the continuation of intellectual progress. Intellectual matters know no national boundaries, and a purely national culture must be a poor thing indeed. The primary concern of any intelligent person must be the establishment and preservation of intellectual freedom and intellectual activity in the world as a whole. In a large part of the world these things have already been suppressed and in another part they are now in serious danger. If this country announces that under no circumstances will it take an active part in the struggle the sole effect will be to encourage the forces opposed to democracy and freedom of thought.

It might have been supposed that proponents of "peace at any price" would have been silenced by the proof that peace alone is not enough to insure intellectual freedom (as in Russia and Germany), and by what has happened to such peace-loving countries as Czecho-Slovakia, Finland, Denmark and Norway.

I. W. Bailey, Harvard University
James Bonner, California Institute of Technology
Robert Chambers, New York University
Alfred E. Cohn, Rockefeller Institute
W. J. Crozier, Harvard University
Hallowell Davis, Harvard University
Th. Dobzhansky, California Institute of Technology
Sterling Emerson, California Institute of Technology
Alexander Forbes, Harvard University
Ernst A. Hauser, Massachusetts Institute Technology
Hope Hibbard, Oberlin College
Leigh Hoadley, Harvard University
Hudson Hoagland, Clark University
T. H. Morgan, California Institute of Technology
Linus Pauling, California Institute of Technology
Peyton Rous, Rockefeller Institute
Karl Sax, Harvard University
A. H. Sturtevant, California Institute of Technology
Albert Tyler, California Institute of Technology
R. H. Wetmore, Harvard University

From the responses obtained it is clear that, had more time been available, a much longer list of signatures could have been secured.

A. H. STURTEVANT

SCIENTIFIC BOOKS

EMBRYOLOGY

The Rise of Embryology. By ARTHUR WILLIAM MEYER. Stanford University, Stanford University Press. 1939. xv + 367 pp., 97 figs. $6.00.

IN his new work, "The Rise of Embryology," Professor Meyer has chosen wisely to present "the history of the basic ideas in embryology," and wisely too, in the reviewer's opinion, has quoted liberally from the original sources, often in his own translations, "to avoid misinterpretation and to indicate something of the intellectual atmosphere of the time." The author has sought to efface his personal views, "for they are of the day," and "to reveal facts, not to utter dicta." The treatment throughout is sympathetic, for Dr. Meyer has a commendable understanding of the difficulties under which the early workers strove, and it reveals an unusually wide acquaintance with the sources, a fact to which the excellent bibliography of 19 pages abundantly testifies. In most cases the author brings his account down to the first quarter or half of the nineteenth century.

The first chapter deals with "Aboriginal Ideas of Reproduction," the beliefs of primitive peoples. Chapter II, "Early Historic Ideas of Reproduction," presents in the briefest possible way some of the more important views of the civilized peoples of antiquity, and especially those of Greece. There follows an interesting chapter on the tenacious doctrine of spontaneous generation which reached the height of absurdity, and, perhaps charlatanry, in Paracelsus. Chapter IV traces the history of the doctrine of epigenesis to von Baer's day. The author quotes the "New English Dictionary," which ascribes the first use of the word "epigenesis" to the year 1807. However, the reviewer finds the term used as an English word in the 1653 translation of Harvey's "De generatione animalium" (*e.g.,* Ex. XLV, p. 224). The treatment of the preformation theory in Chapter V is excellent, and this is followed by brief but adequate discussions of "Pangenesis," and "Panspermism or Panspermatism" in Chapters VI and VII. Chapter VIII presents the absorbing story of "The Search for the Mammalian Ovum." On p. 100 Fabricius is said to have recognized "three parts in the uterus of the hen: (1) the ovary, and (2) the superior and (3) the inferior portions of the oviduct, which he included in the uterus." More correctly, the "superior uterus" of Fabricius is the ovary, the "inferior uterus," the entire oviduct; the latter Fabricius divides into three portions. On the same page Adelmann is incorrectly stated to have said that Coiter "noticed the openings in the ruptured ovarian vesicles," etc. That statement was made about De Graaf (see *Annals of Med. Hist.,* N. S., 5: 338–339). Coiter does not mention the rupture of the Graafian vesicles, but on p. 140 Dr. Meyer says he does. The statement that "to both Harvey and Fabricius the ovum was the beginning of the development of any animal" (p. 101) is incorrect as applied to Fabricius, nor is it true that "both Fabricius and Fallopius expressed the idea that viviparous animals may arise from egg-like primordia" (p. 128). Certainly Fabricius never speaks of the "conception" of the vivipara as an egg, or even as "egg-like." Dr. Meyer has apparently been misled by a

statement of Harvey to that effect. Where does Fallopius express such an idea? On p. 104 Dr. Meyer says, "It will be recalled that Fabricius already had suggested the word *ovarium* for the *testes mulibre* (*sic!*) but the suggestion apparently received very little attention until 1667, when Nicolaus Steno also made it, unaware of the fact that Swammerdam and De Graaf both had done so three years previously." That statement is misleading. Fabricius applied the term *ovarium* to the ovary of ovipara, not to the *testis muliebris,* the ovary of viviparous animals, which he calls a *testis muliebris* or sometimes a *glandula.* The latter term apparently inspired Harvey to speak of the mammalian ovaries as *quasi parvae glandulae.* Further, is there any evidence that either Swammerdam or De Graaf published such an idea in 1664? Dr. Meyer, one suspects, is thinking of Swammerdam's claim that he and van Horne had independently come to the same conclusion as Steno, apparently in 1666 or 1667.

