

Helictites in the New Discovery at Wyandotte Cave, Indiana

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It is the purpose of this paper to describe certain recently discovered passageways in Wyandotte Cave and to discuss the origin and growth of some of the unusual formations in these passageways.

The earliest records of Wyandotte date back to 1800. The portion of the cave called the "Old Cave" was known at that time. In 1850 a party, having traversed the route of the "Old Cave" and observing a current of air to one side of the passageway, succeeded in gaining entrance to a new and longer series of passages. This discovery became known as the "Long Route." A few connecting passages and rooms were found after this time but it wasn't until January, 1941, that another major discovery was made at Wyandotte. At this time guides, searching the unexplored regions of the cavern, came upon a new group of passages containing thousands of new and rare formations. The

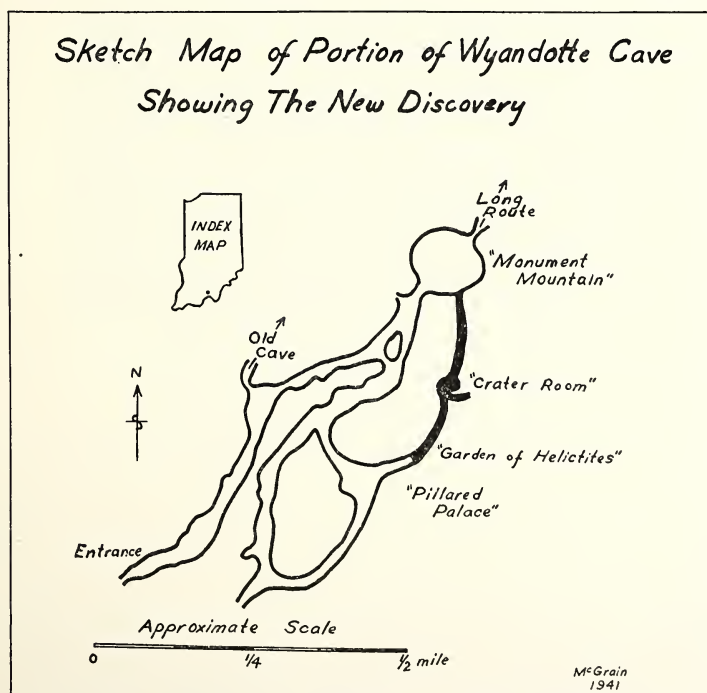


Fig. 1. Portion of the cavern system at Wyandotte showing the new passage recently opened.

"New Discovery" adds considerable to the length of the cavern, although only a portion of the newly discovered passages has been opened to the public.

One of the newly discovered passages, estimated to be some 1,600 feet in length, leads from "Pillared Palace" into "Monument Mountain" room. (Fig. 1.) This passage, as are other parts of this great cavern system, is a relatively simple underground conduit. Clay, silt, and fragments from the ceiling have filled this former subterranean waterway to within a few feet of the top. The new part of the route can be divided conveniently into three parts. The southern portion of the passage is in gray, thin-bedded limestones of the Ste. Genevieve formation. These strata are interbedded with thin layers, stringers, and nodules of flint. This portion of the route is decorated with small and unusual stalactites, and stalagmites, flowstone, and the strange and little known helictites. (Fig. 2.) These peculiar formations are like thousands of tiny twisted and curved fingers, pointing in every direc-



Fig. 2. View in the "Garden of Helictites". Here the clay floor is covered with stalagmites and flowstone; the ceiling is 3 feet above the floor.

tion. (Fig. 3.) From the ceiling and walls they will start down and suddenly, without any apparent reason, will bend or curve sharply, occasionally growing back to the ceiling from whence they came. Helictite-like formations decorate some of the small column or pillar-like structures which reach from the silt floor to the ceiling. All are white; some dull, chalky, and opaque, while others are shiny, crystalline, and translucent. The name "Garden of Helictites" has been given to this part of the "New Discovery." Among this medley of twisted and curved helictitic formations are two weird formations, unlike anything ever seen in Indiana caverns. One is a slanting stalactite, which defies the law of gravity by hanging at a 45 degree angle from the roof of the cavern rather than the customary 90 degrees. It is 12 inches long and $1\frac{1}{2}$ to 2 inches in diameter. Another unusual formation is a small stalagmite which has a tapering projection of calcium carbonate ex-

tending from its side. This projection is about 8 inches long and lies in a horizontal plane a very short distance above the floor of the passageway. Mid-way between "Pillared Palace" and "Monument Mountain" room the visitor encounters a hill-like pile of rocks 25 feet high rising in a rather small room. The thin, slabby rock comprising this hill-like feature has fallen from the ceiling. The floor of the tentatively named "Crater Room" is the top of the underground hill. The room is elliptical in shape and has a slightly domed ceiling which is 8 or 9 feet above the floor. A portion of the ceiling is covered with a crust of cave travertine. From this deposit hang hundreds of "straw" stalactites and helictites. The floor is studded with stalagmites, many of which exhibit unusual translucency. The route from "Crater Room" to "Monument Mountain" room is barren of decorative cave deposits. The ceiling, a coarsely crystalline, somewhat fossiliferous and oolitic white limestone of the Ste. Genevieve formation, has been sculptured by the stream which once used this passage.



Fig. 3. Close-up of some of the helictites in the "New Discovery". The distance between the clay floor and ceiling is about 3 feet.

