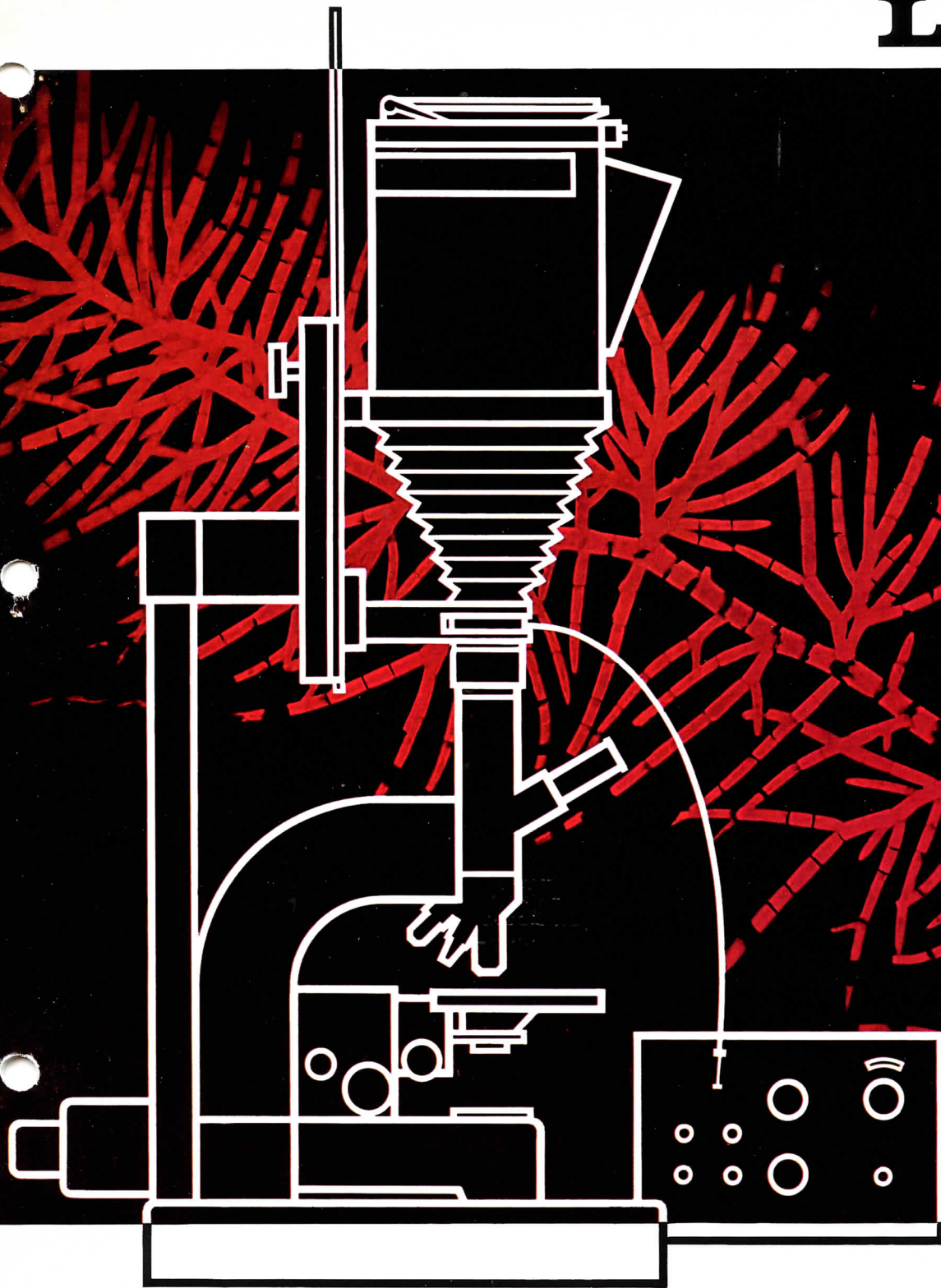


Leitz



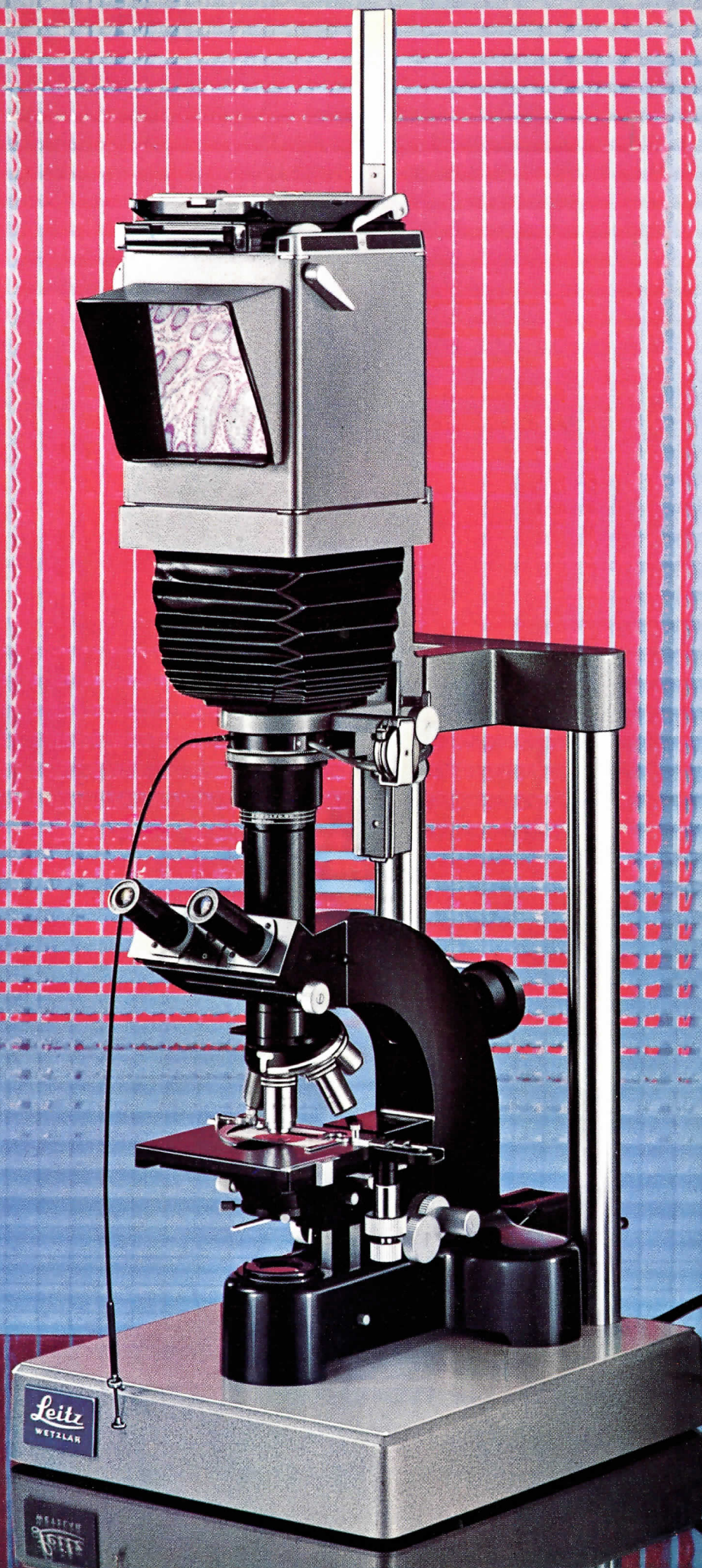
**4x5" bellows camera with fully
automatic exposure control**

**for photomicrography
and macrophotography**



540-28/Engl.

