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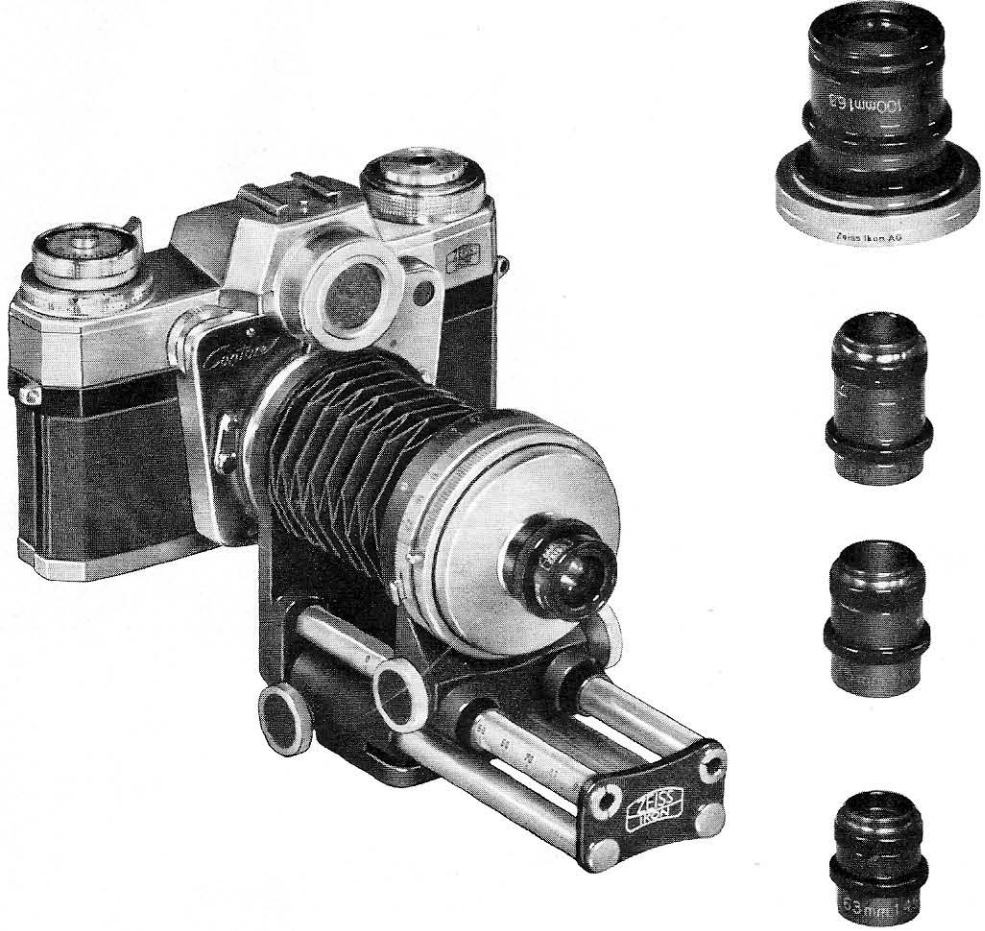

Photography with Luminar Lenses

Othmar and Edeltraud Danesch

In many fields of photography the interest in taking close-up pictures has steadily increased during recent years. This may be due partly to the fact that a small object viewed at a greatly magnified scale tells a much more revealing story and offers the eye unusual and dramatic effects. An extreme close-up picture will convey an optical impression to which we cannot help but react because of its striking appearance.

On the other hand, the increased interest in close-up pictures – particularly in the field of science – may be attributed to the fact that the recording of minute detail and case studies has been made possible which otherwise would never have been accessible to the observer. Such photographic records very often are of greatest value, and in many instances have opened the door to new insights and ideas.

A photographer, in order to be successful in close-up photography, should meet certain special requirements. He should have a clean working technique, a thorough knowledge of the object to be photographed and a good measure of patience.

Generally speaking, the scale of reproduction of close-up photography covers a range from 1 : 20 to 1 : 1 (life size). Such pictures may be obtained by either focusing a standard lens at close distance, by using additional close-up lenses, or by attaching bellows extension or extension tubes.

