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Analyzing Melatiah Nash and *The Ladies and Gentlemen's Diary*

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Analyzing Melatiah Nash and *The Ladies and Gentlemen's Diary*

Abstract

Journals have long been a staple in the history of the spread of mathematical ideas. This paper analyzes one of the first attempts at such a journal in the United States: *The Ladies and Gentlemen's Diary*, and traces the evolution of the journal through its author and editor Melatiah Nash. The contributors and mathematics of the journal are also considered and the journal is compared to several of its contemporaries. Synthesizing all of this information reveals that Nash's publication contained a wide range of mathematics, reached a diverse group of people, and was relatively successful in how it was received and in reaching the editor's goals for the journal. Faculty Sponsor: Sloan Despeaux

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Peer Review

This work has undergone a double-blind review by a minimum of two faculty members from institutions of higher learning from around the world. The faculty reviewers have expertise in disciplines closely related to those represented by this work. If possible, the work was also reviewed by undergraduates in collaboration with the faculty reviewers.

Abstract

Journals have long been a staple in the history of the spread of mathematical ideas. This paper analyzes one of the first attempts at such a journal in the United States: *The Ladies and Gentlemen's Diary*, and traces the evolution of the journal through its author and editor Melatiah Nash. The contributors and mathematics of the journal are also considered and the journal is compared to several of its contemporaries. Synthesizing all of this information reveals that Nash's publication contained a wide range of mathematics, reached a diverse group of people, and was relatively successful in how it was received and in reaching the editor's goals for the journal.

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1. INTRODUCTION

The early 1800s in the newly independent United States of America was an exciting period of growth that would forever shape the country. The country expanded through the Louisiana Purchase, the many John Marshall Supreme Court cases laid the foundation for the judicial system, and one after one, territories achieved statehood. Amidst all the political exchange and expansion of the time, it is easy to overlook the exchange of mathematical ideas. While the politically inclined had a heyday, what were people doing to expand their mathematical horizons? One answer to this question comes in the form of journals, which were accessible to people in different geographical areas at minimal cost and accommodating to any time schedule - one might call them the postcolonial equivalent to online college coursework of today. This paper will analyze one of these journals, *The Ladies and Gentlemen's Diary*, and argue that it displayed a cultural and mathematical diversity due to its historical context and evolution, the demographic of its readers, its mathematical content, and its relative success.

2. *The Ladies and Gentlemen's Diary*

The Ladies and Gentlemen's Diary (*The Diary* for short) was published annually and ran from 1820 to 1822, for a total of three volumes. The author and editor of the journal was Melatiah Nash. The journal was published in New York, where Nash resided, and printed there by a J. Seymour. The journal was not subscription based, like some other contemporary journals of the time, but simply sold per copy at a price that “shall not exceed fifty cents, if it is extended to one hundred pages,” and was sent to “book-sellers at a distance, on the most liberal terms” [12, Volume 1, p. 80]. (Fifty cents in 1820 is roughly equivalent to \$10 today [18].)

As evident by its full, and rather lengthy title, *The Ladies and Gentlemen's Diary or United States Almanac, and Repository of Science and Amusement* had a wide breadth of content. The journal contained a complete almanac, scientific articles, mathematical questions, queries, enigmas, rebuses, and charades. In addition, Volumes II and III contained answers to the respective previous volume's many questions. *The Ladies and Gentlemen's Diary* was the culmination of Melatiah Nash's vision for a publication designed to educate and engage the entirety of the U.S. population, and it was successful due to the relevance and variety of subject matter covered.

Before *The Diary* was conceived, Nash hoped to create a different kind of publication, as evident in a letter he wrote to Thomas Jefferson in 1811 in which Nash sought Jefferson's advice and input [22]:

having frequently observed the small degree of knowledge which prevails amongst mankind in general respecting the solar system and the Stars, and believing a general dissemination of astronomical knowledge would be of great utility, I am preparing for the press a small work, which, it is presumed, will lay a foundation for general improvement in that important science. . . . The title of the work is [t]o be, “The Columbian Ephemeris and Astronomical Diary”- There will be four pages to each month. . . .

