'shoulder' in the contrast-luminance relation, such as was reported by (among others) Abribat⁵. Yet the brightness-luminance relation obtained by direct magnitude estimates shows no sign of a 'shoulder' in the experimental results recorded so far.

While the agreement between Hunt's deductions and my experimental data is satisfying, there is no evidence to suggest that the basic sensation-stimulus relation has been unearthed. I am disappointed to read that Stevens, whose work has done as much as any other to shatter the dogma of Fechner and his followers, now himself appears to claim finality⁶ for the power relation $M = kL^p$.

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Changes in Phototaxis during the Larval Life of the Eyed Hawk Moth

In experiments on phototaxis in caterpillars, great variability is often found among the reactions to the same conditions of different individuals, or of the same individual at different times. No satisfactory analysis of the mechanisms underlying the phototaxis will be possible until we know, and can control, the factors governing this variability. The following results show that, at least in the eyed hawk moth (*Smerinthus ocellata* L.), the age of the larva is one important variable which should be more rigidly controlled than is usually done in work on caterpillar phototaxis.

We carried out our experiments in a dark room on a horizontal table, lighted with a 15-W. fluorescent tube (Philips TL-D 34 de luxe) mounted horizontally at one edge of the table, and occupying the full

Fig. 1. Roman numerals: instars. Black signs: series 1. Open signs: series 2

Fig. 2. Signs as in Fig. 1

length of this edge. Our caterpillars were reared in the laboratory in normal daylight. In each test, four or five larvæ were put on the table at a distance of 45 cm. from the light, and allowed to crawl. As soon as a larva had crawled more than 20 cm. towards or away from the fluorescent tube, it was put back at the starting line. The direction in which each larva was heading was noted at 1-min. intervals, a + or a - being scored for larvæ crawling towards or away from the light, respectively. For larvæ moving at right angles to the direction of the light or nearly so ($90 \pm 22.5^\circ$), 0 was scored. The percentage of 0 scores was always rather low (average of all tests, 5.7 per cent). Resting larvæ were excluded from the observations presented here. The total number of scores per test was never smaller than 80, and usually between 100 and 150. We carried out the tests at various stages in the third, fourth and fifth instars, using the same group of larvæ throughout the series. Later, we repeated the whole series on another group of larvæ.

The results are summarized in Figs. 1 and 2. In both series of tests, the larvæ are far more often photopositive, and less often photonegative, at the beginning of each instar than towards its end. Clearly, reproducible results can be expected from experiments on phototaxis in our species only if the age of the larvæ used is known to the day. Apart from this practical point, the phenomenon described also raises interesting problems both as regards its causation and its functional significance. We are extending the experiments with better methods, and will postpone the discussion of these problems to a later more detailed paper.

As can be seen from the graphs, the larvæ of series 2 were consistently more photonegative than were those of series 1 at a comparable age. This indicates that other, as yet unidentified, factors play a part as well.

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