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PROCEEDINGS OF THE OTTAWA ACADEMY
OF NATURAL SCIENCES.

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THE

LAND & FRESH WATER SHELLS;

OF

LA SALLE COUNTY, ILLS.,

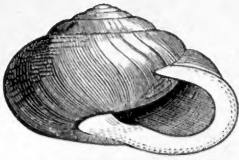
By W. ^{William} W. [✓]CALKINS.

CHICAGO, ILLINOIS, MARCH



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CHICAGO :
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1874.



Helix albolabris.



Helix alternata.



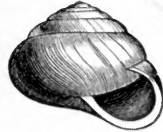
Helix clausa.



Hy. lineata. (enlarged.)



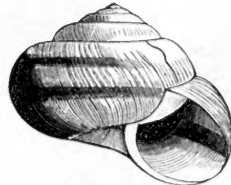
Helix multilineata.



Helix Pennsylvanica.



Helix profunda.



Helix solitaria.



Succinea obliqua.



Try. Lewisii.



PREFACE.

THIS Publication is undertaken by me after several years of careful study. My researches among the Mollusks have not, however, been confined to any prescribed area. Were it so, I should not venture to describe even the Species of one county. My collections have been made in every part of the world; and I have thus accumulated abundant material for study and comparison. I regret that my investigations of the *soft parts* have not been more extensive and thorough, as I regard a complete knowledge of these essential to the proper understanding and definite settlement of species. This is, however, a branch of the study in which all our naturalists are deficient. The species of the United States have occupied my attention more than those of any other country, from the fact that specimens are abundant and easily obtained. And, also, the variations of many American species are very great, thus challenging the wonder and attention of the naturalist at every step. Not only new forms, but the differences occurring in established species, are inducements to research. The field is by no means exhausted or fully explored. If I shall succeed in turning attention in this direction, or in adding anything of interest to the facts already known, my labors will be amply compensated. In this County there are a large number interested in the study of Natural History, and this paper is intended to aid them in prosecuting their investigations in the department of the Mollusca.

A knowledge of the science of Conchology (or of any science,) cannot be acquired in a day; neither in years can one become perfect. We must climb step by step. I do not profess to be more than a beginner myself. Professor Louis Agassiz said that all he had accomplished might be summed up in one single sentence. Therefore, I would say to my young naturalist friends--be not discouraged by the seeming vastness

of the subject. This, on more intimate acquaintance, will prove its greatest charm and a tremendous stimulant to exertion. The difficulty generally is *to know how to begin*. My first attempts were devoted to mere collecting in both fossil and recent conchology. I accumulated vast numbers of specimens, which I endeavored to arrange and classify. It was slow work at first. And I desire here to express my gratitude to an old friend who relieved my perplexities and encouraged me to further labors. I refer to Dr. L. N. Dimmick, now of Santa Barbara, California.

In regard to the species of Mollusca found in this county the number may seem large when we consider the geographical limits. And yet I am well aware that all are not enumerated in this paper. The list is, however, very respectable, and shows not only the interest attaching to this field but indicates that there remain additional facts and species to be investigated. I have taken the utmost pains to have this paper free from errors. My descriptions of species are intended to be short, plain and concise, embracing, perhaps, parts of those used by the authors. But species vary with their localities. This is illustrated in several descriptions of Thomas Say. One species of our La Salle county univalves also exhibits important modifications. In this paper my groupings are based mainly on the latest authorities in this country. For the purpose, I have consulted Binney and Bland's "Land and Fresh Water Shells." I have also looked over the "Invertebrata of Mass.," by Gould and Binney; and examined the new grouping of N. A. Helicidæ, proposed by Bland and Binney, in their paper of 1872. I have used most of the Subgenera as they now stand. I do not, however, attach great importance to this matter as I regard the present systems as transitional, and until the anatomy of all the species is thoroughly known, they must remain so. In the Family Cycladidæ, I have followed Prime. And in the Family Unionidæ, Dr. Lea. The latter Family affords an inviting field for making genera and sub-genera among some of the species. But I am not prepared to enter upon a work of this nature. Were a person writing up all our species it would be advisable to make some

changes. And it is probable that it will be done in the future. But with the small numbers in this county we can do no better than to follow precedent.

In conclusion I desire to return my thanks to numerous friends, for aid in various ways in preparing this paper.

Among them, Dr. James Lewis, of Mohawk, N. Y.; Dr. Isaac Lea, of Philadelphia; Mr. Wm. G. Binney, of Burlington, N. J.; Dr. L. N. Dimmick, of Santa Barbara, Cal.; Mr. D. S. Ebersol, of Ottawa, Ills.; Mr. James W. Calkins, of Manistee, Mich. and Mr. Amos C. Baldwin, of Deer Park, Ills.

W. W. C.

CHICAGO, ILLS., March, 1874.

INTRODUCTION.

GENERAL REMARKS ON THE STUDY OF NATURAL HISTORY.

THE Mollusca, classed by Cuvier as the second of the four great classes into which he divided the Animal Kingdom, have occupied the attention of the greatest naturalists for more than two thousand years. The Nautilus, known as *Argonauta argo*, Linn. was described by Aristotle, who represented it as using its arms for sails and drifting before the wind. Aristotle was the founder of the study of Natural History in ancient times. I have before me a work called the "History of Animals," written by him. This work embraces all the knowledge of that distant age on this subject. Aristotle was acquainted with genera and species. He divided all animals into two classes: those with blood and those without blood. However, he placed in the latter class those animals whose blood is colorless, whereas all bloods are not red as we now know. Pliny followed Aristotle. These two men were the great lights of ancient times in Natural History. From that period we pass over the dark ages and come down to the sixteenth century before we find the study resumed and once more engaging the attention of naturalists. But as might be expected the results were very small, owing to the want of system, difficulties of communication, and the different views of investigators. And it was not until the eighteenth century that we behold a new character and impetus given to the pursuit of the science by the labors of Linnæus. Among other things, we are indebted to him for our system of nomenclature. Prior to that time every naturalist had used such language and terms as pleased him. A matter that caused much con-

fusion and disagreement in passing from one country to another. Linnæus introduced and insisted on the use of the Latin language, it being simple, comprehensive, and familiar to the learned in every part of the world. The choice was a good one. I am often asked why naturalists do not use plain English—for instance, in naming species. I can better answer by a simple illustration. Suppose we take our common river clams and our land snails. The Latin words *Unio* and *Helix* designate these families. But it is not to be presumed that all clams and all snails are alike in their characters, habits, or conditions, any more than that all men are alike; or that the families of Dogs, Cats, &c., are alike. And also in Botany. We thus have many different species in these Families, each species differing from another in some one of its characters, but all perhaps bearing a common family resemblance. We indicate these varieties by giving them specific names. So we have, *Unio rectus*, *Unio gibbosus*, *Helix alternata*, *Helix multilineata*. These specific names are intended to be appropriate and applicable; but are not so always, however. Some are named after individuals or to suit the fancy of an author. I do not consider this practice commendable, as it only tends to increase the confusion and synonymy of some species. The Linnæan system of nomenclature was evidently the best that could have been devised. There were also other improvements suggested by Linnæus which it would be interesting to notice had we space. Then we might examine the systems of classification proposed by Lamarck, Von Baer, Ehrenberg, and Cuvier. We should see how slowly, step by step, the great truths of science have been eliminated and established. Such a work would, however, be irrelevant to the main object of this paper. As I have before said, Linnæus opened up a new era in the study of Natural History; taking it up where Aristotle had left it two thousand years ago, he produced order and beauty where before had reigned disorder and ignorance. The excitement caused in the scientific world by the discoveries of Linnæus, was intense. We can only compare the new revival to that of learning and letters in other eras, or after revolutions, when, as has been remarked, the intellectual vigor of

nations is always quickened. In Europe rapid advances were made. Research and discussion were the order of the day in the scientific world. Conchology met with its due share of attention at the hands of Naturalists. Marine forms were probably studied more than land and fresh-water species, though judging from the papers written on the latter, it would appear that they were not neglected.

