

Chauvenet. The reason given by Merriman ("Text-Book on the Method of Least Squares," p. 93) for the correction of equation (5) is based on the consideration of the mean value of the excess of $\Sigma[e]$ over $\Sigma[v]$, and assumes that this excess has the same relative value as that arising in the ε -method. But it would rather appear that, while the mean excess in the value of ε (in accordance with the law of probability of δ) happens to agree with the ratio of the true to the apparent value of r as rigorously established by Peters, there is no reason to suppose that this would be the case with regard to the mean excess in the value of η . Moreover, as before remarked, if we could obtain this mean excess, the correction founded upon it would not give so satisfactory a formula as that of Peters.

THE THEORY OF TRANSFORMATION GROUPS.

Theorie der Transformationsgruppen. Erster Abschnitt.
 Unter Mitwirkung von Dr. FRIEDRICH ENGEL bearbeitet von
 SOPHUS LIE, Professor der Geometrie an der Universität Leipzig.
 Leipzig, B. G. Teubner, 1888. 8vo, pp. viii + 632.

THERE is probably no other science which presents such different appearances to one who cultivates it and to one who does not, as mathematics. To this person it is ancient, venerable, and complete; a body of dry, irrefutable, unambiguous reasoning. To the mathematician, on the other hand, his science is yet in the purple bloom of vigorous youth, everywhere stretching out after the "attainable but unattained," and full of the excitement of nascent thoughts; its logic is beset with ambiguities, and its analytic processes, like Bunyan's road, have a quagmire on one side and a deep ditch on the other and branch off into innumerable by-paths that end in a wilderness.

Among the most important of the newer ideas in mathematics is that of the *group*. In its nature it is essentially dynamic, involving the notion of operating with one thing upon another. Thus, if x and y be two of the entities of the group we shall derive new entities of the same kind by operating with y upon x and with x upon y . Entities failing of this virtue are by that fact excluded from the group.

The individuals of the group may be finite or infinite in number, but mere population does not suffice to classify them; we must consider whether the entities are separated by finite intervals or whether they succeed each other continuously. For instance, granting that the interval between the condi-