

NOTES ON TENNESSEE'S PIONEER SCIENTISTS

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ABSTRACT

Professionally oriented biographical sketches are presented for 12 of Tennessee's scientific pioneers.

INTRODUCTION

Brief biographical sketches outline the scientific and technical contributions of 12 early Tennesseans. Some are known for their writings or for their editorship of learned journals. Others shaped the scientific curricula of Tennessee's first colleges or guided the growth of technical and scientific societies. The 12 are such a heterogeneous assemblage that it is hard to define the term "pioneer scientist" as it applies to each individually and to all as a group. Still, most—as scientists—participated in the establishment of a scientific discipline, a technical field, or a scientific institution in Tennessee. And most—as pioneers—reached prominence in the years before the Civil War.

The present study is the first attempt at a general biographical review of Tennessee's scientific pioneers. Perhaps no one person can know enough either of history or of science to select all the pioneers who should be studied. To treat just 12 pioneers within an article of reasonable length limits the scope of discussion. Although many scientists played major roles in the political and economic life of Tennessee, these activities are de-emphasized in the present study. Many pioneers had interesting family ties—in the lives of 12 real people, there is always a bit of scandal—but to examine personal relationships and personal problems is not the purpose of the present article.

The pioneers discussed below were selected for their contributions to the growth of science and technology in Tennessee. Therefore, emphasis is placed on professional matters. At most, these biographies try to provide the kinds of information that one contemporary scientist tends to know about another.

GEORGE THOMAS BOWEN 1803 - 1828

In the 1970's, the colleges and universities of Tennessee routinely recruit science teachers from all over the nation and all over the world. Each person chosen to teach science in Tennessee should feel a cultural bond with George Thomas Bowen, who died in 1828. Dr. Bowen was the first out-of-state scientist recruited to become a professor of science in a Tennessee college. He served as Professor of Chemistry and Natural History in the University of Nashville from March 1826 until shortly before his death in October 1828. Prof. Bowen arrived in Nashville at 23, with an earned doctorate, considerable post-doctoral experience, and five highly regarded publications. He was a rising star.

George Bowen was born in Rhode Island, in 1803, and probably began his college career at Brown in 1818. He was admitted to Yale, with sophomore standing, in 1819 and graduated in 1822. He then went to the University of Pennsylvania, where he earned an M.D. in 1824. How he spent the year-and-a-half between his graduation from the University of Pennsylvania and his employment in Nashville is not known, although a period of study in Europe was the fashion of the time.

During his last two undergraduate years, and shortly thereafter, Bowen became deeply involved in what we would now call geochemistry. His specialty was the chemical analysis of minerals and he published five articles in the *American Journal of Science* (see Anonymous, 1828, for a bibliography). Apparently, he planned to make mineralogy his research field. By the time of his death, Prof. Bowen had obtained a Tennessee meteorite and was beginning Tennessee-oriented geological studies.

In Philadelphia, Bowen knew Dr. Gerard Troost, one of America's foremost mineralogists. In late 1827, Troost moved to Nashville; in February 1828, he joined the faculty of the University of Nashville as Professor of Geology and Mineralogy (Rooker, 1933). A prior acquaintance with Bowen probably influenced Troost's move to Tennessee. Clearly, the team of Troost and Bowen could have made the University of Nashville a world-famous center for mineralogical investigations.

It is difficult to appraise the influence of George Thomas Bowen, for he died so young. Knowledge of his life comes largely from an unpublished manuscript by Horton (1937b). Additional sources are a professionally oriented obituary (Anonymous, 1828) and the scholarship of Geiser (1932, 1948b).

ANDREW HAYS BUCHANAN 1828 - 1914

In Bone's discussion of the leading teachers in the history of Cumberland University, the first person mentioned is Dr. Andrew Hays Buchanan (Bone, 1935, p. 125). Buchanan was born in Boonsboro, Arkansas, on June 28, 1828, and died at Lebanon, Tennessee, on August 11, 1914. He was appointed to the Chair of Civil Engineering at Cumberland University, in Lebanon, on August 2, 1854; he remained until school was disrupted by the Civil War in the early spring of 1862. From 1862 to 1865, Buchanan was a topographic engineer with the Confederate forces, reaching the rank of captain (Wingfield, 1954). In the post-war confusion, Buchanan returned to his native Arkansas; but in September 1869 he again accepted an appointment at Cumberland University, this time as Professor of Mathematics and Engineering. He held this post for 43 years, retiring in June of 1911.

