seems to have shown (Arch. f. Augenh., 37, p. 102) that in santonine color effects the source of the change is not any coloring of the retinal layers of the eye—that is, he draws this conclusion from the fact that in dogs and frogs, after very strong doses of santonine, the visual red, after darkness-exposure, had its color not in the least disguised.

C. LADD FRANKLIN.

The Order of Development of Color Perception and of Color Preference in the Child. By WARD A. HOLDEN, M.D., and K. K. BOSSE, B.S., New York City. Archives of Ophthalmology, Vol. XXIX., No. 3. 1900.

In this paper are described the results of a series of experiments made on over 200 children between the ages of six months and thirteen years, relative to some of the phases of developing color perception. In the first part of the paper, by a method devised by Dr. Holden, the child is tested for its absolute color perception by making use of a background shaded from dark to light gray upon which squares of colored tissue paper are so placed that their luminosity is equal to that of the gray background. The child that reaches for a colored square under these conditions, must perceive that color as differing from gray. At the age of six or seven months infants react readily to red, orange and yellow but without much certainty to green, blue and violet. At eight or nine months they react promptly to the first three, and sluggishly to the last three. At ten or twelve months there is often equally prompt reaction to all colors.

Preference tests carried out with satin ribbons showed that children below three years preferred the red end of the spectrum, selecting red first and then following very closely the order of the spectrum, and selecting blue or violet last. After the end of the third year the order of selection is reversed, however, blue or violet being chosen first and red last. This remarkable change is accompanied by a general disinclination on the part of the child to make any selection at all, so that at the age of about three years only a small percentage could be induced to perform the required action. The results thus obtained were tabulated and the figures give a fair picture of the gradually changing conditions. As a brief summary: The child passes through these phases of development: Up to about the third year the red end of the spectrum is preferred, then follows a period in which the attractiveness of the blue end increases until it becomes as strong as that of the red end, the consequence being a disinclination to make any

selection at all. This period may vary greatly in duration. Later the attractiveness of the blue end increases with the result described. The table in the original shows also that, while at the beginning of the preference for blue the reverse order of the spectrum is followed closely, with advancing age this order changes gradually and approaches the order of preference found in adults. Thus the young infant reacts in a physiological way to the more exciting colors of the red end of the spectrum. The older, mentally advanced child rejects the exciting reds and oranges and prefers the more restful colors of the blue end of the spectrum. These results may lead to further investigations. The described changes of preference in a child of about three years must certainly be parallel to alterations in the mental make-up. If we consider that at this age the reflective stage has begun to take the place of the earlier impulsive stage, the results should yield valuable data as to the character of some of the mental changes in the child. It is likely that an investigation into the development of the other senses would give results analogous to these.

K. K. BOSSE.

MEMORY.

Experimentelle Beiträge zur Lehre vom ökonomischen Lernen.

LOTTIE STEFFENS. *Zeitschrift für Psychologie und Physiologie der Sinnesorgane.* Band 22, Heft 5. Pp. 321-382.

This paper is chiefly devoted to a report of a series of experiments dealing with the methods by which various persons memorize verse. Having discovered a number of such methods, the author undertakes to determine which form of procedure requires the least expenditure of time in order to learn by heart any given selection of poetry. Throughout the article the term economy applies to the amount of time, and not to the amount of effort, involved in any of the various undertakings. The larger part of the experiments were made upon seven subjects. This is relatively a small number, but the results are sufficiently uniform to warrant considerable confidence that they represent typical tendencies at least. At a number of points the evidence was supplemented and confirmed by experiments with nonsense syllables.

Apparently the natural disposition of most persons, when attempting to memorize verse, is to split the selection up into a number of sections, which are learned more or less independently, and then put together. This general method shows many individual modifications, both as regards the length of such sections, and as regards the relative