approximate equality of births and deaths—nevertheless the biological changes induced by the war, as expressed in this ratio, were the same for the one as for the others. We are evidently dealing here with deep-seated and fundamental phenomena of racial biology. The biological reactions of French and Germans in respect of a most fundamental phenomenon, the death-birth ratio, were essentially the same, though they started from such different pre-war bases.

The case of England is obviously entirely different. Starting from about the same base as the German states England's biological reaction to war was much less pronounced. There are many explanations, such as better food conditions, different race psychology from any of the other belligerents, etc., which might be brought forward. There appears at the moment no way of accurately evaluating any of these possible explanations. We must perforce rest with the setting forth of the facts. It is worth noting, however, that though England's vital index changed less in degree than that of the other countries, its movement was the same in kind.

There are two other points which one would like to have information upon. The first is: What will be the course of these death-birth ratio curves in the years following 1918? Will they come back to the pre-war level, and if so, how soon? For England and Wales alone is it now possible to get an indication on this point. For the year 1919 the relation $\frac{100\ \text{Deaths}}{\text{Births}}$ had the value 73 per cent. This represents a marked drop, though it does not bring the curve back to the pre-war level. The appearance of official statistics which will make possible the further plotting of the curves of Fig. 1 will be awaited with great interest. In the second place, one would like to know what the appearance of the curve for the United States would be. Unfortunately, we have for the Registration Area of births data only for the years 1915, 1916, and 1917 now available. So few years appear inadequate to set against the longer series for the other countries.

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COLORED PHOTOGRAPHS OF PLANT DISEASE SPECIMENS

In the preparation of a handbook of the diseases of vegetables by the U. S. Bureau of Plant Industry for the Food Products Inspection Service of the U. S. Bureau of Markets, it has been found practicable to make colored illustrations by the aid of a firm of commercial photographers.[1]

The specimens of diseased vegetables were collected by the writers to a large extent in the Chicago markets and freight yards. In addition numerous field excursions were made into the region surrounding Chicago for the purpose of securing specimens. To date, over two hundred illustrations have been completed, a number of which were exhibited at the Baltimore and St. Louis meetings and aroused a very general and real interest on the part of the botanists. So many questions were asked concerning the process by which the illustrations were prepared that the writers are using this means of making the answers as generally known as possible.

A vertical camera was used and the specimens were arranged on a ground-glass background which eliminates shadows. Occasionally a black velvet background was used, and leaves usually were laid on wet blotting paper to prevent curling. In making the exposures, artificial light was seldom used. Most of the subjects have been reproduced in natural size on 8 by 10 inch negatives. The camera was equipped with Cooke Process Lenses, Series 5, of 16 or 18 inches focal length, or with a Goerz Dogmar lens of 12 inches focal length. Color filters, usually the K2 yellow or the green, and occasionally the red, were used in about 75 per cent. of the exposures. About two-thirds of the exposures were made on Seed's Panchromatic plates and the remainder on Polychrome or Standard Orthonon plates. The legends are etched in the gelatin of the negative. The majority of the subjects have been photographed in duplicate to insure against loss of the record by breakage.

Prints are made either on Defender or Kresko printing-out paper or on Defender or

[1] Webster Bros., Chicago, Illinois.

Azo developing paper, preferably the latter in each case. The coloring is secured by painting directly upon the dry prints with transparent dyes. The detail of the image is supplied by the lines of the print itself. Water-soluble aniline dyes in the colors yellow, orange, red, brown, blue and royal blue are commonly used. The original plate is colored with the specimens before the artist and, while it has been necessary to supervise closely the color work on this print, a surprising degree of skill and accuracy has been developed by some of the operatives. Since most truck crop disease specimens are highly perishable and change considerably during the time elapsing between exposure of the negative and the completion of prints, even though held in a refrigerator, it has been found advantageous to register the exact colors on some other print of proper color value at the time of exposure, or if possible to collect fresh specimens of a similar character.

Inasmuch as the print is to serve as a background for the color, the kind of paper chosen and the intensity of the image depend upon the color effects desired. For example, the printing-out paper is desirable for most yellows, browns, and reds, while for purples, blacks, and dark greens the developing paper is preferable. However, the printing-out paper serves very well for the majority of greens and has been more extensively used.

