They Shall Mount Up With Wings as Eagles: Aeronaut John Wise Reflects on Man and Flight

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The history of manned flight does not lack chroniclers. Eighteenth through twentieth century balloonists, airplane pilots, space craft commanders, and ultra light pace setters and their respective exploits consistently receive their just due in newspapers, an endless variety of enthusiast magazines, and both amateur and scholarly monographs. The only major discernable gap in the literature—a gap rapidly being filled—concerns the innermost thoughts and sentiments of those who fly, and perhaps even the enthusiasm of those who celebrate flights as spectators. This "intellectual history of flight" promises to broaden society's understanding by taking informed readers beyond the hardware and beyond the daring escapades, air battles, and world records.

John William Ward has interpreted the meaning of Charles Lindbergh's 1927 flight in a provocative article, while Joseph Corn has examined the intellectual and social significance of the airplane in *The Winged Gospel.*[1] Some insight into the meaning of the Space Age can be gleaned from Tom Wolfe's *The Right Stuff* or from Gerald K. O'Neill's *2081, A Hopeful View of the Human Future.*[2] What has not been given sufficient attention are the thoughts and reflections of aeronauts or balloonists.[2]

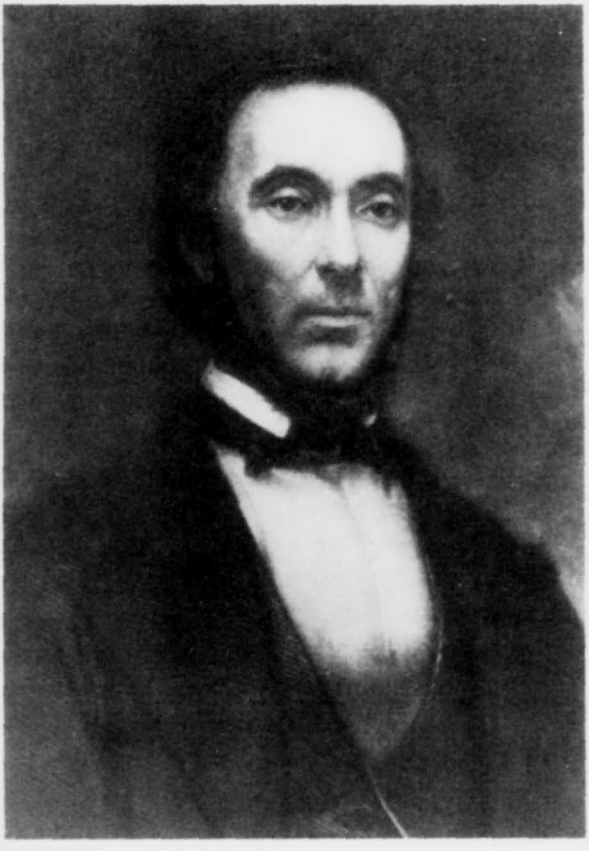
Part of this vacuum can be filled, however, by turning to the writings of Pennsylvania's John Wise—sometimes labeled America's first aeronaut. Wise is important for two reasons: first, this father of American ballooning is credited with 463 ascensions in 44 years; second, his writings are extensive.[4]

Wise's writings are divided between detailed accounts and sketches of his flights (interspersed with very personal observations) and what he considered to be scientific information. While he rightfully is credited with original contributions to ballooning, he was also admittedly building on the work of others. By the time of his first ascension (1835) Leonardo's sketch books and notebooks were over 300 years old and French balloonists had conducted a public flight over a half century earlier, in 1783.

WISE'S CAREER

John Wise was born February 24, 1808 in the Germanic community of Lancaster, Pennsylvania, a thriving inland town 60 miles due west of Philadelphia. One of eight children, he was educated in the local schools and apprenticed to a Lancaster cabinetmaker for five years during the late 1820s. The apprenticeship

Courtesy of Lancaster County Historical Society



John Wise

led to a brief involvement in piano building, a venture eclipsed in the mid 1830s by his interest in ballooning. Aviation was a personal compulsion that had been growing in Wise's thoughts since first reading of the exploits of European aeronauts. With the exception of a brief slump in his aeronautical career, during which time he turned to making scientific instruments in Philadelphia, John Wise spent the rest of his long life building balloons, making flights, studying the atmosphere, training aeronauts, and generally writing about and promoting ballooning.

