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David Rittenhouse



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David Rittenhouse

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To
Carl Bridenbaugh

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List of Abbreviations

A few compressed abbreviations have been used throughout the footnotes for the purpose of brevity:

APS	American Philosophical Society
DR	David Rittenhouse
HSP	Historical Society of Pennsylvania
LC	Library of Congress
LCP	Library Company of Philadelphia
MHS	Massachusetts Historical Society
NYHS	New-York Historical Society
NYPL	New York Public Library
PMHB	<i>Pennsylvania Magazine of History and Biography</i>

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CHAPTER I

Eulogy to an Age

SOMBER excitement and a sense of occasion stirred the air in Philadelphia as the sun climbed toward its meridian on December 17, 1796. The day was crisp but comfortable, the temperature just above freezing. Ordinarily on a Saturday morning everyone would be at work, but on this day even the physicians limited their calls and the clergy chose some other time to write their sermons. Legislators arranged early adjournments, and other officials—federal, state, and city—freed themselves from their usual routine. In homes throughout the city, men and women bustled about, completing their preparations. Some few favored ones regarded a tall, exquisitely crafted clock that stood in a prominent place in their home with unusual poignancy and affection as they looked to see how much time remained.¹

Before noon, individuals and quiet groups began to converge on the First Presbyterian Church in High Street—between Second and Third. Those who approached from the north had to walk around and past the market stalls in the street paralleling the building front. Even those who came from other directions could catch little more than a glimpse of the gleaming Corinthian columns until they were almost at the door. For many, this was an opportunity to see the interior of Dr. Ewing's new church, which was reputed to seat six hundred. Even so large a structure would be taxed to capacity today. Inside, the ushers awaited the flood that was almost upon them. They anticipated that the United States Senate and House, both houses of the

¹DR, Notebook, 1792–96 (entry for Dec. 17, 1796, by unknown hand), APS; *Extracts from the Diary of Jacob Hiltzheimer* (Phila., 1893), 237; Mins. of the Select Council, Dec. 15, 1796, Phila. City Hall Annex.

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Pennsylvania legislature, the city councils, the students, the faculty and trustees of the University, and the College of Physicians would attend in bodies. The sponsoring organization, the American Philosophical Society, met at its hall on Fifth Street at eleven o'clock so the members could walk in procession to the church. In addition, the diplomatic corps, the clergy of all the city's churches, and most other residents of distinction had been invited.²

The written acceptance of President Washington and his lady made it clear that none might regard the invitations lightly. The mayor made plans to attend, and the governor was kept away only by illness. The resulting assemblage shone with a luster that could have been duplicated nowhere else in America.³

The mood, however, was solemn. Six months after his death, David Rittenhouse was to be honored in a formal eulogy pronounced by the celebrated Dr. Benjamin Rush. Although the eulogist was distinguished by his quicksilver mind and a capacity for vitriolic remarks, everyone knew that today benevolence and love would dominate his performance. In a city of admirers of the late David Rittenhouse, Benjamin Rush was one of the most ardent.

Many in that audience had warm memories of the man to be honored, although few—perhaps none—could call themselves his close friends. William and Benjamin Smith Barton deeply admired their uncle, who had helped each of them along the road to success in different professions, but they had not enjoyed the equality of true friendship. Pennsylvania Chief Justice Thomas McKean and State Secretary Alexander James Dallas knew Rittenhouse as a close political associate, although, otherwise, they lived worlds apart. Congressman John Page of

² Floor Plan, Records of the First Presbyterian Church, 1810-17, Presbyterian Hist. Soc., Phila.; Edmund Hogan, *The Prospect of Philadelphia* (Phila., [1795]), 9; APS Mins., 1793-98, 107-9, 111; *Claypoole's Am. Daily Adver.*, Dec. 16, 1796.

³ George W. Craik to S. Magaw and C. W. Peale, Dec. 12, 1796, Arch., APS; *Aurora*, Dec. 22, 1796; Kenneth and Anna M. Roberts, eds., *Moreau de St. Méry's American Journey* (Garden City, 1947), 336.

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Virginia passionately admired Rittenhouse's scientific achievements,—but he could not really understand them. Charles Willson Peale had always felt honored by a close association dating from the darkest days of the Revolution. Yet even he apprehended only intuitively the genius of the man whose distinction he celebrated. George Washington certainly never considered himself Rittenhouse's inferior, but their relationship of mutual respect had always been bounded by austerity. Professor Robert Patterson, who could indeed understand Rittenhouse's scientific papers, never enjoyed more than an external acquaintance. Dozens had known one or another aspect of the man and remained strangers still.

One, at least, sat long with his memories. The Reverend William Smith, onetime provost of the College of Philadelphia, considered himself responsible for discovering Rittenhouse's talents and introducing him to Philadelphia and to the world. Smith had been a devoted advocate, and, under the most trying circumstances, Rittenhouse had gone out of his way to reciprocate. Yet, an intimate friendship was prevented by personality factors and by Smith's equivocation when faced by a Revolution which Rittenhouse accepted without restraint or qualification.

Of Rittenhouse's closest friends, two had died before him and one was absent. The Reverend Thomas Barton, his loyalist brother-in-law, was the only man ever known to have called him "Davy."⁴ Judge Francis Hopkinson shared with Rittenhouse a multitude of relationships—undeterred by post-Revolutionary political differences. Both Barton and Hopkinson had been true friends.

The third friend was Thomas Jefferson—conspicuously but unavoidably missing from this gathering. Long before, he had retired to Monticello, where he now awaited the outcome of the election of 1796, which, by December 17, was still unde-

⁴ William Barton, *Memoirs of the Life of David Rittenhouse* (Phila., 1813), 197.