Prof. Buchanan's only earned degree was the A.B., which he obtained from Cumberland University in 1853. He was later awarded an honorary LL.D. by Lincoln University in Lincoln, Illinois. His two major categories of contributions to scientific knowledge were as a textbook author-teacher and as a topographer-surveyor.

Virtually everyone who took mathematical, scientific, or technical courses at Cumberland University between 1854 and 1911 was a student of Professor Buchanan's. He also authored a text on plane and spherical trigonometry (Bone, 1935, p. 126) which probably had a considerable influence on pre-college instruction in schools staffed by Cumberland University graduates.

In the field of surveying, Prof. Buchanan apparently had few equals. He began this work during the Civil War, when he was employed as a topographic engineer. From 1876 through 1896, he continued his topographic work during the summer holidays,

working for the U.S. Coast and Geodetic Survey. Apparently, he worked exclusively in Tennessee, where he made accurate determinations of elevation and location. In 1902, at the age of 74, Prof. Buchanan again returned to summer work as a surveyor for the federal government. This time, he helped to resolve the boundary line between Virginia and Tennessee. The assignment continued into Professor Buchanan's 75th year, the summer of 1903.

In 1911, at the age of 83, Andrew Hays Buchanan retired; he died three years later at Lebanon. This summary of his contributions to science and technology is based on the work of Bone (1935). Perhaps Buchanan's greatest contribution to science in Tennessee was as a surveyor, for he helped to define the boundaries of the state—a rather basic contribution. Buchanan also may have been one of the first Tennessee mathematics professors to author a textbook, but this is hard to document.¹

TOLBERT FANNING 1810 - 1874

As a teenager, Tolbert Fanning achieved fame as a traveling preacher. For the rest of his life, although he entered many ventures that were not clerical, his primary commitment was to preaching and to the religious or clerical life. Wilburn (1969) provides a biography which emphasizes Fanning's religious involvements. Thus far, no one has prepared a critical bibliography of his many publications.

As a youth at the University of Nashville, from 1832 to 1836, Fanning was strongly influenced by his science professor, Dr. Gerard Troost. Geology became a major interest and, upon graduation, Fanning arranged to earn his living as a professor of natural sciences at Bacon College, Kentucky. His activities outside the sciences and outside Tennessee lie beyond the scope of the present study.

In the growth of science, a few scholars have played extremely important roles as popularists of the scientific. Quite apart from personal contributions to the growth of scientific knowledge, they have whetted the public appetite for scientific knowledge. In the history of science in Tennessee, Tolbert Fanning emerges as a leading popularist of science.

In Tennessee, Fanning first began to emerge as a dominant figure in science and technology when he helped to found and became co-editor of *The Agriculturist* in January of 1840. The journal provided a forum for Tennessee-oriented scientific communications. A host of articles were written by Fanning and by his former teacher, Troost.

When *The Agriculturist* ceased publication in December 1845, Fanning co-edited a new journal, *The Naturalist*, which commenced publication in January 1846 and lasted one year. In 1850, Fanning tried another scientifically oriented journal, also named *The Naturalist* (Corgan, 1976). From Fanning's own pen, these three journals acquired one common character: they sang the praises of geology as an essential field of study for farmers and as a valuable component of a college education. Even in *The Christian Review*, a religious journal edited by Fanning, the importance of geology in general education was a recurring theme (e.g., Fanning, 1847a; 1847b).

Quite apart from his journals, Fanning was a dominant figure in the intellectual growth of Nashville. During the 1840's, he founded or aided in the founding of four schools, all located at Elm Crag, his Nashville farm. The first school, begun in 1840 as "The Eclectic School for Young Ladies," ultimately became "Mrs. Fanning's Girls School." The last school, founded in 1849, was Minerva College, another female institution. In between, Fanning started Elm Crag Agricultural School and Franklin College. These two male-oriented institutions were innovative and successful. Elm Crag claimed to be the first agricultural school in North America. Franklin College, with a broader curriculum, was representative of many Bible-oriented frontier colleges.

