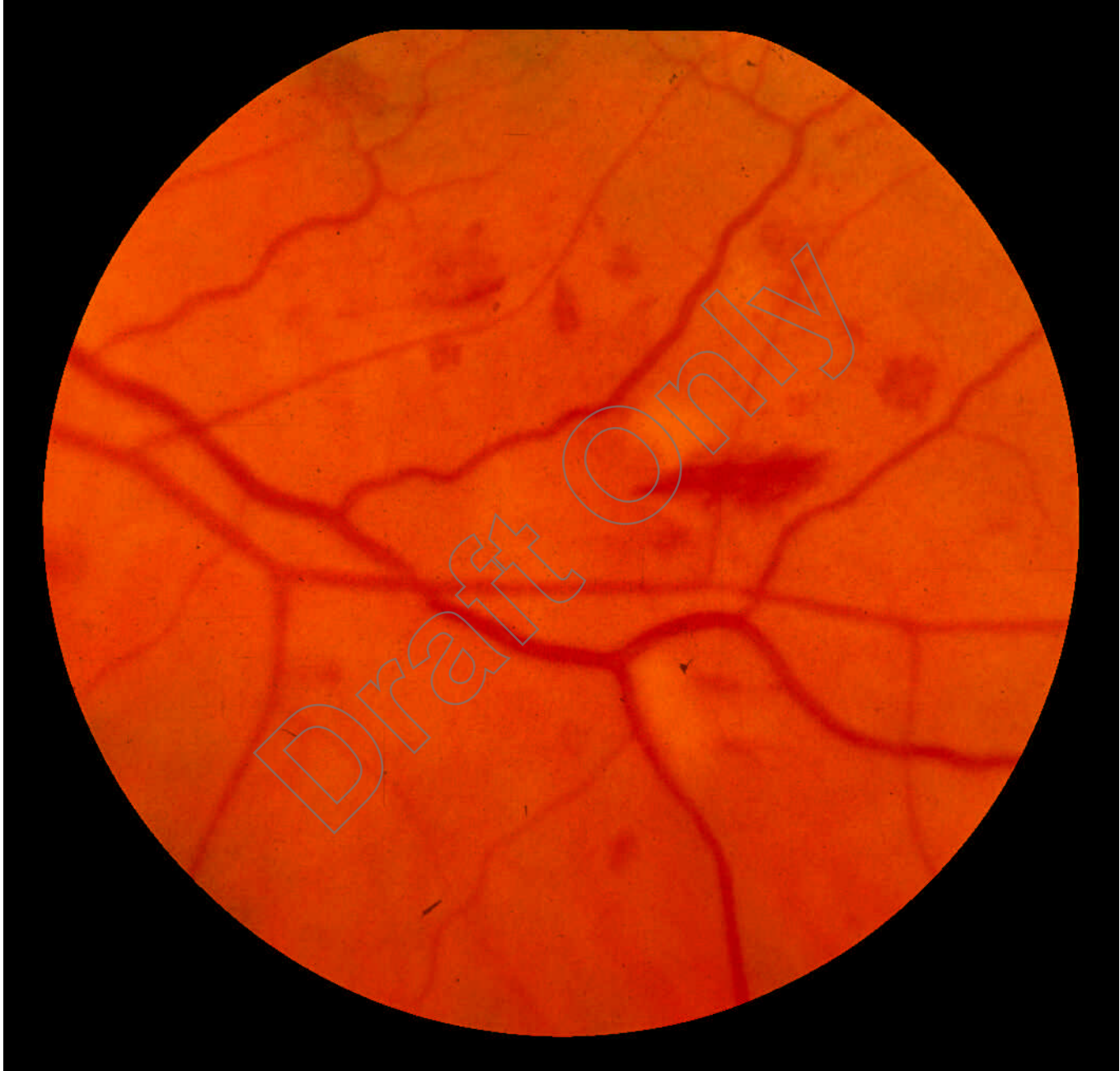
- You record your results in the 3 o'clock position
- However in your view at this position everything is inverted and reversed

