



Lincoln Lore

Number 1792

Bulletin of the Louis A. Warren Lincoln Library and Museum. Mark E. Neely, Jr., Editor.
Ruth E. Cook, Editorial Assistant. Published each month by the
Lincoln National Life Insurance Company, Fort Wayne, Indiana 46801.
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June, 1988

ROBERT V. BRUCE AND THE LAUNCHING OF MODERN AMERICAN SCIENCE 1846-1876

by Sarah McNair Vosmeier

Robert Bruce's *The Launching of American Science 1846-1876*, is an excellent book — scholarly, useful, and interesting. In fact, one could easily guess as much without reading this review. First, Lincoln scholars who know his influential 1956 *Lincoln and the Tools of War* could guess that his latest book would be exceptional as well, and second, Bruce won the 1988 Pulitzer Prize in history for this book.

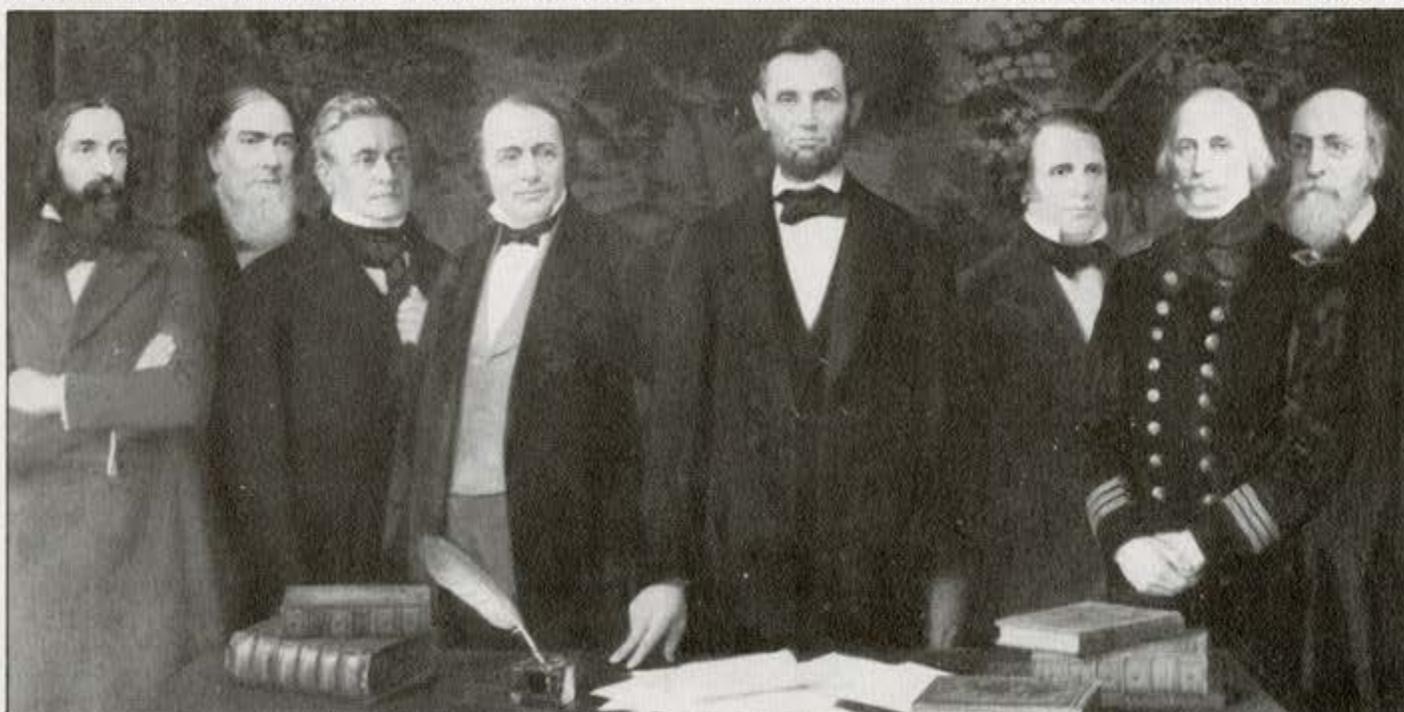
The Pulitzer Prizes are awarded by Columbia University on the recommendation of the Pulitzer Prize Board, a group of 16 people, mostly journalists. Nominations for the Pulitzer Prize are normally made by the publishers, but any individual can submit a nomination by sending the appropriate material to The Pulitzer Prize Board, 702 Journalism, Columbia University, New York, New York 10027. This year 63 books were submitted for the Pulitzer Prize in history. Five were related to Lincoln's era:

