

THE MOLLUSCAN FAUNA OF THE SOUTHERN  
PART OF LAKE MICHIGAN AND ITS RELATIONSHIP TO OLD GLACIAL LAKE  
CHICAGO\*

FRANK COLLINS BAKER  
*University of Illinois, Urbana.*

During a favorable period last winter Dr. A. R. Cahn, of the Department of Zoology, University of Illinois, secured a remarkable collection of beach material from the shore of Lake Michigan at the foot of Division Street in Chicago. A study of this material, and of some other material previously collected by the writer and others from the south shore of the lake, shows that we have in this area a distinct fauna of mollusks, containing at least 23 species and varieties, 11 of which occur only in lake waters in Illinois. The Pelecypoda contain 8 species and the Gastropoda 15 species and races, 10 of these 15 being found only in Lake Michigan.

Among the Pelecypoda, *Sphaerium acuminatum* appears to be a Great Lake dweller, at least as far as Illinois is concerned. Some of the Pisidia of the lake indicate special characteristics but these have not yet been varietally differentiated. Among the Gastropoda, all species and races excepting two are lake forms and ten occur only in Lake Michigan. Such species as *Valvata perdepressa walkeri*, *Bulimus tentaculatus magnalacustris*, *Amnicola limosa superiorensis*, *Cincinnatia cincinnatiensis chicagoensis*, *Vancleaveia emarginata canadensis*, *Pleurocera acuta*, *Goniobasis livescens*, *Goniobasis livescens michiganensis*, *Stagnicola woodruffi*, and *Physella integra billingsii* are typically Great Lakes dwellers. Several of these have their type localities in this part of Lake Michigan.

Nearly all of the varieties have evolved, apparently, from species which lived in Glacial Lake Chicago, and comparison with material from the Chicago deposits made accessible by the drainage canal operations in Chicago shows in nearly all cases the variety gradually developing from the Pleistocene species living in the colder waters of the glacial lake which preceded Lake Michigan. In fact, the Lake Michigan fauna is a direct descendant of the Glacial Lake Chicago fauna, the latter migrating up the Illinois

\* Contribution from the Museum of Natural History, University of Illinois, No. 55.

and DesPlaines rivers in late Pleistocene time. So that the Lake Michigan fauna may be considered a direct response to the changing environment from a river, through a small lake and later a large bay, to the great lake which washes our shores today. As a study in geological evolution, embracing the element of time as well as of change in habitat, no place surpasses the Chicago region with its old lake deposits and its present large lake area. When studied from this standpoint the variations of river species found in the lake are perfectly understandable and they cannot be understood from any other angle.

I am indebted to Dr. V. Sterki for the determination of the Sphaeriidae and to Dr. A. R. Cahn for procuring the material. Dr. Cahn appears to have a special sense for acquiring critical material, a fact well attested by the many new forms found by him in Wisconsin in recent years. Changes in nomenclature used in this paper will be found discussed in the writer's Fresh Water Mollusca of Wisconsin, Bull. 70 of the Wisconsin Geological and Natural History Survey, issued late in 1928.

## PELECYPODA

### SPHAERIIDAE

#### *Sphaerium acuminatum* Prime.

This is the common Sphaerium of the lake, occurring in countless thousands on the shores of Illinois, Indiana, and Michigan. It has been erroneously recorded as *fabale* Prime and *vermontanum* Prime. Most of the Sphaerium from Lake Michigan belong to this species, the previous references to *flavum* being erroneous, according to Sterki. A distinct species about the size of *acuminatum* also occurs but is rare. It has not yet been described by Dr. Sterki

#### *Pisidium virginicum* Gmelin

#### *Pisidium idahoense* Roper

#### *Pisidium scutellatum* Sterki

#### *Pisidium compressum* Prime

These species are abundant on the lake shore. *Scutellatum* is said by Sterki to be the same as the European *Iilljeborgii* of Clessin. As *scutellatum* has been used largely in lists of American Pisidia and as it offers some differences, it would appear best to keep it separate from the European form, at least as a variety. Dr. Sterki reports the Lake Michigan forms to be peculiarly small with the beaks narrow, some with the scutellar angle not or barely marked. It would appear that the lake forms may be as distinct from the river forms as are some of the lake gastropods from the river forms of the same species. *Compressum* is a peculiar form, not the typical river form.