Leitz
WETZLAR

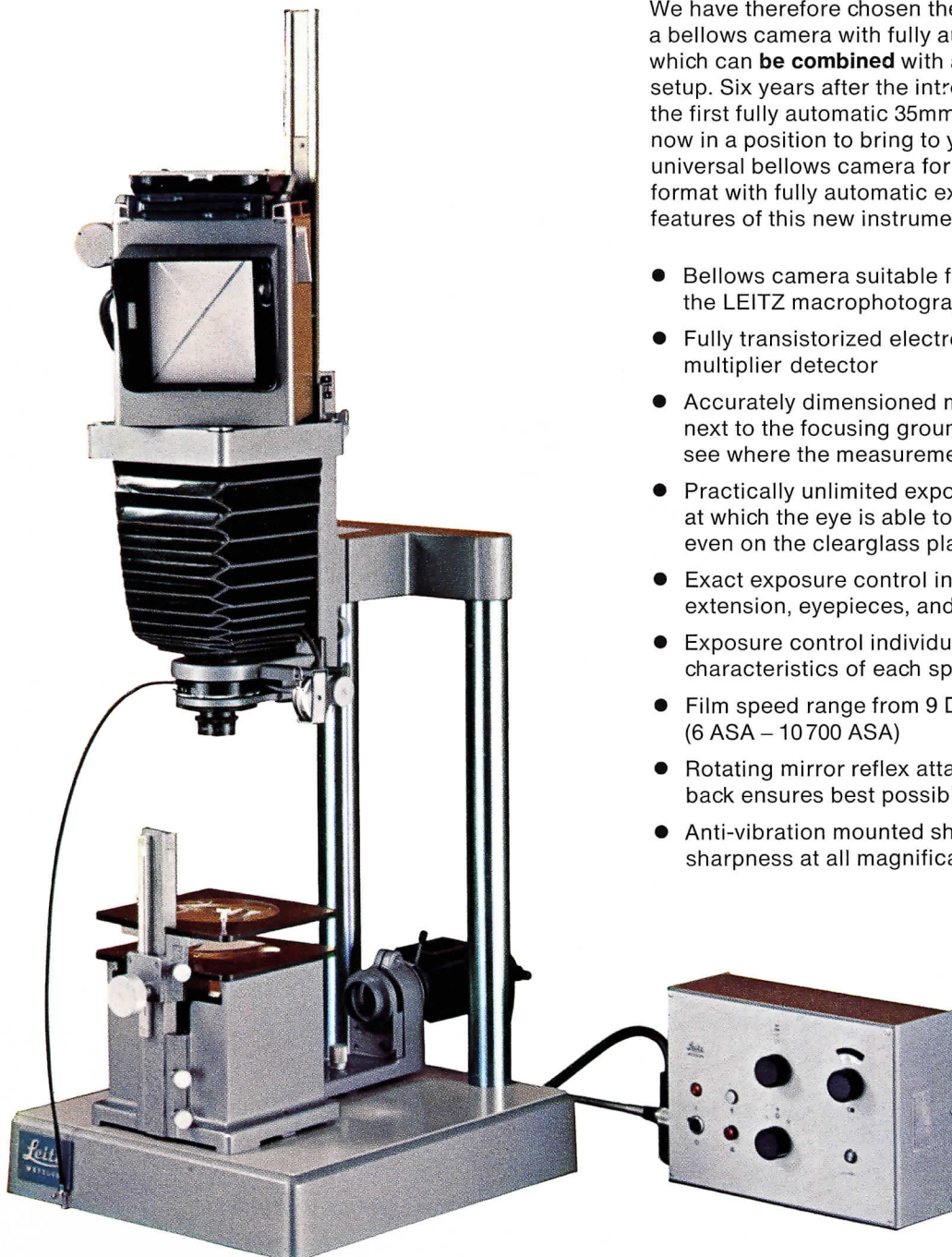


4x5" bellows camera with fully automatic exposure control

Front page: Moss in fluorescent light, 500x.
Exposure 4 min.

◀ 4x5" bellows camera
with ORTHOLUX® microscope

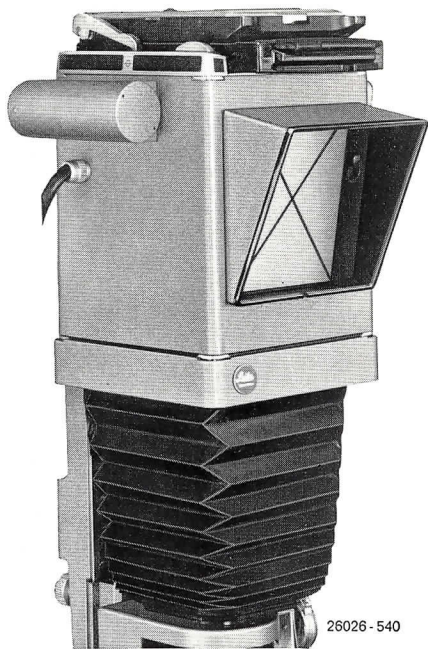
◀ 4x5" bellows camera with the
LEITZ macro-dia apparatus



