The Early Career of John L. Riddell as a Science Lecturer in the 19th Century[1]

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ABSTRACT. John Leonard Riddell (1807-1865), trained in science, especially botany and geology, by Amos Eaton at the Rensselaer School at Troy, New York, became a professional itinerant science lecturer. He began in Ogdensburg, New York, then in Philadelphia, Pennsylvania, with lectures on chemistry and physics. From 1832 to 1836 he concentrated his efforts in Ohio, focusing his lectures on botany, particularly medical botany, chemistry, geology, and electricity. He continued his botanical studies, including the collection of plant specimens, and studied medicine, obtaining an M.D. degree from Daniel Drake's School, the Medical Department of the Cincinnati College. After departing Ohio to teach chemistry at the Medical College of Louisiana in New Orleans, he published and lectured on science fiction based on fancied documentation from a presumed former student, Orrin Lindsay, at Cincinnati. Riddell was an early 19th century science lecturer, field botanist, and author of science fiction.

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ITINERANT LECTURER (1830-1832)

John Leonard Riddell (1807-1865), the oldest of 11 children born to John and Lephe Riddell in Leydon, Massachusetts, lived as a youth in Preston, New York. As a young man he attended the Rensselaer School at Troy and studied science, especially botany and geology, under the famous Amos Eaton. While Riddell actually had little formal training, he acquired the B.A. degree in 1829 and later an M.A. degree from the Rensselaer School through the recommendation of Amos Eaton (Riess 1977, Stuckey 1978). Degrees were often awarded on merit and informal study rather than class work. While still a student, Riddell considered the possibility of a career as an itinerant science lecturer. Elijah B. McCall wrote to him on 21 October 1828 from the Oxford [Pennsylvania] Academy where Riddell had been a student:

> I have not been able to make the necessary inquiry into the practicability of establishing a course of lectures at this or any other place in the county as you propose. But to give an individual opinion on the subject, I think the advantages to be derived from a course with experimental lectures on Chemistry, Geology, etc. if attended to but for no more than one month are of more utility to the students than a dry course of theoretical studies pursued for the span of one year with the most persevering industry. I think that sessions made for the advancement of the students of the academy in the science of Chemistry, etc. illustrated by the necessary experiments would meet with a liberal support and be attended with beneficial consequences. (Archives, Essex Institute).

McCall then gave him some good advice in organizing a lecture series.

Following his training under Eaton, Riddell established himself as a professional itinerant science lecturer. Fortunately some of his lecture notes escaped destruction and are now in the archives of the Peabody Museum, Salem, Massachusetts. Some of these are quoted in this paper to illustrate various aspects of his varied career in science and science teaching. (See Bolles 1867 for a detailed account of the rescue of these papers.)

In 1830 Riddell gave one of his first public lectures at Ogdensburg, New York, on the subject of chemistry. It was delivered on 11 October at the Ogdensburg Courthouse to stimulate subscriptions to a proposed lecture series on physics and chemistry consisting of 24 lectures, including such topics as gravitation, hydrodynamics, optics, electricity, and vegetable and animal chemistry. His closing remarks were as follows:

> The reason why I have taken the liberty to invite you to this lecture is to respectfully inform you that I wish to give a full course of lectures on chemistry. I hope you will not deem it assuming in me when I say that as this will be my only employment, I am convinced that I can render a course amusing and instructive. Especially as the apparatus I shall use will be about as extensive as is desirable. This apparatus I have loaned [sic] from the Patrons of the Ogdensburg High School. It is expected soon to receive considerable addition. I myself have invented a small sum. . . . It is my design to comprise the course in about 24 lectures and to give two lectures on two of the most convenient evenings in a week. I blame no individual for not rationising [sic] a project of this kind unless he is satisfied that the pleasure or profit to be derived will compensate him for his trouble. But I think it not presuming to say, that to those who have no taste for science, but merely a fond of show, very many experiments in chemistry are highly gratifying. Those who can admire the varied and wonderful powers of nature would, I trust, be rationally entertained. This science is extensively useful and might be rendered much more so to all classes of people.

