comparatively small number of birthdays would be dislocated, but this would not be serious.

A. L. CANDY

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QUOTATION WRONGLY CREDITED

SCIENTISTS often hold men of letters up to ridicule for their ignorance or misuse of scientific terms—and very properly. But now and then an opportunity comes for a turning of the tables, as, for example, on page 558 of SCIENCE for December 19, 1924, where Pasteur is credited with the well-known passage from the close of Robert Louis Stevenson's El Dorado: "To travel hopefully is a better thing than to arrive, and the true success is to labor."

FRED NEWTON SCOTT

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SCIENTIFIC BOOKS

A Bibliography of American Natural History. The Pioneer Century, 1769–1865. Vol. 1. An annotated bibliography of the publications relating to the history, biography and bibliography of American natural history and its institutions, during Colonial times and the pioneer century, which have been published up to 1924; with a classified subject and geographic index; and a bibliography of biographers. By MAX MEISEL. Brooklyn, New York, The Premier Publishing Co. 244 pp. Price $5.00.

THE recent rather rapid extension of interest in Americana among libraries and bibliophiles and the growing attention paid to the historical development of scientific interests generally combine to make the publication of this bibliography both welcome and opportune. The classic series of papers by George Brown Goode on the history of American science, especially of natural history, of museums, of national scientific and educational institutions, of scientific congresses, of the United States National Museum and of the Smithsonian Institution furnishes a splendid résumé of the period covered by this bibliography, from the pen of one who took an active and by no means insignificant part in that pioneer period. This bibliography, which has utilized all the modern aids of library organization, will be of greatest assistance to some future historian who may seek to evaluate the effects of ideas, of the influences, both indigenous and foreign, of the leadership of men of ability and vision, of social groups and of environments which have inspired and moulded the development of American biology in the first century of its growth.

The scope of the work is an ambitious one and its proposed outline is as complete as bibliographic skill and training can make it. The author has been fortunate in receiving the personal aid of some who have had personal knowledge of the latter part of the era included, and also of those whose technical information in the wide range of subjects covered has been of great value in securing inclusiveness of pertinent titles especially of works in foreign periodicals, or of foreign publications, and of others whose titles afford no clue to the historical phases of their contents.

The work is more than a mere bibliography by virtue of the analysis and classification of the titles cited. The subjects included are the rôle played by scientific societies, scientific journals, natural history museums and botanic gardens, state geological and natural history surveys and federal exploring expeditions in the rise and progress of American botany, geology, mineralogy, paleontology and zoology. In the first volume the chronological list of institutions and publications which have fostered natural history in the United States is particularly instructive. So also are the annotations on the titles concerned with the history, biography and bibliography of American natural history; see, for example, the data on the group of members of the Philadelphia Academy who formed a center at New Harmony, Indiana. The classified subject index to the historical bibliography fills 37 pages and the geographic index 15 pages, while the bibliography of biographies, from John Abbot, the ornithologist, to Joseph Zentmayer, the maker of microscopes, fills almost a hundred pages. To scan the list is to gain a new vision of the wonderful galaxy of stars which illumined the dawn of American science—the Agassizs, Audubon, Baird, Barton, Bartram, Binney, Bonaparte, Brewer, Cassin, Cooper, Cope, Coues, Dana, Darlington, Elliott, Engelmann, Franklin, Gill, Gould, Gray, Guyot, Hagen, Haldeman, Hall, Hayden, Henry, the Hilgards, Hitchcock, Holbrook, Horn, Hyatt, Jefferson, Kalm, King, Lea, the Le Contes, Leidy, Lesquereux, Le Sueur, Marsh, Michaux, Newberry, Nuttall, Owen, Packard, Peale, Pickering, Pourtales, Powell, Putnam, Rafinesque, Rogers, Say, Scudder, Shaler, Silliman, Stimpson, Storer, Sullivant, Torrey, Tuckerman, Verrill, Whitney, Wilson, Winchell, Wistar, Wolle and Wyman.

The second and third volumes will contain the history of the institutions which have contributed to this field, bibliographies of their publications, and lists of their papers which deal with natural history. State surveys and expeditions will receive similar treatment. This will be followed by a full bibliography of books, articles and miscellaneous publications dealing with natural history and a chronological table of publications.