Automatic photographic devices as integral parts of microscopes either represent a major financial layout, or they restrict the range of application of the instrument. We have therefore chosen the alternative in designing a bellows camera with fully automatic exposure control which can **be combined** with a microscope or a macroscopic setup. Six years after the introduction of the ORTHOMAT®, the first fully automatic 35mm microscope camera, we are now in a position to bring to your attention the first really universal bellows camera for the 9x12cm or 4x5" large format with fully automatic exposure control. The technical features of this new instrument are:

- Bellows camera suitable for all modern microscopes and the LEITZ macrophotographic outfit
- Fully transistorized electronic system with photo-multiplier detector
- Accurately dimensioned measuring field immediately next to the focusing groundglass screen. The user can see where the measurement is taken
- Practically unlimited exposure range, beyond the limit at which the eye is able to record and focus detail even on the clearglass plate
- Exact exposure control independent of bellows extension, eyepieces, and methods of illumination
- Exposure control individually adjustable to the characteristics of each specimen
- Film speed range from 9 DIN to 41 DIN (6 ASA – 10 700 ASA)
- Rotating mirror reflex attachment with international back ensures best possible utilization of the film format
- Anti-vibration mounted shutter produces perfect picture sharpness at all magnifications and shutter speeds.

TECHNICAL DESCRIPTION



Mirror reflex attachment with bellows.
The photomultiplier is housed
in the cylindrical attachment.

The outfit consists of:

The mirror reflex attachment with built-in photomultiplier, the bellows, the electromechanical shutter system, and the control unit.

It is used for photomicrography and macrophotography on the basic stand of our ARISTOPHOT. The only exceptions are our ORTHOPLAN® and PANPHOT® microscopes which have their own attachment bar.

Bellows with mirror reflex attachment

Bellows and mirror reflex attachment are mounted on the ARISTOPHOT by means of a prismatic bar. The image is focused on the groundglass screen of the mirror reflex attachment. The measuring field, corresponding exactly to the measuring area of the photomultiplier, is located next to the groundglass screen. After focusing, which is carried out through the open shutter, the shutter is closed by turning the mirror into the "exposure" position, the photomultiplier switched on, and the beam path to the photographic plate unblocked. The exposure control is fully automatic after the shutter is opened. All commercial sheet films, plates, as well as Polaroid material can be used.

MICRO

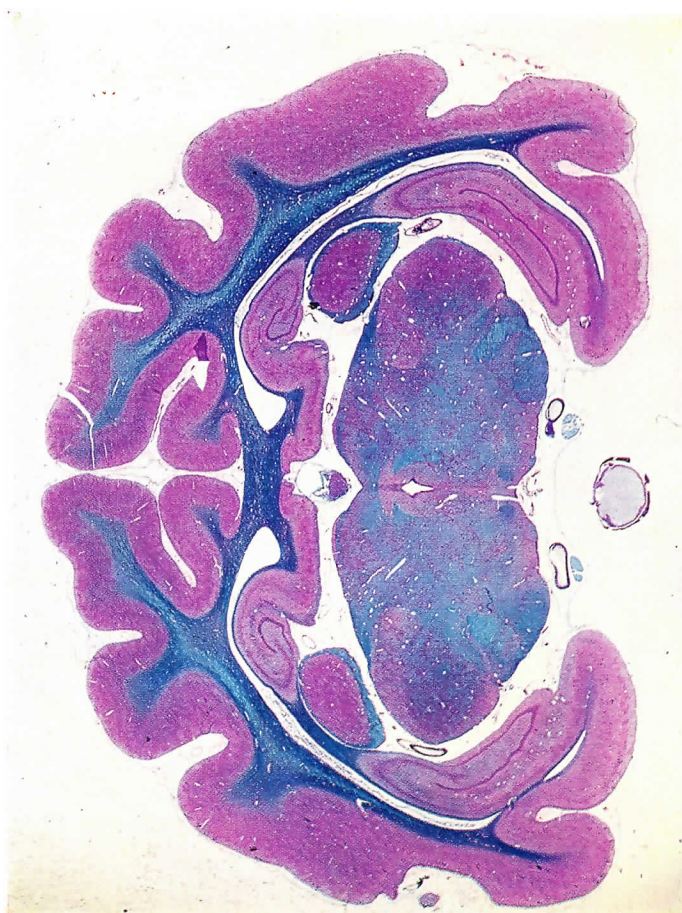
Cat, jaw, horizontal section through tooth. 50x



Photographs: P. Kage

MACRO

Cat, cross section through the brain, 4x. Macro-dia apparatus.