Despite many hazardous moments aloft, Wise was persuaded that mastery of the science of aeronautics was well within his reach, and that society should benefit from this knowledge. To that end he argued for regularly scheduled flights in America and experimental trans-Atlantic flights as soon as the United States Congress or an enterprising newspaper could be persuaded to provide financing. (Congress ignored what it considered to be rather unrealistic dreaming and focused on more practical modes of transportation such as canals and railroads.)

In an ending suitable for a storybook, John Wise at age 71 was lost in a flight over Lake Michigan in 1879.[5]

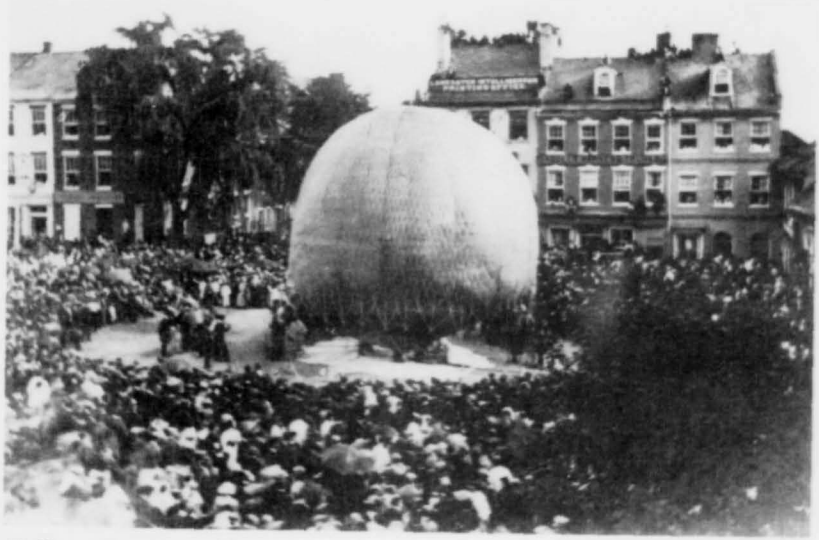
REFLECTIONS OF JOHN WISE ALOFT

It must have been difficult for early aeronauts to pioneer in flight, keep a journal while aloft, and not fall victim to the urge to wax philosophical. A cynic could argue that "philosophizing" was an occupational hazard for aeronauts—perhaps even a disease. For example, Jean Pierre Blanchard was airborn for only 46 minutes during the first public balloon ascension in America in 1793. In these 46 minutes he carried out a number of small tasks, including taking his pulse in response to a request from Dr. Benjamin Rush. This was to be compared with Blanchard's pulse rate taken just prior to ascension. In addition to these tasks, however, he still found time to note in his journal, "What sweet ecstacies take possession of the soul of a mortal, who leaving the terrestial abode, soars into the etherial regions!"[6] Blanchard's "ecstacies" provide some foreshadowing of what was to come.

In reading through and trying to organize and analyze the thoughts of John Wise seven categories are appropriate:

1. A Sense of Awe
2. Enthusiasm and Promotion
3. Adventure and Exhilaration
4. Science and Progress
5. Physical Benefits of Aeronautics

Courtesy of Lancaster County Historical Society



Balloon Ascension in Lancaster's Center Square, Circa 1867

6. Self-Transcendence and Religious Experience
7. Military Applications

More than a few observations fit as readily into one category as another.

A SENSE OF AWE

As faithful chronicler of his own flights, John Wise expressed a broad range of human thought and emotion. Thus, the cold, harsh logic of science coexisted side-by-side with the warm, emotive, and the romantic. On the latter side, both his earlier (1850) and later (1873) writings reveal a sense of awe—both a thought and a feeling that did not depreciate over time. It is something that Wise used very graphic language to describe. In a flight over south-central Pennsylvania circa 1840 he was moved to observe:

> Casting my eyes upwards, I was astonished in beholding another cloud stratum, far above the lower one; it was what is commonly termed a "mackeral sky," the sun faintly shining through it. The balloon seemed to be stationary; the clouds above and below appeared to be quiescent; the air castles in the distance stood to their places; silence reigned supreme; it was solemnly sublime; . . . alone in a mansion of the skies, my very soul filled with emotion; Great God, what a scene of grandeur![7]

(In the next breath in the next paragraph he considered the same scene as a meteorologist and wondered why there were two perfect layers of clouds—one less than a mile above the other—with a clear atmosphere in between.)[8]

Another example of this sense of awe was expressed in a June, 1852 flight from Lancaster, Ohio in the vicinity of Lake Erie:

> Lake Erie shed its brilliant reflection like a great sheet of polished silver, and the vast area far and wide was dotted with plantations and woods, villages and cities, the domes of some glittering in the sunbeams beneath like brilliant stars. Mt Vernon was the handsomest city in the plain; it stood out as the most prominant feature on the great chess-board beneath. . . . The whole circumference of the heavens was hung with a cloud-curtain of a peculiar cast, its lower edges smooth and regularly defined, the upper presenting a variety of scallops and projections, which rendered it most picturesque and beautiful; it was a most beautiful cornice around the interior of an immense rotunda.[9]

ENTHUSIASM AND PROMOTION

The unflagging enthusiasm of a pioneer and visionary such as John Wise is something that Eugene Ferguson has warned scholars not to overlook, for it is central to a thorough understanding of the development of new technology.[10]

Promotion was a logical outgrowth of the enthusiasm. The strategy of this early aeronaut was simple enough: fly often and garner as much newspaper publicity as possible for each flight. The publicity could be counted on to produce a large audience—one prepared to cheer success, but also potentially threatening in the face of extended delay or failure.

With 463 flights in 44 years, Wise averaged 10.5 annually. These ascensions, of course, were not distributed evenly over the calendar year, but rather were concentrated in the warm months, April through September. Thus it is reasonable to think of Wise averaging two flights per month in the better weather for almost half a century. Ascensions were treated as matters of public importance and local newspaper coverage reflected this. Given the predisposition of nineteenth century newspapers for overstatement, it was not unusual for a safe landing following even a minor mishap to be dubbed "miraculous."[11]

The aforementioned formula for promoting aeronautics proved so successful that Wise was ultimately drawn into barnstorming through Pennsylvania and Ohio in the early 1850s with a travelling tent show.[12] He also petitioned the United States Congress on two occasions seeking federal funding for regularly scheduled balloon flights and a trans-Atlantic crossing. In 1843 he requested $15,000 and in 1851 he requested $20,000. His argument to the Congress stressed the fact that knowledge already in existence could be applied to achieve spectacular feats:

> Your petitioner does not pretend to have discovered or solved any great new fangled problem; but would earnestly press . . . known facts, which must be explored. . . . From the improved state to which aeronautical machinery can be perfected, and the advantages . . . from the local currents of air, it is even now feasible to travel eastward with a velocity that will circumnavigate the globe in from thirty to forty days, with an ability to vary from a straight course thirty or forty degrees from the latitude of departure, which would enable us to leave dispatches in Europe and China, and return by way of Oregon Territory to Washington City.[13]

This petition and a later one had the support of Illinois Senator Stephen A. Douglas.[14] As noted earlier, however, Congress was not impressed enough to appropriate a dime for Wise's activities.

Admittedly, there were Congressmen who chortled when his petitions were read, but there was also public enthusiasm and converts who eagerly purchased flying lessons and balloons from Wise and other aeronauts.

ADVENTURE AND EXHILARATION

One of John Wise's more fascinating adventures occurred relatively early in his career. In August of 1838 he ascended to an altitude of 13,000 feet over Lafayette College in Easton, Pennsylvania, planning to explode a balloon and

thereby test the craft's ability to become a safe and viable parachute in an emergency. (While the concept of a parachute was hardly new—dating from Leonardo's sketch books—the rapid conversion of a hydrogen-filled balloon to a workable parachute was another matter.) His plans to explode the balloon by means of an "explosion rope," however, were short-circuited by a thunder storm and a bolt of lightning that performed the work prematurely. In "a moment of awful suspense"[15] the hydrogen left the balloon and descent was rapid. Fortunately, as Wise had predicted, the lower half of the balloon folded into the upper half and a makeshift parachute was created. The craft then managed what he described as an "oscillating" and "zig-zag descent" that was "marked by corresponding notes of the wind, as it whistled through the rigging of the balloon."[16] As Wise neared the earth the craft attained its "maximum velocity of descent, . . . struck the earth obliquely," and tossed the aeronaut ten feet from the craft.[17]

The Lancaster balloonist survived this adventure very nicely, but he was later moved to a wry observation that underscored his accomplishment:

> Although the principle of atmospheric resistance is a self-evident thing, and its application to a safe descent from great heights has been demonstrated, there are yet very few persons who are willing to believe it so well established as to entitle it to be practiced with impunity.[18]

Courtesy of Thomas Winpenny

End of cross country flight from St. Louis to Jefferson County, N.Y., July 2, 1859.

