

PLEISTOCENE MOLLUSCA FROM NORTHWESTERN AND CENTRAL ILLINOIS¹

FRANK COLLINS BAKER
Museum of Natural History, University of Illinois

Two very interesting and important collections have recently been submitted for study by members of the Illinois State Geological Survey. They include several new forms, besides a number of species not before recorded from Illinois Pleistocene deposits, though several of these have been known from Iowa glacial deposits for many years.

In the volume on the *Life of the Pleistocene* (Baker, 1920b, p. 368) the author listed as extinct six species of mollusks. That so small a number of species in so large a group should have become extinct is noteworthy, but is paralleled by the plants of which seven species are extinct. It is believed by the writer that careful analysis of Pleistocene Mollusca will show that more species or varieties have become extinct than is indicated by present records. Many species have been linked with existing forms though they vary quite enough to constitute distinct species or races. It will be found that some species are abundant in Pleistocene deposits, but rare living, indicating that the species is approaching extinction.

In the study of Pleistocene fossils it is of the greatest importance that minute differences between species be recorded, for it frequently happens that two deposits contain species closely related but yet sufficiently different to indicate a difference in climate, habitat, or general environment. A case in point is *Succinea avara* and *Succinea vermata*, two closely related species or races, the latter of which is abundant in loess deposits and other Pleistocene beds. The so-called "lumper" of species can do great harm to the study of fossil faunas, whereas the so-called "splitter," recognizing small differences, may be of real help in the discrimination of faunas and

¹ *Contribution from the Museum of Natural History, University of Illinois, No. 20.*

their relation to each other. Of the two evils, splitting is certainly the less. In the study of the material from these deposits this fact has been kept in mind and careful comparisons have been made with Recent and with other fossil species

MATERIAL FROM THE LOESS AND OTHER DEPOSITS
IN NORTHWESTERN ILLINOIS

This material was collected by Dr. Morris M. Leighton, geologist in charge of Pleistocene investigations for the Illinois State Geological Survey, during the summer of 1920. Dr. Leighton has worked out the stratigraphy of these deposits and his papers appear elsewhere. The localities and sections from which the material came are indicated below, the information being contributed by Dr. Leighton. The molluscan species contained in these strata are listed as to species and abundance. The writer has added certain notes to Dr. Leighton's data, suggested by the zoological content of the strata. More specific information concerning the different species will be found in a later part of this paper.

STATION NO. 1

Locality: Bluff along Farm Creek, Tazewell County, about 7 miles east of Peoria, just east of the Toledo, Peoria & Western Railway bridge, near the south line of SE. $\frac{1}{4}$, Sec. 30, T. 26 N., R. 3 W.

Material: From the deposit of loess underlying the Shelbyville till, and overlying an older leached loesslike clay and the weathered Illinoian till.

Stratigraphic horizon: Early Peorian loess.

MOLLUSCAN LIFE

Helicina occulta, common.

Succinea ovalis, rare, immature.

Oreohelix iowensis, broken pieces.

All are typical Peorian loess mollusks. This is near the type locality of Leverett's Peorian interglacial stage,¹ and these are the first mollusks to be specifically identified from this type section.

¹ Leverett, "The Illinois Glacial Lobe," *U.S. Geol. Surv. Mon.* 38 (1899), p. 187.

STATION NO. 2

Locality: Road cut $\frac{3}{4}$ mile northwest of Winslow, Stephenson County, just southeast of fork in roads.

Material: Yellow calcareous sandy loess from base of cut.

Stratigraphical horizon: Probably early Peorian.

MOLLUSCAN LIFE

Succinea vermeta, a common loess fossil, usually listed as *avara*.

STATION NOS. 3 AND 11

Locality: Stephenson County, SW. $\frac{1}{4}$ of SW $\frac{1}{4}$, Sec. 28, T. 27 N., R. 9 E., about $\frac{1}{8}$ mile northeast of Pecatonica River bridge, bank along roadside 12 to 15 feet high, mostly grass- and shrub-covered; 1 mile north and $\frac{1}{8}$ mile east of Ridott.

Material: Exposure at one place shows yellow, loesslike clay, calcareous, about 5 feet below top. Topographically a terrace resembling the silt terrace of the Pecatonica farther downstream and in tributary $\frac{1}{8}$ mile east. No show of bedding or lamination; possibly obliterated by slumping.

Stratigraphic horizon: Probably Wisconsin, in back water from Rock River during the deposition of the Rock River Valley train.

MOLLUSCAN LIFE

Pomatiopsis lapidaria, very abundant. *Galba obrussa*, seven broken shells. *Helicodiscus parallelus*, common.