Long ciliary nerve



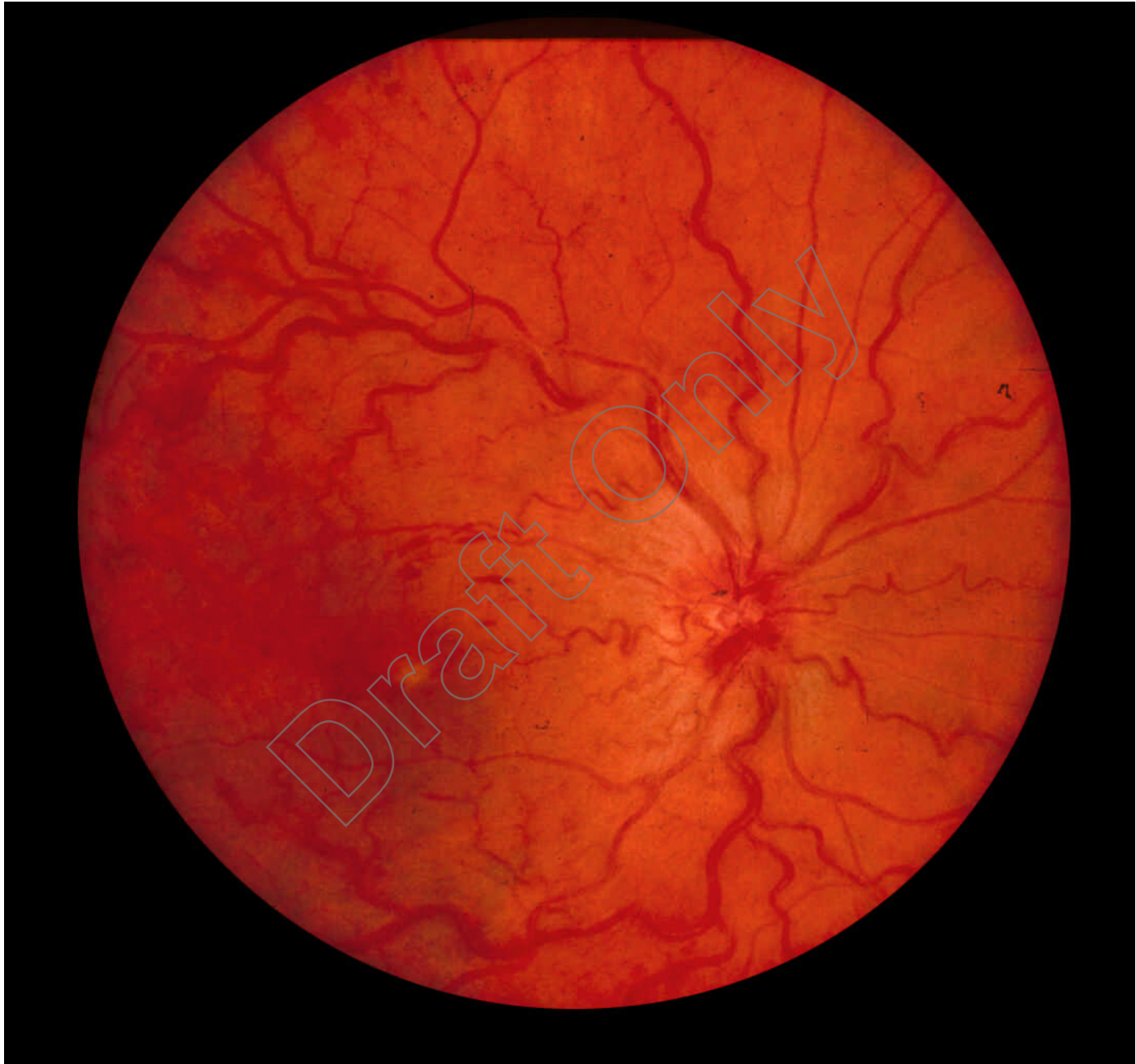








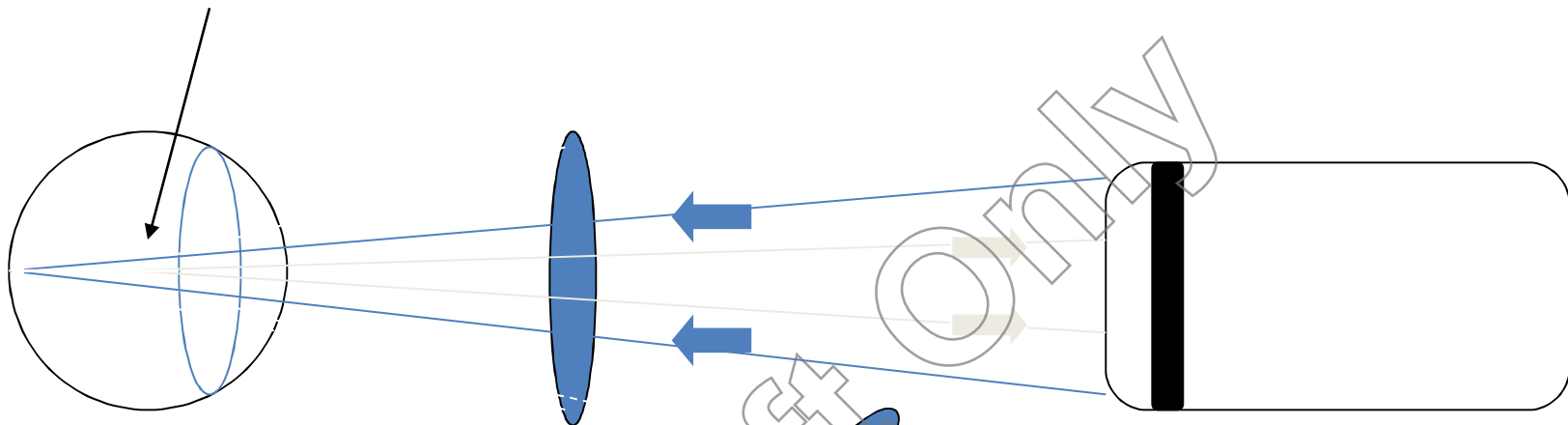




Universal (Goldmann) 3-Mirror Lens

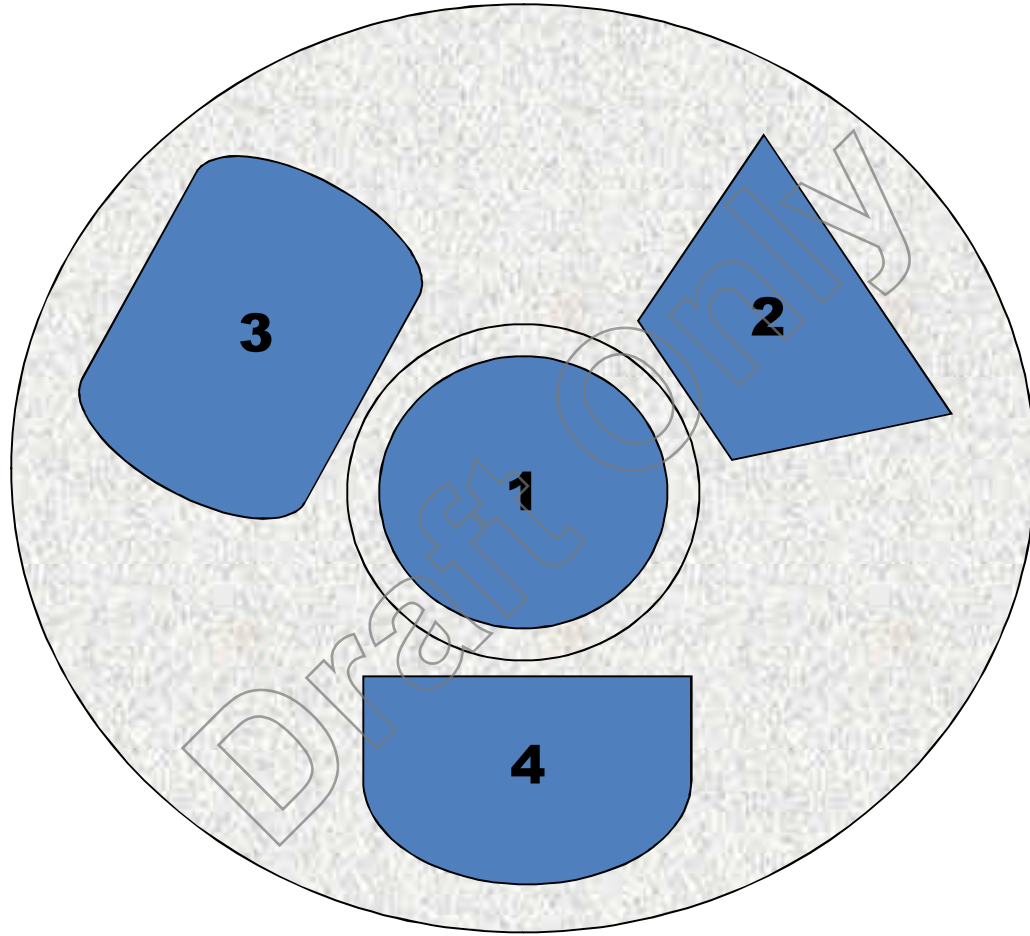
- Contact technique: lens with slit lamp biomicroscope
- Lens placed on the cornea
- 3- dimensional view obtained
- Used both on undilated and dilated pupil

