

POST-PLEISTOCENE FOSSIL RECORDS IN PEAT OF THE UPPER BLUE RIVER VALLEY, HENRY COUNTY, INDIANA

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The records of past ages in the area now comprising Indiana are extensive and unique. They represent almost the entire range of life on earth from the earliest Paleozoic, whose exposure is due to the Cincinnati Arch, to the more recent Pleistocene deposits. Trilobites and brachiopods cemented into limestone speak of vast seas which once rolled over these now elevated land masses, and the coal age with its abundant records of plant remains is well represented in the southwestern part of our state. But in more recent times the Pleistocene not only left a trail of tell-tale relic colonies of northern plants here in Indiana (1, 2), but also made its contributions to the fossil records by depositions in bogs and slowly-forming topographic features, where life records are neatly stored away as in a vast archive, preserving the story of the day when they were living forms, and linking the past to the present, partially interpreting for us the plant and animal world of today.

In spite of the valuable information which these records can and do give us, in spite of the fact that these records are irreplaceable, Indiana has done little to preserve them. The economic phase superseded scientific importance, and so we drained, ditched, excavated, blasted, burned, and ripped out page after page of the most significant ancient history, in many instances not even making a written record of the message.

It is the aim of this paper to place on record and describe a fast-vanishing post-Pleistocene fossil storehouse in the valley of the upper Blue River in Henry County, Indiana.

Topographic Features of the Region

The Pleistocene has left its characteristic topographic forms and features on the greater part of Indiana, but nowhere are they more obvious and pronounced than in the eastern central part of the state. The rolling topography reminds of the lake states, and the wide valleys excavated in the glacial drift speak of the work of powerful streams. One of these streams was Blue River in Henry County. The half-mile-wide valley is everywhere bordered by high uplands or rounded hills composed of transported soil; drift fifty to two hundred feet in depth covers the bedrock; the landscape is strewn with abundant huge granite and quartzite boulders (3). The present small stream appears grotesquely lost in the massive valley. One can readily follow the serpentine winding of this ancient river-bed for miles along Highway 3 between Newcastle and Mount Summit. About two miles east of Mount Summit, Highway 36 descends a steep sand and gravel ridge into Blue River Valley, which is now almost entirely under cultivation. Peat soil covers the valley from two to six feet deep and by its black color becomes a striking feature of the landscape. At the present time the river flows in a deep trenched channel excavated by man. The dredging lowered the water table of the adjacent land so that the area could be used for agriculture. If one continues about three miles northeast along Blue

River, the valley suddenly expands into the circular outline of an ancient lake with shore lines sharply marked by high ridges and knolls. When civilized man first came to Henry County, this ancient lake was a wet swamp into which numerous springs drained. It is situated on a watershed and forms the source of two streams, viz. Blue River draining to the south and Buck Creek draining to the north. The head of Blue River was a powerful bubbling spring, but at the present time the source has been tiled and is hidden from view.

Climatic and Vegetational History

What has been said thus far might well be considered a geology report, but, after all, topographic features and their history form the background and screen upon which gigantic dramas of life were enacted and may themselves be the result of such life activity. It is in topographic features that life left its silent evidence which we call fossils, and from such fragments of once powerful life communities the botanist attempts to piece together the life of the past and the part it played and still plays in present-day vegetation. And so we see here in Henry County, now a peaceful farm community, records of Arctic rigor, slowly moving sheets of scouring, gouging, grinding masses of ice, depositing huge amounts of gravel, sand, and clay, deeply covering the landscape with transported soil.

The scenes change, the climate moderates, the ice masses melt and discharge torrential streams of water, which wind their way down the watershed, excavating deep valleys through the kames and moraines. But our interests as botanists lie in another scene of this great drama enacted on soil which is now Indiana.

Climate ever had its expression in plant life and so we can read into the mute remains of a former vegetation the changing climatic conditions and the accompanying succession of vegetation in central-eastern Indiana. Quite frequently we must rely upon fossil pollen to tell the vegetational succession, but we have actual tree remains to record the story in Henry County. True, the obliterating hand of civilized man has blurred the picture somewhat by disturbing the orderly deposits of great vegetations, but we can even now after more than a century of human activity salvage sufficient fossil records to write a chapter on former vegetation in the Blue River Valley. The tree forms of northern forests, *Thuja* and *Larix*, lie in huddled heaps in the protecting peat which fills the valley basin, and with it are the accumulations of animal remains, including such large forms as mastodon, deer, and elk.

