

iversity of Michigan expedition in 1905, and are
peculiar features above described. *P. bicarinata*
1904 and 1905 in a number of different localities in
island, but all such were quite typical in form.
sculpture of this form is unusually strong for the
nds one of the heavy sculpture of *P. corpulentus*
being less regular and lacking the acute ridges of
galensis is nearer to *portagensis* than to any other
s, but differs in being wider and in the develop-
t of the superior carina, wider umbilicus, stronger
hape of the aperture.

(To be continued.)

SEAWATER FOSSILS FROM BRONX BOROUGH,
NEW YORK CITY.

BY EDWIN W. HUMPHREYS.

mentioned were found at what is now 171 St. and
ough of the Bronx, New York City. The swamp
at this point lies in a long, narrow, anticlinal valley
oded in the Inwood Limestone. When the street,
orris Ave., was filled in across the swamp, the peaty
d accumulated here, was forced up to heights
either side of it. This caused the peat to crack in
revealed numerous pockets which were full of small
is were extremely abundant; so thickly were they
at they could easily be scooped up with a garden
a manner in which they were found it would seem
en gathered together by currents or eddies in the
mp. All of the shells were bleached to a chalky
e very fragile. The following species were found.
t (Say) Hald. Shells of this species, though com-
y abundant and were usually more or less injured.
ata Say. These were exceedingly numerous, hun-
g heaped together in a single pocket. They were of
ng so small that they were lodged in the apertures
Evidently they represented individuals of all ages.
pha Say. This species was rather scarce.
natus Say. This form was also uncommon.

Planorbis parvus Say. These varied in size as much as did the
shells of *Valvata tricarinata* Say, and were about as abundant.

Pisidium variable Prime. This species was very rare. Usually
the valves were separated, only occasionally were they found united.

Whether or not these forms still inhabit this place I am not pre-
pared to say. Though I have not been able to find any living indi-
viduals, further search may yet reveal them.

I desire to acknowledge the assistance of Mr. L. P. Gratacap and
Mr. Bryant Walker in the identification of some of the species.

UNIONIDAE FROM AN INDIAN GARBAGE HEAP.

BY DR. A. E. ORTMANN, CARNEGIE MUSEUM, PITTSBURGH, PA.

On the western banks of the Monongahela River in southwestern
Pennsylvania, upon the flood plain at the Point Marion Ferry, in
Greene Co., opposite the point where the Monongahela and Cheat
rivers unite, the writer found on July 9, 1908, a heap of *Unionida*
shells, buried about one to two feet in the soil on the side of a road.
The soil consists of the characteristic river-silt of this region. Since
Indian "relics" have frequently been found at this place, in fact,
since it is known as the site of an old Indian settlement, it seems
beyond question that this pile (about 2 feet high) represents an old
Indian garbage heap of shells which had been used for food.

When first found, the shells were rather brittle and soft, and many
of them crumbled to pieces. But enough were secured, which re-
mained whole, and subsequently they have hardened. They look
like fossil shells in so far as in most of them the epidermis, and with
it the color, is gone (only in a few *Quadrulas* fragments of the epi-
dermis remain). In species, where the nacre originally is colored
(*Unio gibbosus* and *crassidens*), the color has entirely faded away, or
only very slight traces of it are discernible.

It is hard to say how long ago this pile was formed: it may be
less than a hundred years old. But this does not matter. The
interesting fact about it is that this shell heap has furnished a small
collection of *Unionida*, which contributes considerably to our knowl-
edge of the *Unionida*-fauna of the Monongahela River drainage.

At the present time, on account of the pollution of the water, this
fauna has completely disappeared in the Monongahela proper: there

is not a single living mussel in this river from Pittsburgh to the West Virginia state line (which is within a mile and a half to the south of our locality). Only a few of the tributaries contain mussels, and the most important one is the Cheat River, in which (in Pennsylvania), a rich fauna is yet present within two miles of our locality. The writer has collected repeatedly in the Cheat, in Fayette Co., from a point about a mile above Point Marion up to Cheat Haven, close to the State line. Another locality for *Unionida* is about three miles to the north, in Dunkard Creek, Greene Co., where the writer also collected a number of species. It is interesting to compare these faunas with that of the Indian garbage heap at Point Marion Ferry, which either comes from the Monongahela proper, or from the Cheat. I give first here a list of the latter.

