

Early Science in the Ohio Valley

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Throughout our history, the West has always exerted a profound influence on the East. This influence is not merely economic and political; it is cultural as well. Possibly there has been as much liberalism in western culture as in western politics. John James Audubon was certainly progressive when he conceived the idea of his *Birds of America*. His masterful effort to enlist art to promote science was unusual to say the least. It was the height of audacity.

Audubon's origin was long veiled in mystery. He would have us believe that his mother was a Spanish lady, and that he was born near Lake Pontchartrain, Louisiana. The truth is, as Francis H. Herrick has revealed from the communal records in France, that Audubon was the natural son of Jean Audubon and a Creole woman, Rabin, and that he was born at Aux Cayes, San Domingo, on April 26, 1785. In 1789 the child Audubon and his half-sister were taken by the father, Jean Audubon, back to Nantes and presented by him to his lawful wife, Anne Moynet Audubon. She welcomed the children cordially.² Imagine such a situation and outcome in an Anglo-Saxon household! In 1794 the youngsters were legally adopted as the children of Jean Audubon and his wife. Audubon passed his childhood, entertained by the birds, and spoiled by his new mother, Anne Moynet Audubon. For a brief period in 1802-3, young Audubon studied drawing under the great David at Paris.³ This brief training constituted all the formal preparation received by the boy for the artistic work of his career.

In 1803 occurred Audubon's first return to America. He came to learn English and to enter trade. He settled on his father's farm at Mill Grove near Valley Forge, Pennsylvania. Here he spent a year and began his studies of American birds. In 1804 he became engaged to Lucy Bakewell, quarreled with his father's agent, Da Costa, and returned to France in 1805. In 1806, or earlier, his father placed Audubon in the Naval

² This paper was read before the Indiana History Teachers' Association, which sponsored one of the sessions of the Annual Indiana History Conference, at the Hotel Lincoln in Indianapolis, on December 12, 1936.

³ Francis H. Herrick, *Audubon the Naturalist* (New York, 1917), I, 52-53, 57-58.

⁴ *Ibid.*, 174.

Academy at Rochefort. While there, he made one short cruise.⁴ Probably to escape conscription for Napoleon's wars, he was sent back to America. He and Ferdinand Rozier formed a business partnership.⁵ The partners, in 1807, opened a store in Louisville, Kentucky. They believed in and practiced Adam Smith's principle of division of labor—Rozier kept store and Audubon hunted birds.⁶ Business suffered from the Embargo Act, ostensibly. In 1808, having shown his willingness to succeed in business and having gained the consent of her father and his father, Audubon and Lucy Bakewell were married. They made their home in Louisville. In 1810 his rival, the ornithologist, Wilson, visited Audubon at Louisville, and tried to secure Audubon's subscription for his (Wilson's) work on ornithology.⁷ In this year (1810), Audubon and Rozier moved to Henderson, Kentucky, with their business.⁸ The division of labor continued—Rozier kept store; Audubon hunted birds. Here at Henderson, Audubon, or rather his family, spent seven years—mostly years of hardship.

In 1811 the partners moved to Sainte Genevieve, Missouri, where they dissolved, and Audubon returned to his family at Henderson. Next he formed a commission business partnership with his brother-in-law, Thomas Bakewell. The commission house of Bakewell and Audubon at New Orleans was speedily ruined by the outbreak of war in June, 1812. Meanwhile, Audubon opened a retail store at Henderson on the same principle of division of labor—Audubon hunted birds; Lucy kept the store.

In 1816 Audubon and Bakewell formed another partnership and built, at Henderson, a steam grist-mill and sawmill. Here Audubon, artist-naturalist, worked day and night trying to succeed in business, but failed. He was sent to the Louisville jail for debt,⁹ declared himself a bankrupt, and saved only his clothes, drawings and gun. He took up the work of crayon portraiture at Shippingport (Portland, Kentucky) and was immediately successful. Meanwhile (1819-1820), he worked as taxidermist for a few months in Daniel Drake's Western Museum at Cincinnati. Then he returned to the paint-

⁴ Maria R. Audubon, *Audubon and His Journals* (New York, 1897), I, 24.