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cided. Had Rittenhouse lived just a little longer he would have served as a Jeffersonian elector, for he supported the Virginian's political leadership as warmly as the future President celebrated the scientific merit of David Rittenhouse. Indeed, no one would ever transcend the tributes Jefferson once paid his friend, whom he ranked "second to no astronomer living" and whom he regarded as one of nature's masterworks: "the world has but one Ryttenhouse, and . . . it never had one before." When Jefferson left Philadelphia some years earlier, Rittenhouse had written disconsolately, "I shall ever remember with pleasure whilst memory continues to perform its office, that I have counted the name of Mr. Jefferson in the very short list of my friends."⁵

The church was as crowded with memories of the men who were not there as it was with the visible audience when the little doctor finally rose. His address was a very model of what had been expected of him and captured the rapt attention of his distinguished listeners. The newspapers would later outdo themselves in praise: "Bold, original, liberal, and pathetic . . . abounding with ideas that were important; with sentiments that were noble and practical; with language glowing, energetic, and elegant." "A most masterly composition." With "the ability of an Orator" and the "feeling of a Friend," Rush made of the meeting the "solemn and affecting occasion" the entire city demanded.⁶

He was—and he knew it—dealing not only with a man recently deceased but with a symbol—with a myth. Even during his lifetime, David Rittenhouse had seemed the personification of aspirations seldom attained. In death, the image became yet a little clearer.

⁵ *Claypoole's Am. Daily Adver.*, Nov. 25, 1796; *Aurora*, Dec. 17, 1796; Harry M. Tinkcom, *The Republicans and Federalists in Pennsylvania, 1790-1801* (Harrisburg, 1950), 167; [Thomas Jefferson], *Notes on the State of Virginia* (Paris, 1782 [1785]), 120; Julian P. Boyd, ed., *The Papers of Thomas Jefferson* (Princeton, 1950—), II, 203; DR to Jefferson, Jan. 11, 1793, Jefferson Papers, LC.

⁶ *New World*, Dec. 19, 1796; *Phila. Gaz.*, Dec. 19, 1796; *Pa. Gaz.*, Dec. 21, 1796.

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"Rittenhouse," Rush proclaimed, "the friend of God and man, is now no more!—For this, the temple of Science is hung in mourning,—for this, our eyes now drop a tributary tear. Nor do we weep alone.—The United States of America sympathize in our grief, for his name gave a splendor to the American character, and the friends of humanity in distant parts of the world, unite with us in lamenting our common loss,—for he belonged to the whole human race." Rush went on: Rittenhouse was a true philosopher, yet a bulwark of religion; a warm patriot, yet a citizen of the world and a friend of mankind; he was an honest democrat, a man of the people, yet a man of unquestioned nobility and exquisite capacity. These were the aspirations of the American Enlightenment, harmoniously combined, despite their apparent contradictions, in the person of David Rittenhouse. Rittenhouse was not merely a scientist, or a patriot, or a prominent citizen. He was one of the enlightened ones—"one of the luminaries of the eighteenth century."⁷

As Rush told it, Rittenhouse, though born to the plow, early demonstrated a remarkable genius in mathematics which permitted him to absorb all the advances of science by applying himself, unaided, to a small collection of books. When he turned to clockmaking, he produced the finest orrery, or mechanical planetarium, yet conceived. He displayed brilliance in his observations of the transit of Venus and in succeeding astronomical work. He applied his unusual depth of knowledge to the determination of several state boundaries and the establishment of the United States Mint. He was equally remarkable for the breadth of his interests, which included facility in French, German, and Dutch literature as well as in poetry, music, theology, and politics. He had been a republican before there was a republic. As a revolutionist, he had contributed heavily to American victory in the War for Independence. His honors multiplied with his accomplishments. Among the most significant,

⁷ Benjamin Rush, *An Eulogium Intended to Perpetuate the Memory of David Rittenhouse* (Phila., [1796]), 5, 24.

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Rush mentioned academic degrees, the presidency of the American Philosophical Society, and fellowship in the Royal Society. Pure morals and unaffected modesty further enhanced his greatness.

Thus was the image carved, and thus far it was accepted by most of the audience. Yet Rush's address contained a few allusions and certain overtones that were not equally acceptable to everyone. When the members of the American Philosophical Society retired from the church to their own hall, Judge Thomas McKean offered a *pro forma* resolution complimenting the doctor upon his eulogy. Surprisingly, the resolution ran into opposition. Indeed, the intensity of feeling rose to such a pitch that passage of the motion seemed improbable. Some of the members were determined not to place the stamp of society approval upon everything Rush had said. Dr. Charles Caldwell, who had no love for Dr. Rush but who held David Rittenhouse in the highest esteem, averted defeat by offering an amendment that emphasized "the thanks of the Society" rather than its approval of the contents of the address. He was moved by fear that failure to pass the resolution would reflect implicit criticism of Rittenhouse himself.⁸

Ostensibly, the cause of this unseemly crisis was the manner in which Rush had insisted that Rittenhouse lacked "what is called a liberal education." Far from viewing this as a disadvantage which Rittenhouse had managed to overcome, Rush defiantly proclaimed, "I am disposed to believe that his extensive knowledge, and splendid character are to be ascribed chiefly to his having escaped the pernicious influence of monkish learning upon his mind in early life."⁹ In this pronouncement, Rush repeated that romantic strain of Enlightenment thought which pictured nature as an open book to be read by anyone with a pure heart and a mind unfettered by academic

⁸ APS Mins., 1793-98, 111; Charles Caldwell, *Autobiography* (Phila., 1855), 265-68.

⁹ Rush, *Eulogium*, 23.

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artificialities. It had an additional patriotic appeal, for it made Rittenhouse's achievements appear the peculiar result of his American environment.

Some members of the society felt personally affronted. The Bartons were sure that their uncle was not self-taught to the extent Rush asserted; they knew that their father had helped him in his efforts to acquire the knowledge he wanted. William Smith and the University of Pennsylvania professors imagined that they were hidden targets of Rush's aggressiveness. Smith and Patterson realized that they understood Rittenhouse's scientific writings while Rush did not. They knew that however he had acquired his knowledge, Rittenhouse was an educated man whose insights came from an understanding of science rather than a neglect of its cumulative structure.