1. *Truncilla perplexa cincinnatiensis* (Lea). 3 double, 11 isolated valves, all males of medium and small size. This is not the typical *cincinnatiensis*, but a form intermediate between this and the typical *perplexa* (Lea); the nodes upon the disc are rather small and more numerous than in the typical *perplexa*, but they are less numerous than in *cincinnatiensis*.

Tuberculate forms of *Truncilla perplexa* have never been found recently in western Pennsylvania; all specimens of *perplexa* of this region belong to the next variety.

2. *Truncilla perplexa rangiana* (Lea). 6 double, 7 isolated valves, all males of medium and small size.

Not found at present in the Monongahela drainage, but rather abundant in the Allegheny River from Armstrong County upward. Also in the Shenango River in Lawrence County; the nearest localities at present are about 80 to 100 miles away from Point Marion.

3. *Lampsilis ventricosa* (Bar.). Fragment of one left valve; young specimen.

At present near Point Marion, both in the Cheat River and Dunkard Creek. Widely distributed in western Pennsylvania.

4. *Lampsilis ventricosa ovata* (Say). Fragment of one left valve (beak portion); young specimen.

Not found at present in the Monongahela drainage. It used to be in the Ohio in Allegheny County, and is yet found in the Ohio in Beaver County and in the Allegheny in Armstrong County and farther up.

5. *Lampsilis multiradiata* (Lea). 2 double, 1 single valve; me-

dium size. gone, these of the shell a

This species Pennsylvania

6. *Lampsilis* the others of

At present abundant species

7. *Obovata* inclining toward

This species Ohio drainage

is known in County, about

8. *Cyproge* medium size.

Not in the Pennsylvania;

Allegheny River No live specimens

9. *Psychobry* of medium size

Abundant in the

tion of the Allegheny

10. *Unio* small size.

Abundant in western Pennsylvania

11. *Unio* medium size, in

Only in the Allegheny. Known

County, but not

12. *Pleurobry* Present in (

preferring small and small

ing mussel in this river from Pittsburgh to the West
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gheny County, and is yet found in the Ohio in
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radiata (Lea). 2 double, 1 single valve; me-

medium size. Although the characteristic color of the epidermis is
and these specimens agree completely with this species in the shape
of the left and of the hinge teeth.

This species is found in the Cheat River and elsewhere in western
Pennsylvania, preferring smaller streams.

6. *Lampsilis ligamentina* (Lam.). 4 isolated valves; one young,
the others of medium size.

At present in the Cheat River, but not abundant. It is the most
abundant species in the large rivers of western Pennsylvania.

7. *Obovaria circulus* (Lea). 1 left valve; small. Not typical,
resembling toward *O. lens* (Lea) in shape; probably a female.

This species (including the form *lens*) is found scattered over the
Ohio drainage in western Pennsylvania. From the Monongahela it
is known only from a single locality at Charleroi, Washington
County, about 35 miles north of Point Marion.

8. *Cyprogenia irrorata* (Lea). 2 double, 4 isolated valves, of
medium size.

Not in the Monongahela drainage, and altogether rare in western
Pennsylvania; known from the Ohio below Pittsburg and from the
Allegheny River in Allegheny and southern Armstrong County.
No live specimens have been found recently.

9. *Ptychobranchius phaseolus* (Hildr.). 1 double, 3 isolated valves,
of medium size.

Abundant in Cheat River; also in Dunkard Creek. Widely dis-
tributed in the Ohio drainage in western Pennsylvania, with excep-
tion of the large rivers.

10. *Unio gibbosus* Barn. 4 double, 7 single valves, medium and
small size.