⁵ *Ibid.*

⁶ *Ibid.*, II, 220.

⁷ *Ibid.*, II, 201.

⁸ Herrick, *Audubon the Naturalist*, I, 236.

⁹ Edward A. Muschamp, *Audacious Audubon* (New York, 1929), 100.

ing of portraits and started a drawing school. In 1820—memorable year—Audubon and Lucy mutually agreed that there had been enough of the foolishness of trying to succeed in business just to please their relatives, and, with Lucy's complete approbation, Audubon decided to publish his work on ornithology. Thus, he embarked on his marvelous artist-naturalist career. It was six years before he, in 1826, with his drawings, finally sailed for Liverpool. The appreciation shown him by Europeans was inversely proportional to that shown by Americans. Everybody welcomed and fraternized with the picturesque artist-naturalist from the American frontier. A total stranger, his work spoke that universal language of art which Europeans understand so well.

In Liverpool, Audubon was cordially received.¹⁰ In Edinburgh, he was lionized even as Burns had been a generation earlier. In London, Queen Adelaide became his special patron. He was elected to the Royal Society and also to the Linnean Society. Personally Audubon was popular, and by art lovers universally admired. It is scarcely an exaggeration to say that he stood before kings, for, in Paris, the Duke of Orleans received him personally and by subscription and influence materially aided him.¹¹ Twelve years of unremitting labor, after he landed in Liverpool, and \$100,000 in cash, Audubon paid for success. He traveled 30,000 miles. He also drew and finished in life-colors 1065 figures, representing 489 species.

Back in America, Lucy Audubon was teaching school, sometimes in Louisville, but mostly in Louisiana. She earned as much as \$3,000 a year, supported the family (two boys) and furnished Audubon with the necessary capital to go to Europe. The old principle of division of labor was practiced until fame and money came to Audubon. Not the least influence in the success of the great artist-naturalist was his wife, Lucy Bakewell Audubon. Audubon was a super-salesman. In all he disposed of 165 sets of *The Birds of America*—82 in America at \$1000 per set and 83 in Europe at £182, 14 s. per set. His personality plus his excellent work, enhanced by his beautiful artistry, made a well nigh irresistible appeal. A first edition of *The Birds of America* now commands a price that ranges from \$6,000 to \$10,000 or more.¹²

¹⁰ *Ibid.*, 174.

¹¹ *Audubon and His Journals*, I. 329.

¹² Muschamp, *Audubon*, 263-277.

One day in the late summer of 1818 as he was viewing the Ohio River at Henderson, Audubon saw a man, with what looked like a hundle of clover on his back, land from a boat. The man handed Audubon a letter of introduction which described the bearer as an "odd fish". It was Constantine Samuel Rafinesque, born in 1784 in Constantinople of a French father and a German-Greek mother.¹³ The stranger became the guest of Audubon for a few weeks. During the first night of Rafinesque's sojourn, Audubon heard a commotion in his guest's room which, on investigation, turned out to be Rafinesque in action. The visitor in trying to kill some bats for rare specimens had completely demolished Audubon's beloved Cremona violin. In a few weeks, Rafinesque disappeared and Audubon feared for his safety until word was received from the eccentric naturalist. On leaving Audubon, Rafinesque had gone down the Ohio and up the Wabash to New Harmony, reaching the settlement seven years before the Owens arrived. In 1819 Rafinesque accepted the position of teacher of natural history and modern languages at Transylvania University,¹⁴ then the most important seat of learning in the West.

