CONTENTS

A Preliminary List of the Colonies of Tree Snails, 
*Liguus fasciatus*, in the Area of Dade County, Florida, South 
and West of Miami .......................... Frank N. Young 1

Stratigraphic Distribution of Pleistocene Land Snails in 
Indiana .................................... William J. Wayne 9

Plans for a Checklist of North American Mollusca ..........
 ........................................ Aurèle La Rocque 19

Checklist of Ohio Pleistocene and Living Mollusca .......
 ......................................... Aurèle La Rocque 23

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EDITOR

Aurèle La Rocque
Department of Geology
Ohio State University
125 S. Oval Drive
Columbus 10, Ohio
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STERKIANA is named after Dr. Victor Sterki (1846 - 1933) of New Philadelphia, Ohio, famed for his work on the Sphaeriidae, Pupillidae, and Valloniidae. It is fitting that this serial should bear his name both because of his association with the Midwest and his lifelong interest in non-marine Mollusca.

The purpose of STERKIANA is to serve malacologists and paleontologists interested in the living and fossil non-marine Mollusca of North and South America by disseminating information in that special field. Since its resources are modest, STERKIANA is not printed by conventional means.

STERKIANA will contain articles dealing with non-marine Mollusca of the Americas in English, French, or Spanish, the three official languages of North America. Contributors are requested to avoid descriptions of new species or higher taxa in this serial as the limited distribution of STERKIANA would probably prevent recognition of such taxa as validly published. Papers on distribution and ecology, revised checklists for particular areas or formations are especially welcome but papers on any aspect of non-marine Mollusca will be considered.

STERKIANA will appear once a year or oftener, as material is available. All correspondence should be addressed to the Editor.

STERKIANA est une collection de travaux sur les Mollusques extra-marins des deux Amériques, distribuée par un groupe de malacologues du centre des États-Unis. Toute correspondance doit être adressée au rédacteur. STERKIANA publiera à l'avenir les travaux en anglais, en français et en espagnol qui seront acceptés par le comité de rédaction.

STERKIANA es una coleccion de trabajos sobre los Moluscos extra-marinos vivientes y fosiles de las dos Americas, editada por un grupo de malacologos de los Estados Unidos centrales. Contenira en el porvenir trabajos en ingles, francés, y espanol que seran aceptados por la mesa directiva. La correspondencia debera ser dirigida al Editor.
A PRELIMINARY LIST OF THE COLONIES OF TREE SNAILS, LIGUUS FASCIATUS, IN THE AREA OF DADE COUNTY, FLORIDA, SOUTH AND WEST OF MIAMI

FRANK N. YOUNG

Zoology Department, Indiana University, Bloomington, Indiana.

In recent years a new threat to the natural environment has appeared in southeastern Florida. Areas of the rocky ridge southwest of Homestead which seemed safe from exploitation for years to come are now being intensively farmed by a technique called "rock farming." This consists of breaking up the surface of the Perrine rockland with bulldozers and other heavy machines and using the resulting fragments of limestone to support various winter crops. The native vegetational associations - largely fire-adapted xerophytes - cannot survive this massive change in the substrate, and even if the "rock farms" are abandoned the original pinelands will have disappeared over considerable areas.

In general the "rock farms" have not yet encroached upon the hardwood hammocks (subtropical jungle hammock associates and associations), and in places the stands of broad-leaved trees are isolated in broad cultivated tracts. This temporary reprieve is due only to the difficulty of clearing the tough hammock vegetation even with heavy equipment. Eventually, these unique patches of woodland, which stood originally as isolated islands of tropical forest in the dry pine forests and gladelands, will be cleared. They have already been almost completely destroyed in the vicinity of Miami (Young, 1951) and to the north (Young, 1955). The dense human population of the southeastern ridge had already doomed the jungle hammocks and their associated faunas, but the "rock farms" have accelerated the process of destruction.

My concern with the jungle hammocks centers principally around the colonies of tree snails, Liguus fasciatus (Müller), which most of them once contained. A very few hammocks are preserved in county parks and private estates, but even in these the tree snails seem to be dying out. In view of this situation, I feel we should try to salvage all the data possible on the biology of the hammocks. Competent malacologists and others should make scientific collections from as many of the remaining hammocks as can be reached. If the hammocks cannot be saved, preserved material can at least be made available for future study.