The writer is of the opinion that this deposit may have been partly formed by wind. Two of the species are semiaquatic. *Pomatiopsis* now lives in very small streams, usually not exceeding 2 feet in width and a few inches in depth. *Galba obrussa* is semiaquatic (or amphibious) and spends as much time out of the water as in it. Its habitat is in such streams as above described, or on muddy shores bordering rivers. It does not (nor does *Pomatiopsis*) live in large bodies of water such as lakes or rivers. The writer has seen several places in Illinois, shallow rivulets in woodlands bordering streams, inhabited by these species. One such is near Mahomet on the Sangamon River. *Helicodiscus* is a typical land mollusk. The character of the deposit (loesslike), the contained

calcareous concretions, and the habitat of the contained life all point to the possibility of its being low-land loess.

STATION NO. 4

Locality: Illinois Central Railway cut, Boone County, about $\frac{1}{2}$ mile northwest of depot at Irene, northeast side of cut, NW. $\frac{1}{4}$, Sec. 29, T. 43 N., R. 3 E.

Material: Where fossils were collected the drift section was as follows:

	Feet
6. Soil, dark, loessial, sparse pebbles	About $2\frac{1}{2}$
5. Till, leached, dark buff clay, hard	$1\frac{1}{2}$
4. Calcareous till, yellow on dry surface, grayish yellow with pinkish cast on damp surface, limestone pebbles; dark till in lower 6 feet	About 15
3. Stratified, yellow, calcareous sand, no pebbles; numerous pelecypods and other mollusks	About 5
2. Blue-gray calcareous silt with numerous mollusks; exposed	2
1. Bottom of cut, uncovered	5

Stratigraphic horizon of Nos. 2 and 3: Post-Illinoian and pre-early Wisconsin, possibly Sangamon.

MOLLUSCAN LIFE

Fossils were obtained from Nos. 2 and 3 as noted:

No. 3	No. 2
.	<i>Musculium rhomboideum</i> , 1, fragments
<i>Pisidium costatum</i> , common.	<i>Pisidium costatum</i> , abundant.
<i>Planorbis altissimus</i> , common.
<i>Galba palustris</i> , common.	<i>Galba palustris</i> , rare, immature.
<i>Succinea vermata</i> , rare.

The blue-gray silt, No. 2, indicates a quieter body of water than the yellow sand, No. 3, and the mollusks bear out this interpretation.

STATION NO. 5

Locality: Ten rods southeast of Station No. 4, northeast side of cut.

Material: The cut shows the following section:

	Feet
11. Soil, dark, loessial, sparse pebbles	$2\frac{1}{2}$
10. Leached till, dark buff, clayey, hard	$1\frac{1}{2}$
9. Calcareous till, yellowish when dry, grayish yellow with pink tinge when damp, contains limestone pebbles	7

	Feet
8. Fine sand, no pebbles, yellow, highly calcareous.	2½
7. Calcareous till, banded, yellow and grayish, limestone pebbles, compact.	1½
6. Blue, gummy clay, nearly gritless in some places and pebbles up to 1 inch in others, highly calcareous.	1/3 - 2/3
5. Fossiliferous loess, grayish to yellowish, rusty streaks near base, calcareous throughout, sand streaks, cross-bedded, dip southerly.	5
4. Stratified yellow sand and gray silt with few pebbles, few fossils, discoidal, calcareous.	1½
3. Light blue silt, pebbly, some limestone pebbles, highly calcareous; may be till.	1
2. Sandy to gravelly till, yellowish to rusty, limestone pebbles, matrix calcareous.	2
1. Probably till, gray with pinkish tinge, calcareous; steam shovel has worked stratum giving steeper slope than above section.	7

Nos. 6 to 10 include the Wisconsin drift sheets; Nos. 1 to 3 represent Illinoian till; Nos. 4 and 5 indicate an interglacial interval between the deposition of these tills. The sand and silt (No. 4) may represent the Sangamon, and the loess (No. 5) the Peorian, although there appears to be no break between them. No. 4 has yielded two species of fresh water mollusks; *Planorbis altissimus* and *Calba palustris*, represented by but a few specimens.

STATION NO. 6

Locality: Same as Station No. 5.

Material: Taken from the fossiliferous loess No. 5 of the previous section. Separate collections were made from both the yellow and gray loesses, the mollusks in both being of the same species.

Stratigraphic horizon: Possibly Peorian loess.

MOLLUSCAN LIFE

Succinea vermeta, the common *Succinea* of the loess, occurred somewhat more abundantly in the yellow than in the gray loess. Mr. B. B. Cox, a student in the University of Chicago, collected mollusks from the loess and other deposits, though he did not discriminate between the deposits. He found in addition to the above *Sphyradium edentulum alticola*, a typical Peorian loess fossil, represented by one specimen.

STATION NO. 7

Locality: Whiteside County, SE. $\frac{1}{4}$ of SE. $\frac{1}{4}$, Sec. 15, T. 20 N., R. 3 E., stream-cut bank about 50 feet northwest of small bridge.