In his lecture three days later, after explaining the chemical nature of water with a demonstration of the nature of hydrogen, he entered upon a discussion of compounds of carbon and hydrogen.

> We will therefore attempt to amuse ourselves with experiments upon two substances called the light and heavy carburets of hydrogen, taking into consideration also the nature of

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> gas used in cities for lights [the light form is methane or marsh gas, (illuminating gas)— CH_4; the heavy form is ethane, also used as illuminating gas, C_2H_6.]—Some authors have supposed that when this gas [marsh gas] is generated in stagnant pools or in putrid marshes, it constitutes the contagious *marsh Miasma* which causes intermittent fevers [malaria and/or yellow fever]. The opinion however, appears not to be grounded on fact, for though the air cannot be breathed with impunity, yet when pure it does not produce the methitic and pestilential properties which have been attributed to marsh miasma. The marsh miasma as yet, has completely eluded the researches of scientific man. It probably consists of some very volatile substances arising from putrifying vegetables in swamps, marshes, etc., a substance probably which is capable of diffusing itself like the odor of musk and which floats in the air in combination with moisture and sometimes also with the light carburetted hydrogen. [Later, in 1839, Riddell added the following: Such I believe were Eaton's views. I cannot subscribe to them. I think miasma is of an organic nature.]

Riddell was correct. The nature of malaria was discovered by Alphonse Laveran in 1880 when he found *Plasmodium* in the blood of malaria patients. And yellow fever was explained by Walter Reed and associates in 1900 when they discovered mosquitos were the vector.

LECTURING AND BOTANICAL WRITING IN OHIO (1832-1836)

In the spring of 1832, Riddell gave more public lectures on chemistry at Pittsburgh (Waller 1945). But later that year he went to Marietta to give a series of lectures to the Marietta Lyceum on the plants of Washington County. He was spqnsored locally by Dr. Samuel P. Hildreth, a noted physician and naturalist. The lectures were published in the local newspapers and those accounts which have survived have been reprinted with annotations by Walp (1951). Riddell aided Dr. Hildreth on the first Geological Survey of Ohio, and many of Riddell's letters to Dr. Hildreth are in the library of Marietta College.

Riddell's lecture series was entitled, "Notice of the Vegetable Productions, Growing Spontaneously in Washington County, Ohio." Accounts are given for 18 families with detailed information on local species. The lectures were published between 14 July and 29 September 1832. All of the manuscript notes I found were included in those publications and were republished by Walp, as noted above, except for some notes on Culver's Physic written on a separate piece of paper and inserted into Riddell's notebook at a later date. Following are a few selected excerpts from the lectures and the insert to illustrate Riddell's botanical lectures while in Marietta.

Of the rattle snake plantain Riddell wrote:

> This plant (*Goodyera pubescens*) is said to be an excellent antidote to the bite of serpents, but it probably received its common name from the singular appearance of its leaves. They are of an oval, pointed form, and of a dark green color, but so striped and checked into figures of all shapes, by wandering lines of white, as to resemble the skin of a serpent.

Of wild ginger (*Asarum canadense*) Riddell said: "A tincture of this root in dilute spirit makes a pleasant bitter, possessing very active tonic qualities." Writing on sassafras Riddell noted that "The bark and roots possess a pleasant flavor, and exhale an agreeable and peculiar odor occasioned by a volatile oil, which is extracted for medicinal purposes."

He mentioned that "The Vervains were considered by Parkinson, and the older authors, as efficient antidotes to the poison of serpents." Writing on the family of mints, he pointed out that "Physicians in ancient times, seem to have drawn a large portion of the materia medica from plants of this order [sic]."

"A tall plant known by the name of Culver's Physic (*Leptandra virginia*) grows plentifully in the thickets of secondary growth and not infrequently in situations more exposed. . . . It is esteemed by some practitioners, an excellent cathartic."