The collections of Liguus presently in museums are largely unsuitable for certain types of investigations because of the way in which the material was collected. That is, random samples of the

1 Contribution No. 673 from the Zoological Laboratories of Indiana University.
populations are needed to make certain kinds of comparisons between different localities. Selected series of "pretty" shells are not enough. Each of the hammocks which still support tree snails has a distinctive colony which differs from others either in composition or structural features of the shells. These differences reflect not only different ecological conditions in different locations, but also the fact that each hammock represents a different degree of isolation both in time and space. We may never be able to obtain sufficient material of Liguus to make studies such as those on Partula and Achatinella, but at least we can try to save a little for future students.

The following preliminary list includes the hammocks known to have supported colonies of Liguus in the area of Dade County south and west of Miami and some which may have supported Liguus. Other hammocks and unknown colonies of tree snails should be searched for throughout the area. For convenience, I have divided the known localities into groups on the basis of the pineland "islands" with which they are associated. These "islands" are not now surrounded by water since the drainage of the Everglades, but they were formerly separated by flooded transverse glades (drainage ways of the Everglades across the eastern rock ridge or rim). To locate "islands" use the "Official Map of Dade County, Florida, 1949" (scale 10,000 feet to 1 inch) which may be obtained for a nominal sum from the Biscayne Engineering Company of Miami. The boundaries of the "islands" are indicated by dashed lines on this map - marking the boundaries of the pinelands which also correspond to the rocklands. The hammocks are or were mostly around the edges of the "islands" although there are numerous exceptions. Aerial photographs of the USDA, Production and Marketing Division, for Dade County (1938 and 1953) show many of the hammocks or the remnants of them.

Since the present list is preliminary, I have not attempted any analysis of the composition of the tree snail colonies. Where a colony is indicated as "pure" the name of the color form (Clench and Fairchild, 1939) of L. f. roseatus is given. In the mixed colonies, unclassifiable forms are nearly always abundant indicating interbreeding between the various color forms which occur in pure colonies and may thus be assumed to represent genetically pure lines.

1. Brickell Island - The large area of rocky pineland bounded on the north by the Miami River and its transverse glade inland, on the east by the Silver Bluff shoreline, on the west by the Everglades, and on the south by the transverse glade and stream of Snapper Creek.

The stands of the subtropical jungle hammock associations were largely peripherally distributed around the edges of the island as observed elsewhere. The hammocks of record were located as follows:

1a. Edges of Miami River and its transverse glade inland:
   North end of Brickell Hammock - extending inland along river for about 2 miles. Old records of Liguus from as far west as area of F. E. C. Railroad and river (vicinity of SW 2nd Avenue). 54-41, Sec. 1. (Young, 1951).
   Second growth hammock on bluffs at about SW 6th Street, west of 3rd Avenue. No positive records, but possibly material in Simpson Collection. 54-41, Sec. 1.
   Hammock on low bluffs at SW 7th Avenue and 4th Street near Ada Merritt School. No records, but probably supported Liguus. 54-41, Sec. 1 (Young, 1951).
   Hammock along low bluffs west of NW 12th Avenue. Fragments only of Liguus. 53-41, Sec. 35. (Young, 1951).
   Lawrence Park Hammock on low bluffs along river west of NW 17th Avenue. Mixed colony. 53-41, Sec. 34. (Young, 1951).
Head of Miami River Hammock, on edge of pinelands, near South Fork of Miami River just east of N.W. 27th Avenue. Mixed colony. Lignum found. Citrus trees and other trees along edge of river. 53-41, Sec. 34. (Young, 1951).

Hammock fringe along edge of pinelands west of 27th Avenue north of N.W. 7th Street. No records of Lignum, but may have supported them prior to clearing in about 1920-21. Possibly "Elizabeth Groves" in Simpson Collection. 53-41, Sec. 38.

Hammock on round-topped hill along edge of pinelands at N.W. 4th Street about 50th Avenue. Clearcut, but with remnants of hammock trees - possibly once supported Lignum. 54-41, Sec. 5. (Young, 1951).

Hammock on edge of pinelands west of 50th Avenue, south of N.W. 7th Street. Pure colony of Lignum. 54-40, Sec. 1. (Young, 1951).