Macrophotography comprises the scale of reproduction from 1 : 1 to 25 : 1 (magnification). A bellows extension or extension tubes are required when using a standard lens, a wide-angle lens or sometimes even a long focal-length lens. In addition there are, of course, special lenses available for close-up photography.

To complete the picture, the field of photomicrography with magnifications from approximately 25 x to 1,500 x should be mentioned, as well as electronmicrography from approximately 1,000 x to 160,000 x magnification.

This article is particularly concerned with the field of macrophotography. With the above-mentioned combination of camera, bellows extension and standard or wide-angle lens, a scale of reproduction of 6 : 1 can easily be obtained. If an object is to appear on the film at a larger than 6 times magnification, the use of ZEISS Luminar lenses is recommended.

The Luminar lenses were originally designed as special objectives to be used with a microscope for the purpose of taking photographs, without oculars, of less than 70 x magnifications. However, they can also be used on cameras; if necessary, in conjunction with a bellows extension. The Luminar lenses are attached to the camera or to the bellows extension by means of an adapter ring. (We used the ZEISS IKON Contarex.) ZEISS Luminar lenses are supplied in five different focal lengths: f/6.3, 100 mm; f/4.5, 63 mm; f/4.5, 40 mm; f/3.5, 25 mm; f/2.5, 16 mm.

Detailed information on scale of reproduction, size of object, working distance, and increase in exposure in connection with these five Luminars is contained in the table reproduced below.

The following two examples may serve to demonstrate the advantages of picture-taking with Luminar lenses:

In order to obtain a scale of reproduction of 1 : 1.5 with the Sonnar f/2, 85 mm, it is necessary to use the bellows extension fully extended. With the Luminar f/4.5 of 63 mm focal length, however, the bellows extension can be set on 0 (not extended). Second example: To take a photograph of a small object 6 times magnified on the film, a bellows extension of 240 mm (9 ½ in.) is required when using the Contarex with bellows extension and standard lens. The same magnification can be achieved with the Luminar f/2.5 of 16 mm focal length with bellows extension unopened (setting 0). This difference in extension of 240 mm (fully ex-

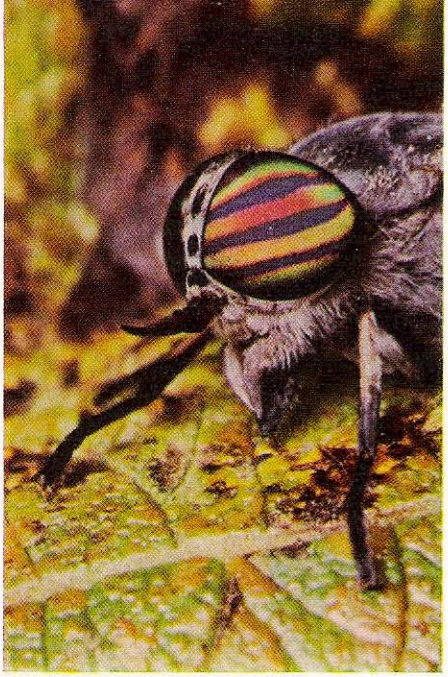

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Fig. 1 (page 63): Head of the horsefly Haematopda Pluvialis L., taken with Luminar f/3.5, 25 mm (original photo 6.5 : 1 magnification).

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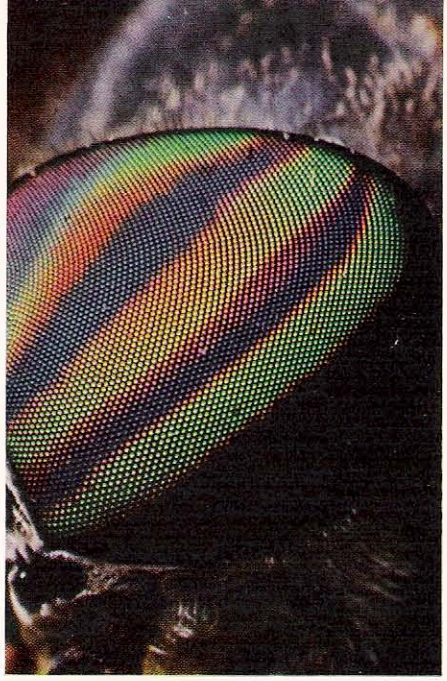