Material: Where the fossils were collected the following section was exposed:

	Feet
5. Soil dark	$\frac{1}{2}$ -1 $\frac{1}{2}$
4. Loesslike clay, dirty buff to buff, leached	1-2 $\frac{1}{2}$
3. Weathered zone, brownish, separates upper from lower material	$\frac{1}{4}$
2. Loesslike clay, yellow with rusty spots, no structure	5
1. Fossiliferous clay, blue silts, dense, sticky, calcareous	1 $\frac{1}{2}$

Stratigraphic horizon of No. 1: Probably Wisconsin in age; perhaps deposited in backwater of tributaries to the Mississippi River during deposition of the Wisconsin Valley train in the Mississippi Valley.

MOLLUSCAN LIFE

Six species of fresh mollusks (one a bivalve) and one species of land mollusks were found in the fossiliferous bed, as noted:

Fresh Water	Land
<i>Pisidium costatum</i> , rare.	<i>Succinea vermeta</i> , common.
<i>Valvata sincera</i> , abundant.	
<i>Planorbis altissimus</i> , rare.	
<i>Galba palustris</i> , rare, immature.	
<i>Galba dalli</i> , common.	

The *Succinea* was doubtless washed into the stream from the land. The near relative of *vermeta*, *Succinea avara*, is frequently found on vegetation bordering streams or lakes.

In the section it would be interesting to know just what the weathered zone, stratum No. 3, indicates. It possibly indicates Recent wash from the bordering hill slopes since man has disturbed the soil conditions by removing the forests.

STATION NO. 8

Locality: Carroll County, NE. $\frac{1}{4}$ of NE. $\frac{1}{4}$, Sec. 8, T. 23 N., R. 5 E., south bluff of creek valley southeast of schoolhouse. The bluff is 30 feet high and occurs in the end of a terrace spur at the mouth of a tributary valley.

Material: The bluff shows the following section:

	Feet
5. Soil and angular "float"	1- 1½
4. Silt, structure mostly obliterated, leached, conforms to the present slope.	1- 3
3. Sands and silts, laminated and thin-bedded, minor lens and pocket structure; clay yellow and brown; red granite boulder 1 foot in diameter occurs about 10 feet above creek bottom on the north side near the base of this horizon; maximum.	22
2. Blue silt, fossiliferous, some brown sand.	6- 8
1. Coarse, angular gravel, discontinuous in the middle portion exposed (above water level)	0- 2½

Stratigraphic horizon: Nos. 2, 3, and 4 are believed to be of Wisconsin age, formed in backwater from the Mississippi, but there is reason to assign it to Peorian age or earlier.

MOLLUSCAN LIFE

Mollusks were collected from both the silts and the sands, as follows:

Silts	Sands
<i>Succinea vermeta</i> , abundant.	<i>Succinea vermeta</i> , abundant.
<i>Vertigo modesta</i> , rare, 1 spec.
<i>Pyramidula shimekii</i> , rare, 3 spec.	<i>Pyramidula shimekii</i> , rare, 1 spec.
.	<i>Galba parva</i> , not common.

The land shells (including all except *Galba*) are characteristic of the Peorian loess. Their presence (especially *Pyramidula shimekii*) in this deposit beneath nearly 25 feet of other material would indicate an earlier age than the Wisconsin. The till in Carroll County is of Illinoian age, and it seems probable that the material above the till, especially Nos. 3 to 5 of the section, while deposited by the Wisconsin waters, really covered up life-remains that lived during the Peorian or Sangamon interglacial period.

In the sands and silts of stratum No. 3 (Station No. 9) three species were found, *Succinea vermeta*, *Vertigo modesta*, *Galba parva*, the *Succinea* being the only abundant species, the others very rare.

STATION NO. 10

Locality: Same as Station No. 8.

Material: Creek bank 5 feet high on south side of meander curve shows the following section:

	Feet
4. Gray silt (modern)	1
3. Black, peaty soil, fossiliferous	1 $\frac{1}{4}$
2. Gray silt, compact	1 $\frac{3}{4}$
1. Fine gravel, cross-bedded to water level	1

Stratigraphic horizon of No. 3: Wabash stage (pre-Recent).

MOLLUSCAN LIFE

Ten species of both land and fresh-water mollusca occurred in this peat deposit, as noted:

Water	Land
<i>Pisidium</i> , species, a few odd valves.	<i>Carychium exile</i> , rare.
<i>Physa gyrina</i> , rare.	<i>Vitrea rhoadsi</i> , rare.
<i>Aplexa hypnorum</i> , rare.	<i>Gastrocopta tappaniana</i> , common.
<i>Planorbis urbanensis</i> , not common.	<i>Strobilops virgo</i> , rare.
<i>Galba dalli</i> , common.	<i>Euconulus fulvus</i> , rare.

