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EDWARD OSCAR ULRICH

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BY

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E. O. Ulrich 1927

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I met Doctor Ulrich for the first time when in 1903 he came to Dr. Clarke with a request from the U. S. Geological Survey that geologists of the New York Survey should take him over our Cambrian, Ordovician and Silurian formations. I was assigned to take him over the Cambrian and Ordovician.

So we started out up the Hudson River, stopped at Whitehall, went through the Champlain basin, skirted around the Adirondacks in the north and returned by way of the Black River Valley to Utica where another geologist was to meet us and take Ulrich over the Silurian. The geologist in question had not appeared, apparently afraid of Ulrich's superior knowledge, and I took him also over our Silurian.

Wherever we stopped and I showed him the geologic section, Ed would say: "It is not so!" A hot discussion would always follow. After a few days of steady arguing, I became exhausted and quit disputing. Then Ulrich said: "If you quit disputing, I will go home. I always develop my ideas going out with others and disputing theirs." I then changed my tactics and when we came to a new outcrop, I pretended not to be sure and asked him about it. Ulrich was a born teacher and loved to be asked. He would at once take up the problem and give me full information and I learned a lot that way.

His knowledge of fossils as well as of Paleozoic formations in America was absolutely uncanny and sufficient to crush any adversary. He identified the fossils at sight, I quietly noted down the names and later reidentified the material and found all identifications correct! Likewise, his memory was incredible. I took him years later to sections we had studied on that first trip and he remembered every foot of them.

His unflinching memory and his universal knowledge of the Paleozoic fossils and formations were his most outstanding accomplishments. Add to this his strong health, his ever-fervent enthusiasm and an outstanding scientist without any peer in his field was the result.

Ulrich was largely self-educated. Regarding the fascinating facts of his youth and education, I may refer the reader to the appreciative account written by his life-long friend and colleague, Dr. Ray S. Bassler for the Geological Society of America (Memorial to Edward Oscar Ulrich, *Proc. Geol. Soc. Am.* for 1944, pp. 331-351.).

I became well acquainted with the problems which were nearest to his heart on a trip my wife and I made with Doctor and Mrs. Ulrich to Europe in 1922, where they attended the International Geological Congress in Belgium. We travelled together to Sweden, where I discovered that Ulrich went there principally for the purpose of looking for his Ozarkian system while I wanted to see the Swedish graptolite shales. Swedish geologists took us around through the interesting and pretty country but to my great sorrow no trace of the Ozarkian could be found. It was a tragedy, made still more harrowing by Mrs. Ulrich's illness.

In Sweden Mrs. Ulrich showed first signs of this illness and in Switzerland she became seriously ill. A Swiss specialist diagnosed the case as much advanced diabetes and told us that she might go any time into a coma. Upon hearing this Mrs. Ulrich asked to return at once to the States, as she did not want to die in a foreign country. So we left, missing our Bohemian trip which I had worked out. Ulrich had to engage a nurse for the trip. He was very fortunate to secure the services of Miss Lydia Sennhauser of Adorf, a graduate nurse of the Red Cross school and a woman of exceptional ability and pleasant character. She stayed with Mrs. Ulrich as long as her entry permit allowed.

Mrs. Ulrich bore her fatal disease with sublime courage and patience until her death ten years later. She had been a school-teacher in Cincinnati and had been a wonderful helpmate in the years when Ulrich with a small income was struggling to find recognition. She had a pleasant voice and liked to sing when we were among ourselves in the evening. My wife and I have very fond memories of her.

Eddie became a paleontologist when he was seven years old. He found a rock-pile near his home in Covington across the river from Cincinnati, where he was born February 1, 1857, the son of a former French officer and later contractor and builder. The rocks and fossils had been thrown out by the Rev. Henry Herzer, a minister who had made himself a reputation as a collector and student of the local fossils. The minister told him they were "fossils, ancient animals turned to stone." The kind minister instructed the wide-awake boy how to collect fossils and where to find them in the neighborhood. Thus started an interest and a career that never flagged in a long life and enriched American geology and paleontology beyond belief.

Ulrich was original in everything he undertook. He showed that early in life, when he assumed the name Oscar after the hero in one of the early stories he read, and did not go through the various collecting stages of boys, as collecting coins, postage stamps, etc., but remained steadfast to his first interest, Cincinnati fossils.