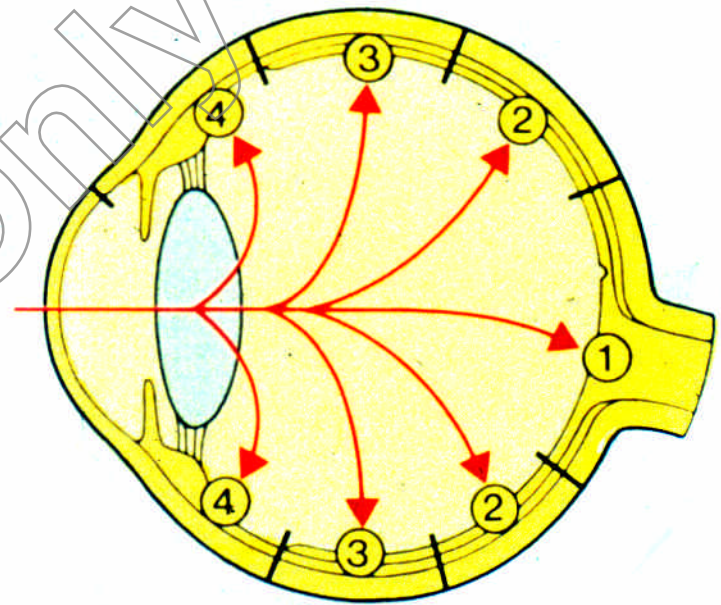
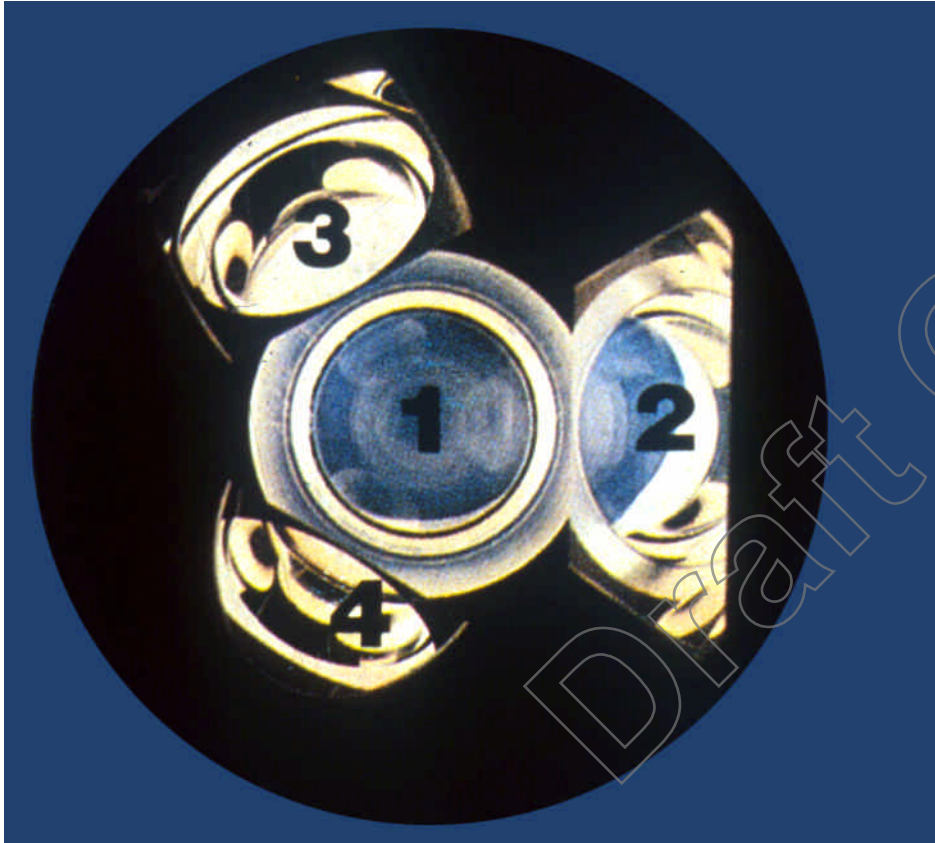


