PLEISTOCENE MOLLUSCA FROM THE VICINITY OF JOLIET, ILLINOIS.*

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Several collections of Pleistocene fossil mollusks from the vicinity of Joliet have recently been submitted for study, which are of unusual interest from the standpoint of geological and geographical distribution. All of the deposits are Post-Glacial in age and represent several stages in the history of Glacial Lake Chicago. It is, of course, difficult or impossible to exactly correlate these deposits with the lake stages, but the contained life indicates that the lake was populated from the Desplaines and Illinois valleys.

MATERIAL FROM THE FAIR GROUND QUARRY, JOLIET

This material was collected by Mr. James H. Ferriss, of the Joliet Daily News, a veteran collector of mollusks, both recent and fossil, and represents several years work. It is thus as complete a collection as could well be made and probably includes about all of the species possible to be found in these strata. Fifty-six species are included, of which eight are bivalves, six water breathing gastropods, 19 pulmonate aquatic gastropods, and 23 land gastropods, altogether forming one of the largest aggregations of Pleistocene Mollusca from one place. One variety is recorded as new, a species listed from Pleistocene deposits for the first time, and the distribution of several recently described species and varieties is enlarged.

Mr. Ferriss thus describes the stratigraphy of the deposits at this locality:

"Above the limestone on the east side, about the center of the prehistoric pond, the marl is nearly pure and of a thickness of from six to ten feet. Then is found a bed of peat with stumps and cones of Arbor Vitae and White Cedar, which do not grow within many miles of

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Joliet. Marl and sand and clay adulterate the peat in certain layers, while in others it is almost pure peat. The material above the limestone measures in all upwards of 20 feet in thickness and contains shells all the way through, the water shells largely in the lower levels and the land shells in the upper strata."

The lower strata containing the marl probably represent a stage when the valley was largely filled with water from the Chicago outlet and there was little territory for land mollusks to occupy. Later, when the outlet became reduced to a narrower river, or perhaps during some of the low water intervals between the different lake levels, land mollusks came and took possession of territory above the river. It is probable that the lower strata which contain such an abundance of fresh water mollusks represent the earlier stages of Glacial Lake Chicago, perhaps as early as the Calumet or even following the Glenwood, for many hardy mollusks, such as many of the species represented are, probably followed the ice very closely, and there is no reason why the water at Joliet, 30 or 40 miles away from the ice, could not have supported some kind of a snail fauna. A huge boulder overlying a bed of Unios in the bed of Wilmette Bay attests the presence of icebergs in Glacial Lake Chicago when an abundant fauna flourished at Chicago. (Life of the Pleistocene, Plate VIII). We must consider, I think, that this life above the limestone in the Joliet quarry represents the biota that migrated up the Illinois and Desplaines rivers and reached Glacial Lake Chicago by way of the outlet via Joliet and Lemont. This time, therefore, could not be later than the Toleston, and was more likely during late Glenwood time, for a considerable fauna has been found in Chicago that lies between the Glenwood and Calumet stages (Bowmanville Low Water Stage). Of this biota, at least a dozen species are the same as those at Joliet. It is probable that these different stages could be worked out if sections were available, such as were studied during the excavation of the large drainage canals in Chicago. At Lemont, above Joliet, sections made with a post-hole auger showed

about seven feet of marl and peat above the Niagara limestone, both the marl and peat containing an abundance of molluscan material.

Collections made in three places below Chicago indicate rather clearly that the Chicago biota migrated up the Illinois and Desplaines rivers. A comparison of collections made at Morris[1], Joliet, and Lemont[2] with those of Lake Chicago indicate this migration route.

The Joliet material contains more species because more thoroughly collected. The other localities would doubtless yield additional species with more time for collecting. The approximation of the Joliet species with those found in Glacial Lake Chicago at Chicago strikingly indicates that the Joliet fauna provided a reservoir from which the Chicago region was populated. The Morris material, though not large in number of species, contains some critical species which also occur in the deposits farther up the river. Additional collections from marl and peat deposits in the Illinois and Desplaines valleys will add more species records and strengthen the chain of migration. The following table graphically shows the relation of the Joliet species to the biota of the other deposits along these rivers:

Distribution of Aquatic Species in Different Localities

Species	Morris	Joliet	Lemont	Chicago
Sphaerium sulcatum	.....	×	.....	×
Sphaerium rhomboideum	.....	×	.....	×
Musculium secure	.....	×	.....	×
Pisidium variabile	.....	×	.....	×
Pisidium compressum	×	×	×	×
Pisidium pauperculum	.....	×	.....	×
Pisidium minusculum	.....	×	.....	×
Pisidium splendidulum	.....	×	×	×
Fresh water snails (Gastropods)				
Valavta tricarinata	×	×	×	×
Valvata lewisii	.....	×	.....	.....
Pomatiopsis lapidaria	.....	×	.....	.....
Amnicola leightoni	×	×	×	×
Amnicola lustrica gelida	×	×	×	×
Pulmonate Gastropods, aquatic				
Physa warreniana	.....	×	×	×
Physa gyrina	.....	×	×	×
Planorbis trivolvis	.....	×	×	×
Planorbis antrosus	×	×	×	×
Planorbis antrosus striatus	×	×	×	×

1. Made by Mr. H. E. Culver; see Journ. Geol., Vol. XXX, p. 58, 1922.
2. Baker, Life of the Pleistocene, p. 56, 1920.

Distribution of Aquatic Species in Different Localities—Concluded

Species	Morris	Joliet	Lemont	Chicago
Planorbis campanulatu ferrissi	×	×	×	.....
Planorbis campanulatus	.....	.....	.....	×
Planorbis arcticus	.....	×	.....	.....
Planorbis deflectus	×	×	×	×
Planorbis altissimus	×	×	×	×
Planorbis parvus urbanensis	.....	×	.....	.....
Ferrissia parallela	.....	×	.....	×
Lymnaea stagnalis appressa	.....	×	×	×
Acella haldemani	.....	×	.....	.....
Galba caperata	.....	×	.....	×
Galba obrussa decampi	×	×	×	×
Galba elodes jolietensis	.....	×	.....	.....
Galba parva	.....	×	.....	.....
Galba dalli	.....	×	.....	.....
Galba obrussa exigua	.....	×	.....	×
Total species	10	32	15	24

The species included in the Ferriss collection are listed below with notes on the critical or interesting species. I am indebted to Dr. V. Sterki, of New Philadelphia, Ohio, for the determinations of the Sphaeriidae.

FRESH-WATER BIVALVES (PELECYPODS)

Sphaerium sulcatum (Lam.) Not common.
Sphaerium rhomboideum (Say). Rare.
Musculium secure (Prime). Common.
Pisidium variabile Prime. Rare.
Pisidium compressum Prime. Common.
Pisidium pauperculum Sterki. Abundant.
Pisidium minusculum Sterki. Very rare.
Pisidium splendidulum Sterki. Very rare.

FRESH-WATER SNAILS (GASTROPODS)

Valvata tricarinata (Say). Very abundant and fairly uniform. There is a tendency to lose the middle carina and develop into the variety below.

Valvata tricarinata perconfusa Walker. Uncommon. All individuals have the elevated spire and strongly carinate whorls of typical *tricarinata,* but the peripheral carina is completely lacking and there are no intergrades, as in *tricarinata.*

Valvata lewisii Currier. Rare, but one specimen found. The spire is low and the sculpture very fine.

Pomatiopsis lapidaria (Say). Rare. The fossil form has deeper sutures than the recent form; specimens from loess-like deposits in northwestern Illinois (Stephenson Co.) are midway between the recent and marl specimens in this respect. The Joliet specimens are rather more widely umbilicated than the recent form.

Amnicola leightoni Baker. Common. *Leightoni* appears to be the common Amnicola of the Pleistocene, replacing *limosa* in many places, and to which it has previously been referred. There is some variation in the form of the aperture, a number of individuals having more shouldered whorls than the typical form as described from Ohio.

Amnicola lustrica gelida Baker. Abundant and variable. The Joliet Amnicolas are nearer typical *lustrica* than the lot from near Morris (the original locality for gelida), the spire being shorter and the body whorl wider. All have the thickened lip and more acute spire with deep sutures characteristic of *gelida*. (See Baker, Nautilus, Vol. XXXV, p. 222, 1921.)

PULMONATE GASTROPODS

Physa warreniana Lea. Common. The marl material is referred with some hesitation to *warreniana*. There is considerable variation in the height of the spire and in the width of the body whorl, the variation being toward an *ancillaria* type of shell.

Physa gyrina Say. Several small specimens are referred to this protean species, probably washed into the locality from some quiet pond-like area.

Planorbis trivolvis Say. A young individual only.

Planorbis antrosus Conrad. The form without spiral striation is rare in these marl deposits.