Dr. Hildreth wrote to Riddell on 19 April 1834 concerning his proposed collecting trip for specimens of natural history and to encourage him to continue his public lectures.

> I am much pleased with your determination of visiting the 'far west' . . . I wish I could go with you, but I cannot at present. My letter to Dr. [Daniel] Drake may perhaps assist you in getting a class or classes in your favorite branches . . . if so, you will probably stay there till late in the season and visit the Mississippi in Sept. or Oct. . . . if you do not meet with sufficient encouragement in lecturing, you had better go on to the Illinois River and upper Mississippi before the sickly season comes on in Aug. and Sept. when they always have more or less fever on the Illinois, but not much on the upper Mississippi. If you stay in Cincinnati I will send you a letter of introduction to Dr. [Robert] Buchanan, who is a warm naturalist and will assist you in collecting shells in the rivers, etc. I want you to make a collection of the shells and minerals of the 'west' for me, and I will give more marine shells or minerals in exchange—write soon, and if you go west, we can still correspond from the different posts as you ascend. (Archives, Essex Institute).

In 1833 Riddell taught chemistry in the Medical Department of Worthington College in Worthington, Ohio, six miles north of Columbus. This small medical department, begun only three years earlier as the Reformed Medical College of Ohio, based its teaching on the premise of no bleeding, cupping, use of mercury, or surgery. Dr. Hildreth was instrumental in getting Riddell placed on the faculty. While teaching there Riddell gave a course of lectures on geology. The series began on 16 May 1833 and followed the outline given below according to Riddell's "Minutes of a Course of Lectures on Geology." The eight lectures were entitled: (1) Introduction; (2) Mode of making geological observations; (3) Meaning of formation more fully explained; (4) On

primitive rocks; (5) Superincumbent rocks, volcanoes, and earthquakes; (6) Transition fossils; (7) Transition and secondary limerocks; (8) On coal formations. To this outline he added as an appendix, "Worthington 19 December 1833. I will here make some mathematical calculations which are intended to have a bearing on the nature and cause of meteors." Riddell was very adept at mathematics and applied his skill whenever the opportunity arose. Among the lecture notes deposited at the Peabody Museum there are many pages of mathematical calculations he produced to support his scientific studies.

Riddell (1834) published his "Catalogue of Plants Growing Spontaneously in Franklin County, Central Ohio," in the *Western Medical Gazette*. Nearly 750 species were listed. Stuckey (1978) has stated that this catalogue "is considered the first county flora published for Ohio." The following year he became Adjunct Professor of Chemistry and Lecturer on Botany in the Medical Department of Cincinnati College founded by Daniel Drake. Riddell thus became a colleague of the best-known naturalist in southern Ohio. Dr. Drake was also a foremost leader in medical circles at Cincinnati, and Riddell received his medical degree from Dr. Drake in 1836. (An account of his life and career has recently been published by Shapiro and Miller (1970).) Riddell then published his most detailed work in botany and the first extensive flora for the Ohio region entitled "Synopsis of the Flora of the Western States" (Riddell 1834-35). It included synopses of approximately 1800 species of plants including 13 newly described species (Stuckey 1972).

Riddell (1836a) followed this work with a "Supplementary Catalogue of Ohio Plants," in which seven new species were described. Soon after receiving his M.D. degree from the Medical Department of Cincinnati College, he published a paper entitled "Miasma and Contagion" (1836b) based upon his original microscopical studies. He attributed the cause of yellow fever to an organism. With this conclusion, Riddell was ahead of his time, for the definitive work on yellow fever came much later in 1900, when Walter Reed and his associates discovered the transmission of the virus by mosquitoes, as already mentioned.

