tische Annalen, volume 43 (1893). The given list of six does not include any American author, but all the writers included therein were very influential in starting work along this line in our country and some Americans, including E. V. Huntington, made further studies relating to the simplification of the postulates of the group concept. While Heinrich Weber may now be reasonably regarded as the first man who fully mastered the group concept (1893), it is of some interest to note that about three years thereafter he made an erroneous assertion relating thereto in the first edition of the second volume of his "Algebra" (1896) when he stated (page 54) that the most important example of a commutative group is the system of our natural numbers when they are combined by multiplication.

On account of the wide use of this algebra this error was often repeated by later writers and seems not to have been publicly corrected before the appearance of the second edition of this volume about three years later. It may remind one of the error committed by Sophus Lie on page 163 of volume 1 of his "Transformationsgruppen" (1888) where he asserted in effect that the numbers which are less than unity form a group when they are combined by multiplication. This error was repeated by Felix Klein several years later in the *Mathematische Annalen,* volume 43, page 66 (1893). It is, however, less striking than the one by Heinrich Weber to which we referred, since neither Sophus Lie nor Felix Klein ever definitely adopted the now common postulates of an abstract group.

Contrary to what might naturally be assumed, all the possible abstract groups of certain low orders were determined long before a satisfactory system of postulates of the group concept was published. Forward steps in the development of mathematical subjects frequently preceded the establishment of a solid foundation of the subject. The history of the development of the theory of ordinary complex numbers furnishes many instances of such forward steps. There is, however, no satisfactory evidence now extant for the assertion that "as early as the fifteenth century mathematicians were compelled to introduce symbols for the square roots of negative numbers in order to solve all quadratic and cubic equations." This assertion appears on page 92 of the valuable volume entitled "What is Mathematics?" by Richard Courant and Herbert Robbins (1941).

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WHEAT GRAINS WITHOUT EMBRYOS[1]

A CRITICAL examination of several thousands of wheat grains of the 1941 crop for separation of kernels only slightly affected by sprout injury showed occasional grains which had a slightly concave area where the embryo usually produces a convex area. This at once suggested the embryoless seeds described by Lyon.[2] Some of the grains were sent to Dr. George H. Conant for sectioning, and these sections show clearly the embryoless condition.

Miss Lyon was especially interested in studying the respiratory activity of such seeds because previous comparisons of activity of embryo and endosperm had been made from samples from which embryos had been removed. She did not discuss the origin of embryoless seeds. Her work was the first report of this condition in wheat. Harlan and Pope[3] had reported the first case in cereals, finding five such seeds in many thousands of barley. They suggested that either the fertilization from which the embryo is formed had failed to occur or that development had been arrested shortly afterward, since there was not more than a doubtful trace of embryo cells.

Miss Lyon found that such seeds were not infrequent in wheat, finding about 0.1 per cent. in 150,000 grains, using six different varieties representing both winter and spring wheats. The North Dakota material examined was chiefly one sample of Ceres, a hard red spring wheat developed at the North Dakota station, and the proportion was similar to that found by Miss Lyon. This adds another variety to the list and supports her conclusion that it is not an uncommon occurrence.

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SCIENTIFIC BOOKS

VERTEBRATE EMBRYOLOGY

Introduction to Vertebrate Embryology. By WALDO SHUMWAY. Fourth edition. 372 pp. New York: John Wiley and Sons. 1942. $4.00.

THIS text, having reached the fourth edition, has quite evidently established itself. The present issue is considerably altered, but retains the general method of comparative treatment, *i.e.,* each of the four animals, amphioxus, frog, chick and man, is compared in its development in each system or part. Physiology is also stressed as formerly. The changes relate principally to increased attention to organogeny, to de-

[1] Contribution from the N. D. Agricultural Experiment Station. Published with the approval of the director.

[2] Mildred E. Lyon, *Jour. Agr. Res.,* 36: 631–637, 1928.

[3] H. V. Harlan and M. N. Pope, *Am. Jour. Bot.,* 12: 50–53, 1925.