The last paragraph on p. 128 gives the impression that all von Baer's "Entwickelungsgeschichte" was translated into French by Breschet. Actually, only pp. 3–140 of Part I were translated.

The last paragraph on p. 130 is confusing. Von Baer makes quite clear his reason for stating that Purkinje's vesicle is absent in the eggs of hens kept without a rooster. He rejects Purkinje's idea that the disappearance of the germinal vesicle in the oviduct is due to pressure exerted by contraction of the infundibulum and then inquires whether its disappearance may not be due to fertilization. He decides that fertilization can not be responsible because he has found that in hens kept without a cock the Purkinjean vesicle is absent in eggs which are passing through the oviduct. Hence, von Baer concludes that the vesicle is expelled from the egg before fertilization and that it is dissolved between the yolk and vitelline membrane.

The "Discovery, Origin, and Meaning of the Spermatozoon" is the subject of Chapter IX, which is followed by a discussion of "Changing Ideas of Impregnation or Fertilization." The salient facts are ably presented. The statement on p. 159, "Aristotle thought that eggs can be impregnated twice—first in the ovary, and again after they leave it"—is, however, misleading, for Aristotle had no clear conception of the ovary and oviduct of the fowl nor of their respective roles in the production of an egg. Aristotle merely says, "Wind-eggs can turn into fertile eggs, and eggs due to previous copulation change breed, if before the change of the yellow to the white the hen . . . be trodden by another bird. (*Hist. An.,* VI, 2).

"The Role of the Mule" is the alluring title of Chapter XI, which treats of hybrids, but carries the subject no further than the end of the 18th century. "The Problem of Malformation" is presented in Chapter XII. One wonders why Colombo is emphasized as one of those who contributed facts leading to a more rational view of abnormal development. Chapter XIII tells many interesting facts about the development of the microscope and other technical aids in preparation for a discussion of "The Growth of Morphology" in Chapter XIV. The treatment of the latter is perforce brief and uneven.

Aristotle, Herophilus and Leonardo da Vinci are lightly touched upon. Alessandro Benedetti is said to have examined a pregnant bitch; but Benedetti opened the deer's uterus—("cervinum uterum olim resecamus," *Hist. corp. Hum.,* Lib. II, cap. 23).

The accounts of Coiter and Aldrovandus are too brief to be informative. Dr. Meyer quotes Needham's statement that Aldrovandus "was the first biologist since Aristotle to open the eggs of hens regularly," etc. Perhaps so, but we must remember that his work did not appear in print until 1600, twenty-eight years after Coiter's work was published, and that there is no real evidence to prove that Coiter did not actually make his study before Aldrovandus, even though his teacher stimulated him to do so. On p. 296 Coiter is listed as one of the men who made "good and abundant use" of illustrations. It should be remembered, however, that Coiter did not illustrate the development of the chick.

Spigelius also has been treated too briefly. His "De formato foetu" first appeared at Padua in 1626, not "in Frankfurt in 1631." Even though Vesalius's faked illustration in the 1555 edition of his "Fabrica" induced Spigelius to say that the human foetus has an allantois, it is not surprising to find that the allantois does not appear in the illustrations Spigelius borrowed from Casserius, because the foetuses illustrated are all at or near term. Further, Spigelius did not neglect to give an explanation of the *cutis sordes* [*vernix caseosa*]. He says that it protects the skin from the deleterious effects of the sweat in the amnion and prevents the outflow of vital spirits through the pores of the foetal skin, which are more open than after birth.

Hieronymus Fabricius ab Aquapendente is considered at length, and four extracts from his "De formatione ovi et pulli" are presented in translation. The emphasis is placed on Fabricius' statement that the chick arises from the chalaza, not from the cicatrix. One wishes, however, that some constructive aspect of his work had been stressed—his real contribution to the knowledge of placental structure, for example.

It is doubtful if an edition of Fabricius' "De formato foetu" was ever issued in 1600, as Dr. Meyer says.

