

A RESTUDY OF THE INTERGLACIAL MOLLUSCAN FAUNA OF TORONTO, CANADA*

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The most complete Pleistocene biota at present known is contained in certain sands and clays of Toronto, Ontario, Canada. These have been extensively studied by Coleman (1906,1915) and the fauna listed. The insect fauna is nearly all of extinct species, but the molluscan fauna is listed as of the same species living today. Of the mammal fauna, about half are extinct.

The age of the Toronto deposits is not clear. Coleman first placed them in the Sangamon interval and later in the Aftonian interval. More recently (1927) he placed the beds in the Yarmouth interval. The writer (1920, p. 327) has thought that they represented the Sangamon interval. The mammalian fauna is quite unlike that of the Aftonian, which contains camels, horses, and other mammals which became extinct about the middle of the Pleistocene. The age might be either Yarmouth or Sangamon, and this cannot be determined without a detailed stratigraphic study of the region in comparison with other regions where the oscillations of the Wisconsin ice sheet may help in the determination of the character of the drift beds above the fossil-bearing clays and sands.

As one of the most complete faunas known, it was thought that a restudy of the Toronto molluscan fauna might throw some light on the relationship of this fauna to others of known geological horizons. The most extensive molluscan fauna known is found at Chicago, where 95 species and varieties have been thus far listed (Baker, 1920). This fauna is post-Wisconsin in age and represents the time when glacial Lake Chicago and Lake Michigan were in the making. Another extensive fauna, also post-Wisconsin, is located at Niagara Falls in gravel deposits (Letson, 1901). Thirty species are here represented. The present reidentification indicates a molluscan fauna of about 30 species at Toronto. It is probable, however, that many small species have been overlooked in this region, which would swell the list to as many, or perhaps more, than are found at Chicago.

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Through the kindness of Dr. Coleman and of Dr. Parks, Director of the Royal Ontario Museum of Palaeontology, a series of the Toronto Mollusca was sent to the writer for study. Of the 41 names listed by Coleman, all but 12 were represented. During the twenty-five years which have elapsed since the list of Coleman was published, the nomenclature of the fresh-water Mollusca has changed radically and our knowledge of recent and Pleistocene faunas has greatly increased, so that a comparison of the Toronto species with those found in other deposits is quite profitable. Unfortunately, there are no interglacial faunas of the naiades of any considerable extent known. From the Aftonian, Shimek (1910) lists three species which are all different from those at Toronto. A few fresh-water gastropods are also listed, but these have not been re-examined from the more modern standpoint and cannot be compared with the Toronto fauna for this reason.

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NOTES ON THE TORONTO INTERGLACIAL FOSSILS

The specimens received from the Royal Ontario Museum are commented upon below. Comparisons are made with the fauna at Chicago and also at Niagara Falls. The latter has been reidentified, and a table showing the original published names and the reidentification names is appended. A table of the Toronto fauna as listed by Coleman and as reidentified is also appended. The comparative distribution of species in the three formations will be found of interest and value, showing at a glance the differences in the general make-up of each. The names used in the following notes are those in the writer's "Fresh Water Mollusca of Wisconsin," published in 1928.

Ambtema rariplicata (Lamarck).

The single specimen in the Toronto material, from Taylor's brickyard, is not *undulata* (*costata*), nor even the recent lake form called *plicata*, but the large river form called *rariplicata*. The umbones are high, full, and rounded, not depressed. It is apparently the species found at Chicago, which was referred to both *peruviana* and *costata* (*undulata*) but appears more like the large river form so abundant in Illinois and Indiana. It does not occur at Niagara Falls.

Quadrula pustulosa (Lea).

Taylor's brickyard. All specimens are referable to typical *pustulosa*. None examined is *schoolcraftensis* (*prasina*). All specimens from the Toronto deposit are small (length 50, height 48, diameter 31mm.), more compressed and less pustulose than the same species from the Chicago deposits. They are more like specimens from southern Indiana and Arkansas. This species does not occur in the Niagara Falls deposits.

Pleurobema cocconeum solida (Lea).