This is a typical swamp or small-pond fauna such as might be found in any quiet pond in Illinois. Such small bodies of water are common in old flood plains. The presence of *Planorbis urbanensis* is noteworthy, the species being hitherto known only from the original locality at Urbana.

STATION NO. 11

Same as Station No. 3.

STATION NO. 12

Locality: Stephenson County, Sec. 22, T. 29 N., R. 6 E., about 100 feet southeast of the fork of the roads $\frac{1}{4}$ mile northwest of Winslow, east side of road; roadcut 7 feet deep, all grassed except $1\frac{1}{2}$ feet at base.

Material: Probably entirely loess. Base shows loess interstratified with sand: yellow, fossiliferous.

Stratigraphic horizon: Not precisely known, although post-Illinoian.

MOLLUSCAN LIFE

The mollusk *Succinea vermeta* appears sparingly in the base of the section.

STATION NO. 13

Locality: Whiteside County, west line of NW. $\frac{1}{4}$ of SE. $\frac{1}{4}$, Sec. 15, T. 20 N., R. 3 E., road cut on upland spur.

Material: Shown in the following section:

	Feet
2. Soil and leached loess	1 $\frac{1}{2}$ -3
1. Calcareous and fossiliferous loess	6

Stratigraphic horizon: Post-Illinoian, possibly Peorian.

MOLLUSCAN LIFE

Seven species of land mollusks typical of the Iowan loess occurred in stratum No. 1, as noted:

<i>Vallonia gracilicosta</i> , common.	<i>Gastrocopta armifera</i> , common.
<i>Vertigo modesta</i> , rare (previously known as <i>Pupilla blandi</i>).	<i>Succinea avara</i> , common.
<i>Pupilla muscorum</i> , rare.	<i>Pyramidula shimekii</i> , rare.
	<i>Euconulus fulvus</i> , rare.

DISCUSSION OF SPECIES REPRESENTED IN THE DEPOSITS

Thirty species are represented in the material collected by Dr. Leighton, three of which have not before been definitely reported from Pleistocene deposits in the state, and three others have been reported but rarely and from deposits not clearly defined stratigraphically. These are:

New Records	Rare Records
<i>Gastrocopta tappaniana</i>	<i>Vertigo modesta</i> .
<i>Vallonia gracilicosta</i> .	<i>Pyramidula shimekii</i> .
<i>Galba dalli</i> .	<i>Oreohelix iowensis</i> .

These collections indicate that the fauna of the loess and other deposits common in Iowa also occur in Illinois, at least in the northwestern part, and that the deposits may be rather definitely correlated with those of Iowa.

The thirty species have the following distribution as to geologic age:

TABLE I
DISTRIBUTION OF SPECIES ACCORDING TO GEOLOGIC AGE

Species	Sangamon	Peorian	Wabash
Bivalves			
<i>Musculium rhomboideum</i>	×		
<i>Pisidium costatum</i>	×		×
<i>Pisidium species</i>			×
Fresh-water gastropods			
<i>Pomatiopsis lapidaria</i>			×
<i>Valvata sincera</i>			×
<i>Aplexa hypnorum</i>			×
<i>Physa gyrina</i>			×
<i>Planorbis altissimus</i>	×		×
<i>Planorbis urbanensis</i>			×
<i>Galba palustris</i>	×		×
<i>Galba obrussa</i>			×
<i>Galba dalli</i>			×
<i>Galba parva</i>		×	
Land gastropods			
<i>Carychium exile</i>			×
<i>Helicina occulta</i>		×	
<i>Vallonia gracilicosta</i>		×	
<i>Succinea ovalis</i>		×	
<i>Succinea avara</i>		×	
<i>Succinea vermata</i>	×	×	×
<i>Vertigo modesta</i>		×	
<i>Pupilla muscorum</i>		×	
<i>Gastrocopta armifera</i>		×	
<i>Gastrocopta tappaniana</i>			×
<i>Strobilops virgo</i>			×
<i>Sphyradium edentulum alticola</i>		×	
<i>Helicodiscus parallelus</i>			×
<i>Pyramidula shimekii</i>		×	
<i>Oreohelix iowensis</i>		×	
<i>Euconulus fulvus</i>		×	×
<i>Vitrea rhoadsi</i>			×

FRESH-WATER BIVALVES (PELECYPODS)

Musculium rhomboideum (Say). A single valve of this fragile species was found in a deposit of blue-gray silt of post-Illinoian and pre-early Wisconsin age (Sangamon?) near Irene, Boone County. It is apparently rare in Pleistocene deposits.

Pisidium costatum Sterki. This small bivalve was selected from three deposits at two localities; in yellow sand and blue-gray silt near Irene, Boone County (Sangamon age), and in the blue silty clay in Whiteside County (Wabash age). It is abundant near Irene, but rare in Whiteside County. *Costatum* is known only from Pleistocene deposits, not yet having been detected among

living *Pisidia*. It is widely distributed and has been recorded from Aroostook County, Maine (Baker, 1920b, p. 155), Michigan (Sterki, 1916, p. 466), and Urbana, Illinois (Baker, 1918, p. 663). These records are all Wabash (post-Wisconsin). The present records carry the species back into interglacial time.