ON THE PROGRESS OF THE STUDY OF THE MOLLUSCA
IN THE UNITED STATES.

Up to the close of the war of 1812, the naturalists of Europe do not seem to have been aware of the extent, numbers, and varieties of the Molluscous Fauna of the United States. Dr. Amos Binney in his work "Terrestrial Mollusks," gives us at some length an account of what had been done by foreign authors. It is a subject of congratulation that the labor of describing American species has been first and mainly done by American naturalists. The first paper bearing upon the Mollusks of this country was published by Thomas Say, in 1817. Another name distinguished in the early history of American Conchology is that of Rafinesque. I would by no means omit one whose writings have been provocative of so much dispute among our naturalists,—and one, too, who possessed superior qualifications as an investigator, and with ideas far in advance of others. It was unfortunate that the latter part of his life should have been clouded with mental and physical difficulties. The *Unio metanever*, common in our rivers, was named by him. Dr. Amos Binney was the first American author to publish a complete monograph of our terrestrial mollusks. This work is invaluable to every student of conchology. Among our living conchologists, Dr. Isaac Lea stands pre-eminent, and he has probably described more American aquatic species than all other authors together. During the last twenty-five years, the progress of American Conchology has been rapid. And identified with its growth and development may

be mentioned the names of Lea, Binney, Lewis, Tryon, Anthony, Haldeman, Gould, Cooper, Conrad. And not least among them all, Dr. Wm. Stimpson, late secretary of the Chicago Academy of Science. There are many others, but most of those I have mentioned are better known to me through their works on our land and fresh-water shells. All of the above have published numerous papers upon our Mollusca in the proceedings of various scientific societies. These are, however, inaccessible to the general reader on account of their cost, and I might say, also, undesirable to most people by reason of their *dryness*. It takes a true naturalist to appreciate them. Therefore, very few know anything about the important work being done by our scientific associations, except what they get second-hand through the medium of some cheap popular publication,—a proof, why, in view of the growing interest felt in the progress of scientific research in this country, we should have in every state, works on local natural history, such as would be adapted to the use of schools and of young investigators.

ON THE DISTRIBUTION OF SPECIES IN LA SALLE COUNTY.

The Helices, or land-snails, were formerly very abundant in all the timbered sections and along the rivers and creeks. The Quaternary deposits are also filled with the dead shells. But the encroachments of the "*Old Settlers*" upon the forests have greatly reduced the numbers of living specimens within the last twenty years; and we may anticipate the time when the last snail will disappear from our geographical limits. The favorite home of the snail family is the deep shade of some forest retreat. In this country they are seldom found elsewhere, with perhaps the exception of a few species. And yet I remember the time, some twenty years ago, before agriculture had invaded our prairies, and when there was a dense growth of vegetation, that snails were quite common in situations remote from the timber regions. I frequently found them in my father's garden. And this was my first acquaintance with that interesting family. I was a mere lad at that time, and could see no possible use for the nasty, slimy, things.

But subsequent reflection has convinced me that first opinions are not always correct. The country drained by the Illinois, Fox, and Vermillion rivers, and by our creeks, are the most productive of shell-life. In fact, the wooded portions are mainly within the drainage of these streams. At present, the valley of the Fox is the most prolific of specimens. *Melie alternata*, is the most abundant species we have. *Melie solitaria* comes next. The other species are about equally divided as to numbers. The Bivalve Mollusca are numerous in all our rivers. The Illinois river being the largest and emptying into the Mississippi, of course produces the most species. At the Starved Rock and in its vicinity, the river, here shallow, is literally filled with clams lying half buried in the sandy bottom. On the North side of the Island, also, a great many are found.

During the past summer, my nephew, A. C. Baldwin, of Deer Park, and myself, while engaged in a clam hunt along the river came to this locality. In a short time we secured a boatload of the bivalves, including over twenty fine species. Having glory enough for one day we returned home to boil them out. The univalve Mollusca are very numerous in all our rivers, creeks and ponds. *Melantho subsolidus*, Anthony, is the most abundant form. *Trypanostama subulare*, Lea, comes next. Then, *Try Lewisii*, Lea. The difference in the characters of the univalve species within the distance of a few miles from each other, is very apparent, produced, no doubt, by the conditions of the station they occupy. Some of the variations are slight, it is true, but quite as marked as some that occur in other species and which have been described as new. I have no desire to increase the already enormous synonymy of American species by attempting to make new ones. Most of the univalves may be found in a semi-fossil state in our recent deposits. Some fourteen years ago while I was examining the remains of the trench and earthwork a short distance southeast of the Starved Rock, and which is supposed to have been a part of Fort St Louis, or connected with it, my attention was called to the abundance of a whitish substance mixed with the sand along the line of the fortification. On examination I found

this substance to be disintegrated clam shells. The bivalves were evidently brought there by the occupants of the fortress, and were doubtless used for food by the besieged, as we know that several desperate battles occurred in this vicinity about the time of the French occupation.

TERRESTRIAL MOLLUSKS.

ORDER PULMONATA.

SUBORDER GEOPHILA.

Before describing the species common to the county, it will be necessary to give my readers a general idea of the habits, etc., of the snails. And I may say here that the facts noticed by naturalists all over the country are very much alike. I have paid considerable attention to this subject and compared my own observations with those of others. I have examined the animals in their own natural homes; and have also domesticated them to the number of ten or twelve species on my premises in Chicago, where at the present writing, some of them are hibernating, or taking their annual sleep. At this time I have a number in glass cases. A few have fastened themselves to the walls of my library, while I have planted some in various locations around the yard for the purpose of observing next year's crop and the variations of animals under domestication. My first observation was *Macrocyelis concava* attempting to make a comfortable meal of its inoffensive neighbor *Helix alternata*. The carnivorous propensity of the species is well known. Some of the species are more active than others in their movements. My *H. alternata* have made frequent attempts to escape from confinement. Most of those I have are, however, generally passive and remain closely withdrawn into the shell. The snails can live, it seems, a long time without food or moisture. Well authenticated instances of this are on record and seem truly marvelous. I now have live species that have been without food for several months, and I propose to test their endurance further. Extremes of temperature are said to be fatal to snails. Most of the species are solitary in their habits, living alone, beneath logs, leaves, and stones, or

