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 pseudospherical 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.

Ithaca, N. Y., November 15, 1892.

J. E. Oliver.

**RECENT STAR CATALOGUES.**


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-
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atic corrections. The weights here assigned are rather a rude approximation; this is pardonable where the object is mainly to make sure of the existence and general direction of the proper motion. But when the purpose in view is to obtain the most probable values of the motions, the systematic corrections and the weights should be rather more strictly applied.

Lalande's zones, for example, usually deserve no more than about \(\frac{1}{3}\) of the weight of the Pulkova catalogue of 1855, while here we find \(\frac{4}{7}\) employed instead. But this secondary correction is, as above stated, here of quite subordinate importance.

T. H. Safford.

NOTES

A regular meeting of the New York Mathematical Society was held Saturday afternoon, November 5, at half-past three o'clock, the president in the chair. The following persons, having been duly nominated, and being recommended by the council, were elected to membership: Professor Cleveland Abbe, U. S. Weather Bureau; Professor Henry S. White, Northwestern University; Mr. Gardner Ladd Plumley, Home Life Insurance Company of New York. It was announced that the president and secretary had been made members of the international committee on the proposed joint memorial to Gauss and Weber at Göttingen. No formal papers having been announced, a general discussion upon mathematical topics was in order. Miss Williams made some remarks, in which she stated that Steiner's method of proving, that the circle has a greater area than any other plane figure having an equal perimeter, appeared to lack rigor, because he took for granted that a maximum exists, and the latter proposition had not been demonstrated. Edler has found a rigorous proof of this proposition relating to the circle; but for the corresponding proposition with reference to the sphere, no rigorous proof by elementary geometrical methods seems to be known. Steiner himself objects to a similar method of proof, which Lhuilier applies to triangles. After stating his objection, Steiner gives a concise and rigorous proof of this proposition. When he goes on to the circle, he seems to forget his objection and to adopt a somewhat similar method. Most of the discussion which followed Miss Williams's remarks turned on this point. Dr. Fiske made some general remarks upon a recent paper* treating of the mathematical theory of