Taylor's brickyard and Don Valley brickyard. Coleman's references to *Unio trigonus* (= *Fusconaia trigona*), *Unio coccineus*, *Unio solidus* and *Unio pyramidatus* are all founded on variations of *solida*. These specimens are like the *solida* of the Ohio River near Cincinnati for the most part, but some specimens resemble the Mississippi River variety called *mississippiensis* by the writer (1928, p. 121). The Toronto specimens are totally unlike the *cocconeum* found at Niagara Falls and Chicago, which appear referable to *Pleurobema coccineum catillus* for the most part, although some specimens in the Chicago fauna are like *solida* in the high umbones. The Chicago *cocconeum* were listed by the writer as variety *magnalacustris*, but the approximation was incorrect. Some flat specimens somewhat resemble the Lake Erie variety but the shell is much larger and heavier and clearly of the river form of *cocconeum* exemplified by *catillus*. The Toronto shells are very different from any form in the Niagara Falls or Chicago faunas. *Elliptio dilatatus* (Raf.)

Unio gibbosus and *Unio phascolus* of Coleman's list. From Taylor's brickyard and bend of the Don. The Toronto *dilatatus* are rather small and very solid, resembling forms living in the medium-sized rivers, as the Winnebago River in Illinois and the upper Wabash in Indiana. They also resemble some examples of variety *sterkii* but are on the whole larger, with a more squarely truncated posterior end. They are exactly like some of the forms of this species found in the Chicago deposits. The *Unio phascolus* in the Toronto collection is a large specimen of *gibbosus* (*dilatatus*), height 42, length 76, width 27 mm., somewhat resembling the figure 188 of the Niagara Falls report (Letson, 1901). No specimens of *phascolus* were found in the Toronto collection.

Anodonta grandis Say.

No specimens of this species occurred in the Toronto collection sent for examination. No *Anodonta* are recorded from the Niagara deposits and only fragments were found in the Chicago deposits. It is probable that the form represented at Toronto was one of the northern varieties, possibly *footiana*.

Obovaria olivaria (Raf.).

Taylor's brickyard. Recorded as *Unio clavus* by Coleman. Four valves are represented in the collection, two right and two left, one pair forming a complete shell. These specimens are slightly more elongated and have the umbones nearer the anterior end than in the more general manifestation of the species in the rivers of Illinois and Indiana, but they are undoubtedly *olivaria* and not *Pleurobema clava*. In the anteriorly-placed umbones and elongated form they differ from any *olivaria* yet examined and might easily constitute a Pleistocene variety of the species.

Ptychobranthus phascolus (Hildreth). *P. fasciolare* (Raf.)

The specimen listed as this species in the Toronto material is *Elliptio dilatatus*, as recorded above. *Ptychobranthus phascolus* is not found in the Chicago deposits but is contained in the Niagara Falls deposits, figure 185 of Letson's paper being this species and not *Lampsilis* (*Ligumia*) *elliptiformis* as listed. Curiously enough, this shell is like the lake form described as variety *lacustris* F. C. Baker (1928, p. 52) from Chautauqua Lake and not like the typical river form of the species.

Ligumia recta (Lamarck).

Taylor's brickyard. The Toronto specimen in the collection is like the small form of the Lake region, typical *recta*. The Niagara Falls specimens are apparently the same. The Chicago form is more like the river form, variety *latissima*.

Lampsilis siliquoides (Barnes).

Taylor's brickyard, bend of the Don. Listed as *Unio luteolus* by Coleman. The specimens are very small and the shells are very thick. They somewhat resemble the variety *rosacea* living in Lake Erie, Lake St. Clair, and Saginaw Bay, Michigan. They more nearly resemble the very thick, wide form living abundantly in Winnebago Lake, Wis., which the writer has named variety *chadwicki* (Baker, 1928, p. 279), having the same well-rounded valves and thickened hinge line. They cannot be referred to *siliquoides*, the typical river form, and perhaps might be included in a variety peculiar to the Pleistocene.

Lampsilis ventricosa (Barnes).

Listed as *Unio occidentis* by Coleman. In the absence of specimens for comparison it can only be conjectured what form may be represented in the Toronto deposits. The species is not recorded from the Niagara gravels. A form of *ventricosa* occurs in the Chicago deposits which is different from any of the described varieties. It is not *canadensis* nor is it *lurida*. The shell is thin and the umbones are elevated and placed just anterior of the center of the dorsal margin.

Sphaerium sulcatum (Lam.).

Listed as *sulcatum* and *simile*. Found in Chicago deposits but not in the Niagara Falls gravels.

Sphaerium striatinum (Lamarck).