Abundant in Cheat River; also in Dunkard Creek. Everywhere
in western Pennsylvania.

11. *Unio crassidens* Lam. 7 double, 4 single valves; one above
medium size, the others medium and small.

Only in the large rivers; abundant in the Ohio and lower Alle-
gheny. Known from the Monongahela at Charleroi, Washington
County, but not farther up. No trace of it in the Cheat.

12. *Pleurobema clava* (Lam.). 2 single valves, medium size.

Present in Cheat River. A rare species in western Pennsylvania,
preferring smaller streams.

13. *Quadrula subrotunda* (Lea). 1 double, 5 single valves; me-
dium and small size.

In the Cheat River at present. Also in the Monongahela at Charleroi, Washington County, and in the Ohio and Allegheny Rivers from Beaver to Armstrong Counties. A species of the larger rivers.

We see, that of these thirteen forms one (*Truncilla perplexa cincinnatiensis*) is not present any more in western Pennsylvania, and five (*Truncilla perplexa rangiana*, *Lampsilis ventricosa ovata*, *Obovaria circulus*, *Cyprogenia irrorata*, *Unio crassidens*) are not found any more in the vicinity of Point Marion (in Cheat River or Dunkard Creek). Of the latter, *Lampsilis ventricosa ovata*, *Cyprogenia irrorata*, and *Unio crassidens*, are typical inhabitants of the large rivers, and, near Point Marion, possibly once existed only in the Monongahela River, the fauna of which is now destroyed. *Truncilla perplexa* and *Obovaria circulus* may yet turn up in the Cheat River, but, if present at all, must be very rare at the present time. This is the more remarkable, since the two forms of *Truncilla perplexa* were represented, in the garbage heap, by a comparatively great number of individuals.

The small size of all specimens shows that the Indians selected for food only such small specimens, rejecting the big ones.

The chief interest of this little collection lies in the fact that it gives us an idea of what damage has been done to our *Unionida*-fauna in recent times. For comparison, I submit here the lists of the species collected by myself in Cheat River and Dunkard Creek.

CHEAT RIVER (collections made on Sept. 6, 1904, Sept. 16, 1907, July 10, 1908).

- | | |
|--|---|
| 1. <i>Lampsilis ventricosa</i> (Bar.). | 8. <i>Symphynota costata</i> (Raf.). |
| 2. <i>Lampsilis multiradiata</i> (Lea). | 9. <i>Alasmidonta marginata</i> (Say). |
| 3. <i>Lampsilis ligamentina</i> (Lam.). | 10. <i>Unio gibbosus</i> (Barn.). |
| 4. <i>Lampsilis recta</i> (Lam.). | 11. <i>Pleurobema clava</i> (Lam.). |
| 5. <i>Lampsilis iris</i> (Lea). | 12. <i>Quadrula undulata</i> (Barn.). |
| 6. <i>Ptychobranhus phaseolus</i> (Hldr.). | 13. <i>Quadrula pustulosa</i> (Lea). |
| 7. <i>Strophitus undulatus</i> (Say). | 14. <i>Quadrula subrotunda</i> (Lea). |
| | 15. <i>Quadrula tuberculata</i> (Raf.). |

The leading species is *Unio gibbosus* (30 per cent.); then follow: *Lampsilis recta* (20 per cent.) and *Ptychobranhus phaseolus* (20 per cent.). The rest (12 species) makes up the remaining 30 per cent. The scarcity of *Lampsilis ligamentina* is remarkable, since this species usually is the leading species in our rivers. Probably, this locality

at River at present. Also in the Monongahela at Washington County, and in the Ohio and Allegheny Beaver to Armstrong Counties. A species of *Truncilla*

of these thirteen forms one (*Truncilla perplexa* *cin.*) not present any more in western Pennsylvania, as *perplexa* *virgiana*, *Lampsilis ventricosa ovata*, *Oboloprogonia irrorata*, *Unio crassidens* are not found in the vicinity of Point Marion (in Cheat River or Dunkard River). The latter, *Lampsilis ventricosa ovata*, *Cyprogenia irrorata*, *Unio crassidens*, are typical inhabitants of the large Cheat River, possibly once existed only in the Cheat River, the fauna of which is now destroyed. *Truncilla* *obovata* *circulus* may yet turn up in the Cheat River, if at all, must be very rare at the present time. This is remarkable, since the two forms of *Truncilla perplexa* were found on the garbage heap, by a comparatively great number

of all specimens shows that the Indians selected the small specimens, rejecting the big ones.