The dispute involved politics, too. McKean's resolution, supported most positively by Secretary Dallas, revealed that the Jeffersonian Republicans were well satisfied with Rush's performance. The doctor himself was moderate on this topic, but he suggested more than he actually stated when he emphasized Rittenhouse's republicanism and asserted his belief in the perfectability of political institutions. He confessed that, had he said less, he would have been accused by Rittenhouse's former political associates "of an act of treachery to his memory." To the extent that the Republicans were satisfied, the Federalists were almost equally dissatisfied, and Rush felt persecuted by their vengeance throughout the following year.¹⁰ They were determined that Rittenhouse's memory should not be used to advance the political fortunes of their opponents. Indeed, this was one of the motives which led William Barton, years later, to attempt to redress the balance with a book about his uncle.

While Rush admitted his subject's political radicalism, he went out of his way to establish his religious conformity. This

¹⁰ *Ibid.*, 37; Rush to William Barton, May 20, 1812, Rush MSS, xxxix, 96, LCP; L. H. Butterfield, ed., *Letters of Benjamin Rush* (Princeton, 1951), II, 793.

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was something the doctor himself worried about. Apparently, he succeeded in satisfying the clergy, and any who recognized the distortion refrained from breaking the peace.

Clearly each group, in education, politics, or religion, would have tailored Rittenhouse's image to a somewhat different measure. He was a symbol of such great importance that no single segment of opinion could be permitted to appropriate him. Everyone admired the man and considered him an ornament to society, but, precisely because he was so universally acclaimed, it was essential that he not be misinterpreted.

The importance of the symbol became starkly clear during the afternoon following the eulogy, but this was not the beginning of the story. More than most men, Rittenhouse had spent his life trying to fulfill an ideal; an ideal continually influenced and altered by the expectations he encountered in his associates. He had gone further than men had any right to expect in attaining the destiny they claimed for him, but his achievement was the result of studied and continued effort. He was a product not of his heredity and his opportunities alone, but of his dreams and the dreams of some of the best men he knew. To his contemporaries, David Rittenhouse seemed the embodiment of virtues they wished they possessed themselves—the embodiment of the noblest virtues of the age.

CHAPTER II

Heritage of a Clockmaker

1732-1767

THE idea that David Rittenhouse rose to distinction despite an inferior heredity could not have been further from the truth. His heritage was more rare and valuable than that possessed by all but a handful of men in his day or in any day. He inherited an unusual capacity for intellectual growth. By no standard can he be described as less than gifted.

Contemporaries were misled by the lack of distinction of Rittenhouse's parents. Neither in social and economic attainments nor in intellectual and cultural pursuits did they command attention. His father, Matthias, was a farmer, self-sustaining and respectable but no more remarkable than thousands of other small farmers throughout the colonies. Within the limits of his work, Matthias was not unsuccessful for he gave David a modest property and provided in some way for all his other children. He appeared industrious and reliable to everyone who knew him, but to his grandson, William Barton, the conclusion was inescapable that Matthias "had no claims to what is termed genius."¹

On the other hand, Matthias Rittenhouse demonstrated much more adaptability and fortitude than a casual observer was likely to see. He had not been raised a farmer but was associated from boyhood with his father and brothers in the operation of the family paper mill near the Wissahickon. When his oldest brother, William, inherited the mill, Matthias bought a farm in nearby Norriton Township. That this relocation was not easy is suggested by scattered hints. None of his children bore

¹ Barton, *Memoirs*, 98.

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the name of any of his relatives although several received names of members of the maternal family. Again, Matthias revealed a consistent antagonism toward craftsmanship and manufacturing in opposing David's early interests.

The education of David's mother, Elizabeth Williams Rittenhouse, was too limited to permit her to display any sort of intellectual capacity. Daughter of Evan and Dorothy Williams, Welsh Quakers, she had been raised from childhood by an elderly relative, Richard Jones. Her people had been farmers and she was able to aid her husband in many ways as he developed his new career. Quick and alert where Matthias was slow, she gave a very different impression to people. Convinced that they must find evidence of David's capacities in one of his parents, William Barton and Benjamin Rittenhouse concurred that his "genius was more derived from his mother than his father."² Limited by the prevalent concepts of heredity, they never thought of looking at the generations before Rittenhouse's parents for evidences of genius. Besides, they were inclined to value British above German ancestry.

However, Matthias' father Nicholas, or Claus, and still more impressively his grandfather William left unequivocal evidence of superior capacity. Born in the German Rhineland, Wilhelm Rittinghausen lived in the Netherlands as Willem Rittinghuysen for ten years before he took his family to Pennsylvania. There in 1690, drawing upon his European experience in paper making, he established a paper mill on the banks of the Monoshoe Creek near where it empties into the Wissahickon. This was a landmark in the development of the colonial economy, and its success brought William into contact with several prominent men in the province, including William Penn himself. William became a leader of the German community and was chosen first minister of the Mennonites who clustered in his vicinity.³

² *Ibid.*, 93, 109, 111.

³ Daniel K. Cassel, *A Genea-Biographical History of the Rittenhouse*

Nicholas, also born in Germany, married a Dutch girl, Willemigntie de Wees, in New York shortly after his arrival in the colonies. As a result, Dutch as well as German was spoken in his home just as it had been in William's. The mill prospered under Nicholas' management and even justified expansion. Nicholas followed further in his father's footsteps by serving as a Mennonite minister.

Inexorably, the genetic portion of his inheritance had already been transmitted when David Rittenhouse was born, on April 8, 1732, in the solid stone house his great-grandfather had built. His ancestry contained enough evidences of capacity to make his own gifts believable. Their development and refinement began within the secure home provided by his parents—first at the family homestead along the Wissahickon and thereafter at the Norriton farm.⁴

The farm consisted of a hundred acres of gently rolling, high ground some three miles above the Schuylkill and twenty miles from Philadelphia. Initially, the household included Elizabeth's two younger brothers, and it soon embraced a considerable progeny. Matthias and Elizabeth had ten children of whom seven lived to maturity—five girls and two boys. Of these, David was the second child and the first son.

