HISTORICALLY SPEAKING, - -

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Bibliographia Historica—I.

A BIBLIOGRAPHY of the history of mathematics would be a tremendous task involving too many languages and too many too technical works to merit space here. However, a bibliography of recent, readable historical materials available and usable by students in secondary schools and undergraduate colleges would not be so long and would be quite pertinent here. We hereby solicit such materials and, for a beginning, we include a list of our own.

The Scientific American, a venerable publication, was purchased in 1947 by a group headed by Gerard Piel formerly of *Life*. Both its purposes and format were revised. Its new policy has led to the printing of a number of articles of mathematical interest. These articles are followed at the back of each issue by a short list of references for further reading, and, in later issues, by letters from readers. In some instances even the book reviews have been short articles of interest in themselves.

The first issue of this new *Scientific American* appeared in May, 1948 as Number 5 of Volume 178. The following is a list of materials of a mathematical-historical nature appearing from May, 1948, through the issue of July, 1953.

Boyer, Carl B., "The Invention of Analytic Geometry." Vol. 180 (January 1949), pp. 40–45.

Cohen, I. Bernard, "Galileo." Vol. 181 (August 1949), pp. 40–47. Not much explicitly about mathematics, but a chapter in the development of theories of the universe, which story as a whole has many points of contact with mathematics.

———, "Books." Vol. 179 (October 1948), pp. 54–59. Reviews of books on the history of science with pictures of Norse runic numerals and diagrams for an ancient system of the universe.

Euler, Leonhard, "The Koenigsberg Bridges." Vol. 189 (July 1953), pp. 66–70. A translation with an introduction by James R. Newman.

Herwitz, Paul S., "The Theory of Numbers." Vol. 185 (July 1951), pp. 52–55.

Morrison, Philip and Emily, "The Strange Life of Babbage." Vol. 186 (April 1952), pp. 66–73.

Newman, James R., "William Kingdon Clifford." Vol. 188 (February 1953), pp. 78–84.

———, "Srinivasa Ramanujan." Vol. 178 (June 1948), pp. 54–57.

———, "The Rhind Papyrus." Vol. 187 (August 1952), pp. 24–27.

———, Reviews of *Makers of Mathematics*, by Alfred Hooper and of *Our Great Heritage*, edited by William Schaaf. Vol. 179 (November 1948), pp. 56–59. Pictures of the title-page of Billingsley's first English language edition of Euclid and of a part of the Rhind papyrus are included. It is in part an essay on "What Is Mathematics?"

———, Review of *Newton's Tercentenary Celebration*. Vol. 179 (July 1948), pp. 57–59, with pictures and a bibliography.

———, "Mathematical Creation." Vol. 179 (August 1948), pp. 54–57. This is really a summary of much of the writing of the famous French mathematician Henri Poincaré on the topic of how one gets a new mathematical idea. This is not strictly history of mathematics, but is related to one of the most interesting problems of the history of mathematics, "How does a mathematical idea grow? Where do new ideas come from?"

Reid, Constance, "Perfect Numbers." Vol. 188 (March 1953), pp. 84–86.

Santillana, George de, "Greek Astronomy." Vol. 180 (April 1949), p. 44. Both ideas of the nature of the universe and many of the persons mentioned here (Anaximander, Pythagoreans, Eudoxus, Ptolemy, Copernicus, Aristarchus) are closely related to mathematics.

Struik, Dirk J., "Stone Age Mathematics." Vol. 179 (December 1948), pp. 44–49.

Whittaker, Sir Edmund, "Mathematics." Vol. 183 (September 1950), pp. 40–42. This note on modern developments in mathematics is one of a set of articles on various sciences under the general heading of a lead article "The Age of Science: 1900–1950," by J. R. Oppenheimer.

The Oldest American Slide Rule

In section M-4 of the Henry Ford Museum, Dearborn, Michigan, an example of *Palmer's Computing Scale* has recently been put on display. This is a circular slide rule. It contains an eight-inch circular log scale which revolves within a similar circular scale printed on a piece of paper-covered cardboard nearly twelve inches square.

