

cracks, which have checkered the surface into roughly hexagonal areas. The existence of mud cracks in limestone is a valuable note. In the American Geologist, Vol. IV., No. 6, is an engraving of a slab of Cincinnati limestone, showing mud cracks. The specimen was found by Prof. C. W. Hargitt near Moore's Hill, and is now in the Moore's Hill College. The association of mud cracks and wave-marks in the same ledge is, no doubt, a valuable note in working out the conditions which gave rise to alternating sediments of limestone and shale. The wave-marks are evidence that the sea was so shallow that slight undulations touched bottom. The mud cracks are evidence of some form of land, a low tide island, at least. The two together seem to show a marked shallowing of the sea during the history of one limestone stratum, or a transition from lime-depositing to shale-depositing conditions.

The other wave-marked stratum to be described presents a surface of exposure about 100 feet by 50 feet. The waves are about three feet from crest to crest, and the hollows are about three inches deep. These wave marks differ from those of the other three strata in that they are curved like rainbows. These curved waves are evidence that the undulations of water that caused them were modified by neighboring shoals or land, the results of a shallowing sea.

In this paper I have given only certain facts of structure and have assigned what I believe to be the immediate causes of these structures. The great problem of the Cincinnati formation is the invariable alternation of limestone and shale strata. The structure noted may be helpful in working out this problem.

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STRUCTURAL GEOLOGIC WORK OF J. H. MEANS IN ARKANSAS. BY J. C. BRANNER.

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CORRELATION OF SILURIAN SECTIONS IN EASTERN INDIANA. BY V. F. MASTERS AND E. M. KINDLE.

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SOME NEW INDIANA FOSSILS. BY C. E. NEWLIN.

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EXTINCT FAUNA OF LAKE COUNTY. BY T. H. BALL.

The object of this paper is to present, so far as is known, some account of animals, supposed to be native, that no longer are found in the county of Lake.

1. I may as well name first one that has surely been extinct quite a number of years, the mastodon, remains of which were found near an old beaver dam

about three miles west of the present town of Crown Point. The portions found were the teeth, weighing some four pounds each. I am sorry not to have in my possession any of its bones, but the remains of a huge quadruped were found there without a doubt.

2. I name next the beaver, *Castor fiber* or *americanus*; remains of the works of these busy toilers having been found in different parts of the county, and some rodent bones, supposed to be of beaver, were exhumed at the head of Cedar Lake, along with human remains, October 1, 1880, the human skeletons having been there more than two hundred years. No living beaver have been seen in the county for more than sixty years, the settlement of the county bearing date of 1834.

3. There is some evidence found in the records of the early French explorers that the buffalo or American bison roamed over the prairies and marshes of northwestern Indiana two hundred years ago, but that animal, in the region named, has certainly been extinct beyond the reach of the knowledge and memory of two generations of hunters and trappers.

4. Some individuals of the black bear species, *Ursus americanus*, were found in the county some sixty years ago by the very earliest settlers. One was shot by Solon Robinson where is now the town of Crown Point. The few seen were probably stragglers, their proper domain just touching the broad prairie region beginning in the northwestern corner of the State.

5. Elk horns have been found at Cedar Lake and in the West Creek marsh, one of which is now in my possession, showing that once, perhaps a hundred years ago, this stately animal fed beside these waters.

6. The earlier inhabitants of the county found a few wild cats, probably *Felis catus*, one of which species was killed at the head of Cedar Lake, in an alder thicket or swamp, early in 1838. A large and formidable looking animal he seemed to me to be, as, with the eyes of a young hunter boy eleven years of age, I looked upon him. For years that thicket, which was on my father's land, was known as Wild Cat Swamp. These cats may be called extinct since 1840. Individuals also of the lynx species or variety, *Lynx rufus*, it is claimed, were seen and heard in early times, fifty years ago. I myself saw in the night, going down from a tree to which we had chased it, an animal that, judging from its movements, might have been a lynx, but none were then killed. Miss Belle Dinwiddie, of Plum Grove, is authority, and competent authority, for the statement that an animal of the cat kind and called a lynx was killed near her home a few years ago. It is probable that only one species of *Felis* was native.