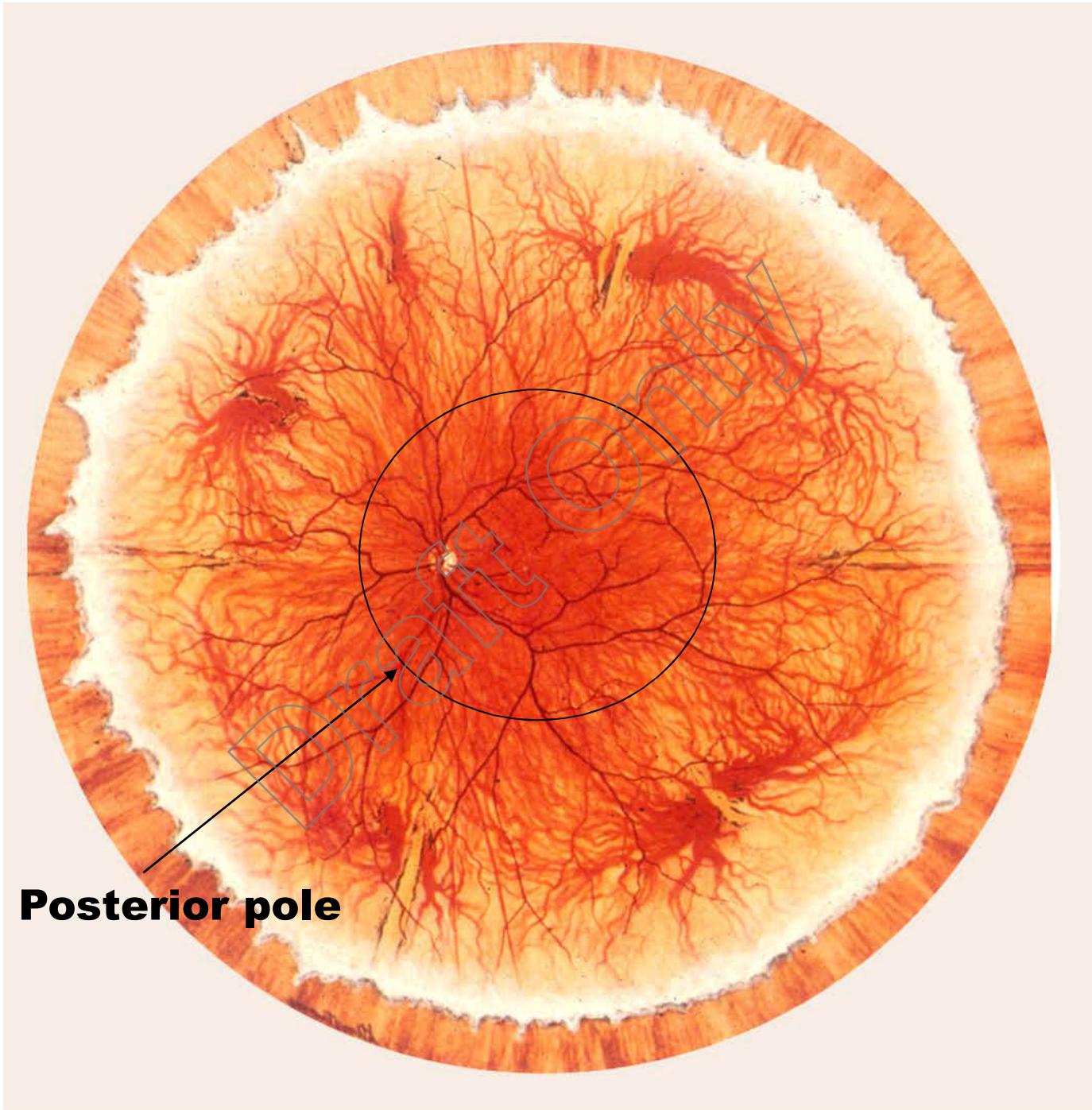


Universal (Goldmann) 3-Mirror Lens

- Central lens: used for posterior pole evaluation
- Trapezoid mirror: for equatorial retinal evaluation