Planorbis antrosus striatus Baker. The majority of the marl *antrosus* are referable to the striate form.

Planorbis campanulatus ferrissi New Var. The shells from the Joliet marls are different from the recent form of typical *campanulatus*. The whorls are not as high, giving the shell the appearance of having a greater diameter and more whorls. The marl form is also smaller on the average and the aperture is not as widely cam-

panulate as in the recent form. Specimens of each form are measured below, the recent form being from Canandaigua Lake, N. Y.

Whorls 5, height 6.3; max. diam. 15.7; min. diam. 11.3 mm. Recent.
Whorls 5, height 6.0; max. diam. 12.6; min. diam. 10.0 mm. Recent.
Whorls 5, height 5.1; max. diam. 12.6; min. diam. 10.3 mm. Marl.
Whorls 5, height 4.6; max. diam. 11.5; min. diam. 8.5 mm. Marl.

Planorbis deflectus Say. Not common. The form with the acutely keeled periphery.

Planorbis arcticus Möller. About a dozen specimens of a small Planorbis occur in the marl material that are indistinguishable from specimens of *arcticus* from the Great Slave Lake region. They were at first identified as *hirsutus* but are quite different from undoubted *hirsutus* from Massachusetts. It is not surprising that this Arctic species should be found in Pleistocene deposits, because the natural migration of these mollusks must have been by way of the Mississippi Valley and their remains would naturally be left in some of the ancient waterways. A single specimen of the same form was found in marl deposits near Rush Lake, Logan Co., Ohio, collected by Dr. M. M. Leighton. It was listed as *hirsutus* in Journ. Geol., Vol. XXVIII, p. 449.

Planorbis altissimus (Baker). Abundant and variable. This, the common small Planorbis of Pleistocene deposits, appears to be related to *arcticus* and is, perhaps, the ancestor of that species. As the latter is rare in Pelistocene deposits and common in the recent fauna in high latitudes this hypothesis seems reasonable. Numerous specimens of a small Planorbis from Devil's Lake and other places in North Dakota, collected by Miss Mina L. Winslow, of the Museum of Zoology, University of Michigan, are to be referred to *arcticus* and not to *altissimus,* as stated in a paper recently published (Journ. Geo., Vol. XXX, p. 54, 1922.) *Altissimus* is not surely known from the recent fauna.

Planorbis parvus urbanensis Baker. This, one of the smallest of the Planorbes, discovered in Pleistocene deposits near Urbana, was found to be fairly common in the Joliet fauna. As it has also been found in Carroll

County it seems to have a rather wide distribution. Not yet reported in the recent fauna.

Ferrissia parallela (Hald.). Rare, but one specimen found.

Lymnaea stagnalis appressa Say. The rather poorly preserved material shows that this large Lymnaea was of good size as compared with the same species in the recent fauna. All of the specimens exhibit a peculiar malleation of the surface not seen in recent specimens. Two pieces of a large shell had this malleation so marked that it was at first identified as *Bulimnea magasoma* (Say). The presence of this marking on undoubted specimens of *appressa* indicates that this species also may bear these markings that are common on shells living in colder regions than the Chicago of today.

Acella haldemani (Desh. 'Binney). Four undoubted specimens of this somewhat rare Lymnaeid are in the Joliet collection. Compared with the recent form they are much smaller and the aperture is narrower. *Haldemani* is known in Illinois only from Cedar Lake, Lake County, where it is rare. (Baker, Bull., State Lab. Nat. Hist., Vol. VII, p. 103, 1906.)

Galba caperata (Say). A single specimen from the marl is smaller than most recent specimens. The spire is longer than in specimens now living in the same region.

Galba obrussa decampi (Streng). Very abundant and variable. Short spired forms of *decampi* have been referred to *galbana*. That species, however, has the inner lip turned back over the columella leaving but a small chink and forming, as Say remarked in his diagnosis, "the sinus of the fold very obvious". *Decampi* varies from a narrow to a wide shell, but the whorls are always distinctly shouldered, the umbilicus open, and the columellar lip forming a raised shelf over the umbilicus. *Decampi* is the common Pleistocene fossil of the central west while *galbana* is comparatively rare. The fossil *decampi* is much more variable than the form from the recent fauna, which is rare, the spire whorls being more pointed and the sutures deeper.

Galba obrussa exigua (Lea). The fossils have deeper sutures and more shouldered whorls than the recent specimens.

