

GEOLOGY OF FRANKLIN COUNTY.

DR. RUFUS HAYMOND'S REPORT OF A GEOLOGICAL SURVEY OF
FRANKLIN COUNTY, INDIANA, MADE DURING THE
SUMMER AND FALL OF 1869.

To Professor E. T. Cox, State Geologist :

SIR—In your letter, dated May 26, 1869, you suggest the following plan of survey and report upon the geology, etc., of Franklin county :

“1. Boundary of county, surface, configuration, streams, etc.

“2. Geological formations and descriptive geology, economical geology, ores, building stone, and all minerals of use.

“3. Timber and agriculture.”

These instructions I have endeavored to carry out, and herewith respectfully submit for your consideration the following report :

PHYSICAL GEOGRAPHY.

Franklin county is bounded on the east by the State of Ohio; on the south, by Dearborn and Ripley counties; on the west, by Decatur and Rush counties; and on the north, by Fayette and Union. It contains about four hundred square miles. At least half the county is very much broken up into ridges and hills, separated by deep ravines and valleys of denudation, usually narrow upon the smaller streams, but occasionally spreading out to half a mile in width.

The principal rivers are, the main White Water and its two branches, the East and West Forks, which unite at Brookville, the county seat, in latitude $39^{\circ} 28'$ north, longitude $85^{\circ} 05'$ west—approximately.

The valley of the main river will average rather more than a mile in width, bounded throughout its whole course by beautiful sloping hills, ridges, promontories and rounded eminences, in many cases covered with forest trees and shrubbery, presenting a scene of unusual beauty throughout its whole course in the county.

The principal tributaries of the West Fork are Pipe creek, Salt creek, Sein creek, Garrison creek and Duck creek, all in the western part of the county. Pipe creek is about fifteen miles in length, and heads in Ripley county; Salt creek is probably twenty miles long, and heads in Decatur. The other streams are small.

The tributaries of the East Fork, within the bounds of the county are two—Templetons creek and Wolf creek—both small and unimportant streams.

The principal branches of the main river are Big Cedar, Little Cedar and Blue creek.

Several of these streams furnish a considerable amount of water in their upper course, but usually become entirely dry near their mouths in the latter part of summer, the water disappearing among the gravel and sand.

I am informed by Hon. John H. Farquhar, who was formerly engaged as an engineer upon the White Water Canal, that the amount of water furnished by the river at a medium stage was, for the East Fork 2,700, and for the West Fork 4,300 cubic feet per minute. The river, at the time the canal was constructed, afforded considerably more water than at present.

White Water is a very rapid stream, having, upon the average, a fall of six feet to the mile, from Hagerstown, in Wayne county, to Elizabethtown, in the State of Ohio. Of the amount of water power it is capable of furnishing, something may be said hereafter.

GENERAL GEOLOGY.

The greater number of rocks within the county belong to the lower Silurian system, the balance to the upper Silurian and Devonian formations. These rocks have evidently been "deposited at the bottom of a deep primitive ocean," and consist of alternate layers of semi-crystalline rocks and other sedimentary deposits, mostly in thin strata, varying from an inch to twelve or fifteen in thickness. These sub-crystalline rocks are mostly composed of carbonate of lime, divided by beds of indurated bluish or gray clay, regularly stratified and divided by cleavage planes. This clay, properly a clay marl, contains a large amount of lime, and effervesces freely with sulphuric acid; upon exposure to the air, it slowly decomposes and crumbles to dust. The rocks contain millions of marine fossils, in great variety, many of them being a mass of shells cemented together with lime.

BLUE LIMESTONE REGION.

The blue limestone is the lowest rock which has been exposed at the bottoms of our streams. It underlies the whole region, and is the only rock found in the southeastern third of the county, except hypozoic boulders, which are found in all situations, from the highest to the lowest grounds.

This limestone, with its accompanying marls, is about four hundred feet thick in the southeastern part of the county, and three hundred and fifteen at Brookville, a mile and a half north of which it disappears, under a drab colored limestone, which is from six to twenty-two inches in thickness—the blue belonging to the lower Silurian, and the drab to the upper Silurian group.

In the blue limestone the following fossils were found, that are referable to the Trenton Period:

Petraia corniculum, *Columnaria alveolata*, *Chaetetes lycoperdon*, *Asaphus gigas*, *Calymene senaria*, *Orthis Lynx*, *O. occidentalis*, *O. testudinaria*, *Strophomena rugosa*, *Leptaena sericea*, *Rhynchonella increbescense*, *Peurotomaria lenticularis*, *Murchisonia bicincta*, *M. bellacincta*, *Bellerophon bilobus*.

S. G. R.—12.

batus, *Endoceras proteiformes*, *Cyrtoceras annulatum*; and to the Hudson Period: *Ambonychia bellastrata*.

In the buff colored stone, which is dolomitic, I found the *Calymene Blumenbachii*, which leads me to infer that it belongs to the Niagara Period.

The surface of the county was originally almost a level plain, which is now varied and cut up by the valleys which the streams have worn for themselves during past ages. Beyond the heads of the streams, where the table land has not been changed by running water, the highest land is so flat as almost to deserve the name of marsh or swamp; yet these flats are not so wet as to prevent the growth of forest trees. Thus it will be apparent that we really have no such thing as hills or mountains, yet, to a person in the valleys or ravines, the rapid slopes, ridges and spurs, give every appearance of his being in a hilly country. Such is the appearance along the valley of White Water and its tributaries. When, therefore, the term hill is used in this report, I wish it to be understood as applicable to the slopes bordering the valleys, and not to hills, properly so called.

The blue limestone, so far as I have observed it in Franklin and neighboring counties, is found in strata varying from less than an inch to twelve or fourteen in thickness. These layers seem to the eye to be nearly horizontal, and occasionally can be traced for half a mile, the inclination only becoming apparent when the out-crop is found bordering streams which run parallel to the dip. I have found it impossible to satisfy myself as to the *exact* amount of inclination. The dip of the blue limestone rocks is to the southeast, at the rate of four feet to the mile, according to the best estimate I can make, after having examined them from the southeastern to northwestern angle of the county. One great difficulty in making a correct estimate of the dip, is the fact that the layers occasionally run out, and are replaced by other strata slightly different, or by the blue marl, so that the identification becomes difficult, and often impossible; all are, however, geologically identical.

The several strata are separated by the blue marl, which

varies from a few inches to one or two feet in thickness. The proportion of stone to the clay varies in different localities, but the stone in Franklin county I think preponderates over the clay marls. The rocks are all divided by vertical fissures into irregular fragments, from twelve inches or less to eight or ten feet in diameter.

There are, however, a few strata in the hills of a smooth, very hard fissile stone, which is often divided into rhomboidal forms—one set of vertical fissures running from southeast to northwest, the other from west of south to a little east of north. This fragmentary arrangement of the rocks accounts for the rounded contour of the hills, points and ridges. When by floods or other causes the rock becomes exposed, the marl crumbles to pieces by the action of the atmosphere; the strata fall successively, and slide down with the unctuous mud, and are never left standing out in mural cliffs, or producing cascades, as is the case with the “cliff limestone,” of which I shall speak hereafter.

It is a curious fact that, notwithstanding the immense number of rocks, from the lowest point we can observe to near the tops of the highest levels, comparatively few loose stones are found at the surface. The hills and slopes of the valleys are covered with clay and other diluvial matter, in all respects identical with that found upon the uplands; and strangely enough, though so near the lime rock, the soil of the hillsides, as is the case in all the uplands and flats, seems to be devoid of lime—a fact scarcely credible when we consider the immense amount of this mineral immediately below the surface. If lime ever existed in any quantity in our upland soils (which is doubtful), it has been *leached* out during the lapse of ages by the constant percolation of water, charged with destructive chemical agents, ever since their deposition. The probability is that those lands which are deficient in lime, would be benefitted by the application of the marls found everywhere between the rocks—and that those which have been exhausted by cultivation might, by a proper application of lime and manures, be restored to their original fertility.

The blue clay or marl found between the strata of blue limestone, it was said, by Dr. Locke, contains thirty-five or forty per cent of lime. It effervesces as freely with acids as the rock itself.

These marl strata generally contain no fossils. There are, however, exceptions to this rule in those found near the summit of the hills. During their deposition, animal life, in many instances, seems to have ceased, to be renewed again in the next succeeding stratum, which abounds, as do most others, with marine shells, nearly all as perfect as during the lifetime of the animal; and in almost every rock the great mass of shells show all their convex surfaces upon one side, and the concave surface upon the other. Occasionally stones are found composed almost wholly of shells standing perpendicular to the surface, and fitting into each other as though they had been so placed by design.

I have found it impossible to determine the number of strata with absolute certainty which our valley slopes contain, for in no place is there more than fifty feet in perpendicular height exposed, except at a cut through a ridge two miles west of Brookville, made in the construction of the White Water Valley railroad, which is about eighty feet in depth. In this cut I have counted about one hundred strata, varying from half an inch in thickness to one foot. From the lowest outcrop at Brookville to the point where the blue limestone disappears beneath another formation, it is three hundred and fifteen feet, which at the rate of one hundred for eighty, would give for the whole elevation upwards of three hundred and ninety strata, which I think may be relied on as nearly correct—if any difference, rather under than above the true number.

The blue limestone is very valuable, being a good building stone, good for burning into quicklime, and for McAdamizing roads. Every rock which has sufficient firmness to bear hammer-dressing, makes a good and durable building material. When free from cavities, much of it is susceptible of a very high polish. By Dr. Locke's analysis of the same character of rock, made some years ago, he

found it to contain 90.93 per cent of carbonate of lime, a trace of iron, magnesia, etc.

In consequence of the fact that this rock is always broken up into fragments, and the layers separated by unctuous blue clay marl, which decomposes and crumbles to pieces upon exposure to the atmosphere, thereby causing the fragments to fall, as I have before stated, there are no cliffs. But in the ravines, where the loose stones and other *debris* have been washed away by floods so as to clearly expose the rocks, they are found overlapping each other like shingles upon the roof of a house. The only exception to this arrangement is at their junction with the lowest member of the Upper Silurian group, which is a rock of superior thickness to any of the blue stones, and longer resists the action of air and water. Where this rock crosses the ravines, having small running streams, cascades are formed from six to twelve or fifteen feet in height.

UPPER SILURIAN.

Two miles north of Brookville, upon a ridge running north and south, and at a height of three hundred and fifteen feet above low water mark at the river, there is the first outcrop of a rock of very different appearance from any below it. Externally, it is of a drab or cream color for one-third of its thickness, both upon the upper and lower surfaces, the center third being of a pale blue color. This is the character of those near the surface. After the rock has been stripped below all atmospheric influences, it is entirely blue. This is a hard, compact limestone, which "spawls" with conchoidal fracture, and probably contains magnesia. It is sufficiently hard to work well to sharp edges. It contains but very few fossils. This rock is used extensively for building purposes, and mostly bids fair to be sufficiently durable.

