Basics of slit lamp microscopy

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The 2 basic parts of the slit lamp biomicroscope are:

- The slit lamp (illumination system)
- The biomicroscope
The illumination system can be

1. Of the Zeiss type
2. Of the Haag Streit type
In the Zeiss type the illumination comes from below
In the Haag Streit type the illumination comes from above.
In both types of illumination system the Kohler illumination principle is used:

The filament is imaged onto the objective lens but the mechanical slit is imaged onto the patient’s eye.
The biomicroscope: based on the optics of a compound microscope

- Two basic types:
  - The Grenough type
  - The Galilean changer type
The Grenough type (Classical Haag Streit)

Flip lever to change magnification
The Galilean Magnification changer

Knob to change magnification (3 or 5step)
Galilean magnification changer

Objective
Magnification can also be changed by changing the eyepiece power.
The slit lamp and the biomicroscope are manoeuvred together on a cross slide by means of a joystick.
The coupling between the slit lamp and the biomicroscope

- This is such as to make the system “parfocal”
- i.e. the focus of the slit and the focus of the microscope are at the same point.
- This parfocality may occasionally need to be dissociated as for example in the technique of sclerotic scatter
The coupling between the slit lamp and the biomicroscope

- This allows both the slit and the microscope to rotate about the point of focus (i.e., the eye)
Dissociation of parfocality can be done in “Haag Streit” type slit lamps by loosening the sclerotic scatter knob.
This dissociation of parfocality is useful for indirect illumination, sclerotic scatter and retroillumination.
The key to successful examination of the anterior segment is knowledge of the various methods of lighting which can be achieved by the slit lamp.
Diffuse illumination

• Not all slit lamps have this option
Diffuse illumination for surface details
Diffuse illumination
Diffuse illumination
Diffuse illumination
Focal broadbeam illumination
Broad beam

Narrow beam
Focal broad beam

Busacca’s nodule on iris
Knob to widen beam
Focal slit illumination
Retroillumination - against red glow
Retroillumination- YAG pits on claw IOL
Indirect illumination (similar to sclerotic scatter)
Sclerotic scatter
Knob for sclerotic scatter allows slit beam to be horizontally rocked
Parfocality of slit and viewing altered for sclerotic scatter
Sclerotic scatter
Filter turret
With additional dyes
Lens precipitates
SPKS - a collage
Krukenberg spindle
Traumatic rosette cataract
Anatomy of the angle
Normally the angle of the anterior chamber cannot be seen as light from it cannot exit from the eye due to total internal reflection at the cornea.
A gonioscopy lens allows light from the angle to exit the eye by eliminating the cornea air interface.
Direct Gonioscopy

Koepppe Gonioscopy lens
Angle recession
Trabecular pigmentation
• Fundus examination can be done with a slit lamp with the use of ancillary lenses.
• Ancillary lenses are required to neutralize the refractive power of the cornea.
Use of the short reflex mirror is recommended for posterior segment examination because the upward projection of the long mirror blocks one of the eye pieces when the illumination is kept at a small 3-5 degree angle from the binocular.

However, the illumination beam column must then be tilted else the illumination beam will fall partly outside the mirror reducing the illumination entering the eye.
Some contact Fundus slitlamp lenses

Mainster standard

Mainster High Magnification

Mainster PRP (widefield for panretinal photocoagulation)
Fundus view with slitlamp and Mainster contact lens
Slit lamp examination with a Volk quadraspheric contact lens (dislocated crystalline lens)
Thank you