Galba elodes jolietensis (Baker). Four small specimens appear referable to *jolietensis,* varying toward *elodes.*

Galba parva (Lea). The marl specimens are rather smaller than individuals from the recent fauna, showing variation toward a *dalli*-like form.

Galba dalli (Baker). Typical. One specimen is larger than any recent individual seen, measuring 5 mm. in length.

LAND GASTROPODS

Carychium exile H. C. Lea. Rare.

Vallonia gracilicosta Reinhard. Rare.

Succinea retusa Lea. Common.

Succinea avara vermeta Say. Rare.

Strobilops affinis (Pilsbry). Rare.

Strobilops labyrinthica (Say). Rare.

Pupoides marginatus (Say). Rare.

Vertigo ovata Say. Not uncommon.

Helicodiscus parallelus (Say). Rare.

Pyramidula alternata (Say). Common. The color markings are well preserved.

Pyramidula solitaria (Say). Common. The color bands are well preserved.

Gastrodonta ligera (Say). Rare.

Zonitoides minuscula (Binney). Rare.

Zonitoides arborea (Say). Rare.

Circinaria concava (Say). Not common.

Polygyra hirsuta (Say). Common.

Polygyra monodon (Rackett). Common. Some specimens are more globose with a higher spire.

Polygyra pennsylvanica (Green). Abundant.

Polygyra clausa (Say). Abundant.

Polygyra thyroides (Say). Not common. Fifty percent of the specimens have a tooth on the parietal wall.

Polygyra multilineata (Say). Common.

Polygyra multilineata algonquinensis Nason. Rare. The small form is the same as the form described by Nason from Algonquin.

Polygyra multilineata (Say). A rare umbilicated form.

Polygyra profunda (Say). Common. Not different from the recent form. The color bands are preserved in some specimens.

Polygyra albolabris (Say). Rare.

From peat deposit near Sag Creek. Collected by J. H. Ferriss.

LAND GASTROPODS

Zonitoides minuscula (Binney). Rare.

Helicodiscus parallelus (Say). Rare.

Bifidaria contracta (Say). Rare.

PULMONATE AQUATIC GASTROPODA

Lymnaea stagnalis appressa Say. Not common.

Galba palustris (Müller). Abundant and variable.

Galba obrussa decampi (Streng). Rare.

Galba obrussa exigua (Lea). Rare.

Physa gyrina Say. Not common.

Physa walkeri Crandall. Rare. Spire longer than in typical form.

Physa integra billingsi Heron. Common and variable as to height of spire and width of body whorl.

Planorbis campanulatus Say. Common. A few specimens approach the form of the Joliet marls called *ferrissi.*

Planorbis trivolvis pseudotrivolvis Baker. Common. Very variable in height of whorls. This form seems to be the common large Planorbis of swamps and stagnant pools. It was evidently abundant during Pleistocene times.

Planorbis antrosus Conrad. Common. In the peat beds the form without spiral striae is the most abundant.

Planorbis antrosus striatus Baker. Rare.

Planorbis deflectus Say. Common. The peripheral carina varies from acute to rounded. None of the forms are the *hirsutus,* however.

Planorbis altissimus Baker. Not common and not as typical as the form in the Joliet marls.

The peat deposits along Sag Creek represent a later time than the marl fossils at Joliet, and are probably to be classed with the deposits of the Englewood stage or the latter part of the Hammond stage. (Baker, Life of Pleistocene, pp. 57, 86, 88, 94.) The life of the two stations are practically identical as far as the critical species are concerned.

Mr. D. J. Fisher, of the Illinois State Geological Survey, has submitted for study several collections of Pleistocene Mollusca obtained from various places in the Joliet Quadrangle. These are listed below with notes on the species.

STATION NO. 1

Locality: Above old quarry in the SE part of Joliet, N. W. ¼, of S. E. ¼, Sec. 15, T. 35 N., R. 10 E.

Material: Calcareous marl.

Stratigraphic horizon: Wabash; Possibly the Bowmanville Low Water Stage.

MOLLUSCAN LIFE

LAND GASTROPODS

Pyramidula solitaria, common.
Polygyra thyroides, rare.
Polygyra clausa, rare.
Strobilops affinis, rare.*
Zonitoides arborea, rare.*
Succinea retusa, rare.

AQUATIC GASTROPODS

Valvata tricarinata, not common.
V. tricarinata perconfusa, rare.
Amnicola leightoni, not common.
Amnicola lustrica gelida, rare.

AQUATIC PULMONATES

Planorbis trivolvis, rare.
Planorbis antrosus striatus, common.
Planorbis campanulatus ferrissi, not common.
Planorbis altissimus, rare.
Planorbis deflectus, rare.

