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About the Institute

The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

UNIVERSITY OF OREGON



Department of Mathematics
COLLEGE OF LIBERAL ARTS

EUGENE, OREGON 97403
telephone (code 503) 686-4703

October 30, 1975

Dear George Van Schaack:

I thought you'd be interested in the enclosed handout sheet, which I passed out to the mathematicians and graduate students in Deady Hall. So far as I can determine, no one in the mathematics department knew the library owned the books described in it. I'll try to see Martin Schmidt today; perhaps he has records showing how the library obtained these books. Do you know?

Gauss' book remains the most valuable mathematics book known to be at Oregon: it was last listed in Bookman's Price List at \$2,500 (1973). Euler's book also appears in the 1973 Bookman's at \$1,500; Newton's 1711 book is listed in 1974 at \$875 and his 1736 book is listed then at £ 220. Do you know of other valuable mathematics books in the library?

Sincerely,

Richard Koch

Many people in the math. mailroom talked of your discovery of Gauss — it was a real coup! All the other books described were, of course, already in

The Rae Book Room.

DATE: October 20, 1975
TO: Mathematics Department
FROM: Richard Koch
SUBJECT: Rare Mathematical Books in the University of Oregon
Library

As many of you know, an original edition of Gauss's "Disquisitiones Arithmeticae" (published in 1801) was recently found in the semi-storage area of the library and now resides in the Rare Book Room (card number QA, 241, G26). The book was discovered by George Van Schaack, a retired mathematician, botanist, and librarian whose hobby is finding rare books in the general circulation sections of the library. (Van Schaack got his PhD in mathematics at Harvard under Marston Morse.)

Recently I discovered that the Rare Book section of the library has several other first editions of important mathematics books. For instance:

Newton invented the calculus in the years 1664-1666. During these years the plague forced Cambridge University to close and Newton worked at home. When the university reopened in 1667, he became involved in other matters and the calculus remained hidden in his private working papers.

One of Newton's most important techniques involved expanding functions in infinite series and integrating term by term; thus

$$\ln(x+1) = \int \frac{dx}{x+1} = \int (1-x+x^2-x^3+\dots) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$$

$$\text{length of segment of circle} = \int \frac{dx}{\sqrt{1-x^2}} = \int (1 + \frac{x^2}{2} + \dots) = x + \frac{x^3}{6} + \dots$$

In 1669, Mercator published a book called "Logarithmotechnia" which contained the series for $\ln(x+1)$. Under the pressure of an imminent loss of priority, Newton wrote, sometime in 1669, a paper called "De analysi per aequationes numero terminorum infinitas;" this paper contains the first public explanation of

the calculus, and is usually thought to be Newton's most famous mathematical work. Newton gave the paper to Isaac Barrow, his teacher, who sent it to John Collins in London. (Collins was the mathematics advisor of the secretary of the Royal Society, Henry Oldenburg.) Collins made a copy of the paper and this copy floated around London for many years. Its most famous reader was Gottfried Leibniz, in 1676; Leibniz' notes have been preserved. When the priority battle between Leibniz and Newton broke out in 1700, the fact that Leibniz had read Collin's copy of Newton's paper played a most significant role. Newton was reluctant to publish the rather hastily written paper, and it first appeared in print in 1711, in a 101 page book called "Analysis per quantitatum series, fluxiones, ac differentias cum enumeratione linearum tertii ordinis." The University of Oregon library owns the original edition of this book (Rare Book Room, card number 516.2, N483). The book is bound in leather and contains several beautiful engravings. It was edited by William Jones, who is also remembered as the first man to use π for the ratio of the circumference of a circle to its diameter.