debris. They prefer the shade of the forest, where they may be found in the situations mentioned. Here they pass the major part of their lives in what seems a dull, lazy existence. They generally sally forth in the night in quest of food. On cloudy days they sometimes come out, but seem to avoid the light and glare of the sunshine. I am speaking of their habits generally. In early spring, however, the snails emerge from their retreats to enjoy the re-invigorating effects of the sun, and are then found for a short time where its rays will fall upon them. We find here a touch of human nature, the same that actuated us when in our boyhood we sought the south side of a cellar door for the same purpose. Having regained their accustomed vigor, the mollusks retire to the first convenient shelter. I have said that the snails live alone. *Helix alternata*, Say, is an exception. This species is gregarious, numbers of them living together, and in winter we find them collected closely as if for the purpose of imparting warmth. I have taken as many as two hundred from beneath a single log. The snails lay their eggs from May to October. These they deposit under logs and leaves to the number of thirty or more. The young are soon hatched if the conditions are favorable. Making their first meal on the shell they have just left, they proceed to shift for themselves. Their growth is rapid. At first the shell consists of one and one half whorls, which increase in number during the first and second seasons. As to the average life of the snails I am uncertain. My friend, Dr. Lewis, thinks it is about one year. I think some of our species live at least two years. I would direct observation to this point. As to size, that depends upon the conditions of food, climate, etc. Our species are as large as any found elsewhere. The snails are vegetable feeders, but not strictly so. Several species are carnivorous. One of these I have noticed. The slowness of their movements, however, preclude the idea of their being entirely animal feeders. They are provided with a rasp-like tongue which enables them to reduce vegetable substances with great facility. As to colors, our American snails are very plain. There are only a few banded species east of the Rocky Mountains. On the Pacific side, there are a number. In this

country we have one variegated species, *H. alternata*, and three banded species, which will be noticed hereafter. In tropical climates, the shells are brilliantly colored, a fact that applies to marine forms as well. The living habits of our species seem to me to have much to do with their colors, shade and solitude producing much the same effect in this respect as hard times upon individuals of another genus.

One peculiarity of our snails, is the tooth-like appendage found in the aperture of many of the species. The cause or use of this I am unable to explain. These have been grouped as *Helicodonta*, by Ferussac. The snails, having passed their summer existence, if so fortunate as to escape alive from their numerous enemies, birds, hogs, etc., prepare, on the approach of cold weather, to go into winter quarters. These they easily find in the same localities where they have before lived. They either burrow in the ground or attach themselves to the under side of their shelter. Having disposed themselves with the aperture of the shell upwards, they blow forth a mucous-like secretion from the collar. This looks like a bubble and is ejected in the same form, so as to cover the aperture of the shell. We call this the *epiphragm*. It hardens and effectually shuts out the cold. As the season advances, the animal retiring further within builds more of these barricades in the same manner as the first. Finally, the pulsations of the heart becoming slower and slower, at last ceases entirely. The sleep is complete. We thus see the economic provisions of nature is providing the means of enabling the animal to withstand the rigors of winter, which in our northern climate are very great. Perhaps we cannot say that the snails are of much use in this country. We may not be able to see it. We know, however, that in times past, they were supposed to possess medicinal properties of a high order. As an article of diet, a dish of them was once considered a great luxury,—with the condiments I suppose. In fact they are still eaten in some countries. And I now have the shell of a large *Bulinus*, from which the contents were scooped out by some native South American of a carnivorous type. And in Paris, celebrated for the refinement of the cuisine, they are still served to order.

LASALLE COUNTY SPECIES.

FAMILY HELICIDÆ.

SUBFAMILY VITRININÆ.

GENUS MACROCYCLIS—BECK.

MACROCYCLIS CONCAVA, SAY.

Shell flattened, whirls five, umbilicus broad and deep, shell striate, lip acute, horn color, breadth one-half inch. This species is abundant, they are fond of animal food; their movements are active; the shell resembles *M. vancouverensis*, Lea, but is not so large and differs in other respects.

GENUS ZONITES, MONTFORD.

Zonites arboreus, SAY. Shell thin and depressed, whirls four and a half, lip acute, light horn color, one fourth inch in diameter. Not abundant.

ZONITES VIRIDULUS, MENKE.

(*Hy. electrina*, GOULD.) Shell depressed, thin, whirls three and one-half, lip simple, shell umbilicated. Dia. 5 mill. Loc. Fox and Illinois River Valleys.

ZONITES FULVA, DRAP.

(*Helix chersina*, SAY.) Shell thin, acute, lip whirls five, aperture transverse, breadth four mill. Abundant.

SUBFAMILY HELICINAE

HELICODISCUS, MORSE,

Helix lineata, SAY.—Shell flat, whirls four, lip acute, with two pair of teeth within the aperture, horn-color, breadth four mill. Very abundant.

GENUS PATULA, HALDE.

Helix alternata, SAY.—Shell has five whirls, peristome acute, umbilicus deep, shell not much elevated, and variegated with numerous reddish spots, some of them oblique, others running into lines on last whirl, diameter nearly one inch. This is the most abundant species in the county; they live in colonies of one hundred or more in some localities. Abundant in a semi-fossil condition in the Quaternary deposits.

Helix alternata, SAY, *variety*.—This is a sharply carinated variety with coarse striæ, resembling *H. mordax*, SHUTT. But as I believe the true *mordax* is from Tennessee, and this is different in not having as coarse striæ, I cannot call it the same. It is a well marked variety, however.

HELIX SOLITARIA, SAY.

Shell has a broad umbilicus, is globose, coarsely and obliquely striate, whirls six, lip acute; shell has two reddish revolving bands; aperture circular, color brownish; shell coarse and heavy in texture, breadth one inch. Very abundant in some localities; also in the Quaternary, is one of the three banded species found in the county.

HELIX STRIATELLA, ANTHONY.

Shell small and depressed, whirls three and one-half with distinct oblique striae; umbilicus large; lip acute, color brownish or russet, breadth one fourth inch. Quite abundant.

GENUS *HELIX*, LINN.**SUBGENUS MESODON, RAF.**

Helix abolabris, SAY.—Shell has nearly six whirls, obliquely and finely striated; lip white inside and reflected; umbilicus covered by the peristome; greatest diameter thirty-two mill. The shell is horn-colored, abundant.

This fine species is so distinct in its characters as to be easily recognized. Some specimens have been found in Illinois with a tooth on the parietal wall, and some also in Pennsylvania.

HELIX MULTILINEATA, SAY.

Shell depressed and sub-globose, whirls nearly six, with fine oblique striae, aperture lunate, a little contracted by peristome. Shell ornamented with numer-

ous reddish bands and lines, peristome reflected and of a roseate color; umbilicus covered, breadth one inch. Abundant.

This is the finest Northern species we have. Say, describes the lip as being white. This is the case with specimens from other states. The rosy lip is a peculiarity of our species. I invariably find them living alone, slightly burrowed in the ground—and seeming to prefer a greensward opening to a shelter beneath logs, etc. My best specimens are from the vicinity of Indian Creek, near Fox river.

HELIX PENNSYLVANICA, GREEN.

Shell elevated, whirls six, white crowded and oblique striæ, umbilicus closed, aperture triangular, somewhat contracted, lip white, reflected, a little thickened near the base, color chestnut, greatest dia. 17 mill. Abundant.

A beautiful species and large. One peculiarity attracted my attention; namely, I have always found them solitary, each in its own little burrow which is very nicely excavated to the depth of from two to three inches, and on a high blue-grass plateau near the Fox river, where there are very few trees or debris. In fact they seem to avoid the usual retreat of other species—fallen trees, etc. The size and rich coloring of the shell is also noticeable.