- Rectangular mirror: for equator to ora retinal evaluation
- Gonio mirror: evaluation of the ora serrata



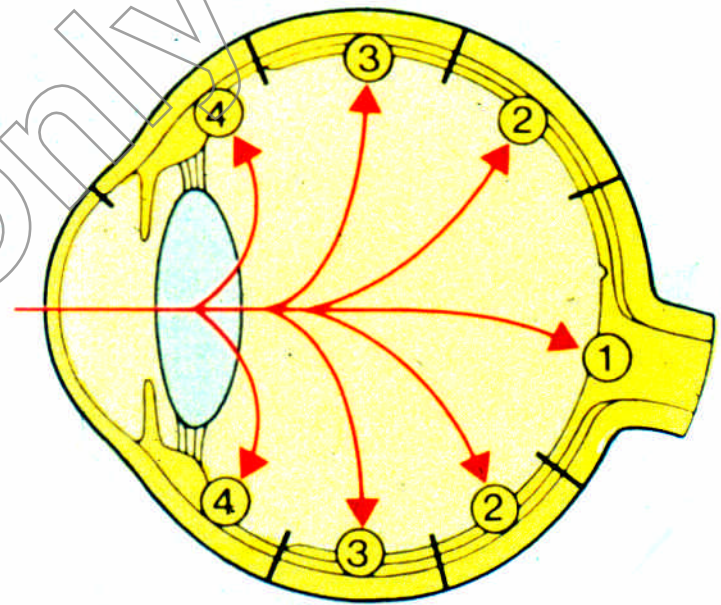
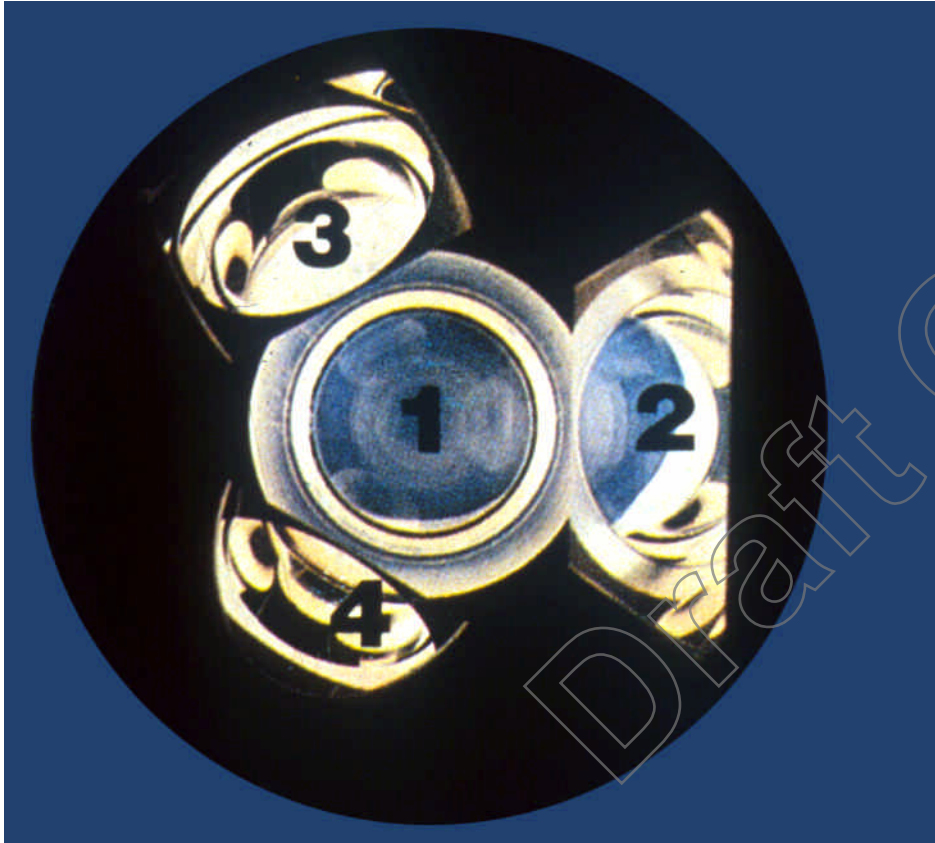