In Fanning's male institutions, geology and the other sciences were a significant part of the instructional program. Both schools stressed the use of specimens, teaching collections, and museums.

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All that went on in Fanning's schools, as well publicized, since Fanning wrote for the journals he edited and for other publications. The curricula at his institutions, which attracted much publicity, that they probably influenced courses at other colleges on the frontier.

During the years after the Civil War, Fanning was less involved with science and with technology and scientifically oriented journals. Still, his early efforts to publicize the scientific make him a pioneer in the history of science in Tennessee.

FRANCIS HAYNES GORDON 1804 - 1873

Existence of an unpublished book-length biographical study of Francis Haynes Gordon by Robert H. White (1967), makes an extended discussion of Gordon's accomplishments unnecessary. This very brief sketch covers a few accomplishments that are not the major foci of White's study and treats some minor matters that White did not discuss.

Francis Haynes Gordon was born in Smith County in 1804. In 1830, with others, Gordon organized Porter's Hill Academy about six miles south of Carthage. In 1833, he and others incorporated Clinton College, also in Smith County. When he organized the college, Gordon was a well read man; but he had no formal education beyond a few years spent at Clinton Academy in Lebanon. Clinton College was not, in fact, a secondary institution.

By February 1842, Clinton College and its lands were advertised for sale in *The Agriculturist*. The college failed; but during his years at Clinton, Gordon played a critical role in the history of scientific agriculture in Tennessee. In 1838, he was the guiding spirit behind the organization of the Smith County Agricultural Society; in 1839, he led in the formation of a state-wide Tennessee Agricultural Society (Caruthers, 1840; Gordon, 1840). By 1842, he had drafted a constitution for a national organization, the American Agricultural Society (Gordon, 1842), which soon came into being. Despite the financial troubles of Clinton College, Gordon attended the first meeting, in Washington, D.C., as one of two delegates from Tennessee (Anonymous, 1842).

Apparently Gordon did not receive, or else did not accept, a high office in the national American Agricultural Society. His fiscal problems, due to the foundering of Clinton College, may have curtailed his activities. For some reason, perhaps his lack of formal education, Gordon never received the Presidency of the Tennessee Agricultural Society, though he served as its secretary for several years. Nor was he ever an editor of its journal, *The Agriculturist*, though he published many letters and reports on agriculture and on the Tennessee Agricultural Society in that journal.

In 1845, Gordon earned an M.D. degree; eventually, he taught medicine at Cumberland University. Still, scientific agriculture apparently remained his great interest. White (1967) regards the widespread introduction of bluegrass into Tennessee as one of Gordon's major accomplishments. Certainly, founding a Tennessee Agricultural Society that published its own journal was also a great accomplishment, as was his role in the national agricultural movement.

For decades Gordon was a prolific contributor to agricultural literature. His bibliography must include several dozen titles. White's biographical study of Gordon provides full transcripts of 33 technical contributions. These show that Gordon retained his interest in scientific agriculture and remained productive in that area well into his final years, though toward the end, White's transcripts suggest, Gordon was becoming more interested in geology. For his impact on scientific agriculture in Tennessee, Francis Haynes Gordon must be regarded as one of Tennessee's pioneer scientists.

JAMES HAMILTON 1796? - 1849

George Bowen, discussed in a prior biography, was apparently the first out-of-state expert recruited to teach science at a Tennessee post-secondary institution. James Hamilton, also of the faculty of the University of Nashville, may have been the first out-of-state expert recruited to teach mathematics. Since the backgrounds of all the early mathematics professors are not yet

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well known, it is possible that there are out-of-state experts who pre-date Hamilton. Still, Hamilton came to Tennessee at an early date with good credentials.

James Hamilton was born in Princeton, New Jersey, probably in 1796, and grew up in a town noted for its schools. His B.A. from Princeton in 1814 was followed by an M.A. in 1817. This was not an earned degree—at the time, Princeton automatically awarded an M.A. to all of its bachelor's-level graduates who spent three years as teachers, and Hamilton had become a teacher at Princeton Academy upon his graduation from Princeton College. Until October of 1827, Hamilton remained in New Jersey teaching at a variety of institutions. Apparently, all were below the college level. He became Professor of Mathematics and Natural Philosophy at Nashville University in October 1827. Though Hamilton resigned twice to return to New Jersey for extended stays, he spent the bulk of his professional career at the University of Nashville. Upon his death, in a Nashville cholera epidemic in 1849, his extensive library was donated to the University. A catalog of this donation still survives (Hamilton, 1849?).