HELIX EXOLETA, BINNEY.

Shell large and ventricose, six whirls, which are striated, peristome wide and reflected, an oblique tooth process on the parietal wall, suture distinct, aperture rounded, breadth one inch. Abundant.

We have an edentate variety which I had supposed to be *H. major*, Binney. But, my friend, Dr. Lewis, suggests that they are only immature *exoleta*, and on further examination, I agree with him. The tooth of *H. exoleta* is only developed on the mature shell.

HELIX THYROIDUS, SAY.

The shell has five whirls with oblique striæ, spire depressed, aperture lunate, lip white, reflected, and at the basal portion partially covering the umbilicus, tooth process on the parietal wall, shell horn colored, breadth nearly one inch. Very abundant.

HELIX CLAUSA, SAY.

Shell has five whirls, is somewhat elevated, horn color, lip reflected, and at the basal portion partially covering the umbilicus, greatest dia. 18 mill. Very abundant.

HELIX PROFUNDA, SAY.

Shell depressed, umbilicated, lip white, reflected, thickened, with a blunt callus on the inner side near the base, whirls six, shell horn color with two broad, revolving bands and two smaller ones, all of a reddish color, extending into the aperture. Shell has coarse and oblique striæ, umbilicus large and deep; greatest breadth one and one-fourth inches.

This is another of our banded species. Some specimens have but one band. We have a variety with a sort of protuberance on the outer circumference of the last whirl, one-fourth inch from the margin of the lip. The species are very prolific in this county.

SUBGENUS STENOTREMA, RAF.

Helix hirsuta, SAY. Shell has five rounded whorls, which are covered with fine bristly hairs resembling minute spines; aperture narrow, almost closed by an elongated tooth on the parietal wall, peristome depressed with notch near its centre, umbilicus covered, breadth $8\frac{1}{2}$ mill.

This interesting species is quite abundant and grows large. Some of the finest specimens I have seen from this (or any,) locality were found by Mr. A. C. Baldwin and myself in the Deer Park, and also in a ravine on the south side of the Vermillion River, near the Farm Ridge Bridge. The situations and conditions were—a constant supply of shade and moisture. The rich, deep chestnut coloring of our species is noticeable.

HELIX MONODON, RACKETT.

Shell depressed, whorls five, hairy; umbilicus partially covered, aperture lunar, a lamelliform tooth on the parietal wall, peristome white, acute, reflected; shell horn color, breadth 10 mill.

This species is not so abundant as the preceding, but has been found by Mr. A. C. Baldwin and myself in the town of Deer Park, on the Fox River, in the Illinois Valley near Fall Creek, and in open tracts of country near the timber. The situations were dry ones.

HELIX MONODON, RACKETT.

Variety Leail, WARD. A somewhat smaller shell than *H. monodon*, of which it is a variety, undoubtedly. It differs in its size and is only found in same situations as *H. hirsuta*.

SUBGENUS STROBILA, MORSE.

Melix labyrinthica, SAY. Shell conic, elevated, apex blunt; whirls six; aperture lunate, with teeth within; color chestnut; dia. $2\frac{1}{2}$ mill; height $2\frac{1}{2}$ mill.

This small species occurs in great abundance in the Fox River Valley, and may be known by its elevated conic shape.

GENUS PUPA, DRAP.

This genus was founded by Draparnaud, to include the minute species of Europe that had been classed with the *Helices*, and by some is considered superficial. The genus has, however, been adopted as a good one. The shells are so minute as to require much time, patience and skill to find. My friend, Dr. L. N. Dimmick, was very successful in finding them, as several thousand specimens presented to me by him attest. The habits of the species are semi-aquatic, being found in damp or wet places, or near streams and frequently on drift-wood in our rivers.

SUBGENUS PUPILLA, LEACH.

PUPA PENTODON, SAY.

Shell conical, ovate; whirls five, well rounded with deep suture; aperture semi-circular; peristome sharp and expanded; has a callus on the inner margin of the lip on which are from three to six denticles; on the parietal wall is one prominent denticle: shell horn color; length $2\frac{1}{2}$ mill. Very abundant.

SUBGENUS LEUCOCHILA, ALBERS.

PUPA FALLAX, SAY.

Shell fusiform, turrated; whirls six, smooth; suture impressed; aperture lateral, large; lip expanded but not reflected; color brown; length 6 mill. Dia. $2\frac{1}{2}$ mill.

This fine species is found in considerable numbers in various localities.

PUPA ARMIFERA, SAY.

Shell subfusiform, smooth; whirls six; peristome white and reflected; aperture small, oval, with reflected lip, much thickened within, its extremities nearly joined by a callus on parietal margin; shell has four teeth in the aperture, on the margin of the lip and within; length 5 mill. Dia. $2\frac{1}{2}$ mill. Abundant.

PUPA CORTICARIA, SAY.

Shell subcylindrical; apex obtuse; whirls five; suture impressed; aperture small, with white, reflected lip; on parietal wall is one tooth; shell horn colored; length $2\frac{1}{2}$ mill. Dia. $1\frac{1}{2}$ mill. Abundant.

SUBFAMILY SUCCININÆ.

GENUS SUCCINEA, DRAP.

SUBGENUS SUCCINEA, DRAP.

The animal resembles *Helix* but is shorter. The species live on the land near the water, and on swamp grass millions may sometimes be found. For instance, in the Calumet swamps. In our county around swales. I find *S. obliqua*, however, in situations somewhat removed from water or damp grounds. On the ap-

proach of cold weather the species imitate the habits of the *Helix*. The shells are oblong in shape, and have from three to four whirls,—the last much the largest.

SUCCINEA OBLIQUA, SAY.

Shell oblong, ovate; whirls three, the last very large and expanded; lip acute; shell straw colored, and moderately thick and firm; length $\frac{3}{4}$ of an inch. Abundant.

This fine species grows large in this county. The texture is thicker than usual.

SUCCINEA AVARA, SAY.

Shell thin; whirls three; shell straw colored; length $\frac{1}{4}$ of an inch. Abundant in meadows in Deer Park.

SUCCINEA RETUSA, LEA.

Shell ovate, oblong, thin, yellowish; whirls three; aperture dilated and drawn back below; length 14 mill. Abundant.

This fine species is longer than the one described by Dr. Lea, but his description was drawn from a single specimen. My shell is the mature specimen.

SUBORDER LIMNOPHILA.

FAMILY AURICULIDÆ.

GENUS CARYCHIUM, MULLER.

Carychium exiguum, SAY. Shell elongated, tapering; apex obtuse; whirls five to six; suture impressed; aperture obliquely oval, white; lip thick, reflected, flattened; umbilicus perforated; a plait-like tooth on

the middle of the columella, about midway between the extremities of the lip; color white, appearance shining; length $1\frac{1}{2}$ mill. Dia. 6 mill.

This minute species was described by Say as a *Pupa*, in 1822, and is still known as such to many collectors. In 1851, Dr. Wm. Stimpson pointed out its true position—"Shells of New England." This is the most abundant of all our minute species. They may be found in wet moss, leaves, bark, drift-wood, etc., along our rivers. Dr. L. N. Dimmick has collected many thousands in the vicinity of Ottawa.

FAMILY LIMNÆIDÆ.