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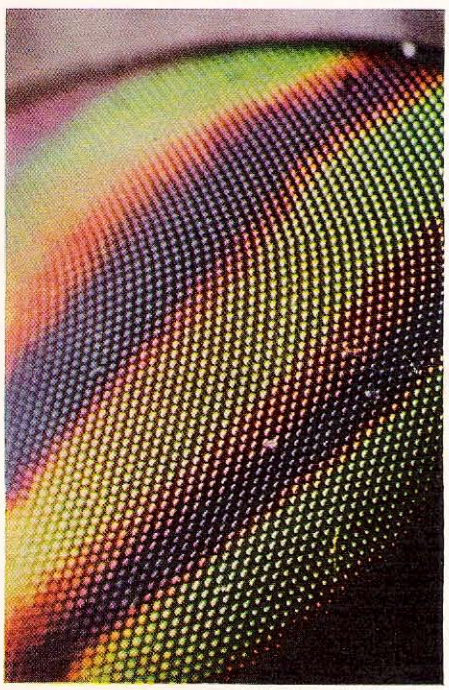
Figs. 2 – 5: Head of the horsefly Tabanus Bromious L., taken with Luminar lenses 63 mm, 40 mm, 25 mm, 16 mm with bellows extension fully extended (scales of magnification of the original photos: 2.6 : 1; 4.4 . 1; 7.8 : 1; and 13.7 : 1).



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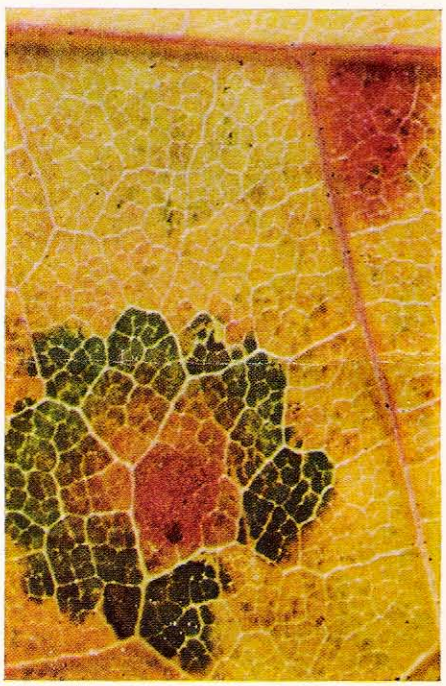

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Figs. 6–10: Maple leaf in autumn colors, taken with Luminar lenses from 100 mm down to 16 mm (original photos taken at 1 : 1; 2.6 : 1; 4.4 : 1; 7.8 : 1; 13.7 : 1).

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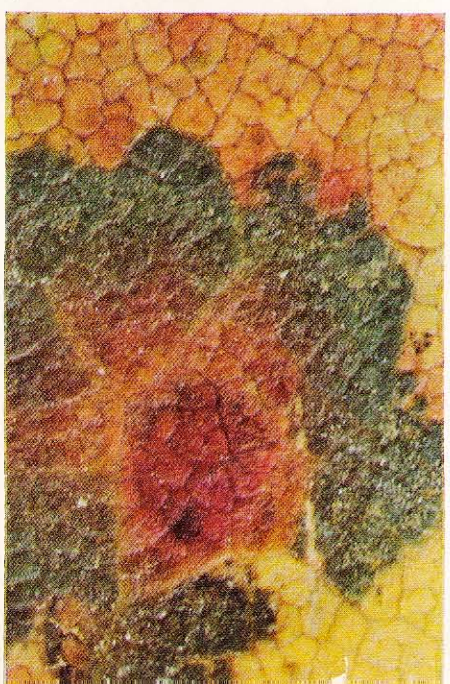