Further investigation shows that the first version of this slide rule was manufactured in 1843, a second and third, in 1845 and 1847. Where the first contained "Directions for Using this Scale" on the back, the second and third contained "Fuller's Time Telegraph," a scale for determining the number of days between dates.

Karpinski in his 1940 bibliography listed only one copy of each, all at Harvard.[1]

Cajori gives the first two dates as 1844 and 1846, commenting that John E. Fuller owned the copyright for the second version.[2] Karpinski agrees that the third version, listed as "Palmer's Computing Scale, improved by Fuller," was copyrighted by Fuller, but also carried Palmer's copyright notice. A number of later versions was published by Fuller under his own name with such varying titles as *Fuller's Computing Telegraph* (1852), *Fuller's Time Telegraph, Fuller's Telegraphic Computer*. A copy of the first of these in the New York Public Library even refers to a London edition.[3] Fuller also published a manual for this rule under varied titles in 1845, 1846 (two editions), and 1848.[4] This probably accounts for the confusion in dates noted above.

Aaron Palmer, however, had published essentially the same book in 1842, before the rule itself appeared, under the title, *A Key to the Endless Self-Computing Scale, showing its application to the different rules of arithmetic, etc.* The first edition was published at Rochester, New York, and a second at Boston in 1844. The copy of the latter in the University of Michigan library promised delivery to subscribers in a few weeks of *Palmer's Endless Self-Computing Scale* which would be published in three styles: for common business calculations, $2; for the higher branches of mathematics, $3; for nautical and astronomical calculations, $5. It also gave four "advantages" for the instrument: "1st. *a complete saving of mental labor;* . . . the most intricate calculations are but a pleasurable exercise of the mind. 2d. *A great saving of time.* Computations requiring from three to four days, are wrought out by this Scale in the incredible short space of one minute [sic!]. 3d. *Complete accuracy* . . . infallible . . . except

[1] L. C. Karpinski, *Bibliography of Mathematical Works Printed in America Through 1850.* (Ann Arbor: University of Michigan Press, 1940), pp. 450, 452.

[2] Florian Cajori, *A History of the Logarithmic Slide Rule and Allied Instruments.* (New York: The Engineering News Publishing Co., 1909), p. 61.

[3] Cajori, *op. cit.*, ix.

[4] Karpinski, *op. cit.*, 471, 472.

through sheer carelessness. 4th. *Mental improvement.* By this Scale, a knowledge of the philosophy of numbers, and their relation to each other, is soon obtained. . . . "

The second American slide rule was contained in *Palmer's Pocket Scale, with rules for its use in solving arithmetical and geometrical problems*, a 48-page pocket size book which appeared in Boston in 1844. The writer has not seen this book or the "7 cm. circular slide rule of brass or cardboard" which Karpinski says accompanied it,[5] but the three 1845 copies (printed in Rochester, New York, Warren, Ohio, and Boston) seen by the writer have a 7 cm. circular disc mounted on the inside of the back cover within a fixed circular log scale which is printed on a cardboard sheet pasted inside the same cover. The latter is $3\frac{1}{2}\times 6$ inches. (See Fig. 1.)

This pocket scale has special gauge points for: the area and circumference of a circle, beer and wine gallons, simple and

[5] *Ibid.*, p. 461.