After the dyes are mixed and diluted to secure the desired shade, the gelatin surface of the print is prepared for coloring (probably softened and swelled) by wiping with a cloth moistened with alcohol, ammonium hydroxide, or more commonly saliva, and the dye is applied with a brush in rather liberal amounts of which the excess is removed by means of a blotter. The quality of the color is determined by the proportions of the dye mixture and the type of paper used for the print; the intensity of color is determined by the dilution of the dye, the intensity of the photographic image, and the length of time the excess dye is allowed to remain on the print before blotting. In case of error the color can be removed with ammonium hydroxide. In some instances a very small amount of this substance added to the dye causes the latter to spread and adhere more satisfactorily. Details in white or background color, such as holes in a leaf, can be conserved by coating with a paste or enamel which is insoluble in ordinary solvents and is removed with benzine after the coloring is completed. Details in black, such as the blackened veins in cabbage black rot, can best be shown by the image on Azo paper. After the coloring is completed, the prints are run through a mordant bath to fix the colors. Combinations of acetic acid, formalin, and other mordant reagents constitute this bath, the exact composition of which depends in part upon the colors to be fixed. The gelatin surface must be thoroughly wetted by the solution. The prints are then rinsed in a water bath, placed face downward on squeegee boards, sponged, and passed through rollers to remove the excess water. The prints are mounted while wet on muslin or Japanese paper with a cardboard flap and allowed to dry on the squeegee board.

While these colored photographs are ultimately to be used for lithographs, it has been found feasible to reproduce about ninety sets of fifty duplicates each for immediate use by hand coloring of duplicate prints, the original colored print being used as a guide. However, this process is too laborious and unreliable for large scale production and the colors will not endure indefinite exposure to light. Colored lantern slides of a very gratifying quality have also been made.

This process of color reproduction could well be utilized in other branches of science and there appears to be no reason why it could not be perfected and employed by educational and research institutions. The results of this method of scientific illustration are far superior to uncolored reproductions and are, it is believed, an improvement over other types of color reproduction because of the accuracy of detail afforded by the photographic image. Such illustrations should find wide use in

technical publications and especially in charts, stereopticon slides, and extension bulletins.

Max W. Gardner,
Geo. K. K. Link

WILLIAM DIXON WEAVER

Dr. William D. Weaver, for a number of years editor of the *Electrical World,* a man of the true scientific spirit, a friend of education and scholarship, a devotee of literature, an upholder of the finer things of life, and one of the most delightful of companions, died at his home in Charlottesville, Va., on November 2, 1919.

Dr. Weaver was born on August 30, 1857, at Greensburg, Pa. After a year spent in preliminary study at the University of Kentucky, he entered the United States Naval Academy, from which he graduated as cadet engineer in 1880. Only a few months ago Dr. Weaver received the honorary degree of LL.D. from the University of Kentucky. After graduation the young officer served in the Navy for twelve years except for one year's leave of absence in 1884, during which he studied electricity and conducted some investigations in the electrical laboratory of the Sorbonne, Paris, and the School of Electrical Engineering, London. In 1883 he was a member of the U. S. S. *Yantic* expedition sent to the relief of Lieutenant Greely, the Arctic explorer. When he resigned from the Navy in 1892 he held the relative rank of ensign.

Mr. Weaver's life work was that of an editorial exponent of the science, art and industry of electricity. After resigning from the Navy he spent a year in the business of manufacturing electrical appliances, and he became editor of the *Electrical World* in 1893. In 1896 the *American Electrician* was established, and this magazine, a monthly, with Mr. Weaver as editor, became notably successful. Mr. Weaver accomplished the difficult task of making a magazine that was useful and interesting to the "practical" man and at the same time of high technical standing. His gifts as a technical journalist were indeed of a high order. In 1906 the *American Electrician* was absorbed by the *Electrical World,* and Mr. Weaver retaining his connection with that paper until May, 1912, when he retired, removing to Charlottesville, Va.

Of a modest, retiring nature, Mr. Weaver did a great deal for electrical advancement, although often he remained in the background, cooperating with others whose names appeared in connection with the particular task in hand. He became an associate of the American Institute of Electrical Engineers in 1887 and became successively a member and a fellow of the society. For six years Mr. Weaver served as manager of the institute, and it is probable that he could have been elected president had he not refused to entertain the honor. On May 16, 1919, as the result of the work of a group of friends and admirers, a bronze tablet was unveiled at the headquarters of the American Institute of Electrical Engineers in recognition of Mr. Weaver's services. It bears a bas-relief portrait and this inscription:

> This tablet is dedicated to William Dixon Weaver, engineer, journalist, scholar, to record his influence in the development and promotion of the art and science of electrical engineering.

In 1900 Mr. Weaver was appointed by the United States government as an official delegate to the International Electrical Congress at Paris, but, upon his suggestion, the appointment was transferred to Dr. A. E. Kennelly, of Harvard University. He had much to do with the St. Louis (1904) International Electrical Congress, of which he was treasurer and business manager. With Dr. Kennelly, who was general secretary, he supervised the publication of the *Transactions* of that congress in three large volumes, published in 1905.

An excellent judge of engineering literature, Mr. Weaver was for several years chairman of the Library Committee of the American Institute of Electrical Engineers. In 1901 Dr. S. S. Wheeler purchased the Latimer Clark collection of electrical books and pamphlets and presented it to the institute. Thereafter, as a labor of love, Mr. Weaver edited the Catalogue of the Wheeler Gift of Books,