THE John Wesley Hyatt Award, a gold medal and a thousand dollars, to be made annually to the individual rendering the most distinguished service in the field of plastics, has been established by the Hercules Powder Company, manufacturers of the basic raw materials used in the plastic industry. Its administration is in the hands of an Awards Committee, including Richard F. Bach, Metropolitan Museum of Art, New York; Dr. Lyman J. Briggs, director of the National Bureau of Standards; Dr. Karl T. Compton, president of the Massachusetts Institute of Technology; Watson Davis, director of Science Service, Washington; Dr. Harry N. Holmes, Oberlin College, president-elect of the American Chemical Society, and Eric Hodgins, publisher, *Fortune,* New York. L. T. Barnett, editor of *Modern Plastics Magazine,* is secretary of the committee. John Wesley Hyatt, for whom the award is named, was a pioneer in the plastics industry.

THE cornerstone of the building for the new laboratories at Princeton, N. J., of the Radio Corporation of America was laid on November 15 by General J. G. Harbord, chairman of the board of the corporation. The speakers included Dr. David Sarnoff, president of the corporation, who spoke by radio from the *S. S. Matsonia en route* from Honolulu to San Francisco, and Dr. Gano Dunn, member of the Board of Directors. Otto S. Schairer, vice-president in charge of the laboratories, presided. In laying the cornerstone, General Harbord sealed into place an air-tight lead box containing radio and electronic devices, as well as literature, representative of current development in the radio age. Included among the contents were an iconoscope and a kinescope, a cathode-ray tube, several new and special types of electronic tubes, a microphone, a loudspeaker and the latest design of a personal radio receiver.

THE Oregon State Board of Higher Education recently approved the restoration of courses leading to graduate and undergraduate degrees in six scientific divisions at the University of Oregon. The degrees will be offered, beginning with the academic year of 1942–43 in mathematics, chemistry, physics, geology, botany and zoology. In 1932 the board transferred all major work in science to Oregon State College as a part of the program of unification and prevention of duplication in the curriculum of the centralized Oregon system of higher education. Service courses in all the branches of science for lower division work were retained at the University of Oregon. In granting the request of the university that the department of science be restored, the committee on curricula of the board pointed out that the request of the university was reasonable and would strengthen the whole system of higher education. It was further stated that for a university to perform its educational function, it must have a complete college of liberal arts, including the sciences.

DISCUSSION

ON THE PRECISION OF ESTIMATES FROM SYSTEMATIC VERSUS RANDOM SAMPLES

IN recent years marked advances have been made in increasing the efficiency of sampling through the development of modern theories of mathematical statistics, which has led to the more wide-spread use of stratified random sampling. It has been possible, in many instances, to effect considerable reductions in the variation to which sample estimates of population parameters are subject by a knowledge of the population to be sampled and a judicious choice of the strata from which the samples are to be drawn.

Gains in efficiency through this kind of restriction have been limited, however, in three ways, *i.e.,* (1) by the extent to which the population to be sampled is stratified, (2) by the size of the sample and additional cost of selecting observations by strata, which determine the extent to which advantage can be taken of the existing stratification, and (3) by the requirement imposed by the mathematical model, upon which error formulae are based, that there must be at least two independently and randomly selected observations in each of the strata sampled. This requirement, which appears to be inconsequential, turns out in actual tests to have a quite serious effect.

A large part of the work of the U. S. Forest Service, whether it be research, administration or land-use planning, requires sampling, to provide estimates of timber volume, forage, infiltration capacity or other characteristics of the land and its cover. Also, basic to many of these sample estimates, is an estimate of the area in each of the recognized cover types. In this sampling work, one of two systematic methods of selecting the samples has usually been employed. These are the line-plot and strip methods of sampling, by which evenly spaced plots along evenly spaced lines are observed, or evenly spaced strips are used as plots. It is evident that selection of plots in either of these two ways does not satisfy the requirement of independence and randomness and that, therefore, data so obtained do not provide a valid estimate of sampling errors when random sampling error formulae are used. In considering revisions of these sampling schemes, it is important to know the extent to which substitution of methods of sample selection allowing straightforward calculation of sampling errors affects the precision of sample estimates. More specifically, what is the effect of introducing the requirement that there be at least two randomly chosen observations in each stratum sampled?

