

tainment of either orthoscopic or pseudoscopic binocular effects was described by Sir David Brewster as long ago as 1844 (*Edinburg Transactions*, 1844, Vol. XV., Part III., p. 360), and quite fully discussed in his book on 'The Stereoscope,' published in 1856. On the optical illusions due to cross vision Brewster based his geometric theory of binocular vision, which was fully elaborated in his book. In 1855 and 1856 the same theory was applied by Professor W. B. Rogers, founder of the Massachusetts Institute of Technology, in a series of articles published in the *American Journal of Science*. It has since been applied by various writers. The incorrectness of this theory is conclusively proved by the possibility of binocular vision by optic divergence (*Am. Jour. Science*, Nov. and Dec., 1881, March, April, May, Oct. and Nov., 1882).

Nevertheless, the subject is attractive, and the results attainable when the visual lines are made to cross at a high angle, such as 50° or 60° , suggest some interesting and perfectly legitimate geometric applications. But these experiments are somewhat trying to the muscles of the eyes.

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August 3, 1901.

SHORTER ARTICLES.

ADAPTATION IN VISION.

APPARENTLY no one has noticed formally the bearing upon brain physiology of one of the commonest phenomena of vision. Within certain very wide limits the percept we have of any object does not change at all while we approach or recede from it. If, for instance, I look at a chair thirty feet off and then walk straight toward it, the appearance of the chair does not alter. Now the retinal elements excited are totally different according to the distance I am from the object. We have then a succession of different physiological processes in the retina with the final result in consciousness of a constant feeling. We naturally suppose that a continuance of the same feeling is due to a continuance of substantially the same physiological processes in the central nervous system. If this is true we can account for the

phenomenon mentioned only by supposing that all the differing successive processes in the end organ somehow get shunted into the same central process. This involves a practical infinitude of associative systems of the subtlest and most complex sort. For with each of the objects of which we thus have a constant perception in spite of varying retinal conditions, different sets of associations are needed corresponding to different views of the object. Moreover, totally new objects suffer like treatment. This latter fact almost tempts one to put faith in a mysterious mental construction on the basis of sense stimuli. Surely if the brain itself does the work of unifying these multitudes of series of retinal events into constant processes corresponding to our percepts, the complexity of its mechanism has never been fairly stated. This, I take it, is what we must believe. We must find in this commonest case of vision a notable example of the fact that our feelings do not parallel outside events or even the sensory processes aroused by them, but are the results of selected adaptations, adaptations in this case presupposing much more involved neural action than the common reflex-arc conception of the brain seems to permit.

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THE INJURY OF FUNGICIDES TO PEACH FOLIAGE.

THE writer has devoted several seasons to an investigation of the injury produced by fungicides to peach foliage. A bulletin giving the results of this work is soon to appear from the Tennessee Agricultural Experiment Station. A preliminary report on this investigation may not be out of place here. Following are some of the points established or rendered probable:

1. Pure copper hydroxide, copper oxide, or even metallic copper spread on the leaves is injurious to the foliage of the peach, but without visible injury to that of either the apple or the grape.

2. A solution of copper sulphate 0.00005 normal ($=0.000795$ per cent.) proved fatal to water cultures of the apple, while grapes and peaches under like conditions, though evidently injured, soon recovered, and the peaches thus