

DISCUSSION AND REPORTS.

AFTER IMAGES AND ALLIED PHENOMENA.

I have a frequent experience in connection with after images which it may be worth while to record, especially as others may be able to repeat or confirm my observations. What I have to remark is not the result of deliberate experiment at first, but is a spontaneous occurrence and what follows it is the consequence of experiment.

I have in my life often experimented with after images, and perhaps this fact makes me susceptible to them and to the observation of them when they occur without the effort to produce them. However this may be, I often notice an after image of a bright object in the field of vision when I am not trying to produce it. It of course arrests my attention and I immediately turn to observe it. As usual it quickly fades. I then try to reproduce the after image by experiment and as generally fail as I try. No amount of effort will reproduce it as before. I may obtain a faint one, but usually can obtain none at all. But the interesting phenomenon in connection with the spontaneous after image that arrests my attention is the fact that I have uniformly observed that it occurs only when I am in a state of abstraction. Thus if I am looking at a lamp or bright ring and at the same time not thinking of the object on which vision is actually fixed, the after image is almost certain to occur with great distinctness if I happen to turn the head to one side and the background is favorable. If I try to repeat the after image by looking purposely at the light, I utterly fail. The production of it seems to be related in some way to the connection between fixation and inattention. It may be worth studying in this connection the influence of attention upon the action of chemical forces in the retina. Of course something of this kind may already have been done, but if so it has not been my fortune to see it, as my studies have not enabled me to keep abreast with the scientific and physiological side of this matter. But the phenomenon which I have just described certainly suggests a possible relation between attention and the amount of chemical action in the retina.

There is another phenomenon which is possibly connected with related functions. When mentally preoccupied and having the eyes fixated on a given point or object I often notice the disappearance of a

part of the indirect field of vision. I have tried to see whether it might not be due to the falling of the object on the blind spot, but uniformly discover that it is not, as the disappearing object may be on the side of the retina opposite the blind spot. On careful experiment and observation I find that the disappearance is directly related to the degree of abstraction, and that I can reproduce it artificially, if I am successful, as I sometimes am, in effecting the abstraction necessary and at the same time the proper adjustment of attention. It is difficult to produce the artificial abstraction required, but when I am successful I effect the disappearance of the object, which immediately reappears the moment attention is given to it without altering the fixation of the eyes. The effect seems to be that of making clear an actual impression, while attention in the previous experiment seems to destroy an after image. Why is this the case? I of course have no answer to this question. It is simply an interesting phenomenon to find the fact, which is apparently the converse of the first experience described. In the former, concentration of attention is conducive to the appearance of after images, and in the latter this concentration tends to extinguish real impressions. The latter may be a normal *retrécissement du champ visuel*, but why the former should not also illustrate the same fact is the phenomenon of interest. JAMES H. HYSLOP.

THE EARLY COLOR SENSE—FURTHER EXPERIMENTS.

In a discussion of the results arrived at in my article on the early color sense, *PSYCHOLOGICAL REVIEW*, Vol. X., No. 1, p. 37, Dr. Edridge-Green has said that the results are entirely due to the illuminosity of the experimental color cards and not to the colors themselves. His theory is that children are color-blind during the first years of life and that a child sees 'all objects as they are seen in a photograph, that is, in different degrees of black and white.' Also in Professor Chamberlain's comprehensive work entitled 'The Child,' in the *Contemporary Science* series, on page 79, we find that Garbini divides the development of the child according to the evolution of the color sense into six periods: "The fourth period being the 'Chromatic' period—from the sixteenth to the twenty-fourth month of life. The child continues to have more and more delicate photoæsthetic and visive perceptions and begins to have first chromatic perceptions—red and green." As all the experiments recorded in my article were concluded before the child was twelve months old, according to this theory also the results were due to some stimulus other than that of color.