Robert V. Bruce, *The Launching of American Science 1846-1876*

Gaines M. Foster, *Ghosts of the Confederacy*
William E. Giannap, *The Origins of the Republican Party*
Merrill D. Peterson, *The Great Triumvirate* (Webster, Calhoun and Clay)
Sterling Stuckey, *Slave Culture*.

The Pulitzer Prize Board chooses a history jury of three historians to examine the nominated books and select three finalists. The chair of this year's history jury was Joel H. Silbey, a political historian whose book, *A Respectable Minority: The Democratic Party in the Civil War Era, 1860-1868*, was reviewed in *Lincoln Lore* number 1680. The other jurors were Alice Kessler-Harris and Gary B. Nash. After the jurors submit their three recommendations, the board chooses from among those finalists or from the larger list of nominations.

Bruce's book was chosen by the jurors as a finalist, and, according to Silbey (interview, August 30, 1988), all three jurors were pleased with its being chosen for the Pulitzer Prize. They



From the National Academy of Sciences
Washington, D.C.

FIGURE 1. Painting by Albert Herter (1924) of (left to right) Benjamin Peirce, Alexander Dallas Bache, Joseph Henry, Louis Agassiz, Abraham Lincoln, Senator Henry Wilson, Charles H. Davis, and Benjamin A. Gould. Although these men are described as the founders of the National Academy of Sciences, the scene as depicted is apocryphal. Nevertheless, various ties among them make the painting more significant than a composite of portraits. Lincoln was interested in science generally and maintained a friendship with Henry. Peirce, Bache, Henry and Agassiz were the core of the Lazzaroni (a group of influential scientists), and Gould was a "junior partner." Davis was on the periphery of the Lazzaroni, working closely with them in organizing the National Academy of Sciences. Furthermore, he was Peirce's brother-in-law. Wilson's political skill insured the passage of the bill creating the Academy.

were pleased both because they were impressed with Bruce's mastery of the material and because they were convinced by Bruce's argument (that modern American science was launched during the nineteenth century). Silbey listed three characteristics which were particularly important to him in his evaluation of the nominees: scholarship, solidity, and imagination.

Thus, a Pulitzer Prize-winning book should be "scholarly," aimed toward a more sophisticated audience, rather than "popular," or aimed toward the general public. Similarly, a winning book should have "solidity": it should demonstrate thorough mastery of the subject. This is not to say that a winning book could not be controversial: although one might criticize a Pulitzer Prize-winning book for its interpretation, one should not be able to criticize the author for ignoring important evidence. Finally, a Pulitzer Prize-winning book should have "imagination." It should do more than simply recount a story; it should bring the story to life, and should make the importance of the story obvious. Clearly, *The Launching of Modern American Science 1848-1876* demonstrates all these characteristics.

Bruce's book is solidly packed with information, and it is the sort of book that readers will probably use more than once. Most of us who know very little about the history of American science will first read the book for the "story," just to understand what happened. In this first reading, Bruce gives us a remarkably readable overview of the main figures and issues in nineteenth-century American science. This overview is useful and interesting in itself, but long after readers have absorbed the overview, they will return to Bruce's book as a reference source — for his statistics and for his thumbnail sketches of almost every significant American scientist of the period.

The overview is readable both because of the way Bruce has organized his material and because of his writing style and subtle sense of humor. An example of Bruce's skill in organization is the way he presents his geographical overview of science in the United States. Rather than simply listing the various geographical regions and their contributions, Bruce suggests that "the best way to survey American science at the dawn of its 'new era' is through the eyes of [Louis Agassiz,] the newcomer who would do so much to transform and lead it" (p. 29). Bruce follows the trips Agassiz took through the United States, describing the scientific activity he would have encountered at each stop. Thus Bruce's geographical survey reads like a narrative rather than a list.

Even when giving examples to prove a point, Bruce breaks up his lists with subtle puns or asides. His discussion of how scientific work was financed is a good illustration of this.

