

Dean

problematical organisms in general whose appearance indicates disposition this is in just the position where they occur, but it is also the place where they are fewest. This seems to be consistent with the almost complete absence of true animals where the problematical organisms are found. The fossils occur both above and below the strata in the greatest abundance, the "Rissoids" are found are notorious fragments which are found attest the character and we again see the small chance of their being preserved, when calcareous ground is present.

It should be remembered that shallow water, exposed to the air twice a day, or even covered by a thin film of water, are admirably situated to preserve impressions left by crawling animal forms. Impressions could be preserved, as well as mud impressions made by rills of water on a sloping surface. Rain drop impressions, sun cracks on the shore, and the burrows or trails of animals are all known from various geological strata in the older rocks are rare indeed; impressions described as such take their place among the problematical organisms. The probabilities are small among the long list of species recorded, most infinitely small; while on the other hand what have been so considered are probably of inorganic causes, are almost invariably pointed out that an alga in sink-holes, or rather an impression in the mud, but rather an impression is what is found in the top of the elevation or cast occurs on the bottom of a piece of rock.

CATALOGUE OF THE SHELL-BEARING MOLLUSCA OF PORTAGE COUNTY, OHIO.

BY GEO. W. DEAN.<sup>1</sup>

The following pages are the result of a somewhat industrious experience of about ten years, with the assistance of friends and experts, both within the state and outside of it. No pretence is made of completeness or perfect accuracy, for such a thing belongs to the impossibilities in the present unsettled and confused state of the nomenclature of this interesting department of the science of Natural History. This confusion is most striking among the fresh water univalves and the Corbiculidæ but it exists in nearly all the genera.

I have no doubt that species new to the county will yet be discovered. I predict that *Unio parvus* Barnes, and possibly *Margaritana hildrethiana* Lea, will be found in the south branch of the Mahoning in the township of Deerfield.

I think also that the Rissoids will be increased by the discovery of new forms.

My thanks are due to S. M. Luther and Geo. I. Streater for valuable aid.

- Class GASTROPODA.
- Sub-Class PULMONATA.
- Order STYLOMMATOPHORA.
- Family ZONITIDÆ.
- Genus *Zonites*, Gray.
- Section *Hyalina* Ferrussac.

*Zonites arboreus* Say.

Common everywhere in woods and under logs. It is naturally an upland species, but it is often found in wet places.

*Zonites nitidus* Mull.

Not so common as the above but is often found in large numbers in wet places, subject to occasional overflow. This is the largest of our Hyalinas.

<sup>1</sup>Kent, O.

*Zonites viridulus* Mencke.

Wet and swampy grounds away from running streams. Not abundant.

*Zonites indentatus* Say.

Habitat moist woods. Not gregarious or abundant. A distinct and beautiful species.

*Zonites minusculus* Binney.

Rather rare. Damp old pastures around stumps and logs, sometimes in woods. I have found this species in four different localities but do not know how generally it is distributed.

*Zonites milium* Morse.

Habitat thick woods, in depressions among the moist leaves. Common, but not usually found in large numbers. The smallest of all our zonites.

*Zonites ferreus* Morse.

A northern species very rare in this latitude. A few examples have been collected by S. M. Luther and Geo. I. Streator in the vicinity of Garrettsville. I have compared it with specimens from Maine and have no doubt of its correctness.

*Zonites exiguus* Stimpson.

I have collected this species in considerable numbers in an open marsh near my place, under sticks and old fence rails. Not very common.

All of the above are found at Kent except *ferreus*.

Section *Conulus*, Fitz.*Zonites fulvus* Drap.

Moist places, and very common.

Section *Gastrodonta*, Albers.*Zonites suppressus* Say.

This species is not uncommon but has not been collected in large numbers. It is found in different situations but generally under leaves in moist woods.

*Zonites multidentatus* Binn.

Habitat same as the above. It is a very beautiful species and has been collected in large numbers by Luther and Streator near Garrettsville, rather common.

Sect

*Zonites fuliginosus* G.

Rather rare in the hill-sides in deep woods.

*Zonites ligurus* Say.

More common than

*Zonites intertextus* Binney.

Quite rare and has been collected

From Luther and Streator.

*Zonites inornatus* Say.

I have collected it at Kent, Hiram, and

throughout the country.

*M. concava* Say.

Common. This genus is found in the Pacific States, but I have not had a field of observation. It is a recognized species of *cava*. Specimens of it very closely resemble those of Oregon and Washington.