On applying for a master's degree, Rafinesque was at first refused, in his own words, "Because I had not studied Greek in a college although I knew more languages than all the American colleges united." He claimed acquaintance with more than fifty languages. This versatile man was a botanist, chemist, anthropologist, conchologist, archaeologist, and ichthyologist. He believed himself to be the inventor of the present coupon system of issuing bonds. He attempted to patent a "steam plow", a "submarine boat", and "incombustible houses".

In 1833, a quarter century before Darwin published his work, Rafinesque wrote: "There is a tendency to deviations and mutations through plants and animals by gradual steps at remote irregular periods. This is a part of the great universal law of perpetual mutability in everything".¹⁵

Rafinesque died at Philadelphia in 1840 in dire poverty. To prevent the landlord from selling the body, his friends,

¹³ Richard E. Call, *Life and Writings of Constantine Samuel Rafinesque* (Filson Club Publications, 1895), 3.

¹⁴ *Ibid.*, 81; Rafinesque, *New Flora of North America*, quoted in "Notice of Botanical Writings of the late C. S. Rafinesque," *American Journal of Science and Arts* (April, 1841), XL, 222-241.

¹⁵ Louis Agassiz, "Notice of a Collection of Fishes from the Southern Bend of the Tennessee River," *American Journal of Science and Arts* (1854), XVII, 354-355.

Dr. William Mease and an undertaker named Bringhurst, broke into the room, let the body down out of the window, and buried it in Ronaldson's Cemetery, Ninth and Catherine Streets. Today his resting place is unknown.

Scientists disagree as to the value of Rafinesque's work. Swainson and Gray thought well of him. Agassiz said he was better than he seemed.¹⁶ Jordan in his classification of Ohio River fishes credits Rafinesque with approximately forty-five species.¹⁷ The fault of Rafinesque was that he had a quantitative complex. He wanted to know everything and do everything himself regardless of how well it was done. The inevitable result was that he did hardly anything well.

During Rafinesque's sojourn at Henderson, Audubon played a practical joke on the credulous scientist. Perhaps Audubon was out of humor because his guest had wrecked his violin. Anyway he told Rafinesque about ten or twelve fabulous fishes that inhabited the Ohio River "further down". One was a sort of monster, four to ten feet long, accustomed to bask lazily in the sun, like a crocodile, and impervious to rifle balls. Rafinesque eagerly seized the descriptions and published them, to the complete consternation of ichthyologists, who have been busy for the ensuing hundred years trying to unravel the tangle. Rafinesque's biographer, Richard E. Call, denounced this bit of horse-play, but after all Audubon was only human.

It is a curious fact that there was considerable that was fantastic about this science of the frontier. Like gargoyles on a medieval cathedral and like the jesters in Shakespeare's tragedies, this element of the fantastic somehow became part of serious, sober science. Richard Owen drew a geological Map of the Globe, and, using arcs of great circles to bound his imaginary geological areas, he made his map look like a conglomeration of problems in spherical trigonometry.¹⁸

But the most bizarre of the fantastic phantasies was the one invented by John Cleves Symmes, nephew of the Ohio land speculator of the same name. Young Symmes conceived the idea that the earth is a hollow sphere, habitable within and widely open at the poles. He wrote, traveled and lectured on

¹⁶ Quoted from *Herbarium Rafinesquianum* (1833), 11, 15, by Call, *Life and Writings of Rafinesque*.

¹⁷ David Starr Jordan, "Review of Rafinesque's Memoirs on North American Fishes," *United States National Museum Bulletin*, (1877), No. 9, 1-50.