*Pisidium noveboracense* Prime

*Pisidium walkeri* Sterki

Both of the above species are rarely represented in the debris of the shore bordering Chicago. They were collected several years ago and named by Dr. Sterki.

## GASTROPODA

### VALVATIDAE

*Valvata tricarinata* (Say)

Specimens of the typical form occur rarely in beach debris.

*Valvata perdepressa walkeri* NEW VAR. (Text figure 1.)

Two forms of *perdepressa* occur in the southern part of Lake Michigan. One is the typical form with high spire and regularly coiled whorls. The other is a flattened, planorboid shell, the spire often depressed below the level of the body whorl. The first is common in the eastern part of the lake and the latter in the western part, especially on the Chicago shore. *Perdepressa* also occurs on the western shore of Lake Michigan on the Door County peninsula near Sturgeon Bay. In the Mollusca of Wisconsin, *perdepressa* is described as a variety of *bicarinata*, following Walker's opinion. An examination of the radula of *walkeri* shows that this reference is erroneous, *walkeri* having a smaller central tooth (65 microns wide) and a formula of 11-1-11, while *bicarinata* has a larger central tooth (80-85 microns wide) with the formula 15-1-15. The form of the shell is also quite different, the planorboid forms only remotely resembling *bicarinata* in the wide, shallow umbilicus. Variety *walkeri* occurs in the Pleistocene deposits of the Chicago area, the specimens, however, being smaller and not quite as planorboid as the recent lake form. They stand midway between typical *perdepressa* with the high spire and the flat form called *walkeri*. The fossil forms are doubtless ancestral to both *walkeri* and *perdepressa*.

It is apparent that the size of the center tooth is a good criterion for the distinction of some of the species of *Valvata*. The following table indicates this feature together with the cusp formula of the center tooth:

<i>Valvata tricarinata</i> .....	70	15-1-15
varieties .....	70	15-1-15
<i>Valvata sincera</i> .....	70	15-1-15
Var. <i>nylanderi</i> .....	70	15-1-15
<i>Valvata lewisi</i> .....	55	9-1-9
Var. <i>helicoidea</i> .....	55	9-1-9
<i>Valvata bicarinata</i> .....	85	15-1-15
Var. <i>normalis</i> .....	85	15-1-15
<i>Valvata perdepressa</i> .....	65	11-1-11
Var. <i>walkeri</i> .....	65	11-1-11
<i>Valvata winnebagoensis</i> .....	45	10-1-10

*Valvata sincera illinoisensis* NEW VAR. (Text figure 1.)

In the Mollusca of Wisconsin a form of *Valvata* was referred to *sincera danielsi* Walker. The receipt of a large collection of Pleistocene fossils from the Illinois State Geological Survey indicates that this reference was erroneous. The fossil form is about half the size of *danielsi* and is apparently wholly extinct. It is a common species in the Pleistocene of Illinois and occurs more rarely in Late Wisconsin deposits in Wisconsin. The type locality is near the west end of Crystal Lake, McHenry County, Illinois, in a marl deposit of Late Wisconsin age. This variety does not occur in the Chicago deposits. It is probably the ancestor of both *sincera* and *danielsi*, but is nearer *sincera*.

*Bulimus tentaculatus magnalacustris* F. C. Baker

This species, usually so abundant in Lake Michigan, occurred but rarely in the Cahn collection. Also known in Pleistocene deposits in Chicago. For the reasons for considering this common circumboreal snail a race see the Mollusca of Wisconsin, I, page 81.

*Amnicola limosa superiorenensis* F. C. Baker

This lake race of *limosa* occurs rarely in debris on the shore of Lake Michigan. It is more abundant in Lake Superior. See the Wisconsin Monograph I, page 101.

*Cincinnatia cincinnatiensis chicagoensis* NEW VAR. (Text figure 2, 12-15.)

