

MOLLUSCAN FAUNULES IN WISCONSINAN LOESS AT CLEVELAND, OHIO

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ABSTRACT. Two distinctive molluscan faunules occur in Wisconsinan loess exposed in a gravel pit near the southeast margin of the city of Cleveland, Ohio. One faunule, judged to be of early Wisconsinan age, and consisting of 16 species, occurs in loess immediately above Sangamon soil developed in Illinoian gravels; 9 of the 16 species are restricted to this loess. The second faunule, judged to be of Tazewellian age, and comprising 11 species, occurs in younger loess above a weathered zone and below varved clay; 4 of the 11 species are restricted to this faunule. Each of the 20 species of fossil mollusks in the total assemblage is illustrated by a photograph, and the vertical distribution of the several kinds is shown on a chart.

THE discovery of fossiliferous loess in northeastern Ohio is so unusual and so important to the study of Pleistocene stratigraphy in this region that the occurrence merits special attention. The molluscan faunules reported upon here were first observed by George W. White in loess exposed above gravels in a large shovel pit operation of the Cleveland Sand and Gravel Company, just southeast of Garfield Park at the southeast margin of the city of Cleveland, Ohio. Further details of the location and a description of the stratigraphic relations at the exposure are given in the accompanying paper by White, in company with whom samples of fossiliferous loess were collected for recovery and study of molluscan faunules.

At the time the samples were collected, the gravel pit exposed about five feet of loess above Sangamon soil developed in gravels of Illinoian age, and below varved silts underlying late Cary till. As shown in the measured section given by White, the upper one-third of the loess is light colored, calcareous and fossiliferous, while the lower two-thirds is dark colored, clayey, weathered and non-fossiliferous above, but weakly calcareous and somewhat fossiliferous in the lower part. Five bulk samples of the loess were taken: (1) from dark, humic-stained silt in what seemed to be the upper few inches of the Sangamon soil, (2) from the lower part of the lower loess (Farmdale? of White's measured section), (3) from the lower part of the upper loess (pro-Tazewell? of White), (4) from

this upper loess immediately below the varved silts, and (5) a channel sample. The occurrence of the various kinds of mollusks at the several levels sampled is shown in figure 1; each of the 20 kinds of mollusks comprising the aggregate molluscan assemblage now known from these loesses is shown in plate 1. The channel sample did not reveal kinds of mollusks not found in one or more of the other samples taken.

Terminology used in this paper distinguishes between time- or time-rock terms, for which adjectival endings are used (late Wisconsinan loess), and stratigraphic names, for which nouns are used (Farmdale loess).

It is obvious that the two loesses are distinguishable on the basis of their contained molluscan faunules (fig. 1). The assemblage in the lower (Farmdale? of White's measured section) loess contains 16 species of fossil mollusks (samples 1, 2), of which 9 are not found in the upper loess; the upper loess (White's pro-Tazewell?) contains 11 kinds of mollusks, of which 4 do not occur in the lower loess. Part of this difference is probably due to slightly different environments prevalent at the time of deposition of the two loesses, since the lower, unlike the upper, contains several aquatic species, *Gyraulus parvus*, *G. pattersoni*, *Helisoma antrosa*, *Lymnaea dalli grandis*, and *Menetus* sp. These aquatic species form an inconspicuous part of the faunal assemblage (each kind except *G. pattersoni* is represented in our collections by a single specimen) but their occurrence is indicative of a pond environment on the surface on which the loess was being deposited, at least at the beginning of the depositional period. The locally depressed topography at this time probably also accounts for the occurrence of a few shells in what seemed to be the upper few inches of Sangamon soil, where I judge that the shells were moved from higher ground by colluviation. Two observations support this view: (1) the shells in this zone are more often broken than those occurring elsewhere in the deposit; (2) the shells are not etched by weathering processes although they are imbedded in humic-stained, non-calcareous silt.

The characteristics of the faunal assemblage in the loess at Cleveland clearly attest to its early Wisconsinan age. *Columella alticola*, *Succinea avara gelida*, *S. grosvenori*, *Hendersonia occulta*, *Vertigo alpestris oughtoni*, *Gyraulus pattersoni*, *Lymnaea dalli grandis*, *Discus mcclintocki*, and perhaps