*P. solitaria* Say.

Streator reports two specimens. I know of one. It is in the shape of a shell. The shells are small, which is usually rather common.

*P. alternata* Say.

A very common species.

*P. perspectiva* Say.

Also very common.

*P. striatella* Anthony.

Rather common in the mountains. It resembles the preceding species in its choice of location.

Section *Mesomphix*, Rafinesque.*Zonites fuliginosus* Griffith.

Rather rare in this county so far as I have observed. On hill-sides in deep woods.

*Zonites ligurus* Say.

More common than any other species of mesomphix.

*Zonites intertextus* Binn.

Quite rare and has no existence in this part of the county. From Luther and Streator.

*Zonites inornatus* Say.

I have collected a few specimens of this species in Shalersville and Hiram townships, but it may be considered rare throughout the county.

## Family SELENTIDÆ.

Genus *Macrocyclus* Beck.*M. concava* Say.

Common. This genus has its greatest development in the Pacific States, but it is the opinion of Mr. Hemphill, whose field of observation has been very extensive, that all of the recognized species of that region are simply varieties of *concava*. Specimens of *concava* from Kentucky are found to very closely resemble the large forms of *vancouverensis* from Oregon and Washington.

## Family HELICIDÆ.

Genus *Patula*.*P. solitaria* Say.

Streator reports two localities where this species is found. I know of one. It is in woods on high ground in Hiram township. The shells are small but high colored for the species which is usually rather dull. Gregarious.

*P. alternata* Say.

A very common and abundant species.

*P. perspectiva* Say.

Also very common in rotten wood.

*P. striatella* Anthony.

Rather common in wet places liable to overflow. It resembles the preceding in appearance but is quite different in its choice of location.

Section *Microphysa* Albers.

Sec

*M. pygmaea* Drap.

This minute species is not uncommon in woods among damp leaves, but it requires close search to find it.

Section *Helicodiscus* Morse.*H. lineatas* Say.

Under old logs, in limited quantity.

Section *Strobila* Morse.*S. labyrinthica* Say.

Rather rare in most localities. There is a small variety in my woods near Kent that is depressed and keeled.

Section *Stenotrema* Rafinesque.*S. hirsuta* Say.

Very common in wet places.

*S. monodon* Rack. Var *fraterna*.

Common in woods.

Section *Triodopsis* Raf.*T. palliata* Say.

Rather common on heavy soils. Absent on the light soils about Kent. Its habitat is about decaying timber.

*T. inflecta* Say.

Very rare in this county. More common in Summit. I found two miles west of Akron a shell in every respect except size like the new species *T. craigini* Call, Kansas, and this leads to the suspicion that *craigini* may prove to be only an umbilicated variety of this species.

*T. tridentata* Say.

Common. Shells of this species and the following one are small throughout the county, only about 12 mm. greatest diameter while at Cincinnati and further south they are 18 mm. or more.

*T. fallax* Say.

Much like the above but not as common.

*V. pulchella* Mull.

Common. A circumnate. The costate variety

Section

*M. albolabris* Say.

Our most common in the northern part of the county. Only the small variety without the keel.

*M. thyroides* Say.

A common and very large variety is found in the county at Kent.

*M. profundus* Say.

Not common and its specimens have been collected in the county.

*M. multilineatus* Say.

The large variety is common in the northern part of the county. It is absent from Kent. The variety *rugosus* is a unbanded variety so common in the county.

*M. sayi* Binn.

A small variety of this species is found in the county from this county. Collected in the county.

*M. dentifera* W. G. Binn.

A single specimen of this species is in the collection of Luther. The determination is from the fact that there is a single specimen in the collection of some well known opinion of some well known forms. It is certain that

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Section *Vallonia* Risso.*V. pulchella* Mull.

Common. A circumpolar species common to three conti-  
nents. The costate variety has not been observed here.

Section *Mesodon* Rafinesque.*M. albolabris* Say.

Our most common species. The heavy variety prevails in  
the northern part of the county, sometimes with the parietal  
tooth. Only the small variety is found near Kent and this is  
uniformly without the tooth.

*M. thyroides* Say.

A common and very distinct species. Like the above the  
large variety is found only upon heavy soils, and the small  
variety at Kent.

*M. profundus* Say.

Not common and it does not occur at Kent. Fine speci-  
mens have been collected at Garrettsville and elsewhere.

*M. multilineatus* Say.