Only the broadest outline of David's familial life is known. In many respects, the family escaped from traditions which bound each parent to differing complexes of belief and behavior. Matthias broke free from his Germanic background into an Anglicized world more congenial with his wife's heritage. Yet, David's later facility with the German language suggests that German was either occasionally spoken or its study

Family (Phila., 1894), I, 78 [must be used with caution]; cf. Calvin I. Kephart, "Rittenhouse Genealogy Debunked," *National Genealogical Soc. Quar.*, 26 (1938); Harold S. Bender, "William Rittenhouse," *Mennonite Quar. Rev.*, 8 (1934), 58; Milton Rubincam, "William Rittenhouse," *Pa. German Soc. Publications*, xxxviii, 64.

⁴ This birth date has been accepted but DR celebrated April 23 as his birthday (April 12 o.s.). See Catharine Van C. Mathews, *Andrew Ellicott, His Life and Letters* (N.Y., 1908), 57.

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encouraged. The Mennonite religious affiliation was altogether abandoned; even with a strong will, it would have been difficult to maintain in that English community. For one period the parents attended a Baptist church. Elizabeth did not remain a steadfast Friend, but the Quaker influence was remarkably strong upon the entire family as the marriage of several of the children to Friends suggests. David himself, though never a member of the Society, chose both of his wives from that faith. Some of the Mennonite doctrines were complementary to those held by the Friends, so Matthias' background was not uncongenial. Nevertheless, circumstances conspired against any strong denominational loyalty.⁵

Records of David's boyhood do not exist, and many remembrances by his contemporaries were colored by the wish to discover every possible parallel with the life of Sir Isaac Newton. Some of them, however, ring true. David was credited with making a wooden model of a water mill at the age of eight—just as Newton was known to have made a model of a wind-mill when still a boy. David, of course, had been born beside a water mill and, however strained Matthias may have felt toward his family, it is likely that the boy did sometimes visit the Rittenhouses and their mill. David was also credited with building a wooden clock at sixteen and a brass clock shortly afterward—just as Newton had built a water clock and a sundial at an early age.⁶

Benjamin Rittenhouse recalled other incidents which linked his brother with Newton the mathematician. Specifically, he remembered finding chalked figures and calculations all over the plow handles and fences when he was commissioned to call in his older brother from his farm duties. Where David learned ciphering or reading and writing no one seemed to recall, and later students have erred in conjecturing ties with schoolmas-

⁵ William W. Hinshaw and Thomas W. Marshall, comp., *Encyclopedia of American Quaker Genealogy* (Ann Arbor, 1938), II, 413, 650, 995; Barton, *Memoirs*, 98.

⁶ *Ibid.*, 97-98.

ters of the area. Much of his early education was gained within the home—there especially he formed many of the attitudes and aspirations which never left him.⁷

Rittenhouse himself recalled one very tangible influence, important because it reinforced tendencies toward craftsmanship which his father might dislike but could not wholly repress. Elizabeth's brother, David Williams, in his work as an itinerant joiner, directly encouraged his nephew. During his lifetime, Uncle David frequently made his home at Norriton and, on his death, he left to his nephew a box of tools and books which young David always afterward recalled as a great "treasure." In addition to tools and implements used by carpenters, the box included a few elementary arithmetic and geometry books and sheets of calculations. The chest had real as well as symbolic importance; it fed David's already demonstrated interest in mechanical pursuits and it provided him an opportunity to develop his mathematical capacities.⁸

Clockmaking in eighteenth-century Pennsylvania was the most precise and stimulating craft open to boys with a bent for mechanics. It required a high degree of manual skill and some acquaintance with both arithmetic and elementary geometry. Norriton was not the most promising location to develop such a trade, but a wide market was accessible for the product of the clockmaker—in the homes of country people as well as in the capital city. Given David Rittenhouse's interests and capacities, clockmaking was the most suitable trade he could choose. Lacking a learned education and isolated on a farm, he could not have found a wider doorway to a variety of opportunities.

Moreover, clockmaking was sometimes allied with mathematical instrument making as, in time, it would be with Rittenhouse. From such a beginning, a group of men in England and in Scotland rose to deserved prominence in the world of sci-

⁷ Rush, *Eulogium*, 7-8.

⁸ Barton, *Memoirs*, 106.

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ence. No American instrument maker succeeded so strikingly as Rittenhouse, but, in the mother country, James Short, John Dolland, Edward Nairne, and George Adams carved out careers which make Rittenhouse's seem less exceptional.

There is no record of the lucky or well-calculated stroke that led Rittenhouse to undertake the making of clocks, nor is there evidence that he was ever apprenticed to any one of several clockmakers from whom he might have learned the trade. There is eloquent circumstantial evidence in the clocks he constructed that he somehow became acquainted with the best techniques of English and American clockmaking. His clocks were not unusual either in design or in manner of construction but only in the fineness of their craftsmanship and in the individuality impressed upon each of them.⁹

Matthias Rittenhouse not only gave his reluctant consent that his son should give up farming but even provided the means for embarking upon a career in clockmaking. He offered to buy the basic tools, and he permitted his son to build a workshop on the Norriton farm alongside the road to town. David Rittenhouse made additional tools required in his work; he was continuously busy either in contriving and constructing or in studying. From 1750 or 1751 until the Revolution, he was a clockmaker by trade.

Norriton was not rich in intellectual resources. Rittenhouse's parents had little inclination in this direction, and the farmers round about had even less. The eager clockmaker met with hardly any opportunity for informed conversation or advice as he extended his studies of mathematics and the sciences. His scholarship was an even more lonely pursuit than, in some measure, scholarship must always be. Even his access to books was limited. In later years, his work continued to be marked by this individual, isolated character.