Other planned adventure must include Wise's 1859 record-setting flight from St. Louis, Missouri to Henderson, New York which took 19 hours and covered—with deviations—almost 1,200 miles. This harrowing flight included a storm over Lake Ontario that nearly swamped the attached boat and thus the balloon. (Cutting the ropes to the boat saved the balloon.) The landing of the *Atlantic* included getting caught in a wind that dashed the craft "through the treetops like a maddened elephant through the jungle."[19]

To take note of a spirit of adventure in John Wise is to belabor the obvious. This was a man prepared to fly the Atlantic almost a century before Lindbergh, a man who lost his life in a flight over forbidding Lake Michigan at age 71. John Wise probably enjoyed the numerous close calls that were part of 44 years of ballooning. What many people find frightening, a few people find exhilarating.

SCIENCE, TECHNOLOGY AND PROGRESS

Though obviously a popularizer of ballooning, John Wise preferred to think of himself as a scientist making a serious contribution, through observation and experimentation, to aeronautics. In his own words:

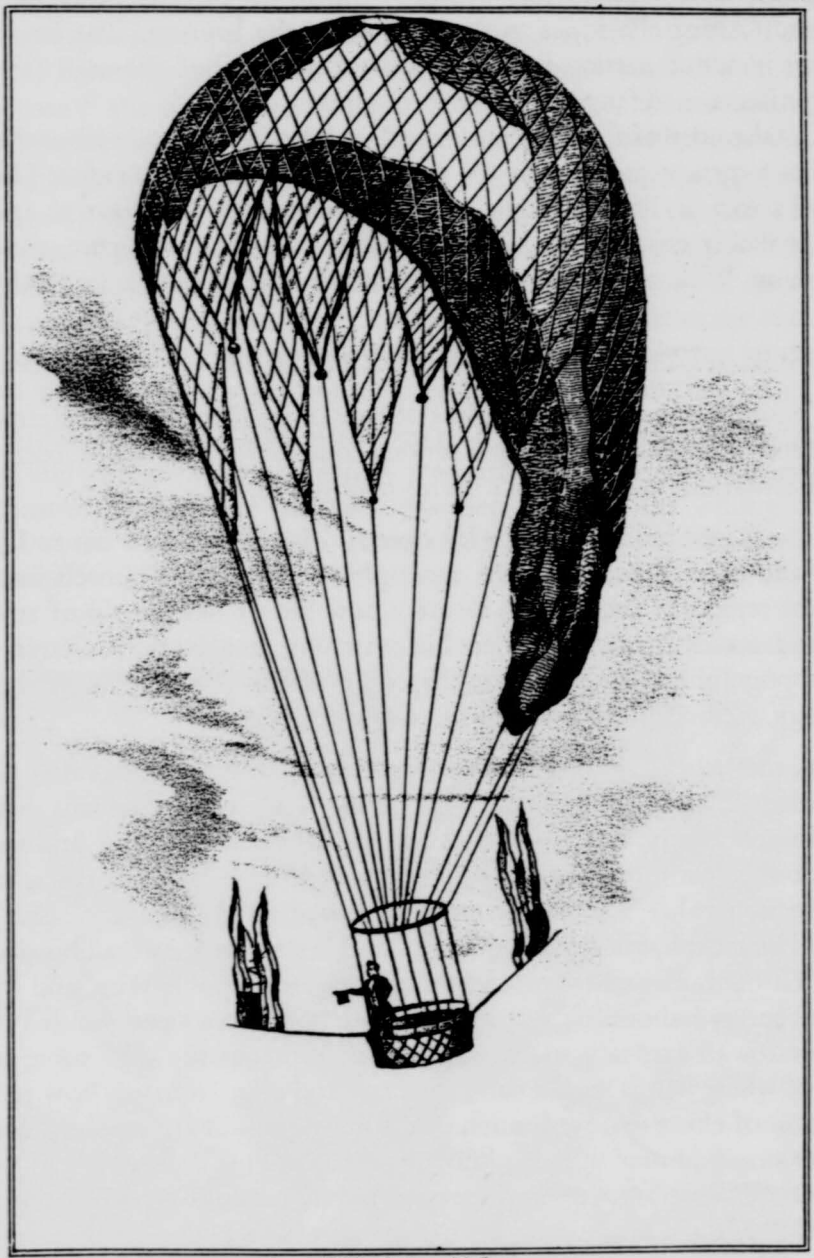
> A vast field of science lay open.... It required him but to lay his hand upon the lever of the atmosphere, and elevate himself into ... the region of the clouds, where a new life—a new world of science and art developed itself to his searching imagination! Geography, topography, natural philosophy, atmospheric phenomena, meteorology, astronomy, all assume a new feature.[20]