The day of the self-financed amateur was passing. In 1846, 15 per cent of the leading scientists . . . were simon-pure amateurs . . . but by 1861 the proportion had fallen to 9 per cent and by 1876 to 4 per cent. . . . A successful businessman could spend both time and money on science and might even retire early to give it his full time. . . . But conscience, need, or cupidity held most such cultivators more strictly to their other duties. . . . [For example,] The Reverend John Bachman got up at four in the morning to serve both God and mammalogy (p. 135).

Bruce also makes artful use of imagery, as in his explanation for studying the period between 1846 and 1876. He admits that "the roots and branches of so complex a story cannot be lopped off clean at those edges," (p. 3) but he explains that 1846 and 1876 were significant years because they included "crucial and symbolic events." The year 1846 marked the beginning of the Mexican War, "the last great surge of westward expansion," as well as Louis Agassiz's arrival in the United States and the founding of the Smithsonian Institution. The year 1876 marked the end of the Reconstruction and Civil War era, as well as the beginning of a new system of scientific education (represented by the founding of Johns Hopkins University), and the celebration of American technology represented by the Centennial Exhibition.

The first three sections of Bruce's book describe various aspects of American science between 1846 and the Civil War, including the relationships American scientists had with



From the Louis A. Warren
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FIGURE 2. Louis Agassiz c. 1865. A prominent European naturalist, Agassiz arrived in the United States in 1846, opening a new period in American science.

European scientists, the American public, and each other.

American scientists often made pilgrimages to Europe for study and they generally admired European scientists. European scientists slighted the Americans, especially at first, but eventually Europeans began grudgingly to accept American science — especially after an American astronomer, Sears Walker, corrected a European's error in the location of the planet Neptune, and after an American botanist, Asa Gray, became an acknowledged ally and confidant of Charles Darwin.

In general, the American public was interested in science and technology — especially during the early part of Bruce's study. In fact, Bruce argues that the public was beginning to place their faith more in science than religion, pointing out that fewer than one third of all free adults in the United States were church members in 1850. At first there was little conflict between scientists and theologians. One prominent naturalist, James Dana, even suggested that science had more "believers" than any profession besides the clergy. However, once geologists began to examine the geological and fossil record, and to suggest that the world had been changing gradually over a long period of time, science began threatening traditional nineteenth-century conceptions of God.

The traditional imagery was of God physically creating life from dust, and of His acting directly through floods and other disasters to control life ever after. The older school of geologists, "catastrophists," had described the history of the earth as a series of cataclysmic changes, and this fit well with traditional religious views. However, the new "uniformitarian" theory (which described the earth as having been gradually modified by a series of repetitive small changes) did not fit with the traditional image of a personal and interventionist God because it suggested that God might not be as intimately involved in His creations as had been previously supposed.

Since the public was beginning to put more faith in science than religion, and since the theologians themselves were attracted to reason and predictability, many of them reinterpreted the *Bible* to fit the new scientific theories, thereby using science to validate religion rather than holding religion above scientific squabbles.

Bruce uses Abraham Lincoln "that quintessential American layman," as an example of the way typical Americans valued science, even over traditional religion at times. (See also, Jean H. Baker's "'Not Much of Me': Abraham Lincoln as a Typical

American," The Eleventh Annual R. Gerald McMurtry Lecture, to be released later this year, for another treatment of Lincoln as a typical American.) For instance, Bruce records that Lincoln carefully read *Vestiges of the Natural History of Creation* (1844), and accepted its controversial theory of gradual development of species — despite this theory's threat to traditional religious views. As it turned out, the book was based on sloppy research, and so the scientific community attacked it as vigorously as the religious community did. Thus, despite the threat, science and religion were in harmony again. Unfortunately for the traditionally religious, as Bruce explains,

the theologians, in their eager acceptance of scientific backing, had implicitly conceded jurisdiction. And in their warnings they had incautiously conceded further that a verdict for development would relegate God to the status of remote First Cause, or even displace him altogether. That day of scientific judgment was much nearer than the theologians could have imagined in the flush of their victory over *Vestiges*. (p. 124)

Later, Darwin's theories were more threatening because they were supported by the scientific community. Furthermore, the theologians could not reinterpret the *Bible* to fit Darwin's theories without drastically altering their theology. Perhaps the theologians' responses were even more frenzied because they had used science to justify their beliefs and Darwin

destroyed that justification.