He attended the public schools intermittently owing to his delicate physique until 1872, when he was able to finish grade-school at the age of fifteen. As, owing to his splendid memory, it was easy for him to keep up his school work, he found much spare time to increase his collection of fossils. After leaving school the excavations for the Eden Park Reservoir of Cincinnati were started. Here was an opportunity for more collecting in the type outcrops of fossils from Eden shale. He applied for a job with the water-works and being tall for his age, secured one as a rodman. He held this job for two years, using his spare time in roaming the Cincinnati hills for fossils. When I went to Cincinnati on a visit, I took my wife over these hills in memory of Ulrich and she enjoyed the beautiful views of the Ohio Valley.

The Reverend Herzer, a trustee of the German Wallace and Baldwin College at Berea, Ohio, was able to get Ed's father to persuade the boy to try for college work. At the age of 17,

in spite of the lack of high school training, he passed the examinations for entrance to the sophomore class of that college. The boy, however, was not at all enthusiastic as he insisted that he was taught too much he did not need and too little that he did. So he turned to other occupations; he became captain of the baseball team and later the science teacher, appreciating his love for geology, put him in charge of the school collection. Training at the college was designed for entrance into the ministry, but this did not appeal at all and he returned home without graduating. Later the college recognized his attainments by conferring upon him the degrees of A.M. in 1886 and Ph.D. in 1892.

The following year his father and his uncle, a physician, prevailed upon him to attend medical school at the old Pulte and Ohio Medical Colleges at Cincinnati. Two winter terms of the medical school were sufficient to bring Edward back to his geology in 1877.

A turning point in Edward's life came in the autumn of 1877, when Dr. R. M. Byrnes invited him to join the Cincinnati Society of Natural History. The following spring the Society, pleased by Edward's enthusiasm, appointed him honorary curator of paleontology. When later the society was enabled by a bequest to buy a commodious building it hired Edward as caretaker in charge at \$30 a month. In the following year, when Ulrich published his first scientific paper, he was put in charge of the natural history collections with a small salary, which required the utmost frugality such as fitting up a living room in his father's carpenter shop.

The year 1878 was also important due to the fact that then the 20 year old Charles Schuchert, working in his father's furniture business, commenced to attend the meetings of the Natural History Society and began to bring fossils for identification, thereby beginning his life-long acquaintanceship and later partnership with Ulrich in some important publications. The two inquisitive spirits of Ulrich and Schuchert delved also into other subjects as spiritualism, which then swept the country. As both had good voices, they had rôles for several seasons in local

amateur productions of the Gilbert and Sullivan operas. Ulrich even told me once that he wondered at that time whether he should not develop himself into an opera singer. Fortunately for geology and paleontology he did not follow up that inclination. Ulrich formed at that time the center of a group of young men whose interest in geology and paleontology he developed and who became prominent scientists. Among them should be mentioned especially Ray S. Bassler and John M. Nickles, besides Schuchert.

An interesting episode of Ulrich's life that followed was his appointment as superintendent of the Little Caribou Silver Mines, a camp about twenty miles west of Boulder, Colorado, where some fifty silver-lead prospects were awaiting development. Ed used to tell me about his experiences there, and his boyhood friend Henry Dickhaut who went with him told me more. The story was how once while horseback riding out in the country he was overcome by a blizzard and became so faint that he left the bridle to his horse, which took him to a farmhouse and saved his life. Dickhaut told me that Ulrich discharged a miner, who was a two-gun man and did not work but was kept on the pay roll because everybody was afraid of him. The gunman stayed around in the saloons advertising the fact that he was going to shoot Ulrich at sight. A day or two after Ulrich and Dickhaut met the gunman coming toward them with a couple of cronies. It was a question who could first pull the gun. Dickhaut said in a loud tone to Ulrich: "I bet you two dollars you cannot hit the top of that small spruce tree over there." Ulrich pulled his gun and shot it off. The two parties passed each other quietly and the gunman left the camp. Another time Ulrich saw a miner working awkwardly at the edge of a pit. He took the bar away from the miner to show him how to handle it, slipped and disappeared in the pit. Everybody thought he was killed, but soon they heard him yell to be pulled out. He told me that he saved himself by throwing himself from one side of the pit to the other and fortunately landed on a pile of soft earth. Dickhaut also told me how Ed, when he worked for his father as a carpenter, once crawled out

on a fresh brick wall. The wall began to sway so that everybody yelled at him to lie down quietly, and the fire department had to be called to bring him down with a ladder. His father's language is not preserved for record. These and other adventures characterize Ulrich's audacity which was liable to bring his companions into dangerous positions and brought about some of my own strenuous experiences with him.