Taylor's brickyard. No typical *striatinum* were found in the lot sent to Dr. Sterki, who reports that while they belong to the *striatinum* group, they are not that species. Typical *striatinum* occurs in both the Chicago and the Niagara Falls deposits.

Sphaerium emarginatum Prime.

Taylor's brickyard. Included in specimens listed by Coleman as *striatinum*. *Emarginatum* occurs in the Chicago deposits.

Sphaerium solidulum (Prime).

Not observed in the Toronto material received. This species occurs in the Chicago deposits but not in the Niagara Falls deposits.

Sphaerium. Of the *striatinum* group.

Winchester Street, Toronto, Don beds. Listed as *rhomboideum*. Dr. Sterki is in doubt concerning the correct name of this lot. It is not *rhomboideum*.

Pisidium compressum Prime.

Bend of the Don and Winchester Street, Toronto. Listed by Coleman as both *compressum* and *adamsi*. All are *compressum*. *Novaboracense* is listed by Coleman, but none was found in the material received. It would appear probable that many more species of *Pisidium*, as well as of *Sphaerium*, should be found in the Don beds. Seven species of the family are listed in the Niagara Falls list and 35 species in the Chicago list, all determined by Sterki.

Valvata tricarinata (Say).

Winchester Street, Toronto, Don beds. Typically tricarinate but with the spire much depressed. Occurs abundantly at Chicago and Niagara Falls. In the latter deposits the form is mostly variety *perconfusa*, while in the Chicago deposits the typical form and three varieties occur.

Valvata perdepressa Walker.

Adares sandpit, Shaw Street, Toronto. Listed by Coleman as *sincera*. The specimens are exactly like the recent *perdepressa* from Lake Ontario near Rochester, N. Y. and the deposit is probably post Wisconsin and not interglacial. The sand pits in western Toronto, mentioned by Chalmers are probably also Post Wisconsin. No *Valvata* referable to *sincera* are contained in the Toronto material and it cannot at present be determined just what species this reference was based on. True *sincera* occurs in the Niagara deposits but not in the Chicago deposits.

Campeloma rufum (Haldeman).

Winchester Street, Don beds (interglacial), embryonic shells; Adares sand pit, Shaw Street, Toronto (post-Wisconsin). The Shaw Street specimens are like the recent form of *rufum* found in Lake Michigan. The Niagara Falls specimen is the same. Recorded as *Campeloma decisum* by Coleman.

Ammicola.

The absence of the characteristic fossil *Ammicola leightoni* Baker from the Toronto deposits is worthy of note. *Ammicola limosa* Say and variety *porata* Say are listed by Coleman, but specimens so labelled prove to be of other species, as noted below. *Ammicola leightoni* occurs in both the Niagara Falls and the Chicago deposits. This species may be present but has been overlooked.

Cincinnatia cincinnatiensis (Anth.).

Winchester Street, Toronto, Don beds. Recorded as *Ammicola porata* by Coleman. Characteristic specimens resembling material from Seneca Lake, N. Y. Occurs in the Chicago deposits but not at Niagara Falls. The *Ammicola sagana* (typographical error for *sayana*) probably belongs here, although no specimens so labelled are in the collection.

Vanclevia emarginata canadensis (F. C. Baker).

Winchester Street, Toronto, Don beds (recorded as *Bythinella obtusa*). Same locality listed as *Ammicola limosa*. The Toronto specimens are rather more truncated at the apex than in typical *canadensis* from the recent fauna. Occurs in both the Niagara Falls and Chicago deposits.

Birgella subglobosa (Say).

Listed as *Somatogyrus isogonus* by Coleman. *isogonus* is the river form with closed umbilicus while *subglobosus* is the lake form with open umbilicus. The latter occurs at Chicago but not at Niagara Falls. This species is so characteristic that it could not be confused with any other species.

Pleurocera acuta Rafinesque.

Winchester Street, Toronto and bend of the Don. Listed by Coleman as *Pleurocera subulare*, *elevatum*, and *lewisi*. While there is some variation, all are referable to the lake form so common in the Great Lakes today. Occurs at Niagara Falls and Chicago.

Goniobasis haldemani Tryon.

Winchester Street, Toronto, bend of the Don. A specimen in the material sent is labelled *Goniobasis depygis* Say. As *depygis* is listed as well as *haldemani* by Coleman it may be that *Goniobasis livescens* might have been determined as *depygis*. However, no specimens of *livescens* occurred with the material received for examination.

