Looking over the lists one notes species of *Podocarpus* (*Taxaceae*) and *Callitris* (*Pinaceae*), *Phoenix* and *Hyphaene* (*Palmaceae*), many genera and species of *Anacardiaceae, Celastraceae, Ebenaceae, Flacourtiaceae, Leguminosae, Moraceae, Proteaceae* and *Rubiaceae*. Very few of the genera are identical with ours, although one may find such names as *Rhus* (with over 20 species), *Ilex, Diospyros, Euphorbia, Vaccinium, Ricinus, Acacia, Mimosa, Cassia, Ficus, Olea, Rhamnus, Cephalanthus, Xanthoxylum, Salix, Celtis*. Aside from these the genera are quite unfamiliar to the American dendrologist.

The other papers include such topics as the breeding of maize, ramie cultivation, plants poisonous to stock, and the cultivation of alfalfa (lucerne). The latter is very full, and includes over eighty pages, with a number of illustrations.

A NEW BOTANICAL JOURNAL

EARLY in the year (February 27) the first number of a new journal appeared under the name *Mycologia*. On the title-page it is said to be "in continuation of the *Journal of Mycology* founded by W. A. Kellerman, J. B. Ellis and B. M. Everhart in 1885." It is to be "published bimonthly for the New York Botanical Garden." About the middle of April the second (March) number appeared, and we are thus able to judge as to what the new journal is to be like. The first number contains a good colored plate of agarics and pore fungi, and one black-and-white plate. The text includes twenty-six pages, and the articles are entitled "Illustrations of Fungi, I.," "The Boletaceae of North America," "Notes on North American Hypocreales, I.," "A Bacterial Disease of the Peach," "The Problems of North American Lichenology" and "Notes and News." The second number contains one colored plate of agarics and three black-and-white plates, and the text includes forty-six pages. The papers are, "Illustrations of Fungi, II.," "The Hypocreales of North America, II.," "Filling Tree Cavities" and "Notes and News."

The journal is well printed and is a worthy continuation of the *Journal of Mycology*. At the moderate price of three dollars per year it will, of course, be indispensable in every botanist's library.

LEO ERRERA

NEARLY four years ago the noted Belgian botanist Leo Errera died in his forty-seventh year. Born in 1858, he very early displayed a brilliancy of mind which indicated what he was to become in his maturity. Receiving his doctorate from the university, he studied also with Sachs, DeBary, Hoppe-Seyler, Waldeyer, Stahl and others, and became personally acquainted with Bower, Vines, Klebs, Schimper and other noted botanists of Europe. Then began a life of incessant activity, during which he prepared and published nearly three hundred papers. The earliest of these appeared when he was but a youth of seventeen years, while the last ten appeared within a year or two after his death, after having been completed by willing friends.

There is now appearing in Brussels a collection of the works of Errera under the title "Recueil d'Oeuvres de Leo Errera" which is to be completed in six volumes. The papers thus brought together (and they are a selection from all his publications) are of two kinds, viz., (1) those addressed exclusively to specialists in botany and physiology, and (2) those intended for "non-specialists who read and think." Those volumes have already appeared, viz., I. and II., devoted to general botany, and VI., containing miscellaneous papers in prose and verse. The third volume is to be devoted to general physiology, the fourth to philosophy, while in the fifth will be found pedagogical and biographical papers. The beauty of these volumes, their good paper and clear type commend them as a fitting memorial worthy of the man whom they honor.

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SPECIAL ARTICLES

DETERMINATION OF THE COEFFICIENT OF CORRELATION

IN statistical work it is often necessary to determine the coefficients of correlation between a number of variables, the calculation of which according to the usual method of correlation tables occupies much time, while the subdivision into larger groups makes the results inaccurate. The following method of calculation secures a great saving of time and labor. The averages and mean square variabilities of all the variables must be determined. By forming the differences between any series of pairs, we find the values of $x - y$, which may be treated like any variable. Indicating averages by brackets, we have

$$[(x-y)^2] = [x^2] + [y^2] - 2[xy]$$
$$= \sigma_x^2 + \sigma_y^2 - 2r\sigma_x\sigma_y$$
$$-r = \frac{[(x-y)^2] - \sigma_x^2 - \sigma_y^2}{2\sigma_x\sigma_y}$$

For a single correlation there is not much saving of time in this method of calculation, but in multiple correlations a very large amount of labor is saved.