In most situations where it is found, there are above it several strata of nodular bituminous limestone, in the aggregate occupying a space of from five to ten feet in perpendicular altitude. The strata are separated by beds of

yellow clay. This clay abounds in fossils, and in some situations above the bituminous layers, are vast numbers of bivalve shells and *cyathophylla*, the latter in greater numbers than I have ever observed them elsewhere. Specimens of these fossils will be forwarded to you, marked as occurring above these rocks, as well as those from the rocks immediately below.

This rock appears near the surface on the farm of Dr. Peck, four and a half miles northeast of Brookville, and is there three hundred and fifty-two feet below the level of the river; a mile and a half west of Peck's we find it on the farm of Josiah Allen, at a height of three hundred and twenty-four feet; two miles west of Allen's, at H. H. Schrichte's quarry, it is found to be three hundred and fifteen feet in height, showing a westward dip of nearly five feet to the mile. Six miles west of Schrichte's quarry, on the farm of C. T. Gordon, we again find it at an elevation of two hundred and ninety-seven feet; and a mile and a half farther west, on the farm of M. C. Gordon, it is found at the height of two hundred and fifty-two feet—a descent of forty-five feet, or thirty feet to the mile.

The dip of this formation is almost exactly opposite to that of the blue limestone strata, and for ten miles nearly at the same rate of inclination. From Gordon's farm the descent is much greater.

In all situations I have found this rock near the tops of the hills, with little above it except the nodular limestone, and with the further exception, that west of the West Fork, in Laurel township, it dips down and under thirty or forty feet of thin limestone strata, similar in most respects to blue limestone, which underlies it at other places, except that here they are *comparatively* devoid of fossils. Immediately upon this formation, two miles west of Laurel, and near the northwestern part of the county, we find the rock, called by the older Ohio geologists "Cliff limestone." It belongs partly to the Niagara epoch of the Silurian period, and the upper members probably to the Devonian.

Heretofore it seems to have been the opinion of our geologists that this formation was wanting in Franklin county—and indeed I was not aware myself that it existed here until I examined that section of the county. I find it very near the Fayette county line; but whether it is to be found north of that line, I am at present not prepared to say. It is confined to a belt of country about two and a half miles wide, beginning near the north line of the county, partly in Laurel and partly in Posey townships, and running south, probably into Ripley and Jefferson counties.

The lower member of this "Cliff-rock," as it appears in most places, is exceedingly rough, irregularly stratified in layers usually three or four inches thick, divided by vertical seams, which, upon exposure to the atmosphere, open, and the rock splits up into small angular fragments; this is particularly the case in the central parts of the cliff, leaving the upper and firmer parts of the rock overhanging like a projecting roof. The limestone of these cliffs is regularly interstratified with hornstone or chert.

The cliffs vary in height from ten to twenty-four feet, the latter being the highest I have measured.

Immediately upon this formation we find our best building stone, one or two being cream-colored; the latter are very hard, and contain siliceous matter, being what is termed "cherty limestone." Some of these courses make as fine flagging as can be found anywhere, and can be quarried of any desired dimensions. They are rough upon both surfaces, being full of protuberances and indentations, the protuberances of each fitting into the indentations of those above and below, there being no clay or other substance between them. The layers, though fitting very closely, in most cases are easily separated. As they lie in the quarry, they present the appearance of regular range-work, having a perpendicular face with narrow seams, which are as straight and true as a mason could put them up.

The district in which this formation is found being so narrow, I have not been able to ascertain the amount or direction of the dip, or, indeed, whether it has any. All

the locations in which I have found the "Cliff" rock seem to be very nearly of the same height.

About three miles southwest of Laurel, on the lands of Mr. Derbyshire, there is a miniature Niagara, a perpendicular fall of forty feet over the coarse irregular rock above mentioned. The shelving rock is in the shape of a horse-shoe, the semicircle being forty or fifty yards in circuit, the rock overhanging about twenty feet. Beneath the fall there is a slaty, calcareous, crumbling rock (probably hydraulic cement rock), twenty feet thick, which, from atmospheric influences, is constantly crumbling and falling out, leaving a tolerably dry cavern. About half a mile northeast of this there is another fall, of thirty-five feet, in every respect similar to the former except in height. Above both of these falls, for some distance back, all the strata, of the same character as those taken from the neighboring quarries, have been worn away by the action of the small streams which form the cascades. During a visit to Logansport, in Cass county, the past summer, I observed a rock of the same character, and of the same geological formation, as that found at Derbyshire's falls, occupying the bed of the Wabash river, in front of that town—hence I infer that the "Cliff limestone" of Indiana has but little, if any, inclination in a northern or southern direction, for there cannot be much difference in the height of our quarries and that of the rock at Logansport. Upon Sein creek, which empties into the West fork a mile below Laurel, there are a number of cliffs varying from ten to twenty-four feet in height. In several places the rock has been precipitated into the creek in large blocks weighing many tons, and though apparently so loosely stratified, and divided by so many seams, they still retain their original firmness and show no signs of disintegration. This Niagara group, and the others mentioned above as belonging to the upper Silurian, do not altogether make more than a hundred feet in perpendicular height. The balance of the formation, if it ever existed in the neighborhood of Brookville, and I presume it did, has been worked away by some great denuding flood, evidences of which may be

seen everywhere. In Schrichte's quarry, two miles north of Brookville, which occupies the top of a narrow ridge, running north and south, we find that one-half of the original formation has been worn off down to the magnesian rock, and subsequently filled up with gravel and clay very distinct from the other half with its nodular limestone and diluvial clay.

In the Sein creek cliffs on the farm of Mr. Bowers there are thirty-two strata of limestone, varying from an inch to three feet in thickness, interstratified with which there are fourteen of hornstone or chert, generally about three inches in thickness.

The Niagara Group, as well as the first rock above the blue "Cincinnati limestone," where they exist separately, are always near the tops of the hills, and are generally, though not always, covered with clay, gravel and broken limestone. The "Cliff" rock is covered with yellow ferruginous clay and fragments of hornstone.

DILUVIUM OR DRIFT.

The superficial material resting upon the rocks above described consist mostly of yellow clay, mixed more or less with small pieces of broken limestone, gravel from primitive rocks, and, in a few localities, almost pure gravel is found, in others sand, and frequently sand and gravel mixed. In no instance upon the uplands or tops of the hills do the rocks penetrate through these materials, and we find them only where the drift has been worn away by the action of the streams. The drift varies from four or five feet to forty or fifty in thickness upon the uplands. The slopes of the valleys and side-hills seem to be covered with drift similar to that upon the high grounds, but not of equal thickness. In digging wells upon the uplands the roots and bodies of trees are frequently found at various depths from ten to thirty feet; and, occasionally, limbs and leaves are found, with vegetable mould at various depths,

BOULDERS.

Boulders of granite, hornblende, greenstone, syenite, gneiss, and, in fact, of almost every species of metamorphic rock, are found all over the county, upon the highest as well as the lowest grounds. They are always found upon the surface and never beneath, except under slides or where gravel in the terraces has been washed over them. I have seen a few granite boulders that would square five or six feet; they are, however, generally much smaller, and are usually worn and rounded by attrition.

CALCAREOUS TUFFA, ETC.

This deposit is found in many situations in the county, but more frequently in the gravelly terraces along the river, where the water of springs has percolated through the gravel, frequently forming large, rough, conglomerate rocks by cementing the gravel into a mass. In other places we find leaves and sticks mixed up in these formations, so perfect that we may even recognize them and determine upon what trees they grew. Around certain springs, the waters of which contain iron, ferruginous tufa is occasionally found in small quantities, containing, I apprehend, not more than five to ten per cent of metal.

TERRACES.

Upon the side-hills parallel to the course of the main river, and upon all its branches, there are benches or ancient terraces—upon the river slopes usually but two or three, but upon the smaller streams there are more. I have counted as many as ten upon a side-hill bordering Blue creek. Upon these ancient benches or beaches, we find no gravel or sand, nothing but soil, clays and rocks *in situ*. On the main river, throughout its course in the county, there are from two to four terraces composed of gravel, sand, broken limestone and small boulders of metamorphic rocks. The first terraces, or lowest bottoms, are usually not more than ten or twelve feet above the water; the

highest vary from seventy to eighty feet, and are often, at the same location, found upon both sides of the river. Where the highest terraces occupy the points just above the junction of the main river and its branches, we find the lower ends composed, usually, of fine sand drifted in strata, first to the east, then to the west, as though they had been washed up by the waves and heaped upon each other as the wind changed from east to west, when the land was slowly emerging from or sinking below the surface, during the last submergence of the continent. These gravelly terraces have evidently been deposited since the valley was excavated to its present depth for they rest upon the rocks *in situ*, in some cases below the present bed of the river, and as they could only have been formed *under* water, it follows that the valley has been submerged since its excavation to at least the height of this formation.

MINERAL SPRINGS.

No mineral springs of a medicinal character are known to exist in the county, with the exception of a few which contain a small percentage of iron, with possibly a small amount of saline sulphur. If springs exist having valuable medical qualities, I have not been able to discover them. Springs, of any kind, are much fewer than we would be led to expect from the configuration of the country. I think the limited number may be accounted for by the fact that all the rock strata, as well as the marl-beds, are divided by vertical seams, which allow the water to pass through them. It is true there are in the county quite a number of springs, but they are not by any means so numerous as I have observed them in other hilly sections. The water of all our springs contains a quantity of carbonate of lime, and is therefore familiarly called "hard water."

BLUE CLAY MARL.

Everywhere between the strata of the blue limestone, there are beds of clay marl, varying from an inch to two feet in thickness. In many instances it has nearly the

hardness of stone, and is regularly stratified; it effervesces as freely with sulphuric acid as the limestone above and below it, showing that it contains lime in abundance. Near the mouths of all the small tributaries of the river, and at a height equal to the gravelly terraces, there are large accumulations of marl, which has evidently been ground up or dissolved by water, which has transported it from the higher grounds to near the mouths of the streams, where its course has been checked up by the waters under which the terraces were formed. In these situations it contains some gravel and abundant angular fragments of limestone, identical with that in the surrounding hills. In some situations this marl is soft and plastic, having very much the color and consistence of putty. The marl-beds are so numerous and common all along Whitewater and its branches, that it seems unnecessary to point out particular localities.

In one locality, on the lands of Mr. H. C. Kunkle, in Laurel township, there is a bed of whitish or cream colored marl about eighteen inches thick, lying immediately upon the "Cliff," or Devonian rocks.

PALAEONTOLOGY.