Cork Hammock along edge of pinelands west of 50th Avenue. Probably never supported Lignum. Possibly succession after fires were controlled. 54-40, Sec. 3.

1b. Hammocks on Indian mounds in Everglades near Brickell Island:
   Egregious Hammock. Pure colony of Lignum. 54-40, Sec. 2, possibly into Lot 2, (Young, 1951).

1c. Hammocks in Everglades west of Brickell Island:
   Hammock on Bird Road at S.W. 73rd Avenue, N.W. Caloosa. Pure colony of Lignum. 53-40, Sec. 14.

1d. Hammocks within the pinelands, south of Coral Gables canal:
   Small Oak Hammock at Red Road just south of Coral Gables canal. (No Lignum, file Ralph Sigmon). 53-41, Sec. 18.

   Oak Hammock just south of University of Miami. Pure colony of Lignum. 54-41, Sec. 19.

   1f. Hammock in vicinity of Coral Gables canal and U.S. Hgw. 1, Pure colony of Lignum. 54-41, Sec. 20.

   1g. Hammock on Hardee Drive west of Red Road. Possibly supported Lignum. 54-40, Sec. 96.

1e. Hammocks along edge of Snapper Creek glades and stream:
   Edge of glade Hammock, north of U.S. Hgw. 1, at Old Loxahatchee (now South Miami). Possibly supported Lignum. 54-40, Sec. 86.

   Edge of glade Hammock, south of U.S. Hgw. 1, at Old Loxahatchee (now South Miami). Pure colony of Lignum. 54-40, Sec. 86.

   Western portion of Madison Hammock, Mixed colony. 54-41, Sec. 8.

1f. Hammocks on or near the Silver Bluff shoreline along the eastern edge of Brickell Island:
   Brickell Hammock - extended from edge of Miami River S.W. along Silver Bluff Cliffs to 54-41, Sec. 14, and was probably continued by a fringe of hammock continuously to Coconut Grove. Hammock developed on floodplain sand-dunes complex on top of bluff along Macarouna Key, probably spreading inland into pineland - these fires were infrequent and continuing at other times. (Young, 1951).

   South Brickell Hammock - possibly a fragment of Brickell proper, but seemingly developed inland position in the pinelands just west of the Silver Bluff. Mixed colony of Lignum. 54-41, Sec. 15.
Cocoanut Grove Hammock - Hammock along bluffs of Silver Bluff shore from vicinity of
Dunbar Key southwestwards. Some modified hammock remnants east of Cutler Road south of
Cocoanut Grove. Fragments of Liguus found by Ralph Humes in 1935 on Monroe Estate.

Twin Hammocks - two small hammocks in pinelands back from Silver Bluff shoreline, developed around potholes? Pure colony of lossmanicus. 54-41, Sec. 32; developed on
Rockdale fine sand-limestone complex. (Young, 1951).

Matheson Hammock and associated hammock remnants along Silver Bluff shoreline.
55-41, Sec. 6. Hammock developed in deposits of Dade fine sand along bluffs and inland
west of Cutler Road. (Large cypress visible from Red Road were probably in glade west of
Matheson.) Mixed colony of Liguus; some extra-areal forms possibly introduced.

Snapper Creek Hammock - partly developed along Silver Bluff shoreline, partly on edges
of stream on deposit of Dade fine sand extending inland along Snapper Creek. Mixed colony.
55-41, Sec. 7.

Note: The development of Brickell and Matheson Hammocks seems to be explained by
their topographic position in relation to fire protection. Brickell was on relatively high bluffs,
and Matheson Hammock was located in a sort of redoubt between the Silver Bluff shoreline
and the Snapper Creek glade. Matheson Hammock may have extended down to the present
Snapper Creek Hammock area at one time.

2. Larkins Island. - Pinelands west of the north fork of Snapper Creek glade and between it and middle
fork. (South Miami on south edge).
Several oak hammocks on glade edges. No records.

3. Upper Snapper Creek Island - Pinelands west of middle fork of glade and north of main Snapper
Creek Glade:

?Low Hammock - 1.5 miles west of Larkins. Pure colony of lossmanicus. Not now
definitely located. Perhaps at Sunset Drive and Palmetto Road. 54-40, Sec. 26.