¹⁸ Richard Owen, *Key to the Geology of the Globe* (New York, 1857). See map, facing title-page.

the subject for ten years, till his death in 1829. Pennsylvania, Ohio, Maryland and South Carolina petitioned Congress to equip Symmes with an expedition to test the truth of his theory. James Buchanan said before the House that for all he knew there might be a hole at the poles, stating that he had formed no opinion.¹⁹

On June 4, 1825, *Niles' Register* carried the following notice: "John C. Symmes, our countryman who has resolved that the earth is hollow and populated, has accepted an offer of the emperor of Russia, through Count Romanzoff, to make a polar expedition under the patronage of the 'deliverer' who has not land enough above ground to satisfy his ambition."²⁰

There were three centers of culture in the old Midwest: Lexington in the Bluegrass; Cincinnati on the Ohio; and New Harmony on the Wabash. The latter was the Mecca of scientists. Lockwood says Audubon was among the visitors. George Engelmann rode horseback from St. Louis, in February, 1840, only to fail to see the scientists that he hoped to meet there. Sir Charles Lyell, eminent Scotch Geologist, was one of the many European scientists who visited New Harmony during its golden age. During his second tour of the United States (1845-1846), he came by way of New Orleans to Mount Vernon (Indiana) and then by stage. In his notes, he says: "We spent several days very agreeably at New Harmony where we were most hospitably welcomed by Dr. and Mrs. [David] Dale Owen. . . . I found a good geological collection, both fossils and minerals made during the state survey. . . . Lectures on Chemistry and geology are given here in the winter."²¹

The early scientific progress of Cincinnati centers around Daniel Drake, who was born at Plainfield, New Jersey, on October 20, 1785. His father moved to Kentucky two years later. There Drake resided till 1800, when the family went to Cincinnati. During the winter of 1820-1821, Drake and others were establishing the "Medical College of Ohio." The departments were organized as follows: The Institutes and Practice of Medicine, Including Obstetrics and Diseases of Women and Children, Daniel Drake, M.D.; Anatomy and Sur-

¹⁹ *Cong. Debates*, 19 Cong., 2 Sess. (Jan. 15, 1827), 713-714; (Feb. 6, 1827), 948-949.

²⁰ *Niles' Register* (June 4, 1825), XXVIII, 213.

²¹ Sir Charles Lyell, *Second Visit to the United States* (London, 1849), II, 270 ff.

gery, Jesse Smith, M.D.; *Materia Medica*, and Pharmacy, Benj. S. Bohrer, M.D.; Chemistry, Elijah Slack, A.M. (President of Cincinnati College); Assistant in Chemistry, Robert Best (Curator of the Western Museum). One interesting announcement reads: "Medical Jurisprudence will be divided among the professors according to its relations with the different branches which they teach." A quotation from the original manuscript states that "After the termination of the session should a sufficient class be constituted, a course of Botanical Lectures will be delivered, in which the leading object will be to illustrate the medical Botany of the United States." Among the reasons for selecting Cincinnati as a seat of the Medical College were: first, the necessity for such an institution in the West; second, the central situation of Cincinnati, its northern latitude, its easy water communications, and above all the large population of over 10,000.²²

But medical Science in the West had its beginning at old Transylvania College in Lexington, where, in 1817, the trustees decided to add a school of Medicine. Dr. Benjamin Winslow Dudley from the University of Pennsylvania was made departmental head and proceeded to organize a faculty. Dudley was tremendously able and correspondingly human. He was a giant in stature and was possessed of a dynamic temper. Unfortunately, Dudley was as facile with a gun as he was with surgical instruments. One of the associate professors was William H. Richardson, typical Kentuckian, scholarly, and of excellent family. During a faculty meeting, Richardson criticized some suggestion of Dudley, whereupon Dudley told him that if he did not keep his mouth shut, he would shoot his d—d head off. Richardson offered to meet him any time, and a duel was arranged. They both fired simultaneously. Richardson missed, but Dudley shot Richardson in the leg and severed the femoral artery. Richardson would have bled to death if Dudley had not ligated the artery. After the operation, the two duelists shook hands and were friends forever.²³

In spite of the dueling, Transylvania flourished, and for thirty years was one of the great Medical schools. In 1826 there were 235 students. Dudley was a tower of strength. He

²² Edward Deering Mansfield, *Memoirs of the Life and Services of Daniel Drake* (Cincinnati, 1855).