LECTURING ON ELECTRICITY

In the collection of Riddell's manuscripts at the Peabody Museum at Salem is a lecture on electricity and lightning. No date or place for the lecture is recorded. Below are a few excerpts typical of Riddell's lecture and especially his treatment of the use of electricity in medicine. Little was really known about electricity and its use for medical purposes. Such use was largely experimental, but it is significant that Riddell was aware of the possibilities. It is also interesting to get Riddell's explanation of electricity based upon his own experiments and his disagreement with prevailing theories. He opened the lecture stating:

> Electricity, the branch of science that is now to engage your attention, holds a high and important rank, among the philosophers and literate of the civilized world. It is also a branch of science that retains its importance in the exercises of our universities and colleges. Some of the wisest and best of men, have hazarded [sic] their lives and one of them has fallen a victim while endeavoring to develop the electric principle. Yet with all these inducements for its investigation, the greater part of mankind scarcely gave it a thought to excite their attention to its importance, [hole burned in page at this point — from his chemical experiments?].

In praise of Benjamin Franklin's pioneering work on electricity Riddell wrote:

> When I reflect on this daring experiment, and knowing from experience the danger that must attend it, I am lost in astonishment at the boldness of the design! Surely this bold experiment of Franklin's, had every quality of the moral and physical sublime, it had all the dignity of danger; even at this day, improved as is our knowledge of electricity, I suspect few of us would be willing to repeat the experiment, during a thunder storm especially. If Franklin did not make his will before he raised his kite, he must have had great confidence in the correctness of his deductions, and if he had that confidence, it increased the triumph of mind over matter, and contributed the more to exalt the human intellect, and added to the sublimity of the scene.

In his criticism of the Chemico-Electric theory he wrote:

> The Chemico-Electric theory, the theory of galvanism, which is the one adopted by most of the great chemists of Europe, and this country, however great the authority which supports it, I cannot approve of; my experiments will not sustain it. Those gentlemen present, who are conversant with Galvanic batteries of great power, know how to appreciate the one with which I have performed the experiments. I will now perform a number of experiments with a view of examining the Chemico-Electric Theory of Galvanism, and point out my objections to it.

Since the date of the lecture on electricity is unknown, it is difficult to place it in perspective with the others, and to relate it to the knowledge of electricity at that time. However, we do get Riddell's thoughts on the nature of electricity and its application to medicine.

In concluding his lecture, he discussed in some detail the use of electricity for medical purposes, explaining:

> My general plan is, to pour into the system a diluted stream of electricity in its mild and expansive form, directing the electric current to and through the diseased parts, without producing any of those shocks which, where they do not injure, must at least *agitate* and *alarm* the timid, more particularly so in those delicate and painful diseases peculiar to females at certain critical periods of life. This system of treatment is founded on the laws of equilibrium, of action and reaction; my primary maxim being never to debilitate or oppress the natural energies, but to soothe the irritability of local inflammation and to aid nature in awakening the dormant powers. It

> is my practice to marke [sic] the immediate effect and subsequent results, by the expression of the eye and of the countenance by varying the mode of operation according to the feelings of the patient, — by making minute inquiries as to the effects felt from time to time — a mode of which, of all others, is the best adapted to procure the **instructive counsels** of **nature, in all cases** the best and most unerring guide.

Riddell's position on the nature of disease and medical use of electricity is exemplified by the following quotation:

> Electricity is applicable to many complaints both constitutional and local, by its general influence on the system or by its topical effects on diseased parts. . . . Disease is nothing more than the efforts of **nature** to recover that lost equilibrium of health, which in the disturbed electrics or conductors, evince the labors of the electrical principle to regain its natural state. . . . It has been shown that electricity is an elementary fire, and therefore the cause of animal heat, and by its abundance or deficiency, produces either the burning fever, acute and inflammatory diseases of the most dangerous kind, or those with the icy coldness of paralysis.

Riddell concluded this lecture admitting that little was known about electricity; yet physicians were acquainted with some of its effects in matters of health and disease. He said: "At present, however, we know nothing for a certainty concerning electricity, but from some of its effects."

SCIENCE FICTION LECTURES

After obtaining his M.D. degree, Riddell became Professor of Chemistry at the Medical College of Louisiana in New Orleans, later the Medical Department of the University of Louisiana. Here he remained on the faculty, practiced medicine locally, and became active in medical, scientific, government, and public affairs at New Orleans over a period of 29 years (Skinner and Riess 1985).

