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LAND MOLLUSCA IN THE VICINITY OF WOLFVILLE,
NOVA SCOTIA

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ABSTRACT

The geographical and ecological distribution of twenty-five species of terrestrial mollusks in the vicinity of Wolfville, Nova Scotia is described. Local paucity of gastropods, as compared with the Nova Scotian total, is related to the low lime availability of the A subzone of the soils. Two new records for the province are indicated: *Quickella vagans* and *Vertigo bollesiana*. In addition, seven new records are added to the Nova Scotian mainland total.

INTRODUCTION

The two principal aims of this study have been to determine the land molluscan fauna in the vicinity of Wolfville and to provide local distributional and ecological data for the species present. A significant byproduct of the investigation has been to establish two new records for the province — *Vertigo bollesiana* and *Quickella vagans*. To achieve these ends, collections of land snails were made at intervals during the spring and fall of 1961. All but one of the twenty habitats sampled lie within a ten mile radius of Wolfville (see locality map). At each station, the microhabitat of each species and the dominant vegetation type were recorded. The data obtained has been assembled in the sections of this paper dealing with gastropod localities and habitats.

LITERATURE REVIEW

The first list of Nova Scotian shells was published in 1857 in the Church Times at Halifax. Compiled by John Robert

Willis, it gave an alphabetical listing of generic and specific names only. Willis' latest and longest list appeared in 1863, was privately printed but fortunately reprinted in the Nova Scotia Institute of Science Proceedings and Transactions (Ganong, 1890). Fourteen terrestrial species were included and these were arranged phylogenetically. Most of the specimens were apparently collected in the vicinity of Halifax and Dartmouth.

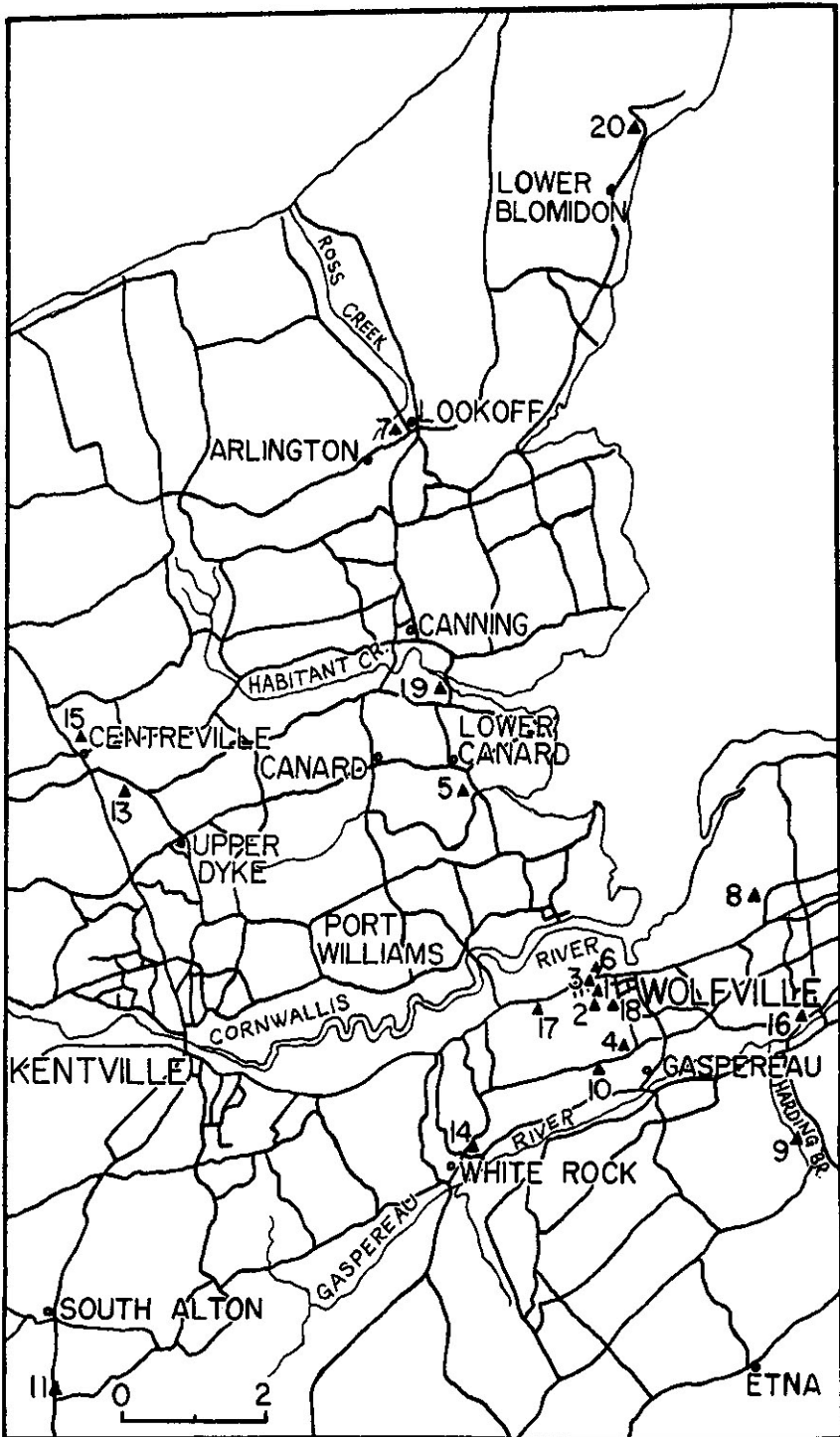
Jones (1877), in the same Proceedings and Transactions, also had published a record of the Nova Scotia mollusca. This, as far as the terrestrial gastropods are concerned, was the same as Willis' except for certain nomenclatorial changes, possibly one change in identification ie. *Helix hortensis* for *H. nemoralis* and one addition *H. pulchella*. These species are *Cepaea hortensis*, *C. nemoralis*, and *Vallonia pulchella* in current nomenclature.