Thomas Barton's arrival as a schoolmaster in Norriton in-

⁹ George H. Eckhardt, *Pennsylvania Clocks and Clockmakers* (N.Y., 1955), 35.

jected a dynamic, new element into Rittenhouse's environment in 1751. Barton at twenty-one was only two years his senior, but, freshly arrived from Ireland, he possessed learning and experience that made his friendship an important acquisition. An Anglican of English descent, he had studied at the University of Dublin. He had a wide range of intellectual interests in which the sciences were prominent although his taste and capacities were best suited for the study of natural history. Barton remained a neighbor for little more than a year, but his influence continued over a much longer period.¹⁰

Their friendship survived Barton's move to Philadelphia in 1752 to accept appointment as tutor in the Academy and Charitable School. From the city, he supplied his country friend with books and encouragement. Their earliest letters testify to a mutual warmth of feeling, which was guaranteed permanence by Barton's marriage to Rittenhouse's eldest sister, Esther. This event was celebrated on December 8, 1753, in Old Swedes' Church, Philadelphia—a distinct suggestion of the strength of Barton's dedication to the Church of England compared with Esther's relative freedom from church ties.¹¹

Rittenhouse's ill health, of which he was to complain for the balance of his life, first assumed importance about this time. His illness was attributed to hard work and hard study without sufficient rest or relaxation. Seeking a cure, he spent some time at Yellow Springs, a chalybeate resort some fifteen miles from Norriton. The waters he took there and the rest seemed to improve the general state of his health, but his most specific complaint would not leave him then or ever again except for the briefest periods.

This disability he described as "a constant heat in the pit of the stomach, affecting a space not exceeding the size of a half

¹⁰ Barton, *Memoirs*, 101-5, 118-22; Benjamin Smith Barton, *A Discourse on Some of the Principle Desiderata in Natural History* (Phila., 1807), 86; Charles W. Rutschky, Jr., "Thomas Barton's Collection of Minerals," *Pa. History*, 8 (1941), 148, 150.

¹¹ Edward Ford, *David Rittenhouse* (Phila., 1946), 17.

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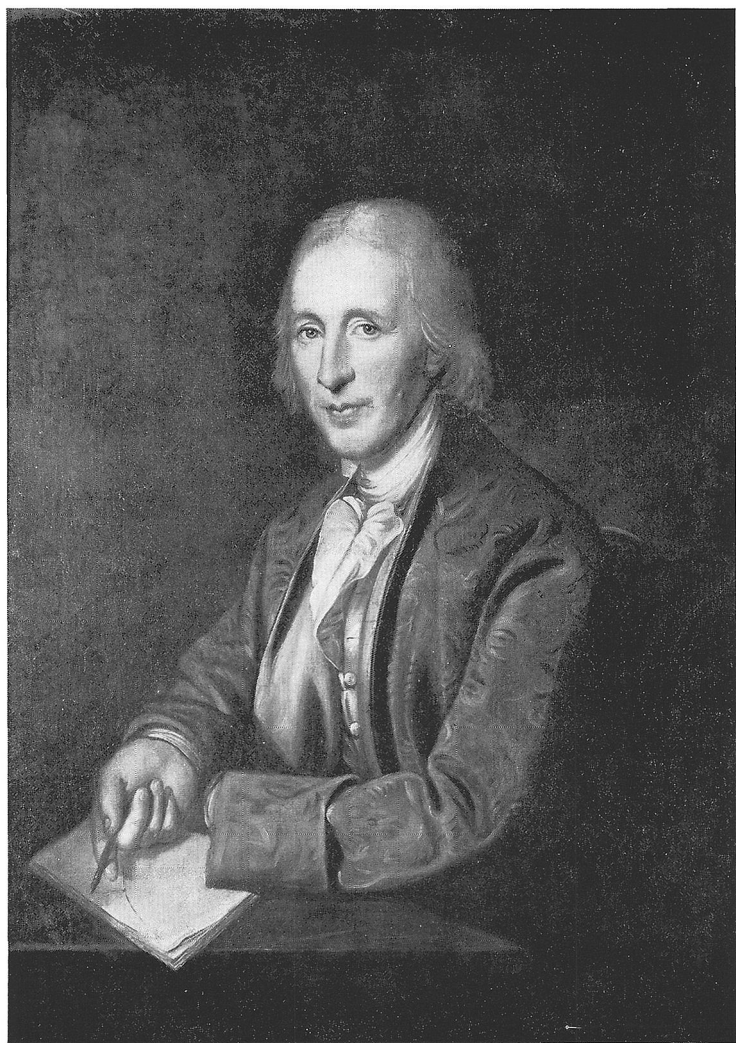
a guinea, attended at times with much pain.”¹² His description coupled with his medical history and his personality strongly suggest that Rittenhouse suffered from a duodenal ulcer. His distress was intermittent, but no clear case history remains. The only relief he specifically recorded occurred when he left his usual routine of cares and annoyances to enjoy the beauties of the wilderness with the change of pace, the exercise, and the rougher life that attended his trips into the interior. Yet even this improvement did not last long, for in the woods, he soon became irked with the inconveniences and the physical discomfort.

Rittenhouse came to live with ill health and, in fact, to count upon it. Even common colds assumed importance to him; his friends thought of poor health as one of his most marked characteristics. He seldom felt well but apparently was never seriously sick until the final illness that claimed his life. Rush diagnosed the chronic discomfort as a constitutional ailment. He voiced the feeling of many that Rittenhouse's personality was influenced by the feebleness of his health—that his “habitual patience and resignation” were the result.¹³

There is no doubt that Rittenhouse's personality and health were linked, but it is likely that his illness owed as much to his personality as the reverse. Physically taller than average, Rittenhouse always remained slender and straight, quick in gait, and lively in his movements but complacent and benign in countenance. His quiet, greyish eyes hinted of suffering, while his handsome face conveyed both aloofness and restraint. He experienced warm emotions and strong reactions to both public and private affairs but his expression of these feelings he kept reined in with an iron discipline. He only relaxed this control in private company or when he spoke of his poor health, which he freely admitted, believing it beyond his volition. He was a realist, seldom able to rationalize away unpleasant facts or to

¹² Barton, *Memoirs*, 99.