Pisidium, species indeterminate. A few odd valves of a small *Pisidium* occurred in peat material from a flood-plain pond in Carroll County, of Wabash age (post-Wisconsin).

FRESH-WATER SNAILS (GASTROPODS)

Pomatiopsis lapidaria (Say). A mile north of Ridott, Stephenson County, in loesslike silt, this species is abundant in company with *Galba obrussa* and *Helicodiscus parallelus*. The species does not differ in any way from living forms.

Valvata sincera (Say). Abundant in blue silts in Whiteside County, apparently of Wabash age. These individuals are quite typical in everything except size, the largest specimens being almost 1 mm. less in diameter than the largest living *sincera* from Lake Winnipeg. The two measurements are:

	ALTITUDE mm.	DIAMETER mm.
Recent species from Lake Winnipeg	4.5	5.5
Fossil species from Carroll County	3.5	4.5

Sincera from Urbana deposits (Baker, 1918, p. 663) are like the Carroll County forms in size. If this disparity in size should prove universal, it might be of advantage to differentiate the latter as a fossil race. Not enough material of either the Recent or the fossil *sincera* is at hand to settle this question definitely. Like the Recent forms, the fossil specimens vary somewhat in the height of the spire and in the sculpture of the whorls, there being a tendency in a few individuals to form thin, sharp ribs, as in the variety *nylanderi*. This feature is more marked in the Urbana *sincera* than in the specimens from Carroll County.

PULMONATE GASTROPODS

Physa gyrina Say. Rare in the Carroll County deposit, the specimen found being also immature.

Aplexa hypnorum (Linn.). A few very young specimens, 3-4 mm. in length, occurred with the other species in the Carroll County peat deposit.

Planorbis altissimus Baker. This small *Planorbis* occurs in sand and silt deposits near Irene, Boone County, in strata believed to be of Sangamon age, and in silt in Whiteside County, of Wabash age. It was most abundant in the Irene deposits. *Altissimus* is the common small *Planorbis* of all Pleistocene deposits. As a fossil it has recently been recognized in deposits from Maine, Michigan, Wisconsin, Indiana, Illinois, New Jersey, and Canada (Ontario). It is the species listed as *parvus* in the writer's *Life of the Pleistocene* (in most cases, although true *parvus* does occur in Pleistocene deposits) and in most references to glacial fossils. It was thought to be extinct, but recently Miss Mina L. Winslow, of the Museum of Zoölogy, University of Michigan, collected a large number of a small *Planorbis* in Devil's Lake and other water bodies in North Dakota which are apparently the same species. Conditions in these lakes are becoming severe, due chiefly to increase of alkalinity, and the species appears to be dying out in the region.

Planorbis urbanensis Baker. Six specimens of a small *Planorbis*, first described from deposits in Urbana (Baker, 1918, p. 664; 1919, p. 94), occurred in the peat deposit in Carroll County. It does not differ from the Urbana individuals and its presence in a distant part of the state indicates a rather wide distribution. It has probably hitherto been listed under the all-embracing name of *parvus*. Known only from fossil strata at present.

Galba palustris (Müller). Specimens of this protean species were found in deposits near Irene, probably of Sangamon age. These do not differ from living examples of the species. Young individuals, 4 and 6.5 mm. in length, occurred in Wabash deposits in Whiteside County.

Galba obrussa (Say). Broken specimens of this species occurred in post-Wisconsin deposits near Ridott, Stephenson County.

Galba dalli (Baker). This, the smallest of the lymnaeids, was common in the peat deposit in Carroll County, and in silt deposits in Whiteside County. The specimens are somewhat larger than the types of the Recent individuals from Indiana and there is some

variation in the height of the spire and the width of the shell. This is the first record for the species in the Pleistocene deposits of Illinois, though it is common in the Recent fauna.

Calba parva (Lea). Three lots of a small lymnaeid apparently referable to *parva* were collected by Dr. Leighton, in brown sand and yellow sand, Carroll County, and in silt, Whiteside County, the latter in post-Wisconsin deposits (Wabash age). In one lot from yellow sand (see Station No. 8) the shell is very wide and convex on the body whorl. This shell resembles Wolf's figure of his *tazewelliana*, described from deposits in Tazewell County (Wolf, 1870, p. 198, Pl. XVII, Fig. 2). This form is much more obese in the body whorl than are individuals of this species from the Recent fauna. Specimens from silt in the same section have a much narrower and more compressed body whorl, and the columella is slightly impressed. A single adult individual from Whiteside County (silt deposit) has the columella impressed so as to form a slight plait. The material at hand is not sufficient to separate these forms satisfactorily, or to indicate whether they are merely local sports or larger variations. On the whole, if these are merely individual variations, the *parva* of the late Pleistocene is much more variable than its living representative.

