Robert M. Yerkes, assistant professor of comparative psychology, Harvard University.

The Animal Behavior Monograph Series will be published in connection with the *Journal* as a provision for papers which are too lengthy, or, for other reasons, too costly to be accepted by the *Journal*. The monographs of this series will appear at irregular intervals and will be grouped in volumes of approximately 450 pages.

The Journal of Animal Behavior and *The Animal Behavior Monograph* Series will be published for the editorial board by Henry Holt and Company, New York. Manuscripts for the *Journal* may be sent to the managing editor, Professor Robert M. Yerkes, Emerson Hall, Cambridge, Massachusetts, or to any other member of the editorial board. Manuscripts for the Monograph Series should be sent to the editor, Professor John B. Watson, Johns Hopkins University, Baltimore, Maryland, from whom information may be obtained concerning terms of publication. Books and other matter for review in the *Journal* should be sent to the editor of reviews, Professor Margaret F. Washburn, Vassar College, Poughkeepsie, New York.

The concluding (October) number of volume 11 of the *Transactions of the American Mathematical Society* contains the following papers:

Virgil Snyder: "Conjugate line congruences contained in a bundle of quadric surfaces."

Jacob Westlund: "On the fundamental number of the algebraic number field $k(p\sqrt{m})$."

G. C. Evans: "Volterra's integral equation of the second kind, with discontinuous kernel."

H. Beck: "Ein Seitenstück zur Moebius'schen Geometrie der Kreisverwandtschaften."

Louis Ingold: "Vector interpretation of symbolic differential parameters."

L. P. Eisenhart: "Surfaces with isothermal representation of their lines of curvature and the transformations (second memoir)."

G. E. Wahlin: "On the base of a relative number field, with an application to the composition of fields."

L. M. Hoskins: "The strain of a non-gravitating sphere of variable density."

Also Table of Contents of Volume 11.

The opening (October) number of volume 17 of the *Bulletin of the American Mathematical Society* contains: "Note on implicit functions defined by two equations when the functional determinant vanishes," by W. R. Longley; "Sturm's method of integrating $dx/\sqrt{X}+dy/\sqrt{Y}$," by F. H. Safford; "A property of a special linear substitution," by F. R. Sharpe; "On the factorization of integral functions with p-adic coefficients," by L. E. Dickson; Review of Hensel's Theorie der algebraischen Zahlen, by L. E. Dickson; Shorter Notices: Lehmer's Factor Table for the First Ten Millions, by L. E. Dickson; Staude's Analytische Geometrie des Punktepaares, des Kegelschnittes und der Fläche zweiter Ordnung, by D. D. Leib; Dette's Analytische Geometrie der Kegelschnitte, by D. D. Leib; Lebon's Henri Poincaré, Biographie, Bibliographie, by J. W. Young; André's Notations mathématiques, by G. A. Miller; Hancock's Applied Mechanics for Engineers, by E. W. Ponzer; "Notes"; "New Publications."

The November number of the *Bulletin* contains: Report of the summer meeting of the society, by F. N. Cole; Report on "The preparation of college and university instructors in mathematics," by the American sub-committee of the International Commission on the Teaching of Mathematics; Review of works on vector analysis (Coffin, Gans, Ignatowsky), by H. B. Phillips; "Notes"; "New Publications."

A SECOND EARLY NOTE ON THE TRANSMISSION OF YAWS BY FLIES

In Science for January 7, 1910, I communicated a note giving observations made by Edward Bancroft in 1769 on the transmission by flies of this malignant tropical skin disease. Recently in looking over Henry Koster's "Travels in Brazil in the Years from 1809 to 1815," published in Philadelphia in 1817, I found the following more specific statement as to the means of transmission of this loathsome disease. In Vol. II.,

pages 235 and 236, after giving a description of the disease, he says:

This horrible disorder [the yaws] is contracted by inhabiting the same room with the patient, and by inoculation; this is effected by means of a small fly, from which every precaution is oftentimes of no avail. Great numbers of the insects of this species appear in the morning, but they are not so much seen when the sun is powerful. If one of them chances to settle upon the corner of the eye or mouth, or upon the most trifling scratch, it is enough to inoculate the *bobas*, if the insect comes from a person who labors under the disease.

It will be noted that, while Koster is not able to give the specific name of the fly, he definitely declares it to be a certain fly with well marked characters. It may be well to add that the disease called "bobas" throughout Brazil, is identified by Koster himself as identical with the "yaws" prevalent in Venezuela and the Guianas.

For the loan of the book from which this note is taken, I am indebted to the courtesy of Mr. E. C. Richardson, librarian of Princeton University.

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SPECIAL ARTICLES

A FURTHER STATISTICAL STUDY OF AMERICAN MEN OF SCIENCE

THE advancement of science and the improvement of the conditions under which scientific work is done are of such vast importance for society that even the most modest attempt to introduce scientific method into the study of these conditions has some value. It is truly both exhilarating and appalling to face the opportunities and responsibilities of science and of scientific men. The applications of science have quadrupled the wealth which each individual produces and have doubled the length of human life. In many cases the gain has been greater than this. In transporting freight or printing a newspaper, the products of each man's labor have been multiplied a hundredfold; in equal measure the danger from smallpox, cholera and the plague has been diminished.

As intercommunication increases between the nations, bringing them all within the circle of our civilization, and as the total population of the earth grows, the number of scientific advances becomes continually larger and the value of each of ever greater magnitude. It is thus an economic law that the means of subsistence tend to increase more rapidly than the population.[1] When the applications of electricity increase the efficiency of each individual on the average by twenty per cent.—as may now be the case in civilized countries—the economic value would be in the neighborhood of twenty billion dollars a year. In comparison with a sum so inconceivable, the cost of science since the days of Faraday and Henry is altogether insignificant. In the United States at present there are scarcely more than a thousand men engaged in serious research work, and they do not on the average devote more than half their time to it. Throughout the world there may be seven to ten times as many. The investigations of these men may cost a total of $20,000,000 a year, perhaps one thousandth of what may be gained by the applications of electricity, or one hundredth of what is saved by the use of the phosphorus match.

But man does not live alone by the applications of electricity and the use of the phosphorus match. Science has given us a new heaven as well as a new earth, for it has checked not only poverty and disease, but also superstition, ignorance and unreason. It has done away with slavery and with the need of child labor; it has made excessive manual labor by women or by men unnecessary. By

[1] This inversion of the law of Malthus, to which the writer has called attention on several occasions (*e. g.*, SCIENCE, December 18, 1896) has recently been given a most interesting expression by Professor T. H. Norton (*The Popular Science Monthly*, September, 1910). Both the number and the value of scientific advances being directly proportional to the total population, the means of subsistence tend to increase as the square of the population.