Like most of his university colleagues, Hamilton was an important figure in Nashville intellectual life. Unlike most of his colleagues, Hamilton never published a scientific paper. Knowledge of his life comes almost entirely from an unpublished study by Horton (1937a). Hamilton did write occasional articles, mainly on weather, for Nashville-area newspapers. He kept extremely detailed day-by-day meteorological records for most years from 1834 to 1849. His data for 1840-1845 were used by the U.S. Weather Bureau in characterizing the climate of Tennessee (e.g., Blodgett, 1854). According to Horton (1937a), Hamilton's weather records are still preserved in the archives of George Peabody College for Teachers in Nashville. Perhaps they have significance for contemporary meteorologists.

JOHN H. KAIN 1759 - 1831

Like many modern scientists, John H. Kain was a late bloomer. Platt and Ogden (1969) indicate that he was about 57 when he graduated from Yale University in 1816. Two years later he began the practice of medicine in Knoxville.

John Kain's scientific career has two known highlights. According to Glenn (1912), Kain wrote the best geologic paper on Tennessee that was published prior to the establishment of a state-supported geological survey in 1831. This report, a regional survey, shows that Kain was both an observant and a well traveled man (Kain, 1819a). Apparently, Kain authored only one subsequent scientific study that was non-medical in content (Kain, 1819b).

It is for his leadership in medicine that John H. Kain is best remembered. In 1831, at the second annual meeting of the Tennessee State Medical Association, Kain gave the principal invited address (Kain, 1831). He was elected vice president for 1832-1834, but died prior to the beginning of his term.

When Glenn wrote his memorable *Growth of Our Knowledge of Tennessee Geology* (1912), he lamented a lack of knowledge of Kain. Apparently, the only published biographical sketch is by Platt and Ogden (1969).

ALBERT MILLER LEA 1805 - 1891

In the fall of 1836, Albert Miller Lea became the first person appointed to the newly created post of Chief Engineer of the State of Tennessee. Apparently, the position lasted only long enough to permit publication of one formal report (Lea, 1837). Examination of this report shows that Lea and his staff did a great deal of precise surveying. Glenn (1912) concluded that they were probably the first people to run long lines of interconnected altitude determinations in Tennessee. Exact elevations were essential in planning new transportation routes, and one main function of the State Engineer's office was to aid the growth of transportation.

Lea's report is unusual among state documents of the era. When the state published the report, it also published a dissenting opinion written by Lea's Assistant Engineer, Mr. C. W. Nance (1837). Nance questioned Lea's professional judgment

and skills. He also stated that Lea had not seen that a suitable wage was paid to the Assistant Engineer.

Apparently, both Lea and Nance were reasonably proficient. Lea had learned his skills in the Army. A Knoxville native, Lea entered West Point and graduated fifth in a class of 33 in 1831. When he served as Chief Engineer of the State of Tennessee, Lea's only degree was an A.B. from West Point.

Later, Lea undertook additional studies at East Tennessee University. He received an A.M. in 1844, was on the faculty from 1844 through 1850, and served as Chairman of the Department of Mathematics in 1847-1848. Folmsby (1950) notes some highlights of Lea's career at East Tennessee University.

In 1850, Lea declined reappointment, but apparently he taught for part of 1851 before leaving East Tennessee University. Beginning in 1849, and continuing into 1854, A. M. Lea served the City of Knoxville as City Engineer; from 1851 to 1853, he applied his technical knowledge in operating a glass manufacturing concern (Geiser, 1959, p. 120).

In the 1840's and 1850's it was rare for an accomplished and highly educated engineer to serve on the staff of a city government. Lea may have been the first well qualified city engineer in the history of Tennessee. Lea's work in Tennessee is especially important because it shows the early recognition by the State Government of the importance of government-sponsored engineering studies.

In the mid-1850's, Lea left Tennessee. Most of his later contributions to the growth of science and technology were made in Texas. These are summarized by Geiser (1959, p. 120-121.)