The Story of Early Settlers

In work of this kind one naturally turns first to the reports of the early settlers, those of our times who have been a vital part in the transformation of a region from a primitive condition to the present farm community. Fortunately in the present case, there are still several old settlers living who can give word-of-mouth report on what the area was like during the dawn of civilization. One of these men is Mr. John Ritchie. Eighty-two years have passed since first he saw the light of the world in Blue River Valley, here he was also destined to spend most of his long life on his father's farm which adjoins the river valley. His

father was one of the earliest settlers among the pioneers who came to the region in 1820. At that time the valley floor was intermittent low-land forest and sedge-covered flats, locally and in some geology reports (3) erroneously called prairies. In fact, the region about Mount Summit is called Prairie Township. The settlers called the sedges "saw grass". The whole valley was infested with rattlesnakes which would coil up on the hummocks of the sedges.

The settlers soon claimed the peaty soil of the broad valley, at least in the less wet areas, for agriculture. About forty years ago the river channel was dredged, and the plow soon made an end of the sedges. The farmers were amazed at the abundant cedar deposits embedded in the peat, which they would plow out after the frost had raised them in the cultivated areas. The plowers would at times strike piles of these trees which appeared as deposited in the backwash of a turbulent stream. Some of the trees were sixty feet and over in length, with branch and root stubs still intact. Some of the wood was used for fence posts and some for firewood. Mr. Ritchie says that many of the fence posts have served forty years and are still in good condition. Mingled with the cedar logs were trunks of *Larix laricina*. No evergreens were in the valley when the settlers first moved into the region.

Besides these immense drifts of timber, the farmers would then find, and still do find, large numbers of deer and elk antlers. Some of these had parts of the skull attached, and in some instances bones of the whole skeleton were found. Wagonloads of such antlers were sold to the junk dealers. One immense set of elk antlers measured six feet from tip to tip. Mr. James Hernly, another of the old settlers along the valley, found a fine set of mastodon teeth. Well-preserved mastodon teeth and jaws were also found in the valley of Flat Rock River.

Fossil Specimens

Upon the invitation of Mr. Chas C. Deam, the writer accompanied him to the region for closer survey of the soil and fossil remains. Mr. Deam had visited the valley for some preliminary survey work in 1919. On our trip in December, 1934, we found in an uncultivated field old cedar stumps still partially covered by soil with the roots intact, some of these were pulled up and are stored at Butler University. At the farm of Mr. Tom Razor, a block was sawed from a cedar log eleven inches in diameter. A specimen of *Larix* was collected on the same farm in 1919. While no fine specimens of antlers are available at the present time, residents near the valley offered their cooperation for collection of good specimens which might be found in the future.

The soil is typical peat, and farmers dare not burn corn stalks or brush on the land, for the soil catches fire readily. In some instances such muck fires have smouldered for weeks. Samples of the peat were sent to Dr. Paul B. Sears, of the University of Oklahoma, for analysis. He describes it as moss peat with some sedge remains, but not of sphagnum origin.

The mastodon tusks found by Mr. James Hernly weighed eight pounds each. The tusks, as well as the recently discovered mastodon jaw and teeth, are at present in the Henry County museum at Newcastle.

Relic Boreal Plants in the Region

The only relic boreal plants found by the author are *Potentilla fruticosa* L. and *Gentiana crinita* Froel., which grow abundantly in a little hillside bog above the lake in Memorial Park, a mile north of Newcastle. The plants were first collected there by Mr. Scott McCoy of Indianapolis. They were found nowhere else in the valley, but the region has been so much disturbed by agricultural activity that relic plants possibly existing in 1820 might well have been exterminated since that time. Mr. Chas. C. Deam reports the following additional relic northern plants from that region: *Cacalia tuberosa* Nutt., *Solidago ohioensis* Riddle, *Lobelia Kalmii* L., *Eleocharis rostellata* Torr., *Rynchospora capillacea* Torr.