The job in Colorado lasted only two years because the ore proved scarce and finally the paymaster ran away to South America. Ulrich came home to his father's shop with new experiences in both geology and life. He continued to live solely through his carpentry work, but found time nevertheless for the description of various local fossils. Schuchert, who had learned to do lithographic work, urged this method of illustration on Ulrich. Both commenced drawing and in time became skilled in producing through the camera lucida natural size and enlarged views of fossils upon the stone and etching the slab afterward for printing.

With these means of illustration Ulrich now published six preliminary papers in the Journal of the Cincinnati Society of Natural History and his three more pretentious papers on American Paleozoic Bryozoa (1882-84). In these articles he described many new genera and species based upon the microscopic structure as shown in thin sections. Although these papers formed the foundation for the modern knowledge of stony Bryozoa they gave their author the reputation of a species maker, an unfair criticism which clung to him and affected his life for the next twenty years. He divided the cosmopolitan *Monticulipora petropolitana* into at least a dozen different genera and several times that number of species, which was too much to be believed. I remember a sarcastic note printed at that time to the effect that he received three small branchlets of a single bryozoan stock from three different men and described all as different species, utterly untrue but characteristic of the venom of some of his critics.

Schuchert urged Ulrich to seek employment in describing and illustrating the chapter on Bryozoa in one of the state surveys

which then were contemplating large works on paleontology. As a result A. H. Worthen, Director of the Illinois Geological Survey, offered Ulrich a contract for the illustration of Volume 8.

This fine lithographic work paid Ulrich well enough to set up housekeeping at 1004 Central Avenue, Newport, an address that became well known to visiting American and European geologists. He married in 1886 Albertina Zuest, a school-teacher who combined an appreciation of paleontology with a fine regard for good housekeeping neatness and thus made an ideal helpmate for a scientist. I learned to admire her on our European trip in 1922.

Ulrich's fine work on Volume 8 led to his engagement by Dr. N. H. Winchell to describe and illustrate the Ordovician Bryozoa for the Paleontology of Minnesota. Schuchert, who had lost his furniture business through a fire, joined him and lived with him at his Newport home. Ulrich's memoir on the Bryozoa and Schuchert's on the Brachiopoda became fundamental standard works on these two classes of fossils for American paleontologists.

In the latter part of 1888 James Hall, who was collecting material for use in his brachiopod monograph, Volume VIII, Paleontology of New York, came to Cincinnati and, impressed by Schuchert's ability and enthusiasm, as well as his fine brachiopod collection, invited him to return with him to Albany. Schuchert accepted and thus started on his long and successful career in the east.

Ulrich devoted the following three years to the reports on Paleozoic Bryozoa and Sponges for the Illinois Survey and then spent a year on the final report on the Minnesota Bryozoa. While the active geological operations were suspended in Minnesota for 1½ years in 1888-1890, Ulrich was busy in field and office work for the Kentucky Survey, working out the classification and tracing the formations of Mississippian and Pennsylvanian ages in the western part of the state. He worked out reports on the geology of Caldwell and Crittenden counties, which failed of being printed because of the Governor's veto

of the appropriation for geology. In these reports Ulrich recorded the discovery of two recurrences of the lithology and fauna of the celebrated Warsaw or Spergen Hill deposits; the location of a strip of coal bearing land, a mile wide and 8 miles long; the presence of several peridotite dikes, and that the numerous fluorspar, lead and zinc deposits of western Kentucky are true fissure veins and not mere local deposits in eroded cavities as had heretofore been held. His conclusions were later verified by the Federal Survey in Professional Paper 36 (1905).