Fossils in great abundance are found in almost every rock of the blue or Lower Silurian limestone.

The lowest rock which shows at the water's edge, near Brookville, is almost a mass of broken and prostrate corals, cemented together by lime. In this rock, standing perpendicular to its surface, are numerous stems of *encrinites*, which appear to have grown up through the corals after they had been broken and prostrated. Corals are found in most of the rocks, but nowhere so numerous as in this stratum, and in others found at an altitude of three hundred and twenty-five feet. The latter differ from the former in several respects, but particularly in being flat in many instances, while the former are nearly round. I send samples of both kinds.

Besides these we have—

Strophomena rugosa, in great profusion.
S. planæanvoxa, " "
S. deltoidea, " "
S. alternata, very numerous.
Orthis testudinaria, very numerous.
Orthis subquadrata, "
Orthis occidentalis, "
Orthis biferatus, Va. Lynx, "
Spirifer, not numerous.
Halysites, of Niagara group.
Favosites, of the Devonian.
Petraia, very numerous in Silurian rocks.
Maclurea, rare.
Encrinites, of several species.
Calymene Blumenbachii, and several other trilobites.
Astrea rugosa, rare.
Rhynchonella Wilsoni, rare.
Cyathophyllum turbinatum, rare.

In addition to these there are many other varieties which I am not able to identify.

IRON ORE.

Nodules of iron ore are occasionally found among the drift and gravel of the river banks, bearing evidence of having been water-worn, and doubtless were brought here with the other drift materials. The quantity is too small ever to be of any value. Pyrites, or sulphide of iron, is generally diffused among all the rocks, but in very small quantities; it is found between the layers, adhering to their surfaces, and occasionally crystals are found in the blue clay. The most beautiful specimens I have seen were found in the Niagara rock in Posey township. It has the color of gold.

LEAD.

There is a tradition that lead was once found upon a small tributary of the East fork, one mile from Brookville.

It is still the belief of some people that lead exists there, yet no man has been found who has *himself* seen the ore. The opinion is founded upon the old story, that an Indian had communicated the secret to some of the early settlers.

I have never been able to find it, and have no idea that lead will ever be found there, or indeed in any other part of the county, unless it be in very small quantities in the Devonian group.

COPPER.

A single piece of native copper has been found in the county, weighing about six pounds. It was no doubt transported with the drift from Lake Superior, as it was rounded, and bore other evidences of attrition.

GOLD.

In the northwest part of the county, in Laurel and Posey townships, upon Sein creek and its branches, gold is generally disseminated in very small particles. A common panfull of gravel and sand, when washed out, generally shows from two to three particles of gold in thin scales. None has ever been found larger than a grain of wheat. Though so generally disseminated, it is doubtful whether the quantity is sufficient to pay the expenses of washing it out. Gold has also been found upon Little Duck creek, and in other places in the county. The yellow clay in the neighborhood where gold is found, is mixed with quartz or chert, and whether the gold belongs to this formation, or has been transported in the drift, it would be difficult to say. Hornstone, in horizontal strata, is abundant in the neighborhood of the localities where the gold is found. Gold is here, as elsewhere, found associated with black sand.

SALT.

From forty to fifty years ago salt was made at four different places in the county. It has been so long ago that it has almost become traditional that salt was once produced here. A few of the older inhabitants, who were then

very young, remember the fact, but I have yet found no one who can tell me what amount was made, or how many gallons of the water it took to make a bushel of salt. Three of the salt wells were on Salt creek, two on the farm of George and David Hawkins, section 4, township 11, range 12 east, and one on the farm of Alexander Hawkins, of the same section. The latter is the well at which the largest amount of salt was made. The fourth well was on Pipe creek, section 8, township 10, range 13 east, northeast quarter, in Butler township. These wells are all situated in the blue limestone and clay marls of the Lower Silurian group. On the hills near them is found the magnesian and bituminous nodular series, which, as I have before stated, occupy but a very few feet in perpendicular height, and belong to the Upper Silurian. It is not probable that the water of these wells is of such a character, or in quantities sufficient to render the working of them profitable.

COAL.

Many people have an idea that coal may be found in Franklin county, and it has heretofore been impossible to convince them that there is none. Next in importance to knowing what a district of country *does contain*, is a knowledge of what it *does not contain*. If I could convince those persons who believe in its existence here, that it does not belong to our formation, and that any search for it will be utterly hopeless, I should feel that some good had been accomplished.

The semi-crystalline rocks of the upper and lower Silurian system were formed in the early ages of the world's history, when there was no vegetation upon the earth, except a very few and widely separated sea-weeds. Coal is universally admitted to be of vegetable origin, and its immense quantity points to a period for its formation, when the earth was densely covered with vegetation, tropical in character, such as tree ferns, gigantic rushes, etc., similar to those now found in some parts of Central and South America. The rocks of Franklin, and adjoining counties, were

deposited at a period long anterior to that in which coal was formed, and long before the earth was prepared to produce land plants, except a few, of the most insignificant character—this being the fact, it was impossible that coal could have been formed here at that early period. This should be sufficient to convince every one that it need not be sought for in this county. Fragments of black bituminous shale, which will burn feebly, are occasionally found here. This, no doubt, has been the cause of misleading people as to the existence of coal in this locality.

BUILDING MATERIALS.

Clay of a good quality for the manufacture of bricks is found in every part of the county. They are made on the uplands of the fine-grained yellow and whitish clay of first rate quality. Many are also made near Brookville, from the arenaceous loam of the river bottom lands, of very good quality, but occasionally contain fragments of lime, which slacks after exposure of the brick to the air, causing them to break, and rendering them unfit for outer walls. With care to exclude the lime, these bricks are as good, if not better, than those made from the upland clays.

Stone, known usually as the "blue Cincinnati limestone," is abundant everywhere, and is the surface-rock, as has been said elsewhere, in the southeastern third of the county. It is a valuable and very durable stone, but, unfortunately, there are but few strata, of sufficient firmness to work well, which exceed six inches in thickness. The thinner layers are used in walling cellars, and all other rough work where beauty is not essential. Many of the thicker strata are so shelly, and composed of broken corals and fossil shells, that they are not suited to ordinary stonework. Every stone which is sufficiently firm to bear hammer-dressing, may be relied upon as being sufficiently durable for any description of masonry. The thin strata are extensively used for flagging the sidewalks in the town, and have proved to be durable, and will, no doubt, outlast several successive pavements of brick.

The localities where this rock is found are so numerous, and so generally known, that to point them out would be superfluous. North of Brookville, one mile and a half in a direct line, the rock of which we have been speaking disappears under a stratum of (probably) magnesian limestone, which varies from six to twenty inches in thickness. This stone is extensively used for heavy masonry, and range-work of various kinds; its qualities have been mentioned in a former part of this report, and need not be repeated here. It is extensively quarried by Mr. Schrichte, on the south-east quarter of section 17, town 9, range 2 west; also on the lands of Jane McCarty, sections 8 and 9; on W. W. Butler's, section 8; on the farm of W. J. Peck, sections 13 and 14; on Josiah Allen's, and James Gavin's section 15; on the lands of John Skinner, Wm. Brier, and Samuel Shepperd, section 7; William Frank's, section 18; on lands of Z. B. Reed and J. P. Shiltz, sections 17 and 18; also on the lands of C. T. Gordon, section 32; and those of M. H. Gordon, section 30, town 12 north, range 13 east. It is also found on H. H. Seal's farm, section 36, town 10, range 2 west. South of Brookville it is found on the lands of Hon. A. B. Line, J. H. Lanning and John Althero—all in section 28, town 11 north, range 13 east; also on lands of E. Krause and P. Conrad, section 17, town 10 north, range 13 east. It is found in and around the town of Oldenburg, in great abundance, section 4, town 10 north, range 12 east; also on H. Schwegmann's farm, section 1, same town.

Besides the localities already mentioned, there are many others which might be named; but to enumerate them all would render this report tedious and unnecessarily long.

The most valuable building-stone in the county, or probably in the State, is found in Laurel and Posey townships. It is of the same character, and belongs to the same formation as the Dayton stone so extensively used in Cincinnati and other places, and the same as that found at Greensburg and St. Paul. This group has generally been referred to the Niagara series, and probably correctly so,

but I am of opinion that the upper strata, at least, belong to the Devonian formation. The few fossils I have been able to find in them (the upper members) are referable, in my opinion, to that group. Let this be as it may, the rocks are without doubt of great value as a building material, and when they come to be generally known will be extensively used.

Two miles north-west of Laurel, D. H. Mook owns a valuable quarry, which has been extensively worked. The strata are generally blue, especially the lower series, are hard, easily worked to a fine edge, are durable, and may be obtained of any required size or thickness. It is situated on the south-east quarter of section 5, town 12 north, range 12 east. Immediately west, in the same section, there is a fine outcrop of the same rock upon the land of Wm. Depperman; this has not been worked to the same extent as Mook's, but it contains a vast amount of valuable *material*.

On section 17, town 12 north, range 12 east, Messrs. Kemble & Payne own a quarry of very fine quality of stone. In this quarry the upper members are cream-colored cherty limestone. Stone of any desirable thickness may be obtained there.

John H. Faurot has a fine quarry on the southwest quarter of section 18, town 12, range 12; it has been but little worked. James Murphy also has a fine quarry in the same section. Thomas B. and William D. Adams, whose farm is on section 1, town 12, range 11 east, have a good quarry of the same character of stone. It is upon this farm where gold has been found in greater quantity than in any other locality in the neighborhood.

To these gentlemen, and especially to Thomas B. Adams, Esq., I am greatly indebted for assistance in prosecuting my examinations in that section of the county; and to the Rev. Wm. B. Adams my acknowledgments are due for hospitable treatment and entertainment at his residence.

Martha Plow owns a quarry in section 6, town 12, range

12, which promises well, but has not been worked to any considerable extent. J. A. Derbyshire has a fine quarry on section 20, town 12, range 12, and G. W. Kimble another in section 19.

Alfred Deter has, adjoining the village of Bulltown, in Posey township, a good quarry in section 13, town 12, range 11 east. This is the most western quarry I have seen.

One of the finest quarries in this formation belongs to Jesse Cloud, and is situate in the south-west quarter of section 7, town 12 north, range 12 east. The strata vary in thickness from two inches to ten. The thin flags are yellow, very hard, and upon being struck with a hammer give out a clear sharp ring, similar to glass; they are very durable, notwithstanding their argillaceous character.

Flagging, or stone for any other purpose, may be obtained here, or at any of the neighboring quarries, of uniform thickness and of any dimensions.

Besides these quarries there are a number of others in the vicinity which might be mentioned, but I deem it unnecessary to name them all, as they may be found in a belt two and a half miles in width by five or six in length.

TIMBER.

