all fields of natural history who might wish to take advantage of our organized expeditionary research in this region.

The New York Times has equipped the expedition with code radio transmitting and receiving apparatus, with which daily communications, news dispatches, etc., will be released from the base camp. The expedition is electrically equipped to provide for unusual field comforts and laboratory facilities and should offer extremely pleasant conditions for extensive studies of a practically unknown area.

While the expedition is essentially ethnological in character, it is my desire to increase the scope of scientific accomplishments while in the field by adding to the personnel such scientific members as may be qualified to contribute their bare transportation and living expenses, which are estimated at $1,250.00 for a full interval (New York to New York) of six months.

Supplementary field activities will include: (a) The collection of fine-grained geological specimens for Massachusetts Institute of Technology, Department of Geology, for time relation research. (b) A specimen of the rare, landlocked *Arapaima gigas*, a fifteen-foot, five hundred pound fresh-water fish, is to be secured for the American Museum of Natural History. (c) Geographical data will be filed with the American Geographical Society. This will include the exploration of Mt. Roraima, popularly known through Conan Doyle's fictional extravaganza as the "Lost World." (d) An experiment will be conducted to determine the effect of a controlled diet of modern prepared foods on the physical development of a selected group of primitive children.

All members of the expedition will be entirely free to devote their full time to their respective interests. They will be at liberty to write and to lecture on their specific subjects upon the return of the expedition and may equip themselves with both still and moving picture cameras for this purpose.

Inquiries and applications should be directed without delay to the headquarters of the expedition at Essex House, 160 Central Park South, New York City.

The expedition is thoroughly equipped for the general maintenance of the health of the party, but applicants will be required to provide health certificates attesting their physical ability to withstand the rigors of tropical life.

R. STUART MURRAY,
Leader, British Guiana Expedition, 1935

SCIENCE FOR THE GENERAL PUBLIC

ALLOW me to amend Waldemar Kaempffert's contention that "if we had a public adequately educated in science it would not be necessary . . . to resort to the literary devices of the primary school reader . . ." (SCIENCE, June 28, p. 640). The average intelligence and comprehension of the readers of our daily papers are, I find, far higher than the editors of those dailies presume.

And allow me to amend Howard W. Blakeslee's earlier contention that scientists will get more newspaper attention by using emotion-laden phraseology (SCIENCE, June 14, p. 591). Rather, scientists will keep the respectful attention of the general public (1) by always presenting their ideas clearly, and (2) by pointing to the significance of their work, with an evaluation *ad hominem* where at all possible.

MYRON WEISS

TIME, THE WEEKLY
NEWSMAGAZINE,
NEW YORK AND CHICAGO

SCIENTIFIC BOOKS

DE GENERATIONE

A History of Embryology. By JOSEPH NEEDHAM, Sc.D. Cambridge, at the University Press: New York, The Macmillan Company, 1934. xviii + 274 pp. 40 figs. Price, $4.00.

THIS is a second edition, somewhat enlarged and revised, of the author's historical introduction to his 3-volume "Chemical Embryology" of 1931. The detached chapters, at a lower price, are thus more readily available, which is fortunate, for they make a very serviceable book. Unauspiciously it begins with "Embryology in Antiquity: I. Indian Antiquity"—two pages illustrated solely by the nondescript painting on a recent New Guinea door (de Clercq, 1893). The main text is here unchanged, but footnotes and references have been added. Dr. Needham's reading-list, at the end of the volume, is a long one (35 pages) and there are few historians who will not find in it new and enticing titles. "Egyptian Antiquity" follows, with added material. There are figures of an ancient standard, borne before the king in his jubilee festival, representing no one knows what. But Seligman and Murray consider this bilobed object, with its cord or streamer, to be a perfect image of an afterbirth. Folklore on that topic—"reverence for the umbilical cord"—is followed by an account of primitive incubators, with "a very beautiful hymn" by a king of Egypt on the hatching of the bird. "Hellenic Antiquity" is almost as briefly considered, after which the reader encounters the heading, already contradicted, "Hippocrates: the Beginning of Observation."