Ulrich was always fascinated by fossils that had been neglected by others because of the difficulties of their study and the necessity of thin sections. The most important of them were the bryozoans. He continued to study them with the resumption of his work in Minnesota. His 1882-1884 classification of the Paleozoic Bryozoa was elaborated in the 1890 paper, which formed the greater part of Volume 8 of the Illinois Survey, and again in 1895 in the report of the Geological Survey of Minnesota. The work has stood the test of criticism and remained the basis for the study of these puzzling fossils. True to his dedication to the neglected groups, he, at the same time, took up the study of the American Paleozoic sponges, which also required thin sections. The results were also published in collaboration with Oliver Everett, who had collected many fine specimens for Volume 8 of the Illinois Survey. Next followed the Ostracoda, which received attention in several smaller articles in 1891-1892 and the monograph of 1897 on the Paleontology of Minnesota. The ostracodes always remained his pets. I still remember how we two were approaching a railroad station when he noticed some ostracodes in a rock by the roadside, sat down and collected furiously while we missed our train and dinner. Another time on the island of Gotland he saw some ostracodes in an abandoned quarry and forgot all his work intended for the day; but I also remember that when we were once "at sea" about the age of a rock ledge in the woods of New York state he knocked out some ostracodes and determined the age of the rock. True to his fascination for neglected fossils he next took up the Ordovician Lamellibranch-

iata and Gastropoda and published three memoirs in the Minnesota Paleontology and in Volume 7 of the Ohio Geological Survey. These papers, also, have proved of fundamental importance for later work by others, the writer included.

The last of the local amateurs to join the Ulrich association of aspiring collectors was Ray S. Bassler, then a fifteen-year-old high school freshman, who, encouraged by the school principal, went to Newport and timidly called upon the august man and was invited to come as student assistant whenever time from school permitted. Bassler helped Ulrich for eight years. Thus started one of the most fortunate associations that proved wonderfully fertile for science, for Bassler became the world's leading student of fossil bryozoans. A third member of the group was Nickles, who wrote the first systematic account of Cincinnati stratigraphy and became the bibliographer of the Federal Geological Survey. Later, under the auspices of the Geological Society of America, he published the bibliographies of the geology of the world, exclusive of North America.

Several months were spent for a Newport firm on exploratory work for phosphate, but the approach of the depression at the end of the century brought prospecting in the Central Basin to an end and hard days came for the free lance geologist. Ulrich had to put up his collections as collateral at the banks to keep home and laboratory going. It was fortunate in these dark days that he could sell collections of thin sections of Bryozoa to the British Museum, the University of Munich and other institutions in both Europe and America, and thus could keep going for several years. It required hard work as the sections had to be ground by hand on a sandstone slab. This recalls to the writer that he ground the material for his early papers on an old iron stove lid.

Recognition for the scientist, already 40 years old, was slow in coming in spite of his outstanding work. A break came in 1897, when a collector was needed by the Federal Survey to make another attempt to find fossils in the disputed Ocoee slates of eastern Tennessee. At the suggestion of Dr. C. Willard Hayes he was given a trial at the job. Although he failed, as

had all previous collectors, he impressed Doctor Hayes by his sound work and was shortly afterward invited to assist him in mapping the Columbia, Tennessee, quadrangle. This led to his permanent appointment on the Federal Survey.

Ulrich had now the opportunity to apply his knowledge of fossils to broader studies in correlation, paleogeography and diastrophism and he made the most of it. It became evident with the many folios under preparation that the old time stratigraphic divisions, such as the Trenton limestone, would have to be subdivided before the finer details of structure could be depicted on a map. Ulrich now plunged into problems in stratigraphy and correlation, and true to his thorough nature he had to see for himself. This was the time when he came to New York and the writer took him for six weeks over the Cambrian, Ordovician and Silurian terranes of the State. Ulrich, until his retirement in 1932, undoubtedly saw more Paleozoic geology from the Rockies eastward than any other person. Owing to his incredibly retentive memory he was always able to enter a discussion on any Paleozoic formation and he had buried in his memory an overwhelming amount of facts. I recall, on our trip to Europe together, that one day when sitting on the deck of the steamer looking out at the sea I said casually that I had come to the conclusion that the graptolites (an extinct class of organism of great importance for intercontinental correlation of strata) are related to the bryozoans. Ulrich said: "I have known that for 15 years." I wondered and asked on what grounds. He said: "They have oocidia like bryozoans." I then proposed a joint paper, which was published later. I had observed on splendid material I collected in Oklahoma muscle-scars that convinced me of their relationship to bryozoans. When later I studied the graptolite collections of the U. S. Geological Survey which I had borrowed I found specimens with Ulrich's label pointing to the small sacs attached to the rhabdosomes as "probable oocidia such as bryozoans have"!