In 1670-1671 Newton wrote up an extensive account of the calculus. He intended to publish this account as an appendix to his book "Optics." When Newton reported his new optical discoveries to the Royal Society, a lively debate grew up, in which Newton at first took an aggressive role. Soon, however, the argument degenerated; some people began claiming that there was no need to repeat Newton's experiments because the results could not be as he described for a priori reasons. In disgust Newton withdrew the "Optics" from publication and with it his second account of the calculus. The account was first published after Newton died.

in a book published in 1736 called "The method of fluxions and infinite series, with its application to the geometry of curved lines, translated from the Authors's Latin original not yet made publick." The University of Oregon library owns the original 1736 edition of this book.

Newton had few significant students, but his rival Leibniz taught the Bernoulli's, and they taught the great mathematical figure of the 18th century, Leonard Euler. Besides writing mathematical papers, Euler wrote many beautiful textbooks. The most famous of all is a two volume set called "Introductio in analysin infinitorum," published in 1748. It was the first book to define sin, cos, tan as ratios of sides of triangles; it emphasized for the first time the importance of functions; it contains the identity $e^{-\pi i} = -1$, the equation $\sum \frac{1}{k^2} = \frac{\pi^2}{6}$, the theory of the zeta function including $\sum \frac{1}{n^s} = \pi (1 - \frac{1}{p^s})^{-1}$, the theory of the partition function and many other things. We use η , e , sin, cos, tan because Euler used these symbols in his textbooks. In Struik's "A Concise History of Mathematics" we read "in several fields Euler's presentation has been almost final. An example is our present trigonometry with its conception of trigonometric values as ratios and its useful notation, which dates from Euler's 'Introductio in analysin infinitorum' (1748). The tremendous prestige of his textbooks settled forever many moot questions of notation in algebra and calculus: Lagrange, Laplace, and Gauss knew and followed Euler in all their works. The 'Introductio' of 1748 covers in its two volumes a wide variety of subjects. It contains an exposition of infinite series including those for e^x , sin x, cos x, and presents the relation $e^{ix} = \cos x + i \sin x$ (already discovered by Johann Bernoulli and others in different forms). Curves and surfaces are so freely

investigated with the aid of their equations that we may consider the 'Introductio' the first text on analytic geometry. We may also find here an algebraic theory of elimination. To the most exciting parts of this book belong the chapter on the Zeta function and its relation to the prime number theorem, as well as the chapter on 'partitio numerorum.' Great mathematicians have always appreciated their indebtedness to Euler. Gauss expressed himself: 'The study of Euler's works will remain the best school for the different fields of mathematics and nothing else can replace it.' Riemann knew Euler's works well and some of his most profound writings have an Eulerian touch. Publishers might do worse than offer translations of some of Euler's works together with modern commentaries."

Boyer, in his book "A History of Mathematics" writes:

"It may fairly be said that Euler did for the infinite analysis of Newton and Leibniz what Euclid had done for the geometry of Eudoxus and Theaetetus, or what Viète had done for the algebra of al-Khowarizmi and Cardan. Euler took the differential calculus and the method of fluxions and made them part of a more general branch of mathematics which ever since has been known as 'analysis'-- the study of infinite processes. If the ancient 'Elements' was the cornerstone of geometry and the medieval 'Al jabr wa'l muqabalah' was the foundation stone of algebra, then Euler's 'Introductio in analysin infinitorum' can be thought of as the keystone of analysis. This important two-volume treatise of 1748 served as a fountainhead for the burgeoning developments in mathematics throughout the second half of the eighteenth century. From this time onward the idea of 'function' became fundamental in analysis."

The University of Oregon library owns the original 1748
edition of both volumes of 'Introductio in analysin infinitorum'
(Rare Book Room, card number 513, Eu 53).

Since these books would have been from one hundred to one hundred and fifty years old when the pioneers first traveled the Oregon trail, it is remarkable that they ended up in Oregon. The man in charge of the rare book room, Martin Schmidt, has been on the East coast for a conference, so I do not yet know how the books were obtained. The library has apparently owned them for many years.