The geologists were more disturbing than other scientists because of their willingness to advance unpopular theories to explain their discoveries. In fact, for the most part geologists were the only American scientists to advance any theories. There was so much of America to be explored and investigated that most American scientists were unwilling to take time to synthesize the facts they gathered, much less develop theories to explain what they had observed. They justified this behavior by professing Baconianism (the scientific method which deemphasizes hypothesizing unless a hypothesis can be substantiated by extensive data). In theory, American scientists "looked a jump or two ahead to generalizations, but in practice bagged the nearest visible fact, counted it a goal achieved, then went on to bag the next" (p. 71).

Although American scientists in various fields shared many similarities, there was variation in the scientific experience. Bruce makes this particularly evident in the chapters "Becoming a Scientist" and "Being a Scientist," which are the result of painstakingly thorough research. With the help of his research assistant, John B. Cusack, Bruce analyzed 1,078 articles from the *Dictionary of American Biography* on scientists whose working years included any part of the period the book covers. These articles were analyzed for numerous variables, including the scientists' education, parents' occupations, and their areas of specialization. For each variable he analyzes, Bruce reports much more than the bare statistics. In fact his use of colorful and appropriate quotations reflects as much work as his statistics do.

For instance, in describing how American scientists were tending toward specialization, Bruce discussed the relevant statistics, and then uses one botanist's career as an illustration of the trend.

William Sullivant, for example, began shedding divisions of his field after 1840 — first grasses and sedges, then lichens and fungi, then all flowering and seed-bearing plants, and so on until by 1860, no longer a rolling stone, he confined himself to gathering mosses (p. 94).

After exploring the variations among American scientists, Bruce turns to the leaders in organizing American science, the Lazzaroni. (Lazzaroni was a "playfully self-mocking" name the group gave themselves; originally it had referred to a group of Neapolitan beggars, and more recently it had been connected with a Genoese secret society in New York City.) The Lazzaroni were a loosely organized group with a changing membership, the core of which was Alexander Dallas Bache, Joseph Henry, Benjamin Peirce, and Louis Agassiz (see Figure 1). Bache was the head of the United States Coast Survey, a long-term project that studied both land and sea and was "made to cover almost the whole range of physical science, from the structure of the microscopic dwellers in the bed of the ocean, up to the . . . determination of positions of fundamental stars" (p. 174). Henry was the head of the Smithsonian for the first 32 years of its existence. Peirce was the preeminent American mathematical astronomer, and he worked with Bache on the Coast Survey, becoming superintendent upon Bache's death in 1867. Agassiz contributed to American science as a catalyst for the scientific awakening of the 1840s, and as a fund-raiser and popular lecturer. Bruce explains that the Lazzaroni were significant because

Articulate, energetic, and strategically placed, they focused and projected the needs and aspirations of American scientists like a lens. . . . They did not dominate their sphere as fully as the Founding Fathers in politics or the business tycoons of their own day. Yet they were akin to them in purpose: the organizing of a new era (p. 217).

The Lazzaroni, and other scientists, came into conflict with the general public over the issue of democracy. American science was democratic, in that scientific success could not be easily passed from one generation to the other, and in that what little support science received in the United States came from the general public or from the government. In comparison, European science was supported by the aristocracy. Nevertheless, many people perceived scientific institutions like the American Association for the Advancement of Science (AAAS) to be elitist. Certainly, the Lazzaroni did not advocate pure

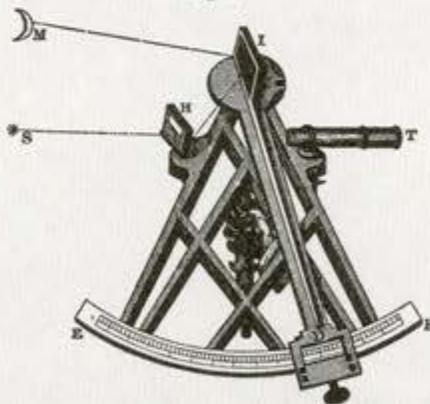
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THE EARTH.

server. At *d* is represented a *tangent screw*, by which a slow motion is given to the telescope at *c*. At *h* and *g* are seen two *spirit levels* at right angles to each other, which show when the azimuth circle is truly horizontal. The instrument is supported on a *tripod*, for the sake of greater steadiness, each foot being furnished with a screw for levelling.