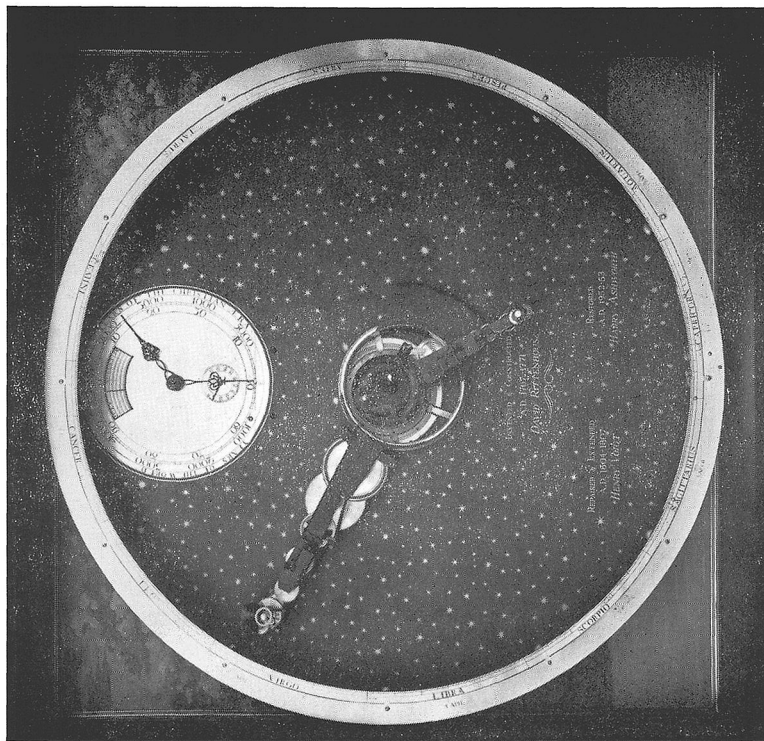
¹³ Rush, *Eulogium*, 42.



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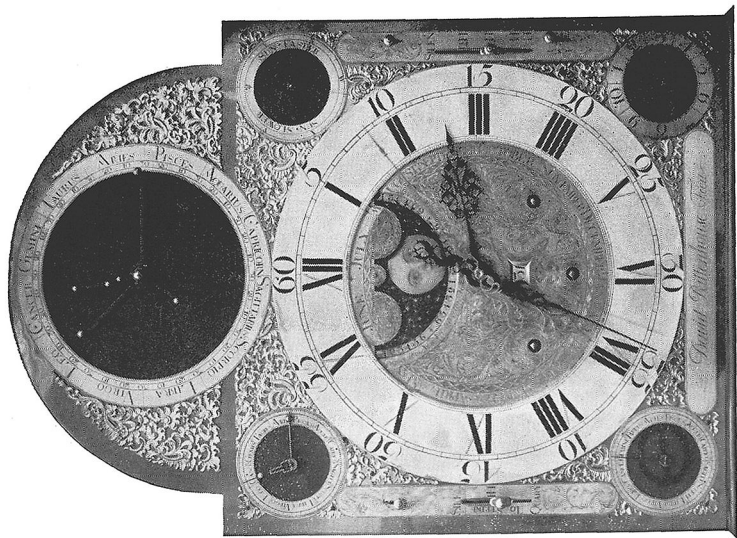
David Rittenhouse

By Charles Willson Peale, 1791



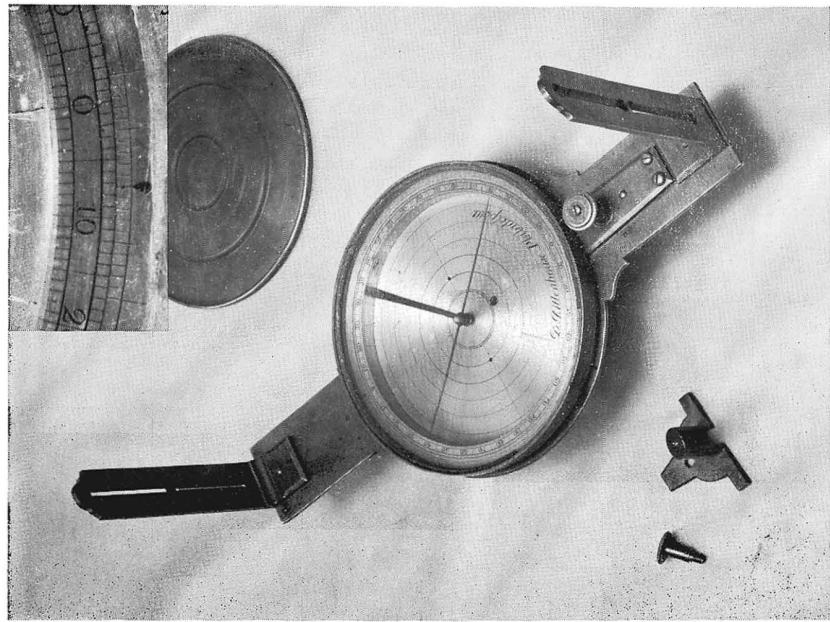
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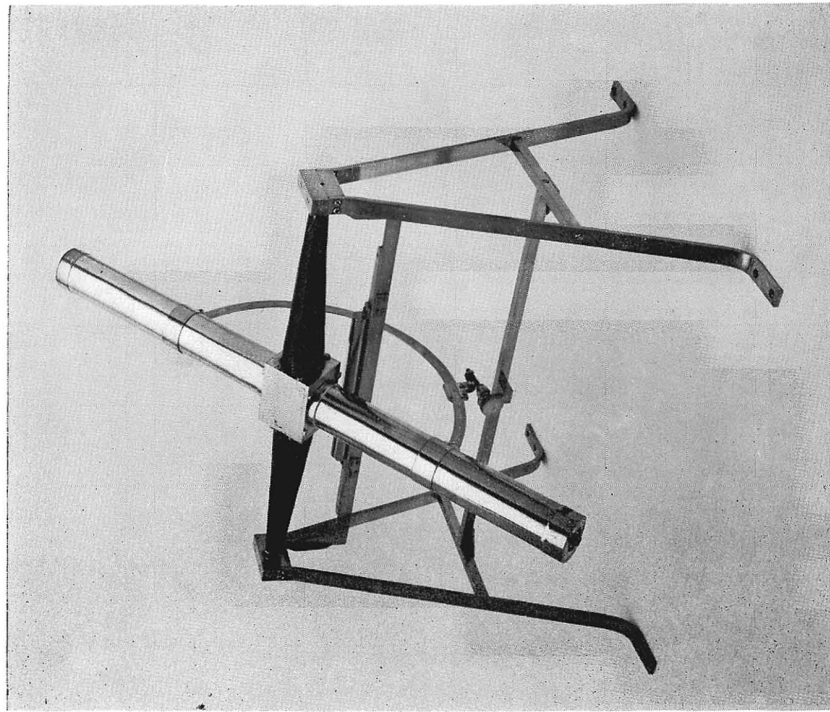
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Rittenhouse's Finest Clock



