

tion of laws ; still, *a priori*, the hypothesis would seem to be quite admissible. Certain details of the theory remain to be fixed as may be most advantageous. For instance, the medium may have either one or more dimensions besides the familiar three, and its extent in the new directions is as yet undetermined. It may be self-returning in the new directions, instead of ending abruptly ; and so on. It may even *shade off* in the new directions, the materials of the world tending toward our three-fold space as a region of maximum density ; either through some kind of selection such as Mr. C. S. Peirce has suggested, or of quasi-attraction, a little as in Hinton's *Scientific Romances*. Such shading would follow some rapid exponential law, as in the theory of distribution of errors ; and its modulus, however small, would probably be definite.

The useful assumption "that the measure of distance remains the same everywhere" (p. 201), does not necessarily imply that every so-called "curved space" lies in an uncurved space of more dimensions, but only that the relation among the mutual distances of four quasi-complanar points be always that known to hold among the geodetic distances apart of four points on a sphere whose radius is either real or purely imaginary. Thus it is not true that a two-dimensioned pseudo-spherical space must be finite unless "constructed in space of four dimensions" (pp. 200-1) : and the oversight, made by so good a writer, goes to justify Klein's criticism that the phrase "curved space" is misleading. Why not rather, in the general case, describe the space as *quasi-curved* ?

The rest of the account given of hyperspace and of the constitution of matter is well thought out and clear. It will help the general reader toward some truthful notions as to studies which may perhaps play an important part in the near future.

J. E. OLIVER.

ITHACA, N. Y., November 15, 1892.

RECENT STAR CATALOGUES.

Zweites Münchener Sternverzeichniss, enthaltend die mittleren Oerter von 13200 Sternen, für das Aequinoctium, 1880. Beobachtet und berechnet von Dr. JULIUS BAUSCHINGER, Observator der Sternwarte. Munich, 1891. 4to, pp. xxvi. and 172.

THE Scottish astronomer, John Lamont, long director of the observatory at Bogenhausen, a suburb of Munich, had caused the observation, about the middle of this century, of about 33,000 stars ; they were taken in zones, and by an ingenious method for saving labor. Unfortunately, the assist-