List 54-8 contains information about the use of the bellows camera with the various ARISTOPHOT accessories for microscopy and macroscopy. However, the values of the bellows extensions vary from those given in List 54-8 as follows:

Minimum bellows extension without mirror reflex attachment approx. 10cm (without automatic system)

Minimum bellows extension with mirror reflex attachment approx. 25cm

Maximum bellows extension with mirror reflex attachment for micro approx. 70cm

Maximum bellows extension with mirror reflex attachment for macro approx. 80cm.



Control unit with the three switches: Object ratio, Film Speed at 3 DIN increment (geometric progression in ASA) Film Speed at 1 DIN increment (geometric progression in ASA). Flash connection, warning lamps.

Shutter

The electromechanical shutter system is connected with the bellows by a socket. The shutter is opened by a cable release. It closes as soon as the automatic system signals correct exposure time. The built-in vibration damper reduces the already very soft shutter bounce to far below the effective limit. The automatic system can be disconnected by setting the shutter at the "manual" position. When the automatic system is connected the opening of the shutter is indicated by the lighting up of a lamp; the lamp is extinguished as soon as the shutter is closed. The highest automatic shutter speed is $1/15$ sec.; a red warning lamp on the switch unit lights up at higher shutter speeds.

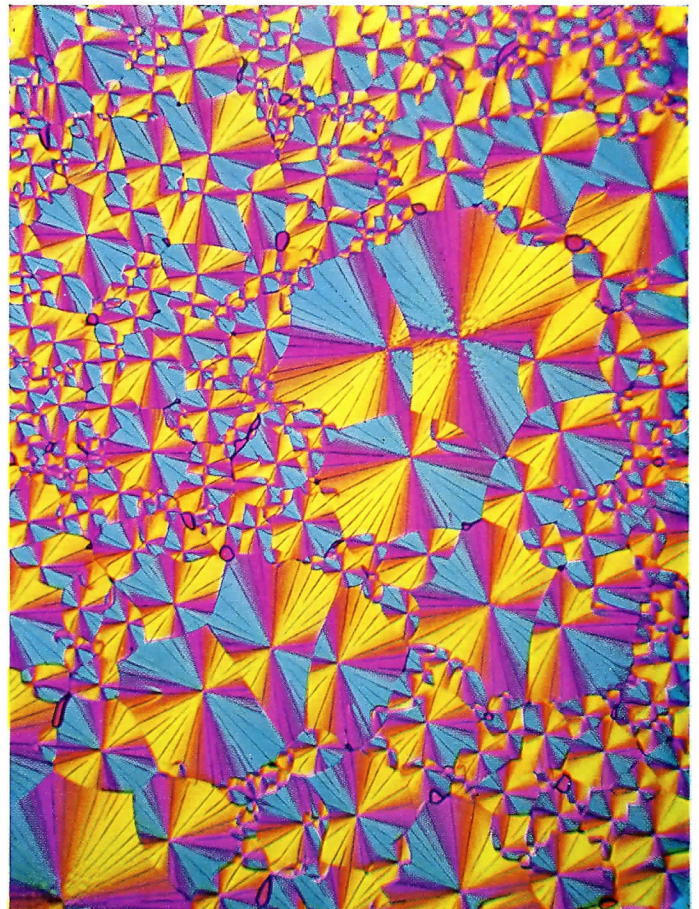
FLUORESCENCE

Spleen in fluorescent light, 100x. Exposure 120 sec.