New York State Library and Charles E. Smart

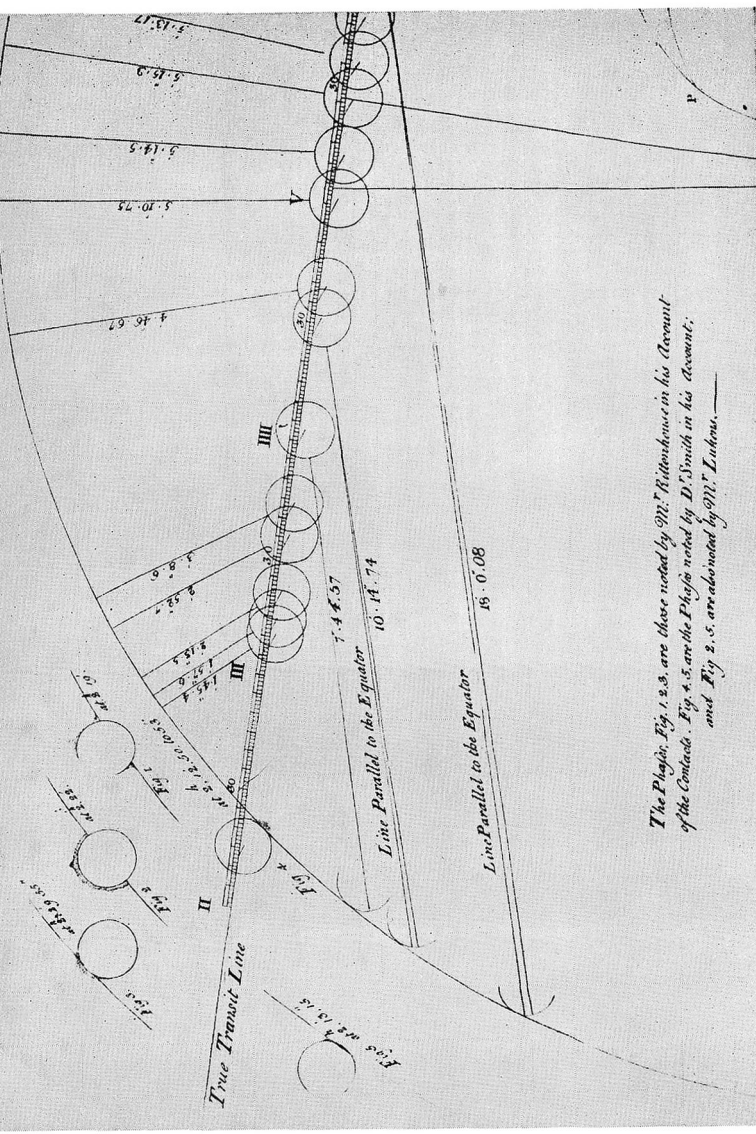
Vernier Compass
(Vernier Detail Inset)



American Philosophical Society

Transit Telescope

Projection of the Transit of Venus, over the Sun, as



The Phases, Fig. 1, 2, 3, are those noted by 971; Rittenhouse in his Account of the Contacts. Fig. 4, 5 are the Phases noted by D. Smith in his Account; and Fig. 2, 5, are abridged by 971; Luther. —

permit the worlds of life and fantasy to merge. He lived with tension, repressed emotion, and unsatisfied aspiration from this early point of his life.

Thomas Barton was a sympathetic resource but not a relaxing one. He continued to encourage and to stimulate his friend. When he returned in 1755 from a trip to England to receive Episcopal ordination, he brought with him a parcel of books for Rittenhouse. For himself, he had obtained support from the Society for the Propagation of the Gospel in Foreign Parts and appointment to a mission at Sulphur Springs, near Carlisle, where he could look west toward the Pennsylvania frontier. During the Seven Years' War, he served for a time as military chaplain. Rittenhouse, of course, excused himself from war service on the grounds that he did not have the "health for a soldier."¹⁴ Instead, he busied himself in the study of optics, self-consciously reflecting on Archimedes, who had been slain in wartime when similarly engaged in scientific investigations.

The Bartons' stay at Sulphur Springs provided Rittenhouse with the opportunity for his first recorded western excursion. With a fresh and alert mind, he viewed for the first time communities relatively close to his home. Reading, less than forty miles away, surprised him by its size; "the number and goodness of the buildings," he reported, "far exceeding my expectations."¹⁵

Less enthusiastic was his reaction to the Ephrata community of Seventh Day Baptists, which practiced an ascetic, monastic way of life. Such principles as pacifism and opposition to judicial oaths they shared with the Quakers and Mennonites, but neither this element of familiarity nor the extensive learning of Conrad Beissel, head of the order, reconciled Rittenhouse to the strange group. He commented, "I was there entertained with an epitome of all the whimsies mankind are capable of conceiving. Yet it seemed to me the most melancholy place in

¹⁴ Barton, *Memoirs*, 105n.

¹⁵ *Ibid.*, 115.

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the world, and I believe would soon kill me were I to continue there.”¹⁶

Returning to Norriton, Rittenhouse worked constantly to increase the skill of his hand and to broaden and deepen his knowledge of the principles of some of the sciences—still in isolation from competent guidance. His clocks were already as good as any produced in Pennsylvania in a day when the construction of tall clocks had become a fine art. Most of the forty odd examples of his work still surviving can be dated only very roughly, those with “Norriton” engraved on their face being, of course, the earlier. In addition to his name, the face sometimes carried a motto. In construction, he used the common anchor escapement except for his highly accurate astronomical clocks in which he introduced a dead-beat escapement and, in addition, some form of compensation pendulum. Even before he began adding devices for playing tunes and for the presentation of a great variety of information, the clocks he built for sale marked him as a master. These pendulum, weight-driven mechanisms command today the highest prices in the field of tall American clocks—basically because of their intrinsic merits rather than because of the fame of their maker.