The large variety is rare and only found in the northern  
part of the county. The small variety is not uncommon at  
Kent. The variety *rufus* is occasionally found, but the plain  
unbanded variety so common in some places does not occur in  
the county.

*M. sayi* Binn.

A small variety of this species has been found along Tinker's  
Creek in Cuyahoga county, but only one specimen is known  
from this county. Collected by S. M. Luther.

*M. dentifera* W. G. Binney.

A single specimen reported from Hiram township by Mr.  
Luther. The determination may well be considered doubtful  
from the fact that there are so many forms of *albolabris* that  
this single specimen may be a sport or abnormal. It is the  
opinion of some well informed conchologists that *major*,  
*exolata*, *andrewsi*, and this species are only some of its varietal  
forms. It is certain that the dividing lines are hard to find.

## Family ACHATINIDÆ.

Genus *Ferrussacia* Risso.*F. subcylindrica* Linn.

Not yet discovered in any numbers. A few isolated specimens only have been collected.

## Family PUPIDÆ.

Genus *Pupa* Lam.*P. pentodon* Say.

Most or all of the specimens I have seen are what is known as *P. curvidens* Gld. I have no doubt that both forms occur in the county. It is extremely variable and I do not with my present knowledge regard the latter as a distinct species. It is a common species and is found in localities very different in character.

*P. contracta* Say.

Common in wet places under decaying wood.

*P. corticaria* Say.

Inhabits bark of decaying logs as its name indicates. Quite rare here; I have only found six specimens in ten years.

*Pupa edentula* Drap.=*Vertigo simplex* Gould.

Not common. Attached to decaying wood and under leaves. Best time for collecting this species is late in the fall. *P. alticola* Ing. is probably identical with this.

Genus *Vertigo* Muller.*V. bollesiana* Morse.

In swamps. Rare.

*V. ovata* Say.

Rather common in wet places on logs and sometimes stones.

*V. milium* Gould.

Abundant in some places on decaying wood and among leaves.

## Family SUCCINIIDÆ.

Genus *Succinea* Drap.*S. ovalis* Gould.

Very common.

*S. avara* Say.

Also a very common black woolly substa

*S. aurea* Lea.

Not recognized Luther.

*S. obliqua* Say.

Found sparingly

*S. totteniana* Lea.

Not common. Collected on uplands *obliqua*, but its distribution would indicate the others.

*C. exiguum* Say.

An abundant species in localities like the p

*P. lapidaria* Say.

Common along with *Z. nitida* usually placed among because it is undou

*L. columella* Say.

Not uncommon i

*L. casta* Lea.

A much smaller variety of *colu*

*L. decidiosa* Say.

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Family SUCCINIIDÆ.  
Genus *Succinea* Drap.

*S. avara* Say.

Also a very common species. It is usually covered with a  
black wooly substance easily removed with a brush.

*S. aurea* Lea.

Not recognized here. Collected at Garrettsville by Mr.  
Luther.

*S. obliqua* Say.

Found sparingly in low grounds.

*S. totteniana* Lea.

Not common. This is the only succinea that I have col-  
lected on uplands. It is usually considered a variety of  
*obliqua*, but its decided green color and different habitat  
would indicate that it is at least as good a species as some  
others.

Family AURICULIDÆ.  
Genus *Carychium* Müll.

*C. exiguum* Say.

An abundant species attached to bits of decaying wood in  
localities like the preceding.

Family POMATIOPSISIDÆ.  
Genus *Pomatiopsis*.

*P. lapidaria* Say.

Common along the borders of streams subject to overflow,  
along with *Z. nitida* and *Succinea avara*. This family is not  
usually placed among the Pulmonata. I give it this place  
because it is undoubtedly a land species.

Family LIMNÆIDÆ.  
Genus *Limnæa* Lamark.

*L. columella* Say.

Not uncommon in stagnant water.

*L. casta* Lea.

A much smaller shell. Habitat the same and thought to  
be a variety of *columella*.

*L. decidiosa* Say.

Very common and abundant. Our smallest *Limnæa*.

*L. humilis* Say.

Much like the preceding only a little larger, common.

*L. caperata* Say.

A more robust species than the preceding but almost equally common.

*L. kirtlandiana* Lea.

There is much confusion about this species. The type was evidently only about half grown. The mature shell is quite common and it may prove to be only a slender form of the following.

*L. palustris* Müll.

I do not know that this species has been collected here but I think it has and I have no doubt of its existence in the county.