Ulrich was now occupied mainly with work on folios. He published the Columbia Folio with C. Willard Hayes in 1903.

There were publications on the western Kentucky lead and zinc district with W. S. Tangier Smith, on copper deposits in the Mississippi Valley with H. Foster Bain, and a number of other folios. The first of these were the Tahlequah, Winslow and Muskogee quadrangles of Oklahoma with Mr. Taff. It was while working on these quadrangles that Ulrich met and hired as assistant, a young student, Rector Mesler, whom he brought with him to Washington and who remained his assistant until Ulrich's death.

There followed the Fayetteville, Ark., folio with George I. Adams, and the Yellville, Ark., Mineral Point, Wisc., and the four Big Horn Mountain folios. On the Wisconsin work he became acquainted with the state geologist Dr. W. O. Hotchkiss (later president of the Rensselaer Polytechnic Institute) and a close friendship sprang up. The two families used to visit each other annually, the men spending their time in looking over the geological field.

Of especial importance was Ulrich's connection with the folios covering the Appalachian Mountain system. This field work, especially in connection with George W. Stose, resulted in the revision and mapping of the Shenandoah limestone and its component units. A whole series of folios, starting with the Mercersburg-Chambersburg and other Pennsylvania folios, was taken up by these authors as far south as the Birmingham, Ala., quadrangle, mapped by Charles Butts. Among these folios are the Pawpaw-Hancock folio of Maryland, the Belmont, Allentown, and Reading folios of Pennsylvania, and the Eureka Springs and Harrison quadrangles of Arkansas. He was persistently busy in those years preparing stratigraphic and paleontologic reports for the folios and monographs of the Geological Survey, and he was, so to say, the final authority on all problems that the mapping geologists of the Survey encountered in their work. I always found him busy handing out advice to others.

None of this important work is reflected in his bibliography, but it led to the publication of his master work: *Revision of the Paleozoic Systems* (1911). This became my bible on geologic problems and it will be a safe guide for all coming

geologists. In this Revision he explains the principles of stratigraphy and proposes radical changes in the classification. The most important part of the Revision is the proposition and description of two new systems, the Ozarkian and Canadian. He made those systems by taking part of the upper Cambrian and lower Ordovician, claiming important breaks above and below these systems. I know from his attitude that he considered the creation of these two systems as the crowning achievement of his career. With these two systems he advanced into line with Murchison, Sedgwick and Lapworth. I shall always remember how Ulrich, Cushing and I roamed New York to find the breaks in the Little Falls dolomite. It was arduous work and the two friends, Ulrich and Cushing, fought all day long. I went along quietly so that they would not both jump on me. I also remember how unhappy Ulrich was in 1922 in Sweden, when he could not locate the Ozarkian in spite of the help of the friendly Swedish geologists.

Bassler writes: "Doctor Ulrich believed that these new systems were based on criteria similar to those used in separating the well known Cambrian, Silurian, etc. The Ozarkian, he thought, shows the same sequence of diastrophic events and develops as great a thickness of marine deposits as any of the previously established systems. The published records of the Canadian showed this to be equally true for it. Believing that the Ozarkian rocks rest on the top of the typical Upper Cambrian and below any separated as the Canadian, he considered that its 8,000 feet of limestone in the Ozark uplift and the Appalachian Valley certainly represented a sufficient time interval for consideration of it as a system. He acknowledged that the described Ozarkian faunas were too few in species to afford a good argument but the known undescribed species, especially the straight and curved cephalopods and the numerous coiled gastropods absent in the Cambrian faunas and so different from the wealth of graptolites and the first of the coiled cephalopods of the Canadian, were certainly sufficiently diagnostic. Objections to these new systems arose, and today there seems to be a tendency to recognize the Canadian as valid and to abandon the Ozarkian by referring its strata to the Canadian and the Cambrian. Time and more investigations, including particularly the publication of more complete paleontological evidence, will bring the truth."

Ulrich, Foerste and others in recent years published the descriptions of the Ozarkian cephalopods, and Ulrich and Cooper the descriptions of the Ozarkian brachiopods.