²³ Otto Juettner, "Rise of Medical Colleges in the Ohio Valley", *Ohio Archaeological and Historical Publications* (1913), XXII, 485.

performed the operation of lithotomy more than 600 times with only a four per cent mortality, before the days of anaesthesia and clean surgery. During its life which closed about 1860, Transylvania Medical School trained more than 2000 physicians. During the thirties, some of the professors seceded and founded the Louisville Medical Institute, which was the mother of the different schools finally merged in the Medical Department of the University of Louisville.²⁴

In the Bluegrass town of Danville, Kentucky, in 1809, Ephraim McDowell performed the first ovariectomy. His boldness gave him a place among the great surgeons of all time. Mrs. Jane Todd Crawford was suffering from internal complications. Two doctors on consultation advised that they send sixty miles for Dr. Ephraim McDowell. He came on horseback with his instruments in his saddlebags. McDowell's examination convinced him that only an operation would save the life of the patient. Mrs. Todd rode back to Danville for the operation. McDowell's nephew, who had studied in Philadelphia, and a young student assisted in the operation. In twenty-five minutes it was over; in twenty-five days the patient rode home. But the wise ones of Philadelphia were skeptical, even after McDowell had repeated the operation. Not till 1819, after he had performed four more operations would the world believe him. Easterners were slow to conceive the idea that they could learn anything from a surgeon of the frontier.²⁵

It is only possible to mention William Maclure, who, in 1809, published his *Observations on the Geology of the United States*, and who became known as the father of American Geology.²⁶ He was one of the New Harmony lights of Science. He also wrote *Opinions on Various Subjects*, a work of three volumes, which he published in 1831-1838 at New Harmony. Agassiz also did important work in the West.²⁷

Thomas Say, who lived from 1787 to 1834, was one of the early scientists of the West who was a natural born Ameri-

²⁴ Juettner, "Rise of Medical Colleges," 485.

²⁵ Henry Ernest Sigerist, *American Medicine* (New York, 1934), 89.

²⁶ George P. Merrill, *The First One Hundred Years of American Geology* (New Haven, 1924), 32.

²⁷ In 1848, Agassiz came from Harvard to Lake Superior to study fishes and glacial phenomena. He discovered and named twenty-four species of fish in the Great Lakes. He reached the conclusion that all fish and other fresh-water animals of the Great Lakes originated there. Thus he held the doctrine of multiple creation; i.e., animals have originated in their various habitats and have not been distributed. Agassiz also formulated his glacial theory, in part, while on this expedition. Agassiz, *Lake Superior* (Boston, 1830), 279 ff., 376.

can citizen. In 1825 he went to New Harmony to join the distinguished company there gathered. In 1827, he married Lucy Way Sistaire and lived in New Harmony the rest of his life.²⁸ Say's work was almost wholly taxonomic, and his writings almost wholly descriptive. He published practically nothing of the history of the forms he named. He was early recognized in Europe and was elected to the Linnean Society of London. His early papers were published in the *Journal of the Academy of Natural Sciences* of Philadelphia, and later ones in the *Lyceum of Natural History* of New York. Others were published by Say himself at New Harmony.²⁹

In 1859 J. L. Le Conte edited and published, in two volumes, *The Complete Writings of Thomas Say on the Entomology of North America*. Most of the figures of shells were drawn by Mrs. Say. The drawings of insects were chiefly by himself. J. S. Kingsley says that the number of new species which Say described has probably never been exceeded except by two exceedingly careless workers, John Edward Gray and Francis Walker of the British Museum.³⁰ If Kingsley is right, it is not too much to assert that quantitatively, Say was the greatest of entomologists.

