binocular thresholds can be considered identical but are markedly lower than the unfiltered monocular threshold (condition *d*), which again substantiated the marked increase in the sensitivity to discomfort in binocular as compared with monocular viewing. It can also be seen that in monocular viewing conditions, the addition of the neutral density filter markedly increases the threshold, as would be expected. The crucial comparison for our purposes is that between unfiltered monocular viewing (condition *d*) and filtered viewing (condition *c*). It will be recalled that in going from condition *d* to condition *c* the total illuminance of the two retinae increases while perceived brightness decreases. Thus, if the threshold of discomfort is determined by brightness, it would be expected that the threshold luminance should increase in going from condition *d* to condition *c*. It can be seen that, in fact, the threshold luminance decreases ($P < 0{\cdot}01$ with a two-tailed *t* test) which suggests that the threshold of discomfort does not depend on the perceived brightness, but rather is more directly related to the total illuminance of the two retinae.

Thus, although in many circumstances increases in retinal illuminance are accompanied by increases in perceived brightness, the experience of aversion or discomfort is probably not due to the perception of brightness *per se*. The results of this investigation may be taken to suggest that the increased neural activity presumably caused by increased flux can give rise more or less independently to the experiences of brightness and discomfort. While the data presented here do not rule out the possibility that muscles controlling pupillary aperture may be important for the feelings of visual discomfort[6], it is interesting to note Nakagawa's report[7] that weak electrical stimulation of the freshly exposed human optic nerve caused visual sensations, while stronger stimulation failed to produce visual sensations but did induce feelings of fatigue and pain. It is possible that the aversive response to high luminance is due to a mechanism similar to that postulated by Melzack and Wall[8] for the somatic system, but any further speculation seems unwarranted at this time.

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CHARLES M. BOURASSA
Laboratory of Neurophysiology,
Good Samaritan Hospital,
Portland, Oregon.

JONATHAN D. WIRTSCHAFTER
Department of Neurology,
College of Medicine,
Columbia University,
New York.

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Startle Response of Rats after the Production of Lesions at the Junction of the Mesencephalon and the Diencephalon

LESIONS at the junction of the mesencephalon and diencephalon have been found to affect the reactivity of white rats. These rats sometimes showed intense muscular reactions to sensory stimulation although they were usually more placid than other rats. The purpose of my experiment was to conduct a quantitative study of this phenomenon.

As a quantitative index of "reactivity" the strength of the animal's immediate muscular reaction to a strong auditory stimulus was used. This is a component of the "orienting reflex"[1], which has been referred to as the "startle pattern"[2].

Eight male rats were used. Electrolytic lesions were produced with a stereotactically oriented electrode, lowered bilaterally on to the area described. After the experiment, the animals were killed and the exact location of the lesions determined. A typical lesion is shown in Fig. 1.

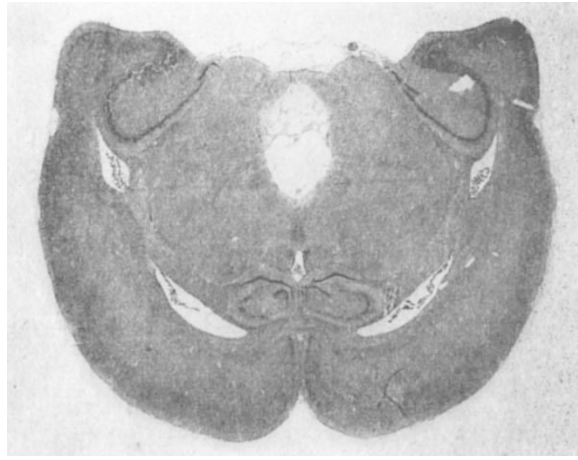

Fig. 1. Extension of a typical lesion at the level of the mammillary body.

The "reactivity" was measured using the movement of a light, hanging cage in which a rat was placed. The movements of the cage were mechanically enlarged and transmitted to a smoked drum. The amplitudes of the reactions to twenty consecutive bursts of intense white noise 0·5 sec long were recorded at intervals of 25 sec by this method.

It was found that the animals with lesions responded more strongly (mean amplitude = 32·0 mm) than normal animals (mean amplitude = 9·6 mm). The probability that this difference is fortuitous is less than 0·01 according to the Mann Whitney test[3].

The startle pattern is often regarded as an emotional response which is phylogenetically primitive. Lindsley describes it as "probably a primitive and transient form of fear"[4]. It is, however, involved in every instance where defence reactions or similar "emotional" responses are studied[5,6]. The results presented here might therefore be of interest in a discussion of such behaviour.

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SVEN G. CARLSSON
Department of Psychology,
University of Gothenburg,
Sweden.

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