In 1906, Campbell published a list of the mollusks of Picou county. This included ten terrestrial species of which three were new records: *Retinella indentata*, *Triodopsis albolabris*, and *Pallifera dorsalis* (recent nomenclature). The last two records need yet to be confirmed; the first, if not based on a misidentification has now been confirmed.

Further additions to the Nova Scotian terrestrial gastropod record were not made until 1949 when Ord and Watts published a paper on the slugs of the province. If Campbell's list is accurate, two rather than four new records (as reported) were added at this time.

MacMillan (1955) who made a survey of the Cape Breton land and freshwater gastropods, has added thirteen species to the provincial list, the largest number since Willis' time. Excluding subspecies, forty species were reported by him for the island as compared with the twenty-nine, currently known for the mainland.

Twenty-five species have been listed for the Wolfville area. This may be compared with forty-two for Cape Breton (MacMillan, 1955), twenty-seven for New Brunswick (LaRocque, 1961) and sixty-five for Maine (Johnson, 1915). The low figure for New Brunswick can certainly be ascribed to insufficient collecting.



LOCALITY DATA

(refer also to locality map)

Locality 1

backyard lawn, 4 Park Street, Wolfville

Zonitoides arboreus, *Cionella lubrica*, *Vallonia excentrica***Locality 2**

narrow floodplain bordering College brook, near intersection of projected extension of Highland Park avenue; young aspens, some willows and alders.

Hygromia hispida, *Zonitoides nitidus*, *Oxychilus cellarius*, *Retinella electrina*, *Succinea* sp. (1 shell), *Deroceras reticulatum*, *Arion circumscriptus***Locality 3**

floodplain with grasses and weeds, near embankment on west side of College brook, immediately north of highway 1

Hygromia hispida, *Zonitoides nitidus*, *Retinella electrina*, *Cionella lubrica*, *Deroceras reticulatum*, *Arion circumscriptus***Locality 4**

upland with second growth trembling aspen woods, .25 miles west of Highland avenue on Ridge north of Gaspereau valley

Zoogenetes harpa, *Retinella electrina*, *Cionella lubrica*, *Vertigo bollesiana***Locality 5**

dykeland, Canard river north shore, west side of road; grasses dominant (no trees)

Vallonia pulchella, *Cionella lubrica*, *Vertigo pygmaea***Locality 6**

floodplain with grasses and weeds, west side of College brook, a few yards upstream of Dominion Atlantic railway track

Zonitoides nitidus, *Retinella electrina*, *Vitrina limpida*, *Discus cronkhitei catskillensis*, *Deroceras reticulatum*, *Arion circumscriptus*

Locality 7

upland, second growth mixed deciduous-coniferous woods, .2 miles west, on Arlington road, of west road to Bennett Bay

Vertigo gouldi, *Cepaea hortensis*, *Discus cronkhitei catskillensis*

Locality 8

marshy, hummocky, non-wooded ground, west side of road, first west of Grand Pre park; just south of railway track.