Charles Alexandre Le Sueur was born in Havre, France, on January 1, 1778.³¹ In his twenty-third year, he secured by competitive examination a position with the Australian expedition sent out in 1800. Here he formed an acquaintance with Péron. Cuvier credited Péron and Le Sueur with discovering more new species than all the modern naturalists up to their time.³² The death of Péron in 1810 and the downfall of Napoleon in 1815, brought sorrow and dejection. So Le Sueur welcomed the invitation to become the traveling companion and co-worker of Maclure, the amateur geologist. Leaving France in August, 1815, they made a survey of the West Indies and reached New York in May, 1816. Together they traveled over northeastern United States. Maclure studied geology, and Le Sueur, fishes. From 1817-1825, Le Sueur was curator of the Academy of Natural Sciences in Philadelphia. In 1819 he worked for a time on mapping the Northeastern Boundary of the United States.³³ He visited Kentucky in 1821.

²⁸ Henry B. Weiss and Grace M. Ziegler, *Thomas Say* (Baltimore, 1931), 134.

²⁹ L. O. Howard, "Thomas Say," *Dictionary of American Biography*.

³⁰ John S. Kingsley, "Sketch of Thomas Say" *Popular Science Monthly* (Spet. 1882), XXI, 687-691.

³¹ Mme. Adrien Loir, *Charles Alexandre LeSueur* (LeHavre, 1920), 9.

³² *Ibid.*, 10.

In 1825 Maclure persuaded Le Sueur to go to New Harmony on the Wabash. There for twelve years, he taught drawing in the community school, and engraved plates for Say's works on conchology and entomology. Traveling with Troost, Say, or alone, from New Harmony as a base, Le Sueur visited New Orleans repeatedly, and made trips to Nashville and the Tennessee Mountains, taking notes, making drawings, and sketching specimens and people.³⁴ Saddened by Say's death and warned by the French government that continued absence might deprive him of his pension, Le Sueur returned to France in 1837.³⁵ At Havre in 1845, he was made director of the new Museum of Natural History.³⁶ He was one of the first American zoölogists to regard every fact so important that it needed to be ascertained and correctly stated. Agassiz considered Le Sueur next to himself the greatest American ichthyologist.

David Dale Owen, noted member of the Robert Owen family, arrived in New Harmony in 1828. In 1831 he went back to England, where he studied geology and chemistry at the University of London. Returning to America, he entered (1832) the Ohio Medical College at Cincinnati. He spent his summers in arranging and classifying geological specimens for Maclure. After graduating from Medical College in 1836, he accepted the position of state geologist for Indiana.³⁷ Working without assistance, he made his own chemical analyses in a \$10,000 laboratory that he had himself established at New Harmony.

In 1838 Owen resigned his Indiana position to accept an appointment from James Whitcomb, Federal Land Commissioner, to make a survey of the Dubuque and Mineral Point districts of Wisconsin and Iowa, an area of about 11,000 square miles. He received his commission on August 17, 1839, hired and instructed his 139 assistants, and finished his work on November 14, "a feat of generalship," says Merrill, "which has never been equaled in American Geological History."³⁸ In 1847 Owen was appointed United States Geologist to survey

³³ *Ibid.*, 20.

³⁴ *Ibid.*, 61ff.

³⁵ *Ibid.*, 80.

³⁶ Le Sueur was the first to study the fishes of our Great Lakes. He published twenty-nine papers on American fishes. The most notable of all his American contributions is a monograph on suckers, a species well known in the middle West.

³⁷ Merrill, *First One Hundred Years of American Geology*, 199.

³⁸ *Ibid.*

the Chippewa Land District in Wisconsin, Iowa and Minnesota, a work not finished till 1852.