This is one of the most abundant species in Lake Michigan, the shells occurring most commonly in any quantity of beach debris. It is a shortened-up race of the river form *cincinnatiensis*, differing in being more globose, with shorter spire and wide umbilicus. The radula is exactly like that of *cincinnatiensis*. This race also occurs rather abundantly in the Chicago Pleistocene deposits, but is slightly smaller. Typical *cincinnatiensis*, the river form, also occurs, and the variety *chicagoensis* is due to the forcing of the river form into the rougher waters of a large lake. This change of environment began when Glacial Lake Chicago was forming, the species having a chance to gradually change by living in a more or less protected environment in Wilmette Bay and behind bars and islands in Lake Chicago. *chicagoensis* is an excellent example of the effect of a changing environment in directing the course of evolution.

*Vancleaveia*, New Genus.*Vancleaveia emarginata canadensis* (F. C. Baker). Text figure 2, parts 3-5 and 10; also figure 3.

The difference in the center tooth of the radula and in the form of the spire whorls, flattened and coiled in the same plane, has led the writer to consider this group as a separate genus. The lower lateral ridge of the center tooth has three large cusps instead of one as in *Cincinnatia* and the lateral tooth has a larger number of cusps (Fig.

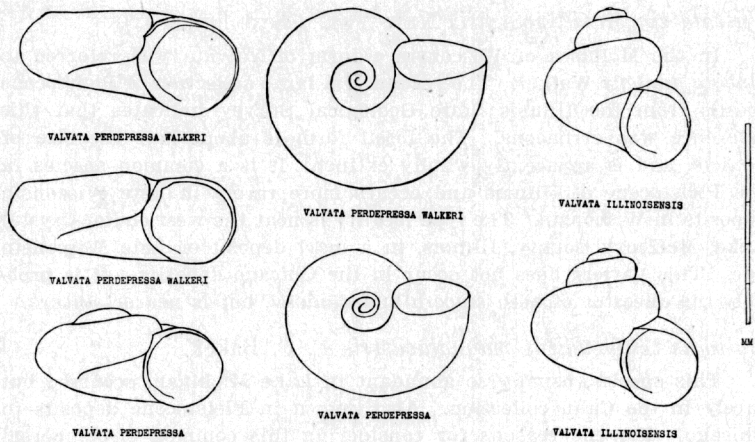


Fig 1. New forms of *Valvata*. (Camera lucida drawings).

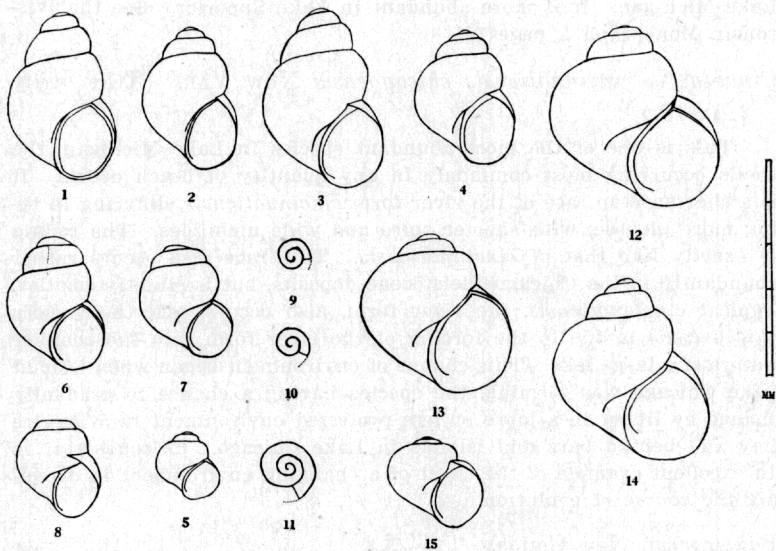


Fig. 2. *Vancleaveia emarginata*: 1, male; 2, female; 9, apical whorls.—*Vancleaveia emarginata canadensis*: 3, male; 4, female; 5, immature; 10, apical whorls.—*Vancleaveia lacustris*: 6, male; 7, female; 8, immature; 11, apical whorls.—*Cincinnatia cincinnatiensis chicagocensis*: 12, type; 13, 14, paratypes; 15, immature. (Camera lucida drawings).