Cionella lubrica, *Retinella electrina*, *Vallonia excentrica*

Locality 9

narrow floodplain of Harding brook, about 1 mile upstream of store at Melanson, with mixed hemlock, spruce and birch

Euconulus fulvus, *Discus cronkhitei catskillensis*, *Cionella lubrica*, *Zonitoides arboreus*, *Retinella indentata*, *Striatura exigua*

Locality 10

upland with mature hemlock-spruce forest, about 1 mile west of Highland avenue on Gaspereau Ridge road

Vertigo gouldi paradoxa, *Zonitoides arboreus*

Locality 11

outcrop of amygdaloidal basic rock, east side of highway, about 1 mile south of South Alton

Vertigo pygmaea

Locality 12

edge of house, 4 Park Street, Wolfville

Vallonia excentrica, *Cionella lubrica*

Locality 13

dominantly coniferous woods, 1 mile from Centreville, on Upper Dyke road

Euconulus fulvus, *Discus cronkhitei catskillensis*, *Striatura exigua*, *Zonitoides arboreus*, *Vertigo ventricosa*

Locality 14

upland with second growth deciduous woods, about .5 miles from White Rock on road to Gaspereau Ridge road

Striatura exigua, *Discus cronkhitei catskillensis*, *Succinea* sp. (shell only)

Locality 15

wet, young deciduous woods, adjacent to bog in Centreville

Striatura exigua, *Discus cronkhitei catskillensis*, *Quickella vagans*

Locality 16

floodplain of Gaspereau river, north slope, west side of road at bridge to Wallbrook; marshy plants

Succinea sp.

Locality 17

road embankment, grass and weed covered, bordering brook; about .7 miles east of Greenwich on south side of highway 1

Hygromia hispida, *Cionella lubrica*, *Zonitoides nitidus*, *Oxyloma decampi gouldi*, *Deroceras laeve*, *Deroceras reticulatum*, *Arion circumstriptus*

Locality 18

old foundation, east side of University avenue, about .1 mile south of Highland Park avenue, Wolfville, Nova Scotia.

Hygromia hispida, *Zonitoides nitidus*, *Cionella lubrica*, *Oxychilus cellarius*, *Deroceras reticulatum*, *Arion circumscriptus*

Locality 19

small brook with marshy vegetation, flowing into Habitant Creek just west of the first north-south road east of Canning

Oxyloma decampi gouldi

Locality 20

cow pasture, bordering roadway trending northwest from Lyons Cove, about 1 mile north of Lower Blomidon

Arion subfuscus, *Arion circumscriptus*, *Vitrina limpida*, *Cionella lubrica*, *Vallonia excentrica*, *Discus cronkhitei catskillensis*.

The most ubiquitous species of land snail in the vicinity of Wolfville appears to be *Cionella lubrica* which has been found at 50% of the localities. *Discus cronkhitei catskillensis*, noted at 35%, comes a poor second.

Whereas several species have been found at single localities, ie. *Quickella vagans*, *Zoogenetes harpa*, *Vertigo ventricosa*, *Arion subfuscus*, *Vertigo bollesiana* and *Retinella indentata*, the last two are known by single specimens only. These would seem to be the most selective in their habitat preferences or the least adaptable.

The most varied fauna observed was found at locality two. It comprised eight species. The most restricted molluscan faunas were recorded at localities eleven and sixteen. Each contained a single species.

ECOLOGICAL DATA

Family Succineidae

Oxyloma decampi gouldi Pilsbry

in grass, under mat, on wet brook embankment
on rushes partly submerged in water of brook

Quickella vagans (Pilsbry)

in and under wet leaf mould, deciduous woods, adjacent to bog

Family Cionellidae

Cionella lubrica (Mueller)

under rocks and boards in lawn
in grass on stream embankment
on bone fragment in second growth aspen woods
on drift wood and boards in meadow bordering brook
under wood in marshy ground
under started bark and rotting logs, mixed coniferous woods, floodplain of brook
under boards and logs, in cow pasture bordering road
under boards, bones, by old foundation