The interest of this little collection lies in the fact that it shows what damage has been done to our *Unionidacea* times. For comparison, I submit here the lists of shells collected by myself in Cheat River and Dunkard Creek. (collections made on Sept. 6, 1904, Sept. 16, 1907,

- | | |
|----------------------------|---|
| <i>ventricosa</i> (Barn.), | 8. <i>Symphynota costata</i> (Raf.). |
| <i>viridulata</i> (Lea.), | 9. <i>Alasmidonta marginata</i> (Say). |
| <i>virginiana</i> (Lam.), | 10. <i>Unio gibbosus</i> (Barn.). |
| <i>virgata</i> (Lam.), | 11. <i>Pleurobema clava</i> (Lam.). |
| <i>viridis</i> (Lea.), | 12. <i>Quadrula undulata</i> (Barn.). |
| <i>viridis phaseolus</i> | 13. <i>Quadrula pustulosa</i> (Lea.). |
| <i>undulata</i> (Say). | 14. <i>Quadrula subrotunda</i> (Lea.). |
| | 15. <i>Quadrula tuberculata</i> (Raf.). |

species is *Unio gibbosus* (30 per cent.); then follow: *Unio gibbosus* (20 per cent.) and *Ptychobranchus phaseolus* (20 per cent.) (12 species) makes up the remaining 30 per cent. *Lampsilis ligamentina* is remarkable, since this species is the only living species in our rivers. Probably, this locality

is the limit of the range of this species, and the latter does not reach farther up stream. All of the species are rather small, the most striking in *Lampsilis recta*, which actually is represented by a dwarf race.

All the species have been found alive, except *Quadrula undulata*. DUNKARD CREEK (collections made on July 8 and 9, 1908).

- | | |
|---|---|
| <i>Lampsilis ventricosa</i> (Barn.), | 8. <i>Strophitus undulatus</i> (Say). |
| <i>Lampsilis luteola</i> (Lam.), | 9. <i>Anodonta grandis</i> (Say). |
| <i>Lampsilis recta</i> (Lam.), | 10. <i>Symphynota costata</i> (Raf.). |
| <i>Lampsilis iris</i> (Lea.), | 11. <i>Unio gibbosus</i> (Barn.). |
| <i>Proptera alata</i> (Say), | 12. <i>Quadrula rubiginosa</i> (Lea.). |
| <i>Tritogonia tuberculata</i> (Barn.), | 13. <i>Quadrula tuberculata</i> (Raf.). |
| <i>Ptychobranchus phaseolus</i> (Hildr.), | |

Of these, only *Lampsilis luteola* and *Anodonta grandis* were found alive; the condition of the creek was not favorable for collecting shells (first and second day after a heavy thundershower). It is probable, that the fauna is not complete, and I cannot say anything about the frequency of the single species.

VARIATION.

BY REV. HENRY W. WINKLEY.

First, nature never makes two individuals exactly alike; secondly environment. One hundred shells of the same species from a given locality will show individuality. Compared with a group of the same species from another region there is another difference. Like the difference between races of the human family, this is undoubtedly due to environment. At Eastport, Maine, where the Bay of Fundy tides create strong currents, chitons, limpets and other forms are in profusion and attain unusually large size. These may be called sedentary forms and depend on food being brought to them. A few feet away *Buccinum* is abundant but small. The same is true of *Lunatia heros* found in neighboring waters. These are carnivorous forms and are much larger at Casco Bay and its neighborhood.

Haminea solitaria is a white shell. A small colony from the