

SCIENCE

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FRIDAY, JUNE 20, 1902.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

MEASUREMENT AND CALCULATION.*

IN my address of a year ago I sought, in a summary way, and by concrete illustration, to indicate how science originates in and advances with observation and experiment. I would now invite your attention to a similar consideration of the rôle which measurement and calculation play in the higher developments of science.

All sciences are at first qualitative. They pass in their growth from the fact-gathering stage of unrelated qualities to the orderly stage of related qualities and thence upward to the stage of quantitative correlation under theory. Such, at any rate, has been the course of all sciences hitherto developed, and it seems safe to predict that such will be the course of those which may arise in the future. The recognition of this fact is of prime importance. It helps us to understand the great relative diversity in perfection among the sciences; it affords a basis for rational optimism with respect to the continued progress of science; and it ought to make the specialists of the older sciences less contemptuous than they sometimes are in their attitude toward the newer ones which have not yet passed the 'rock-naming and bug-hunting stage.'

Whenever a quantitative relation be-

* Address of the retiring President of the New York Academy of Sciences, read February 24, 1902.