Nash clearly had a dream for a small publication. The disparity between what he envisioned and what he achieved can be at least partially explained by Jefferson's

recommendations. In his response to Nash's letter, dated November 15th, 1811, he encouraged Nash to pursue the publication with an even further reach, stating that "...I think you might give it more of the character desired, by the addition of some other articles..." [23]. Jefferson suggested including additional articles on subjects such as time calculation and geographical positioning. This letter provides some intriguing insight into Jefferson's faith in American's mathematical abilities as he suggested that Nash include an explicit formula for calculating the time of sunrise and sunset using logarithmic tangents. Jefferson's particular interest in time calculations came from his desire for Americans to have access to useful mathematical applications "beyond the scope of the common almanacs" [23]. Jefferson even volunteered to subscribe to the journal.

Nash took Jefferson's advice and in 1812 published what could be considered the precursor to *The Diary*: A work entitled *The Columbian Ephemeris and Astronomical Diary* [11]. This roughly 70-page composition was filled with charts, tables, and articles about planets, calendars, time, and navigation. Though this ephemeris had intentions of being printed annually, the 1812 edition was the only volume published.

The failure of *The Ephemeris* must have influenced Nash's intentions for *The Diary*. In the Preface of Volume I of the journal, he explained that he wished to provide a high-quality almanac "holding an intermediate station between the ephemerides of the highest order, and the Almanacs in general circulation" [12, Preface]. Furthermore, Nash tapped into a cultural well of learning through the "Science and Amusement" section. This section was filled with original writings, questions and enigmas in an attempt to "induce the cultivation and exertion of native talent" and contribute to the "dissemination of useful knowledge" [12]. In the Preface, Nash also actively encouraged the public to get involved in the production of the journal by asking them to submit their own questions and answers to the questions posed in the journal. There were even prize questions in every edition, and the correct responders to those questions would receive copies of *The Diary* from that year. Nash learned from *The Ephemeris* that more than just astronomical facts were necessary for a journal to engage readers.

The Diary was also heavily influenced by a similar, successful journal from England, *The Ladies' Diary, or Woman's Almanac, of London* (for more on the *Ladies Diary*, see [5]). Nash explicitly stated that his journal was modeled after this one; however, this American version was to be bigger and better. Additionally, Nash says that the English *Diary* "has been continued one hundred and sixteen years, without intermission" and that he hoped the American journal would flourish and be well received "if supported by our countrymen with a zeal and enterprise proportionate to their intellectual facilities" [12, pp. 4–5].

Nash's journal was to be a bridge between plain almanacs and academic journals - an evolution already well-established in England from publications such as *Poor Robin* and *The Ladies Diary*. The blend of almanac, scientific news, mathematical questions, and various other word puzzles was the preferred and most successful journal recipe for eighteenth-century England, and in fact, journals that tried to focus solely on mathematics did not last long [7].

There were several other almanacs published during the early 1800s in the United States. For example, *The Farmer's Almanac* started in 1792 by Robert Thomas and is still published today (and is now known as *The Old Farmer's Almanac* [20]),

The Annual Visiter and Citizen and Farmer's Almanac [15] by Joshua Sharp ran at least from 1808 to 1820, and *The Maine Farmers' Almanac* [14] by Daniel Robinson began in 1819 and lasted at least until 1877. These publications often contained other miscellaneous information such as government office information, recipes, and humorous anecdotes along with the almanac. Nash's journal was distinguished from these almanacs by its mathematical content.

3. READERS AND CONTRIBUTORS

Just as the English *Diary* thrived because of its sizable and diverse fan base, Nash's *Diary* hoped to attract a variety of readers. To attain this, Nash was explicit in his intent for inclusiveness. The audience was every person in America as evident in the Volume I Preface which states that all people are welcome to participate: "particularly in the youth of both sexes" [12, pp. iv – v].

So who actually contributed? William Marrat, Robert Adrain, Walter Folger, John Gummere, Nathaniel Bowditch, and roughly thirty others made contributions to the mathematics section of Nash's publication venture. The contributor's education levels and social statuses were wide ranging. For the majority of those who wrote in to the journal, no historical or biographical records could be found. (Concluded from searching the American Periodical Series Online, America's Historical Newspapers, and Biography and Genealogy Master Index databases.) Additionally, several contributors had backgrounds in the military, as religious officers, or as teachers because when their questions or answers were published, their name was preceded with a title from their respective profession. Finally, several contributors were key players in the developing academic network of the country.