Franklin county was originally covered with a magnificent forest, comprising most of the hard timber trees common to the latitude. A little more than one-half of all the lands have been cleared, and are now under cultivation; and in the remaining half a large amount of the best timber has been sawed into lumber or made into staves, so that good timber in the county is *comparatively* scarce, and is becoming more so every day.

The principal timber trees are:

White oak (*Quercus alba*). This is, and always was, the most abundant tree in the county.

Burr oak (*Quercus macrocarpa*). Found in various parts of the county, but nowhere abundant.

Chestnut oak (*Quercus Castanea*). Two miles north of Brookville, upon a poor point, there is a grove of about

thirty chestnut-oak trees. These are all I have ever seen in Southeastern Indiana.

Red oak (*Quercus rubra*). Very common.

Black oak (*Quercus tinctoria*). Common upon the hills.

Red beech (*Fagus ferruginea*), and white beech (*Fagus Sylvestris*). The most numerous of all trees except white oak.

Shellbark hickory (*Carya alba*). Very abundant.

Thick shellbark (*Carya sulcata*). Quite common.

Pig-nut hickory (*Carya glabra*). Common.

White ash (*Fraxinum Americana*). A very common and valuable timber tree.

Blue ash (*Fraxinum quadrangulata*). Rather abundant, and the most valuable of all ash timber.

Hoop ash (*Celtis Mississippiensis*), and hackberry (*Celtis occidentalis*). Quite common, the latter tree the most numerous.

Sycamore (*Platanus occidentalis*). Plentiful along the borders of all our streams.

Butternut (*Juglans Cinerea*). Quite common.

Poplar (*Liriodendron tulipifera*). Once very abundant, now becoming scarce.

Black walnut (*Juglans nigra*). Formerly abundant, but now becoming scarce.

Sugar maple (*Acer saccharinum*). Abundant.

White maple (*Acer dasycarpum*). Common.

Red or swamp maple (*Acer rubrum*). Common.

Wild cherry (*Cerasus Virginiana*). Not abundant

Sweet gum (*Liquidamber Styraciflua*). Common in the southern part of the county; occasionally found in north-east part.

Cottonwood (*Populus angulata*). Quite common along our streams.

Linden-basswood (*Tilia Americana*). Very common.

Buckeye (*Æscules glabra*). Very abundant.

Coffee-nut (*Gymnocladus Canadensis*). Not very abundant.

Honey locust (*Gleditschia triacanthos*). Quite common

Gum (*Nyssa uniflora*). Common.

Slippery elm (*Ulmus fulva*). Common.

White elm (*Ulmus Americana*). Abundant.

Mulberry (*Morus rubra*). Rather abundant.

Red cedar (*Juniperus Virginiana*). A few small groves in the county.

In addition to the timber trees above named there are many smaller varieties, but as they are seldom used for building or mechanical purposes I have thought it unnecessary to name them.

WATER-POWER.

Our streams do not furnish, upon the average, more than one-third the amount of water they did thirty or forty years ago. There were then many water-mills upon the small tributaries of Whitewater that are now abandoned on account of the failure of water. This failure is caused by the destruction of the forests, and by draining the flat uplands. Whilst the surface was covered with trees, brush and leaves, the water, after rains, was prevented from flowing rapidly into the streams, so that the rises were gradual, but since the side-hills have been cleared and set in grass, and the level lands drained, the water rushes rapidly into the streams, causing great floods, which wash the banks, overflow many of the bottoms, and as quickly subside, leaving a deficiency of water as compared with former years. These floods have greatly marred the beauty of the river by washing away the banks, and leaving great accumulations of gravel and sand in its widened bed. Formerly the stream was bordered by trees, and the water was so transparent in the fall and winter that the bottom could be seen at a depth of twenty feet. It is still a very clear stream, but by no means equal to what it was formerly. The fall upon the average is six feet to the mile—some places more, some less—but everywhere ample power may be had to propel almost any amount of machinery.

The Whitewater canal, now abandoned for purposes of navigation, is still used for hydraulic purposes, and fur-

nishes a very large amount of valuable water-power which is used to some extent, but there are still a number of locks unoccupied which are capable of furnishing almost any necessary amount of power.

ANCIENT EARTH-WORKS.

There are few earth-works, except mounds, found in this county. Three miles north of Brookville, and immediately west of the East fork, upon the top of a hill near three hundred and fifty feet high, there is a semicircular wall of earth three hundred yards in length. It is built across a narrow ridge which is formed by two deep ravines, one on the south, the other on the north, which, with the river on the east, isolate the flat on top of the hill (containing fifteen or twenty acres,) from the level country to the west, and was built, probably, to protect the inhabitants from any enemy approaching from that direction.

There are quite a number of earthen mounds in the county, but none of large size; I have seen none more than ten or twelve feet high; many of them are not above three or four feet in height. Those on the highlands bordering the river are uniformly upon the highest places, and always in view of the river and its valley.

These mounds are so situated with reference to each other that a person standing on a mound in the most northern part of the county, overlooking the valley of the river, could see the next mound below him, and from the second the third was in view, and so with all the others, thus forming a chain of observatories, from which the approach of an enemy could be telegraphed with great celerity from one to the other, either by smoke or some other intelligible signal. Though these mounds were used as burial places, I have no doubt they were also used as signal posts; and very probably the signals were made by fire, for the clay of which they are composed in some cases has been burned to near the color of common brick.

The Mound Builders were a people possessing rare good taste, which is evidenced by the situation of their mounds.

These were always built in picturesque positions—either on the highest grounds, or, if in the valleys, upon the edges of the highest river terraces, overlooking the water and the lower portions of the valley.

Two miles below Brookville, upon the farm of Mr. Roberts, there are, within the distance of two furlongs, upon the edge of the highest river terrace, nine small mounds. Besides these nine, which appear to have been completed, there is one barely commenced and abandoned. The commencement was made by digging up the earth to the depth of about twelve inches, which was then thrown out from the center and heaped up around the circumference, forming a circle within which the superstructure was to be erected, and which has very much the appearance of a shallow basin. It was in these basins that the dead were burned, or rather partly burned, for they were not usually entirely consumed. Not many mounds in this neighborhood have been thoroughly explored; and, in such as have, few contain anything more than bones and charcoal. In two of them bracelets of copper were found, and, in some others, a pipe or two; one of these, found in a mound eight miles below Brookville, was said, by those who found it, still to have retained the scent of tobacco; if this be true, it conclusively proves that these people used tobacco as well as their successors, the modern Indians. There are upon many of the high points mounds of stone, which have been erected by a different people from the Mound Builders. These contain vast quantities of human bones, both of adults and children, as well as the bones of squirrels, skunks, and other small animals. These were not probably the burial places for the dead, but a collection of their bones brought together from many places for final sepulture.

FOSSIL BONES OF MASTODON, &C.

Parts of skeletons of three mastodons (*mastodon maximus*) have been exhumed in the neighborhood of Brookville; one of them about a mile below, and the other three and a half miles; both found among the gravel in the up-

per river terrace, some eight or nine feet below the surface. This conclusively proves that these animals existed previously, if not at the time, of the formation of the terraces. They were most probably destroyed by the flood which transported the drift. The third skeleton was found three and a half miles north-east of Brookville, on the farm of Mr. David Barnard, in a piece of marshy ground which he was ditching. A tooth or two, and some other bones of the mammoth (*Elephas primigenius*) were found some years ago in Saltcreek township; one of the grinders, which I once had in my possession, was thirteen inches wide, six inches deep, and four inches thick, and weighed, when found, fourteen pounds, but after being thoroughly dried weighed but eleven. Only about half the tooth had been used in mastication, the balance not having, at the death of the animal, appeared above the integuments of the jaw.

SOIL AND AGRICULTURE.

There is considerable variety in the soil of Franklin county. The Whitewater bottoms are, or at least once were, as productive lands as could be found anywhere; they contain a large per cent. of vegetable matter, or humus, with clay, sand and lime—in fact all the elements of fertility. Some of these lands have produced pretty fair crops of corn for fifty successive years without the use of any kind of manures. This constant cropping in corn, however, is perceptibly exhausting them, and points out the necessity of a rotation in crops, and the application of fertilizers, if we expect them to maintain their fertility.

Forty years ago wheat could not be profitably produced in the alluvial bottoms on account of the great amount of vegetable matter which the soil contained. This has to a considerable extent been exhausted by the growing of corn and these lands now produce good crops of wheat. In the eastern part of the county, Bath, Springfield, and Whitewater townships, there is a large amount of level and very productive land. Many parts of this section were formerly considered to be of little value on account of their swampy

character, but, since they have been cleared and drained, they are considered, taken all in all, to be the most desirable lands we have. The soil is largely composed of vegetable matter with a subsoil of yellow clay.

I will forward a specimen of the soil from Springfield township, which will give you an idea of the character of the soil in that section. Lands there range from forty to eighty dollars per acre.

In Blooming Grove township the soil is gray, and in many cases nearly white, with a yellow argillaceous subsoil found at about fifteen inches below the surface. This clay, when brought up and mixed with the superficial soil greatly enhances its productiveness. I have no doubt that if these lands could be subsoiled, and this clay mixed with the soil, the result would be a great improvement in their productiveness.

In the southern part of the county the soil is also grayish, with a subsoil of arenaceous yellow clay. This soil is not so productive as that in some other parts of the county, but produces fine apples, peaches, and other fruits. In the western part of the county, the soil is gray, with a subsoil of ferruginous-colored clay. This clay abounds in fragments of hornstone. The soil is more productive than its appearance would lead us to expect.

In the surface diluvial soils I have been unable anywhere to find even a trace of lime. None of them effervesce in the slightest degree with acids. If they ever contained lime (which will admit of doubt), it has been *leached* out by the constant percolation of water during past ages. I have found it a hard matter to convince our farmers that their lands contain no lime, and in many cases have entirely failed to do so.

I have no doubt that lime could be beneficially applied to these lands, provided the precaution be taken at the same time to apply manure, muck, or to plow in a crop of green clover.

Our farmers are generally well situated, but little in debt; most of them have good houses, and many even

elegant residences. There is a great amount of substantial comfort and wealth among them. The county is remarkably healthy, and nothing seems to be wanting that is necessary to render them happy and contented.

HYDRAULIC LIMESTONE.

Interstratified with the "Cliff" rock, there are strata of a crumbling impure limestone, having every external appearance of the Louisville cement rock. It has not been tested, but there can be but little doubt that it will prove to be of this character. I have sent specimens to Mr. Speed, of the Louisville Cement Co., to be tested, but as yet have not heard the result.

RUFUS HAYMOND,
Assistant Geologist.

BROOKVILLE, IND., NOV. 22, 1869.

MAMMALS FOUND AT THE PRESENT TIME
IN FRANKLIN COUNTY.