Quite apart from the one published report, Lea's work as State Engineer has another kind of significance. It is tempting for the scientist of the 1970's to look back to the pioneer era and imagine that day-to-day life brought greater joys to pioneer scientists than it does to scientists of today. Perhaps this is not a reasonable generalization. The Nance-Lea hassle in the 1830's over wages and competency was probably a very nasty affair. It shows us quite clearly that discontent, bickering and the like have long been a part of science and technology.

S. H. LONG 1784 - 1864

All Tennessee science professors who have been recruited from outside the state follow in the footsteps of George Bowen, discussed above. Similarly, all professional engineers who modify the fluvial landscape of Tennessee should feel strong ties with Stephen Harriman Long. Long was an engineer with the Army at a time when the concept of civil engineer was new and the role of government in engineering projects was not clearly defined. Long designed roads, advised on the building of railroads, created new types of bridges, revolutionized ship design, and modified the courses of rivers. Many of his projects altered the landscape of Tennessee.

Long was first assigned to Tennessee in 1827. He came because the citizens of Tennessee demanded river modification projects to improve commercial navigation. Lotteries were Tennessee's main potential source of local funds for river improvement projects. In 1827, the state legislature sanctioned five river improvement lotteries for Middle Tennessee alone (Barbee, 1934). Long's initial work in Tennessee involved projects on the Cumberland and Tennessee Rivers. Through the 1830's and 1840's he continued such work, and was assigned also to railroad surveys. For 20 years, Long's work included field studies in Tennessee.

Tennesseans should remember S. H. Long as the man who began the first large-scale engineering modifications of most of Tennessee's major rivers. He also mapped the topography of several proposed railroad routes and built at least one road connecting Knoxville with Bristol. This road he modestly referred to as "Long's Road" (Long, 1832).

Much of our current knowledge of Long and his career comes from an excellent biography by Wood (1966). Wood draws on several dozen archival sources and a hoard of official government reports that he considers publications: for example, he cites 28 congressional documents. In several congressional documents, Long added significantly to knowledge of the geology of Tennessee (e.g., Long et al., 1846; Long, 1875). Many of Long's

other congressional reports are now so rare and so infrequently cited that their content is essentially unknown.

While Long made significant contributions to geology, his major claim to a place in history is as an engineer. In engineering, S. H. Long should be remembered for what he did, rather than for what he wrote. Apparently the effectiveness of Long's engineering work in Tennessee has never been evaluated in a formal publication. Did "Long's Road" serve to localize towns and influence regional development? Was it well planned? Has it become part of some modern highway? Did the initial modifications of the Tennessee River serve to set the pattern for subsequent engineering? Was Long a farsighted man who managed rivers wisely? A look at the history of science and technology can generate a lot of difficult questions that remain unanswered.

CHARLES MINOR ? - 1842

In 1801, a Swiss-born agriculturist named DuFours tried unsuccessfully to raise \$10,000 to establish a grape nursery in Middle Tennessee (Arnow, 1963, p. 263). Many other pioneers in Tennessee were involved with nursery stocks. Some were locally famous for fine peaches, rare varieties of plum, and other fruits that may have been derived from nurseries in the coastal states. One excellent example of a horticultural pioneer is John Brown of Maury County. From 1837 to 1841 he raised a fig tree; he was, apparently, the first person ever to do so in his vicinity (Clayton, 1841). Though there was much horticultural experimentation in Tennessee during the early antebellum years, there is no clear evidence of a large-scale, commercially successful nursery until about 1830, when Charles Minor of Clarksville established Minor's Nursery.

Very little is known of the life of Charles Minor. He was referred to generally as Capt. Minor, which suggests a military background. His large nursery was located in northern Montgomery County, about 11 miles from Clarksville. It was discussed in at least five brief articles of the time (Fanning, 1840; 1842a; 1842b; Anonymous, 1840; 1843). The exact location of the nursery is unrecorded; apparently, it was between Clarksville, Tennessee, and Hopkinsville, Kentucky.