other species, are extinct in the region of northeastern Ohio. Such a high proportion of locally extinct species clearly indicates an early Wisconsinan age for the loesses in question and excludes an association of the loess with Cary till, for experience has shown that late Wisconsinan (post-Bradyan) deposits contain molluscan assemblages essentially like those living in the vicinity (Leonard, 1952, p. 16). Furthermore, the general character of the aggregate faunal assemblage is similar to that found elsewhere in early Wisconsinan loess, but the two faunal assemblages reported here do not correspond in detail with Iowan and Tazewellian faunal assemblages known to occur in early Wisconsinan loess in the Missouri Valley (Leonard, 1951, p. 325; 1952). *Discus patulus*, *Discus mcclintocki*, *Vertigo alpestris oughtoni*, *V. pygmaea*, *Carychium exile canadense*, and *Lymnaea dalli grandis* are not known to occur in early Wisconsinan molluscan faunas in the Missouri Valley, but each has its counterpart in a similar kind of snail. These and other details of difference between the upper and lower faunal assemblages in the Cleveland loess as compared with faunal assemblages in early Wisconsinan loess are easily accounted for by differences in soil, floral and climatic conditions in the two regions. It seems unwise at this time, in view of the lack of knowledge of molluscan faunal assemblages in Pleistocene deposits in northeastern Ohio, to attempt an exact correlation between the two distinctive faunal assemblages observed there and subdivisions of Wisconsinan time. All the facts available, however, tend to support the judgment of White concerning the age of the two loesses at the Cleveland exposure, but the confirmation cannot be a positive one, pending the acquisition of further knowledge of fossil molluscan faunas in Pleistocene deposits in northeastern Ohio.

THE MOLLUSCAN FAUNA

Aquatic Species

The aquatic species of mollusks found in these sediments are limited to the lower loess (fig. 1). They are all pulmonate gastropods and hence not restricted to permanent bodies of water. So far as known, each of these species lived in ponds or quiet streams and were capable of surviving periods without open water. The presence of these species in the lower loess

faunal assemblage indicates the presence of a pond here at least at the beginning of loess deposition.

Helisoma antrosa (Conrad), plate 1, i: This snail is re-

MOLLUSCAN SPECIES	SAMPLES			
	1	2	3	4
<i>Columella alticola</i> (INGERSOLL).....			●	●
<i>Discus patulus</i> (DESHAYES).....			●	●
<i>Stenotrema leai</i> (BINNEY).....			●	●
<i>Succinea avara gelida</i> BAKER.....			●	●
<i>Cionella lubrica</i> (MULLER).....	●	●	●	●
<i>Euconulus fulvus</i> (MULLER).....	●	●	●	●
<i>Hendersonia occulta</i> (SAY).....	●	●	●	●
<i>Succinea grosvenori</i> LEA.....	●	●	●	●
<i>Pupilla muscorum</i> (LINNE).....	●	●	●	●
<i>Vertigo alpestris oughtoni</i> PILSBRY.....	●	●	●	●
<i>Vertigo pygmaea</i> (DRAPARNAUD).....	●	●	●	●
<i>Carychium exile canadense</i> CLAPP.....		●		
<i>Discus mcclintocki</i> BAKER.....		●		
<i>Gyraulus parvus</i> (SAY).....	●	●		
<i>Gyraulus pattersoni</i> BAKER.....	●	●		
<i>Hawaiiia minuscula</i> (BINNEY).....		●		
<i>Helisoma antrosa</i> (CONRAD).....		●		
<i>Lymnaea dalli grandis</i> BAKER.....		●		
<i>Menetus</i> sp.		●		
<i>Strobilops labyrinthica</i> (SAY).....		●		

Fig. 1. Occurrence and distribution of kinds of mollusks at levels sampled in loess at Cleveland exposure. 1. Species in four inches of colluvium(?) associated with Sangamon soil. 2. Species in lower loess (Farmdale?). 3. Species in lower part of pro-Tazewell loess. 4. Species in upper part of pro-Tazewell loess.

presented in our collections by a single individual. The species may be living in the vicinity; it is reported by Robertson and Blakeslee (1948, p. 65), from Chautauqua County, New York. It is a snail that lives in ponds and small streams.

Gyraulus parvus (Say), plate 1, h: Represented in our collections by two immature individuals. These shells may belong to the subspecies *urbanensis* described by Baker (1918, p. 94) from Pleistocene deposits on the campus of the University of Illinois.

Gyraulus pattersoni Baker, plate 1, g: The occurrence of this species in Wisconsinan deposits is unusual; Leonard (1950, p. 20) reports it only from sediments of Kansan age in the Great Plains region. This is also the first record for the species east of Harrison County, Iowa.

Menetus sp., plate 1, j: A single immature individual belonging to this genus is not certainly identifiable. Two species of *Menetus* are reported by Robertson and Blakeslee (1948, p. 71) from the Niagara region.

Lymnaea dalli grandis Baker, plate 1, o: This is a Pleistocene snail described by Baker (1930) in a discussion of the aquatic mollusks in Pleistocene sediments of Illinois. Robertson and Blakeslee (1948, p. 62) list it from Livingston County, New York, in the "outlet of marl swamp."

Terrestrial Species

Each of the species discussed here is a pulmonate gastropod, adapted to life on land. They require moist earth and plant debris in which to deposit their eggs and rear their young. All the species in this assemblage are discussed and illustrated by Pilsbry (1939-1948) and most of them are listed by Leonard (1950, 1952) from Pleistocene deposits in the Great Plains region.