The *Limnæidæ* are found all over the world. They are very variable in their characters, and as yet imperfectly understood. In habits they are aquatic, and are found in rivers, ponds, and creeks. They feed on vegetable matter or the slimy material found in rivers, and on infusorial animalculæ. Dr. Gould speaks of them eating each others' shells in the latter part of the warm season. Having myself kept them alive for months at a time, I am able to confirm Dr. Gould's statement as far as this. They rasp off with their tongue the confervaceous vegetation and epidermis of each others' shells in a very thorough manner. The sexes are united in the same individual. The shell is dextral, with a fold upon the columella. They come to the surface to breath free air, but are adapted to breathing through water. On the approach of cold weather they bury themselves in the mud for the winter. From my own observation, they begin to dis-

appear in the early part of October ; *Limnæa stagnalis*, L., being the last I have found at the surface, and this on the first of November.

SUBFAMILY LIMNÆINÆ.

Shell spiral, spire more or less acute, last whirl large, aperture large.

GENUS LIMNÆA, LAM.

SUBGENUS LYMNOPHYSA, FITZ.

LIMNÆA REFLEXA, SAY.

Shell dextral, elongated, volutions six, which are very oblique and wrinkled ; spire acute and long ; body whirl dilated, aperture rather narrow ; shell reflected from the middle ; length one and one-fourth inches. Illinois River.

***Limnæa pallida*, ADAMS.** Shell thin, whirls five ; suture marked, horn color, body whirl not much enlarged ; fold upon the columella not large ; length one-half inch. Loc. Fox and Illinois rivers.

***Limnæa humilis*, SAY.** Shell small, horn color ; length 8 mill. Found in swales near Illinois River.

***Limnæa desidiosa*, SAY.** Shell oblong, spire long as the aperture ; whirls five ; of a yellowish horn color ; length 10 mill. Found in same locality as the preceding species.

LIMNÆA CAPERATA, SAY.

Shell conic, whirls five, suture distinct ; apex acute, whirls wrinkled, and with light colored revolving lines on the young shell ; aperture dilated, somewhat ;

labium without much fold ; color yellowish horn, with frequently, bands of white ; aperture reddish within : length 14 mill.

GENUS PHYSA, DRAP.

The Physas are the most active and hardy of all the aquatic univalves. They move rapidly through the water shell downwards. They inhabit muddy bottoms and prefer still waters. They are tenacious of life, living much longer out of water than any other species I have taken, and emitting when removed from their native element, a peculiar snapping noise. I have seen them attack bugs as large as themselves with the greatest ferocity and quickly draw them beneath the water. The shells are sinistral. In regard to their propagation, a curious fact came to my notice about two years ago. Quite a large stream of water was allowed to flow from an artesian well in Central Park, (which is situated in the city of Chicago,) off through the prairie in a southerly direction. For a time there was no appearance of shell life in this stream ; but presently I noticed the form *Physa gyrina* in great abundance. How they got there was the question, as there was no means of communication with other waters except through the artesian well before mentioned. And as this and other similar wells in the vicinity are, without doubt, subterraneously supplied from our Lakes, these Physas must have come through with the current. My friend, Dr. James Lewis, offers this solution of the question :—that the eggs were deposited in the lake and drawn into the

undercurrent ; with this novel means of transport they passed finally to their new position, when the proper conditions of light, heat, etc., arising, the eggs were hatched out ! It is well known by naturalists, that the ova of some land and aquatic mollusks will sometimes lie dormant for years, unless the conditions for their development are favorable. I have a theory of my own to offer in regard to the presence of the species noted. The country now covered by the city of Chicago, was formerly low and marshy, and frequently overflowed from the lake, or streams near by, and sometimes by freshets. By means of these, the germs of molluscous life may have been deposited. However, I regard the view of Dr. Lewis as likely to be the true one in this case ; and I understand that similar instances have occurred elsewhere. The Physas are remarkable for their endurance of cold, and may be seen moving about at a time when other aquatic species are torpid or have buried themselves in the mud.

Physa gyrina, SAY. Shell oblong, of a polished, shining appearance ; color light yellowish ; whorls five, suture marked ; apex acute ; aperture more than half the length of the shell ; labrum slightly thickened on inner margin and tinged with a reddish line ; length 16 mill. A fine and abundant species.

PHYSA HILDRETHIANA, LEA.

This species is placed by Mr. W. G. Binney, in the synonymy of *P. gyrina*, Say ; but I think they are distinct. The following describes my specimens which are large and well developed. I obtained them from a

pond in Deer Park. My description is fuller than that of Dr. Lea.

Shell elliptical, of a chestnut color, firmer in texture than *P. gyrina*, whirled five, spire obtusely elevated; aperture nearly two-thirds the length of the shell, and compressed; labrum sharp, with its inner margin red; and further within the aperture, a chestnut colored line showing outside a whitish color; length 19 mill.

Dr. Lea calls this the most remarkable *Physa* found in this country. The pond from which I obtained my specimens, has the bad habit of getting dry every season. The remarkable size of the shells as well as their shape, at once attracted my notice. The species disappear with the water, but for several successive years, have reappeared with the advent of their natural element; or, the ova deposited have served to perpetuate the family. The above two species are all that I can vouch for as living in this county. In the Lake Michigan drainage around Chicago, *Physa gyrina* attains a very large size, but is different in shape from *Physa Hildrethiana*.

GENUS BULINUS, ADANSON.

BULINUS HYPNORUM, LINN.

Shell fragile, slender, polished; whirled six, aperture narrow, spire tapering, color light yellowish, columellar fold slight; length about 18 mill. Loc. stagnant ponds near Illinois River.

This species differs from *Physa*, in being more slender and more highly polished, and in having a simple, unfringed mantle. The shell appears of a deep black when the animal is within.

SUBFAMILY PLANORBINÆ.

GENUS PLANORBIS, GUETTARD.

This is one of our most abundant mollusks, and may be found usually in quiet waters feeding on coniferaceous vegetation or decayed matter. The genus is represented by a number of species in this county. Of *Planorbis*, I believe that more species have been made than will stand. We have several varieties of *P. trivolvis* that are very good *as varieties*, and I believe as much entitled to the rank of distinct species as some that are called such.

PLANORBIS GLABRATUS, SAY.

Shell has five whirls, rugose in appearance, spire regular; umbilicus large, deeply concave; exhibiting the volutions; color brownish; breadth nearly one inch. Loc. Fox River.

SUBGENUS PLANORBELLA, HALDE.

PLANORBIS CAMPANULATUS, SAY.

Shell has four whirls; umbilicus deep, color yellowish horn; aperture dilated, campanulated; greatest breadth one-half inch. Abundant.

SUBGENUS HELISOMA, SWAINSON.

PLANORBIS TRIVOLVIS, SAY.

Shell has four whirls, which are finely striated; two and a half whirls visible upon the right side, the antepenultimate disappearing within the umbilical cavity: aperture large, slightly thickened within the margin.

and its faces projecting beyond the planes of the shell ; color chestnut ; greatest breadth three-fourths of an inch. Very abundant.