LAND GASTROPODS

Helicina occulta Say. A number of individuals of this species occurred in Peorian loess near Peoria. It is not a pulmonate land snail.

Carychium exile H. C. Lea. A single individual of this small snail occurred in the peat deposit in Carroll County. It is quite typical.

Vallonia gracilicosta Reinhard. Seven specimens of a *Vallonia* occurred in the loess deposit of Whiteside County that are referable to *gracilicosta*. They exactly conform to the figures by Sterki (1892, p. 256, Pl. XXXIII, Figs. 48, 49) and they agree with his description, having the fine, distinct ribs characteristic of this species, which are finer and differently spaced than those of *costata*. *Gracilicosta*, according to Shimek, is a common loess fossil in Iowa. It has not previously been positively identified from Illinois deposits,

although it probably occurs and has been listed as *pulchella* or *costata*. McGee's reference to *pulchella* from Fulton, Whiteside County (*Pleistocene History of Northeastern Iowa*, p. 448) may be this species, as it looks like that species without the aid of a powerful magnifier (Baker, 1920b, p. 351). It probably occurs widely distributed in northwestern Illinois. Living *gracilicosta* are known only from the West and Canada. Its abundance in the loess indicates a former greater southward extension in distribution.

Succinea ovalis Say. Fragments of a large *Succinea* from the Peorian loess near Peoria are believed to be this species.

Succinea avara Say. Several specimens of a species referable to true *avara* occurred in the loess of Whiteside County.

Succinea vermeta Say. The great majority of *Succineae* collected by Dr. Leighton are referable to Say's *vermeta*, which appears distinct from his *avara*, the spire being longer, the sutures deeper, the whorls rounder, and the aperture roundly ovate instead of long ovate. The shells referred to *vermeta* vary among themselves, but all are easily separable from typical *avara*. *Avara* as recorded from Pleistocene deposits also includes *vermeta*, the two forms not being differentiated. The two forms are said to intergrade completely in the Recent fauna, but this does not seem to be true of the Pleistocene fauna, at least as shown by the material examined. The localities represented in the collections of Dr. Leighton are:

Sangamon sand, Irene, Boone County.
 Early Peorian loess, Winslow, Whiteside County.
 Peorian loess, Stevenson County.
 Wabash sand, Carroll County.
 Wabash silt, Whiteside County.

Vertigo modesta Say. This small land shell (of which the *Pupilla blandi* Morse of the Iowa deposits is a synonym) occurred sparingly in three places, in silt and sand, Carroll County, and in loess, Whiteside County. The individuals from silt and sand deposits are apparently typical with four teeth in the aperture; but the loess specimen from Whiteside County is different from any form described. There are a columella tooth and two palatal teeth, but no parietal tooth. Pilsbry (1919, p. 128) describes a toothless and a tridentate form of *modesta* from Norton Sound,

Alaska, and the Whiteside County specimen adds another variation. Not enough material is at hand to ascertain whether this variation is anything more than local. *Modesta* (under the name of *Pupilla blandi*) is a common loess fossil in Iowa. In Illinois it has been reported from the Yarmouth stage (Baker, 1920b, p. 271), and from deposits in the driftless area (Baker, 1920b, p. 353).

Pupilla muscorum (Linn.). Two specimens from the loess of Whiteside County, apparently typical.

Gastrocopta armifera (Say). Common in loess of Whiteside County, and quite typical.

Gastrocopta tappaniana (C. B. Adams). Abundant in the peat deposit of Carroll County.

Strobilops virgo (Pilsbry). Two specimens of this small land shell occurred in the peat deposit in Carroll County. They are typical.

Sphyradium edentulum alticola (Ingersoll). A single specimen of this small species occurred in the calcareous loess in Boone County, collected by Mr. B. B. Cox. This species is reported from but two other places in Illinois. These are as follows (data from Baker, 1920b): Aftonian, well boring near Rock Island, cited as *Pupa alticola* (p. 240); Peorian or Wabash loess, near Galena (p. 353). Its small size has probably caused it to be overlooked in the examination of loess deposits from Illinois.

Helicodiscus parallelus (Say). Common in yellow sand of Wabash age near Ridott, Stephenson County. All of the specimens are typical.

Pyramidula shimekii (Pilsbry). This characteristic land mollusk was found in two localities, both of Peorian age, loess of Whiteside County and sands of Carroll County. But one specimen was collected in each place. *Pyramidula shimekii* is an abundant fossil in the loess of Iowa and may be said to be characteristic of the Iowan or Peorian loess. No authentic records are known from strata later than the Peorian. While it is common in Iowa, it is rare in Illinois, and records are known from but one locality other than those listed (Galena in the driftless area, Trowbridge and Shaw, "Galena Folio). It may have been listed elsewhere under the name of *Pyramidula cronkhitei anthonyi*, which

somewhat resembles *shimekii*. The specimens collected by Dr. Leighton are slightly smaller than specimens from the Iowa localities.