*L. reflexa* Say.

I have not seen it here but Mr. Streator reports it rather common at Garrettsville.

Genus *Bulinus* Adanson.

*Bulinus hypnorum* Linn.

Not uncommon with habitat like the *Limnæas* in stagnant waters.

Genus *Physa* Drap.

*Physa heterostropha* Say.

If Mr. Say had placed everything under this head that he could not place elsewhere the result would be about what we find it; an extremely variable and abundant species.

*Physa sayi* Tappan.

*Physa zordii* Baird.

*Physa ancillaria* Say.

All found here and all may prove only varieties of *heterostropha*. I have collected the latter in Stewart's Lake together with *ancillaria* and more than half were doubtful as to which species they belonged. I regard *ancillaria* as only a variety.

*Physa gyrina* Say.

Equally variable with *heterostropha* and almost as common.

*Physa ampullacea* Gould  
Rare. This seems different from *gyrina*.

*Physa niagarensis* Lea.

Reported by Streatorville but I have not seen for this species are true *niagarensis* is very near size of *heterostropha*. V

Genus

*P. trivolvis* Say.

Common but does not

*P. bicarinatus* Say.

Common. Also small

*P. campanulatus* Say.

Not uncommon.

*P. corpulentus* Say.

Doubtfully determined

Section

*P. albus* Mull.

*P. deflectus* Say.

*P. parvus* Say.

*P. exacutus* Say.

All common.

Section

*P. armigerus* Say.

An abundant and very

The following fresh in Pulmonata.

Fam

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*Physa ampullacea* Gould.

Rare. This seems distinct but is said to be only a variety of *gyrina*.

*Physa niagarensis* Lea.

Reported by Streator from Camp Creek north of Garrettsville but I have not seen the shells. Shells collected at Akron for this species are undoubtedly *heterostropha*. The true *niagarensis* is very heavy and very white, and not half the size of *heterostropha*. Very uniform in size and appearance.

Genus *Planorbis* Guettard.

*P. trivolvis* Say.

Common but does not develop its full size here.

*P. bicarinatus* Say.

Common. Also small.

*P. campanulatus* Say.

Not uncommon.

*P. corpulentus* Say.

Doubtfully determined.

Section *Gyraulus* Agass.

*P. albus* Mull.

*P. deflectus* Say.

*P. parvus* Say.

*P. exacutus* Say.

All common.

Section *Segmentina* Fleming.

*P. armigerus* Say.

An abundant and very distinct species.

The following fresh water univalves are not classed with Pulmonata.

Family VALVATIDÆ.

Genus *Valvata* Mull.

*V. tricarinata* Say.

A very common species in streams.

Family STREPOMATIDÆ.

Genus *Goniobasis* Lea.

*G. depygis* Say.

Very common and abundant in all the larger streams.

Family RISSOIDÆ.

Genus *Bithynella* Moquin Tandon.

*B. nickliniana* Lea.

Known from Tinker's Creek only.

Genus *Amnicola* Gld. and Hald.

*A. pallida* Hald.

Tinker's Creek.

The two species last named were collected by Mr. Pettengell of Hudson and I can give no particulars about them.

*A. porata* Say.*A. parva* Lea.

These two species are common at Kent.

*A. cincinnatiensis* Anth.

Lake Brady, Kent. The determination of this species is doubtful.

Family PALUDINIDÆ.

Genus *Melantho* Bowdich.

*M. integra* Say.*M. decisa* Say.*M. decisa* var. *rufa* Hald.

All these and probably others are found in our streams but of there being more than one species I have grave doubts. Chas. T. Simpson the able Assistant Curator at the National Museum entertains the opinion that there is but one species of *Melantho* in the whole country.

Family ANCYLINÆ.

Genus *Ancylus* Geoffroy.

*A. rivularis* Say.

Adheres to stones and is common in many of the streams. Streator.

*A. parallelus* Hald.

Not uncommon in sluggish waters. Plentiful in the Cuyahoga river on stems of *Pontederia cordata*. Streator.

*A. clementula* Say.

A common and

*A. lucustris* Lea.

Not common. I

*A. ferrussaciana* Lea

Reported by Lut no means of knowi

*A. salmonea* Lea.

Cuyahoga river 1 cal with specimen

submitted to Geo. 7

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*A. pavonia* Lea.

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*A. grandis* Say.

I have fine large

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*A. decora* Lea.

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CLASS LAMELLIBRANCHIATA.