In addition to giving his scientific lectures and doing research in medicine and botany, Riddell published in 1847 an imaginative account of a fanciful visit to outer space entitled "Orrin Lindsay's Plan of Aerial Navigation with a Narrative of his Explorations in the Higher Regions of the Atmosphere and his Wonderful Voyage Around the Moon" (Riddell 1847). He also lectured on this topic, and in April, 1847 did so at the People's Lyceum in New Orleans. His lecture notes are prefaced with the statement: "This account of aerial navigation embraces an account of Orrin Lindsay's lately invented balloon and a narrative of two extraordinary aerial voyages, one to the Moon and one to Mars, recently made by him (18 April 1847)." The lecture began as follows:

> Orrin Lindsay, a native of Cincinnati, now of Natchez, Mississippi, a former student of mine, and a scholar well accomplished in natural science, has lately assigned to my care a memoir narrating some singular and almost incredible experiments and adventures of his, with a request that I will make them public through some appropriate channel. Strange as the narrative may appear, I must say that all the collateral and incidental statements accord well with the best influences of modern science, and develops satisfactorily a good deal of curious knowledge. I have therefore thought that I could not offer a more acceptable entertainment to the lyceum than by reading Mr. Lindsay's narrative. [During] progress in the reading, I shall take the liberty to explain many points and perhaps even to elucidate some by experiments.

Supposedly, Lindsay had explained his work to Riddell when both met in northern Ohio in March of 1836. Lindsay, according to the account, had made preparations in Natchez, Mississippi, and his experiments with balloon exploration took place in the Devils' Punch Bowl, 1.5 miles north of Natchez. He developed an alloy impervious to gravity, a goal sought in modern times by Roger W. Babson with his laboratory on gravity research and his annual prize for research on gravity. Lindsay then supposedly developed an aerial machine, a balloon, and made observations at a reported height of 45 miles on temperature, aerial tides, wind currents, frozen clouds, shooting stars, meteorites, and the Aurora Borealis. He inferred that the moon has no water, which was correct. Concerning the atmosphere of the moon, he stated that the "Origin of the moon's diminutive atmosphere — when the whole space between the earth and the moon was nebulous — two nuclei, each appropriated O_2 and N_2 proportional to the power of gravitation. Subsequent oxidation has reduced these amounts somewhat. Thus the coldness of the moon has an effect." Here Riddell, speaking for the mythical Lindsay, was wrong; oxygen did not appear in the earth's atmosphere until green plants evolved. Riddell was aware, however, of the nebular theory of Laplace long before it was supported by the work of Daniel Kirkwood in 1848 (Numbers 1977: 41-54).

A sketch of Lindsay's plan to visit Mars, believed by him to be inhabited, was "given" to Riddell, but details were not recorded. Lindsay "reported" to Riddell that matters on Mars are much the same as on earth. The arts and sciences are even more advanced on Mars. The "Martigians" are about four feet high and much like man on earth. They have a good science of astronomy.

Riddell listed the following as topics for discussion during his lecture about the "Martigians":

Their aerial navigation
Manner of making ice
Gun powder engine
Electric telegraph
Skating on water [ice?]
Steam boat on rollers [steam railway?]

Their Sundays devoted to scientific and cultural lectures (i.e., currency, banking, etc.)

Their opinion of Mesmerism, which Lindsay explained to them

Their republican form of government; peace prevails and has for many centuries, ever since the use of the electric telegraph and aerial navigation

The occasional pestilence that keeps down the population; Riddell explained their view on the cause of the pestilence.

An account was given by Lindsay of "an inferior race on certain parts of Mars — between man and monkeys — made slaves by the 'Martigians' — were treated kindly — were below our Hottentots in point of intellect; [but] can talk a little. They are naturally savage, but have the use of fire. Some of their notions are derived from 'Martigians' who have been their prisoners and from those who have been enslaved."

