

THE MATHEMATICAL DEPARTMENT OF THE YATES COUNTY CHRONICLE

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Abstract

In the second half of the nineteenth century, in an attempt to promote mathematics, a number of recreational mathematicians published mathematical journals or edited mathematical columns. The most prominent among them, William J.C. Miller, edited a mathematics column in the *Educational Times and Journal of the College of Preceptors* for almost fifty years and, to facilitate the publication of solutions, founded *Mathematical Questions and Their Solutions from the 'Educational Times'*. Artemas Martin founded the *Mathematical Visitor* and *Mathematical Magazine*, J.E. Hendrick, *The Analyst: A Journal of Pure and Applied Mathematics*, and Benjamin Finkel the *American Mathematical Monthly*. Mathematical columns were edited by William Hoover in the *Wittenburger*, Franklin P. Matz in the *Barnes Educational Monthly*, H.A. Wood in the *National Educator*, E.T. Quimby in the *New England Journal of Education*, and Samuel Hart Wright in the *Yates County Chronicle*. These publications consist mainly of mathematical problems for solution and related articles. We focus on the mathematical column that appeared in *Yates County Chronicle* edited by Samuel Hart Wright.

In the United States in the early 1870s, Ulysses S. Grant was President. John Thompson Hoffman, with ties to Boss Tweed and Tammany Hall, was Governor of New York. A period of reconstruction following the Civil War was coming to an end as was the economic boom of the previous decade. Many bankers needing money to cover their paper assets were unforgiving when manufacturers defaulted or fell behind in their loan payments and farmers with their mortgages. Factories were forced to shut down and farmers lost their homes and farms. The average daily wage in 1870 was \$1.56, the average yearly earnings \$384, and the unemployment rate was 17.7%.¹ It was during this period when the American economy was at low ebb that an exceptional pedagogical event occurred, one of longer duration than any other such exploit. At roughly the same time that a revival movement was being founded on the banks of Lake Chautauqua near Jamestown, New York an intriguing educational experiment in journalism occurred a little more than 100 miles to the northwest in the Lake District of New York. This scholarly adventure did not occur in a schoolroom but in a local newspaper when the paper included a Mathematical Department, a column devoted to mathematical problems and their solutions. Its impact reached from Maine to California and it became the prototype for other such ventures. In this article we include details of the newspaper and its local, the column and its contributors, and conclude with a brief memoir of its editor and a sample of problems that appeared in the column.

The *Yates County Chronicle* (1856-1904) was the successor of the *Penn-Yan Whig* (1840-1855). From 1905 on it was published as the *Penn Yan Chronicle Express*. Yates County is a 338 square mile heavily agricultural region in Central New York State with a population of about 25,000. It has a very active Amish community. Penn Yan, which sits on the upper branch of Keuka Lake, was incorporated in 1833. The name was derived from the fact that when incorporated its inhabitants were Pennsylvanians and Yankees in equal numbers. Stafford C. Cleveland, who was very active in the Yates County Genealogical and Historical Society and published numerous historical items in the paper, became the managing editor in 1854.

The four-page paper appeared every Thursday each page formatted with eight columns. In 1872 Yates County's population was a little less than 20,000. From 1872 to 1880, the number of subscribers rose from 1,500 to 1,850. Subscription to the paper was \$2 per annum to office and mail subscribers and \$2.50 to village subscriber by carrier. Ads ran \$8 for a half column, editorial notices 15¢ a line, business locals 10¢ a line, marriage notices a dollar, death notices 50¢, and obituaries 6¢ per line. The paper included articles on mound builders, astronomical phenomena, California orange groves, vineyards on the shores of Seneca Lake, Darwinism, Judge Hunt's behavior during the trial of Susan B. Anthony. The newspaper also included a 'Jottings' column, later renamed 'Chow-Chow', that included local information such as the names of those who had recently moved to town, those who had died, and where stray heifers had been sighted.

As did many other periodicals of the time, the paper contained numerous ads. Especially intriguing were those for Vegative that had cured thousands in the Boston area of scrofula, Jurubea, the great South American blood purifier, Stanford's Liver Invigorator that protected systems from miasmatic influences, Dr. Pierce's Pleasant Purgatives Pellets, Dr. Flint's Quaker Bitters composed of root bark herbs, a great blood purifier, Ayer's Cherry Pectoral, for diseases of the throat and lungs, such as coughs, colds, whooping cough, bronchitis, asthma, and consumption, Sandford's Liver Invigorator that protects body systems from miasmatic influences, and Gray's Specific Remedy for self abuse; loss of memory; dimness of vision; premature old age; back pain; universal lassitude; and many other diseases that leads to insanity, confusion; and premature graying - all of which as a rule are caused by deviating from that rule of nature and over indulgence.

