

# ZEISS - Mikropolychromar



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It frequently happens that the scientific worker, in applying the microscope to his investigations — medical, zoological or botanical — has to deal with colourless objects. Such cases are often beset with difficulties because colourless objects as a rule exhibit little contrast and are therefore barely visible. The usual procedure of chemically staining such objects is tedious and time consuming and, apart from Vital stains, necessitates the killing of the material. Moreover Vital stains do not always provide the desired colour contrast, and in any case such staining inevitably results in a certain interference with the essential conditions and vital processes of the micro-organism.

The *Zeiss Mikropolychromar* opens a new avenue for scientific investigation of such colourless objects, for it provides a means of “staining” them not chemically but optically. This optical staining has the effect of showing up the otherwise colourless object brightly illuminated in one colour on a differently coloured background (Fig. 1 and frontispiece). Optical staining with the Mikropolychromar has the advantage over ordinary dark field illumination

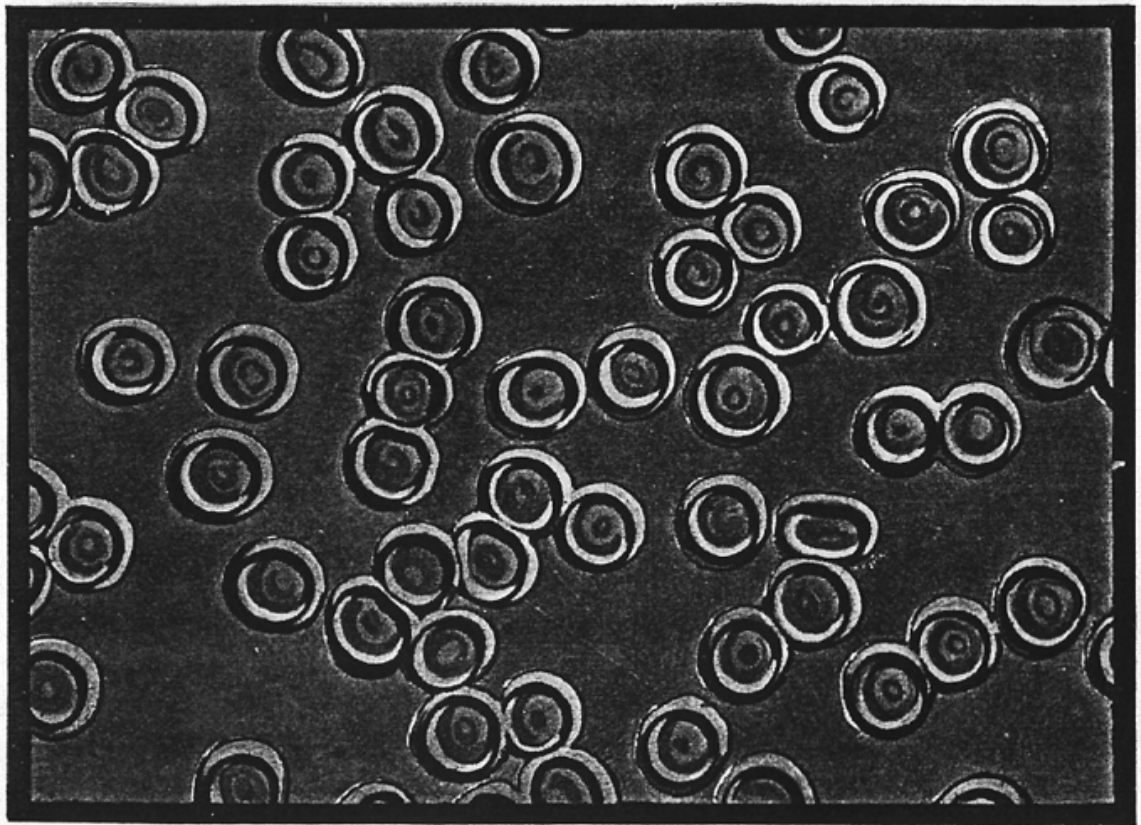


Fig. 1. Red Blood Corpuscles (Blood smear)  
 optically stained with the Mikropolychromar (colour combination V7 + g3)  
 Winkel-Zeiss Achromat 30 N. A. 0.60 and Complanatio eyepiece 17.5  $\times$ .