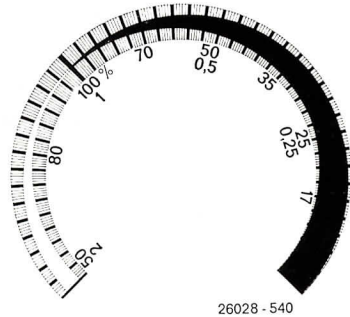
POLARIZED LIGHT

D (+) - biotin, vitamin H in polarized light, 100x.



Measuring field/object ratio

A small groundglass screen on the mirror reflex attachment serves as measuring field. The operator can thus see at any time the object measured by the instrument. The measuring area occupies 1% of the 9x12cm format; this corresponds to the cathode area of the photomultiplier. For the accurate exposure of still smaller objects or of certain contrasty structural elements of more extensive object portions corrections can be applied to the automatic system by means of the "Object Ratio" control (darkfield, phase contrast, macro range). This control is continuously adjustable, ensuring adequately exact measurement of all objects.



Scale of the "Object ratio" switch. Range of white central wedge: correction facilities for brightfield. Range of black central wedge: Correction facilities for darkfield. The figure 80 indicates object ratio 80%, surrounding field 20%. The figures in the bottom row are correction factors.

Film speed

The film speed is set with a switch on the front panel of the control unit. Its speed range is 9–41 DIN at 3 DIN increments (6–10700 ASA at geometrical progression). An additional switch further subdivides this range into 3 intervals, covering each integral DIN value from 9 to 41 DIN (6–10700 ASA).

Electronic system, photo multiplier

The electronic part of the bellows camera is fully transistorized; the camera is therefore instantly operational. An instantaneous photomultiplier is used as detector; its

INDICENT LIGHT

Feeding evidence of a woodworm, 12x



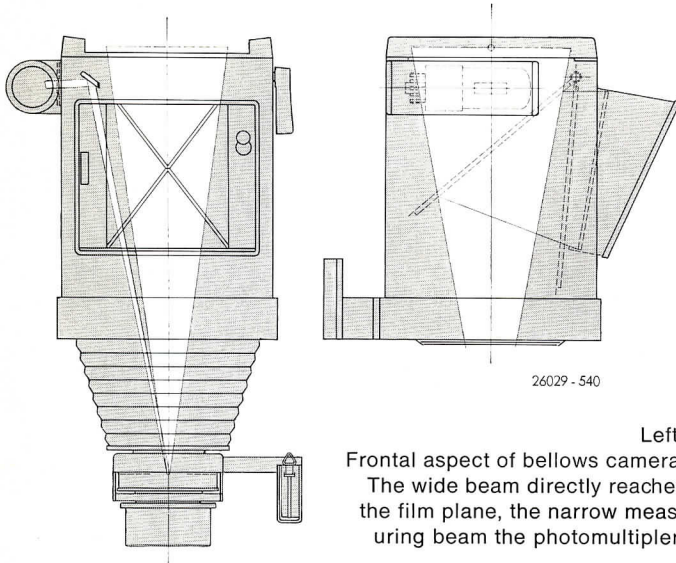
Copper from a cyanide bath, 100x



sensitivity is high and, unlike photo-resistors, it is completely unaffected by "light memory". The automatic system responds to light intensities at which the eye can hardly focus details on the clearglass plate. The dark current of the photomultiplier is negligible and can be disregarded, so that the exposure control functions reliably even with these long exposure times. Since the photomultiplier is located in the mirror reflex attachment, the bellows extension is already allowed for by the exposure measurement.