On Ulrich's fifty-fourth birthday, February 1, 1911, Rector Duvall Mesler was appointed as Ulrich's personal assistant, a position he held to the end of both their lives. Rec, a student of geology at the University of Arkansas under Professor A. H. Purdue, had been recommended to Ulrich while working in the southwest and Ulrich brought him back with him to Washington. Rec was the ideal assistant for Ulrich. An excellent collector and skilled preparator, he relieved Ulrich of many annoying tasks at the office and also at home. He never married and always lived with the Ulrichs. My wife and I when visiting there always admired and wondered at his devotion. He showed it in a sublime way by passing out of life on the day of Ulrich's burial. His life work was done. He had no selfish ambition for himself, and indeed he did his part in forwarding our science. He showed his friendship and kindness by giving my wife a chance to see Washington and its beautiful surroundings, Ulrich himself having no time to waste on scenery. The latter's mind was so set on work that even in Sweden and Switzerland he refused to spend an hour, much less a day, in seeing and admiring the landscape. He had a one-track mind and a single purpose and interest in life. That may be the underlying cause for the greatness of many a man.

No perplexing problems in the geologic work at the Survey were sidestepped. Such a one was the black shale problem connected with the question of the Devonian or Mississippian age of the Chattanooga formation. The modest paper on the subject published in 1912 gives no inkling of the work spent on the problem in the field and laboratory. It led to a general discussion of the problem by various authors with diverse conclusions.

The next task came when the Maryland Geological Survey delegated Ulrich to prepare the chapters on several groups of organisms, particularly the Ostracoda. The Silurian volume, although intended as a taxonomic study, owing to Ulrich's

thoroughness developed into a stately volume on the stratigraphy as well as generic and specific descriptions of the Ostracoda.

After the completion of this work the Chester controversy, based primarily on the correlation of certain Upper Mississippian formations, attracted Ulrich's attention on account of its bearing on the principles involved. The work necessitated extensive field work with Charles Butts and others in western Kentucky and adjoining states. The results were published between 1916 and 1926.

Ulrich's monthly reports to the Director during this period reveal an amazing amount of work on quadrangles all over the eastern and central United States from Wisconsin and Michigan to Maryland in the east and it is a characteristic of Ulrich that his associates in the field, as Hotchkiss in Wisconsin, Buehler in Missouri and Butts and Stose in the south and east became his close friends and admirers. They all loved him for his knowledge and honesty and frankness of opinion.

Biologists have divided investigators into splitters and lumpers. Ulrich, owing to his keen, discerning mind, was above all a splitter, both in his stratigraphic work and in his descriptive work on fossils, but he could also become a lumper when he was looking for general principles and conclusions.

Of the continuous stream of papers that flowed from his pen, usually in collaboration with young men, we will mention papers on the Revision of the Paleozoic Bryozoa (with Bassler) in 1904-1905; also with Bassler, New American Paleozoic Ostracoda in 1908; on cystids and crinoids between 1921-1928; on conodonts (with Bassler) in 1926; with Resser, several trilobite articles in 1930; and (also with Bassler) a monograph on Cambrian bivalved crustaceans in 1931 and with Cooper on Ozarkian and Canadian Brachiopoda in 1938. Ulrich was usually at work on several papers. Once when I was in his office he spread out 17 papers before me and said: "Ruedemann, you will have to come here and help me with them!" When he took up an investigation, he soon discovered that it led to others on all sides.

Some of his papers were not published, as Ulrich would not

compromise with the truth as he saw it. Such a paper concerned the Richmond question. The problem was whether this formation was to be mapped as uppermost Ordovician or lowest Silurian. The writer went out with him into the field when he was seeking the solution of the problem in the western New York Silurian, especially the Medina formation.

In April 1931, at the annual dinner of the National Academy of Sciences, when the writer had the honor and great pleasure of handing Dr. Ulrich the Mary Clark Thompson Medal for his outstanding contributions to geology and paleontology, he pointed out that Ulrich used his immense knowledge first in continent-wide distinctions and correlations of Paleozoic formations and finally in intercontinental comparisons, all this with decisive and undoubtedly lasting results; further, that much of our Paleozoic paleogeography is based on his work; that he recognized that the Paleozoic epicontinental seas of this continent were a multitude of small basins and troughs rather than the wide inundations before assumed, and, finally, that we have to thank him for determining that the evolution of the faunas did not take place in these basins but in the ocean along the edge of the continent.