129. The *sextant* is one of the most useful instruments, both to the astronomer and the navigator, and will therefore merit particular attention. In figure 19, *I* and *H* are two small mirrors, and *T* a small telescope. *ID* represents a movable arm, or radius, which carries an index at *D*. The radius turns on a pivot at *I*, and the index moves on a graduated arc *EF*. *I* is called

Fig. 19.



the *Index Glass* and *H* the *Horizon Glass*. The under part only of the horizon glass is coated with quicksilver, the upper part being left transparent; so that while one object is seen through the upper part by direct vision, another may be seen through the lower part by reflexion from the two mirrors. The instrument is so contrived, that when the index is moved up to *F*, where the zero point is placed, or the graduation begins, the two

From the *Louis A. Warren*
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FIGURE 3. Denison Olmsted's *An Introduction to Astronomy* (1846). Another illustration of Lincoln's interest in science, a copy of this book with Lincoln's signature was offered for sale in 1926.

democracy where every member would have an equal vote. Instead they wanted the AAAS to be led by a few prominent scientists (themselves especially). As Joseph Henry liked to say, the Lazzaroni believed that scientific opinion ought to be weighed, not counted.

Although the AAAS was distracted by the squabbles over elitism versus democracy, it did promote a sense of community and a concern for standards among American scientists. Significantly, it also served as judge for American scientific achievements, weaning American scientists away from European influence.

The combination of trends toward elitism and specialization eventually moved science beyond the reach of average Americans. Bruce describes these typical Americans as wading happily into the shallows of scientific knowledge. They looked out over its surface with eagerness for the goods it might bear to them, with apprehension of the terrors that might rise from it, with sheer wonder as its vastness and power came more and more clearly into view. But as the professional pushed out into the deep, the layman found him increasingly hard to follow and so at last could only stand and watch (p. 118).

Bruce's fourth and last section, on the period between 1861 and 1876, will probably be the most enjoyable for Lincoln buffs because they will recognize many of the people Bruce discusses. Lincoln himself appears several times, especially in connection with Joseph Henry, whom Lincoln described as "one of the pleasantest men I have ever met." Lincoln's interest in science and technology is fairly well known, (in large part due to Bruce's earlier work) but the similar interests of some of his famous contemporaries are not as well known.

Joseph Henry became friends with Lincoln during the war, but before the war, Henry had maintained a long friendship

with Senator (and later Secretary of War) Jefferson Davis. Davis supported many of the efforts of the Lazzaroni, including Henry's unending (and futile) efforts to keep the Smithsonian a research institution rather than a museum or library (p. 196).

(to be continued)

125th ANNIVERSARY OF THE GETTYSBURG ADDRESS GETTYSBURG, PENNSYLVANIA NOVEMBER 18-19, 1988 ACTIVITIES

18 November 1988

2:00-5:00 Gallery 30, York Street, Gettysburg: Autographing party for Gabor S. Boritt and Norman D. Forness, for the new book they edited, *The Historian's Lincoln: Pseudohistory, Psychohistory and History* (University of Illinois Press, 1988)

19 November 1988

10:30 Gettysburg: Reenactment of Lincoln's arrival at Gettysburg; many spectators in 1860s dress.

11:00 Parade to National Cemetery

12:00 Chief Justice Rehnquist speaks at Cemetery

1:30 Gettysburg College: 50th Anniversary Luncheon of the Lincoln Fellowship; Chief Justice as chief guest; Mark E. Neely, Jr., speaker; Boritt, presiding

8:00 Chapel, Gettysburg College: Fortenbaugh Lecture, Arthur Schlesinger, Jr.: "Lincoln and FDR as Commanders in Chief"

9:00 Weidensall Hall, Gettysburg College: Fortenbaugh Reception

Luncheon participants must be members of the Lincoln Fellowship of Pennsylvania.

For further information call 717-337-6555 or write the Civil War Institute, Gettysburg College, Gettysburg, Pennsylvania 17325.



From Duke University
Durham, North Carolina

FIGURE 4. Jefferson Davis c. 1855 as Secretary of War. Before becoming president of the Confederacy, Davis had actively supported science, especially the Smithsonian Institution, whose founder, Joseph Henry, was a friend of his.