Advertisements for Minor's Nursery ran on a regular basis in *The Agriculturist*, a farmer-oriented journal published in Nashville. Regular ads also appeared in many newspapers of Middle Tennessee and adjacent Kentucky. The nursery also advertised, at least occasionally, in Memphis-area papers and in the *South Western Farmer*, published in Raymond, Mississippi. Standard ads offered crop items, ornamental shrubs, flowers, and 29 varieties of grapes, but these were clearly sidelines. Fruit trees were Minor's major product. By 1841 he was advertising a stock of over 100,000 grafted and budded fruit trees. One ad used in 1842, and perhaps earlier, was basically an inventory: 109 varieties of apple trees, with 20,000 trees; 35 varieties of peach trees, with 25,000 trees; 74 varieties of pear trees, with 2,000 trees; 32 varieties of plum trees, with 3,000 trees, etc. Minor's Nursery was clearly big business and provided a lot of Clarksville people with rich experience in applied botany.

In the fall of 1842, tragedy struck. Capt. Minor and his wife were killed. Though Fanning (1842a) announced the deaths, he did not state a cause; and Clarksville papers of appropriate date are not preserved. Whatever the cause, a massive sale of nursery stock began—Nashville agents sold fine plants at \$0.375, or less, for most varieties. In October 1843 the remaining stock and other assets were transferred to J. C. Andrews of Clarksville, who continued the business. However, Minor's Nursery had apparently passed its zenith.

In the 1830's and 1840's, Minor's large nursery must have been a technological stimulus to agricultural development in Middle Tennessee and adjacent areas. Anonymous (1840) described the business and stated that Minor's Nursery was the first nursery established in Tennessee. None of the argumentative readers of *The Agriculturist* challenged this statement through letters to the editor. Where did Minor get his stock? How did the nursery get started? There are many unanswered questions. Arnow (1963, p. 262) records that as early as 1806 a Montgomery County man named James McCorkle was advertising apple trees for sale. Arnow notes that these were apparently ungrafted.

Perhaps Minor's fabulous nursery had its roots in Mr. McCorkle's less technical venture one generation earlier in the history of Tennessee.

MATTHEW RHEA 1795 - 1879

Matthew Rhea was born near Blountville, Tennessee, in 1795. As a youth he attended Washington College, then began to earn his living by surveying, teaching, and farming. In 1820 he moved to Maury County, where he remained until 1834. During this period, surveying and cartography became his major interests.

Rhea made three significant contributions to the growth of science in Tennessee. His prime contribution was publication, in 1832, of a map of Tennessee, the first map of the state that incorporated extensive field surveys. Rhea's work clarified the geography of Tennessee and was a stimulus to economic development. Rhea's second contribution was to geology. While he never authored a geological report, Rhea accumulated original data on the geology of Tennessee which he contributed to at least one publication (Buchanan, 1836). Finally, Rhea (1832) was one of the first people to describe a Tennessee archaeological site that involved the type of aboriginal interment that is now called a stone box burial.

After publishing his map and his archaeological report, Rhea changed the orientation of his career. He moved to Fayette County, where he became president of a female academy. Apparently, he was never again a leader in cartography, geology, or archaeology.

In 1971, Robert M. McBride reprinted Rhea's "Map of the State of Tennessee." This was a great service to all who study nineteenth century Tennessee. The map is accompanied by a reprint of Eastin Morris' "Tennessee Gazetteer," first published in 1834 (McBride & Meredith, 1971). Included in the reprint edition is a brief biography of Matthew Rhea by Mary U. Rothrock (*In McBride & Meredith, 1971*) which provides data on Rhea's employment, ancestry, marriage, etc.

FERDINAND RUGEL 1806 - 1879

Any historically oriented study of the flora of Tennessee or adjacent states has to take into account the work of Ferdinand Rugel. During the antebellum years, Rugel was a professional field botanist who collected from Virginia to Florida and Cuba. His collections were sold primarily in Europe and primarily through Robert James Shuttleworth, a British-born botanist who lived in Switzerland and France.

Rugel was born near Altdorf, Wurttemberg on January 26, 1806. His chief academic accomplishment was an apprenticeship served with a pharmaceutical house in Berne, Switzerland. According to the custom of the time, Rugel called himself Doctor. In Berne, Rugel became so interested in botany that by 1838 he was in the field collecting for extended periods of time. Probably he had become a professional collector by 1839, for in that year he spent at least four months in the field and also traveled widely.