As part of the project, Dr. John Evans, under Owen's direction, made the first survey of the Bad Lands of the Upper Missouri. The *Report of a Geological Survey of Wisconsin, Iowa and Minnesota and Incidentally of a Portion of Nebraska Territory* formed a quarto volume of 628 pages of text with fifteen plates of fossils, nineteen folding sections and a geological map. The fossil illustrations were especially fine for that period. In 1854 Owen was appointed state geologist for Kentucky and held the position for five years. In 1857 he accepted the position of state geologist for Arkansas and there virtually worked himself to death. Towards the end, his doctor complained to Owen that he was shortening his life and wouldn't live a week, upon hearing which, Owen said he wanted to live only thirteen days to finish his work.³⁹

David Dale Owen was the first to point out the rich minerals of Iowa and Wisconsin, and that the ores of lead and zinc were limited to the magnesian limestone. He was the first to give the name subcarboniferous to the beds immediately under the coal of Indiana. Like other New Harmony scientists he was an artist. His geological illustrations are exquisite in their artistic beauty. He also embellished his reports with scenic drawings of superb quality. Of the twenty-five plates in Owen's report of 1840, fourteen are from his own drawings. Not only was he an artist, but he used excellent English. Some of his descriptions, in beauty of language, reflect the skill of an able writer of fiction.

Audubon and Le Sueur were artists recognized abroad. Had the occasion arisen, Owen, would probably have been recognized as an artist in Europe. These artist-scientists had no process of photography. They made their own pictures, and anticipated modern photography in science. Incidentally, in making their own pictures, they linked science with art and gave a double impetus to culture. Audubon was appreciated in Europe before he was recognized in America, and, in Europe, the appreciation was twofold—for his artistic as well as for his scientific work. His election to the Royal Society, and to the Linnaean Society as well, was spontaneous. When the renowned Cuvier saw Audubon's *Birds of America*, he hailed it as "The greatest monument yet erected to orni-

³⁹ *Ibid.*

thology.⁴⁰ The artist Redouté was just as enthusiastic as was Cuvier. Said Gerard, the great portrait painter: "Mr. Audubon, you are the king of ornithological painters. We are all children in France and Europe. Who could have expected such a thing from the woods of America?"⁴¹ Thus, did Paris acknowledge its debt to the American frontier.

It was in relation to Darwin, however, that Audubon really made history. In his famous books, *The Origin of Species* and *The Descent of Man*, Darwin has forty citations to the works of Audubon.⁴² The same books by Darwin cite Gould forty-five times and Alfred Wallace, sixty-six times.⁴³ Thus, Wallace is the only scientist whom Darwin cites a considerable number of times more than he cites Audubon. And, it should be remembered, that Wallace was, with Darwin, independent co-discoverer of the theory of evolution. Thus the scientific influence of the American frontier on Europe is made manifest. While Audubon's drawings entranced the world, his printed works became a source book for Darwin. With no scientific training, Audubon collected information that made Darwin his debtor in the development of the theory of evolution. If America was not culturally independent of Europe, she was fast making the relation one of interdependence.

Culturally the West had come into its own. It had demonstrated that it could contribute to the advancement of knowledge. Audubon spent ten years of his life in Kentucky and six years later went to dazzle and enlighten Europe with his artistry and his knowledge of American bird life. Rafinesque, Le Sueur and Agassiz described and classified the fishes of the West.⁴⁴ Thomas Say was called the father of American conchology, and accurately described more insects than did any man living. William Maclure and David Dale Owen promoted the science of Geology, and made New Harmony more justly famous for its science than for its demonstration of the futility of communism on the frontier. McDowell, of Danville, Kentucky, performed the first ovariectomy on record,

⁴⁰ Herrick, *Audubon the Naturalist*, I, 1.

⁴¹ *Audubon and His Journals*, I, 330.

⁴² The reference is to Audubon's published works, especially his *Ornithological Biography*.

⁴³ Charles Darwin, *The Origin of Species* (New York, 1909 ed.), and *The Descent of Man* (New York), 1883 ed.)

⁴⁴ Agassiz also partially formulated his glacial theory on the shores of Lake Superior.

and required ten years to convince a skeptical world. Transylvania University made Lexington the "Athens of the West" and became the mother of Medical schools for the West. The record is one of which any frontier might well be proud.