Indeed, the field of aeronautics was wide open, and Wise was well-positioned. He added to his own understanding of the heavens by studying meteorology with Joseph Henry, a multi-talented figure who was the first Secretary of the Smithsonian Institution and a successful pioneer in forecasting the weather.[21]

Precisely what sort of scientific contribution did the Lancaster aeronaut make? His most subtle achievement resided in persistence in sailing aloft over 44 years. Through an endless process of trial and error John Wise, and other nineteenth century balloonists, convinced at least the more open minded that it was possible for an aeronaut to ascend from a particular site with some foreknowledge of where winds would carry the craft and approximately how rapidly. The repetition of effort removed much of the mystique and rendered the process one more example of man utilizing know-how to conquer nature.

Second, Wise argued long and hard for the proposition that at an altitude of 10 to 15,000 feet a steady wind blew from west to east and that this explained the predictability noted in the preceding point. Third, he developed a rip panel activated by a rip cord that enabled a balloonist to deflate the balloon rapidly so that upon descent the balloon did not act like a sail allowing a gust of wind to bang the basket and occupants along the ground for a mile or two as an addendum to

Courtesy of Thomas Winpenny



P.S.Duval& Steam lith. Press.

DESCENT NEAR PHILADELPHIA.

Descent near Philadelphia, October 1, 1838.

landing. Fourth, he is credited with developing a balloon varnish that was the best in its day.[22] In addition, he experimented with a variety of balloon fabrics and various gases. In sum, while no scholar is moved to label John Wise an aeronautical genius, and one even dubbed him "a crank" in some scientific areas,[23] this father of 19th century aeronautics made at least a modest contribution to the science and technology of ballooning.

PHYSICAL BENEFITS

At the close of his 1850 treatise, *History and Practice of Aeronautics,* John Wise expounded for four pages on the thesis that, "Aerial Voyages Are Life Conservative." He argued that the "health-promoting, life-saving, and soul and body-envigorating capabilities"[24] of aerial navigation are sufficient by themselves to justify the attention that ballooning received. Indeed, while the sick "seek distant climes" and embark on "long and perilous sea voyages," they should learn that, "The elysian fields of health are much easier to be found by the use of balloons,"[25] More specifically he argued:

> atmospheric pressure has a great deal to do ... with the mechanical functions of life must be admitted by all sound reasoning on the subject, and ... is demonstrated by sending chronically diseased persons through the healthy fields of life inspiring air ... and examining the results. When I first engaged in the business of aeronautics I was suffering from chronic dyspepsia, added to a severe affection of the lungs caused by a long continued inhalation of dust composed of rosewood and the fine particles of glass, arising from ... my business ... (piano forte making).
>
> From the devouring ravages of such a complicated disease the practice of ballooning relieved me....[26]

The scientific explanation was as follows:

> .. as we rise up in the atmosphere ... the atmospheric pressure is gradually diminishing upon the muscular system, allowing it to expand—the lungs becoming more voluminous, taking in larger portions of air at each inhalation, and these portions containing larger quantities of caloric, or electricity, than those taken in on the earth, and the invalid feels at once the new life pervading his system, physically and mentally.
>
> The blood begins to course more freely when up a mile or two with a balloon—the gastric juice pours into the stomach more rapidly—the liver, the kidneys, and heart, work under expanded actions—the brain receives and gives more exalted inspirations—the whole animal and mental system becomes intensely quickened, and more of the chronic morbid matter is exhaled ... in an hour or two

> while two miles up on a fine summer's day, than the invalid can get rid of in a voyage from New York to Madeira, by sea.[27]

Almost as though these health benefits were not enough, Wise hastened to add that balloon ascensions created a great hunger in him—indeed a "ravenous appetite for animal food."[28] Having made this observation, he rested his case.