Lymnaeidae.

None of the lymnaeids were contained in the Toronto material. Coleman lists *Limnaea decidiosa* and *L. elodes*. The first might have been either *Fossaria obrussa* Say or the variety *decampi* Streng, both of which occur in Pleistocene deposits, the latter, however, more abundantly. Specimens labelled *desidiosa* from Niagara Falls proved to be *Fossaria exigua* upon ex-

TABLE OF COMPARATIVE DISTRIBUTION

CHICAGO	NIAGARA FALLS	TORONTO
<i>Fusconaia undata</i>	-----	-----
<i>Amblema rariplicata</i>	-----	<i>Amblema rariplicata</i>
<i>Quadrula pustulosa</i>	<i>Quadrula pustulosa</i>	<i>Quadrula pustulosa</i>
<i>Quadrula quadrula</i>	-----	-----
<i>Cyclonaias tuberculata</i>	-----	-----
<i>Pleurobema catillus</i>	<i>Pleurobema catillus</i>	<i>Pleurobema solida</i>
<i>Elliptio dilatatus</i>	<i>Elliptio dilatatus</i>	<i>Elliptio dilatatus</i>
<i>Elliptio crassidens</i>	-----	-----
<i>Lasmsgona costata</i>	-----	-----
<i>Anodonta grandis, var.</i>	<i>Anodonta grandis, var.</i>	<i>Anodonta grandis, var.</i>
<i>Alasmidonta calceola</i>	<i>Alasmidonta calceola</i>	-----
-----	<i>Alasmidonta marginata</i>	-----
-----	<i>Ptycho. phaseolus</i>	-----
<i>Obovaria reflexa</i>	-----	-----
-----	-----	<i>Obovaria olivaria, var.</i>
<i>Truncilla truncata</i>	-----	-----
<i>Proptera alata, var.</i>	-----	-----
<i>Ligumia ellipsiformis</i>	-----	-----
<i>Ligumia iris</i>	-----	-----
<i>Ligumia lienosa</i>	-----	-----
<i>Ligumia recta</i>	<i>Ligumia recta</i>	<i>Ligumia recta</i>
<i>Lampsis rosacea</i>	<i>Lampsis rosacea</i>	<i>Lampsis rosacea</i>
<i>Lampsis lurida</i>	-----	<i>Lampsis ventricosa, var.</i>

TABLE OF COMPARATIVE DISTRIBUTION

CHICAGO	NIAGARA FALLS	TORONTO
<i>Campeloma rufum</i>	<i>Campeloma rufum</i>	<i>Campeloma rufum</i>
<i>Valvata tricarinata</i>	<i>Valvata tricarinata</i>	<i>Valvata tricarinata</i>
<i>Valvata perdepressa</i>	-----	<i>Valvata perdepressa</i>
-----	<i>Valvata sincera</i>	-----
<i>Amnicola leightoni</i>	<i>Amnicola leightoni</i>	-----
<i>Amnicola gelida</i>	-----	-----
<i>Cincin. cincinnatiensis</i>	-----	<i>Cincin. cincinnatiensis</i>
<i>Vancleaveia canadensis</i>	<i>Vancleaveia canadensis</i>	<i>Vancleaveia canadensis</i>
<i>Pyrgulopsis letsoni</i>	<i>Pyrgulopsis letsoni</i>	-----
<i>Birgella subglobosa</i>	-----	<i>Birgella subglobosa</i>
-----	<i>Pomatiopsis scalaris</i>	-----
<i>Pleurocera acuta</i>	<i>Pleurocera acuta</i>	<i>Pleurocera acuta, var.</i>
<i>Goniobasis livescens</i>	<i>Goniobasis livescens</i>	-----
-----	<i>Goniobasis niagarensis</i>	-----
-----	<i>Goniobasis haldemani</i>	<i>Goniobasis haldemani</i>
<i>Lumnaea jugularis</i>	-----	-----
<i>Stagnalis elodes</i>	-----	<i>Stagnalis elodes</i>
<i>Stagnalis reflexa</i>	-----	-----
<i>Stagnalis umbrosa</i>	-----	-----
<i>Stagnalis jolietensis</i>	-----	-----
<i>Stagnalis woodruffi</i>	-----	-----
<i>Stagnalis caperata</i>	-----	-----
-----	<i>Stagnalis niagarensis</i>	-----
<i>Fossaria obrussa</i>	-----	<i>Fossaria obrussa</i>
<i>Fossaria decampi</i>	-----	-----
<i>Fossaria exigua</i>	<i>Fossaria exigua</i>	-----
<i>Helisoma striata</i>	<i>Helisoma striata</i>	<i>Helisoma striata</i>
<i>Helisoma trivolvis</i>	-----	-----
<i>Helisoma pseudotrivolvis</i>	-----	-----
<i>Helisoma campanulata, var.</i>	-----	-----
<i>Menetus exacuus</i>	-----	-----
<i>Gyraulus obliquus</i>	-----	-----
<i>Gyraulus altissimus</i>	<i>Gyraulus altissimus</i>	<i>Gyraulus altissimus</i>
<i>Ferrissia parallela</i>	-----	-----
<i>Ferrissia fusca</i>	-----	-----
<i>Physa sayii</i>	-----	<i>Physa sayii</i>
<i>Physa integra</i>	-----	-----
<i>Physa walkeri</i>	-----	-----
-----	<i>Physa niagarensis</i>	<i>Physa niagarensis</i>
<i>Physa gyrina</i>	-----	-----

