The Roots of Ecology in Indiana

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If history is the interaction between places and people, then there can be little doubt that Indiana has an honored "place" in the history of ecology in North America. In fact, Indiana is the place where modern ecological science finds its roots. The Lake Michigan dunes of northwest Indiana served as the site for the pioneering research of Henry Chandler Cowles. In his 1899 doctoral dissertation entitled "The Ecological Relations of the Vegetation on the Sand Dunes of Lake Michigan," Cowles (1) defined the science for succeeding generations of ecologists:

> "The province of ecology is to consider the mutual relationships between plants and their environment."

Influenced by the ideas of European biogeographers such as E. Warming (2) and A.F.W. Schimper (3), and geologists, especially T.C. Chamberlin, Cowles filled the first several pages of his dissertation with his vision of the new science.

> "The ecologist employs the methods of physiography, regarding the flora of a pond or swamp or hillside not as a changeless landscape feature, but rather as a panorama, never twice alike."

> "Any plant society is the joint product of present and past environmental conditions, and perhaps the latter are much more important than most ecologists have thought."

> "The ecologist, then, must study the order of succession of the plant societies in the development of a region, and he must endeavor to discover the laws which govern the panoramic changes. Ecology, therefore, is a study in dynamics."

Cowles recognized the division between community ecology (synecology) and population ecology (autoecology). Of the former, he writes:

> "The species characteristic of each formation must be discovered, together with the facts and laws of their distribution. The progressive changes that take place and the factors in the environment which cause these changes must be discussed."

and of the latter:

> ". . . it is the author's purpose to discuss the adaptations of the plants to their dune environment, paying especial attention to those species which show a large degree of plasticity, and which are found growing under widely divergent conditions."

It is notable that Cowles chose the dunes of northwest Indiana as the site for his study because he felt "that nowhere else could many of the living problems of ecology be solved more clearly; that nowhere else could ecological principles be subjected to a more rigid test." Thus, it is the rare ecology text that does not identify Indiana as the "place" where ecology finds its roots in North America.

With ecology firmly rooted in Indiana as "place," let me address the question of "person." It would be especially convenient at this point, to be able to say that Cowles was a "Hoosier" (He was not.) or that he attended Indiana University (He did not.) or that he taught at Butler or Purdue or Taylor or Hanover or any one of a number of Indiana's fine old colleges and universities (No luck there either.).

Indiana's connection with the roots of ecology as "person" is more subtle, though no less real. Again, we must look carefully at Cowles' dissertation. There, toward the end of the introduction, Cowles gratefully acknowledges the "kindly interest and cooperation shown by his associates . . . especially Head Professor John M. Coulter, through whose influence the author was directed along lines of ecological research." It seems, that Cowles' ideas were shaped by both a "place," the Indiana dunes, and a "person," John M. Coulter.

John M. Coulter was a "Hoosier." Before accepting the position at the University of Chicago, Coulter had been associated with Hanover College (graduating in the class of 1870), Wabash College and Indiana University. John was one of the founding fathers of the Indiana Academy of Science, elected President in 1886-7 and made a Fellow in 1893. Throughout his life, Dr. Coulter remained interested in the Academy and its affairs, returning on several occasions to address the membership. One of John Coulter's books, "Plant Relations" (4), firsst published in 1899, can be considered the first North American ecology textbook. This volume offers modern plant ecologists a fascinating look at the beginnings of their discipline. In the Preface to the 1901 edition, Coulter cites the "recent rapid development of the subject" and adds additional material, including several photographs, from Cowles research. It is notable that John was not the only Coulter to make an impact on the Indiana Science, his brother Stanley was also elected a Fellow of the Academy in 1893 and served as President in 1895-96. Stanley Coulter would later become the Dean of the Purdue University School of Forest Science.

The interaction between John Coulter and Henry Cowles reminds us again of the importance of the relationship between professor and student in shaping the history of science. Cowles had begun his graduate work at the University of Chicago in geography, when Coulter, recognizing his potential, encouraged him first, to join the fledging Department of Botany and finally to study the ecology of the Indiana dunes. After completing his doctorate, Cowles remained at the University of Chicago as a master teacher. One of his students would later write of him:

> "No teacher brought his students more directly to nature. He was a master in the field. . . . He was at his genial best around campfires in the evening. It is given to few men to found a new science and to live to see it well established." (5)

The "pedagogical genealogy" of American plant ecologists, as outlined by Sprugel (6) in 1980, confirms Henry Chandler Cowles' extraordinary role in the development of ecology in North America. Figure 1, though far from a complete listing, illustrates the magnitude of Cowles' influence as a teacher. If Cowles is the "father of modern ecology" then surely John M. Coulter, Indiana Academy of Science President and Fellow, must be considered the "grandfather" of the science.

