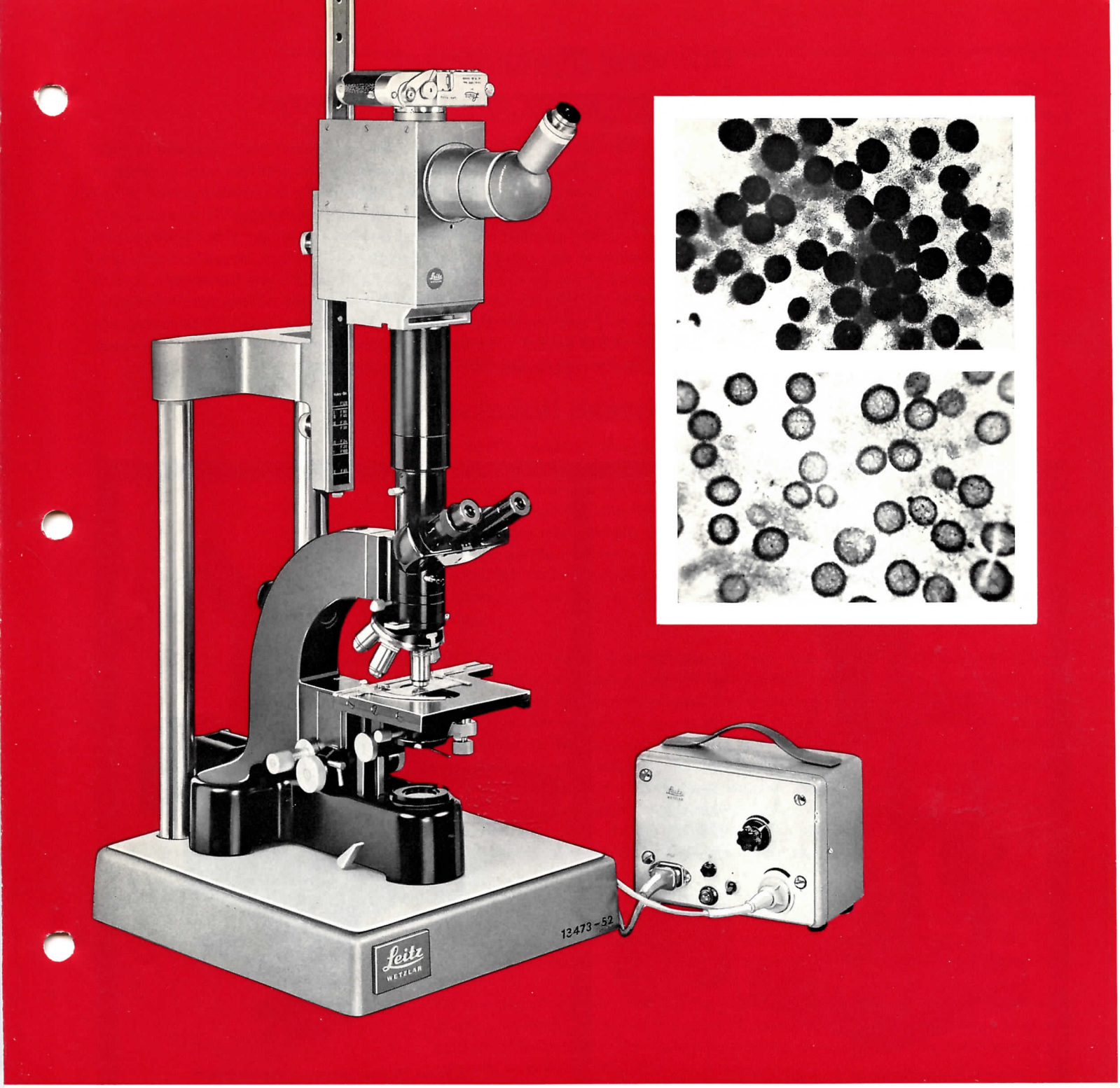

Leitz
WETZLAR

Universal IR-attachment

for microscopy and macroscopy

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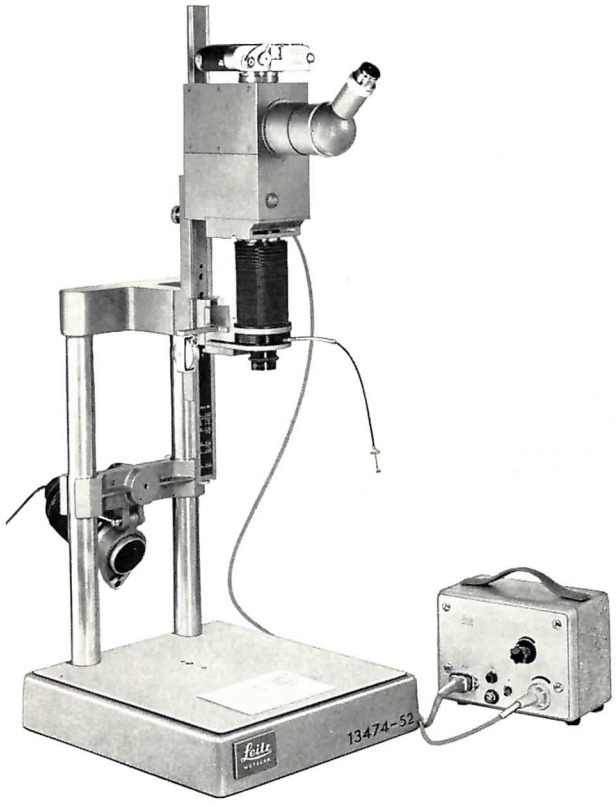
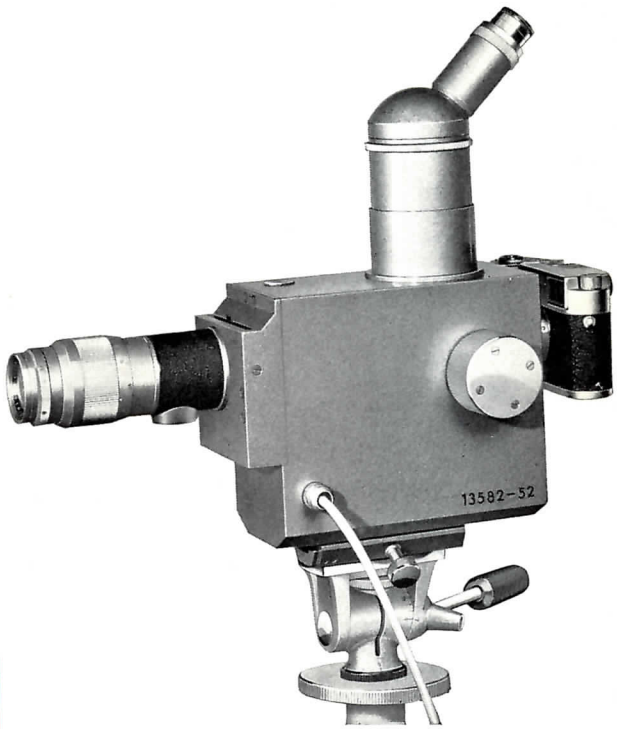
Universal IR-attachment for microscopy and macroscopy

The LEITZ IR-attachment allows direct microscopical and macroscopical investigation in the near infra-red. The image produced by the infra-red rays, invisible to the naked eye, appears very contrasty and bright on the fluorescent screen of the image converter on which it is viewed through an interchangeable eyepiece in a tilting tube. The light sources are powerful low-voltage lamps. The visible portion of their radiation is eliminated by interchangeable IR-filters, chosen so that graduated sections of the spectral region from 700 to 950mμ are transmitted. It is in this region that the reflectance of the various substances differs most noticeably. Special objectives and eyepieces, necessary, for instance, in U.V. microscopy, are not required as the optical systems used in the visible region fully transmit near IR radiation, and are adequately corrected for this region.



Universal IR attachment on the ARISTOPHOT for macroscopy



Universal IR attachment on camera tripod

Advantages

The outstanding advantage of the LEITZ universal IR attachment, besides its general use in the micro and macro range is the considerable saving of time during examinations. Since direct observation is not possible in the infra-red, photography was hitherto the only medium of investigation. Here, series were often required with different filters, so that frequently an examination took up several hours. With the IR attachment, on the other hand, observation and photography are possible exactly as in the visible region. A film specially sensitized for infrared is therefore not required. This feature alone makes the investigation of a wide range of objects possible in a minimum of time. About the uses of the instrument see p. 4.