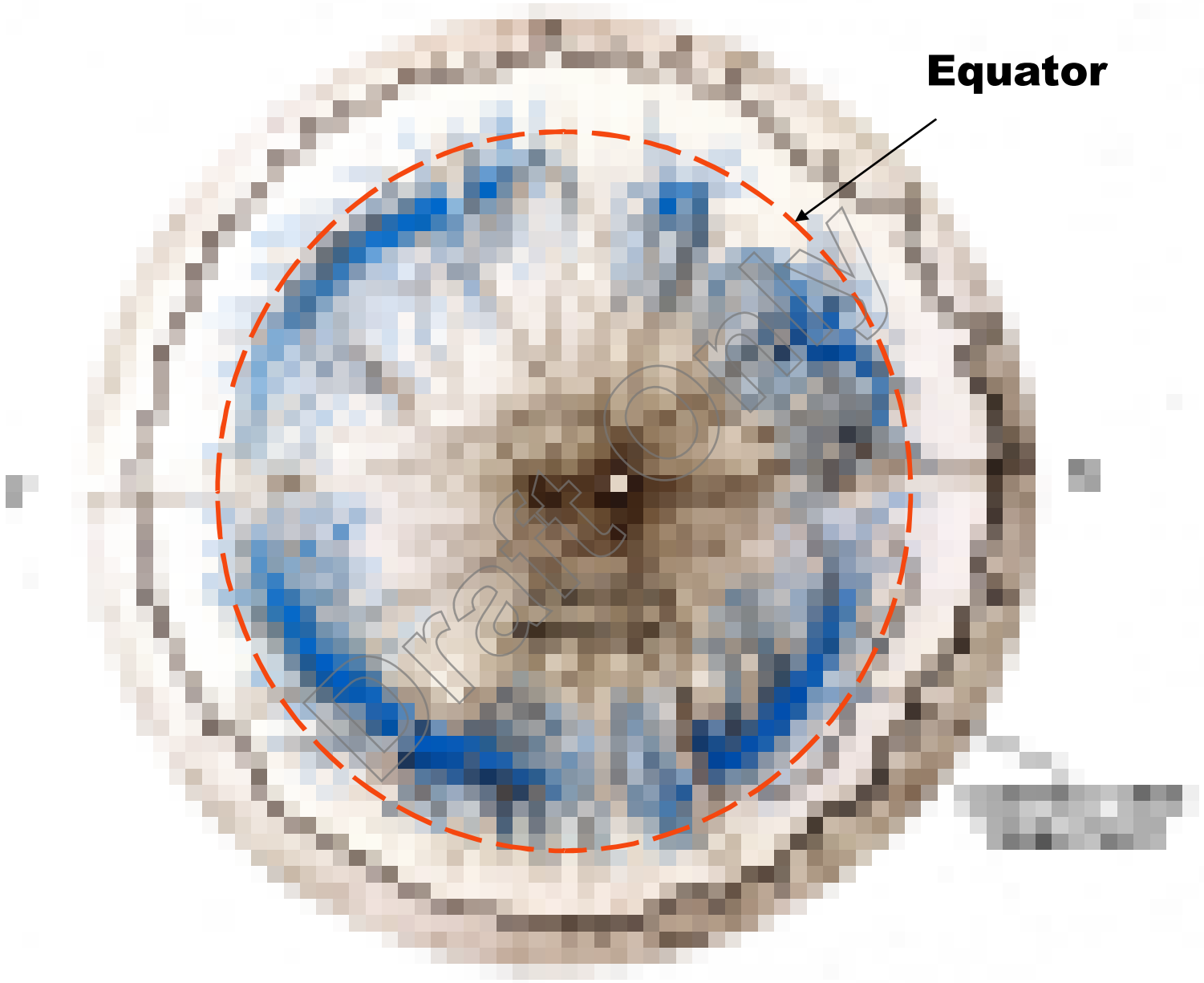


Posterior pole

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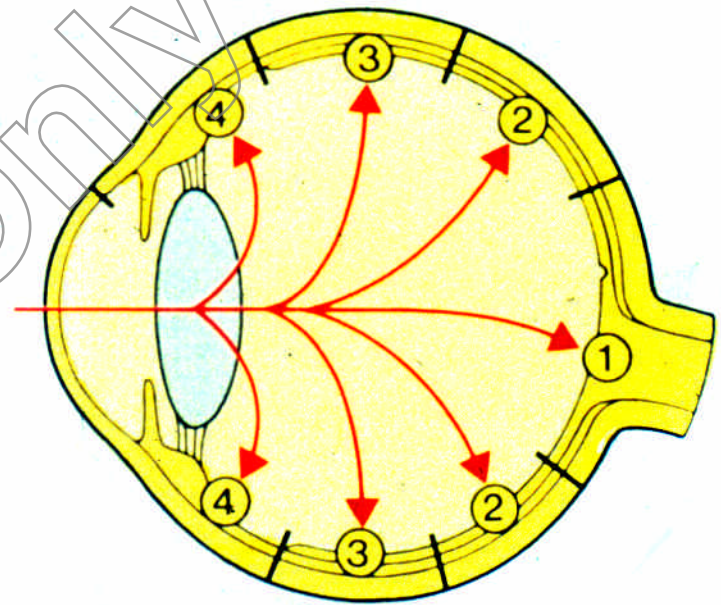