Dr. Bruno Bloch in his scholarly essay "Die ge-

schichtlichen Grundlagen der Embryologie bis auf Harvey" (Abh. d. Kaiserl. Leop.-Carol. Akad., 1904) has reported how the unknown author of the Hippocratic *De natura pueri* gave directions for placing twenty or more eggs under a hen or two, so that by breaking open an egg every day one could observe, as he had done, the progressive development of the chick; and how Aldrovandi, on reading this account more than fifteen centuries later, proceeded to do just that, stimulating his pupil Coiter, and their younger contemporary Fabricius, to productive observations. Riolan also avers that the example of Hippocrates and Aristotle was followed by Aldrovandi, Coiter and Fabricius. In the interim there were many fumbling writers, and eminent physicians, theologians, artists and poets who adverted to the mystery of development. Patiently Dr. Needham records their slender contributions and futile opinions. With St. Hildegard, hailed by admirers as "die erste deutsche Naturforscherin und Ärztin," he thinks that "embryology touched, perhaps, its low-water mark." She thought that the stupid, feeble and useless elements of humanity were the less firmly curdled cheeses. But with Albertus "the new spirit of investigation leapt up into being." Like Aristotle "he produced biological work with, as it were, no antecedents." Averaged with Dr. Bloch's comment that "Albertus' embryology is throughout purely a work of compilation, lacking independence—an extract from Aristotle, modified in some parts through Galen and the Arabic sources," one may fairly estimate the contribution of the only anatomist who is now a full-fledged saint.

Leonardo is described as "the father of embryology regarded as an exact science." From Leonardo's notebook Dr. Needham selects a page of drawings of consummate art, and the memorandum that in every nine months, beginning with conception, increase in size diminishes till man has come to his full height. "One almost expects to see Leonardo exemplify his words with a graph until one remembers with a shock that he lived two centuries before Descartes, and five before Minot," whereupon Dr. Needham inserts as Fig. 9 Minot's graph in appropriate illustration. Such correlation of Leonardo and Minot has more basis than the finding of axial gradients "deep down in the mind of Aristotle," from which emerged also "the first reference to enzyme action."

In stating that Vesalius "took hardly any interest in fetal development" Dr. Needham declares him "the greatest anatomist of any age." Thus Vesalius, as usual, is not underestimated; nor Stensen, said to be "to all intents and purposes the founder of geology." The comment that Fallopius "must be mentioned as the discoverer of the organs which bear his name" may be compared with a preceding statement that "Herophilus described the Fallopian tubes." Fabricius fares badly. Dr. Needham does not agree with *Carolo Singer temporum nostrorum Erasmo eruditissimo* when the latter writes that Fabricius "elevated Embryology at one bound into an independent science." Unconsciously, however, Dr. Needham pays tribute to Fabricius. For in discussing Walter Needham he declares that his namesake's book is important "because it contains the first practical instructions for dissections of embryos (see Fig. 24)." The figure in question the elder Needham purloined from Fabricius, and he uses it also in his amusing attempt to draw a fetal horse from memory. But there are more serious matters.

The account of Malpighi's studies is inadequate and misleading. Under the microscope Malpighi first saw the central nervous system arising as a furrow in the skin, closing off as a tube, and expanding in a series of vesicles to form the brain. This familiar but momentous observation is not mentioned. The heart, at first a straight tube, coils in a precise manner which Malpighi clearly figured; but how from such a structure the four-chambered adult heart arose remained to him a mystery, and reasonably so. Instead of references to these and other basic morphological observations, we read that Malpighi "appears to have been anticipated as regards the first description of the chick's heart pulsating in colourless blood by Henry Power, M.D.," with a longer quotation from Dr. Power's delightful but relatively superficial book, than anything taken from Malpighi. Dr. Needham is interested in Malpighi's inference that organization is present in the egg at the outset. "Yet Malpighi's view was much more sensible than many which succeeded it," is a patronizing comment; and there are scattered references in the following pages to "the error of Malpighi," and "Malpighi's unfortunate experiments." Unable to draw, though having so much to represent, Malpighi produced some of the ugliest sketches known, though Dr. Needham comments, in all sincerity, "the plates . . . are beautiful." He continues—"It is interesting to note that Malpighi could not have done his work without Harvey whose name he mentions on his first page." Malpighi, in reporting his study "On the formation of the chick in the egg" to the Royal Society in London, writes politely and modestly—"Many have sweated in this research, eminent among whom is your immortal Harvey, whose finished observations so enlighten the world that my labors, especially, shrink into insignificance." That is not the judgment of posterity!