Upper Snapper Creek Hammock - large oak-tropical hardwood hammock on SW edge of
pinelands in 54-40. Secs. 33-34. Liguus in mixed colony. (Now partly a Boy Scout Camp
area).

Note: Upper Snapper Creek Hammock may be developed on Dade fine sand at the edge
of the pineland island. A shallow glade in Sec. 22 may have originally separated this por-
tion from the main pinelands.

?Small oak hammocks along glade edges - several patches are still evident. No records
known.

?Hammocks on elevated areas in Snapper Creek glade near Island: One fairly well
developed hammock with a cypress fringe indicating the original isolation occurs in 54-40,
Sec. 32, just SW of Upper Snapper Creek Hammock. No records.
(See also West Kendall Island which is closely associated with Upper Snapper Creek ham-
mock system).

4. North Cutler Island - Pinelands between Snapper Creek and Cutler Creek bounded on east by Silver
Bluff shoreline and on west by north fork of Cutler Creek glade. Some of the highest ground on
the ridge (over 10 feet elevation at rock surface) lies at the north end of this island:

Snapper Creek Hammock - south side of Snapper Creek. The hammock is developed on
deposits of Dade fine sand along the south edge of creek also. Probably originally extending
to the Silver Bluff shoreline and inland along the stream. The higher hammock still supports
a mixed colony of Liguus. 55-41, Sec. 7.
Warwick Hammock, N.E. of junction Old Cutler Road (Howard Drive) and Ludlum Road. 
Fairly large hammock developed on deposit of Dade fine sand at eastern edge of small rock-
land area near glade. Possibly originally on glade edge since aerial photographs show a small
arm of glade extending into edge of hammock. No definite records of Liguus. 55-40, Sec. 13.

Low hammock along north side of Cutler Creek in 55-40, Sec. 26. No definite records,
but probably originally supported Liguus in some places at least.
Glade edge hammock fringe in 55-40, Sec. 11. (Not explored).

6-6. Kendall and Middle Kendall Islands - Pinelands surrounded by the glades of Cutler and Snapper
Creeks. No records known.
Low oak hammocks along glade edges may have formerly supported Liguus. No
definite records.

Hammocks on elevations in the glade of Snapper Creek north of Middle Kendall Island -
several possible hammocks are known, but no definite records.

Hammock south of Upper Snapper Creek Hammock - maybe on arm of Middle Kendall
Island.

7. West Kendal Island - Pinelands around Dade County Home and Hospital transected by North Kendal
Drive:
   County Home Hammock - area around home and hospital. Now largely cleared, but
formerly fairly extensive glade-oak-tropical hardwood hammock. Contains mixed colony of
Liguus; probably with some introduction. 54-40, Sec. 31.
   Springhill Farm Hammock - south of Sunset Drive west of 107th Avenue. Mostly cleared.
   Pure colony of allotennalis. 54-40, Sec. 31.
   Hammocks near north and west edge - not yet explored.
   Hammocks along NW glade edge. Fragments of Liguus found by Ralph Humes, 1938.
   Hammock on S. E. Glade edge - not yet explored.

7a. Hammocks on elevations in the Snapper Creek Glade east of West Kendal Island:
These hammocks in 54-40, Sec. 32 are known to have contained colonies of Liguus.
Several others probably did in the past but are now largely cleared.

Chip Hammock - small hammock on elevation in glade, surrounded by fringes of cypress
trees - now mostly cleared. Pure colony of allotennalis.
Large hammock south of Snapper Creek north of North Kendal Drive. Largely cleared and
fenced. Mixed colony of Liguus in N.E. edge near canal - former orange grove and presently
numbey.
Small hammock in NW corner of Sec. 32. Fragments of allotennalis.

8. Howard Island - Pinelands surrounded by glades of Cutler Creek:
East side of glade, oak fringes. (Pure colony of Linnemania, found by Ralph Humes in
1938).

9. Rockdale Island - Pinelands surrounded by glades running N. W. from vicinity of Rockdale:
No records.

10. Lindgren Island - Pinelands west of Howard transected by Lindgren road:
No records.
11. Little Rockdale Island - Pinelands in glade at S. end of Rockdale Island: 
   Hammock fringe along west side in 55-40, Sec. 34 - not explored.