The term *helictite* comes from the Greek word *heliktos*, meaning *twisted*. It is applied to twisted, irregularly bent cave formations, particularly to contorted stalactites, which defy the law of gravity by deviating from the vertical. The term was apparently used first by H. C. Hovey (1882). In discussing stalactitic distortion he wrote, "The term 'Helictite' has been suggested as appropriate to these contorted growths." In a very broad sense the term has been used by a few writers to include "crystal aggregates", "crystal clusters", "cave

flowers", and "rosettes" but the writer prefers the restricted definition given above.

Three general types of helictites differing as to structure have been recognized by the writer. The first type is the "pipe stem" or "straw" formations. These are hollow or tubular and start like ordinary stalactites but branch like a limb or root and usually terminate in a twist or curve. The helictite may taper to a point or it may suddenly enlarge to a mass several times the diameter of the stem proper. The second type is almost solid. It has a core and is built outward with successive more or less concentric layers of crystalline calcium carbonate. Careful examination with a magnifier will reveal a small hole through which the solution might pass. The smallness of the conduit can be explained by deposition within the original tube and the layer effect by water charged with calcium carbonate flowing down the outside of the helictite and thus coating it with successive deposits. The third type is also practically solid. It is definitely crystalline internally and upon careful observation may be seen to possess radial structure. This structural form is thought to be due to the recrystallization of the calcium carbonate. In some cases all evidence of an inner tube has been destroyed by the recrystallization.

Prior to the new discovery in January, 1941, helictites in Wyandotte were known to occur in "Pillared Palace" and other portions of the cavern. The "New Discovery" contains a profusion of helictites which excels in both abundance and variety all other assemblages of this type of formation in the cavern. Because of their peculiar shapes, helictites attracted the attention of the earliest explorers of Wyandotte. Collett (1878) described the helictites in "Pillared Palace" as "strange, crooked, writhing, twisting, unsymmetrical sprigs of white limestone." Blatchley (1896) described the same formations as stalactites no larger in diameter than a lead pencil and curved and twisted in a unique and grotesque manner.

Many theories have been offered as explanation of their growth. Collett (1878) suggested that they grew by propulsion from the bottom after having been pushed out of the solid rock. Hovey (1882) attributed the twisted form of helictites to lateral outgrowths having fungi for the starting point. Blatchley (1896) said that the bent and twisted condition of the helictite was due to the varying currents of air which pass through portions of the cave and force the tiny drops of water on the end of the stalactite first to one side of the tip and then to the other. Greene (1906) suggested that the curves are possible due to the twinning tendency in the crystallization of the calcite. Lobeck (1929) ascribed the formation of helictites to the presence of impurities in the dripping water. He thought that impurities, such as grains of sand or silt, accumulate on the outside of the stalactite and cause a change in the direction of crystal growth at those points. McGill (1933) considered that this type of deposit probably results from impurities in the dripping water and from the effect of air currents in directing growth. Casteret (1938) offered an unexplained kind of osmosis as a likely

hypothesis for the formation of helictites. Huff's (1940) experiments with artificial helictites lead him to conclude that helictites are tubes that assume their crooked shape as a result of the chance orientation of crystals at the growing end of the tube, that helictites are produced where there is a hydrostatic head and where there is a small flow.

The writer's observations of helictites in Wyandotte Cave have lead him to substantiate Huff's (1940) hypothesis. The air currents in Wyandotte are mainly in two directions, inward in the winter and outward in the summer, not the infinite number of directions as would be indicated by the growth of helictites. The channel in the helictites is a conduit for the calcium carbonate bearing water which makes the deposit at the extremity of the helictite and not at the base. Although fungus growth was observed upon the silts and clays of the floor of the cavern none was observed growing upon the helictite. Since the Ste. Genevieve limestone as a whole is relatively pure and is not known to be sandy in the vicinity of Wyandotte Cave the presence of impurities in the dripping water doesn't seem logical. In the early stages of exploration of the "New Discovery" in the Spring, 1941, guides noted that small quantities of water were released when a thin crust upon the ceiling was penetrated or when a helictite was accidentally broken, thus suggesting the presence of hydrostatic pressure where the helictites are growing at the present time. A rather close study revealed that the helictites possess a very small opening at the growing end of the formation. Thus it follows that, even though hydrostatic pressure may be present, the rate of flow is small. When the flow of water holding calcium carbonate in solution is slow enough, evaporation prevents the formation of a drop, and a deposit, not oriented by gravity, forms. These helictites may grow directly from the ceiling itself, or may grow from a stalactite, particularly one of the "straw" variety.

The chemical composition of helictites is the same as the accompanying stalactites, stalagmites and similar deposits, but the laws governing their formation and growth have been baffling. They are, of course, the work of the precipitation of calcium carbonate from ground water but no one knows exactly how the work is done. There have been several theories but little uniformity of opinion has been reached. It is probable that no single theory applies to every case. Blatchley's, Hovey's, Lobeck's, and McGill's explanations would account only for the helictite which starts as a regular stalactite, and do not take other types into consideration. However, if it can be assumed that natural helictites are formed by the same process as the artificial ones, Huff (1940) has solved some of the controversial problems. The writer's observations in the "New Discovery" of Wyandotte Cave have proved rather conclusively that some of them are formed in this manner.

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