Similarly, Leeuwenhoek is introduced casually, Sir Thomas Browne reporting to his son,—"Here are some

things remarkable. . . . It may bee worth your reading." Libelous is the comment,—"the time-killing dilettante, almost philatelic, quality of Leeuwenhoek's investigations is, as Becking says, too obvious to be overlooked." But Leeuwenhoek has been vindicated by Dobell, and the reviewer recalls the session of the American Association at which Dr. Welch read passage after passage from Dobell's new book until reluctant adjournment near midnight. Dr. Needham says "Dobell's book on Leeuwenhoek, though marred by certain lapses of taste, is probably the most considerable and ingenious study of any seventeenth century biologist extant."

Embryology in the eighteenth century, with which this history concludes, is no climax. There are indeed Haller, Wolff, Buffon and Réaumur with his incubators, but "he nowhere gives any indication of his percentage hatch." (Après avoir vû naître des poulets de plus de trois quarts des œufs d'une couvée, etc., Réaumur, 1749, T. 1, p. 256). The fundamental questions remain unsolved while the observational and experimental data accumulate. Dr. Needham, in his conclusions, presents the limiting factors in a diagram. He has written an excellent book, attempting to clear his own mind, teased with the problems of teleology and the final cause.

That he writes as an Englishman and a chemist is clear from his selection of portraits to illustrate the history of embryology till 1815. William Harvey is the frontispiece; Coiter, fortunately, in excellent full page half-tone; and Leeuwenhoek, but no Malpighi; Robert Boyle, Sir Kenelm Digby, Sir Thomas Browne and his wife Dorothy; with smaller line drawings of De Graaf, Nathaniel Highmore and a group vignette including Buffon to complete the list. English also in his spelling *foetus,* sanctioned by the Oxford Dictionary, which contains this entry:

Latin, *fetus,* incorrectly written *fœtus.* The etymologically preferable spelling with *e* in this word and its cognates is adopted as the standard form in some recent Dicts., but in actual use is almost unknown.

Not so in America! The incorrect diphthong appearing several times on sundry pages is an unnecessary blemish in a book so commendable.

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HARVARD MEDICAL SCHOOL

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

MEETING OF THE SOUTHWESTERN DIVISION

THE fifteenth annual meeting of the Southwestern Division and associated societies was held in Santa Fé, New Mexico, from April 29 to May 2, 1935, with the Laboratory of Anthropology, the Museum of New Mexico and the School of American Research as the host institutions. The meeting was the largest in the history of the division, with 220 registrants and 142 scientific papers, and the local committee, under the chairmanship of Jesse L. Nusbaum, director of the Laboratory of Anthropology, planned especially well for the smooth and efficient running of the meeting. The New Mexico Public Health Association met with the division, holding its own sessions for papers, and six other organizations, including the Ecological Society of America, were officially represented on the program, especially in the symposium on "The Ecological Aspects of the Emergency Activities of the Government." The second annual conference of investigators engaged in the interpretation of tree rings or in their technology, as developed by Dr. A. E. Douglass and his associates, organized itself on a permanent basis as the Tree Ring Society, with Dr. Douglass as president and H. T. Getty, of the Department of Archeology, University of Arizona, as secretary.

The sixth annual John Wesley Powell lecture was delivered on Monday evening, April 29, at the Museum of New Mexico by Dr. Edgar Lee Hewett, director of the Schools of American Research, on the title: "The Social Sciences in the Program of Education." On May 1 at the Laboratory of Anthropology occurred an important and enthusiastically attended symposium on "Trees: Recorders of History and Climate." The topics and speakers were: I. "Factors Influencing Tree Growth," G. A. Pearson, director of the Southwestern Forest and Range Experiment Station, Tucson. II. "Tree Rings: the Archeologists' Time-Piece," Dr. E. W. Haury, assistant director of Gila Pueblo, Globe, Arizona. III. "Tree Rings: Indicators of Nature's Depression Cycles," Dr. A. E. Douglass, director of the Steward Observatory, University of Arizona, Tucson.

Other general and public lectures were delivered by Dr. W. B. Pietenpol, of the University of Colorado, on "Atomic Nuclei," and by Dr. Walter H. Brown, of Stanford University, on "The Outlook for Public Health Programs in the United States." Under the charge of Colonel C. M. Adams, of the U. S. Public Health Service, there was an exhibit of methods of malaria control in New Mexico, in part illustrated with motion pictures. The annual banquet of the division was held at La Fonda Hotel on Wednesday evening, May 1, following which the retiring president