Family UNIONIDÆ.

Genus *Anodonta* Cuvier.

*A. edentula* Say.

A common and well marked species.

*A. lacustris* Lea.

Not common. Lake Brady.

*A. ferrussaciana* Lea.

Reported by Luther and Streator from Silver Creek. I have  
no means of knowing whether the determination is correct.

*A. salmonea* Lea.

Cuyahoga river near the Geauga line. This shell is identi-  
cal with specimens from Ashtabula County that have been  
submitted to Geo. W. Tryon and Samuel H. Wright and iden-  
tified as this species. The whole interior of adult specimens  
are colored a deep salmon, apparently caused by a constitu-  
tional disease of the animal. It is, in some places very abun-  
dant in sluggish streams.

*A. subcylindracea* Lea.

An abundant species in all of the larger streams.

*A. pavonia* Lea.

The typical form is rather common in the Cuyahoga river.  
A fine radiated variety is found in the Little Mahoning.

*A. grandis* Say.

I have fine large specimens of this species from a small  
stream in Windham township.

*A. decora* Lea.

This is a very beautiful shell but evidently only a smaller  
form of *grandis*.

*A. fragilis* Lam.

I am unable to see any value in this species. It is probably  
another form of *grandis*.

*A. pipiniana* Lea.

A set of this species is now in good condition, in the Lea  
collection at the National Museum from Lake Pepin in this  
township. Superficial examinations have not resulted in its  
re-discovery.

*A. plana* Lea.

Immense specimens of this species over eight inches long inhabit a small pond in Stratsboro township.

*A. imbecilis* Say.

Very rare here. One specimen from Lake Brady and one from a small pond in Franklin township. They have not the beautiful bluish green tint of Ohio river specimens. Recently Mr. Streater reports this species in considerable numbers from the Cuyahoga river in the north part of Hiram township.

Genus *Margaritana* Schum.*M. rugosa* Lea.

This robust and plentiful species in the larger streams is comparatively rare here, but I have seen it in the Cuyahoga and it is probably found in Silver Creek and other tributaries of the Mahoning.

*M. complanata* Lea.

In Silver Creek, but not abundant.

*M. marginata* Say.

In Silver Creek and doubtless other branches of the Mahoning, but not very common.

Genus *Unio* Retz.*U. coccineus* Lea.

Silver Creek, Windham township.

*Unio gibbosus* Barnes.

Silver Creek, Windham township. Common.

*U. luteolus* Lam.

Common and abundant in all the larger streams.

*U. nasutus* Say.

Common in many of the lakes and small streams and abundant in the Cuyahoga.

*U. pressus* Lea.

A very common species.

*U. undulatus* Barnes.

Silver Creek, Windham and doubtless other tributaries of the Mahoning.

*U. occidentis* Lea. Branches of the Mahoning but not abundant. This form of *occidentis* is identical with *U. subovatus* Lea.

*S. sulcatum* Lam.

Common at Kent.

*S. solidulum* Prime.*S. striatinum* Lam.*S. stromboideum* Sc

Not common.

*S. occidentale* Prim

Not common.

*S. truncatum* King;

Kent. There is

species.

*S. fabalis* Prime.

Fine specimens

*S. securis* Prime.*S. rosaceum* Prime.

This species und is rare.

*S. pantumeium* Say.*P. abditum* Hald.

Found sparingly

*P. compressum* Pri

Abundant here

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at Watsboro township.

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*Margaritana* Schum.

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dant. *Unio* is identical with *U. subovatus* Lea.

Family CORBICULIDÆ.  
Genus *Sphærium* Scopoli.

*S. sulcatum* Lam.

Common at Kent.

*S. solidulum* Prime. Kent.

*S. striatinum* Lam. Kent.

*S. stromboideum* Say.

Not common. Garrettsville.

*S. occidentale* Prime.

Not common. Kent.

*S. truncatum* Kingsly.

Kent. There is some doubt about the determination of this  
species.

*S. fabalis* Prime.

Fine specimens from Geo. I. Streater at Garrettsville.

*S. securis* Prime. Rare at Kent.

*S. rosaceum* Prime.

This species undoubtedly occurs here, but like the preceding  
is rare.

*S. partumeium* Say.

Genus *Pisidium* Pfr.

*P. abditum* Hald.

Found sparingly in swamps.

*P. compressum* Prime.

Abundant here in the Breakneck Creek. Fine large speci-  
mens.