

ELEMENTS OF PHYSIOLOGY**Ready in
January**By **ERNEST G. MARTIN, Ph.D.***Professor of Physiology*

AND

By **FRANK W. WEYMOUTH, Ph.D.***Associate Professor of Physiology**School of Medicine, Stanford University**Octavo, about 800 pages, with 133 engravings*

PHYSHIOLOGY is here presented by development of two key-principles. The first is the familiar key-principle—that living protoplasm is a system of molecules and ions, hence understanding of its structure and functioning is to be sought by applying to it the physical, physico-chemical and chemical laws which describe the interrelations of molecules and ions. The first section contains an account of the nature and capacities of protoplasm as revealed by observation and experimentation.

The second section deals with the principle that every protoplasmic cell is inherently a self-sustaining system. Consequently, if it is continuously provided with a proper environment, it should continue to live and function indefinitely (subject to the possible influence of intrinsic senility). Accordingly the task of Physiology, after examining the properties of protoplasm, is to enquire as to the factors of suitable cell environment, and the limits of departure from the optimum for each. In a highly organized body, like that of man, the maintenance of proper cell-environment depends on the interaction of various complex mechanisms. The third section is concerned with these. Since bodily maintenance must be carried on in the presence of a changing external environment various adjustments of the organism are necessary. The fourth section considers these. A final chapter deals with Reproduction.

POULTRY PRODUCTION**New (4th)
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REVISED throughout, this edition reflects the transition that collegiate instruction in poultry husbandry is undergoing, the tendency being to put fundamental principles in the foreground, to explain why, rather than how. Sixty-one pages and 2 colored plates have been added to this edition.

BLOOD-PRESSURE: ITS CLINICAL APPLICATIONSBy **GEORGE WILLIAM NORRIS, A.B., M.D.***Professor of Clinical Medicine, University of Pennsylvania; Chief of Medical Service "A," Pennsylvania Hospital***HENRY CUTHBERT BAZETT***M.B., B.Ch. (Oxon.), F.R.C.S. (Eng.)*

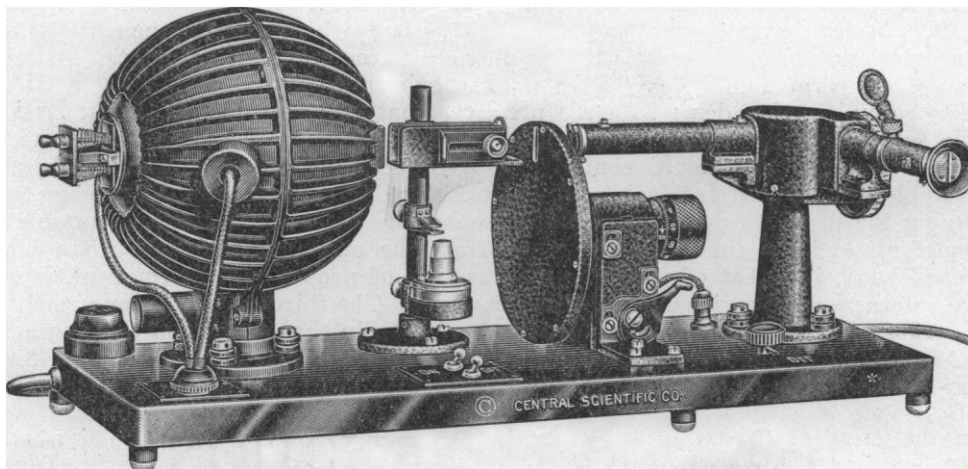
AND

THOS. M. McMILLAN, M.D.*Professor of Physiology, University of Pennsylvania* *Assistant Physician, Pennsylvania Hospital; Cardiologist, Philadelphia General Hospital**New (4th) Edition. Octavo, 387 pages, 47 engravings and 1 colored plate.**Cloth, \$4.50, net*

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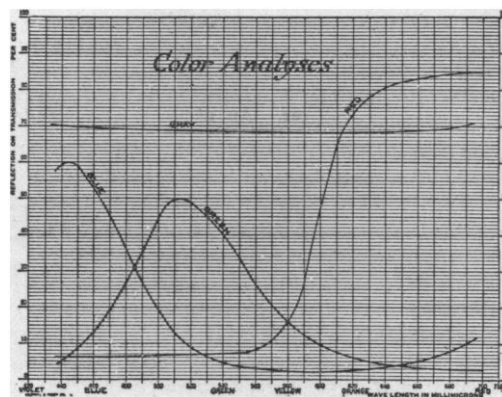
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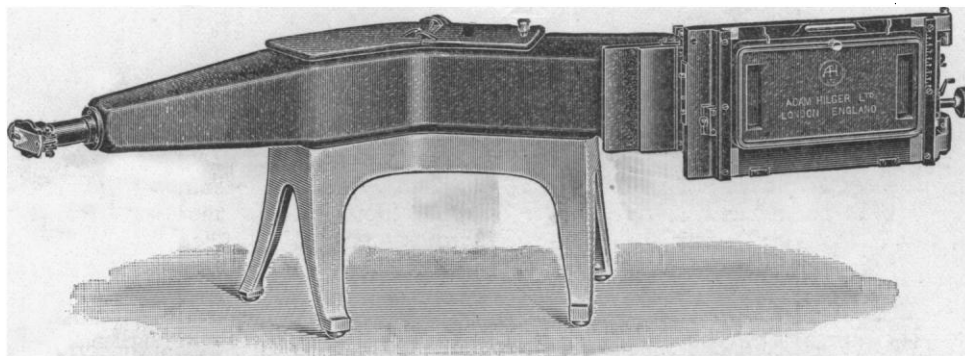
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THE NOTION OF PROBABLE ERROR IN ELEMENTARY STATISTICS¹

