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AN IOWA JOURNAL OF MATHEMATICS

GERTRUDE A. HERR

The aim of this paper is to call the attention of Iowa scientists to the fact that in the development of mathematical periodicals Iowa has played a significant part. From January, 1874 to November, 1883 *The Analyst, a Journal of Pure and Applied Mathematics* was published in Des Moines by Joel E. Hendricks, a self taught mathematician. This journal, started thirteen years after the last issue of the *Mathematical Monthly* of Boston (1859-1861), had the distinction of surviving longer than any previously published journal of its kind in the United States.

That it enjoyed an international circulation and appreciation is attested by the correspondence which, through the foresight of Mr. Charles Aldrich, has been bound into the volumes of *The Analyst* in the Historical Library at Des Moines.

Among these letters there are orders for the journal from such men as Professor C. H. F. Peters, director of the Litchfield observatory of Hamilton College, Clinton, New York, who wrote January, 1883, "With admiration I have seen how your energy has succeeded in establishing and maintaining a periodical that gathers together the mathematical minds of the country, and has acquired already a prominent consideration abroad."

Professor J. W. L. Glaisher of Trinity College, Cambridge, England, wrote April 10, 1877 sending a check for his yearly subscription and asking for some back numbers of the journal to complete his file.

La Societe Physica-Mathematique of the imperial University of Kasan, the royal observatory at Greenwich, England, the Milan observatory all subscribed for the ten volumes of *The Analyst*.

Professor C. Pelz of the Technical High School of Graz, Austria, wrote to Dr. Hendricks April 19, 1883, that he had tried in vain to get through the ordinary channels of the book trade a photograph of the editor of "The Analyst." He was now applying directly to Dr. Hendricks as he was anxious to "behold a portrait of one of the most advanced mathematicians of our times."

Besides letters of men of mathematical reputation from all over the country there are orders for *The Analyst* from men of other

interests, from a lieutenant in the army, from George D. Bangs, general superintendent of the Pinkerton National Detective agency, also from Mr. T. S. E. Dixon, a patent lawyer of Chicago, and from Orson Pratt, the Mormon magnate.

It is a credit to the Iowa Historical Department that through the repeated efforts of Mr. Aldrich, Dr. Hendricks was persuaded, shortly before his death (June 8, 1893), to write an autobiographical sketch. This sketch written in the clear strong handwriting of the author is now bound into the volume of *The Analyst* in the Iowa Historical Library. It was also printed as a part of an article about Dr. Hendricks in the Des Moines Daily News, November 25, 1892.

From this sketch, from frequent conversations and correspondence with the four living daughters and with one granddaughter and from the scrap book of Dr. Hendricks (kindly lent me by his daughters) I feel I have been privileged to become acquainted with a remarkable genius whose spirit was as gentle and unselfish as his mind was keen and versatile.

Although a native of Pennsylvania (Bucks County, March 10, 1818) Dr. Hendricks spent most of his first 46 years in Ohio and Indiana where he received in all 18 months of schooling at times when he could be spared from the farm work.

When he was 18 his reputation as an expert in cyphering obtained him his first school teaching job in spite of the fact that he had never studied grammar or geography.

He served an apprenticeship as a millwright teaching school when not plying his trade. His first serious interest in Algebra is described in his own words. I quote from the manuscript in Volume I:

"I had, therefore, never seen a treatise on algebra, but before I commenced my school in the winter of 1839, one of my brothers had bought a copy of Bridge's algebra, but could not understand it, he said, and gave it to me."

. . . "After getting my school fairly started, I determined that I would find out what merit or utility there was in algebra. Accordingly I set apart two hours of each night for the study of algebra. I shut myself up in my room at 8 o'clock each evening, excluding all company, and studied my algebra till 10 o'clock, at which time I generally went to bed, not always to sleep, however, as I frequently spent hours after I had gone to bed in thinking over some difficulty that I had encountered in my study. In five weeks, by pursuing this course, I had gone through Bridge's algebra, had

solved all the examples the book contained and many other questions that I had before been unable to solve, but which I now solved readily by the application of algebra."

"At the close of my school, in the spring of 1840, though I was aware that I could apply algebra in the solution of many questions with great advantage, yet I wished to know from conversation with an acknowledged mathematician how much of an algebraist I was.

"The county surveyor, Abijah McLean, who lived in New Lisbon, was believed to be a profound mathematician, and, though I had never seen him, I determined to visit him and learn from him how much I knew and how much I had yet to learn to become a mathematician.

"I accordingly selected some of my best solutions and took them with me to New Lisbon and called upon and introduced myself to McLean. Of course I was embarrassed, but I made out to tell him what I had done and showed him my solutions. He examined them with much apparent interest and complimented me highly for what I had done.