By KEYTE HLADKY
Of the Emerald

When Richard Koch, professor of mathematics, set out to do research for a math history lecture, he little expected to find what he did — three first editions of famous old mathematics books. While going through the main library's card catalog he saw the books listed, and found them in the rare book room. Theoretically they were never lost, but until someone came along with the background to recognize them, their value remained unnoticed.

The books? All original editions: Isaac Newton's "Analysis per quantitatum series, fluxiones, ac differentias cum

production in analysis in-finitorum" by Leonard Euler, published in 1748. It is the first comprehensive book on analytical geometry, trigonometry and the importance of function in analysis.

Koch disclaims his finds, saying that he only recognized the books' values. He speaks instead of George Van Schaack, "a retired mathematician, botanist and librarian whose hobby is finding rare books in the general circulation section of the library." Last February, Van Schaack found an original edition of Karl Frederick Gauss' "Disquisitiones Arithmeticae," the first definitive book on number theory, published in

\$2.94 from Stechert, an international bookdealer. The Euler volume was bought at the same time and from the same source for \$3.24. The two Newton books were bought between April and September 1924 from Purdon and Putnam, a London dealer.

"The Analysis" cost one Pound, two shillings sixpence. "Method of Fluxions" cost one Pound." And in a letter to University Librarian H. William Axford, Koch writes, "Gauss' book remains the most valuable mathematics book known to be at the University; it was last listed in "Bookman's Price List" at \$2,500 (1973). Euler's book lists at \$1,500; Newton's 1711 book is listed in 1974 at \$875 and his 1736

finds it." He says changing interests are responsible for "finds" like Koch's. And he praises stack-combers like Van Schaack: "The library made a mistake, as you're bound to do when you have a million books. But Van Schaack knows his onions, and we're eternally grateful to him. He's brought in several books on math and botany."

Yet, with all this, "the books don't influence us," says Koch. "We have translations, modern editions and further knowledge...the finds were astonishing to some in the department, but to most, they're just more dusty books." He has, however, written a five-page paper detailing their historical importance.

Books: old math finds yield original Newton editions

enumeratione linearum tertii ordinis," published in 1711. This book contains, with other papers, his "De analysi per acqutiones numero terminorum," the first public explanation of calculus and his most famous mathematical work. (Though he wrote it in 1669, Newton did not publish the "Analysis" until 1711).

The library also has his earlier expansion of calculus, "The method of fluxions and infinite series, with its application to the geometry of curved lines..."

Written in 1670-71, it was not published until 1736, some time after his death.

The most valuable of Koch's finds was the two-volume "In-

1801. Gauss' work, says Koch, "was so significant that several famous mathematicians used to sleep with it under their pillows." The book was retrieved from the stacks and placed in the rare book room.

How valuable are these books? According to Professor Martin Schmitt, curator of special collections, "They're rare, but not terribly rare. We're happy to have them, but they're probably nothing we couldn't purchase today, given a larger budget."

The books were ordered over 50 years ago by Dr. E.E. DeCou, then head of the math department. In a letter to Koch, Schmitt writes, "The library bought the Gauss volume in October 1917 for

book...at 200 pounds."

The books don't look like treasures. The Gauss is faded, dog-eared and unimpressive. The Euler and the Newton books are more striking with leather bindings and gilt lettered titles. Their pages are thick and heavy; the print, archaic; the language, Latin. (The 1736 Newton is in English — translated from Latin after his death). Beautiful etchings of classic characters vie for space with familiar mathematical diagrams.

How could the books be forgotten for so long? "It happens all the time," says Schmitt. "A book is ignored until someone whose specialty is in that area



Photo by Warren Morgan

Rare Book Coll.

QA

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.G26

Gauss, K. F.,

Disquisitiones arith-
meticae. 1801.

In perp. Bar. Schaub

- Jones 1881
Richter 235 & 70
- second state with
B7 G4 K3 FF7 &
- T86 cancelled &
which is not known
to Herb. lit.
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