Although Henry Cowles never published in the Proceedings of the Indiana Academy of Science, his ideas about ecology and succession influenced the research of Indiana scientists. As early as 1905, Will Scott wrote the following concerning his research on the Leesburg Swamp:

> "One of the main purposes has been to test the theories and factors proposed by Warming and Cowles. His (Cowles) most important conclusion is that plant societies are intimately associated with the physiography of a region and as the topographic forms change from one form to another the plant societies are also modified." (7)

The Indiana Academy of Science, through John Coulter, left its mark on Henry Cowles and Cowles would return the favor many times. For example, the 1917 edition of the Proceedings contains a paper by M.S. Markle entitled "A Comparison of the

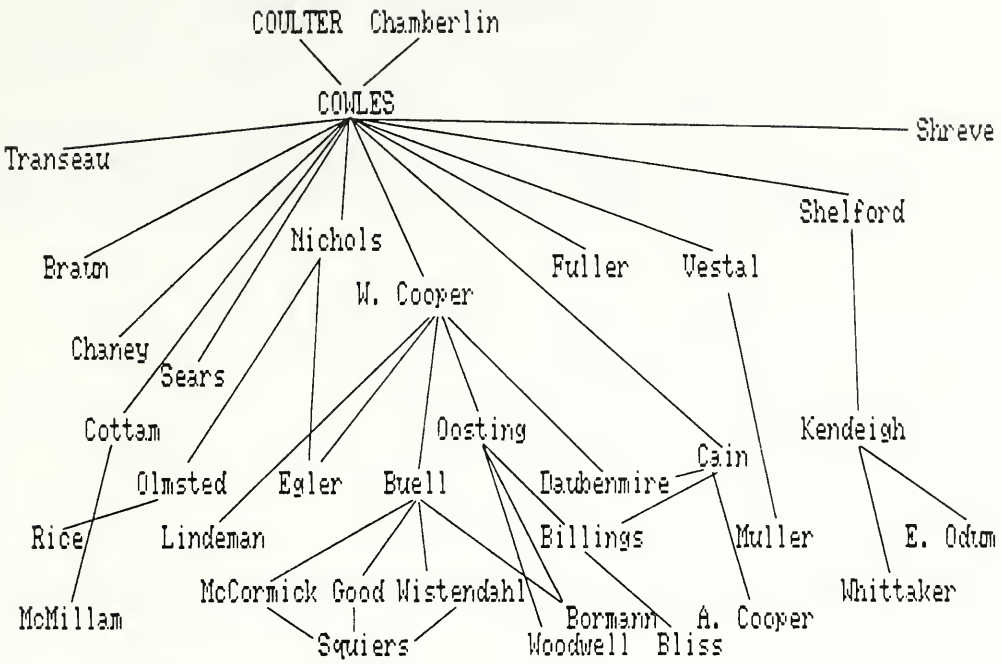

FIGURE 1. Some of the "pedagogical descendents" of John M. Coulter and Henry Chandler Cowles (after Sprugel (6)).

Plant Succession on Hudson River Limestone with that on Niagra Limestone, Near Richmond, Indiana" (8). Millard Markle was a graduate student of Cowles at the University of Chicago from 1910 to 1915. Markle would spend 58 years in active service to the Academy, serving as its President in 1945 and authoring "The History of Plant Taxonomy and Ecology in Indiana" in 1966 for Indiana's Sesquicentennial celebration.

On 8 October 1965, the Ecology Section of the Indiana Academy of Science was formally approved and at the 1966 annual meeting the first papers, a total of four, were read. Today, the Section is alive and well with a membership of more than 330 and with participation at annual meetings averaging more than 20 presentations per year. We've come along way John, I think you'd be proud.

I stand before you today as a plant ecologist, Chairman on the Ecology Section of the Indiana Academy of Science at this centennial meeting, because of the influence of a "place," the Indiana dunes, and a "person" John M. Coulter, through his student Henry Chandler Cowles, through his student William S. Cooper, through his student Murray F. Buell, and through his students Jack McCormick, Ralph E. Good, and Warren A. Wistendahl. If John M. Coulter is the "grandfather" of ecology, then I am his "great, great, great grandson." Thus, I find myself connected to the roots of ecology in Indiana.

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