Indices of authors and institutions will also be provided. This bibliography when completed will

thus be a great convenience to the historian of the biological sciences and also to specialists in a number of fields, especially since American titles have often been so incompletely represented in European bibliographies of the last century.

CHARLES ATWOOD KOFOID
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LABORATORY APPARATUS AND METHODS

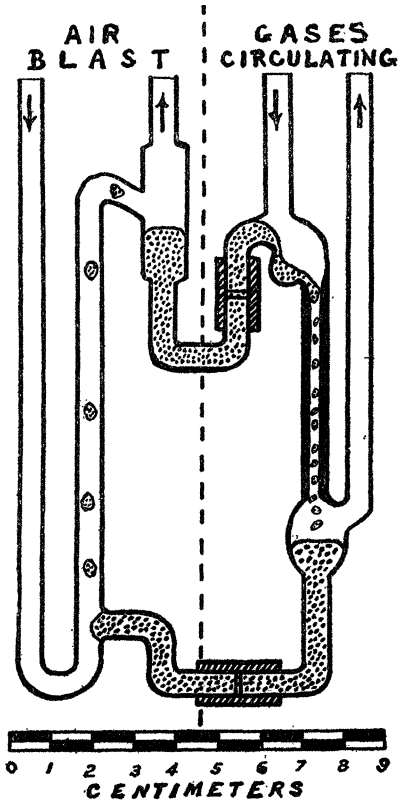
A SIMPLE CIRCULATION PUMP FOR GASES

THE physicist, the chemist and the biologist all may have occasion to pass continuously the same sample of gas at ordinary pressure over an object under investigation. This is commonly done by some form of circulation pump involving valves, which gives stepwise circulation and requires an individual motor. In meeting this problem, we have secured practically uniform and continuous flow by utilizing a very simple form of gas circulation, which uses for power the customary air-blast to be found in most laboratories. We believe a brief description of our apparatus will prove of interest to other workers.

The principle on which our apparatus functions may perhaps be made clear by an analogy. If one wished to circulate water round an annular trough, one might employ a paddle wheel operating at a constricted part of the annulus. In our gas-circulator, we paddle the gas round the closed system by means of a constant stream of droplets of mercury falling by gravity down a narrow tube which forms part of the circuit. This constant falling of mercury is reminiscent of the operation of a Sprengel pump, in which, however, the mercury droplets, by filling the bore of the fall-tube, act rather as pistons than as paddles. The portion of the figure to the right of the vertical dotted line shows the construction that serves the fall-tube.

The portion of the apparatus to the left of the dotted line is devoted solely to the purpose of raising the fallen mercury back to the level of the top of the fall-tube. Its action is precisely the converse of that of the right-hand portion, for here an air-blast from outside is employed to blow the mercury in droplets, which do not fill the bore of the rise-tube, from the low to the high level.

The entire apparatus as sketched is smaller than a man's open hand, and is constructed of glass tubing of 4 to 5 mm bore, except for the fall-tube, whose bore is about 2.5 mm. The two rubber connections shown in the figure make for ease in construction; and, in any case, the gases to be circulated come in contact only with glass and mercury. About 7 cc of mercury are sufficient. As in Bunsen and other pumps which incline to temperamentality, slight differences of construction sometimes lead to large changes in efficiency. A satisfactory model is furnished by the Eastern Instrument Company, 109 Oliver St., Newark, N. J.



A single such apparatus will circulate gases against back pressures in the circuit corresponding to a head of over 30 cm of water at a speed of two liters per hour; while, if the back pressure or resistance is negligible, the speed of circulation may exceed eight liters per hour. The consumption of air-blast air, at the customary six pounds pressure, is about one eighth of a cubic foot per minute, which is but half what a blast lamp uses. If greater volume of air circulation is desired, several such circulators may be used in parallel.

A. W. C. MENZIES
E. M. COLLINS
P. L. TYSON

PRINCETON, N. J.

SPECIAL ARTICLES

PROPAGATION OF ELECTROMAGNETIC WAVES OVER THE EARTH

AMONG the facts to be explained in a satisfactory theory of the propagation of radio waves over the