7. The common American deer, *Cariacus virginianus*, was once very abundant in the county. The following is one of Lake's historic records: "When putting on the roof of the Rockwell house in Crown Point, V. Holton and others saw, coming out from Brown's Point and passing out across the prairie to School Grove, a drove of deer, one bounding after the other, according to their best count in number one hundred and eleven."

I never myself saw so many at one time, but I have ridden in among them by night and have seen them by day in numbers sufficient to delight the eyes of a hunter or of a naturalist. But not one can now be found on these five hundred miles of area. Several years ago there was a cold, hard winter. The snow was quite deep, and on the snow came what is called a crust. On the top of the crust the dogs, the boys and the men pursued the almost helpless deer and slaughtered them without mercy. Few survived, and now, as I have said, of these beautiful animals and of the spotted fawn that could be seen in the spring time, in all the island groves and wild pastures there is left not one.

8. The habitat of the timber wolf, *Canis lupus*, extended into the southeastern part of Lake County, into what is called Eagle Creek Township. These have been considered as not actual denizens for fifty years, but a few individuals have made occasional visits, some in 1872, and three or four in 1893, one of which was killed by Mr. O. Dinwiddie, of Plum Grove.

9. The bald eagle, *Haliaeetus leucocephalus*, once a native, for a nest of this grand bird, perhaps its last, was found in 1835 in the eastern part of the county, and gave name to a stream and the stream to a township, I name next, as now extinct. One fine specimen of this species that was shot on my father's place at Cedar Lake in 1857, measured from tip to tip of its outstretched wings seven and a half feet. It is possible that one may now and then fly for an hour over the southern shore of Lake Michigan, but they do not sit now, as in boyhood I used to see them, on the great oaks at Cedar Lake to watch the fish hawks; their native home is in the county of Lake no more.

10. I name, last, a reptile that the citizens of Lake may well hope has become extinct, although possibly some few yet linger amid the growing civilization, the ground rattle snake, perhaps *Crotalus horridus*, quite poisonous, and fifty years ago very abundant. I had a dog that disposed of other snakes, but when he found one of these he backed out and kept away. The last one that I saw was killed some four years ago.

It is not always easy to trace a border line, and some other species I might call extinct of which a few individuals may still be found, but in addition to these ten species, some of which made not a little wild life, I will name as approaching

extinction the prairie wolf, *Canis latrans*, of which in boyhood I shot one and trapped one; the otter, the mink, and the raccoon; also the black squirrel, the pinnated grouse, the partridge and the quail. As a citizen of Lake County I may say, with most of them we dislike to part. We had them, some of them by the thousands, once, but now they are rapidly disappearing. Yet, notwithstanding our fourteen railroads, our thirty towns and villages, with their constant hum of business, and our thousands of farms, we still have of mammals, birds and reptiles, of both vertebrates and invertebrates, quite a rich fauna left for the study of childhood and youth, for the investigations of the naturalist; but very little now for the sportsman, the hunter, or the trapper, where, according to the estimate of E. W. Dinwiddie, "250,000" wild fowls have been shot in a single season, and some sixty thousand musk rats have been trapped in a single year; where a thousand ducks have been in one sportsman's house at one time; where the wild geese have been almost by the million, but where along our southern marsh they make their nests no more.

All these that I have named are becoming so rapidly extinct that they will soon no longer form a part of our fauna, and Lake County will lose its former renown as the sportsman's paradise.

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THE SYNONYMY OF THE OHIO RIVER UNIONIDEÆ. BY R. ELLSWORTH CALL.

[ABSTRACT.]

The Ohio River is the original source of most of the earlier described Unionide of North America. The French explorers collected these forms and sent them to Europe. Among naturalists there, who described these collections, was Lamarck, who thus becomes the original source of information. Later Say, Rafinesque, Conrad, Barnes and Lea severally studied the Unios collected in the Ohio and gave different names to the same forms. There has resulted a confusion of specific names that has greatly retarded a correct understanding of the shells of this river. This paper redescribes the shells of such species as are imperfectly known, gives the synonymy of the several forms, has complete bibliographic references to original publications and illustrations, and has full notes on the geographic distribution of the several forms throughout the drainage basin of the Ohio.

An attempt at a natural grouping has also been made. An early—the earliest described—form has been made the type of the several divisions which are to be taken, not as sub-generic divisions, but as arbitrary morphologic sections, each of which will include forms that are closely alike in essential details. Through this grouping the facts lead to a rather extensive synonymy.