Universal IR - attachment with ORTHOLUX®.
Photomicrograph: Gooseberry mildew
Top: in normal halfwatt light
Botton: in infra-red light

Design features

Attachment for observation and photography of microscopical and macroscopical objects in the near infra-red.
Electronic image intensification by a built-in high-power image converter with extremely fine-grain fluorescent screen — hence a bright and very detailed image even at high magnifications.
Inclined eyepiece tube, rotatable through 360° with interchangeable eyepieces of 8x—18x* magnification.
Powerful low-voltage lamps of sufficient intensity in the infra-red.
Interchangeable filters for various spectral ranges from 700mμ to 950 mμ.

Suitable for use

On the ARISTOPHOT and PANPHOT with microscope or macro-objectives and bellows; see ARISTOPHOT list;
or on a camera tripod for the observation and photography of large objects in the infra-red region with the LEICA® and LEICA lenses.

Technical description

The LEITZ universal IR-attachment forms an independent blockshaped unit. Its sturdy construction ensures secure mounting and permanent alignment of the optical and electronic components. The attachment is mounted on the guide rail of the ARISTOPHOT or the PANPHOT. For use with the microscope, a tube with a built-in 0.33x intermediate optical system and interchangeable microscope eyepiece establishes the optical connection for this instrument. For macroscopy the ARISTOPHOT- or the PANPHOT shutter which also incorporates the photographic objectives is connected with the universal IR-attachment by means of a small bellows.