During the period from February 29, 1872 to August 26, 1880, except for eleven issues chiefly for want of mathematical type for fractions and exponents, the paper included a weekly Mathematical Department column edited by S.H. Wright. Until January 16, 1873, the column appeared on the third page. Then, unless the circus was in town, the column appeared on page four. Sometimes the problems appeared first, sometimes the solutions. Sometimes the column consisted of only problems, sometime only solutions. In June 1879 a short-lived checker column appeared adjacent to the Mathematical Department. Wright vowed to have concise solutions appear two to four weeks after they had been proposed claiming that:

Teachers, and all lovers of the Mathematical Sciences, are invited to contribute solutions and problems to this department. All correct solutions will be duly acknowledged in print. Persons contributing problems will please send original ones only, and accompany each with its solution.²

A year later, he admitted that the early problems had been easy, popular examples and chiefly supported by local contributions and concluded that:

It has now advanced gradually in interest and become the medium of higher mathematics, and is supported by mathematicians of distinguished abilities in various parts of the United States. Our highest aim is to make the Department acceptable to all and especially interesting to its contributors. Thanking those whose labors have made it the Department what it is. We trust confidently upon their aid in the future.³

His specific instructions went as follows:

The best paper upon which to write solutions is the buffered kind. Such as is issued in printing office for enclosing newspapers. Old envelopes cut open are excellent. It will save the editor of this department much labor if our correspondents would write their solutions on such paper, and on strips about 6 inches wide, and of sufficient length to contain only one solution, which in all cases be headed with the number and name of the author. When each solution is upon a separate piece of paper, it facilitates examination, the liability to overlook any is less, and the printer finds it more convenient, A HEAVY HAND should always be used in solutions. Hair marks annoy the printer much, especially when they are on white paper.⁴

Of the one hundred and twenty-two contributors, One hundred and twelve were male, five female, and five used pseudonyms. One of the contributors, Christine Ladd, a secondary school teacher in Union Spring, New York, had been valedictorian of her class at Wesleyan Academy in Wilbraham, Massachusetts and had attended Bryn Mawr College. Ladd studied for a time at Harvard College before commencing graduate studies in mathematics and logic at Johns Hopkins under the supervision of James J. Sylvester and Charles S. Pierce. At the time Hopkins didn't recognize degrees for women. She eventually received her Ph.D. degree from the college in 1926.

The following table lists the chief mathematical contributors to the *Chronicle*:

	SOLVED	POSED	POSED& SOLVED	TOTAL
Walter Siverly	503	45	38	510
Artemas Martin	482	180	167	495
William Hoover	415	52	36	431
Enoch B. Seitz	421	28	21	428
Samuel H. Wright	24	343	11	356
David S. Hart	266	29	23	272
David Wickersham	167	3	3	167
Eleridge Vansyckle	164	10	7	167
James G. Clark	144	21	18	147
H.S. Banks	100	2	1	101
Josiah Scott	88	16	7	97

With a contributor's first appearance in the column, their hometown was listed. There were thirty contributors from New York State, thirteen from Ohio, nine from Pennsylvania, eight from Indiana, six from Illinois and Iowa, five from Missouri, four from New Jersey, three from Maine, and West Virginia, two from, Connecticut, Massachusetts, Michigan, Nevada,

Washington, D.C. and Canada, and one each from California, Kansas, Maryland, New Hampshire, Oregon, the Washington Territory, and eight of unknown abode. Siverly was from Oil City, Pennsylvania, Martin from Erie, Pennsylvania, Hoover was the Superintendent of Schools in Bellefontaine, Ohio. Seitz taught in Greenville, Ohio. Hart was a physician in Stonington, Connecticut. Wickersham was from Wilmington, Ohio and Vansyckle from Neshanic, New Jersey. Clark taught at William Jewell College in Liberty, Missouri. Banks resided in Newburgh, New York. The Honorable Josiah Scott served as a judge for the Superior Court in Bucyrus, Ohio and went on to serve on the Supreme Court of Ohio.

In an effort to make contributors more acquainted with each other, Wright encouraged contributors submit informative life stories.⁵ Over the next few years autobiographical essays by Daniel Brown, James Clark, Joseph Ficklin, Edward Gillett, J.A. Gillett, Joel E. Hendricks, William Hoover, James Matteson, Franklin P. Matz, Thomas F. Stowall, David Trowbridge, Eleridge Vansyckle, and John M. Wilt, were published, While most appeared in one issue. Trowbridge's appeared in eleven installments and J.A. Gillett's in eight. When the *Normal Monthly*, whose mathematical column was edited by Edward Brooks of Millersville, Pennsylvania, ceased publication, Wright continued Artimas Martin's series of articles on Diophantine Analysis in the *Chronicle*. In 1880, Wright republished many problems that had appeared in his almanacs. After the column had been in existence for two years, he made a significant change in direction:

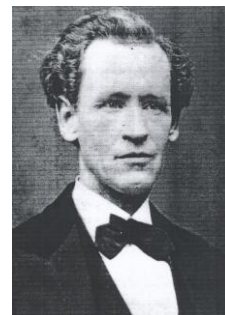
With this issue of the Chronicle we enter upon the third year of the Mathematical Department, Though we have no financial interest in the paper or Department, we are encouraged by the constant occasions of supporters of the latter. The plan hereafter, as heretofore, will be to adapt the Mathematical Department to all branches of mathematics from the easy to the very difficult, from the practical application of Arithmetic to the practical application of the Calculus, solving problems of the highest interest in Commerce, Mechanics, Astronomy, Optics, Trigonometry, Diophantine and Intermediate Analysis, and Probability, or Chance.⁶

Of the first thousand of the 2,517 problems that appeared in the mathematical column, only three went unsolved. Unlike solutions in the *Educational Times* and other American publications, Wright did not restate the problem when publishing the solution. Problems numbered 978 to 1100 were posed by him and dealt with similar maxima minima problems. He also posed problems numbered 1416 to 1999 which concentrated on trigonometric identities and formulas for volumes. We classify the remaining 1810 problems as follows:

	<i>YCC</i>	<i>ET</i>
Geometry	559	430
Applied Maths	418	123
Arithmetic	185	5
Number Theory	182	45
Analysis	132	48
Algebra	129	47
Probability	107	22
Trigonometry	55	7
Combinatorics	43	12
TOTAL	1810	739

The problems in the arithmetic division dealt mainly with proportions, rates, calendars, clocks, or interest. Those in algebra section concerned the solution of equations. The geometry section included Euclidean constructions, volumes of solids, properties of curves, locus, envelopes, conics, and triangle geometry problems. The majority of problems posed in the analysis section dealt with finding extrema, performing integrations, or summing infinite series. The applied mathematics section included problems in astronomy and navigation. The probability section included geometric probability and average problems. In comparison, from 1872 to 1880, the *Educational Times* posed 739 problems which were more challenging and contained significantly less straightforward arithmetic and more substantial geometric problems.

The brief biography of the editor of the Mathematics Department of the *Chronicle* that follows is essential for a more complete understanding of the commitment he made to promoting mathematics in America. Samuel Hart Wright, the son of James and Zillah (nee Hart) Wright, was born near Peekskill, NY in 1825. When still a boy, his family decided to migrate to the lake district of central New York. They traveled westward via the Hudson and Mohawk Rivers and the Erie Canal to a farm in Starkey on the shores of Seneca Lake about two miles east of Dundee. His father, whose mathematical education high point was 'the rule of three', later served as a Methodist minister. Samuel was for the most part self-taught. He gathered and sold nuts to purchase text books. He worked on his father's farm for several years before marrying Joana McLean in 1845. He continued to work as a farmer, but to supplement their income he computed astronomical calculation for almanacs. In 1849, he sold his calculations to a Rochester firm for \$20 and twenty dollars worth of medical books. In 1850, he moved to Dundee, NY and began teaching at Dundee Academy. Joana took in music students to help meet expenses. In 1852, their three-year old son James died. Samuel left Dundee to study medicine at the College of Physicians and Surgeons in New York City where he stayed with Joana's parents. After completing that part of his education, Wright spent a year apprenticeship with Dr. Henry Spence in Dundee. In 1855 Joana died in childbirth along with their fifth child. The next year he was awarded a medical degree from Geneva Medical School in New York. When David Young, the well known almanac contributor died, Wright visited Young's widow in Nyack at her invitation. He was offered and took the list of addresses of the thirty-one publishing houses that Young had contributed calculations. The book proved very useful in opening up new markets for his astronomical calculations. In the ensuing years, he practiced medicine and became very well-known for his astronomical calculations.



S. H. Wright

After a time, Wright became interested in the study of botany and on one botanical excursion he met his second wife Mary Jane Burtch. They had one daughter, Florence. Continuing his botanical, astronomical, and medical interest, he was awarded an M.A. degree from Williams College in 1865. In 1866, they were living in Penn Yan where he served as the County Physician. The year before he began editing a mathematical column for the *Yates County Chronicle*, he lost his hearing. The column was modeled after the one that appeared in the English periodical the *Educational Times*, to which he had made a few contributions. In 1874, he was named a nonresident botanist of Yale University and was awarded an honorary doctorate degree from Hamilton College in Clinton New York. That same year he passed his almanac

business on to his son Berlin. On a visit to Florida, he discovered an interesting species of plant. He sent a sample to Professor Asa Gray at Harvard who confirmed it was new and aptly named it *Hartwrightia floridana*. It is a member of the *Asteraceae* Family. Wright died in 1905. Two cylindrical sections of a petrified tree from Arizona, adorn his tomb in Penn Yan. His botanical collection and herbarium now reside in the Cleveland Museum of Natural History.