"The nucleus of the unfertilized hen egg," says Dr. Meyer, "is large and conspicuous." What does he mean? The reviewer would emend a number of Dr. Meyer's renderings in the extracts from Fabricius,

e.g., on p. 285, line 14, for "from the substance," read, "by the substance"; in line 17, for "Indian hen," read, "turkey hen"; line 29–30, for "or that something . . . eggs," read, "or that something analogous (to the chalazae) has been laid down, as in the smallest eggs" (*aut analogon quid esse positum, ut in minimis ovis*); line 34, *turrita* is probably the wild pigeon; line 38—p. 285, line 1, for "that all agree . . . eggs," read, "that it is reasonable to believe that chalazae are present in all eggs; line 1, for "I exclude," read, "I have refrained from observing"; line 9, for "two," read, "too." Dr. Meyer says on p. 287 that Fabricius believed that the seminal material of "vipers" is slight in quantity; Fabricius makes that statement of vivipara.

Harvey receives somewhat briefer treatment than Fabricius. Highmore is mentioned briefly, and Descartes is justly reprimanded for having "set a bad example, indeed, for men of science" by his "loose generalizations." Walther Needham, Malphigi, Kerckring, Kuhlemann and Haller pass in review, and then comes a splendid, extensive account of John Hunter's work on the development of the goose egg. Caspar Friedrich Wolff's, von Baer's and Purkinje's contributions form a fitting climax.

In the last chapter the author cites a number of interesting facts to support his contention that "Experimentation—is not the child of to-day," and to disprove the statement that "until 1859 embryologists were content to follow changes in form."

The book is illustrated by 97 figures, admirably selected, but in some instances indifferently reproduced. Fig. 91, taken from Plate VIII of Pander's "Beiträge zur Entwickelungsgeschichte," etc., has unfortunately been reversed by the printer, and the legend attributes it to von Baer. The few typographical misprints are of no serious consequence, neither is the omission of a few works from the bibliography.

While the more important slips of the pen have been pointed out, it should be emphasized that they do not seriously impair the value or importance of Dr. Meyer's fine book. It is a work which supplements admirably Needham's "History of Embryology"; this reviewer welcomes its appearance.

HOWARD B. ADELMANN

CORNELL UNIVERSITY

SPECIAL ARTICLES

ALCOHOL TASTE THRESHOLDS AND CONCENTRATIONS OF SOLUTION PREFERRED BY RATS

IN a previous study[1] it was found that rats whose only access to fluid was in the form of an 8 per cent. alcohol solution drank the same total volume as a control group of rats which had access only to tap water. No abnormal behavior was observed and the rate of growth and the activity curves were the same. The experimental animals reduced their food intake, as measured in calories, in proportion to the caloric value of ingested alcohol, thereby maintaining a caloric value equal to the number of calories ingested by control rats on the standard diet. It was further reported that rats restricted in fluid to a 16 per cent. solution of alcohol differed from the 8 per cent. group only by slightly decreased activity and a reduced total volume of fluid intake. The animals refused to take more alcohol in grams than the first group obtained from the 8 per cent. solution. The fact that the rate of growth and activity curves were normal for many months when the alcohol replaced from one fourth to one third of the stock diet demonstrated that alcohol served as a food.

Since publication of the above study on alcohol, numerous instances of beneficial regulatory activities of rats have been reported. Thus, it was found that adrenalectomized rats maintained a constant internal salt environment and kept themselves alive by ingesting large amounts of salt;[2] similarly, parathyroidectomized rats ingested large amounts of calcium solution and thus kept themselves free from tetany.[3] Rats even make beneficial selections when allowed to select their entire diet from purified (or nearly purified) substances.[4]

Using a technique originally devised to determine the taste thresholds of rats for such substances as salt,[5] sugars,[6] etc., we have obtained further information regarding the ability of rats to regulate their alcohol intake. These results throw more light also on the nutritional value of alcohol. In these experiments the rats, kept on our standard McCollum diet, had access for several weeks to two graduated bottles filled with distilled water. Intake from each bottle was recorded daily. When the intake from each bottle had reached a fairly constant level, we put a subliminal concentration of alcohol solution (0.01 per cent. by weight) in one bottle. Thereafter each day we increased the concentration in small steps. Fig. 1 gives the record of one of the animals. The ordinates indicate fluid intake in cubic centimeters; the abscissae

[1] Curt P. Richter, *Jour. Exp. Zool.*, 44: 387, 1926.

[2] Curt P. Richter, *Am. Jour. Physiol.*, 115: 155, 1936.

[3] Curt P. Richter and John F. Eckert, *Endocrinology*, 21: 50, 1937.

[4] Curt P. Richter, L. Emmett Holt, Jr., and Bruno Barelare, Jr., *Am. Jour. Physiol.*, 122: 734, 1938.

[5] Curt P. Richter, *Endocrinology*, 24: 367, 1939.

[6] Curt P. Richter and Kathryne H. Campbell, *Am. Jour. Physiol.*, 128: 291, 1940.