Optical signals

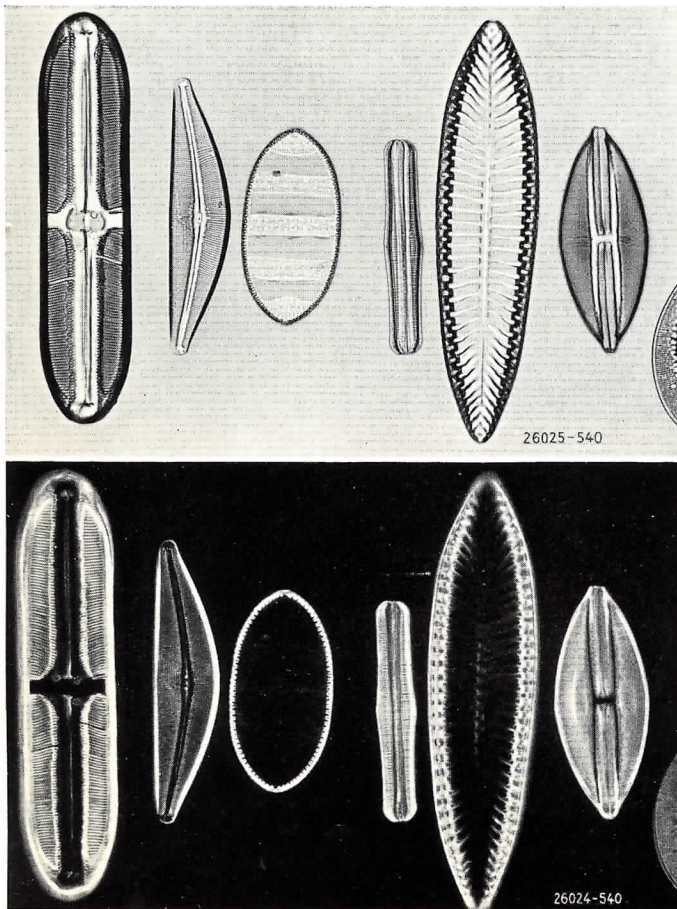
The instrument is extremely convenient to operate, a few movements only being required for the exposure. The controls are clearly arranged on the front panel of the control unit. Warning lights inform the user about important operational stages of the automatic system.



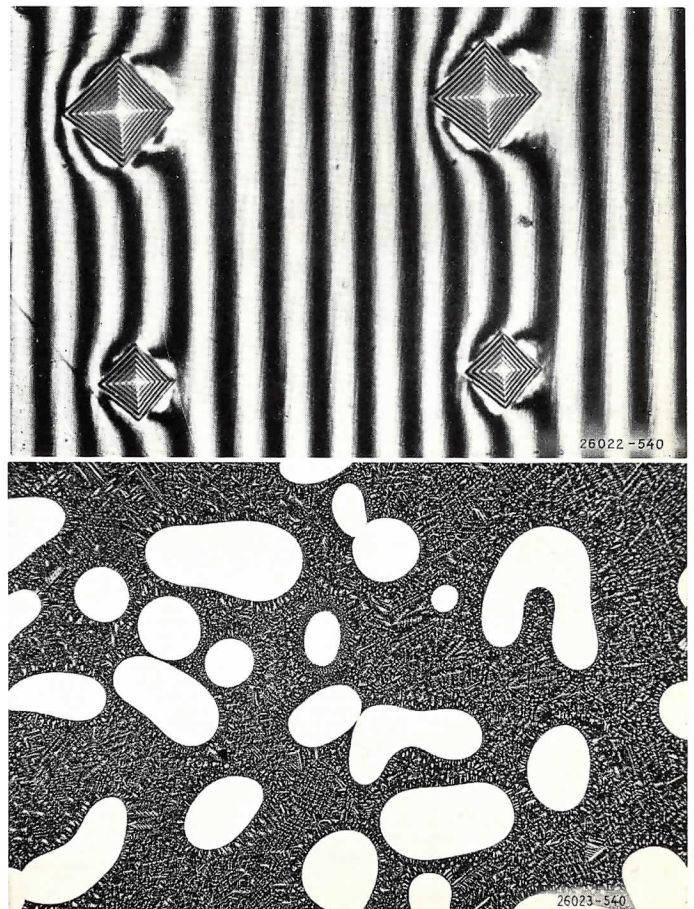
Left: Frontal aspect of bellows camera. The wide beam directly reaches the film plane, the narrow measuring beam the photomultiplier.

Right: Side view. The two mirror positions are indicated by broken lines. At the 45° mirror position the light enters the groundglass screen and the adjacent measuring field.