Family Pupillidae

Vertigo bollesiana (Morse)

under started bark, second growth *Aspen* woods

Vertigo gouldi (Binney)

under started bark, second growth mixed coniferous-deciduous woods (poplar, birch, spruce)

Vertigo gouldi paradoxa Sterki

under started bark, mature hemlock-spruce forest

Vertigo pygmaea (Drap.)

in grass and weeds, under boards and logs, floodplain of creek

in crevices, on basic amygdaloidal flow rock

Vertigo ventricosa (Morse)

under boards, mainly coniferous woods

Family Valloniidae

Vallonia excentrica Sterki

under boards and rocks in lawn grass

on cut wood, in grasses on boggy ground

under boards and bogs, along roadway in cow pasture

Vallonia pulchella (Mueller)

under boards and logs in grass on floodplain

Zoogenetes harpa (Say)

on pieces of wood, some burnt, second growth *Aspen* woods

Family Endodontidae

Discus cronkhitei catskillensis (Pilsbry)

on damp cardboard in grass and weeds, brook floodplain

on damp paper, second growth mixed coniferous-deciduous woods

on rotten logs, mixed birch, spruce, hemlock woods, narrow floodplain of brook

started bark, mainly coniferous woods

under logs, second growth deciduous woods

in leaf mould, young deciduous woods, adjacent to bog

under boards, cow pasture, adjacent to roadway

Family Zonitidae

Oxychilus cellarius (Mueller)

in leaf mould and under rotting logs, flood plain of brook

under boards and bones, in grass and weeds, at old foundation

Retinella electrina (Gould)

in leaf mould, under branches and logs, floodplain of brook
on bone fragment, second growth *Aspen* woods
on damp cardboard in grass and weeds, floodplain of brook
on cut wood, in grass, boggy ground

Retinella indentata (Say)

on rotten logs, hemlock-spruce-birch woods, narrow flood-
plain of brook

Striatura exigua (Stimp.)

under rotten logs, hemlock-spruce-birch woods, narrow
floodplain of brook
rotten logs, mainly coniferous woods
under logs and in leaf mould, second growth deciduous
woods
in wet leaf mould, deciduous woods, adjacent to bog

Vitrina limpida Gould

on damp cardboard, in grass and weeds, floodplain of
brook
under boards and logs, in cow pasture, adjacent to roadway

Zonitoides arboreus (Say)

under boards and stones in lawn grass
under started bark, hemlock-spruce-birch woods, on
narrow floodplain of brook
under started bark of logs, upland mature hemlock-spruce
woods
in grass and leaf mould, road embankment bordering brook

Zonitoides nitidus (Mueller)

in leaf mould, under branches and logs, *Aspen* woods,
floodplain of brook
under boards and logs, in leaf mould bordering brook
on damp cardboard, in grass and weeds, floodplain of brook

Family Arionidae

Arion circumscriptus Johnston

under boards and logs in cow pasture next to roadway
in damp leaf mould, grassy and weedy road embankment
bordering brook
under boards, in grasses and weeds by old foundation

Arion subfuscus (Drap.)

under boards and logs in cow pasture next to roadway

Family Limacidae*Deroceras laeve* (Mueller)

in damp leaf mould, grassy and weedy road embankment bordering brook

Deroceras reticulatum (Mueller)

under boards in weeds and grasses next to old foundation
in damp leaf mould, grassy and weedy road embankment bordering brook

Family Kaliellidae*Euconulus fulvus* (Mueller)

under rotting logs, mainly coniferous woods (upland)
under rotting logs, hemlock-spruce-birch woods, floodplain of brook

Family Helicidae*Hygromia hispida* (Linne)

in leaf mould and under logs, *Aspen* woods on floodplain of brook
in leaf mould and under boards, in grasses and weeds on floodplain of brook
in leaf mould, grassy and weedy embankment bordering brook
under boards, in grasses and weeds, by old foundation

Cepaea hortensis (Mueller)

on damp cardboard, second growth mixed deciduous-coniferous woods (upland)

ECOLOGICAL DISCUSSION

The presence or absence of an organism is to a considerable extent dependent upon environmental factors. Now while these are to varying degrees interrelated, some factors appear to be more restrictive than others. In the case of terrestrial mollusks in Britain, Boycott (1934) noted that local distribution could be directly correlated with available moisture, shelter and lime. Further, food per se, had no influence

either by its quality or quantity on the recurrence of the gastropods. Snails usually feed on decaying vegetation and fungi, few feed directly on living plants but some are carnivorous. The type of plant cover supplying the decaying matter is immaterial except for the effects it has on the physical nature of the habitat ie. acidity, shelter, moisture retention and percentage of organic matter.