Discussion

The one species of wood found in the peat is without doubt *Larix*, for it still bears all characteristics of *Larix*, and was identified as such by Prof. Record of Yale University, in 1919. The cedar, which the farmers call "red cedar", is not so definitely identified. It has even been suggested that it might be *Juniperus virginiana*, but the fact that stumps of this species were found in the soil with roots in position argues against *Juniperus*, for the soil is bog substratum, the habitat of *Thuja* and not of *Juniperus*. The sapwood in the sample collected is thin, and the freshly-cut wood has a distinct cedar-oil odor.

The question now arises, are we dealing with driftwood deposits where glaciers carried in the remains of northern conifers as well as the carcasses of deer and elk, or are we dealing with a post-Pleistocene cedar-tamarack bog which was superseded by other vegetation in natural succession? The logs found imbedded in the deeper strata of glacial sand and gravel encountered in well digging were evidently brought in by the water, but the logs and antlers found near the surface are imbedded in peat soil covering the glacial sand and gravel. Peat is residual soil, formed *in situ* by plant remains, and must be of post-Pleistocene origin. It is also not likely that the logs could have been washed down after the melting of the ice, for they would hardly have resisted decay if exposed to the air during the time the peat formed in the boggy valley. Besides, even today we find stumps with root remains in the soil.

No doubt the once powerful Blue River dwindled in water volume as the glaciers retreated, and the shallowing outer reaches evidently supported aquatic and helophytic vegetation which gradually filled up the shallow water. Mosses invaded, and in time the valley developed into a cedar-tamarack bog as one sees along most streams in northern Michigan and Wisconsin today. The total absence of these northern species when settlers moved in at the beginning of the last century and the sedge control in the valley indicate pyric influence at a time when *Thuja* and *Larix* had been reduced to a relic colony by advancing broad-leaved forest.

The animals might have perished at the same time, but it is more likely that they became mired, and the remains accumulated in the course of time after the forest had disappeared; or the Indians might have driven them into the soft boggy soil and from points of vantage shot them as they made their way with difficulty. Mr. Ritchie found the

remains of four posts in the valley placed in a way to indicate the former presence of an elevated platform for lookout purposes.

Destruction of an isolated forest by deep burning in a peat substratum would prevent re-establishment of relic species and initiate a sedge-meadow stage of succession. This was being superseded by willow-ash-elm when cultural influences interfered.

There is a unique sequel to such an hypothesis along Indian River in Cheboygan County, Michigan. According to Mr. R. T. O'Reilly, an old settler of Alanson, Michigan, this river was closely bordered by luxuriant cedar-tamarack forest when, twenty-five years ago, a fire swept through the area and completely destroyed the forest. Three years ago the author visited the region and found the wide belt along the river, once vegetated by cedar and tamarack, a mud flat controlled by helophytic vegetation.

In conclusion: All evidence gathered on repeated visits indicates that the valley of the upper Blue River was once a cedar-tamarack bog in which logs became embedded as they fell, and that a catastrophic influence during a time when the northern forest had been reduced to a relic colony was responsible for the total destruction of these boreal species.

Summary

1. Record is made of a rich post-Pleistocene fossil deposit in peat in the valley of the upper Blue River in Henry County, Indiana.
2. The fossils consist of both plant and animal remains.
3. The logs are, to all appearances, remains of *Thuja* and *Larix*.
4. Indications are that they represent the remains of a former cedar-tamarack bog in the valley.
5. *Thuja* and *Larix* were not present in the area when settlers moved in at the beginning of the last century.
6. Peat two to six feet in depth covers the floor of the valley.
7. The boreal relic plants found in the area by the author are *Potentilla fruticosa* and *Gentiana crinita*.
8. In 1820 the valley was in the sedge-meadow stage.
9. Animal remains found are a set of mastodon tusks and deer and elk antlers.
10. It is suggested that fire might have been the immediate cause for the complete destruction of the northern forest and the initiation of a sedge-meadow.
11. Relics found in the area will be presented to the State Museum.

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