SELF TRANSCENDENCE/RELIGIOUS EXPERIENCE

To the extent that John Wise harbored the potential for self trancendence or felt inclined to address some of life's more profound mysteries, time spent aloft served as a catalyst to draw this out. (This is not to argue that such inclinations made him unique among aeronauts.) One episode that approximates self transcendence took place while aloft over the Schuykill River in Philadelphia. Wise was alone in a balloon that was "slowly writhing and twisting, as it were, between two contending currents" without hat, coat, or boots when "strange emotions pervaded my mind."[29]

> Grandeur had ever been a delightful theme to me, but this was more than grandeur. All the higher faculties of the human mind became gradually aroused; I was gently awakening from a magnificent dream, casting my eyes upon a scene of reality that appeared far more grand and magnificent than the dream itself; strange feelings were passing through my mind; I felt composed in body, but there was an indescribable emotion agitating the inner man, and it was some time before I reasoned the soul and body into their natural state of equilibrium.[30]

Closely related to thoughts of self transcendence were thoughts that can best be characterized as religious. While not much is known about the religious views of John Wise, it is believed that he was influenced by the writings of Emanuel Swedenborg, an eighteenth century Swedish theologian whose mystical and unconventional thoughts proved compelling to a variety of dissenters from the narrower traditions of established religious denominations. Swedenborg received communications from the spirit world that provided knowledge of all things in the heavens and below. Accordingly, he was in a position to explain the spiritual meaning of the Bible, as opposed to merely the literal or historical. Such claims appealed to the liberal and thoughtful tendencies in Wise.

An ascension from Lancaster, Ohio in June of 1852 provided the occasion for a great outpouring of religious sentiment. This particular flight of the *Ulysses* had generated a series of delights for the pioneering aeronaut. At 11,000 feet the craft was "distended to her most pompous dimensions, smoking at the mouth like an overcharged steamer."[31] Shortly thereafter Wise was bemused by the sight of a train emerging from foliage "like an anaconda with a black head dragging itself along the ground."[32] This was later followed by an enthusiastic community shooting off a cannon in a salute to Wise. He waved back at the crowd with a

Courtesy of Thomas Winpenny

Grand, Sublime and Interesting Spectacle!

The Mammoth Balloon 'Hercules'

AGAIN IN SERVICE!

GRAND and Topical Ascensions, on FRIDAY and SATURDAY, the 23rd and 24th of August, inst., from the city of Lancaster.

Topical ascensions will be made on Friday, the 23rd, with a rope and windlass, to commence at 9 o'clock, A. M., and continue during the day. The Balloon will be secured during the night, and operations will continue during Saturday, the 24th, until 4 o'clock, P. M., when the Æronaut, Mr. Wise, will leave *terra firma* for a long voyage with a party of passengers.

If, however, the weather on Friday, should be too boisterous to retain the "Hercules" till Saturday, then the grand ascension, with a party of passengers, will be made on Friday, at 4 o'clock, P. M., and an effort will be made by the Æronaut to bring the Balloon back to the city without discharging the gas, for next day's operations. For topical ascensions, persons will be charged according to heighth, from 500 to 1000 feet, and ten minutes time will be allowed for each ascension, exclusive of the time of letting out and taking in the rope.

For the long voyage, the fare will be $150. For seats, either topical or the voyage, apply to John Wise. [aug 20-30

An advertisement that appeared in the Lancaster Intelligencer August 20, 1850.

flag, but "wished at the time for a good six pounder to return the salute in right good earnest."[33]

As this entertaining flight drew to a close and he prepared to descend over Mt. Vernon, Ohio his mood shifted and he became reflective:

> ... my attention ... was drawn over the grand scenery below; ... I calmly laid down my pencil and book, and exclaimed, in heartfelt reverence, "Great and wonderful are thy works, O God!" and as I pondered over the scene, my mind was naturally enough led to the contemplation of how vast the mind and power of the Deity must be ... in a serious contemplation, a few moments thereafter, of the mag-

nitude and power of God, how humbled, how insignificantly small, I felt! . . . how small an atom my whole paraphernalia must be in the great work of nature.[34]

MILITARY APPLICATIONS

A final consideration in this cataloguing of the thinking of John Wise focuses on the utility of aeronautics on the battlefield. The Lancaster balloonist envisioned an opportunity to contribute to the war effort in the 1840s and again in the 1860s. In the first instance his ideas never got beyond the drawing board.

Wise self-confidently described his plan for shortening the Mexican War. His brief treatise was entitled: "Easy Method of Capturing the Castle of Vera Cruz." Wise claimed that his plan would make "the capture of the castle of San Juan de Ulloa as . . . easy as the launching of a frigate."[35] He required a balloon 100 feet in diameter, made of twilled muslin, coated with varnish, and capable of lifting 30,000 pounds. The balloon, car, cable, and network were not to exceed 10,000 pounds—leaving 18,000 pounds for percussioned bomb shells and torpedoes and another 2,000 pounds for men and ballast. This "cloud of destruction," as Wise labeled it, would be maneuvered from land or a boat by a cable five miles long—a distance sufficient to keep the "man-of-war balloon" beyond the reach of castle guns.[36]