"McLean, though he was some twenty years my senior, was ever after a warm friend of mine and a frequent correspondent until his death. It is to him I am chiefly indebted for what mathematical knowledge I have since acquired. From his library I obtained most of the mathematical books I have since studied, including Hutton's Mathematics, Newton's Principia, and Bowditch's translation of the *Mecanique Celeste*."

Later Mr. Hendricks read medicine with a successful surgeon, Dr. George S. Metzgar, from whom he received a "very flattering certificate of qualification to practice medicine," a profession which he followed for 20 years though he never carried out his intention of obtaining an M. D. degree.

He helped found the Newville Academy in Indiana and was made a trustee, then president of the board of trustees, and then teacher of mathematics at that institution.

In 1861 he accepted a contract to make the first government surveys in Colorado territory, a contract which he completed successfully two days before the required date despite illness, threats from Indians, and general adverse conditions.

In the fall 1864 he moved with his wife and daughters to East Des Moines where for 10 years he engaged in surveying and where from 1873 to 1883 he gave all his time and energy to editing and publishing *The Analyst*.

He was elected in 1872 to serve two years on the city council of

Des Moines but he resigned after one year because he found that political expediencies were sometimes out of harmony with his principles.

He owned a large tract of land near the Capitol, virgin forest and hazel brush, which he sold in small lots at the same price he had paid for it in a tract—an evidence as one of his granddaughters said “that to give not to get, was his life long practice.” He made no formal practice of medicine after coming to Des Moines but he gave gratis his professional services to his neighbors and to the needy who came to him.

While in Indiana and Ohio, Dr. Hendricks conducted mathematical sections for several school papers. He seems to have felt a real personal need for a periodical devoted to mathematics and it was this need which encouraged him to solicit the cooperation of other mathematicians in supporting the journal which he launched in 1873.

The “Introductory Remarks,” Volume I, No. I, reveal the spirit of the editor and his aim for the journal.

“As a knowledge of the laws of natural phenomena (and as a consequence the happiness and welfare of mankind) is promoted by community of mind, it is believed that by such an intercourse of thought as this journal is intended to induce, the sum of human happiness will be increased.”

* * * * *

“*The Analyst* . . . is intended to afford a medium for the presentation and analysis of any and all questions of interest or importance in pure or applied mathematics, embracing especially all new and interesting discoveries in theoretical and practical astronomy, mechanical philosophy and engineering.”

The Analyst was first published as a monthly, then bi-monthly and finally as a quarterly. Dr. Hendricks set all the type himself using the basement of his home on Court Avenue as his shop. The illustrative figures were wood cuts made under his direction by two of his daughters who confess they “knew nothing of what they were about.”

One of the grandchildren (Mrs. Carrie Garrell Hunter of Newton) writes of seeing her grandfather load the trays of type into the back of the open buggy, then gently shake the lines over the fat white pony’s back and start toward the city fording the river to avoid the toll on the bridge. She says also, “He went only as fast as Billy wanted to go because he was so kind he wouldn’t

have hurt the horse's feelings by appearing not to be satisfied. He had no thought of recompense from the journal — for he knew it couldn't pay financially."

One of the daughters (Mrs. Frances Garrell of Newton) wrote of her father, "He was a *good* man. I never knew him to tell an untruth, to swear, to speak a vulgar or obscene word, never give way to a fit of temper and say things he would not mean. He did not use tobacco nor intoxicating liquor of any kind. I never realized until I wrote this what a wonderful and unusual character was his. Just honest, merciful."

Another daughter (Mrs. Clara Graham of Georgetown, Colorado) writes: "Although all of the family ardently admired my father and believed that he was the greatest man in the world it is not with Mathematics but Astronomy that he is always associated in our minds and it is the love of the stars that he gave us that has been one of our most wonderful and beautiful heritages."

This vital interest in Astronomy is evidenced in *The Analyst* in the number of articles on astronomical subjects printed — some of them by Dr. Hendricks himself, and by the fact that many such articles have editorial notes added to them. While Dr. Hendrick's chief interest was in Mathematics and Astronomy he was keenly interested in many other fields of thought. There are letters in his correspondence thanking him for several unusual rock and pottery specimens sent in to the Smithsonian institute. His scrap book contains copies of articles by him written for such journals as *The American Engineer*, *Scientific American*, *Railroad Gazette*, *Chicago Medical Examiner*, *Boston Journal of Chemistry*, *American Naturalist*, *Popular Science Monthly*, *Iowa School Journal*, *Banner of Light* (a spiritualist paper) and many others.