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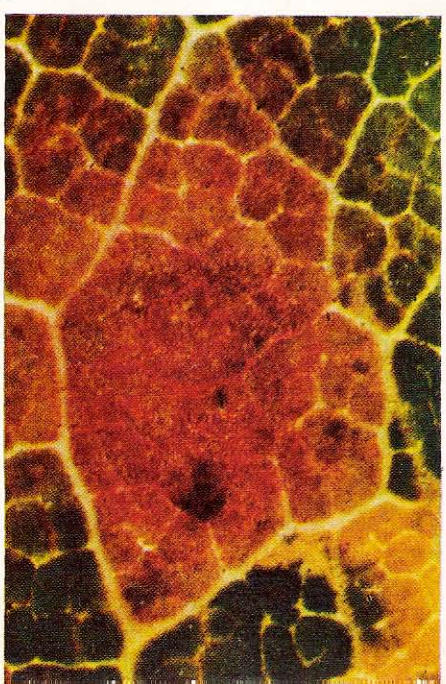

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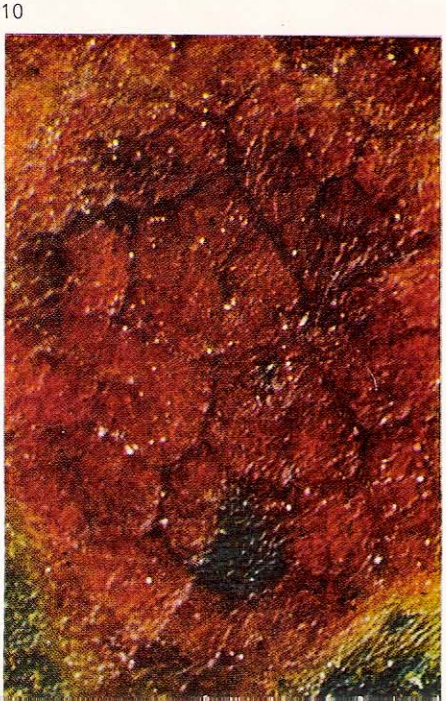

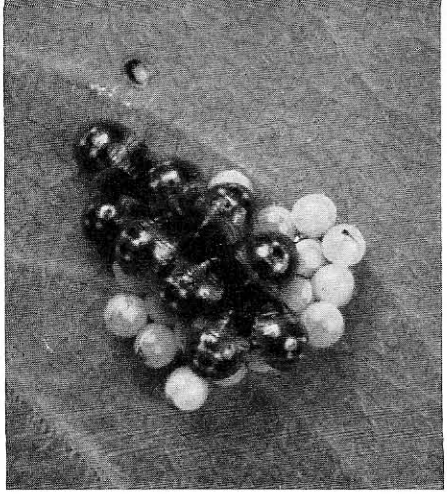

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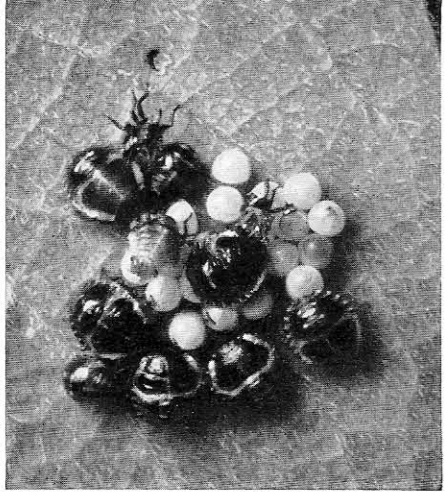

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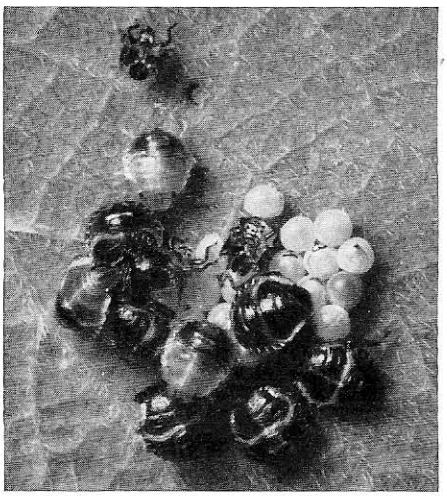

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Figs. 11 - 14: This series shows the process of the first skin shedding of newly hatched leaf-lice.