Planorbis parvus urbanensis, rare.
Physa warreniana, rare.
Galba obrussa exigua, rare.

BIVALVES (PELECYPODS)

Sphaerium rhomboideum, rare.
Pisidium splendidulum, not common.

Two species of land shells, starred in the above list, occur in the Fisher collection that were not included in the Ferriss collection. On the other hand, 35 species occur in the Ferriss collection that are not in the Fisher collection. Mr. Ferriss collected the material many years ago when exposures were better than at present and also gave much more time to collecting, visiting the quarry many times. The marl material is commented upon on a previous page.

STATION NO. 2

Locality: Bank of DuPage River, S. W. ¼ of N. W. ¼, Sec., T. 35 N., R. 9 E., Joliet Quadrangle.
Material: Alluvial clay.
Stratigraphic horizon: Pre-recent.

MOLLUSCAN LIFE (LAND PULMONATES)

Polygyra clausa (Say), rare, *Succinea ovalis* Say, common.

STATION NO. 3.

Locality: South edge of southern slough, SE. ¼ of SW. ¼, Sec. 31, T. 36 N., R. 10, E.
Material: Alluvial clay.
Stratigraphic horizon: Pre-recent.

MOLLUSCAN LIFE (AQUATIC PULMONATES)

Planorbis trivolvis pseudotrivolvis Baker, not common.
Planorbis parvus Say, not common.
Physa gyrina Say, not common.
Galba elodes Say, not common.

These mollusks are such as live in swampy pools or sloughs where the water is more or less stagnant.

STATION NO. 4.

Locality: Bank of Du Page River, SE. ¼ of SW. ¼, Sec. 16, T. 35 N., R. 9 E.

Material: Alluvial clay.

Stratigraphic horizon: Pre-recent.

MOLLUSCAN LIFE

Goniobasis livescens Menke, common.
Valvata tricarinata Say, rare.
Sphaerium stamineum (Conrad), common.
Planorbis trivolvis Say, rare.
Planorbis antrosus Conrad, rare.
Planorbis crista Linn., rare.
Polygyra thyroides (Say), rare, young.

This is a river fauna and is of the same general character as the river fauna of today in this region. The single specimen of *Planorbis crista* is peculiar in lacking the ribs which are characteristic of that species. This is the only specimen of this form observed among hundreds of specimens examined, both recent and fossil.

STATION NO. 6.

Locality: SW. end of southern slough, NW. ¼ of SE. ¼, Sec. 11, T. 35 N., R. 9 E.

Material: Alluvial clay.

Stratigraphic horizon: Pre-recent.

MOLLUSCAN LIFE

Planorbis campanulatus Say, rare, but one broken specimen found.

Planorbis antrosus Conrad, rare, one immature specimen.

Planorbis deflectus Say, common, the keeled periphery not as acute as in some recent forms.

Planorbis exacuous Say, not common, and typical.

Planorbis crista Linn., not common, with sharp, well defined ribs.

Planorbis altissimus Baker, abundant, somewhat resembling some forms of *parvus*.

Amnicola lustrica Pilsbry, rare and typical.

Amnicola leightoni Baker, not common; somewhat resembling some forms of *limosa.*

Amnicola walkeri Pilsbry, common and typical.

Valvata tricarinata (Say), common and sharply tricarinate.

Physa warreniana Lea, rare, but one young specimen found.

Galba elodes jolietensis (Baker), rare, one young specimen found.

Pisidium splendidulum (Sterki), rare.

The above fauna is characteristic of a lake or large pond and not of a swamp, and probably represents a former large body of water connecting one of the stages of Glacial Lake Chicago. It is related in a general way to the fauna of the marls of the Joliet quarry.

STATION NO. 7.

Locality: Bank of DuPage River, SE. ¼ of NW. ¼, Sec. 10, T. 35 N., R. 9 E.

Material: Alluvial clay.

Stratigraphic horizon: Pre-recent.

MOLLUSCAN LIFE

AQUATIC

Goniobasis livescens (Menke), common.
Campeloma subsolidum (Anthony), rare.
Sphaerium stamineum (Conrad), rare.

LAND

Pyramidula solitaria (Say), rare.
Pyramidula alternata (Say), rare.
Polygyra hirsuta (Say), rare.

This is a river fauna, the land mollusks being washed in from the bank. The specimens are all normal and the same species now live in the vicinity.