A TABLE FOR TRANSFORMING THE CORRELATION COEFFICIENT, $r$, TO $z$ FOR CORRELATION ANALYSIS

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THE purpose of this paper is to set forth a table for transforming the correlation coefficient, $r$, to $z$, for use in correlation analysis, in accordance with the methods presented by Fisher. At the same time some examples are given to demonstrate the method of using the table.

In connection with correlation studies it is often important to compare correlation coefficients. That is, there may be two correlation values obtained for the same characters under different conditions, or correlation coefficients obtained for various characters, and in either case a comparison of these correlation coefficients may be valuable. The usual method of making such comparisons is to determine the probable errors or the standard errors of the correlation coefficients and then obtain the difference between the correlation coefficients and the error of this difference, which is the square root of the sum of the squares of the two errors. The difference between the correlation coefficients is then interpreted on the basis of the value of the error of the difference. Unless the difference is three or more times the probable error or two or more times the standard error, it is not considered significant. In some investigations it is also desired to combine correlations that have been determined from several populations of similar material, either by averaging the correlation coefficients or obtaining the weighted average.

It is recognized that correlation coefficients obtained from a small number of observations are not so reliable as when based on a larger number and at the same time, as pointed out by Fisher, the correlation coefficient, $r$, obtained from a small number of individuals is not distributed normally. For this reason it is better to use some means of comparing correlations based on a constant which is a function of the correlation coefficient but which by nature is more nearly normally distributed. Fisher suggests such a constant, $z$, which is obtained from

$$z = \sqrt{ \frac{1}{2} \left[ \log_e (1 + r) - \log_e (1 - r) \right] }$$

or

$$z = r + \frac{1}{3}r^3 + \frac{1}{5}r^5 + \frac{1}{7}r^7 + \frac{1}{9}r^9 \ldots .$$

The value of $z$ may be calculated from either of the above equations. If tables of the natural logarithms are available it is a simple matter to substitute the values for $\log_e (1 + r)$ and $\log_e (1 - r)$ and obtain the value of $z$. If tables of natural logarithms are not available the common logarithms may be used and the values of

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1Paper Number 213, Department of Plant Breeding, Cornell University, Ithaca, N. Y. Received for publication August 3, 1935.
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