FAMILY SORECIDÆ—SHEWS AND MOLES.

Genus Sorex—The Shrews. There are one or two species of shrews in the county, which I have not been able to identify.

FAMILY TALPIDÆ—MOLES—GENUS SCALOPS.

Scalops aquaticus—Common Mole. These animals are very numerous, and are the only species I have observed here. If the star-nosed mole exists here, I have never met with it.

GENUS VESPERTILIO.

Vespertilio noveboracensis—Red Bat.

V. pruinus—Hoary Bat.

V. rufus—Brown Bat. Bats are numerous here, and belong mostly to the species named above.

CARNIVORA—FAMILY FELIDÆ THE CATS—GENUS LYNX.

Lynx rufus—American Wild Cat. Occasionally there is a wild cat seen in the county, but they are rare.

SUB-FAMILY VULPINÆ—THE FOXES—GENUS VULPES.

Vulpes fulvus—Red Fox. It is only within the last ten or fifteen years that the red fox has been observed in this county. Previously to that time we had none but the common gray variety.

Vulpes Virginianus—Gray Fox. These foxes are numerous; probably as much so as they ever were.

FAMILY MUSTELIDÆ—WEASEL FAMILY—GENUS PUTORIUS.

Putorius noveboracensis—Common Weasel. The common weasel, probably the most rapacious, blood-thirsty and cruel of all carnivorous animals, is still found here, though in small numbers. When they make an attack upon the poultry or rats of a barn they continue to stay as long as anything is left with life, unless prevented by fatigue or the approach of daylight.

Putorius vison—The Common Mink.

Putorius nigrescens—Little Black Mink. These minks are both common—the former the most numerous. These animals are very destructive to poultry, and therefore very unpopular with our good housewives.

SUB-FAMILY LUTRINÆ—THE OTTERS.

Lutra Canadensis—The Otter. It is barely possible that a few of these animals still linger along White Water, though I have seen none for many years.

SUB-FAMILY MELINÆ—THE SKUNKS—GENUS MEPHITES.

Mephites mephitica—Skunk—Polecat. Of the nine species of skunk in America, we have but one; this one, however, is universally conceded to be sufficient. The skunk, notwithstanding its horrid odor, is really a pretty animal; but I apprehend will never be very popular. They are much more numerous in this region than formerly, and seem to be increasing yearly. The young kittens are very pretty little animals, and make pleasant pets, provided they are not *kept too long*.

FAMILY URSIDÆ—THE BEARS—GENUS PROCYON.

Procyon lotor—Raccoon. It is the general opinion of our people that the raccoons are as numerous as they ever were, probably more so; but as their skins are of little

value, they are not hunted as much as formerly, which may account for their abundance.

GENUS *URSUS*.

Ursus Americanus.—Black Bear. The last black bear was seen here about thirty years ago. They were once very numerous. The prints of their claws are yet plainly to be seen upon the smooth bark of hundreds of beech trees in the forests.

FAMILY DIDELPHIDÆ—THE OPOSSUM—GENUS *DIDELPHIS*.

Didelphis Virginiana.—Opossum. The opossum is still abundant. There are but two species of opossum in the United States; one southern, the other northern.

ORDER RODENTIA—THE GNAWERS—FAMILY SCIURIDÆ—THE SQUIRRELS—GENUS *SCIURUS*.

Sciurus vulpinus.—Fox Squirrel. About thirty years ago the fox squirrel made its first appearance in the neighborhood of Brookville, and has gradually increased in numbers until it has become the most numerous of the larger varieties. It will not live in dense forests, but prefers the points where there are but few trees, and the fields with scattering trees having suitable cavities in which to make their nests. These squirrels, if left unmolested, would become very tame, and probably even make their homes about our houses and barns.

Sciurus Carolinensis.—Gray Squirrel and Black Squirrel. My friend Prof. Baird, of the Smithsonian Institute, believes the gray and black squirrels to belong both to the same species. I have more respect for the opinions of Prof. Baird than any other naturalist with whom I have had communication, and his opportunities have been much greater than mine for forming a correct judgment in relation to this subject. Still I am inclined to think he is mistaken. His opinion was made up by comparing a large

number of *dried* skins—mine by comparing fresh specimens of gray and black squirrels. This comparison has led me to believe that there is a difference in form between the black and gray. The black squirrel is shorter and stouter than the gray, and it has seemed to me that their ears are also shorter. They do not seem to be disposed to associate with the gray. Between thirty and forty years ago, there were about one-sixth of the squirrels in south-eastern Indiana black; in north-eastern Indiana nearly half of them were black. At this time there are no black squirrels to be seen in southeastern Indiana, neither has there been for several years. Occasionally gray squirrels are very abundant here; why then is it, if the gray and black be the same, that we no longer find among them the latter? Four years ago the gray squirrels migrated eastward, passing near Brookville, still I neither saw or heard of a black one.

I have always believed the black to be a much wilder squirrel than the gray—and this will account for their having abandoned the densely populated districts, while the gray still remains. It has been generally understood that the farther north a particular species of an animal is found, the lighter its color becomes; but if the *black* be a *gray* squirrel this order of nature has been reversed, for the farther north I have gone in this State the more black squirrels I have seen.

Sciurus Hudsonius.—Mountain Squirrel—Chickaree. But a single specimen of this squirrel has ever been observed in the county.

GENUS PTEROMYS.

Pteromys volucella.—Flying Squirrel. This beautiful little squirrel is very numerous—but, being nocturnal, is not often seen unless it be sought in the holes of old rotten trees and stumps, where it lies concealed during the day. It is easily tamed.

GENUS TAMIAS.

Sciurus (tamias) striatus.—Ground Squirrel—Chipmunk. Very numerous all over the woods and fields; it is probably more numerous than in the early settlement of the country.

GENUS ARCTOMYS.

Arctomys monax.—Woodchuck—Ground-Hog. The ground-hog is very numerous in the Whitewater valley; the gravelly terraces, wherever covered with brushwood, they seem to prefer to all other situations. They have been accused of preying upon domestic fowls, but I apprehend unjustly.

GENUS MUS.

Mus decumanus.—Norway Rat. The brown or Norway rat is here, as elsewhere, extremely numerous. It is one of the hardiest and most energetic animals, constantly increasing in number notwithstanding the utmost exertion of all its enemies, man inclusive. They first appeared at Brookville in the summer of 1827. At that time the black rat was numerous; it was, however, but a year or two after the Norway rat appeared, until they were all gone—all eaten up by this predatory stranger.

The brown rat has been wrongly named Norway rat; they came originally from Persia to Europe, from whence they have spread to the uttermost ends of all civilized countries.

Mus rattus.—Black Rat. As above stated, these have all been destroyed by the Norway rats.

Mus musculus.—Common Mouse. The common house mouse is familiar to every one, and is common everywhere.

GENUS HESPEROMYS.

Hesperomys leucopus.—This mouse is very common in the woods. They feed upon cockle-burs, stores of which

they often lay up in the deserted nest of the song-sparrow and other small birds.

GENUS ARVICOLA.

Arvicola riparius.—Meadow Mouse. Common in the fields and meadows.

GENUS FIBER.

Fiber zibethicus.—Musk Rat. Very common along the rivers, creeks and canal. It is the fur of this animal which is sold to the ladies under the name of "French Mink."

GENUS HYSTRIX.

Hystrix Hudsonius.—Porcupine. Now very rare.

FAMILY LEPORIDÆ—THE HARES—GENUS LEPUS.

Lepus sylvaticus.—Gray Rabbit, or Hare. Of the twelve or thirteen species of hare in the United States, we have but a single one, the common gray rabbit, or more properly, hare, for there are no rabbits natives of America; those we have here were imported from Europe, and are domesticated.

ORDER RUMINANTIA—FAMILY CERVIDÆ—GENUS CERVUS.

Cervus Virginianus.—Virginia Deer, Red Deer. Formerly very abundant, but I presume there is not now a single one living in the county.

The above list I think comprises all the Mammals now to be found in the county.

BIRDS OF FRANKLIN COUNTY, INDIANA.

FAMILY VULTURIDÆ—THE VULTURES—GENUS CATHARTES.

Cathartes Aura—Turkey Buzzard. Numerous during the warmer parts of the year; never seen in very cold weather. Two or three warm days during the winter, happening in succession, scarcely ever pass without a visit from these vultures. This is the only vulture I have ever seen in the county.

SUB-FAMILY FALCONIDÆ—THE FALCONS.

Falco columbarius—Pigeon Hawk. Occasionally seen following the flight of pigeons in their migrations; very rarely seen at other times.

Falco sparverius—The Sparrow Hawk. This beautiful little hawk is very abundant, and a constant resident.

SUB-FAMILY ACCIPITRINÆ—THE HAWKS.

Accipiter Cooperii—Cooper's Hawk. Probably the most numerous of all the hawks. They destroy more young chickens and quails than all the other hawks together. They fly with amazing rapidity, and scarcely ever miss taking their prey.

Accipiter fuscus—Sharp-shinned Hawk. These little hawks are quite common, but, like the sparrow hawk, are too small to do much mischief in the poultry-yard.

SUB-GENUS BUTES.

Buteo borealis—The Red-tailed Hawk. Very numerous here, as well as throughout the wooded districts of the western country. They prey upon domestic fowls, hares, squirrels, the tufted grouse, and quails.

Archibuteo Sancti Johannis—The Black Hawk. I have seen but two or three of these birds; these I think were not residents, but strangers.

Nauclerus furcatus—The Swallow-tailed Hawk. I have seen but a single specimen of this hawk. It is a remarkably beautiful bird, looking something like a gigantic swallow.

GENUS AQUILA.

Aquila Canadensis—The Golden Eagle. Frequently seen. More numerous in fall and winter than at other seasons.

GENUS HALIETUS.

Haliaetus Washingtonii—The Washington Eagle. This magnificent bird has been seen along White Water almost every winter for fifty years. I have myself seen them very frequently.

Haliaetus leucocephalus—The Bald Eagle. Very common in fall and winter.

PANDION.

Pandion Carolinensis—The Fish Hawk—Osprey. This beautiful eagle is often seen in the spring and fall. They do not breed here.

GENUS BUBO.

Bubo Virginianus—The Great Horned Owl. This powerful and rapacious bird is numerous, probably as much so as any other owl.

Scops Asio—The Screech Owl. This pretty little owl is abundant.

GENUS SYRNIUM.

Syrnium nebulosum—The Barred Owl. This is a very common owl in all the western country; usually most numerous in densely wooded districts, but I have seen two of them in prairies, miles from any tree.

GENUS NYCTALE.

Nyctale acadica—Saw-whet Owl. I have seen but a single specimen of this owl in the county, but have heard of others having been seen.

GENUS CONURUS—PARROT FAMILY.