Doctor Ulrich always claimed that the American marine succession is the most complete and best determined and therefore the best fitted for recognition as the world standard in classifying Paleozoic events. I had much fun on our trip in Europe in 1922 listening to his strenuous arguments with foreign geologists about this problem. He would always bring it up on the first occasion offered; it almost seemed to me that it was one of the principal purposes of his trip to spread this gospel among the "backward" European geologists. He made six trips to Europe between 1922 and 1931 to check his results in America with the classic outcrops abroad.

Ulrich resumed the European field trips in the summer of 1925, when, in company with his friends Prof. Richard M. Field, the late Milton Fullé and the late Charles E. Resser, stratigraphic problems were studied in Great Britain, Norway and Bohemia. The next year he returned to Europe for the Inter-

national Geological Congress in Madrid and further study of European stratigraphy. Further trips mostly to the British Isles followed in 1927, 1929 and 1931.

Finally, in the early summer of 1933 the Washington papers copied a London announcement that Miss Lydia Sennhauser and Dr. E. O. Ulrich had been married there on June 20, with Dr. C. J. Stubblefield of the Geological Survey of Great Britain officiating as best man. My wife and I can heartily verify by our own observation Dr. Bassler's statement as to their happiness. Bassler writes in his Memorial: "Knowing Mrs. Ulrich and her genial, sympathetic nature, his friends realized that the rest of Uncle Ed's life would be free from any cares and responsibilities which might restrict him in carrying on his studies." Lydia told me on the steamer in 1922 about her arduous work as nurse in Davos, a famous resort for consumptives in Switzerland. There is no doubt in my mind that she proved a godsend to the aged scientist in his declining years. She is probably very proud to have been the wife of such a great scientist.

Anyone who visited Ulrich in his office could not fail to observe how he was at all times ready to help out his colleagues from his great store of information. They would come into his office without hesitation and get his advice on various geologic problems. He ate his simple lunch in his office, and even that time would be used for discussion.

Dr. Ulrich was an original fellow of the Geological Society of America and also of the Paleontological Society. Well earned honors came to him from America and foreign countries. Dr. Bassler lists them as follows: "He served as president both of the Paleontological Society and the Washington Geological Society. He was a member of the Washington Academy of Sciences, the National Academy of Sciences (1917), the Academy of Natural Sciences of Philadelphia (1932), of Sigma Xi (1936), Foreign Correspondent of the Geological Society of London (1927), the Geological Society of Stockholm (1927) and of the Senckenberg Institution (1933). His name was starred as early as 1910 in American Men of Science. Various

honors in recognition of his researches came to him. In 1931 the National Academy of Sciences awarded him the Mary Clark Thompson Medal, as noted above, and in 1932 the Geological Society of America presented him with the Penrose Medal for distinguished attainment and outstanding contributions to the science of geology."

Owing to his strong physique, he held up well both physically and mentally until shortly before the end. In spite of the crowded conditions in Washington, he would insist on the long bus ride to the Museum every day until several months before the end. The latter came early in the morning of February 22, 1944, when he passed into a gentle sleep from which he did not awake.

Ulrich's fame is established forever among geologists, and a host of younger generations of geologists will remember him for many years to come with love and admiration.

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

- Amer. Geol. = American Geologist.
Amer. Jour. Sci. = American Journal of Science.
Cin. Soc. Nat. Hist. Journ. = Cincinnati Society of Natural History,
Journal.
Geol. Soc. Amer. Bull. = Geological Society of America, Bulletin.
Geol. Soc. Amer. Sp. Pa. = Geological Society of America, Special
Papers.
Ill. Geol. Sur. = Illinois Geological Survey.
Md. Geol. Sur. = Maryland Geological Survey.
Minn. Geol. Nat. Hist. Sur. = Minnesota Geological and Natural History
Survey.
N. Y. State Mus. Bull. = New York State Museum, Bulletin.
Ohio Geol. Sur. = Ohio Geological Survey.
Okla. Geol. Sur. Bull. = Oklahoma Geological Survey, Bulletin.
Smith. Inst. Ann. Rep. = Smithsonian Institution, Annual Report.
Smith. Misc. Coll. = Smithsonian Miscellaneous Collections.
U. S. Geol. Sur. Bull. = United States Geological Survey, Bulletin.
U. S. Nat. Mus. Proc. = United States National Museum, Proceedings.
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