Say gives the breadth as half an inch. The species attains to nearly an inch in breadth in Chicago River, and resembles *P. macrostomus*, White. I have forms answering to *Plan. corpulentus*, Say, and which I believe to be *tricolvis* ; and, also, the following which are included in the synonymy of *Plan. tricolvis* ; *Plan. regularis*, Lea,—an immature form ; *Plan. megastoma*, DeKay ; *Plan. tricolvis, var ; fallax*, Halde. It will be seen that the varieties are numerous. I believe that the differences may be accounted for by the character of the waters, chemical elements, station, climate etc.

PLANORBIS BICARINATUS, SAY.

Shell has three whirls, carinated, color brownish ; aperture large ; color within reddish, with two white lines corresponding with the carina ; breadth one-half inch. Abundant.

SUBGENUS GYRAULUS, AGASSIZ.

PLANORBIS DEFLECTUS, SAY.

Shell dextral, depressed ; whirls five, minutely wrinkled, texture thin, aperture large, color light horn ; breadth five-sixteenths of an inch. Very abundant.

PLANORBIS PARVUS, SAY.

Shell horn color, whirls five, minutely wrinkled ; concave above and beneath ; and equally showing the volutions ; lip rounded ; breadth one-fifth of an inch.

LEGUMENTINA, FLEMING.

Shell dextral, spire depressed ; whirls few, visible on both sides, furnished internally with teeth ; outer lip simple.

SUBGENUS PLANORBULA, HALDE.**SEGMENTINA ARMIGERA, SAY.**

Shell has four whirls, umbilicus deep, exhibiting the volutions ; aperture subovate ; oblique ; far within the throat six teeth ; color of shell brownish ; breadth one-fourth of an inch. Abundant.

SUBFAMILY ANCYLINÆ.**GENUS ANCYLUS, GEOFFROY.**

River-limpet. Etymology, *Ancylus* (*agkulos*,) a small round shield.

This genus resembles in shape the marine *patella*. The shells are fragile and small. We have a species which is about two-sixteenth of an inch in length, and which I presume to be *Ancylus tardus*, Say. I found numbers of them associated with a valvata-like *Phrygania*, clinging to stones in Fox River.

ORDER PECTINIBRANCHIATA.**FAMILY VALVATIDÆ.****GENUS VALVATA, MULLER.**

Valvata tricarinata, SAY. Shell has three volutions ; three revolving, carinate, prominent lines, giving to the whirls a quadrate appearance ; Suture deep ; umbilicus large ; aperture circular ; lip simple, almost surrounding the aperture ; shell horn colored ; breadth one-

fifth of an inch. Very abundant in ponds and other waters. May be easily known by the quadrate appearance of the whirls, its round aperture, etc.

VALVATA SINCERA, SAY.

This shell differs from the former species in being smaller, and is without the carinated whirls. Found in the same localities as the preceding species, but not so abundantly.

FAMILY VIVIPARIDÆ.

GENUS VIVIPARA, LAM.

This family is numerously represented in all our rivers. The animals are sluggish in their habits. They inhabit muddy bottoms, or among the vegetation found in our waters. Their food is vegetable, but not invariably, as they have been found feeding on decayed animal matter. Many of the species are viviparous. I have taken *V. contectoides* in the fall of the year, with the ovaries full of the young, the shells showing distinctly three of the bands peculiar to this species. The foot of the animal is provided with an opercle which closes the aperture when its owner withdraws into the shell. In the spring they deposit their young in the mud. The shells are turrated. For purposes of study, I keep a few species alive on my premises.

VIVIPARA CONTECTOIDES, W. G. BINNEY.

Shell large, globose, has five whirls, which are finely striated; peristome acute and continuous, tinged on the inner margin with a dark line; aperture subcircular; color brownish horn. The body whirl has four reddish

bands, the last near the base ; whirls very bulging. The beginning of new peristomes is marked by prominent lines or ridges. Length one and one-fourth inches. Loc. Illinois River.

This elegant species has caused much dispute among our naturalists, some claiming that it is identical with a well known European species ; among these is Mr. Geo. W. Tryon. I am inclined to think, however, that the weight of evidence is in favor of Mr. Binney's views.

VIVIPARA SUBPURPUREA, SAY.

Shell oblong ; whirls five, wrinkled ; apex obtuse ; suture impressed ; color greenish with a purplish tinge ; spire lengthened ; shell has three reddish bands ; length three-fourths of an inch. Found in the Illinois river.

This species may be distinguished from any other by the unusual expansion of the last whirl, and the reddish bands which are prominent in some specimens, but obscure in others.

GENUS MELANTHO, BOWDITCH.

Melantho decisus, SAY. Shell elongated, ovate, whirls six ; peristome acute, lines of growth plain ; apex missing in full grown specimens ; color green ; aperture oval, oblique, bluish within ; length one and one-fourth inches. Quite abundant in Fox and Illinois rivers, and also in the Vermillion river.

We sometimes find here a shell corresponding to *Paludina heterostropha*, Kirtland. The shell is sinistral ; has five whirls ; suture is distinct ; color green ;

length three fourths of an inch. Loc. Fox river. The shell has been referred by authors to various species as only a reversed variety ; and I am inclined to so consider it.

MELANTHO SUBSOLIDUS, ANTHONY.

Shell ovate, thick ; whirls six ; suture distinct ; aperture ovate ; spire elevated ; apex entire ; color green ; length one and one-half inches. Abundant.

This is one of our most abundant species, and is considered by some to be a synonym of *M. decisus*. It is a very variable shell in its characters.

GENUS LIOPLAX, TROSCHEL.

LIOPLAX SUBCARINATA, SAY.

Shell has six carinated whirls, wrinkled ; suture impressed ; aperture oval ; color greenish ; length three-fourths of an inch. Loc. Illinois river.

Say's description of this species was of a dwarfed specimen and represents it as having but three whirls. The foregoing are the prevailing species of Vivapara. We have, however, *M. coarctata*, Lea ; and *M. rufus*, Halde, though specimens are not abundant. There yet remains much work to be done before the true position of some species is determined.

FAMILY RISSOIDÆ.

SUBFAMILY HYDROBINÆ.

GENUS AMNICOLA, G. & H.

Amnicola porata, SAY. Shell obtuse, conic ; volutions four, wrinkled ; spire obtuse ; labrum and labium equally rounded, umbilicus distinct ; shell rather short ;

horn color. Very abundant in the Fox and Illinois rivers, clinging to stones, roots, etc.

SUBFAMILY POMATIOPSINÆ.

GENUS POMATIOPSIS, TRYON.

POMATIOPSIS LAPIDARIA, SAY.

Shell turritid, thin, smooth; volutions six; suture impressed; aperture longitudinally ovate—orbicular, operculated, rather more than one-third the length of the shell; color brown; length one-fifth of an inch. Abundant.

This species is longer than *A. porata*. I follow Binney in placing it in the genus *Pomatiopsis*. The animals are amphibious, and may be found near our rivers in moist places. They possess the power of crawling on the surface of the water in a reversed position, shell downward.

FAMILY STREPOMATIDÆ, HALDE.