Conurus Carolinensis—Parakeet—Carolina Parrot. I have seen but a single flock of these birds, in June, many years ago. There were in the first settlement of the county, were are told by the old inhabitants, very numerous.

GENUS COCCYGUS.

Coccygus Americana—Yellow-billed Cuckoo. This curious bird is very numerous, arriving late in May. Its strange hammering or pounding note may frequently be heard in the woods both day and night. These birds should be sacredly protected, because they feed principally upon the caterpillar. of which they destroy immense numbers.

FAMILY PICIDÆ—THE WOODPECKERS—GENUS CAMPEPHILIS.

Campephilus principalis—Ivory-billed Woodpecker. A former resident in the county. None have been seen for many years.

GENUS PICUS.

Picus villosus.—The Hairy Woodpecker. Resident. Very abundant. There are two or three varieties of this woodpecker, varing slightly in size.

Picus pubescens—Downy Woodpecker. Resident. This is a very abundant species. Often seen in our orchards, as well as among ornamental trees around our residences. This and the former species are erroneously called Sapsuckers. Neither of them is the bird which bores holes in the bark of living trees for the purpose of drinking the sap. The only holes they bore are made in searching for worms

mostly in dead limbs or decaying wood. They should be protected as friends, and not destroyed as enemies.

GENUS SPHYRAPICUS.

Sphyrapicus varius—Yellow-bellied Woodpecker. Quite numerous. Resident.

GENUS HYLATAMUS.

Hylotomus pileatus—Black Woodpecker. Resident. This large woodpecker was once numerous, but is now rarely seen.

GENUS CENTURUS.

Centurus Carolinus—Red-bellied Woodpecker. The true Sapsucker. This woodpecker is very common in spring and autumn. This is the bird which bores holes in the sugar maple, apple trees, etc., for the purpose of drinking the sap. These holes, when bored in the bark of the apple tree in October, fill up with a viscid sweet sap, which the bird collects from day to day; and so with the sugar maple, hickory, and some other trees. They are very quiet birds, and not so often seen as many other less numerous species. They have a peculiar squealing note when frequenting the orchards, which is often heard when the bird itself is not to be seen without considerable search. Resident.

GENUS MELANERPES.

Melanerpes erythrocephalus—Red-headed Woodpecker. This is the most numerous and showy of all the woodpeckers, and the most universally known. In seasons when there is no mast, acorns and beechnuts, they all migrate to warmer regions, but when there are plenty most of them remain. They lay up sufficient stores of these to support themselves during the winter. They deposit beechnuts in holes in decaying trees—the acorns they generally hull, split into two parts, and drive them into the cracks of dry trees. During the whole time they are laying up these

stores, and, in fact, during the whole winter, there is constant turmoil, strife and fighting going on amongst them, caused by a universal propensity to rob their neighbors, which, of course, is resisted, hence the noise and strife everywhere heard in the woods upon the ripening of the mast. When they migrate they never return until the weather becomes settled and warm—about the first of May.

GENUS COLAPTES.

Colaptes auratus—Flicker, Yellow-hammer, High-holder. This is a very common bird. It feeds mostly upon worms and insects, and is especially beneficial to the farmer from the millions of larvæ, etc., which it destroys during the year. A constant resident.

GENUS TROCHILUS.

Trochilus colubris—Ruby-throated Humming Bird. This beautiful little bird is very numerous. Though so small and apparently frail it arrives early in the spring—about the 10th to 15th of April. Migratory.

GENUS CHÆTURA.

Chætura pelagica—Chimney Swallow. Migratory. This is a very numerous species. They arrive late in May, behind all other swallows, but remain some six weeks longer in the fall than the others.

GENUS ANTRASTOMUS.

Antrastomus vociferus—Whip-poor-will. This noisy bird always has been numerous here. They make no nest at all, simply laying their two eggs on a leaf or the ground. The young are beautiful, little downy creatures before the wing and tail feathers have become visible.

GENUS CHORDEILES.

Chordeiles Americanus—Night Hawk, Bull Bat. The night hawk is very numerous in the month of May, re-

maining some time before passing on to their usual breeding-places farther north. A few breed here. Many persons confound this bird with the whip-poor-will. They belong to the same family, but there is a very great difference in the appearance of the two birds. On their return from the north in September, their number seems to be much greater than in the spring.

GENUS CERYLE.

Ceryle alcyon—Belted Kingfisher. Resident. The Kingfisher is very numerous along all our streams, winter and summer. This is the only kingfisher we have.

GENUS TYRANNUS.

Tyrannus Carolinensis—King Bird. Migratory. Very common; arriving late in the season, and departing early in autumn. They are the most courageous of all the smaller birds (except the *Parus atricapillus*), fearlessly attacking eagles, hawks, ravens and crows indiscriminately.

GENUS MYIARCHUS.

Myiarchus crinita—Great Crested Flycatcher. Very numerous; arriving about the first of May. They build their nests in hollow trees. Migratory.

GENUS SAGORNIS.

Sagornis fusca—Pewee. Migratory. This bird is familiar to every one, and is numerous; arriving usually in March, and remaining until the weather begins to get cold.

GENUS CANTOPUS.

Cantopus virens—Wood Pewee. Migratory. Very numerous; arrive about the first of May.

GENUS EMPIDONAX.

Empidonax Traillii—Traill's Fly-catcher; migratory. Rare. I have seen probably not to exceed a dozen in a residence of forty years.

Empidonax acadica—Green-crested Flycatcher; migratory. Very common in thickly wooded districts; more common among beech timber than elsewhere. Nearly always build their nests upon the lower branches of beech trees, from four to fifteen feet from the ground, in caves or near ravines, where the nest is protected from the winds. The nest is hanging, suspended from the two branches of a forked limb, very similar in form and material to the nest of the Red-eyed Flycatcher, but not so deep.

GENUS TURDUS.

Turdus mustelinus—Wood Thrush; migratory. Numerous here, and all over the wooded districts of the western country. The male and female sit by turns during incubation. Of all the thrushes, its notes are the most beautiful, clear, and full, varying through many tones impossible to describe, ending in a metallic vibratory sound, which to be appreciated must be heard.

Turdus Pallasi—Hermit Thrush; migratory. Occasionally, though rarely, seen.

Turdus fuscescens—Wilson's Thrush; migratory. Have seen a few specimens; does not breed here.

Turdus Swainsonii—Olive-backed Thrush; migratory. Have seen but a single specimen.

Turdus migratorius—Robin; semi-migratory. This is by all odds the most numerous of the thrushes. Most of them go south during the winter, but it is not uncommon to see large numbers of them during that season. In the latter part of the winter these birds occasionally roost at a given place in vast numbers, as pigeons are in the habit of doing. I have known this to be the case in two instances in the neighborhood of Brookville. Thousands of them were killed by ruthless "pot-hunters."

GENUS SIALIA.

Sialia Sialis—Blue Bird; resident. This popular and familiar bird is very abundant; seen at all seasons.

GENUS REGULUS.

Regulus Calendula—Ruby-crowned Wren; migratory. These diminutive birds are common in fall and winter.

Regulus satrapa — Golden-crested Wren; migratory. Common in fall and winter. About as numerous as the ruby-crowned wren.

GENUS MNIOTILTA.

Mniotilta varia—Black and White Creeper. Very abundant. Its note may be heard at any time in the woods during spring and early summer. They build their nests on the ground.

GENUS GEOTHYLPSIS.

Geothlypis trichas—Have seen but a few specimens.

GENUS ICTERIA.

Icteria viridis—Yellow-chested Chat. Very common upon all brushy points where there are but few forest trees. Never found in deep wooded solitudes.

GENUS HELMINTHOPHAGA.

Helminthophaga pinus—Blue-winged Yellow Warbler. I have seen but a single bird of this species, at least that I recognized as such. Migratory.

GENUS SEIURUS.

Seiurus aurocapillus—Oven Bird, or Golden-crowned Thrush. This is a very common bird, arriving about the first of May. In passing through the woods, one is scarcely ever out of the sound of their voice. Migratory.

Seiurus noveboracensis — Water Thrush; migratory. These noisy little thrushes are heard along all the smaller streams in early spring, usually arriving in March.

GENUS DENDROICA.

Dendroica virens—Black-throated Green Warbler; migratory. Occasionally seen as they pass to and from their breeding grounds in the North.

Dendroica coronata—Yellow-rumped Warbler; migratory. Quite common.

Dendroica aestiva—Yellow Warbler; migratory. These pretty little birds are quite common, and build their nests in rose bushes and other trees and shrubs, close to our dwellings in the town.

Dendroica superciliosa—Yellow-throated Warbler. Common.

GENUS MYIODIOCTES.

Myiodioctes mitratus—Hooded Warbler; migratory. The most numerous probably of all the warblers. This bird most always attracts the attention of all who see it, from the curious contrast of intense black and deep yellow which mostly characterize its plumage. Builds its nest upon low shrubs.

GENUS LETOPHAGA.

Setophaga ruticilla—Red Start; migratory. This beautiful little bird is very numerous, and may be seen any day in warm weather, pursuing gnats and flies, in catching which they are very expert. It builds its nest, usually, in the forks of bushes from eight to fifteen feet from the ground. It arrives about the first of May, and departs in September.

GENUS PYRANGA.

Pyranga rubra—Scarlet Tanager; migratory. Arrives last of April. This beautiful bird is very numerous through all our woods. It is the only one of the genus found here. The Summer Red Bird I have never seen here.

FAMILY HIRUNDINIDÆ—THE SWALLOWS—GENUS HIRUN

Hirundo horreorum—Barn Swallow. This bird, so familiar to every one, is very numerous. It arrives early in April, and departs in the forepart of September.

Hirundo lunifrons—Cliff Swallow — Republican Swallow. This swallow has been quite numerous since the summer of 1849. During that year, for the first time, they built their nests in the county. Prior to that time, I had occasionally seen them passing through the county. They are now, probably, as numerous as any other swallow.

Hirundo bicolor—White-bellied Swallow. I have seen a few of these birds as they passed through to their breeding grounds further north. They do not breed here, but in the northern part of the State, near Warsaw, many of them build their nests. They are built in the hollows of trees and the deserted holes of the woodpecker.

GENUS COTYLE.

Cotyle riparia—Bank Swallow. Numerous along all the streams with abrupt sandy banks, into which they burrow and build their nests. They often arrive in March.

Cotyle serripennis—Rough-winged Swallow. Occasionally seen, but hard to distinguish from the former.

GENUS PROGNE.

Progne purpurea.—Purple Martin. These birds are numerous, and a great favorite with our people. I have seen them as early as the 17th of March. They generally all leave by the first week in September.

GENUS AMPELIS.