12. Peters Island - Pinelands west of Peters-Perrine north of Black Creek glade and surrounded by arms
   of the glades and almost transected by an incomplete transverse glade:
   No records.

13. South Cutler Island - Pinelands along Silver Bluff shoreline, south of Cutler Creek and bounded
   inland by the N. W. - S. W. glade connecting Black Creek and Cutler glades:
   Note: This island supports an extensive hammock system which has not been thoroughly explored.
   Cutler Hammock - portion south of Cutler Creek. This is the main hammock and the
   classic locality. Supports mixed colony of Liguus with some peculiar marmoratus-testudineus
   types. 55-40, Sec. 26.
   Oak-tropical hardwood hammock in 55-40, Sec. 35, along Silver Bluff shoreline south
   of Richmond Drive. Fragments of Liguus found by Ralph Humes, 1938.
   Franjo Fringe Hammock - along glade edge from Richmond Drive to Franjo Road. No
   definite records. 54-40, Sec. 34 - 56-40, Sec. 4.
   Peters Hammock, east of Peters east of Franjo Road, 56-40, Sec. 4. Pure colony of
   lossmanicus.

   Black Creek Fringe hammocks - along edge of Black Creek on South Cutler pineland edge
   from Franjo Road south and southeast of Old Cutler Road (Ingraham Highway). 56-40, Sec.
   5-6-17. Includes 12 or more hammocks or hammock fragments. No records.
   Black Creek or Black Point Hammock - developed on elevation, probably with Dane fine
   sand or Rockdale fine sand-limestone complex, along south side of Black Creek east of Old
   Cutler Road. Supports mixed colony of Liguus, including fuscoflamellus and alternatus.
   56-40, Sec. 17.
   Hammock developed on Perrine marl, very shallow phase, north of Black Creek in 56-
   40, Sec. 17. Probably never supported Liguus. Now completely cleared.
   No hammocks seem to have survived along the low Silver Bluff shoreline.

14-15. Small pineland islands surrounded by glades along Quail Roost Drive:
   No records. Some low oak hammock fringe shown on aerial photos.

16. Redland Island - The large incompletely dissected pinelands running from Goulds northwest into
   56-39, Sec. 19, and southwest to 57-38, Sec. 5, southeast to Florida City. Goulds, Princeton,
   Naranja, Modello, and Homestead are built on the projecting arms of this island along the F.E.C.
   Railroad and U.S. Hgw. 1. The Silver Bluff shoreline is greatly dissected south of Black Creek
   and can be traced in only a few places. The elevation is variable, but all of the pineland seems
   to be above 5 feet elevation at the rock surface and some areas - northwest of Goulds - are 9
   feet or more above mean sea level.
   The principal extant hammocks - Cox, Ross-Costello, Timbs, Fuchs, and (actually on Long-
   view Island) Campbell, show an interesting arrangement along a line roughly parallel to U.S.
   Hgw. 1 and about 2.5 mi. northwest of it and the F. E. C. Railroad. Nearly all of these ham-
   mocks are developed in the pinelands around large sinkholes. Of these only Timbs and
   Campbell also show a clear correlation with existing glades. Some other hammocks are clearly
   edge of glade hammocks such as Detroit Hammock at Florida City, probably Hattie Bauer, Lew-
   is-Nixon and various hammock fringes. The general elevation and lack of real streams probably
   limited the development of hammocks except in exceptional situations. The arrangement of
   the principal hammocks is along a line corresponding roughly to the topographical crest of the
   ridge of the island although most of the incomplete transverse glades have eroded further inland
toward the Everglades. The present structure of the transverse glades between Redland and Longview Islands seems to indicate that the glades developed as drainage channels on the ridge and captured the Everglades proper as their headwaters eroded inland. The incomplete glades may have arisen as a result of water being forced under the ridge from the west and appearing aboveground on the east side of the central crest. The hammocks may lie over underground portions of glades. Such is clearly suggested by the arrangement of Cox, Ross-Castello hammocks and Caldwell, Silver Palm, and other small hammocks to the southeast of them.