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that the objects are not merely differentiated from the background by virtue of their relative brightness but that

even when the background is as bright as the  
 object, the object and background appear in  
 contrasting colours.

By means of this optical contrast staining the finest structures are revealed with remarkable distinctness, for the use of the Mikropolychromar combines in one image the advantages of both types of illumination — dark field and bright field — and to this adds striking colour contrast.

# SECTION THROUGH THE MIKROPOLYCHROMAR SHOWING THE PATH OF THE RAYS

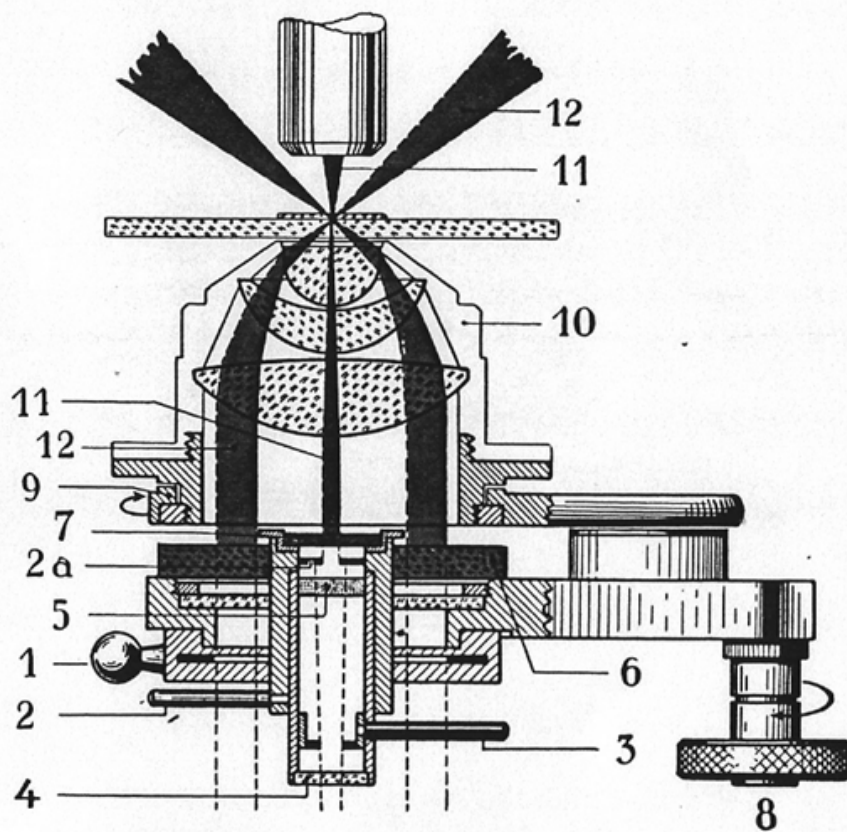


Fig. 2.

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## Explanation of Fig. 2.

1. Aperture diaphragm for the marginal rays 12 (with nickel plated knob).
- 2a. Aperture diaphragm for the axial rays 11.
2. Lever (nickel plated) for adjusting the aperture diaphragm 2a.
3. Auxiliary diaphragm with lever, for adjusting only the intensity of the axial rays 11. (This lever is black, to distinguish it from those of the aperture diaphragms, which are nickel plated).
4. Colourless protective glass, which absorbs heat radiation.
5. Special frosted glass which destroys the image of the aperture 3 by scattering and at the same time absorbs the ultra-violet light which is harmful to the eyes.
6. Interchangeable coloured glass ring which causes the marginal rays (and with them the microscopic object) to appear coloured (e. g. red).
7. Interchangeable colour filter, which colours the axial rays of the illuminating beam differently from 6, e. g. blue, and so causes the background against which the object is seen in the microscope to appear of a different colour from that of the object itself.
8. Milled head by means of which the apparatus can be swung out sideways (for convenience in changing the glasses 6 and 7); further, a small displacement of the apparatus by means of this head 8 to a slightly eccentric position effects a transition to a semi-bright, semi-dark field illumination.
9. Arrangement which permits the rotation of the whole apparatus about the optic axis and which is used in conjunction with azimuth stops for the observation of directional effects.
10. Aplanatic condenser N. A. 1.4 into which the apparatus (Mikropolychromar) is screwed.
11. Axial rays for tinting the field of view, e. g. blue, by transmitted light.
12. Marginal rays for the dark field illumination of the object in a colour contrasting with 11, e. g. red.