Oreohelix iowensis (Pilsbry). Fragments of a large land shell in the Peorian loess near Peoria are believed to be this species. This fossil has been reported several times from Illinois deposits, and as it is a characteristic loess fossil, it may be of value to list these localities for comparison.

Virginia, Cass County (listed as *Helix strigosa*), Sangamon loess (Leverett, p. 171).

Fulton, Whiteside County, Peorian loess (McGee, p. 448).

Savanna, Carroll County (Chamberlin & Salisbury, p. 285), driftless area. (See Baker, *Life of Pleistocene*.)

Euconulus fulvus (Müller). A single specimen occurred in each of two deposits, in loess, Whiteside County, and in peat, Carroll County. Both are typical.

Vitrea rhoadsi Pilsbry. Two specimens of this little snail occurred in the peat deposit in Carroll County. They were apparently typical.

WABASH DEPOSITS IN THE VALLEY OF THE ILLINOIS RIVER

Mr. Harold E. Culver, geologist of the State Geological Survey, recently obtained a very interesting collection of molluscan material from marl deposits in Grundy County. Mr. Culver has furnished the following information concerning this deposit and its relation to the associated strata:

The shells from the marl deposit were uncovered in coal stripping operations near Morris, Illinois. The pit is located in the S.E. quarter of sec. 34 of Saratoga Township (34 N., 7 E., 3d. P.M.).

TYPICAL SECTION OF UNCONSOLIDATED STRATA

	Inches
5. Swamp silts, medium to dark gray.	18
4. Porous clay, bright yellow-brown in color, lower surface very uneven, and thickness variable.	2
3. Marl, light gray in color.	8
2. Lake muds, gray, iron-stained, porous and full of organic matter, no shells, some glacial boulders, and in places till at the base.	24
1. No. 2 coal, average.	30

From the character of the deposit and its relation to the underlying material, it is clear that it is post-Marseilles in age, and has evidently been laid down in a somewhat limited depression, which was probably connected with the main Illinois Valley through a narrow outlet three or four miles to the southwest. This depression presumably constituted merely an area of overflow for the older Illinois River, and still bears somewhat of the same relation to the present stream. The deposit of marl is in places less than three inches in thickness, but probably exceeds a foot at the maximum. The areal extent is not known, but judging from the topographic relation the basin in which it was deposited covers two or three miles. It does not seem probable, however, that the marl deposit is even as extensive as this.

From Mr. Culver's description the deposit would seem to be related to the old glacial outlet from Glacial Lake Chicago, when that body of water was at one of its high stages, possibly the Calumet stage. During the Glenwood and Calumet stages the Illinois Valley was well filled with water and every little cove, inlet, or depression near the valley margin was filled with water and formed ideal habitats for fresh-water mollusks such as are now found in the deposit under discussion. Similar marl beds are known from Joliet and are now being studied. The species in the Morris deposit are mostly identical with those found in the Chicago basin (Baker, 1920b), and it is to be presumed that the latter area was supplied with life from the Illinois Valley. It is not impossible for the Morris deposit to be pre-Lake Chicago in age, as the mollusks in the deposit could easily have lived during the Glenwood stage of Lake Chicago.

DISCUSSION OF SPECIES

Pisidium tenuissimum calcareum Sterki. An abundant species occurring also in the deposits at Urbana.

Pisidium compressum Prime. This species is evidently rare in this deposit, only a single valve being found in picking over a half-pint of material.

Amnicola leightoni Baker. Abundant. This *Amnicola* appears to be peculiar to glacial deposits. Some of the *Amnicola* recorded from Pleistocene deposits in the Chicago basin (Baker, 1920b) are this species and not *Amnicola limosa*, although specimens believed to be *limosa* occur. It is recorded from Ohio (Baker, 1920a, p. 448),

and the species probably has a wide distribution in Pleistocene deposits, from which it has been listed as *limosa*.

Amnicola walkeri Pilsbry. A common species in this deposit. Also widely distributed.

Amnicola lustrica gelida Baker. This variety of *Amnicola lustrica* was recorded as *lustrica* variety in a previous paper on Ohio glacial mollusks (Baker, 1920a, p. 448). It occurs abundantly in the Gundy County deposits, at Chicago, in other parts of Illinois, in Wisconsin, and in Michigan. It is constantly separable from typical *lustrica* and should have a name to distinguish it (see Baker, 1921, p. 22). It is probably peculiar to Pleistocene time.

