THE UNRELIABILITY OF SHORT-TIME EXPERIMENTS.¹

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Young experimenters are likely to be very enthusiastic over their discoveries. After obtaining results covering a year or two, the temptation is to rush into print and proclaim to all the world findings that seem perfectly clear. If restraint is exercised, the chances are that what seemed to be trustworthy results are completely upset by some later year. Discoveries that seemed so certain are spoiled by irregularities brought in by additional investigations. It is very easy to formulate a law on the first set of data, but the trouble is that the law is likely to cease operation when put to later tests.

Unusual results that are likely to lead to early fame offer a particularly strong temptation for hasty publication. Glancing over the more important results of agricultural experimentation, however, the list is singularly free from revolutionary discoveries. Most of the sensations have been caused by the presentation of results covering only a short time. A seemingly perfect correlation is frequently found because the number of variates is so few that all conditions are not represented. The complications in ordinary agriculture are so great that precision can scarcely be expected. It is not at all uncommon to find variations of 100 percent in the average yields of crops; sometimes several years in succession will show an average of nearly this much above the average of a long period. Were it possible to eliminate experimental error, these variations would make very little difference in many comparative experiments, but experimental error will creep into even the most careful trials. A small error in an exceptional year may affect the results of the experiment for several succeeding years. Treatments affecting the moisture condition of the soil are especially subject to fluctuations caused by years in which the climatic conditions are widely different from the normal.

EXPERIMENTAL RESULTS.

In order to show the extent of fluctuations in yields during different years, the influence of these fluctuations on results variously summarized, and the specific dependence that should be given to data

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