Equator

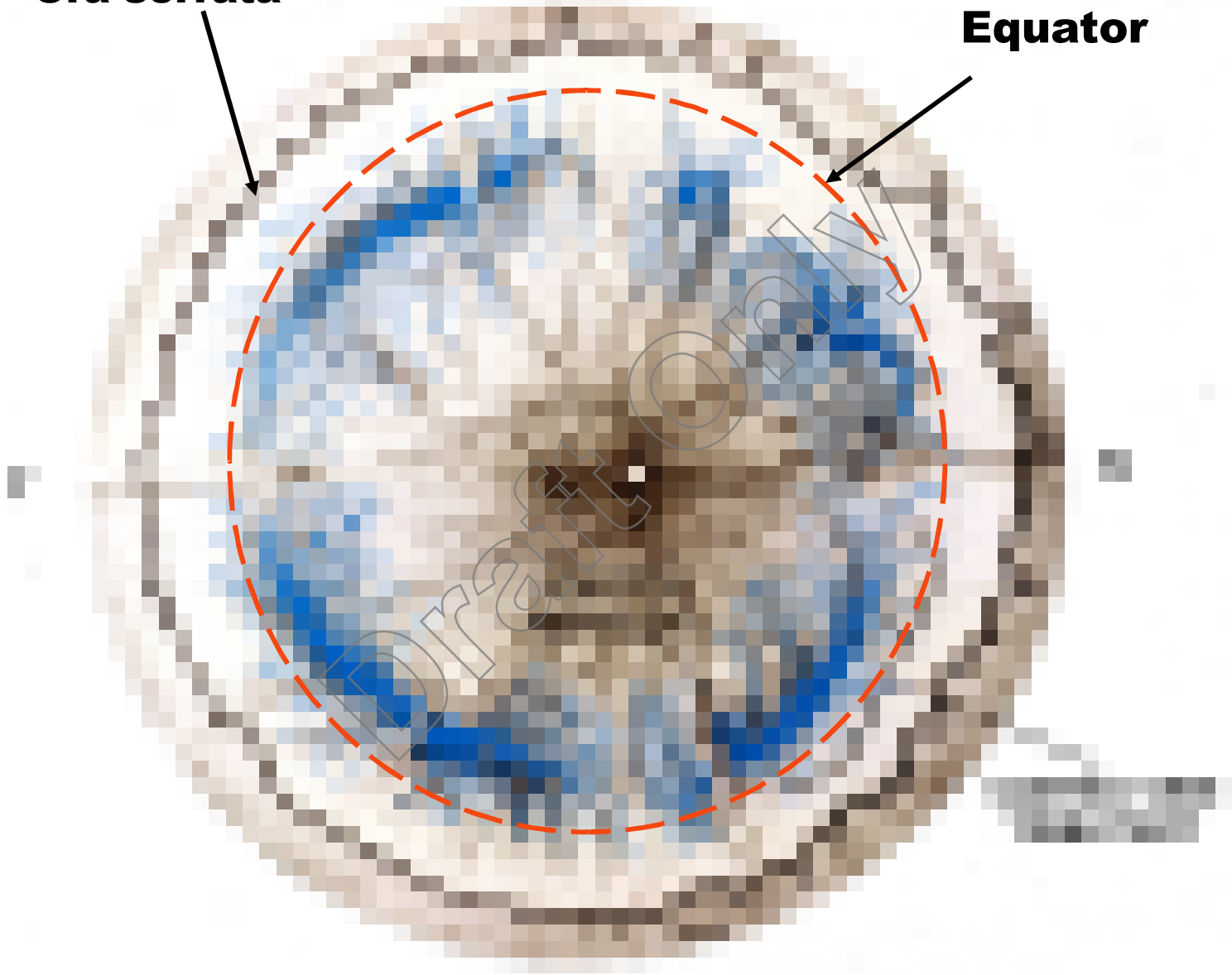
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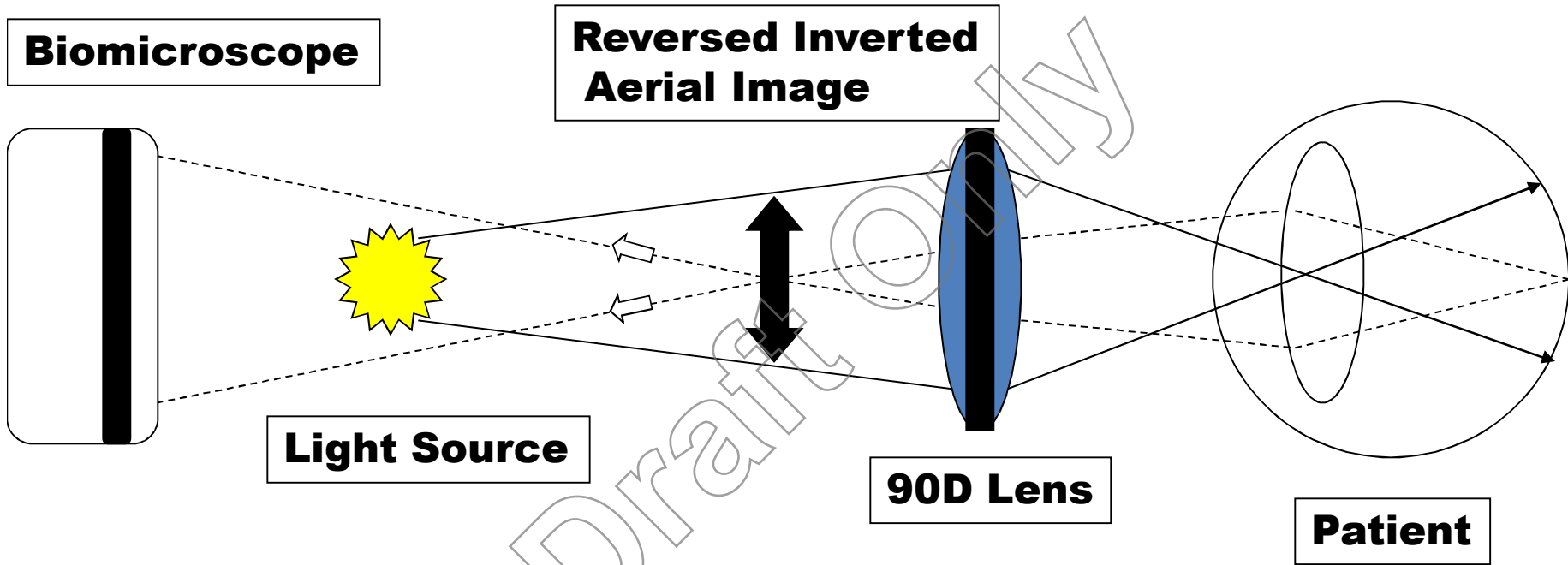
Ora serrata

Equator



Hand-held Condensing Lens

- Advantages:**
- * non-contact
 - * provides stereopsis
 - * use with slit lamp biomicroscope
 - * well illuminated view of the posterior pole
 - * alternative procedure to Goldmann 3 mirror lens



INDIRECT OPHTHALMOSCOPY AND SLIT LAMP BIOMICROSCOPY LENSES



Condensing Lens

- * double aspheric lens
- * clear or yellow coated
- * available in many different powers
- * pupil dilation desirable
- * lens alignment, visual axis centration, vertex distancing tilting is needed in this procedure

Comparison of auxillary lenses

<u>Lens size</u>	<u>Magnification</u>	<u>Field of View</u>	<u>working distance from cornea</u>
60D	1.09	67 degrees	11mm
78D	0.87	68 degrees	7 mm
90D	0.72	69 degrees	6.5mm
Superfield	0.76	116 degrees	-----
Super 66	1.00	96 degrees	-----