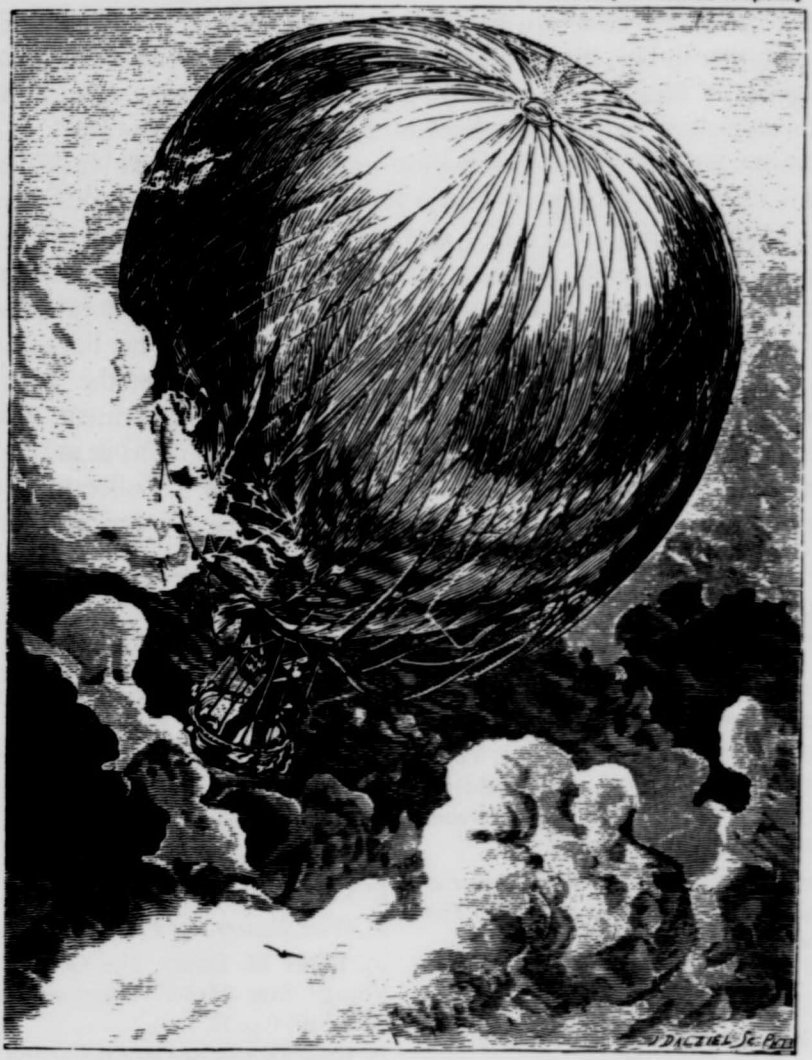
The idea of bombing Vera Cruz may have seemed novel to contemporaries of John Wise, but the nineteenth century aeraonaut surely knew that Leonardo had speculated about such matters centuries earlier and even sketched a bombing. In any event, Wise sent his proposal to the War Department in Washington where the idea died.

The Civil War proved frustrating for other reasons. Looking back on the experience several years later, Wise lamented the fact that the army had made only a limited commitment to aerial reconnaissance. He argued that, "Aeronauts, to be useful for reconnaissance in time of war, should be trained for the purpose, just as are the military engineers of other departments."[37] Indeed, "When the first Napoleon determined to make use of the art as a means of warfare, he established a training school where pupils were daily drilled in the practice of aeronautics. . . ."[38]

When John Wise actually got to the battlefield he quickly saw the need for a "locomotive inflating apparatus with which to decompose steam, so that a balloon could be filled in a few hours . . . any place where wood could be secured."[39] He got permission to write to Morris and Company in Philadelphia to request an estimate of what they would charge to build such a device. Morris and Company estimated $7,000, a figure that was rejected by the government as too high.[40]

After serving only 27 days,[41] Wise left his country's service, having completed some successful reconnaissance work in northern Virginia, but also having met with considerable frustration. He later speculated that "by the time the

Courtesy of Thomas Winpenny



"I WAS APPREHENSIVE THAT IT MIGHT BE MY LAST VOYAGE."
Ascent from Philadelphia, April 30, 1835.

balloon is made capable of doing mankind essential service, the idea of war shall be banished from the mind of civilized man as a thing too barbarous and brutal to be worked up into tales of glory and honor."[42]

CONCLUSION

What is to be made of this pioneering aeronaut? The collected observations of John Wise produce a portrait of a generally successful enthusiast and promoter of ballooning—someone who achieved a great deal in 463 ascensions despite his inability to sell trans-Atlantic flights to the Congress and despite his

inability to contribute decidedly on the battlefield. His commitment to aeronautics, which ultimately cost him his life, was sufficiently contagious to draw his son, his daughter-in-law, his grandson, and many others to the same pursuit. The multiple goals of Wise required that on occasion he display the temperament and tricks of a side-show barker. At other times he strove to do the work of a scientist, developing quailities of observation and reflection, while endeavoring to learn from authorities such as Professor Joseph Henry at the Smithsonian.