In 1865 Dr. Hendricks received an honorary A. M. from Indiana State University. A letter in connection with this event is amusing. It seems that Dr. Hendricks failed to receive his official notice of the honor. In correcting this matter the president of the university wrote that he wished all degrees could be as deservedly conferred as that given Dr. Hendricks. He admits that the university had the previous year conferred an honorary degree upon a certain reverend gentleman (whose name he does not withhold) and it turned out the man so honored was only a "big blow."

Dr. Hendricks was elected a member of A.A.A.S. in 1880, a fellow in 1885 and a member of the New York Mathematical Society in 1885.

The plan of each number of *The Analyst* was to print three or

five articles of some length and then give problems, and answers to problems previously published.

The Analyst has received official recognition in the article by Florian Cajori published in 1890 by the Bureau of Education, Circular of Information No. 3 pages 280-281. Since this evaluation of Cajori's carries the weight of an authority I quote from it in place of presenting the catalogue of significant articles which I had prepared myself before I discovered the very adequate article by Cajori, who was himself a contributor to *The Analyst*.

"*The Analyst* bears evidence, moreover, of an approaching departure from antiquated views and methods, of a tendency among teachers to look into the history and philosophy of mathematics and to familiarize themselves with the researches of foreign investigators of this century. Thus, discussions regarding the fundamental principles of the differential calculus were carried on. Levi W. Meech gave an "Educational Testimony Concerning the Calculus;" W. D. Wilson, of Cornell, gave "A New Method of Finding Differentials;" Joseph Ficklin, of Missouri, showed how one might "find the differential of a variable quantity without the use of infinitesimals or limits;" C. H. Judson, of South Carolina, gave a valuable "investigation of the mathematical relations of Zero and infinity," which displayed the wholesome effects of the study of such authors as De Morgan. Judson dealt powerful blows against the reckless reasoning that had been in vogue so long, but, during an occasional unguarded moment, he was hit by his opponents in return. De Volson Wood, of the Stevens Institute, and Simon Newcomb, of Washington, discussed the doctrine of limits."

Other articles of special interest mentioned by Cajori include a group of articles on "Solution of the General Equation of the Fifth Degree;" the "Brief Account of the Essential Features of Grassmann's Extensive Algebra" by W. W. Beman, "Symmetrical Functions etc.," and "Recent Results in the Study of Linkages," by W. W. Johnson whom Cajori says was a "frequent and most gifted contributor to *The Analyst*."

David S. Hart wrote a "Historical Sketch of American Mathematical Periodicals" from which Cajori quotes in his own more extensive article on the same subject.

Among the contributors to *The Analyst* were Asaph Hall, E. B. Seitz, George R. Perkins, M. Merriman, J. W. Nicholson, Daniel Kirkwood, David Trowbridge, Artemas Martin, and G. W. Hill.

A number of Iowa men proposed problems and offered solutions for problems proposed by others.

"The list of contributors," Mr. Cajori further says, "included the most prominent teachers of mathematics in the country."

Dr. Hendricks suffered from a form of heart disease. In September, 1883, he announced that because of failing health he found it necessary to discontinue the publication of *The Analyst*. In the last issue, November, 1883, the editor says in his concluding note: "We had hoped to be able, in this issue, to answer the many inquiries that have been made as to its probable continuance, by a definite announcement of a publication to take its place, . . . as several gentlemen of acknowledged ability, and well and favorably known by all mathematicians and astronomers, both in this country and in Europe have expressed a willingness to assume the labor and responsibility of continuing the publication; but as the arrangements for its continuance appear to be still incomplete, we have not been authorized to make a definite announcement."

It is a disappointment that Dr. Hendrick's correspondence on this point seems not to have been preserved. However there is no doubt that the *Annals of Mathematics* which first appeared in March, 1884, was the successor of *The Analyst*. *The Annals* was founded by Professor Ormond Stone of the University of Virginia and was published at his expense for ten years at which time the University of Virginia took over the publication thus completing the first twelve volumes of the First Series in June, 1899.

In the beginning of Volume 12 (1898-1899) there is a concise statement of the history of the publishing of *The Annals*. The statement is there made "The Annals was the successor of *The Analyst*, a journal of Mathematics founded and edited by Dr. Joel E. Hendricks."

When state funds were no longer available at the University of Virginia for the publication of *The Annals* Harvard University took over the publication of the second series October, 1899 to 1911 following which the journal was taken over by Princeton University where it is still being published.

Thus it was that out of Iowa there came a journal of mathematics which met a compelling need among mathematicians and astronomers in the United States, and which proved to be the foundation upon which one of our most outstanding periodicals of the present was built.

It is fitting that Iowa mathematicians should hold with respect,

admiration, and gratitude the memory of the man whose foresight, courage, ability, industry and devotion made possible this significant accomplishment in mathematical literature.

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