Carychium exile canadense Clapp, plate 1, s: This snail, which was found only in the lower loess, lives near water, and might have been found around the margin of the ancient pond. Robertson and Blakeslee (1948, p. 50) report it from Ontario and Livingston counties, New York, and Oughton (1948, p. 78) reports it living as far north as James Bay, Ontario, Canada.

Cionella lubrica (Müller), plate 1, n: This woodland snail

very likely is living in the vicinity of Cleveland. It is common in Pleistocene deposits from the Kansan stage to the Recent.

Columella alticola (Ingersoll), plate 1, b: Found abundantly in the upper loess samples. Living colonies of this gastropod are limited to western montane regions (Leonard, 1952, fig. 13). In the Great Plains, this snail is found only in Pleistocene sediments of Tazewellian age.

Discus mcclintocki Baker, plate 1, p, q: This species is characteristic of Pleistocene sediments of Wisconsinan age, but a few living colonies have been found in Iowa.

Discus patulus (Deshayes), plate 1, l, m: This species may be living in the vicinity of Cleveland; it is reported by Robertson and Blakeslee (1948, p. 33) and Oughton (1948, p. 38) from the counties or provinces near lakes Erie and Ontario.

Neither of these species of *Discus* has been found in the western Missouri River Valley, where *Discus cronkhitei* and *D. shimaki* occur in Wisconsinan sediments (Leonard, 1952).

Euconulus fulvus (Müller), plate 1, f: This woodland snail is probably living in the vicinity of Cleveland, as it is reported by Robertson and Blakeslee (1948, p. 22) and by Oughton (1948, p. 18). It is a common fossil in deposits of Wisconsinan age in the Great Plains (Leonard, 1952, p. 19).

Hawaiiia minuscula (Binney), plate 1, e: This ubiquitous little gastropod is known from sediments as old as Pliocene and it is found living almost everywhere in the United States.

Hendersonia occulta (Say), plate 1, r: This snail was described from Wisconsinan loess; a few colonies of living examples are known, but none in the vicinity of Cleveland. It is abundant in the Cleveland loess.

Pupilla muscorum (Linné), plate 1, a: This species is a common fossil in Wisconsinan deposits. It may be living in the vicinity of Cleveland, as it is reported from New York by Robertson and Blakeslee (1948, p. 40) and from Ontario, Canada, by Oughton (1948, p. 54).

Stenotrema leai (Binney), plate 1, t, u, v: This is a woodland species which probably is living in the vicinity of Cleveland.

Strobilops labyrinthica (Say), plate 1, k: Two examples of this woodland snail were found in the lower loess. It probably lives in the Cleveland area.

Succinea avara gelida Baker, plate 1, w: This small snail is known only from Pleistocene sediments of Wisconsinan age.

Succinea grosvenori Lea, plate 1, x: This species is extinct in the eastern part of the United States, although common in the loess at Cleveland and elsewhere, where loess faunas have been studied.

Vertigo alpestris oughtoni Pilsbry, plate 1, d: This tiny gastropod was described by Pilsbry (1948, p. 968) from living examples from Baffin Island, Northwest Territory, Canada. This is the first record from the United States. The colony on Baffin Island is the only record of living examples of this species.

Vertigo pygmaea (Draparnaud), plate 1, c: This minute snail was not reported by Robertson and Blakeslee (1948), but Oughton reports it from Southern Ontario (1948, p. 62). It is probably not living in the Cleveland area.

SUMMARY AND CONCLUSIONS

Two distinctive molluscan assemblages occur in loess near Cleveland, Ohio.

The lower molluscan assemblage is tentatively correlated with the Farmdale substage of Wisconsinan age, while the upper molluscan assemblage is tentatively correlated with the Tazewellian substage.

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PLATE 1

All figures enlarged 5 times.

- a. *Pupilla muscorum* (Linné). Common.
- b. *Columella alticola* (Ingersoll). Common.
- c. *Vertigo pygmaea* (Draparnaud). Common.
- d. *Vertigo alpestris oughtoni* Pilsbry. Common.
- e. *Hawaiiia minuscula* (Binney). Rare.
- f. *Euconulus fulvus* (Müller). Rare.
- g. *Gyraulus pattersoni* Baker. Immature, rare.
- h. *Gyraulus parvus* (Say). Immature, rare.
- i. *Helisoma antrosa* (Conrad). Immature, rare.
- j. *Menetus* sp. Rare.
- k. *Strobilops labyrinthica* (Say). Rare.
- l., m. *Discus patulus* (Deshayes). Common.
- n. *Cionella lubrica* (Müller). Common.
- o. *Lymnaea dalli grandis* Baker. Rare.
- p., q. *Discus meclintocki* Baker. Common.
- r. *Hendersonia occulta* (Say). Abundant.
- s. *Carychium exile canadense* Clapp. Common.
- t., u., v. *Stenotrema leai* (Binney). Common.
- w. *Succinea avara gelida* Baker. Common.
- x. *Succinea grosvenori* Lea. Common.