3). The genus has the center tooth of *Potamopyrgus* and the lateral tooth of *Cincinnatia*. *Canadensis* occurs more or less abundantly on the shore of Lake Michigan and is exactly like the form as it occurs in the type locality, Lake Kakiska, near mouth of Beaver River, west of Great Slav Lake, about latitude 61°. The variety is also found commonly in the Pleistocene deposits of Glacial Lake Chicago and in other Pleistocene deposits in Illinois. In the Chicago deposits, the variety may be observed in its changing variation from the river form, with almost closed umbilicus, to the widely umbilicated form of the Great Lake.

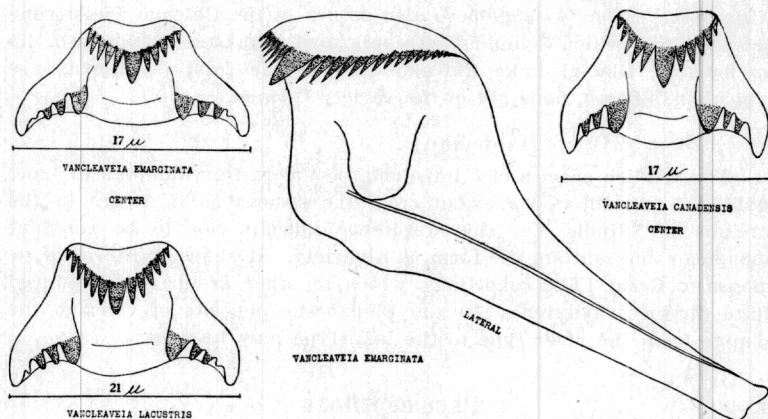


Fig. 3. Radula of *Vanclaveveia*, central teeth and one lateral tooth.

*Canadensis* is to be considered a lake variety of *emarginata*, but it would seem advisable to separate the race called *lacustris* from Winnebago Lake as a species, the shell being much wider and having  $2\frac{1}{2}$  apical whorls coiled in the same plane while in *emarginata* and *canadensis* there are but  $1\frac{1}{2}$  whorls in this plane. The spire whorls in *lacustris* are separated by deep sutures, a feature not present in *emarginata*. The figures illustrate this difference (Fig. 2; 6-8, 11). The species of *Vanclaveveia* may then be written:

*Vanclaveveia emarginata* (Kuster). The river form with closed umbilicus (1, 2, 9).

Variety *canadensis* (F. C. Baker). Lake form with open umbilicus (3-5, 10).

*Vanclaveveia lacustris* (F. C. Baker). Form with wide, flattened spire whorls (6-8, 10).

The lake forms, *canadensis* and *lacustris*, have a much higher center tooth than the river form, *emarginata*. The whole family of *Amnicolidae* is in need of revision, based on examination of genitalia and radula, and until such revision is made such groups as offer dif-

ferences in radula or genitalia must be considered as genera. When this has been done it may be advisable to reduce some genera to subgenera. See the Wisconsin Monograph, I, page 127 for a description of *lacustris*. It is to be observed, however, that the figure of the radula is incorrect and represents *Cincinnatia cincinnatiensis judayi* and not *lacustris* (see also that figures 40 and 55 have been transposed in the monograph).

*Birgella subglobosa* (Say)

This large amnicoloid occurs very rarely in the lake. It is like the typical lake form which occurs in the northern lakes of Wisconsin and Minnesota. *Birgella subglobosa* also occurs in the Chicago Pleistocene deposits from which it undoubtedly migrated into Lake Michigan or its predecessor, Glacial Lake Chicago. All of the fossil specimens are typical *subglobosa*, none are of the variety *isogona*.

*Campeloma rufum* (Haldeman)

The reddish species of *Campeloma* occurs in fair numbers in Lake Michigan. It differs somewhat from the species as it occurs in the streams of Illinois, but this difference appears not to be constant enough to differentiate the form as a variety. It shows, however, a response to Great Lake conditions, which in other groups has produced quite distinct variations. In the Pleistocene deposits of Chicago the change from the river type to the lake type may be seen.