Fig. 11: The insects sit on the empty eggshells. The full eggs, still green in color, proved to be not fertilized. June 15th.

Fig. 12: After a few days they shed their skins. The light-colored insect is just shedding and the two noticeably small ones - upper and lower left - are almost ready for this phase. June 19th, 1.15 P. M.

Fig. 13: All lice have shed their skins; now they become darker. June 19th, 2.30 P. M.

Fig. 14: After completing their first shedding, they separate. June 19th, 4.30 P. M.

Lens	Setting on bellows extension	Scale of reproduction	Object size in mm	Working distance in mm	Exposure factor
Luminar f/6.3, 100 mm	without	-	-	-	-
	0	1 : 4.3	99 x 150	520	1.5
	30	1 : 1.9	43 x 66	275	2.4
	60	1 : 1.2	28 x 42	210	3.4
	90	1.1 : 1	20 x 31	175	4.5
Luminar f/4.5, 63 mm	without	1 : 7.7	180 x 270	559	1.3
	0	1 : 1.5	36 x 54	148	3
	30	1.1 : 1	21 x 31	106	5
	60	1.6 : 1	14 x 22	89	7
	90	2.1 : 1	11 x 17	80	9
Luminar f/4.5, 40 mm	without	1 : 1.6	36.5 x 55.6	94	3
	0	1.5 : 1	15.8 x 24.1	58	6
	30	2.2 : 1	10.4 x 16.0	49	10
	60	3.0 : 1	7.8 x 12.0	44	16
	90	3.7 : 1	6.2 x 9.5	41	22
Luminar f/3.5, 25 mm	without	2 : 1	12.3 x 18.7	27.5	8
	0	3 : 1	7.3 x 11.2	22	17
	30	4.3 : 1	5.4 x 8.2	19.5	28
	60	5.4 : 1	4.2 x 6.4	18.2	42
	90	6.6 : 1	3.5 x 5.3	17.2	58
Luminar f/2.5, 16 mm	without	4.2 : 1	5.5 x 8.4	12	25
	0	6.2 : 1	3.7 x 5.6	11	50
	30	8.1 : 1	2.8 x 4.3	10	80
	60	9.9 : 1	2.3 x 3.5	9.5	120
	90	11.8 : 1	2.0 x 3.0	9	160

tended bellows with a long extension tube) as compared to 25 mm (closed bellows) means a definite practical advantage because in the latter case we are dealing with a compact, handy assembly as against an unwieldy, hard-to-operate combination.

The use of Luminar lenses requires only a moderate amount of practice, particularly when still objects are to be photographed. This, however, is not an unusual requirement in this type of photography. A few difficulties may arise, though, in the case of moving objects, the most important one being the depth of field which decreases as the magnification increases. This loss can generally be compensated for by stopping down the lens. On moving objects, such as a small caterpillar hatching from an egg, a certain depth of field is required. Therefore, it is not possible to stop down all the way because at very small lens openings the sharpness decreases due to diffraction. Thus, in order to obtain sharp pictures of moving objects, it is advisable not to go below a certain scale of reproduction.

Furthermore, electronic flash is necessary to photograph moving objects at such magnifications. The small diameter of the Luminar lenses and the relatively long working distances as compared to other lenses permit the use of two reflectors to best advantage.

From the experience gained in working with Luminar lenses and the Mannesmann Multiblitz Press, we find the following points worthwhile mentioning: If the two reflectors are moved so close to the lens that they almost come in contact with it, correctly exposed color transparencies (on Kodachrome II film) are obtained at scale setting 15. With Luminar f/2.5, 16 mm, the Multiblitz Press has to be operated at full power; with Luminar f/3.5, 25 mm, at full or half power, depending on whether the object is dark or light. With the other Luminar lenses, f/4.5 40 mm, f/4.5 63 mm, as well as f/6.3 100 mm, the Multiblitz Press can be used almost always at half-power. With other electronic flash equipment settings will vary accordingly.

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