IR- image converter

The image converter is a cathode-ray tube with an infra-red-sensitive cathode. Infra-red rays striking the cathode liberate electrons which are accelerated in the direction of the fluorescent screen. Since the electron emission is proportional to the incident IR-radiation at every point of the photo-cathode, a faithful image is reproduced on the fluorescent screen, and magnified for observation. The image screen is installed inside the tube. Its fluorescent layer, which renders the invisible image produced by the infra-red rays visible, has an extremely fine structure. Even very minute details are clearly revealed, and are not impaired by the grain size of the screen layer even at high magnification. Contrast and image brightness can be varied within wide limits by varying the anode potential.

Infra-red filters

The interchangeable infra-red filters are inserted in a slot in front of the image converter. Their purpose is to suppress the entire visible region of the light, so that only the infra-red portion reaches the photo-cathode. 6 filters are available: K700, K750, K785, K850, K900, K950 (the numerical values indicate the lower transmission limits in mμ).
On removal of the infra-red filter, a stop automatically blocks the aperture of the image converter, preventing the entry of visible light which might damage its photo-cathode. Furthermore, the Smith lens which compensates the curvature of the cathode, is made of RG glass.

Optical system

All objectives and eyepieces used in conventional microscopy and macroscopy are suitable for the universal IR attachment. Please note that the total magnification of the optical system of the microscope or the macro-outfit is reduced by the factor 0.76 through the image converter.

Photography

A LEICA body mounted with its bayonet changer on the universal IR attachment is used as a camera. An image of the screen is formed in the film plane at a ratio of 2.6:1 by a built-in objective (total factor in the film plane 2.6x0.76:1=2:1). Special focusing or correction is not necessary, since the image screen and the film plane form conjugate planes.
The IR attachment can be mounted on a camera tripod for the infra-red observations or photography of large objects. All LEICA lenses irrespective of focal length (see illustration) can be used except **the dual-**focusing SUMMICRON®.

* Weak eyepieces are preferable for use with powerful objectives, since the resolving power is reduced by a factor of 0.5 due to a 2x increase of the light wave length.

Uses

The design of an infra-red microscope was first suggested by forensic scientists. Where other methods of investigation fail, the differential reflection and absorption of infra-red rays and their ability to penetrate thin films and turbid media afford an additional possibility of microscopical investigation.
As a result, the interest in examinations in the infra-red region is steadily increasing also in other fields of science, such as botany, zoology, palaeontology, archaeology, medicine, etc. A study of the relevant literature is rewarding; in addition, the following fields of investigation will yield useful results:

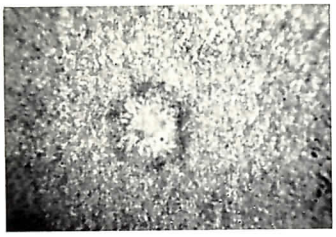
Forensic science:
Establishment of forgeries of all kinds, rendering legible and identification of concealed or obliterated writing or marks, determination of close-range wounds etc.

Botany:
Investigation of chlorophyll, parts of plants and seeds.

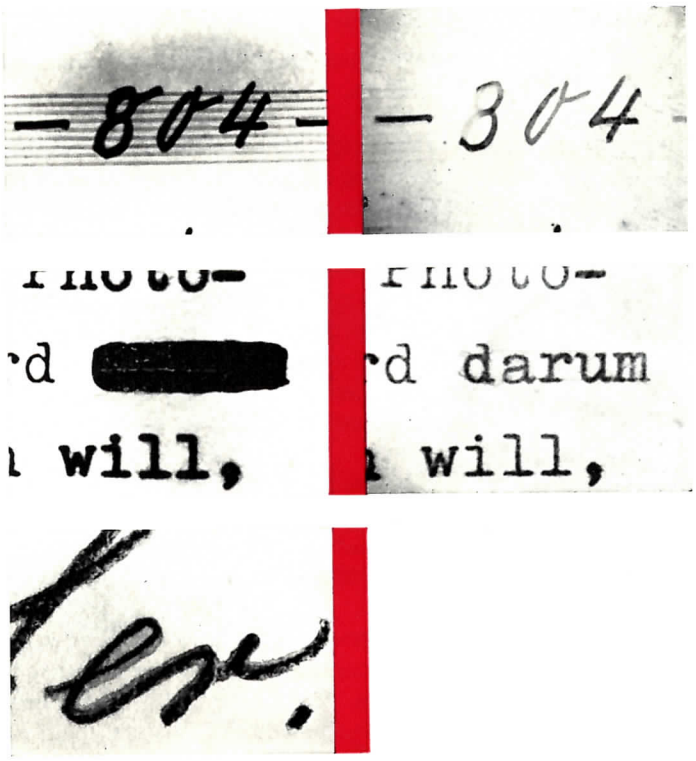
Zoology:
Chitin layer of the insect carapace, keratinous substance, hair, etc.

Palaeontology:
Investigation of carbonized fossils.

Archaeology:
Rendering writing legible, investigation of tissues, materials and dyes.



Fabric with scorch mark in infra-red light.



Several comparisons of pictures in visible and infra-red-light, such as cheque forgeries, obligation of typescript and subsequent tracing of existing writing.

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