A similar device may be used in the calculation of correlations of fraternities. When the deviations for members of a fraternity are designated by $x_1, x_2, x_3 \cdots x_n$,

$$[(x_1 + x_2 + x_3 + \cdots + x_n)^2] = n\sigma_x^2(1 + \overline{n-1}r)$$
$$r = \frac{[(x_1 + x_2 + \cdots + x_n)^2]}{n(n-1)\sigma_x^2} - \frac{1}{n-1}$$

A similar method will allow the determination of the average correlation of a large series of variabilities. By reducing each variable to multiples of its variability, we find

$$\left[\left(\frac{x_1}{\sigma_1} + \frac{x_2}{\sigma_2} + \cdots + \frac{x_n}{\sigma_n}\right)^2\right] = n + r_{1,2} + r_{1,3} + \cdots + r_{n-1,n}$$
$$[r] = \frac{\left[\left(\frac{x_1}{\sigma_1} + \frac{x_2}{\sigma_2} + \cdots + \frac{x_n}{\sigma_n}\right)^2\right]}{n(n-1)} - \frac{1}{n-1}$$

Correlations of phenomena that can not be measured, but only counted, may be treated in the following manner: If two events that have the probabilities p_1 and p_2 are correlated, we may say that those cases in which the event 1 occurs have the probability 1, or a deviation from the normal probability $1 - p$.

Those cases in which the event 1 does not occur have the probability 0, or a deviation from the average probability of $-p_1$. If we call p_2' the probability of the event 2 when event 1 occurs, p_2'' the probability of event 2 when event 1 does not occur, and q_1 the coefficient of regression of 2 upon 1, we have

$$p_2' - p_2 = q_1(1 - p_1)$$
$$p_2'' - p_2 = -q_1p_1$$

Thus the phenomenon corresponds strictly to that of measurable variables, and the procedure may be followed that is applied in the calculation of the coefficient of correlation of measurable variables. It follows that

$$p_{1,2} = p_1p_2 + q_1p_1(1 - p_1)$$

We designate, as usual,

$$q_1 = r\frac{\sigma_2}{\sigma_1}$$
$$q_1 = r\sqrt{\frac{p_2(1-p_2)}{p_1(1-p_1)}}$$
$$p_{1,2} = p_1p_2 + r\sqrt{p_1(1-p_1)p_2(1-p_2)}$$
$$r = \frac{p_{1,2} - p_1p_2}{\sqrt{p_1(1-p_1)p_2(1-p_2)}}$$

The correlation between a measurable and an unmeasurable quantity can be determined in a similar manner. When the measurable quantity is grouped as an array of the measurable quantity, we find, using the same symbols as before,

$$[x'] = q_1(1-p)$$
$$[x''] = -q_1p$$
$$\therefore \quad [x'] - [x''] = q_1$$
$$\text{or} \quad q_1 = \frac{[x']p}{p(1-p)}$$
$$r = \frac{[x']p}{\sigma_x\sqrt{p(1-p)}} = \frac{-[x''](1-p)}{\sigma_x\sqrt{p(1-p)}}$$

From these formulas, multiple correlations may be calculated according to the same formulas as those used for measurable variables.

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THE ENZYMES OF OVA—INFLUENCED BY THOSE OF SPERM?

Some few summers ago, while working in the laboratories of the Biological Station at Woods Hole, Mass., the writer began some experiments to ascertain whether or not the action of the enzymes of ova were in any measure increased or decreased by those of sperm. The problem was suggested by the work of other investigators which showed that some enzymes have an interdependent action. It was also conceived that the process of fertilization might be due to the acceleration of