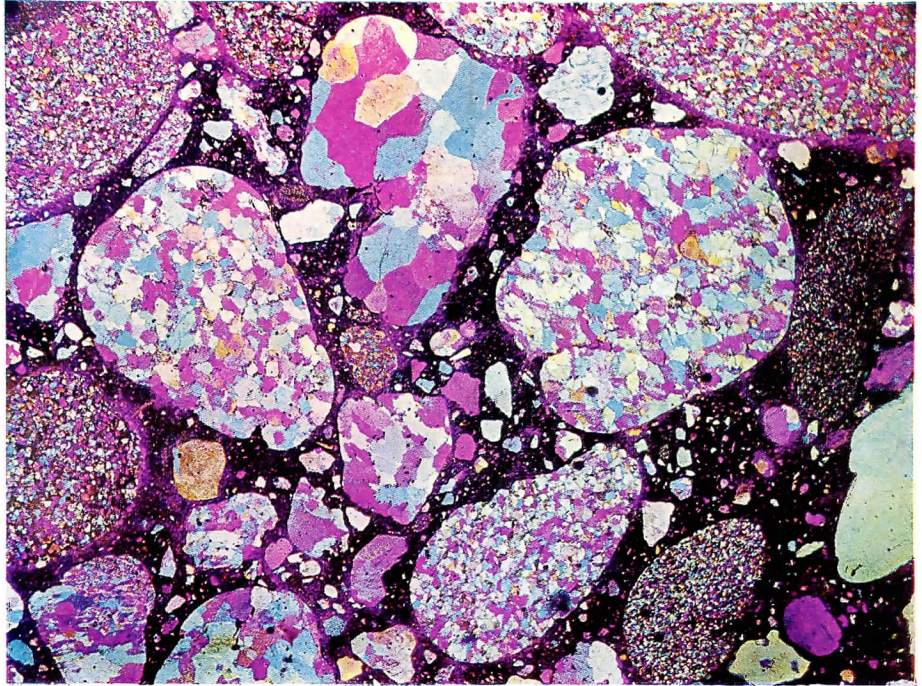
Diatoms, 200x in brightfield and in darkfield



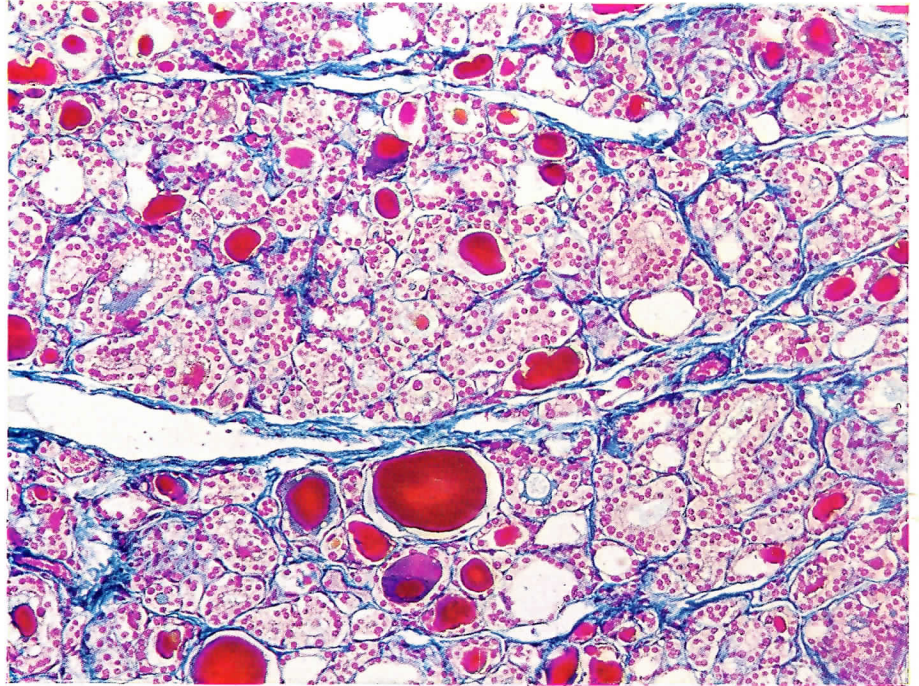
Hardness indentations in the reflected-light interference microscope, 500x. AgCuCdSn alloy, quenched in water at 600° C, 800x.



Polished section of concrete in polarized light,
8x. Macro-dia apparatus.



Human thyroid gland, 100x



Photographs:
H. Kornmann and K. Steinbach,
Applied Microscopy Laboratory,
LEITZ Works, Wetzlar.

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