WHAT I have to say to-day is not addressed to professional mathematicians or statisticians. To mathematicians and statisticians all that I shall say is already entirely familiar. There are two other classes of readers, however, to whom I hope the discussion may be of service: (1) the rapidly increasing number of laymen who, without technical mathematical training, are constantly coming upon such terms as "probable error" in their general reading, and (2) the non-mathematical research worker who is constantly tempted to embellish his numerical results by adding an imposing array of "probable errors"—obtained, alas, too often by the simple process of substituting blindly in a formula. (A formula, of course, is an essential tool; what will concern us here, however, is the underlying significance of such a formula, and the necessary limitations surrounding the proper use of it.)

What are the principles that lie behind the common use of the term "probable error"? What does it really mean when we say, for example, that a quantity x has an estimated value of 3.6 with a "probable error" of 0.2 (written $x = 3.6 \pm 0.2$)?

The conventional reply to this question will occur to all of us—namely, that "the probable error is the error that is as likely as not to be exceeded." For example, if $x = 3.6 \pm 0.2$ the conventional understanding is that the "true value" of x is as likely to lie outside the limits 3.4 and 3.8 as it is to lie between those limits.

But this conventional reply does not go very far behind the scenes—we should like to have something more fundamental. Under what circumstances can we properly speak of errors as "equally likely" to occur? What are the fundamental considerations underlying the whole range of ideas which are suggested by the term "probable error"? I believe the best modern opinion is in favor of treating the so-called "probable error" from the point of view of empirical statistics, with as little reference as possible to the technical theory of probability; and I am convinced that much misunderstanding will be avoided if we can keep as

¹ Address of the retiring vice-president and chairman of Section A (Mathematics), American Association for the Advancement of Science, Nashville, Tennessee, December 29, 1927.

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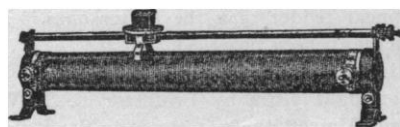
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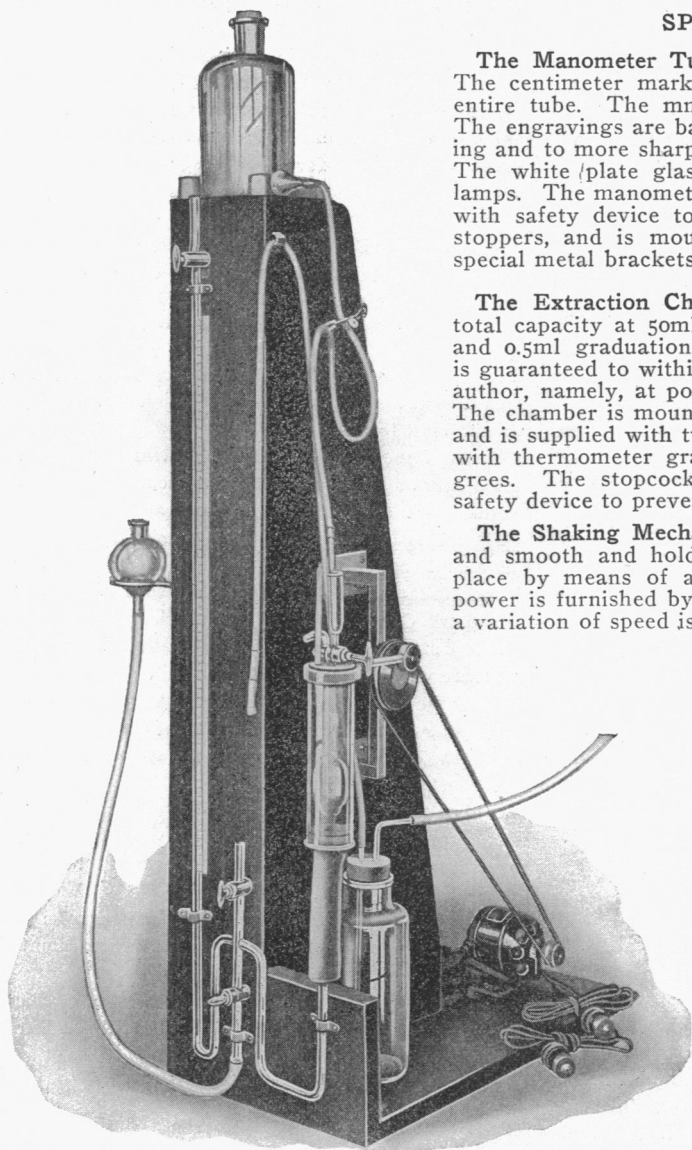
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