amination. *Fossaria obrussa*, var. *decampi*, and *F. exigua* occur in the Chicago deposits. Without specimens the true relationship of these small *Fossaria* cannot be determined. The larger *elodes* is more or less common in Pleistocene deposits under the recent name of *Stagnicola palustris elodes* (Say). This occurs in the Chicago deposits but not in the Niagara Falls deposits.

Helisoma antrosom striatum (F. C. Baker).

This snail, listed as *Planorbis bicarinatus*, is the common form of *antrosa* (= *bicarinata*) in Pleistocene deposits. It occurs in both the Niagara Falls and Chicago deposits.

Gyraulus altissimus (F. C. Baker).

Listed by Coleman as *Planorbis parvus* Say. All of the Pleistocene specimens of the small planorbes, with one or two exceptions, are referable to *altissimus* and not to *parvus*. This species (*altissimus*) occurs abundantly throughout the whole of the Pleistocene, from Aftonian to post-Wisconsin time. It is abundant in the Niagara Falls deposits, where it was listed as *parvus*, and is also abundantly represented in the Chicago deposits.

Physa niagarensis Lea.

Winchester Street, Toronto. Listed by Coleman as *Physa heterostropha*. Also listed by Letson from the Niagara Falls deposits as *heterostropha*. All of these are referable to the small *Physa* called *niagarensis* by Lea which is abundant at the present time in many places near Lake Ontario. The Chicago species is apparently typical *integra* Hald.

Physa sayii Tappan.

The *Physa* listed by Coleman as *ancillaria* is apparently the same as the form found in the Chicago deposits and referred to *sayii*. In the author's Pleistocene (1920) this is listed as *warreniana*, but this is a wholly different species not found in Pleistocene deposits as far as now known (see Baker, 1928, I, p. 437).