As noted previously, over forty species of terrestrial mollusks have been reported from Nova Scotia but only twenty-five in the vicinity of Wolfville. This difference cannot be entirely attributed to insufficient or inadequate collecting nor to major climatic differences within the province. A fairly wide range of habitat types has been examined. Further, a number of the larger, more conspicuous species have not been observed locally ie. polygyrids, anguispirids, etc. More likely it is due to the low lime content in the A subzone of the Wolfville area soils. To test this postulate, I intend to make a study of the land mollusks of the Windsor area, a region in part underlain by limestone, gypsum, and anhydrite.

Graham (1957) in his study of the molluscan skin has emphasized the fact that no mollusk has become truly terrestrial in the sense that an arthropod or vertebrate is terrestrial, even though many gastropods live on land. Thus gastropods are terrestrial in the sense that woodlice and *Peripatus* are terrestrial. They avoid the truly terrestrial conditions and live in restricted habitats of high humidity. They have never acquired the water-proof skin which true land life requires — either by covering the epidermis with a waterproof cuticle (as in insects) or by covering it with layers of dead cells or scales (as in vertebrates).

That moisture is important is readily apparent when we consider our local situation. I found the largest number of individuals per species and species per habitat in damp localities ie. floodplains. Locally these exhibited different dominant vegetation types, for example grasses and weeds vs. mixed deciduous woods. The amount of moisture required does vary considerably from species to species however. Thus *Zonitoides nitidus* has been found only in rather moist situations but *Vertigo pygmaea* appears able to thrive equally well in wet and dry localities. The latter species because of its small size,

was afforded shelter by minute crevices and solution cavities in bare amygdaloidal basic flow rock near South Alton.

Even a combination of good moisture and shelter may not be sufficient for many species, however. Thus the fairly mature hemlock-spruce woods at locality ten, which had a good ground cover of matle and rotting logs and also a good moisture content, revealed few individuals of only two species after diligent search. The very low lime content of the soil and its high acidity made this area unfavourable to abundant molluscan life.

Finally, the importance of man should not be overlooked in connexion with snail ecology. His clearing of the land and cultivation tends to reduce soil moisture in summer and at the same time remove habitat niches. On the other hand, he may increase the lime content of the soil through fertilization thereby making it suitable for some species.

LITERATURE CITED

- BOYCOTT, A. E., 1934.
The Habitats of Land Mollusca in Britain. *Jour. Ecol.*, 22, (1), pp. 1-38.
- CAMPBELL, A. R., 1906.
The Mollusks of Pictou County. *Bull. Pictou Acad. Sci.*, 1, pp. 25-26.
- GANONG, W. F., 1890.
John Robert Willis, the First Nova Scotian Conchologist. A Memorial. *Proc. and Trans. N. S. Inst. Nat. Sci.*, 7, pp. 404-428.
- GRAHAM, A., 1957.
The Molluscan Skin, with Special Reference to Prosobranchs. *Proc. Malac. Soc. London*, 32, (4), pp. 135-144.
- JOHNSON, C. W., 1915.
Fauna of New England: List of the Mollusca. *Occ. Paps., Boston Soc. Nat. Hist.*, 7, (13), 231 pp.
- JONES, J. M., 1877.
Mollusca of Nova Scotia. *Proc. and Trans. N. S. Inst. Nat. Sci.*, 4, pp. 321-330.
- LA ROCQUE, A., 1961.
Checklist of New Brunswick Non-Marine Mollusca. *Sterkiana*, 3, pp. 40-42.
- MACMILLAN, G. K., 1955.
A Preliminary Survey of the Land and Fresh-water Gastropoda of Cape Breton, Nova Scotia. *Proc. N. S. Inst. Sci.*, 23, pp. 389-408.
- ORD, M. J. and A. H. G. WATTS, 1949.
New Records for the Distribution of Certain Land Mollusca in Nova Scotia. *Proc. N. S. Inst. Sci.*, 23, pp. 16-35.
- WILLIS, J. R., 1857.
A list of Shells of Nova Scotia. *Church Times, Halifax*, Oct. 17, 1857.
1863. Nova Scotia Shells. Privately printed list, issued in November, 1863.