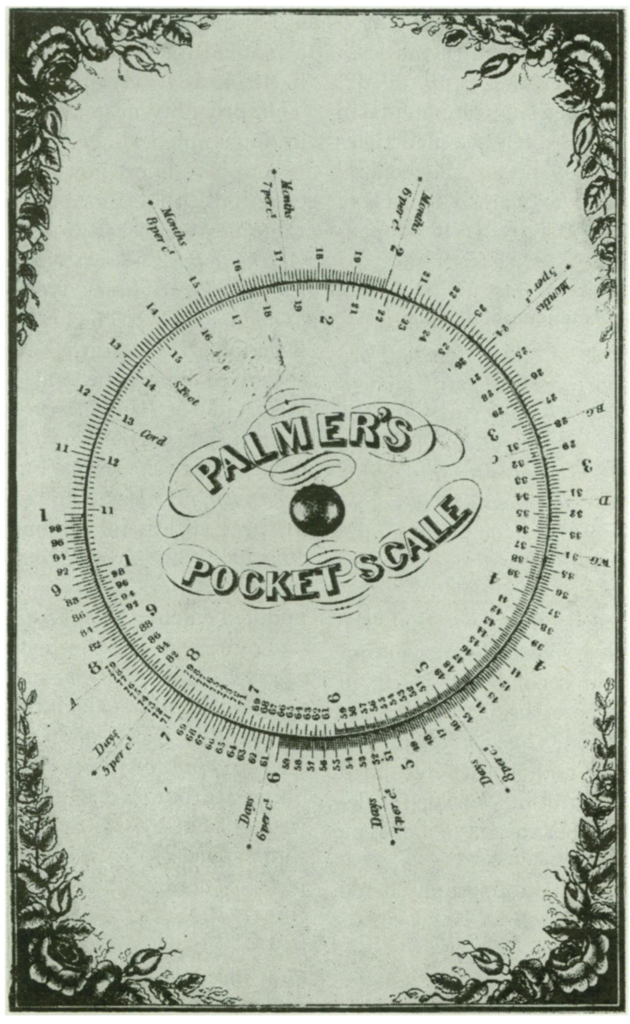

Fig. 1
(from University of Michigan, History of Science collection)

compound interest for a variety of rates and times, acres, square timber, square yards, square and circle equal in area, inscribed square, cube, triangle, pentagon, hexagon, heptagon, octagon, nonagon, dodecagon, three and four circles inscribed in a given circle.

The book inside of which this scale is fastened is essentially the same as the *Key* mentioned above, differing only by a few corrections and rephrasings. All these books contain an interesting series of recommendations before the preface. Among those recommending it are Benjamin Peirce, a famous Harvard Mathematics Professor, Frederick Emerson, whose *North American Arithmetic* was popular, an engineer, a notary public, a lawyer, and teachers.

In conclusion, the place of this scale and its related books in history may be seen better if we note that the slide rule had been mentioned and sketchily discussed in several arithmetic texts used in the United States, such as George Fisher's *The American Instructor: or, Young Man's Best Companion*, printed by B. Franklin and D. Hall in 1748,[6] as well as in Bowditch's *The New American Practical Navigator* (1802) and Hawney's *Complete Measurer* (1818).[7] The first work printed in America devoted solely to this topic seems to have been George Curtis' *A Treatise on Gunter's Scale, and the Sliding Rule* . . . published in Whitehall, New York, 1824.

All of this reflects something of the interests and needs of a new country, pioneering and trading, as compared with England where John Napier had first published logarithms in 1614, Edmund Gunter discussed his scale in 1620, and William Oughtred published treatments of the circular and straight slide rules in 1632 and 1633 respectively, having, however, been anticipated in the first publication if not in the actual invention of the first circular rule, by Richard Delamain's *Grammelogia* in 1630.[8]

[6] *Ibid.*, pp. 59, 65.

[7] Cajori, *op. cit.*, p. 59.

[8] Florian Cajori, *The History of Mathematics* (New York: Macmillan, 1919), p. 158.

NEWS NOTES

Engineering Booklet

An increasing interest in engineering shown by high school students in recent months has led to the publication of a new booklet about the profession, released recently by Stevens Institute of Technology, Hoboken, New Jersey. Designed to answer questions about the work engineers do, the 16-page publication also discusses the scholastic attainments and special aptitudes which indicate whether a student should seek admission to an engineering college.

In explaining the purpose of the booklet called "What's Engineering?" Dr. Jess H. Davis, president of the Institute, revealed that Stevens and other engineering colleges were getting more requests from high school students for information and for interviews relative to admission than had been received in several years. He said that high school counselors also were being called on to answer more queries about engineering careers. The new booklet was written with an eye to aiding both students and counselors.

Young men are cautioned against going into engineering, despite the promise it seems to hold, unless they show ability in high school mathematics and science. Regarding aptitudes, they are told that a boy who happens to be handy with tools is not necessarily cut out for an engineering career. In order to become an engineer, he must "have the capacity to learn how to design or even improve the radio or motor he enjoys repairing."