To answer this question, tests were made of cover type estimates. These showed unmistakably that the removal of this requirement and selection of the observations in a systematic manner resulted in gains in efficiency; these frequently amounted to more than 100 per cent.

An understanding of the source of this gain in efficiency rests upon recognizing that the great bulk of the populations sampled, particularly in biological and social-science investigations, are not segregated into well-defined strata that are homogeneous within their boundaries, but, rather, vary continuously in much the same fashion as elevations or fertility levels in a field. Therefore, even though individuals in selected subregions of a population tend to be high, or low, as compared with those in other subregions, it will be found upon investigation that, even within subregions, there will be continuous trends of the variate measured, and that the changes between adjacent subregions is continuous in the transition zone encompassing the subregion boundaries. When this is recognized, it becomes apparent that sampling in many populations in place or time reduces to a problem of estimating the ordinates or the integral of a single-valued continuous curve. It is also evident from this that uniformly spaced observations will yield a better representation of this curve than will observations that are restricted only to the extent that when the range of the abscissae of the curve is divided into $\frac{n}{2}$ equal parts, two of the n observations fall in each part. With this restriction, many of the observations may fall so close together that two or even three observations supply little more information concerning the curve than does a single observation. Upon more thorough consideration it will be evident that the gain in accuracy, as measured by the expected variation among systematic sample totals or means, arises also from a usually high correlation among them. That is, when the results of a single sample, so selected, are available, the results of any other such sample can be predicted with considerable precision.

To furnish an estimate of the precision of this prediction requires obtaining two rather easily calculated statistics, namely, estimates of the error variance of a single observation and of the correlation between the ordinates measured and the ordinates to be predicted. The first is estimated by the residual mean-square error from a polynomial fitted by the method of least squares. Since the observations are evenly spaced and of equal weight, this is most readily accomplished by use of orthogonal polynomials, the fitting process being continued until additional fitted constants no longer reduce the residual mean-square significantly as adjudged by Snedecor's F. To estimate the correlation coefficient, it is necessary to calculate the correlation between observations, in the original sample, that are separated by one unit, two units, etc., and to fit a curve to the observations of the correlation coefficient and the distance between observations. This curve is controlled in that at zero distance the correlation coefficient is equal to one. With the data used in this study, a curve of the form $r = e^{-kd}$ where r is the correlation coefficient, d is the distance and k is an arbitrary constant, was usually sufficient to represent the data. From this curve, which may be converted to a curve of $(1-r^2)$ over distance, the average value of $(1-r^2)$ for all possible systematic samples selected in the same way can be estimated. The average squared error of estimate thus is calculated as $s^2\ \overline{(1-r^2)}$, where s^2 is the residual mean square from the polynomial and $\overline{(1-r^2)}$ is the average $(1-r^2)$ as defined above.

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EXTRA STRONG HELIOTROPIC EFFECT OF NEON LIGHTS

IN Texas there is an annual swarming of insects to city lights, which begins at the time late in August when the first break in the excessive summer heat occurs. During all the rest of the year none of these species are to be seen on the city streets.

Then one evening a few cool breezes arise from the north, and that night countless thousands of flying black field crickets descend on the towns. These last for a few nights, and then disappear. A week or so later a similar horde of small black and narrow hard beetles cover buildings around light fixtures. Later an army of odorous small green bugs descend on the towns. These annually recurring visitations have been noticed with interest by the writer for a great many years. During all these years the concentration of insects around lights varied only with the position and intensity of the visible white light rays emitted by the ordinary street and business illuminations.

In the last few years a striking change has been noted in the objects of their attentions. With the installation of numerous neon lights throughout the business district the insects have almost ignored the ordinary white street lights which formerly were covered with them, and which would be seen first in their flight in from the country, and have collected in vast numbers on the neon signs down town.

This selectivity is shown strikingly where a brilliantly white lighted store shows comparatively few insect visitors and another beside it with neon signs is black with countless thousands.