We conclude with a chronological sample of problems from the Mathematics Department of the *Chronicle*:

1. A boy has 18 colored marbles all being different colors. He picks out 7, then putting them back, takes out another 7 again, and so on, putting them back every time. How often can he do this, so as not to have two pickings alike? [#25, posed by S.H. Wright, April 18, 1872]
2. How many cannon balls, 6 inches in diameter, can be put in a box 6 feet long, 4 feet wide, and $4\frac{1}{12}$ feet high? [#241, George Neubauer, Greenville, OH, May 1, 1873]
3. Find integral values of x, y, z which will make $x^2 + xy + y^2$, $x^2 + xz + z^2$, and $y^2 + yz + z^2$ squares. [#246, D.S. Hart, May 8, 1873]
4. A bag contains 10 apples. A boy takes out an apple out of the bag at random, and then puts it back again, he does this 10 times. Required the probability that the boy has had in his hand every apple in the bag. [#275, A. Martin, June 19, 1873]
5. A penny is laid on top of another penny at random. What is the probability that the top penny will not fall off? [#285, A. Martin, June 26, 1873]
6. Prove that $x^2 + y^2$ and $x^2 - y^2$ cannot both be squares simultaneously. [#368, A. Martin, October 16, 1873].
7. How high above the earth's surface must a man be to see one-quarter of the surface? [#428, S.H. Wright, December 11, 1873]
8. A pyramidal pile of cannon balls has 50 balls on each of the four sides of the base. How many balls in the pile? [#441, S.H. Wright, December 25, 1873]
9. Take any three consecutive whole numbers $x - 1, x, x + 1$, if none of them is divisible by 5, then $x^2 + 1$ is divisible by 5. [#481, A. Martin, January 29, 1874]
10. A boy left home on an errand immediately after noting the position of the hands on an accurate clock. On his return between two and three hours later, he found that the hands had exchanged places with each other. How long was he gone? [#577, Judge Josiah Scott, July 9, 1874]

11. A straight line (segment) is divided at random into three parts. What is the chance that a triangle can be formed with them? [#580, A. Martin, July 23, 1874]
12. Show that the difference of a number and its cube is divisible by 6. [#603, W. Hoover, August 13, 1874]
13. Show that the difference between a positive integral number and its fifth power is divisible by 30. [#647, Orlando D. Oathout, December 3, 1874]
14. A man residing on the bank of a river, p miles wide wishes to reach point A on the opposite bank. a miles further down the river. He must cross the river in a boat which he can row at 2 mi/hr without the aid of the current which flows at 1 mi/hr. He can walk at 4 mi/hr. At what angle must he cross the river in order to reach A in the least possible time. [#655, E.B. Seitz, December 17, 1874]
15. Three circles, radii a, b, c touch each other externally: Find the radius of the circle circumscribing them. [#674, A. Martin & J.W. Jones, Circlevew, OH, January 7, 1875]
16. Find two positive integral numbers such that if each and also their sum and difference is increased by unity the four results will be squares. [#924, A. Martin, March 2, 1876]
17. Find the area of the maximum ellipse inscribed in the quadrant of a given ellipse. [#927, W. Siverly, March 2, 1876]
18. The side of a mountain that makes an angle with the horizon of $22\frac{1}{2}$ has a vertical tree 100 feet high standing on it. From the top a squirrel jumped off directly up the mountain and struck the ground 40 feet from the foot of the tree. Had he jumped directly down from the mountain, how far from the foot of the tree would he have struck? [#972, Professor Hazard, Adams, MA, April 20, 1876]
19. If Dr. A. kills 3 patients out of 7, Dr. B. 4 out of 13, and Dr. C. 5 out of 19. What chance has a sick man for his life who employs all three of these doctors at the same time? [#2009, W.H. Bates, Earlsville, IL, February 14, 1878]
20. If in an equilateral triangle there be inscribed its greatest circle, then in each of the three equal remaining pieces its greatest circle, and so on, ad infinitum, the sum of the areas of all the circles so described will be n square units. Determine the side of the triangle. [#2193, B.F. Burleson, Oneida Castle, NY, December 5, 1878]
21. A conical wine glass 12 inches deep and 10 inches in diameter, is one-quarter full of water. How large a ball can be dropped in and just be covered with water? [#2309, S.H. Wright, September 11, 1879]

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References

¹ *National Bureau of Economic Research Publications in Reprint*, p. 48. Princeton University Press, 1960.

² *Yates County Chronicle*, April 18, 1872.

³ *Ibid.*, February 27, 1873.

⁴ *Ibid.*, January 1, 1874.

⁵ *Ibid.*, October 16, 1873.

⁶ *Ibid.*, March 3, 1874.