In his exhaustive monograph, Crowe (1986) quoted the belief of Flammarion (1879-80) that "It is almost certain that the inhabitants of Mars are of a different form from us, and fly in its atmosphere," and "the actual inhabitation of Mars by a race superior to our own is in our opinion very probable." The idea persisted not only in science fiction, but even in serious literature. It is also interesting that Riddell was aware of the popular belief at that time of a hierarchical ordering of races based on intellect.

SUMMARY

Dr. John Leonard Riddell was a 19th century pioneer in field botany, natural history, science teaching, and science fiction. While his career in Ohio was relatively brief, it was colorful, inspiring, and historically important. His lectures on scientific topics brought a basic understanding of such matters to the public not generally available at that time. His lectures at medical schools brought botanical, chemical, and physical science to medical students. Travelling as he did, especially around Ohio during 1832-36, gave him the opportunity to become an authority on the plants of that state. Even his flight into fancy with his account of a visit to the moon and to Mars was an early attempt to develop science fiction, which has become so popular today.

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LITERATURE CITED

Bolles, E. C. 1867 Meeting of 18 March 1867. Proceed. Essex Institute 5: 120.

Crowe, M. J. 1986 The extraterrestrial life debate 1750-1900. Cambridge and New York: Cambridge Univ. Press.

Flammarion, C. 1879-80 Mars inhabited like our own earth. Kansas City Rev. 3: 86-90; 156-160.

Hildreth, S. P. [Letter to J. L. Riddell]. Located at: Archives, Essex Institute, Salem, MA. 1834 April 19.

McCall, E. B. [Letter to J. L. Riddell]. Located at: Archives, Essex Institute, Salem, MA. 1828 Oct. 21.

Numbers, R. L. 1977 Creation by natural law: Laplace's nebular hypothesis in American thought. Seattle: Univ. of Washington Press.

Riddell, J. L. 1834 Catalogue of plants growing spontaneously in Franklin County, central Ohio; excluding grasses, mosses, lichens, fungi, etc. Western Med. Gazette 2: 116-120; 154-159.

——— 1834-35 Synopsis of the flora of the Western States. Western J. Med. and Phys. Sci. 8: 329-374 (1834); 489-556 (1835).

——— 1836a A supplementary catalogue of Ohio plants. Western J. Med. and Phys. Sci. 9: 567-592.

——— 1836b Memoir on the nature of miasma and contagion. Western J. Med. and Phys. Sci. 9: 401-412; 526-532.

——— 1847 Orrin Lindsay's plan of aerial navigation with a narrative of his explorations in the higher regions of the atmosphere and his wonderful voyage around the moon. New Orleans: Rea's Power Press. Located at: Peabody Museum, Salem, MA; 33 pp.

Riess, K. 1977 John Leonard Riddell: scientist-inventor, melter and refiner of the New Orleans Mint, 1839-1848, Post-master of New Orleans, 1859-1862. Tulane Studies in Geol. and Paleon. 13 (1 and 2): 1-110. Special papers in the history of science — I.

Shapiro, H. D. and Z. L. Miller 1970 Physician to the West. Selected writings of Daniel Drake on science and society. Lexington: Univ. Press of Kentucky.

Skinner, H. C. and K. Riess 1985 John Leonard Riddell: From Rensselaer to New Orleans (1827-1865). Earth Sciences Hist. 4: 75-80.

Stuckey, R. L. 1972 John L. Riddell's synopsis of the flora of the western states: a present-day evaluation of the first major flora west of the Allegheny Mountains. Amer. J. Bot. 59: 674-675 (abstract section).

——— 1978 Medical botany in the Ohio Valley (1800-1850). Trans. and Studies College of Physicians of Phila. 45: 262-279.

Waller, A. E. 1945 The vaulting imagination of John L. Riddell. Ohio Arch. and Hist. Quart. 54: 331-360.

Walp, R. L. 1951 Riddell's notice of vegetable productions growing spontaneously in Washington County, Ohio. Ohio J. Sci. 51: 320-334.