John Wise accomplished much, and yet it was less than he had sought. One recognized scholar credits the Lancaster balloonist with competent work in meteorology but hastens to add that Wise was "a bit of a crank in other scientific areas."[43] Perhaps his enthusiasm, at times, blinded Wise to his limitations as a scientist. A pronounced romantic streak allowed him to get the most out of ascensions—leading to endless expressions of awe and wonderment. With great patience Wise recorded much of what went through his mind as an early aeronaut and published these musings in 1850 and again in 1873. Collectively, the two volumes provide a window into the mind of an important American pioneer.

NOTES

1. Joseph J. Corn, *The Winged Gospel* (New York: Oxford University Press, 1983).

2. Tom Wolfe, *The Right Stuff* (New York: Farrar, Straus, Giroux, 1979) and Gerald K. O'Neill, *2081, A Hopeful View of the Human Future* (New York: Morrow, 1982).

3. Tom Crouch, *The Eagle Aloft: Two Centuries of the Balloon in America* (Washington: The Smithsonian Institution, 1983).

4. John Wise, *History and Practice of Aeronautics* (Philadelphia: J. Speel, 1850) and *Through the Air* (Philadelphia: To-Day Printing and Publishing Co., 1873). Wise's *History and Practice of Aeronautics* is 310 pages in length and his *Through the Air: A Narrative of Forty Year's Experience As An Aeronaut* is 650 pages in length (though it includes the reproduction of 150 pages from the 1850 work).

5. The most authoritative work describing the career of John Wise is the Tom Crouch study cited above.

6. Jean Pierre Blanchard's *Journal* p. 19 reproduced in *The First Air Voyage in America* (Philadelphia: Penn Mutual Life Insurance Co., 1943).

7. Wise, *History and Practice*, p. 210.

8. Ibid.

9. Wise, *Through the Air*, p. 446.

10. Eugene S. Ferguson, "Toward A Discipline of the History of Technology," *Technology and Culture*, 15 (January, 1974), p. 21.

11. Wise, *History and Practice*, p. 198.

12. Crouch, p. 202.

13. Wise, *History and Practice*, p. 245.

14. Esther M. Douty, The Greatest Balloon Voyage Ever Made," *American Heritage*, 6 (June, 1955) p. 12.

15. Wise, *History and Practice*, p. 192.

16. Ibid., 193.

17. Ibid.

18. Ibid., 198.

19. Doughty, p. 107.

20. Wise, *History and Practice*, p. 174.

21. Crouch, *Eagle Aloft*, p. 208. John Wise is discussed briefly in volume II of the Jospeh Henry papers. Precisely how much contact Wise had with this distinguished scientist is unclear. See Nathan Reingold, editor, *The Papers of Joseph Henry* (Washington: Smithsonian Institution Press, 1972-1985).

22. See Crouch, *Eagle Aloft.*
23. Ibid., p. 206.
24. Wise, *History and Practice,* p. 307.
25. Ibid., p. 308.
26. Ibid.
27. Ibid., p. 309 and 310.
28. Ibid., p. 310.
29. Ibid., p. 153.
30. Ibid.
31. Wise, *Through the Air,* p. 446.
32. Ibid.
33. Ibid.
34. Ibid
35. Wise, *History and Practice,* p. 257.
36. Ibid.
37. Wise, *Through the Air,* p. 555.
38. Ibid.
39. Ibid.
40. Ibid.
41. The Army Balloon Corps remained in service until June of 1863 under the leadership of Thaddeus Lowe, a rival of Wise. For additional information on John Wise in the Civil War see Eugne B. Block, *Above the Civil War* (Berkeley: Howell-North Books, 1966) and L.T.C. Rolt, *The Aeronauts* (New York: Walker and Company, 1966).
42. Wise, *Through the Air,* p. 555.
43. Crouch, *Eagle Aloft,* p. 206.