PLEUROCERIDAE

*Pleurocera acuta* Rafinesque

The typical lake form of this species occurs more or less abundantly in the lake, and is like the typical form as it occurs in Lake Erie. It is very rare in the Chicago Pleistocene deposits appearing quite late in the history of Glacial Lake Chicago.

*Goniobasis livescens* (Menke)

The long-spined form of this species, which is considered typical, the type coming from Lake Erie, is rare in Lake Michigan, though more common in the small lakes bordering the south shore of the lake. In the Chicago Pleistocene this species is very abundant in all lake stages from the Toleston stage to the end of the Lake Chicago stages.

*Goniobasis livescens michiganensis* F. C. Baker

The shorter, heavier form of *livescens* first observed in Lake Michigan on the Door County peninsula (see Wisconsin Monograph, I, p. 183) occurs abundantly on the shore of Lake Michigan near Chicago, and probably elsewhere in the southern part of the lake region. It does not occur, in its typical aspect, however, in the Chicago deposits, but in the later stages of Lake Chicago the *livescens* may be observed to be undergoing a change toward the shorter lake form.

*Michiganensis* appears to be the form of the wave-beaten shore, while typical *livescens* occurs more abundantly in small bays and the mouths of rivers flowing into the Great Lakes. In Lake St. Clair and the Detroit River the form is typical *livescens* and not *michiganensis*.

## LYMNAEIDAE

*Stagnicola woodruffi* (F. C. Baker)

This Lymnaeid is one of the most abundant species in Lake Michigan, the shore from Michigan to Illinois sometimes being strewn with the bleached shells. There is little variation from the typical form and it appears to be one of the most distinct species of the genus. Curiously enough, it is very rare in the Chicago Pleistocene deposits, the few specimens thus far found having a longer spire and somewhat resembling some forms of *catascopium*. It is possible that *woodruffi* is a descendant of *catascopium*, but the latter species has not yet been found in fossil deposits in Illinois nor does it occur living in the rivers of the state. *Woodruffi* is the only lymnaeid living the Lake Michigan near Chicago.

## PLANORBIDAE

*Gyraulus arcticus* ('Beck' Moller). See Wis. Mon., I, pl. 23, figs. 34-38.

A few specimens of this small species occur in the Lake Michigan material. *Arcticus* is related to *Gyraulus altissimus* (F. C. Baker), but differs in its rounder basal whorls, those of *altissimus* being much flattened and having a more 'reamed out' appearance. *Arcticus* is apparently the modern descendant of *altissimus*. The latter occurs more or less abundantly in the Chicago deposits and shows some indications of variation toward *arcticus*.

## PHYSIDAE

*Physella sayii* (Tappan)

Lake Michigan shore from Millers, Ind., to Lake Forest, Ill. A form of this species occurs very abundantly along the entire south shore of Lake Michigan and extends up the west shore as far, at least, as Sturgeon Bay. It is smaller than typical *sayii*, as found in Ohio and in the smaller lakes of Wisconsin, and the spire is usually more dome-shaped and not as acute. Much the same form occurs in the later Chicago deposits. These lake forms evidently indicate a response to the rougher lake environment which has produced a smaller shell and a broader, more depressed spire. The Chicago Pleistocene material indicates a transition from long to short spire. As the range of variation in this species is very great it does not seem desirable to bestow a separate name on these short-spired Great Lake forms.

*Physella integra billingsii* (Heron)

A small *Physella* occurs on the Lake Michigan shore which appears referable to Heron's species, which the writer has considered a race of *integra* (see Wis. Mon., I, p. 463). It is always smaller than typical *integra*, has a wider whorl at the shoulder, the spire is less elevated and the aperture is much less ear-shaped. *Integra* occurs in the Chicago Pleistocene deposits and varies much toward both river and lake form. If we take the heavy, long-spined, ear-shaped shell designated by Haldeman as typical, then the smaller shell with more regular aperture is clearly separable as a lake race, which also inhabits the smaller lakes and river estuaries of the Great Lake region. These forms are certainly not typical *integra*, unless we choose to lump all ecological variations under that name, which would be quite undesirable. Curiously enough, this species was represented only by immature and very young specimens in the material obtained by Dr. Cahn at Division Street.