For example, Robert Adrain (1775-1843) was a self-taught mathematician of great notoriety in his day as a professor and publisher of his own journals, *The Analyst* and later *The Mathematical Diary* [3]. John Gummere (1784-1845) was another mostly self-educated man who published several papers on the subjects of surveying and astronomy and was a professor of mathematics at Haverford College [19]. Another notable contributor was Nathaniel Bowditch (1773-1838), who was well known for his papers on navigation and translation of Pierre-Simon Laplace's work [17]. The presence of these men and others of similar prestige made *The Diary's* credibility more apparent and also increased the journal's difficulty level. In fact, the answers to many of the questions they posed only came from within this elite group. Even if others could not achieve the necessary level of skill required to solve these problems, the presence of tough questions exposed the journal's audience to a challenging level of mathematics.

The contributors of this journal also came from a wide variety of places. While most were from New York and Pennsylvania, there was at least one from Maryland and one from South Carolina, suggesting that the journal was available a good bit farther south than its city of publication. In addition, at least nine were from England. One interesting Englishman in particular was a Master Thomas Gaskin, who was only 11 years old when he posed and answered questions [9].

Thus, Nash achieved his goal of appealing to a wide range of people with his journal, as they included young and old, northerners and southerners, Americans and foreigners, masters and pupils. The only obvious gap was the lack of women explicitly participating in the mathematical questions. Several people contributed under pseudonyms, however, so there is no way to know who they were.

4. TOPICS AND PROBLEMS

In addition to the diversity of contributors, the questions of the journal hit on an assortment of topics. Areas of interest included geometry, algebra, physics, geographical positioning, finances, astronomy, and ratios. Since the readers (and responders) were often also the journal's contributors, the topics covered were of interest to the patrons, and relevant to their lives and the times. To illustrate, one question from Volume I is an exponential decay question involving slavery [8]:

QUESTION IV.

PROBLEM BY THE LATE W. DOUGLAS, NEAR TRENTON, N. J.

If out of a cargo of six hundred slaves, two hundred die, during a passage of six weeks, from Africa to the West Indies, how long a passage will it take that one half of the cargo may be thus murdered; supposing the mortality to be the same throughout the passage, in proportion to the living?

This could be translated to “During a six week passage, a cargo ship carrying 600 slaves will lose 200 slaves to death. How long of a passage would cause the death of half the original number of slaves if the death rate stays the same?” A simple exponential decay model does not need to be asked through the medium of slavery; however, contextualizing the problem reveals perhaps deeper purpose behind the question. Earlier in 1820, the same year this volume was published, the Missouri Compromise was passed in Congress, allowing Missouri to be admitted as a pro-slavery state in the Union but forbidding slavery in any other territory above Missouri's lower border [2]. This fact coupled with the author's use of words like “murdered” and his being from New Jersey suggests that Mr. Douglas disapproved of the institution of slavery and used this question to voice that opinion. Thus, viewing the question through a historical lens offers more insight than when taken at face value.

Regardless, the question was answered using two different methods by two different people. One, the anonymous Philomathes, used arithmetical and geometrical progression along with logarithmic scales and set differences of logarithms proportional to each other [13]:

$$\text{As } \log. 600 - \log. 400 : \log. 600 - \log. 300 :: 6 \text{ weeks} : \frac{6 \log. 2}{\log. 3 - \log. 2} = \\ \mathbf{10.257 \text{ weeks.}}$$

Through this strategic process, the answer of 10.257 weeks was found [13]. The other, John Campbell, answered using proportions. Since one-third of the slaves died in six weeks, one-hundred of the remaining four-hundred (one-fourth) perishing at the same rate would leave only three-hundred alive. This therefore leads to the ratio $\frac{1/3}{1/4} = \frac{6}{7}$. Adding the unknown quantity, found to be 412, to 6, gives the answer 1012 weeks [4]. This offers some insight into the mathematical background of the two contributors as Philomathes recognized the need for logarithms in order to model exponential decay while Campbell utilized a more basic approximation method. Also, the notation used in each answer is different than what is used today; both used single colons : and double colons :: to represent proportionalities

(the first could be translated to a fraction bar and the second to an equal sign, thus setting up a relationship between quantities).

