Indeed, this reviewer thinks that it is not as a historical authority that parts 2 and 3 of this book should be read, but rather as an often personalized account of *some* of the exciting electronic computer events of the 1940's and 1950's. Thus, perhaps the most serious criticism of the book is for its misleading title. Whereas the title promises a general treatment of computers "from Pascal to von Neumann," in fact the last two-thirds of the book is primarily a description of Goldstine's activities in computer development. Parallel developments receive little or no attention. The book does fill a need for more information on the computer achievements of the '40's and '50's, and with minor omissions it does give a rather complete earlier computer history.

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I thank Velma R. Huskey for assistance in writing this review.

Pictorial Chronicle

A Computer Perspective. By the office of Charles and Ray Eames. Harvard University Press, Cambridge, Mass., 1973. 174 pp., illus. $15.

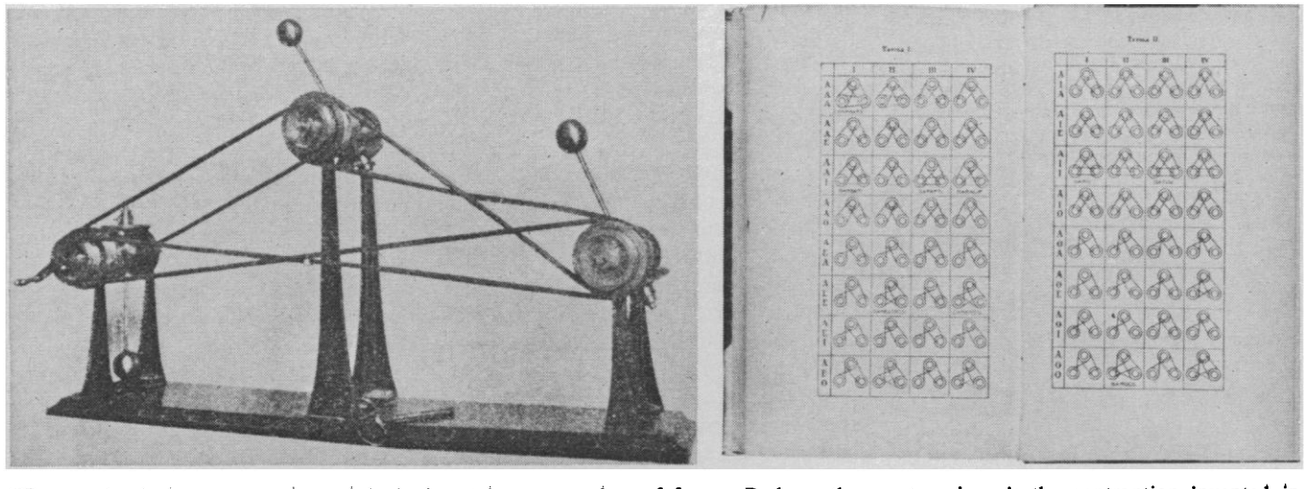
This volume is a pictorial essay on the ideas, events, individuals, and artifacts related to the 20th-century development of the information machine. It is based on an exhibit known as the "history wall" which opened on the ground floor of the IBM building at Madison Avenue and 57th Street in New York City in February 1971 (see *Computing Reviews*, May 1971, p. 203).

In many ways, the book is easier and more luxurious to read than the wall is to view. One can savor it without sore feet and without having to stretch for objects nearly eight feet above or having to attempt to study an artifact or document partially hidden by another object or picture.

The book, like the exhibit, covers six decades of events, beginning in 1890. The development of the modern-day computer is traced from its beginnings in terms of three distinct evolutions: "logical automata," "statistical machines," and "calculations." However, the book is not a history in the conventional sense of developing a clear chronology of its major themes or developing the relationships between their various facets. From a historical viewpoint, it is flawed by arbitrary forcing of events to their decades of occurrence, regardless of the flow of ideas. Thus the burden of evaluation and connection is placed on the reader. For example, the work of Vannevar Bush and Harold Hazen on control problems in the 1930's is pictured on pp. 106–07 and 115–17, while one of the major outcomes of this work, Project Whirlwind (1950's), does not appear until pp. 150–51.