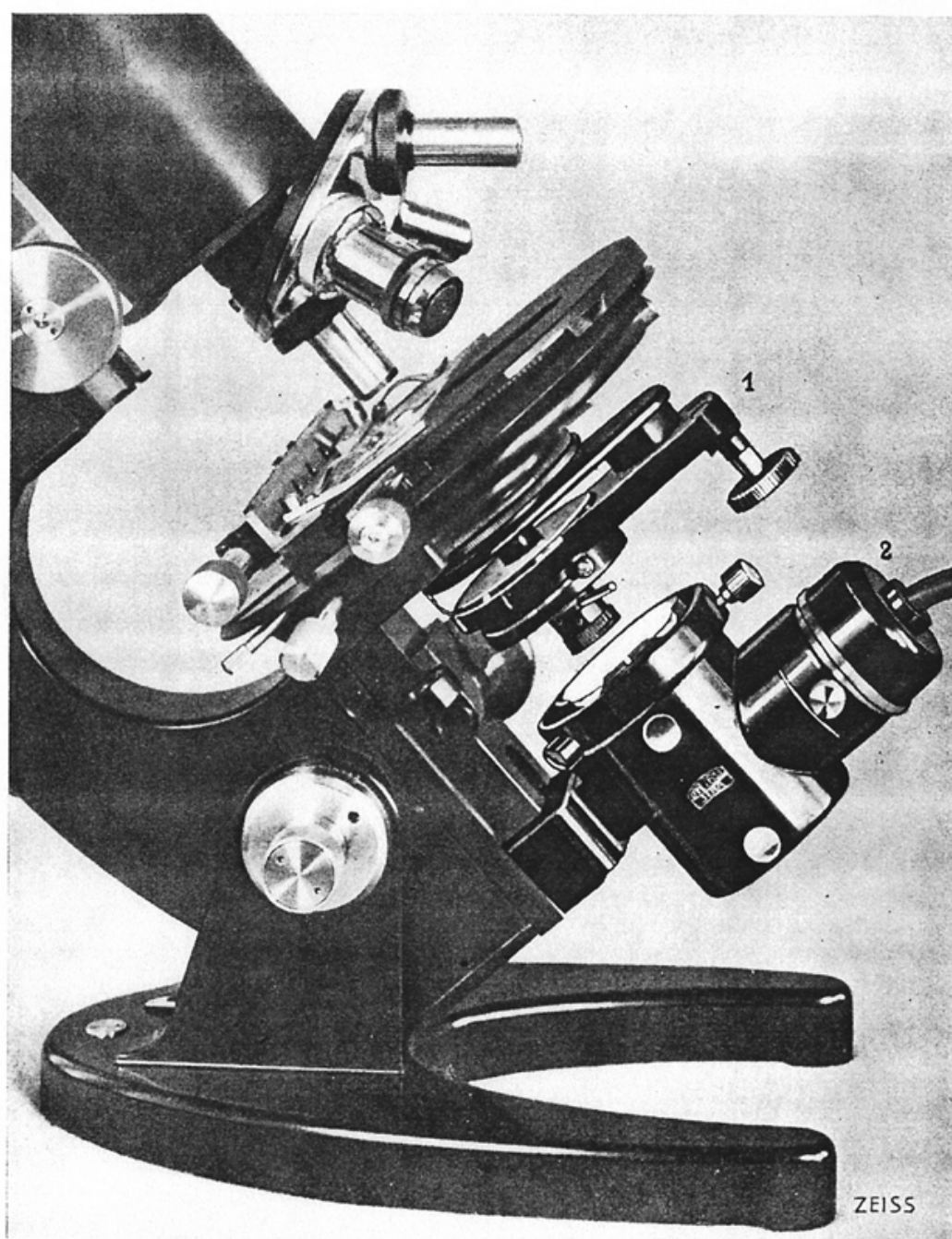


Fig. 3. 1. Mikropolychromar.