Valvata tricarinata (Say). Both Recent and Pleistocene carinate *Valvatae* show a large amount of variation in the degree of carination. Most of these variations have been named and but one possible combination seems unrecognized (*supracarinata*), and this has been characterized from specimens in the Grundy County deposit (Baker, 1921, p. 24). Of these possible variations, seven in all, five occur in the deposit under discussion. These are:

Valvata tricarinata (Say), common.

Valvata tricarinata perconfusa Walker, abundant.

Valvata tricarinata infracarinata Vanatta, rare, two specimens observed.

Valvata tricarinata supracarinata Baker, rare, four specimens observed.

Valvata tricarinata simplex Gould, rare, one specimen observed.

Physa anatina Lea. A common *Physa* in this deposit appears to be Lea's species, although the spire is not as high as in normal *anatina*.

Physa walkeri Crandall. Common, associated with *anatina*. Apparently typical. Both species are widely distributed in Pleistocene deposits.

Planorbis campanulatus Say. Rare, but two specimens observed.

Planorbis antrosus Conrad.

Planorbis antrosus striatus Baker. Both *antrosus* and its variety *striatus* occurred commonly, in about equal numbers. A very common species in Pleistocene deposits.

Planorbis deflectus Say. Not common. Typical of the species as found Recent.

Planorbis exacuous Say. A single specimen of this characteristic species was observed. It differs from Recent *exacuous* in having a bluntly acute periphery, hence higher whorls, and in the decided deflection of the aperture. It may be an individual variation, as but the one specimen was found.

Planorbis altissimus Baker. This common small *Planorbis* occurred abundantly in the deposit. It is the most abundant species of the genus in Pleistocene deposits.

Calba obrussa decampi (Streng). Common, but most of the material is immature.

Mr. Culver also collected a number of shells in Section 23 of the same township, in a slight depression which drains fairly well to the southwest. Mr. Culver says of this material:

The shells lie scattered through about a foot of black mucky soil, which overlies clay which is presumably weathered Marseilles till. Although lying at an elevation considerably above the present alluvial flats of the Illinois River, this appears to be merely an accumulation of recent muds, and hence cannot be referred to the glacial epoch.

Four species are represented in the lot:

Galba reflexa Say.

Planorbis trivolvis Say.

Physa gyrina Say.

Planorbis pseudotrivolvis Baker.

All were abundant except *Planorbis pseudotrivolvis*, of which but one specimen was present. This is an interesting find, because this form of *Planorbis* is present in the Chicago deposits and is now living near Urbana (see Baker, 1920, p. 123). The fauna is one that we now find in swales or summer-dry ponds in many parts of Illinois, or in the small branches of rivers near their sources.

LIST OF WORKS CITED

BAKER, FRANK COLLINS.

- 1918. "Post-glacial Mollusca from the Marls of Central Illinois," *Journal of Geology*, Vol. XXVI, pp. 659-71.
- 1919. "Description of a New Species and Variety of *Planorbis* from Post-glacial Deposits," *Nautilus*, Vol. XXXII, pp. 94-97.
- 1920. "A New *Planorbis* from Illinois," *Nautilus*, Vol. XXXIII, pp. 123-25.
- 1920a. "Pleistocene Mollusca from Indiana and Ohio," *Journal of Geology*, Vol. XXVIII, pp. 439-57.

BAKER, FRANK COLLINS.

- 1920b. "The Life of the Pleistocene or Glacial Period," *University of Illinois Bulletin*, Vol. XVII, No. 41, pp. i-xiv, 1-476.
1921. "New Forms of Pleistocene Mollusca from Illinois," *Nautilus*, Vol. XXXV, pp. 22-24.

CHAMBERLIN, T. C., and SALISBURY, R. D.

1888. "Preliminary Paper on the Driftless Area of the Upper Mississippi Valley," *U.S. Geological Survey, Annual Report*, Vol. VI, pp. 199-322.

LEVERETT, FRANK.

1899. "The Illinois Glacial Lobe," *U.S. Geological Survey, Monograph* 38.

MCGEE, W. J.

1891. "The Pleistocene History of Northeastern Iowa," *U.S. Geological Survey, Eleventh Annual Report*, Part I, pp. 189-577.

PILSBRY, HENRY A.

1919. Monograph on *Pupillidae* in Tryon's *Manual of Conchology*, II, Vol. XXV.

SHAW, E. W., and TROWBRIDGE, A. C.

1916. "Galena-Elizabeth Folio, Illinois-Iowa," *U.S. Geological Survey, Geological Atlas*, No. 200.

STERKI, VICTOR.

1892. Monograph on *Vallonia* in Tryon's *Manual of Conchology*, II, Vol. VIII, pp. 247-61.
1916. "A Preliminary Catalog of the North American Sphaeriidae," *Annals, Carnegie Museum*, Vol. X, pp. 429-77.

WOLF, JOHN.

1870. "Descriptions of Three New Species of Shells," *American Journal of Conchology*, Vol. V, p. 198.