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THE STATISTICAL SIGNIFICANCE OF EXPERIMENTAL DATA¹

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WHEN a few days ago your secretary, Mr. W. T. Bovie, acting on request from your chairman, Mr. J. S. Hughes, urged me with their well-known energies to speak in this symposium they left me little chance to refuse. As I understand the circumstances I am a sort of "pinch hitter" for Mr. J. Arthur Harris, whose long-continued biometric studies would clearly indicate him for this place, but whose absence in the south made it necessary to find a substitute. From him you might reasonably have expected a home run; you must be content with me if I bunt out a one-bagger just to keep the game going.

I should have liked to have more time for preparation. The literature upon the statistical aspects of feeding experiments is not microscopic and the data available for statistical study are extensive. Moreover, my Yale training received here twenty odd years ago under J. Willard Gibbs was not such as to make comfortable for me the presentation of somewhat hastily collected notes. There was not in those days the fervid impatience in science that has developed in recent times in some quarters, and Gibbs himself was a model to any young man not only in his scientific thinking but in his modest and painstaking contemplation of some of the most intricate problems of nature—statistical problems. It may not be amiss if I quote these words from the preface of his last great work entitled "Elementary Principles in Statistical Mechanics" written in 1901:

We avoid the greatest difficulties when giving up the attempt to frame hypotheses concerning the constitution of material bodies, we pursue statistical inquiries as a branch of rational mechanics. In the present state of science, it seems hardly possible to frame a dynamic theory of molecular action which shall embrace the phenomena of thermodynamics, of radiation, and of the electrical manifestations which accompany the union of atoms. Yet any theory is obviously inadequate which does not take account of all these phenomena. Even if we confine our attention to the phenomena distinctly thermodynamic, we do not escape difficulties in as simple a matter as the number of degrees of freedom of a

¹ An address prepared by request as part of a symposium on feeding experiments held by the Biochemical Section of the American Chemical Society, meeting in New Haven during the week of April 2-7 in connection with the dedication of the new Sterling Chemical Laboratory of Yale University.

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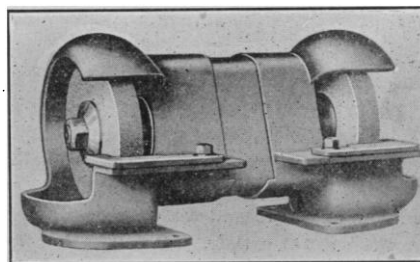
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