This one example of a question from *The Diary* can be contrasted to many others that range in difficulty – most notably, those which are solved using calculus. This area of mathematics was not yet considered common knowledge, as evident in the fact that the majority of questions solved using “fluxions” and “fluents” explicitly mention the book *Simpson’s Fluxions* to justify the method [13]. *Simpson’s Fluxions* seems to refer to *The Doctrine and Application of Fluxions* by Thomas Simpson (as opposed to his other publications) published in 1750 in England that lays out all the methodology of the Newtonian approach to the calculus [16]. Perhaps even more intriguing, however, is that in the second volume of *The Diary*, a solution by Robert Adrain, answering a question that he himself posed, appears to use Leibniz’s notation for calculus while solutions by other contributors are answered using Newton’s notation. Adrain explicitly calls the equation below a “differential equation between z and s,” then claims that in finding a solution for a similar equation “the integral is easily assigned by logarithms” [1].

$$dl = \frac{ds}{\sqrt{1 + 2e\phi}}$$

Adrain did not bother to justify his methods as all of the others did. The fact that Adrain was the only contributor to use Leibniz notation suggests that many Americans were still using Newton notation for calculus in the early nineteenth century.

This glimpse into the content and context of *The Diary* illustrates not only the differences between the mathematics of then and now, but also how the journal had a finger on the pulse of the country. The many functions and features of this journal – a calendar, a political sounding board, and a forum for scholarly exchange – gave any reader something to relate to. Thus, this journal truly was the cultural melting pot Nash had envisioned, where people of all backgrounds could exchange ideas and further their education.

5. CONCLUSIONS: A JEFFERSONIAN DREAM

Coupling the expectations and content of the journal with the figure of Nash and his correspondence with Thomas Jefferson gives a most serendipitous picture of a member of society trying to educate and enlighten the American population – a Jeffersonian dream! Examining the result of this noble effort leads to an apparently successful fulfillment of this dream in terms of an engaged and contributing population. In fact, in Volume III, Nash included a few reviews of the journal, all extremely positive. While, obviously, Nash would not publish poor reviews of his work, the fact that people went out of their way to express their praise suggests that the journal was especially enjoyed. For example, one reviewer exclaimed: “I am highly pleased with the work, and have no doubt but it will be of great use in disseminating useful knowledge throughout the Union” [6]. Yet *The Diary* only ran for three volumes. The explanation for this short life was given by David Hart in an article from *The Analyst* (1875), which says that the demise of the journal was due to illness in Nash’s family. Hart also expressed that the journal’s failure

was a letdown to the mathematical community at the time [9]. As Nash was the sole executive of the journal, there was no one to continue the work.

Even though *The Diary* was relatively short lived, the journal should still be considered a success when compared to others from the same time period. *The Mathematical Correspondent*, edited by George Baron and Robert Adrain, lasted only from 1804 to 1806; one of Robert Adrain's other projects, *The Analyst* similarly only ran for one year (1808); and *The Monthly Scientific Journal* by William Marrat also only survived one year (1818) [7]. Robert Adrain started another journal, *The Mathematical Diary*, shortly after the fall of Nash's *Diary*. This undertaking lasted considerably longer, from 1825 to 1832, likely because of the low difficulty level and thus accessibility it offered [10]. As this brief list shows, mathematical journals in early nineteenth century America were short lived at best, and in this context, *The Diary's* three years could be considered a respectable run.

In conclusion, *The Ladies and Gentlemen's Diary* attempted to provide a range of mathematics and other topics that would appeal to and educate the many different people of the United States. Analyzing the journal from a historical context has revealed insight into the journal's evolution and cultural significance, suggesting that Nash's publication engaged the public and encouraged mathematical inquiry. Even though *The Diary* did not go down in history as one of the most influential works of the 1820s and few may know who Melatiah Nash was, the journal left its mark on the history of American mathematics and offers a unique glimpse into the past through the window of mathematics.

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