Ampelis cedrorum.—Cedar Bird, resident. These birds are common. They breed from June to September. I have seen three of their nests in the town, two in June and

one in September. All three were upon shade trees on the principal business street of the town, under which people were constantly passing.

GENUS COLLYRIO.

Collyrio borealis.—Shrike—Butcher Bird. Frequently seen in autumn and winter. In 1854, I saw a Butcher bird flying with a Goldfinch, which it had just caught. Going in the direction it flew, a short time afterwards, I found it upon a small elm tree eating the bird, having suspended it in the cleft of a small split elm. The idea instantly occurred to me that the habit this bird has of sticking pieces of flesh and insects upon thorns and other sharp substances, is done as a matter of convenience, enabling them to eat at their leisure, and saving the labor of holding them with their feet, which are rather feeble, and not for the purpose of decoying other birds, as many persons have supposed. I have upon one occasion, myself, seen a Butcher bird fly to a thorn bush, and take off a piece of a bird which it had previously stuck upon one of the thorns—showing that this habit, in addition to its convenience, should be considered as one of economy, enabling it to save, for future wants, that which is not necessary for present use.

GENUS VIREO.

Vireo olivaceus.—Red-eyed Flycatcher, migratory. This bird is so numerous that a traveler through our woods, during the summer is scarcely ever out of the sound of their voices.

Vireo noveboracensis.—White-eyed Vireo. These little birds are quite common. Their nests are suspended, like those of the Red-eyed Fly-catcher, from a forked limb.

GENUS MIMUS.

Mimus polyglottus.—Mocking Bird, migratory. This celebrated songster occasionally strays this far north. I

have seen two or three, and have heard the song of a few others here, within the last forty years.

Mimus Carolinensis.—Cat Bird. Migratory. The Cat bird arrives about the first of May. They are numerous all over the west. I have seen them in numbers as far north as St. Paul, Minnesota, in the month of October. It is not popular on account of the habit it has of eating the eggs and young of other small birds. They hatch as many as three broods of young occasionally, though, generally, but two during the year.

GENUS HARPORHYNCHUS.

Harporynchus rufus.—Brown Thrush, migratory. The Brown Thrush arrives about the first of April. It is very numerous, and the best imitator of all the thrushes except the Mocking bird.

GENUS THRYOTHORUS.

Thryothorus ludovicianus.—Great Carolina Wren. Numerous, and resident throughout the year.

Thryothorus Bewickii.—Bewick's Wren. Occasionally seen. Does not breed here.

GENUS TROGLODYTES.

Troglodytes aeden.—House Wren, migratory. Have seen but two in the county. None breed here.

Troglodytes hyemalis.—Winter Wren. This beautiful little Troglodyte is very common during the winter. I have heard it sing but once—that song was beautiful.

GENUS CERTHIA.

Certhia Americana.—American Creeper. Occasionally seen, though not numerous.

GENUS SITTA.

Sitta Carolinensis.—White-bellied Nuthatch. This familiar bird is very numerous, and known to our citizens by the name of Tom-tit. It is a permanent resident.

Sitta Canadensis.—Red-bellied Nuthatch. This bird does not reside or breed here, but is occasionally seen late in autumn and winter.

GENUS POLIOPTILA.

Polioptila cærulea.—Blue-gray Flycatcher. This lively little bird is very little larger than a Humming-bird. It arrives early in April, and proceeds immediately to construct its nest. It chooses for its situation a smooth limb of a tree, from ten to sixty feet from the ground, not horizontal, but inclining slightly downwards; upon this it begins its nest by placing small pieces of lichens in a circle, fastening them down with fibers of spiders' web. This process it continues until the nest is of sufficient height, the whole surface being covered with small pieces of gray lichens. But the most remarkable thing in this fabric, is the fact that every piece of lichen is placed with its proper side out, just as it grew upon the tree—looking to a person not familiar with the nest very much like a lichen-covered knot.

GENUS LOPHOPHANES.

Lophophanes bicolor.—Tufted Titmouse. Very numerous, and seen at all seasons of the year. They build their nests in the hollows of trees and limbs, often in our decaying apple-trees.

GENUS PARUS.

Parus atricapillus.—Black-cap Titmouse. Very numerous, and a constant resident. They build their nests in small holes and in cavities of limbs, fence-rails, etc., if they can find such; if not, they peck out a hole in rotten stems and trees to suit themselves. The nest is always near the

ground. Though so small, they are the most courageous birds I know. If you disturb their young when nearly ready to fly, they will actually dash against your hand if placed in or near the nest.

GENUS CARPODACUS.

Carpodacus purpureus—Purple Finch. Frequently seen in winter and spring. They breed in the north and winter in more temperate latitudes.

GENUS CHRYSOMITRIS.

Chrysomitris tristis—Yellow Bird, Thistle Bird. Very numerous and a constant resident. Breed from June to September.

GENUS CURVIROSTRA.

Curvirostra Americana—Red Crossbill. Seen here almost every winter—feeding upon sunflower seeds and seeds of the larch.

GENUS PLECTROPHANES.

Plectrophanes nivalis—Snow Bunting. I have seen these birds occasionally during severe winters.

GENUS PASSERCULUS.

Passerculus Savanna—Savanna Sparrow. I have seen a few of these birds. Rare.

GENUS POECETES.

Poecetes gramineus—Bay-winged Finch. Very common in all our fields. Build their nests on the ground.

GENUS ZONOTRICHIA.

Zonotrichia leucophrys—White-crowned Sparrow. They seem to spend the winter here, and are seen until near the first of June, when they disappear, and are seen no more till fall.

Zonotrichia albicollis—White-throated Sparrow. Common in winter and spring.

GENUS JUNCO.

Junco hyemalis—Snow Bird. Very abundant from October to middle of April.

GENUS SPIZELLA.

Spizella monticola—Tree Sparrow. Very numerous in winter, keeping company with the snow birds. The habits of the two birds are very similar.

Spizella pusilla—Old-field Sparrow. Very numerous during summer in old fields, partly covered with briars, upon which they build their nests. They are similar in general appearance and size to the Social Sparrow.

Spizella socialis—Chipping Sparrow. These social birds are very numerous, appearing about the first of April, and remaining in the fall until the appearance of frost.

GENUS MELOSPIZA.

Melospiza melodia—Song Sparrow. Resident. Very numerous both winter and summer; frequently making their nests among the shrubbery of our yards, and raising two or three broods during the summer and autumn.

GENUS GUIRACA.

Guiraca ludoviciana—Rose-breasted Grosbeak. This showy and beautiful bird is frequently met with late in May and early June. I have never met with its nest, and cannot be sure that it breeds here, but, having on one occasion seen the bird in August, I am inclined to believe they occasionally do.

GENUS CYANOSPIZA.

Cyanospiza cyanea—Indigo Bird. Migratory. Quite numerous on the borders of our fields. Like to build their

nest in fields upon isolated bushes, not often more than four feet from the ground. I have seen a nest on a rose-bush within a foot of a front door of one of the residences in the town.

GENUS CARDINALIS.

Cardinalis Virginianus—Red Bird, Cardinal Grosbeak. The Red bird is very abundant here, as it is in all districts of the Western country. The male is a good singer, and on this account is kept in cages by many of our citizens. It is a constant resident.

GENUS PIPILO.

Pipilo erythrophthalmus—Ground Robin, Chewink. Found usually in thickets and about brush piles—keeps mostly upon the ground, and runs much more than it flies. Builds its nest upon the ground. Constant resident.

GENUS DOLICHONYX.

Dolichonyx oryzivorus—Bobolink, Reed Bird, Ortolan. I have occasionally seen this bird in our grassy fields in the last of May and first of June. They occasionally stay a week or two, but never breed here to my knowledge.

GENUS MOLOTHRUS.

Molothrus pecoris—Cow Black Bird, Cow Bunting. This is a very numerous species—seen at all seasons of the year. It never builds a nest of its own, but lays all its eggs in the nests of other and smaller birds than itself. They lay but one in each nest. I have frequently found their eggs in the nests of the red-eyed flycatcher, indigo blue-bird, blue-gray gnatcatcher, redstart, etc. When this egg hatches, the young bird, being larger than the legitimate nestlings, it crowds all the latter out of the nest, and remains the sole occupant, and is reared with labor by its foster parents. As soon as it becomes fully grown it joins the first flock of its kindred it meets with. These birds

during the latter part of summer are found following the cows as they feed along in the pastures, keeping close to their heads, usually some on each side, and moving as they move. It is not certainly known why they do this, but most probably they do it for the purpose of catching such insects as the cow may scare up in her progress.

GENUS AGELAIUS.

Agelaius Phoeniceus.—Swamp Blackbird. These black-birds are common about marshy grounds, but, from the scarcity of swamps in the county, they are few in comparison to the vast numbers found in the northern part of the State. A few make their nests here.

GENUS STURNELLA.

Sturnella magna.—Meadow Lark. Resident. This starling is abundant in all our meadows. Its nest is built upon the ground.

GENUS ICTERUS.

Icterus spurius.—Orchard Oriole. Migratory. This very noisy bird is numerous. Arrives about the first of May.

Icterus Baltimore.—Baltimore Oriole. Migratory. Quite numerous; arriving during the first week of May. It breeds here, building a pendulous nest, which it hangs from the drooping ends of long branches of trees, as far from the body of the tree as possible, with a view of protecting the nest from climbing enemys.

GENUS QUISCALUS.

Quiscalus versicolor.—Crow Blackbird. Very abundant, arriving in March, and building their nests in April and May. After rearing their young, they proceed north about the first of August, and return, going south in the month of October.

GENUS CORVUS.

Corvus carnivorus.—American Raven. The raven was once numerous in this section, yet now so rare that I have seen but one during the past twenty years.

Corvus Americanus.—Common Crow. Rather numerous at all seasons of the year except in extreme cold weather, when they are seldom seen. A few days of warm weather in the winter seldom pass without the crows making their appearance.

GENUS CYANUVUS.

Cyanura cristata.—Bluejay. The bluejay is the dandy of the corvidæ family, and seems disposed to show himself on all occasions to the best advantage. For many years they were in the habit of building their nests in the ornamental and fruit trees of the town; but they are not very popular neighbors, for, like the cat-bird, they rob the nests of the social sparrow and other small and helpless birds.

GENUS ECTOPISTES.

Ectopistes migratoria.—Wild Pigeon. Still seen in large numbers, though evidently they have been constantly diminishing in numbers for the last forty years, and are probably not half so numerous as they formerly were.

In the months of January and February, 1854, these birds roosted about two miles from Brookville, notwithstanding the country is thickly inhabited. No one who did not see them, or who has not seen a "pigeon roost," can form any adequate conception of their numbers.

GENUS ZENAIDURA.

Zenaidura Carolinensis.—Turtle Dove. Very abundant. A constant resident throughout the year.