TABLE OF NIAGARA FALLS GRAVEL MOLLUSCAN FAUNA

Listed by Miss Letson	Reidentification
<i>Fleurocera subulare</i>	<i>Fleurocera acuta</i> Rafinesque
<i>Goniobasis livescens</i>	<i>Goniobasis livescens</i> (Menke)
<i>Goniobasis livescens niagarensis</i>	<i>G. livescens niagarensis</i> (Lea)
<i>Goniobasis haldemani</i>	<i>Goniobasis haldemani</i> Tryon
<i>Ammicola limosa</i>	<i>Ammicola leightoni</i> F. C. Baker
<i>Ammicola letsoni</i>	<i>Fyrgulopsis letsoni</i> (Walker)
<i>Bythinella obtusa</i>	<i>Vancleaveia emarginata</i>
<i>Pomatiopsis lapidaria</i>	<i>P. lapidaria scalaris</i> F. C. Baker
<i>Valvata tricarinata</i>	<i>V. tricarinata perconfusa</i> Walker
<i>Valvata sincera</i>	<i>Valvata sincera</i> Say
<i>Campeloma decisa</i>	<i>Campeloma rufum</i> (Haldeman)
<i>Limnaea columella</i>	<i>Pseudosuccinea columella</i> (Say)
<i>Limnaea desidiota</i>	<i>Fossaria exigua</i> (Lea)
<i>Limnaea catascopium</i>	<i>Stagnicola catascopium</i>
<i>Physa heterostropha</i>	<i>niagarensis</i> (F. C. Baker)
<i>Planorbis bicarinatus</i>	<i>Physa niagarensis</i> Lea
<i>Planorbis parvus</i>	<i>Helisoma antroea striata</i> (F. C. Baker)
<i>Sphaerium striatinum</i>	<i>Gyraulus altissimus</i> (F. C. Baker)
<i>Sphaerium stamineum</i>	<i>Sphaerium striatinum</i> (Lam.)
<i>Pisidium virginicum</i>	<i>Sphaerium stamineum</i> (Conrad)
<i>Pisidium compressum</i>	<i>Pisidium virginicum</i> (Gmelin)
<i>Pisidium abditum</i>	<i>Pisidium compressum</i> Prime
<i>Pisidium ultramontanum</i>	<i>Pisidium abditum</i> Haldeman
<i>Pisidium scutellatum</i>	<i>Pisidium ultramontanum</i> Prime
<i>Lampsilis rectus</i>	<i>Pisidium scutellatum</i> Sterki
<i>Lampsilis ellipsiformis</i>	<i>Ligumia recta</i> (Lamarck)
<i>Alasmidonta calceola</i>	<i>Ptychobranchus phaseolus</i> (Hildr.)
<i>Alasmidonta truncata</i>	<i>Alasmidonta calceola</i> (Lea)
<i>Unio gibbosus</i>	<i>Alasmidonta marginata</i> Say
<i>Quadrula solida</i>	<i>Elliptio dilatatus</i> (Raf.)
<i>Quadrula coccinea</i>	<i>Fleurobema coccineum</i>
	<i>catillus</i> (Conrad)
	<i>Fleurobema coccineum</i>
	<i>Catillus</i> (Conrad)

A study of the comparative table of the fauna of the three deposits under discussion is of interest. The Toronto fauna, as at present known, shows some peculiar variations not included in either the Chicago or the Niagara Falls deposits. This is especially true of the naiades, in which there is a tendency to vary in a way similar to the fauna now living in the Mississippi River. On the whole the Toronto fauna may be said to resemble the Wabash River fauna as at present known more than the Niagara Falls fauna. This might indicate a migration by way of an interglacial Maumee outlet of a Sangamon or Yarmouth Great Lake system, if such was present, as appears probable. Such species as *Pleurobema solida*, *Elliptio dilatatus*, *Obovaria olivaria*, and *Lampsilis siliquoides rosacea* are not like any of the variations of these species living or contained in post-Wisconsin deposits. The gastropod fauna appears to be similar to other interglacial faunas and also to the Chicago and Niagara Falls post-Wisconsin faunas. Not enough material of this group, however, is available for study to satisfactorily determine this point. The apparent absence of many small species of gastropods from the Toronto fauna, as *Amnicola leightoni*, *Amnicola gelida*, *Fossaria obrussa decampi*, *Valvata lewisii*, as well as many of the smaller Sphaeri-