This family of univalve mollusca presents in its numbers and diversified forms one of the most interesting studies in the whole range of American Conchology. There are nearly five hundred recognized species of *Strepomatidæ* from North America. Of these, the larger part are from Southern waters, only a few being found in the Ohio river and its northern tributaries. And these are small in size compared with those from Tennessee and Alabama. In the East, the St. Lawrence river and its branches form the northern limit of the family; and in the West, the northern

boundary of the United States, beyond which, I believe, none have been found. The Ohio river seems to form a dividing line also, both northern and southern species fading out as they approach this stream. They are not found in New England at all, nor in the vicinity of the Ocean. The distribution of species and the characters of the shells of the north find a parallel in some marine mollusks, and leave no doubt as to species being specially adapted to the station they occupy in the first creation, though some of them may be subsequently modified by change of the conditions. The family were formerly called *Melanians* from their supposed affinity to Oriental forms; and it was not until recently that the differences both in the shell and animal were pointed out by Prof. Haldeman. Our species have a plain or entire margin to their mantle, whilst the Oriental species have a fringed mantle. The soft parts have not, as yet, been much studied in this country, and species, genera, etc., are based upon the characters of the shell. We have in this county four species, three of them very abundant in all our rivers.

GENUS PLEUROCERA, RAFINESQUE.

PLEUROCERA SUBULARE. LEA. (*Trypanostoma*.)

The following description is from American Journal of Conchology, Vol. 1: "Acutely turrated; rather thin; spire much elevated; apex acute; whirls twelve, flat; carinate at apex; body whole; angulate on the periphery. Horn color, generally light yellow and bluish ash below the suture."

This species may be found abundantly in the Fox, Vermillion, and Illinois rivers. The variations of this species, or rather of the shells, within the limits of the county, are very considerable, and due, I have no doubt, to the position they occupy, the temperature, food, chemical elements of the water, etc. Thus, in some specimens from one locality, the whirls are rounded, and have from one to two bands, and are of a dark horn color. From another locality, the whirls are eleven, and the color very light, resembling *P. pallidum*, Lea. I refer to mature shells; in the young shells, the differences are not so marked.

PLEUROCERA LEWISII, LEA.

Sulcate, somewhat thin, conical, elevated; spire much elevated, with indistinct suture; whirls eleven, flattened, covered with sulcations, of which there are four to five on the body, which is angulate on the periphery. Horn color or dark brown, banded or without bands, white or purple within.

This species is found in the same localities as the preceding one. Having both from the same stations that had evidently grown up together, and finding the difference in the characters of the two shells well maintained and constant, in both the young and adult shell, I am satisfied that they are distinct. *P. Lewisii* is a much broader shell at the base; more pyramidal in shape; has sulcations; and is of more solid texture than *P. Subulare*. Of the *soft parts* of the two, I cannot speak as yet. Nor is it essential at this time, as we base our species upon the characters of the

shells. These species are now sometimes called *Trypanostoma*, a Genus instituted by Dr. Lea to take the place of *Pleurocera*, Raf. The latter having priority, however, must stand.

GENUS GONIOBASIS, LEA.

GONIOBASIS LIVESCENS, MENKE.

Ovate oblong, smooth, moderately thick; spire short, conically acute, suture slightly impressed; whirls five to six, rather flat, the last large; aperture large, elliptical. Horn color, purple within. Length, one-half inch; abundant.

GONIOBASIS DEPYGIS, SAY.

Oblong, conic ovate, whirls five, the last elliptical. Suture well impressed; aperture narrow ovate, acute above. Color yellowish. Two rufous bands on the whirls. Shorter than *G. livescens*. *Fox and Illinois Rivers*.

Of more than two hundred and fifty species of *Goniobasis* found in American waters, the two just described are all we can boast of as inhabiting this country. The latter species is not so abundant here as the former. All our *Strepomatidae* are very hardy, living some time after being removed from the water as I have had occasion to notice, and differing in this respect from the *Viviparidae*. They are evidently suited to our northern climate.

NOTE.—**Valvata**—— We find by thousands in the Fox and Illinois rivers, fixed to stones, etc., the *larva case* of an insect—*Phrygania*. The *case* is built of grains of sand, cemented together in the shape of a *valvata*, for which it has been mistaken.

CONCHIFERA.

FAMILY CYCLADIDAE, WOODWARD.

GENUS SPHERIUM, SCOPOLI.

Sphaerium Simile, SAY. (*S. sulcatum*, Lam.) Shell oval, truncated at the extremities in young, and rounded in adult specimens; convex, sub-equipartite: beaks slightly elevated; surface with conspicuous concentric wrinkles; epidermis brown or chestnut color. About seven-tenths of an inch long; height, one-half inch; breadth, two-fifths of an inch.

This species is abundant in Illinois river. The shells are bluish within. The young shells are of a lighter color, thinner, and show the wrinkles at all ages; lines of growth prominent. Animal with simple mantle; foot tongue-shaped.

S. sulcatum, Lam. is the same shell, but must be considered a synonym, as Say first described it.

SPHERIUM PARTUMEIUM, SAY.

Shell rounded—oval, sub-equipartite; lowest anteriorly, somewhat angular behind; thin and fragile; valves very convex, minutely wrinkled by lines of growth, and obsoletely radiated; light horn color, beaks elevated. Length, nine-twentieths of an inch. Abundant.

SPHERIUM OCCIDENTALE, PRIME.

Shell small, oval, thin, fragile; striæ fine; beaks small and rounded; color light yellow; beaks not prominent. Length, one-third of an inch. Not so abundant as the preceding species.

GENUS PISIDIUM, PF'R.

PISIDIUM ABDITUM, PRIME.

Shell small, rounded—oval, beak raised slightly, surface smooth, striæ fine. Color chestnut; beaks near the posterior side. Length, three-twentieths of an inch; breadth, one-tenth of an inch.

This universally distributed species is abundant, but from its small size seldom noticed. Found in mud in our rivers.

PISIDIUM COMPRESSUM, PRIME.

Shell solid, trigonal, very oblique; drawn up near the beaks, which are placed posteriorly; striæ distinct; epidermis chestnut. Size about the same as *P. abditum*. Abundant in swales and Illinois river.

This species varies in shape, but its obliquity is constant. Its peculiarity is the apex of the beaks, which assume the appearance of wings placed on the summit of the umbones. The animal is active. Several other species of this family are reported from Illinois, but I am unable to report any more from this county. *Sph. striatinum*, Lam., if a distinct species should be included, as we have the shell. The *Sphaeriums* are sometimes mistaken by local observers for young *Uniones*.

FAMILY UNIONIDÆ,—NAIADES.

SUBGENUS UNIO, RETZIUS.

Of this great family, fifteen hundred species have been described, and about eleven hundred are admitted. We have many species in our rivers, some of

which are very fine and large. The Uniones are generally so plain in appearance as to attract but little notice. But it is known that the modifications of form are very great. I have known the *soft parts* to be used for food by some people—a purpose for which I should consider them about equal to green chips. However, there is no accounting for *tastes*. That racoons and muskrats are fond of them is evidenced by the *shell-heaps* that we frequently see along river banks and on shallows.

Unio Æsopus, GREEN. This shell is found abundantly in the Illinois river, and attains a large size. Color dark, and appearance rough.

Unio alatus, SAY. A fine winged shell of a greenish color, found in the Fox river and Fox river feeder. As yet I have not obtained them abundantly, and have seen none in the Illinois river.

Unio anodontoides, LEA. This shell is quite long. The color is milky-white; shell very smooth. Loc. Illinois river.

Unio cornutus, BARNES. A rather small species, about as broad as long, with several protuberances on each valve. The shell is frequently very finely colored with greenish dots and rays. Loc. Illinois river.