2. Illuminating lamp, attachable to the microscope in the place of the mirror.



The manipulation of the Mikropolychromar is simplicity itself. The apparatus is introduced, together with the aplanatic condenser N.A. 1.4, into the condenser sliding sleeve of the illuminating apparatus, and observation can be commenced immediately the illumination has been adjusted. There are no difficult or tedious adjustments. This advantage is of great importance in research work in which very rapid working is essential. As can be seen from Fig. 2 and the accompanying explanation it is possible with the Mikropolychromar to adjust the separate colours (those of the object and the background) to one another so as to obtain the best result, and a special feature of the instrument is its universal adaptability. Thus an object can be examined not only in any desired colour\*) on a differently coloured background, coloured on a colourless background, or coloured on a black background, but also in oblique semi-bright, semi-dark field or by ordinary bright field illumination. These different kinds of illumination are all combined in the one apparatus and can be interchanged in the shortest possible time with but few operations.

As source of light we have provided for our large stands F, G, H, K, L and S a special lamp of high intensity which is attached to the stand in the place of the mirror (fig. 3). For other stands the use of a Spot Arc lamp is recommended.

\*) Tested combinations are given in a table inside the case of each instrument.

#### Recommended objectives:

Achromat 6 N.A. 0.17, Apochromat 10 N.A. 0.30, and Achromat 20 N.A. 0.40; as a high power dry lens Achromat 30 N.A. 0.60 (Winkel-Zeiss), and the oil immersion Apochromat 60 N.A. 1.0 (X) with iris diaphragm.

#### Object slides:

should be of colourless glass 1—1.1 mm. thick.

#### Bibliography:

P. Kraft. "Optische Färbung mikroskopischer Objekte mit Mikropolychromar", Zeitschrift der Deutschen Geologischen Gesellschaft, Vol. 84, 1932, Nr. 9, pp. 651/2 (Short extract from a lecture).

# PRICE LIST

Nr.			Codeword
11 70 01	Mikropolychromar for the optical coloration of microscopic objects, including 7 different colour glasses 42 mm. diameter of optical glass coloured throughout in bulk (and therefore fast even in the tropics), 3 colour glasses 42 mm. diameter for directional colouring and 4 smaller glasses of different colours 8.5 mm. diameter, in alder-wood case (without aplanatic condenser) ..... if not already available:	<del>138.-</del>	Kakae 138.-
11 41 40	Aplanatic condenser N. A. 1.4 .....	<del>32.-</del>	Micropus 32.-
13 93 26	Illuminating lamp, for attaching to the microscope lamp in place of the mirror, with centring condenser with frosted glass (opaque to heat radiation), clear glass disc (heat absorbing), opal glass disc, 6 volt 8 c. p. filament lamp, lamp holder and rubber covered lead with plug .....	<del>36.-</del>	Kakbf 36.-
13 96 12	Spare filament bulb, 6 volt, 8 c. p., 1.5 amp. with centred position of incandescent wire .....	<del>1.75.-</del>	Kemua 1.75.-
	<b>Electrical Accessories:</b>		
	a) for alternating current		
13 95 84	Transformer Type T, 1.7 amp. for 110 and 220 volts with connecting lead .....	<del>13.-</del>	Prodigemur 13.-
13 95 66	Adjustable Transformer for 110 and 220 volts, with meter and connecting lead .....	<del>23.-</del>	Mirabilior 23.-
	b) for direct current		
	Adjustable Resistance 1.5 amp. 320 ohms:		
13 90 83	for 110 volts .....	<del>15.-</del>	Mincerait 15.-
13 90 84	for 220 volts .....		Mincerions

In ordering or in any correspondence please state

- 1) the manufacturing number of the stand on which the Mikropolychromar is to be used and
- 2) the voltage and nature of the electric supply available.

## CARL ZEISS / JENA

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