Early in his career, he ventured upon the construction of a variety of other instruments. In 1756, he was at work on a telescope, an enterprise which accompanied his study of astronomy and optics. He also constructed the commonly used surveyors' instruments, especially compasses and levels. This activity must have begun before 1763 because in that year he was called upon to perform duties he could not have considered until he had mastered the skills of terrestrial and celestial surveying. To this knowledge, he moved through the craft of the instrument maker.

In 1763, the Reverend Richard Peters, secretary to the governor of Pennsylvania, called Rittenhouse to help with the pro-

¹⁶ *Ibid.*, 113.

tracted effort to determine the boundary between Pennsylvania and Maryland. The basis of settlement had already been accepted by both parties, and joint commissioners had had surveyors at work for three years on the difficult geometrical problem of running the tangent line from the point that is now the southwest corner of the state of Delaware to the point where it intersects a twelve-mile circle about New Castle. This had been such a discouragingly slow affair that two English surveyors, Charles Mason and Jeremiah Dixon, were finally engaged to complete the boundary. Rittenhouse gave his "attendance" at New Castle at this juncture of the dispute.¹⁷

Whatever services he rendered were not extensive. When he received £6 for his efforts, he remarked that he had been paid "much more generously" than he expected. If he did verify latitudes, as has been asserted, it was the mathematical operation involved rather than the field observations that seemed most burdensome. He declared, "I found it a very laborious affair; being obliged, singly, to go through a number of intricate calculations."¹⁸

In any case, this episode brought Rittenhouse to the notice of intellectual and political leaders in Philadelphia. He was favorably introduced to the attention of Peters and his fellow Anglican clergyman, the Reverend William Smith. Both men were interested in the kind of intellectual attainment Rittenhouse represented and both were in positions to help. Peters immediately offered his assistance.

Through Barton's influence and through fortuitous circumstances, Rittenhouse was drawn into a friendly relationship with the Proprietary political faction, but his emotional attachment was not so readily engaged. The march of the Paxton Boys in

¹⁷ *Message from the Governor of Maryland . . . in Relation to the Intersection of the Boundary Lines of the States of Maryland, Pennsylvania, and Delaware* (Washington, 1850), 24-26; Thomas D. Cope, "Charles Mason and Jeremiah Dixon," *Scientific Monthly*, 62 (1946), 543.

¹⁸ Barton, *Memoirs*, 150.

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early 1764 revealed a yawning gulf between the attitudes of this group and Rittenhouse's own feelings toward a complex of social and political attitudes.

Violence had erupted in Pennsylvania following the disasters of Pontiac's War in the summer of 1763. The ensuing winter saw the massacre of reservation Indians by irate frontiersmen who struck out against presumed Indian perfidy and demonstrable governmental inaction. The killings reflected a wrath which continued to rise in the West, culminating in an organized march on Philadelphia during the first few days of February. Before the marchers reached Philadelphia, however, a delegation of city leaders met and dissuaded them from violence. The crisis was marked by sympathy on the part of Anglicans and Presbyterians, who constituted the major elements of the Proprietary political faction, and by the strong antagonism of the Quakers and their supporters. The pamphlet war that followed further sharpened these differences along political, religious, and ethnic lines.¹⁹

Rittenhouse could not contain his fury at the rowdy behavior of the marchers: "About fifty of the scoundrels marched by my work-shop—I have seen hundreds of Indians travelling the country and can with truth affirm, that the behaviour of these fellows was ten times more savage and brutal than theirs. Frightening women, by running the muzzles of their guns through windows, swearing and hallooing; attacking men without the least provocation; dragging them by the hair to the ground, and pretending to scalp them; shooting a number of dogs and fowls—these are some of their exploits."²⁰

His contempt was further confirmed by his sister Eleanor, who relayed the excitement into which Philadelphia was thrown by the threatened assault. She rejoiced that her Quaker husband, Daniel Evans, had mustered with the defense forces, "In less

¹⁹ Brooke Hindle, "The March of the Paxton Boys," *William and Mary Quar.*, 3d ser., 3 (1946), 461-86.

²⁰ Barton, *Memoirs*, 148n.

than a quarter of an hour, they were all on their march,—it is supposed above a thousand of them.” She further confided, “There were not ten [Presbyterians] among them . . . Instead of joining with the others, they would sneak into the corners, and applaud the ‘Paxton-boys.’ ”²¹

Rittenhouse’s personality, his family background, his experiences, and his reason led him to the attitude of the Quaker-Assembly faction even though that may not have been an expedient position from the viewpoint of his career. He found himself in the opposite camp from his brother-in-law. Barton was not only tied to the Anglican-Presbyterian-Proprietary faction but his time spent among the frontiersmen and his war experience gave him a sympathy Rittenhouse could not understand. Anonymously, Barton wrote a pamphlet entitled *The Conduct of the Paxton-Men, Impartially Represented* in which he tore at the hypocrisy of Quaker pacifism and the injustice of “*Quaker Government*.” More specifically, his philippic was a party refutation of Benjamin Franklin’s anti-Paxton *Narrative of the Late Massacres*.²²

There was no way that Rittenhouse and Barton could have accommodated their viewpoints on this matter, but the difference did not strain their friendship. Indeed, that proved firm against still more serious stresses and each continued to react to the major political events in harmony with his own set of mind.

Later in 1764, Rittenhouse was assigned his patrimony by his father in the form of clear title to the Norriton farm. Matthias bought another farm in adjoining Worcester Township, where he moved his family, leaving David in possession of the old homestead and of his little workshop by the side of the road. At the time he received this remarkably large portion of all Matthias possessed, David agreed to assume large responsibilities for the rest of the family when his father should die. He

²¹ *Ibid.*, 148n.-49n.

²² Both works published anonymously, Phila., 1764.