Unio capax, GREEN. Shell thick; umbones rather large, color brownish, rayed with green. This shell seems to be allied to *Unio occidentis*, Lea. This is one

of several species bearing a close resemblance to each other, and is said to be distinguished from each. Loc. Illinois river.

Unio coccineus, LEA. A smallish species, abundant in the Fox and Illinois rivers.

Unio crassidens, LAM. A rather thick, large species, of a greenish color; abundant in Illinois river.

Unio elegans, LEA. A small, short species, richly colored. Illinois river.

Unio ellipsis, LEA. Shell very oblique; rather heavy. Color brownish, white within, teeth prominent. About two and a half inches in diameter. Abundant in Fox and Illinois rivers.

Unio ebenus, LEA. A heavy black-colored shell, common in the Illinois river.

Unio gracilis, BARNES. This species is rather fragile and very plain in appearance. Loc. Illinois river.

Unio gibbosus, BARNES. A very plain, coarse shell. Color dark brown; very gibbous. Within, color bluish. Loc. Illinois, Fox, and Vermillion rivers.

Unio iris, LEA. A rather flat shell, obliquely rayed with greenish bands. Length, two and a half inches. Loc. Illinois river. Not abundant.

Unio luteolus, LAM. A variable shell, some being quite flat while others have an inflated appearance. The name indicates the characteristic of the shell,

referring to the numerous green lines and bands that ornament its exterior surface, radiating obliquely from the umbones. Within, the shell has a pearly, bluish-white appearance. Length averages three inches; breadth, one and a half to two inches. Abundant in the Vermillion, Fox, and Illinois.

Unio ligamentinus, LAM. A heavy, coarse shell. Color brownish, rayed with green. Teeth prominent. White and nacreous within. Length from three to four inches. Breadth from two to two and a half inches. Abundant in Illinois and Vermillion rivers.

Unio metanevrus, RAF. Shell heavy and thick, quadrate; beaks prominent. A sinus extends down from the beaks across the centre of each valve; numerous tubercles on the surface. Color yellowish outside, white within; teeth prominent and heavy. Size about three by three. This beautiful species is very abundant in the Illinois river.

Unio multiplicatus, LEA. Shell large, flat, brownish without. Plications numerous. Length, six inches; breadth, four. This shell bears a strong resemblance to *Unio undulatus*, Barnes. But I am inclined to believe it to be distinct.

Unio novi-eboraci, LEA. Shell rather small and flat. Beaks not prominent, and far back. Color yellowish, with interrupted, greenish lines radiating from the beaks. Length, two inches; breadth, one inch. Very abundant in the Vermillion river.

Unio occidentis, LEA. Shell very broad; umbones large, elevated; beaks recurved; surface smooth. Color yellowish, strongly rayed with green—colors very bright in young shells. The thickness increases with age. Old specimens are ponderous. Inside, pearly white. This and several other species bear a very close resemblance, and may yet be referred to *Unio ovatus*, Say.

Unio obliquus, LAM. This shell is found in the Illinois river in connection with *Unio solidus*, Lea.

Unio orbiculatus, HILDRETH. Shell oval, quadrate, olive color; narrow radiating lines from the beaks; *umbo* depressed. Within, white, tinged with pink, or salmon color. Shell solid. Abundant in the Illinois river.

Unio pustulatus, LEA. Found in the Illinois and Vermillion rivers.

Unio pustulosus, LEA. Found in the same localities as the preceding species.

Unio rubiginosus, LEA. A small rubiginous species, abundant in the Illinois and Fox rivers.

Unio rectus, LAM. A heavy straight shell of a black, polished exterior, pink within. Six to seven inches long. Abundant in the Illinois river.

Unio retusus, LAM. Shell oval, beaks curved; strongly setuse. Color brownish outside; white, pearly within. Illinois river.

Unio spatulatus, LEA. Shell rather thin, long anteriorly; beaks not prominent. Color greenish, rayed with darker greenish lines. Within, white. Shell strongly spatulate. Length, two and a half inches. Very abundant in Fox river.

Unio solidus, LEA. This shell is heavy, and of a brown color without; within, pink. It resembles *U. mytiloides*, but unlike the latter has no depression in its posterior slope. Loc. Illinois River.

Unio tuberculatus, BARNES. Shell from five to eight inches long, heavy and tuberculated over its entire exterior surface; white within, brown without. Abundant in the Illinois river.

Unio triangularis, BARNES. A small triangular shell, marked with green and black spots and lines. Loc. Illinois river.

Unio trigonus, LEA. Shell heavy and solid, somewhat resembling the *undatus*, Barnes, from which, however, it differs in the beaks, and is also more angular. Loc. Illinois river.

Unio undulatus, BARNES. Shell oblong, with from four to five undulations running towards the anterior; *umbo* far back and low. Color within, bluish-white, perlaceous. Length, five to seven inches. Vermillion and Illinois rivers.

Unio verrucosus, BARNES. Shell rather quadrate; thick; numerous *warts* on its exterior. Color within, bluish-slate. Vermillion and Illinois rivers.

Unio zigzag, LEA. A small shell, with numerous zigzag lines and blotches of a green color. Bluish-white within. I can see no difference between this species and *U. donaciformis*, Lea. Loc. Illinois river.

SUBGENUS MARGARITANA, SCHUM.

MARG. COMPLANATA, BARNES.

This broad, flat species is abundant in the Illinois river.

MARGARITANA RUGOSA, BARNES.

This well-marked shell is abundant in the Fox, Illinois, and Vermillion rivers.

MARGARITANA CONFRAGOSA, SAY.

This shell is sufficiently marked by its peculiar broken undulations and the knotty appearance of the beaks, to distinguish it from any other species.

MARGARITANA DELTOIDEA, LEA.

This small deltoid species inhabits the Illinois river.

Margaritana marginata, SAY. Shell ovate, thin, wedge-shaped from before; beaks small but elevated, with several undulations. Color, olive green, mottled with broken lines of a darker color. Within, bluish.

Teeth small. Posterior tip rounded. This shell may be easily known by its trunk-like appearance. It attains a length of full three inches, and thickens with age. Very abundant in the Fox, Illinois, and Vermillion rivers.

SUBGENUS ANODONTA, BRUG.

ETYMOLOGY. (ANODONTOS,) Edentulous.

Anodonta edentula, LEA. Shell firm, beaks moderate, with several undulations on them, and eroded. Color black, and appearance, outside, polished. Length, three inches; height, one and one half. Within, salmon color. This fine species may be found in the Vermillion river, near the Farm Ridge Bridge. With the assistance of a racoon I was enabled to discover the localities of the largest specimens.

Anodonta ovata, LEA. A rather broad, compressed shell, found in the Illinois river.

Anodonta imbecillis, SAY. This shell is small and thin, of a bright green color exteriorly. Illinois river.

Anodonta corpulenta, COOPER. A large, smooth species. Loc. Illinois river. This shell has been mistaken, on account of its size, for *A. Grandis*, Say.

The foregoing embraces all the species of the Family Unionidae that have come under my own observation as living within the limits of the county. There are

others, no doubt, as they appear to be found in adjacent districts. Notwithstanding the plain appearance of the *Uniones*, they present points of study and interest to the naturalist quite as great as those of any other family of Mollusks.