GENUS MELEAGRIS.

Meleagris gallopavo.—Wild Turkey. I can remember when wild turkeys were very numerous, but it is doubtful whether at this time there is even a solitary individual left. This is not the bird from which the stock of our tame turkeys originated. Our species cannot be domesticated. It has often been tried, but finally they all wander off and become wild. The wild turkey has no wattle under its chin and throat as the tame species have, neither do they have any white feathers. The domestic turkey originated most probably in Mexico or some of the West India islands, where there are wild turkeys marked with white.

FAMILY TETRAONIDÆ—THE GROUSE—GENUS BONASA.

Bonasa umbellus.—Ruffed Grouse: Partridge: Pheasant. This beautiful grouse, once so numerous, is becoming rare. There are still a few of them lingering among the brush of our uncultivated hillsides. The curious drumming noise which this bird is in the habit of making during the breeding season in the spring, and upon warm days in the latter part of October and first of November, is familiar to all who live near its haunts; but the manner in which this sound is produced seems to have escaped the observation of nearly every one. Even the great Audubon, whose observations were usually so correct, was mistaken as to the manner of its production. He says it "beats its sides with its wings, in the manner of the domestic cock, but more loudly, and with such rapidity of motion, after a few of the first strokes, as to cause a tremor in the air not unlike the rumbling of distant thunder." This is well told, and true, with the single exception that the bird in drumming does *not* beat its sides.

The drumming is produced thus: The pheasant, standing upon the trunk of a prostrate tree, usually surrounded by brushwood, erects his body to its full height, and produces the drumming sound by striking the *convex surfaces* of his *outstretched wings together behind his back*, just as

we often see boys swinging their outstretched arms behind them, so as to make the backs of their hands meet behind and opposite the spine. This is the truth of the matter. Audubons' idea that the pheasant could produce a louder noise than the domestic cock, nearly four times his size, by beating its small compact body with its wings, is, to say the least, a curious mistake. The *hollow rumbling* sound could *not* be produced in this manner.

GENUS ORTYX.

Ortyx Virginianus.—Quail—Bob White. The quail is still rather common, but not so numerous as formerly. In addition to its other enemies, the red fox has recently made its appearance in this county, and probably destroys more of them than all the others.

FAMILY GRUIDE—THE CRANES—GENUS GRUS.

Grus Canadensis.—Sand-hill Crane.—I have never seen but three sandhill cranes in the county. They are very numerous in the northwestern part of the State. The white or great whooping crane is seen there also occasionally.

FAMILY ARDEIDE—THE HERONS—GENUS GARZETTA.

Garzetta candidissima.—Snowy Heron. Frequently seen along Whitewater in August and September.

GENUS ARDEA.

Ardea Herodias.—Great Blue Heron or Crane. Very frequently seen—occasionally even in winter.

GENUS ARDETTA.

Ardetta exilis.—I have never seen but two of these beautiful little bitterns in the county.

GENUS BOTAURUS.

Botaurus lentiginosus.—Bittern—Stake-driver. This bittern is rare here—have seen three individuals. In the

northwestern part of the State they are quite numerous. Some of the people there call them *Thunder-pumpers*.

GENUS BUTORIDES.

Butorides virescens—Green Heron—Fly-up-the-Creek. This is by far the most numerous of the heron family. They breed here.

GENUS NYCTIARDEA.

Nyctiardea Gardeni—Night Heron. I have seen two of these herons only. They are rare.

GENUS TANTALUS.

Tantalus loculator—Wood Ibis. These large and curious birds occasionally visit the Whitewater valley in the month of August. Some years ago I kept one (which had a broken wing) about six weeks. In that time it became very tame, learned its name, and would come when called. We fed it upon living fish, which it would swallow with amazing rapidity, except catfish, which required labor and time to dispose of. It died from having eaten a mackerel which had been placed in a basin to soak.

GENUS CHARADRIUS.

Charadrius Virginicus—Golden Plover. Have occasionally seen this plover.

GENUS ÆGIALITIS.

Ægialitis vociferus—Killdeer. This noisy plover is very numerous, and a constant resident throughout the year.

GENUS STREPSILAS.

Strepsilas interpres—Turnstone. Have seen a few flocks of these birds passing through the country.

GEEUS PHILOHELA.

Philohela minor—American Woodcock. The woodcock is not, nor never has been, very numerous in this part of Indiana, owing mainly, I apprehend, to the fact that we have but little swampy land of the character which they frequent. They are, however, occasionally seen.

GENUS GALLINAGO.

Gallinago Wilsonii—Wilson's Snipe. Where swampy meadows are found these birds may occasionally be seen in the latter part of March and through the month of April.

GENUS TRINGA.

Tringa maculata—Jack Snipe. The jack snipe is not numerous, though I have occasionally seen it about ponds.

Tringa Wilsonii—Least Sandpiper. Frequent our rivers, though by no means abundant.

GENUS SYMPHEMIA.

Symphemia semipalmata—Willet. This noisy bird is frequently seen along Whitewater in early spring and autumn. It is a fisher, and catches small minnows by running them down in shallow water, all the while uttering its shrill discordant notes, which may be heard at the distance of half a mile.

GENUS RHYACOPHILUS.

Rhyacophilus solitarius—I have frequently observed this bird, though they are by no means numerous.

GENUS TRINGOIDES.

Tringoides macularius—Spotted Sandpiper. This noisy restless sandpiper is much the most numerous of all the family in this region. They build their nests near the banks of the river, in a bunch of reeds or under a small

bush. Their eggs are much larger in proportion to its size than those of any other bird I have ever known.

GENUS ACTITURUS.

Actiturus Bartramius.—Bartram's Sandpiper—Field Plover. I have seen but two of these birds in the county. In southern Illinois they are numerous all over the prairies.

GENUS NUMENIUS.

Numenius longirostris.—Long-billed Curlew. Very rare only one or two have been seen.

GENUS PORZANA.

Porzana Carolina.—Sora. Common Rail. Frequently seen in spring on their way north. They breed in Kosciusko and other northern counties.

GENUS FULICA.

Fulica Americana.—Coot. Mud Hen. When overtaken by storms these birds frequently stop in our streams and remain a few days. They do not breed here.

GENUS GALLINULA.

Gallinula galeata.—Florida Gallinule. I have seen two gallinules which had been caught in the neighborhood. They seem to have very little fear of man, and are easily tamed.

GENUS ANSER.

Anser hyperboreus.—Snow Goose. Occasionally seen flying over in their migrations.

Anser Cærulescens.—White-headed goose. I have seen one flock containing four of these geese.

GENUS BERNICLA.

Bernicla Canadensis.—Wild Goose—Canadian Goose. Seen in large flocks every fall and spring in their semi-annual migrations. They rarely ever stop, except they become bewildered during dense fogs.

Bernicla Brenta.—Brant. Occasionally seen flying over when migrating.

GENUS ANAS.

Anas boschas.—Mallard—Green-head. This duck is probably more numerous in our waters than any other species.

GENUS DAFILA.

Dafila acuta.—Pintail—Sprigtail. Has rarely been seen within the past ten years.

GENUS NETTION.

Nettion Carolinensis.—Green-winged Teal. This beautiful little duck is regularly seen here in the spring and fall.

GENUS QUERQUEDULA.

Querquedula discors.—Blue-winged Teal. This diminutive duck appears here about the first of October, usually remaining several days. They are very unsuspecting birds, and easily approached by the gunners, and are therefore much sought after by "pot hunters."

GENUS SPATULA.

Spatula clypeata.—Shoveler Duck. This very curiously marked duck is common late in April, when most other ducks have disappeared.

GENUS MARECA.

Mareca Penelope.—Widgeon. In the year 1855 a few widgeons were shot here. This is the only instance known of their appearance here.

GENUS AIX.

Aix sponsa.—Summer Duck. Wood Duck. This, decidedly the most beautiful of all the ducks, is very common along Whitewater. They always build their nest in hollow trees, and never upon the ground, as is the custom of all other ducks.

GENUS FULIX.

Fulix marila.—Big Black Head Duck.

Fulix affinis.—Little Black Head. Both these ducks are occasionally seen, though by no means abundant.

GENUS AYTHYA.

Aythya Americana.—Red Head. Pochard. But a single instance known of their having appeared here—1855.

Aythya vallisneria.—Canvas Back Duck. This far-famed duck made its appearance here for the first and only time, to my knowledge, in the month of March, 1855. One of them was shot by a friend, which I had a chance to examine and afterwards to taste. It was very tender and juicy, but had such a fishy flavor that it could scarcely be eaten. I supposed they had come from the southern sea-coast, where they had fed upon shell-fish instead of eel-grass, which seems to be necessary to perfect their flavor.

GENUS BUCEPHALA.

Bucephala Americana.—Golden Eye. Quite common in spring.

Bucephala albeola.—Butter Ball. Quite numerous through the fall and winter.

GENUS MELANETTA.

Melanetta velvetina.—Velvet Duck. Numerous in winter.

GENUS MERGUS.

Mergus Americanus—Sheldrake. These birds are very numerous in Whitewater during the whole winter, which they visit for the purpose of fishing. The stream is remarkably clear, and, being very rapid, seldom freezes over, but the water becomes cold enough to benumb the fish, which thus fall an easy prey to these expert divers. I have known one of them to hatch and rear its brood in this vicinity.

GENUS LOPHODYTES.

Lophodytes cucullatus—Hooded Merganser. This handsome little merganser is very numerous during the colder periods of the year.

GENUS LARUS.

Larus argentatus—The Silvery Gull. Occasionally seen in autumn and spring.

GENUS CHROICOCEPHALUS.

Chroicocephalus Philadelphius—Bonaparte's Gull. Frequently seen all over the State. A small but beautiful bird.

GENUS STERNA.

Sterna paradisea—The Roseate Tern. I have frequently seen this tern along the river and canal.

GENUS PELECANUS.

Pelecanus onacrotalus—Rough-billed Pelican. The pelican occasionally visits us, but its visits are like those of the angels, "few and far between."

GENUS GRACULUS.

Graculus carbo—Common Cormorant. I have seen a single specimen in the winter.

GENUS COLYMBUS

Colymbus torquatus—Loon, Great Northern Diver. The loon is frequently seen in our waters in the fall and spring. Those I have seen in the water were great divers, but could not be forced to take wing. The solitary cry or wail of the loon is, to my ear, the most melancholy sound I have ever heard, conveying to the mind the idea of utter hopelessness and despair.

GENUS PODILYMBUS.

Podilymbus podiceps—Didapper. Grebe. Very common in our waters in October and November. They generally remain about three weeks.

This concludes the list of all the birds of the county which I have observed and been able to identify. Doubtless many others visit this section which I have not observed, and I have seen many which I have not been able to identify.