TABLE OF THE TORONTO MOLLUSCAN FAUNA

Listed by Coleman	Reidentification
• <i>Unio undulatus</i> Authors	<i>Amblema rariplicata</i> (Lamarck)
• <i>Unio rectus</i> Lamarck	<i>Ligumia recta</i> (Lamarck)
• <i>Unio luteolus</i> Lamarck	<i>Lampsilis siliquoides rosacea</i> (DeKay)
• <i>Unio gibbosus</i> Barnes	<i>Elliptio dilatatus</i> (Raf.) Variety
• <i>Unio phaseolus</i> Hildreth	<i>Elliptio dilatatus</i> (Raf.) Variety
• <i>Unio trigonus</i> Lea	<i>Pleurobema coccineum solida</i> (Lea)
• <i>Unio coccineus</i> Conrad	<i>Pleurobema coccineum solida</i> (Lea)
• <i>Unio occidentalis</i> Lea	<i>Lampsilis ventricosa</i> (Barnes) Var.
• <i>Unio solidus</i> Lea	<i>Pleurobema coccineum solida</i> (Lea)
• <i>Unio clavus</i> Lamarck	<i>Obovaria olivaria</i> (Raf.)
• <i>Unio pyramidata</i> Lea	<i>Pleurobema coccineum solida</i> (Lea)
• <i>Anodonta grandis</i> Say	<i>Anodonta grandis</i> Say. Variety
• <i>Unio pustulosus</i> Lea	<i>Quadrula pustulosa</i> (Lea)
• <i>Unio pustulosus schoolcraftensis</i> Lea	<i>Quadrula pustulosa</i> (Lea)
• <i>Sphaerium rhomboideum</i> (Say)	<i>Sphaerium</i> new species
• <i>Sphaerium striatinum</i> (Lamarck)	<i>Sphaerium emarginatum</i> (Prime)
• <i>Sphaerium sulcatum</i> (Lamarck)	<i>Sphaerium sulcatum</i> (Lamarck)
• <i>Sphaerium simile</i> (Say)	<i>Sphaerium sulcatum</i> (Lamarck)
• <i>Sphaerium solidulum</i> (Prime)	<i>Sphaerium solidulum</i> (Prime) ?
• <i>Pisidium adamsi</i> Prime	<i>Pisidium compressum</i> Prime
• <i>Pisidium compressum</i> Prime	<i>Pisidium compressum</i> Prime
• <i>Pisidium noveboracense</i> Prime	Not examined
• <i>Pleurocera subulare</i> (Lea)	<i>Pleurocera acuta</i> Raf. Variety
• <i>Pleurocera elevatum</i> (Say)	<i>Pleurocera acuta</i> Raf. Variety
• <i>Pleurocera lewisii</i> (Lea)	<i>Pleurocera acuta</i> Raf. Variety
• <i>Goniobasis depygis</i> Say	<i>Goniobasis haldemani</i> Tryon
• <i>Goniobasis haldemani</i> Tryon	<i>Goniobasis haldemani</i> Tryon
• <i>Limnaea decidiosa</i> Say	<i>Fossaria obrussa</i> (Say)
• <i>Limnaea elodes</i> Say	<i>Stagnicola palustris elodes</i> (Say) ?
• <i>Planorbis parvus</i> Say	<i>Gyraulus altissimus</i> (F.C.Baker)
• <i>Planorbis bicarinatus</i> Say	<i>Helisoma antrosa striata</i> (F.C.Baker)
• <i>Amnicola limosa</i> (Say)	<i>Vanocleveia emarginata canadensis</i> (F.C.Baker)
• <i>Amnicola porata</i> (Say)	<i>Cincinnatia cincinnatiensis</i> (Anth.)
• <i>Amnicola sayana</i> Anth.	Not examined
• <i>Bythinella obtusa</i> (Lea)	<i>Vanocleveia emarginata canadensis</i>
• <i>Physa heterostropha</i> Say	<i>Physa niagarensis</i> Lea
• <i>Physa ancillaria</i> Say	<i>Physa sayi</i> Tappan
• <i>Somatogyrus isogonus</i> (Say)	<i>Birgella subglobosa</i> (Say)
• <i>Valvata sincera</i> Say	Not examined
• <i>Valvata tricarinata</i> (Say)	<i>Valvata tricarinata</i> (Say)
• <i>Campeloma decisa</i> (Say)	<i>Campeloma rufum</i> (Haldeman)

idae so abundant in other deposits, indicates either that these species have been overlooked in sorting material or that they were absent from the Toronto fauna.

It is apparent that more intensive collecting in the Toronto deposits is urgently needed. The clays should yield a large number of the small gastropods and pelecypods. The deposits near Shaw Street, in western Toronto are apparently not interglacial but post-Wisconsin in age, the presence of *Valvata perdepressa*, a species known only from the post-Wisconsin deposits of the Great Lakes region, indicating this age rather positively.

SUMMARY AND CONCLUSIONS

The Toronto formation is undoubtedly interglacial, and represents either the Sangamon or the Yarmouth interval. The molluscan fauna is characteristic and not exactly like that of any later fauna. It is different from the post-Wisconsin faunas at Chicago and Niagara Falls, especially as regards the naiades. The deposits at Shaw Street, in western Toronto, are not interglacial but post-Wisconsin in age. A large quantity of material from the Don beds should be collected and studied in the light of recent molluscan classification. The Shaw Street deposits should be carefully studied with reference to their correlation with the fauna of the Niagara Falls gravels. Other exposures of supposed interglacial deposits bordering the shores of Lake Erie and Lake Ontario should be studied. This is especially true of the Ontario peninsula. Well borings in southern Ontario might also provide data throwing light on the distribution of these interglacial beds.

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