While the disadvantages of this format are obvious, the advantages, of course, are also clear: The intellectual and technical developments are vividly placed to enhance the reader's awareness of the environment within which they occurred. This gives the reader the freedom to make his own way through the complexity of the evolution of ideas and their eventual foci in the contemporary scene. In this sense, the pages may give a much more accurate display of the history of computer development than any conventional approach. For example, one becomes clearly aware in this carefully constructed illustrated essay of the important roles played by von Neumann in a variety of areas: the stored program concept, operations research, automata theory, the EDVAC, the Institute for Advanced Study machine, and weather research. It is naive to assume, however, as one might as a result of the way this volume presents the material, that these milestones did not have complex conceptual and implementational evolutions in which a variety of individuals played critical roles.

The volume is attractively done, as one would expect from the Eameses, and will be of interest to the general reader as well as to the specialist. It admirably accomplishes, within the



"The mechanical representation of logic has taken a number of forms. Perhaps the most curious is the contraption invented in 1903 by Annibale Pastore, a professor of philosophy at the University of Genoa, Italy. Although the machine did not look complicated (or for that matter, logical), its wheels, belts, weights, and differential gears could be hooked up in a bewildering variety of configurations to represent any of 256 syllogistic structures." Pastore presented the 256 configurations in his book *Logica Formale: dedotta della considerazione di modelli meccanici*, "which includes the following example of the syllogisms his machine could handle: *Whatever is simple does not dissolve; The soul does not dissolve; Therefore, the soul is simple.* After making belt connections corresponding to each premise and the conclusion, the operator would crank wheel A. Since the syllogism is invalid, the wheels would not budge." [From *A Computer Perspective*]

constraints of its format, the "task of making clear the historical forces that produced the modern computer" (I. B. Cohen, Introduction, p. 7).

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Men, Institutions, and Ships

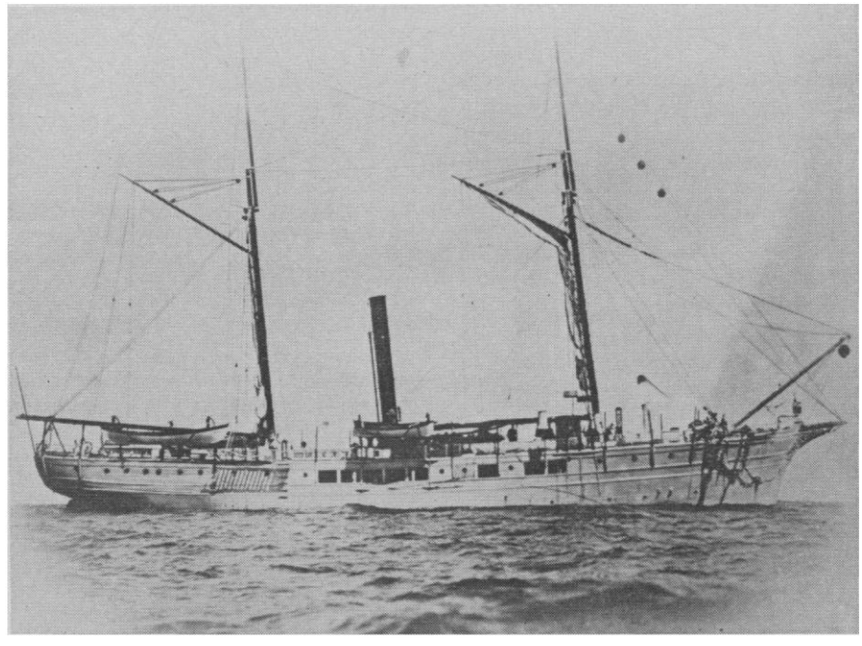
The Edge of an Unfamiliar World. A History of Oceanography. SUSAN SCHLEE. Dutton, New York, 1973. 398 pp., illus. $10.95.