In 1840 Rugel came to the United States explicitly to collect biological specimens from Georgia and the Carolinas. To support himself in advance of specimen sales, he worked as a pharmacist. At first, Rugel lived in Portsmouth, Virginia. By late 1841, he got as far south as Knoxville, Tennessee. In 1842, he ventured into Dandridge, Tennessee; and there he met a change in plans. Rugel's original intent was to return to Europe after a few years of collecting; but Miss Laura Bell of Dandridge oriented him toward long-term residence in Tennessee. She became Mrs. Rugel and the mother of 12 little Rugels.

Until 1849, Rugel was primarily a plant collector, although he seems to have practiced medicine at Dandridge in the mid-1840's. After 1849 he moved to Knoxville, where he worked for a wholesale drug firm for many years. Sometime after the Civil War he moved to Jefferson County. As late as 1878, Rugel still did significant field work. He died on January 31, 1879, in Jefferson County, Tennessee.

In the nineteenth century, Ferdinand Rugel provided the European market with many thousands of carefully collected plants from East Tennessee and adjacent areas. They were sold

to anyone interested in botany and served to publicize the floral diversity of eastern North America. Modern knowledge of Rugel's work comes almost entirely from the work of Geiser (1948a), although an extremely brief professionally oriented obituary appeared soon after Rugel died (Anonymous, 1879).

ALEXANDER PETER STEWART
1821 - 1908

On battlefields at Chickamauga, Missionary Ridge, Atlanta, Shiloh, and elsewhere, Alexander Peter Stewart earned a place in history that has little to do with his academic interests in meteorology, engineering, and mathematics. Stewart was one of two Tennesseans who rose to the rank of lieutenant general in the Confederate Army. For many years he was the highest ranking Confederate veteran.

In addition, Stewart was President of the University of Mississippi and a pioneer in the management of National Parks, with many other claims to distinction based on the attainments of his later years (Wingfield, 1954). Quite apart from these accomplishments, Stewart contributed significantly to the growth of science in Tennessee, especially in antebellum times.

Alexander P. "Alex" Stewart was born at Rogersville, Tennessee, on October 2, 1821. In 1838, at 17, he became a cadet at West Point. When he graduated in 1842 he had done well enough to merit a commandant's post at Fort Macon, North Carolina. In 1843 he was recalled to West Point and assigned to be an Assistant Professor of Mathematics. T. J. "Stonewall" Jackson and many other distinguished men were among Stewart's pupils.

Early in 1845 Stewart left the Army to become Professor of Mathematics at Cumberland University in Lebanon, Tennessee. The University of Nashville employed him from October 1849 through April 1850, when he returned to Cumberland University. In 1852 Cumberland University went through a reorganization and Prof. Stewart emerged as Head of the School of Engineering. He resigned from Cumberland in 1854 and became City Surveyor for Nashville and Professor at the University of Nashville. He returned to Cumberland in 1856, took leave for the Civil War, and resigned for the last time in September of 1869 (Bone, 1935).

Professor Stewart made three major contributions to the development of science and technology in Tennessee. First, as a teacher and as head of the engineering school within Cumberland University, he influenced technical and scientific education. He may have been the first person officially designated as the head of an engineering school in Tennessee, although the chronology of departments and schools in other universities has yet to be exhaustively investigated. Second, Stewart's work as city surveyor for Nashville seems comparable to A. M. Lea's work in Knoxville, discussed above. It represents an early involvement of scientific men in the processes of local government. Finally, he was a meticulous recorder of weather conditions (Stewart, 1851-1853). His weather data were used by the U.S. Weather Bureau in describing the climate of Tennessee (e.g., Blodgett, 1854).

CONCLUSIONS

Twelve brief biographies identify a few of Tennessee's scientific pioneers. While biographical data are quite limited, they suggest a few conclusions:

1. By the late 1820's, Tennessee colleges were able to recruit science teachers from leading out-of-state institutions.
2. By the 1840's, Tennessee had begun to establish local scientific and technical journals that published the results of local scholarship.
3. By the 1850's, Tennessee had produced nationally known leaders in scientific and technical fields.
4. In antebellum Tennessee, the scientist who did the work was not always the person who got the highest honors, as evidenced by the career of F. H. Gordon.

5. Discord and discontent have long been part of Tennessee science, as evidenced by the Nance-Lea controversy.
6. While the Civil War did not interrupt or terminate the career of every Tennessee scientist, the war caused a general curtailment of intellectual activities.

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