Oceanography, although its beginnings are respectably far back, was long a small community where everybody knew nearly everybody else. Since World War II, it has exploded to vast dimensions and great diversity. This happened first by the drawing in of talent from the outside, and only much later by formal training of oceanographers as such.

Now the size and wealth of its domain and its impact on human thoughts and affairs make oceanography of interest to those whose task it is to explore the evolution of man's ideas and their interaction with reality. At the same time, the practitioners of the science, finding it increasingly difficult to keep up even with the daily developments in their own specialties, begin to lose contact with the evolution of the field and feel a need to acquaint themselves with its past in a more deliberate and systematic manner than by just listening to the lore provided by the old hands. Thus the time is ripe for historical studies of this suddenly so visible and important field. With the exception of some specialty studies, there are few of these, and Susan Schlee has filled an important gap and filled it well.

This charming book is an introduction that will not so much satisfy the desires of the historians and oceanographers as whet their appetites. In the process, it provides a rich, stimulating, and also entertaining experience, written as it is in an easy, flowing style full of small details that focus on personalities and events. For this reviewer, who has watched the oceanography scene for almost 25 years, it contains a great deal that was new and much more that suddenly made sense out of strings of loose information picked up here and there. The history of oceanography is filled with men, institutions, and ships. The names are often familiar and suddenly acquire new perspective. To see Sir Charles Wyville Thomson, formerly best known from the oceanic ridge that bears his name, as a human being, to find that R. V. *Pillsbury* traces its name back to a man who desperately tried to retain a scientific effort in the 19th-century Coast Survey, but failed, are small delights that brighten days normally filled with charts, tables, and administrative memos.

The reading of the history of one's own field leaves many impressions that last. There is the sobering surprise, in some areas, that we have advanced so little. I enjoyed the careful discussion of the contribution of the *Challenger* expedition to our present knowledge of deep-sea sedimentation. To a much larger degree than many of us realize, we have succeeded only in quantifying and geographically expanding Murray and Renard's concepts; it is just in the last very few years that we have solved some major problems and raised important new ones. Reading this chapter in Schlee's book suggests that we might profitably take the *Challenger* Reports down off the shelf and dump some fairly large number of newer works. Quite in contrast with this, and almost wholly new to me, is the history of the International Council for the Exploration of the Sea in the early part of this century, and its successful organization of what has remained a major and active research program in biological and physical oceanography. Fascinating also, and in a way comforting, is the story of the relations between the U.S. government and academic and private ocean science. Concerned as we are today, or perhaps indignant is a better word, about the official emphasis on immediate returns of benefits to society, there appears to be nothing new in it. On the contrary, it is government support of fundamental research that is the new phenomenon, and if today we see a return to the older, more pragmatic, or perhaps more mercenary, attitudes



"The U.S. Coast and Geodetic Survey steamer *Blake,* which was used by Alexander Agassiz for a series of three cruises from 1877 to 1880." These expeditions of Agassiz's "were no carbon copies of the *Challenger*'s voyage, for the engineer-naturalist . . . had new ideas on how to rig a ship for deep-sea exploration. Agassiz had gotten these ideas . . . from the Calumet and Hecla copper mines in northern Michigan. There . . . he acquired much experience in hoisting pieces of heavy machinery and loads of ore up and down mine shafts, and this knowledge he applied to the similar problems of raising loads of deep-sea animals aboard the *Blake.* He worked closely with Charles Sigsbee, the steamer's able and inventive captain, and the two of them rearranged the drums and winches aboard the 139-foot ship, replaced her bulky hemp lines with thinner but stronger wire rope, and equipped the vessel with a double-edged dredge (that could land on either edge and still work), a better trawl, and Sigsbee's own improved version of Lord Kelvin's sounding machine." [Reproduced in *The Edge of an Unfamiliar World,* courtesy National Ocean Survey]