The plants and Lignum colonics of the Redland hammocks indicate that the major hammocks (along the line indicated) are probably also the oldest. The peripheral hammocks (Lewis-Nixon, Detroit, Modello, Harnosa Buckpit, and possibly others) support only pure colonics of Lignamnus. The central hammocks not only contain this form, but may have such peculiar mutants as "Paniculatum" (Timbs), "compactus" (Cox), and others. The central hammocks are thus not only more diversified in flora but also in the composition of their tree colonics.

In addition to glade edge hammocks near Gould, east of Princeton, and in the vicinity of Harnosa and Modello, the following major hammocks are still intact or can be located exactly:

Cox or Harnosa Mill Hammock (now Monkey Jungle). Mixed colony. 56-39, Sec. 9.
Little Cox — a lythoma hammock on Harnosa Mill Road at Newton Road. 56-39, Sec. 9. Mixed colony, probably introduced.
Caldwell (probably not same as hammock referred to by older workers). A lythoma hammock with pure colony of Lignamnus. 56-39, Sec. 10.
Silver Palm Hammock. Mixed colony. 56-39, Sec. 15.

Small hammock northwest of Princeton - 56-39, Sec. 20. No records.
Timbs or Timms Hammock (Birch Hammock 1, 2, 3, 4) — east of Tennessee Road, north of Bauer Drive. Mixed colony. 56-39, Sec. 30. (Now in county park.)
Bauer Hammock, southwest of Timms on Bauer Road just east of Krems Avenue. Mixed colony of Lignamnus. 56-39, Sec. 30.
Hammocks or hammocks between Timms and Bauer Hammock — 56-39, Sec. 30. Probably originally pure colonies of Lignamnus, but now with Lignamnus introduced from Timms and probably other areas.

Mattie Bauer Hammock (or Mundy Hammock). Originally with mixed colony of Lignamnus - 56-39, Sec. 33. (New Orchard Jungle).
Krems Hammock, on Biscayne Drive near Meldora Road. No records. 57-39, Sec. 6.
Fuchs Hammock (or Sykes Hammock), north of Kings Highway west of Richard Road. Originally mixed colony into which Lignamnus have been introduced. 57-39, Sec. 1, 10.

Redland Hammock — probably originally part of Fuchs. 57-39, Sec. 10. No records.
Lewis-Nixon Hammock — at end of Avocado Drive west of Modello. Probably originally a pure colony of Lignamnus into which a few cestrosenecosus were introduced. 57-39, corner of Secs. 4-5, 6-8.

Detroit Hammock — just north of Florida City. Probably included Scout and Miles Hammocks, and possibly Cave Hammock. hammock now in city park. Pure colony of Lignamnus. 57-39, Sec. 24.

Modello Hammock, at U.S. Rwy. 1 in Modello. Location uncertain. No record.

Glade edge hammocks east of Princeton. No records.

Glade edge hammocks north of Goulds. No records.


17. Longview Island - Pinelands west of Florida City separated from Redland Island by narrow transverse glade:

Campbell Hammock - on Campbell Drive E. of 212th Avenue - 57-38, Sec. 9. Mixed colony of Ligum.


Chapman Hammock south and west of Lewis-Nixon Hammock. Mixed colony.

18. Southwest Island No. 1. - Pinelands crossed by Ingraham Highway southwest of Longview Island:

Hammocks along glade edges - no records.

19. Southwest Island No. 2. - Pinelands east of former Royal Palm State Park on Ingraham Highway:

Oak hammocks. Several mixed colonies not exactly located.

Hammock 1 mi. east of Royal Palm State Park lodge - 58-37, Sec. 16. Mixed colony with euhemer.

I wish to acknowledge the assistance of Mr. Ralph Humes of Miami and Mr. Fred Fuchs, Sr. of Homestead for information concerning the older localities. Descriptions of some of the hammocks are to be found in the botanical works of John K. Small in the _Journal of New York Botanical Gardens_.

I would appreciate additions, corrections, or emendations to the preceding list as well as information concerning material available for study in museums or private collections.

REFERENCES


STRATIGRAPHIC DISTRIBUTION OF PLEISTOCENE LAND SNAILS IN INDIANA

WILLIAM J. WAYNE
Bloomington, Indiana.

During the past few years I have prepared reports on the occurrences of land mollusks in the Pleistocene sediments of Indiana, primarily as species lists in guidebooks for field conferences. A few of these lists, with discussions of stratigraphy and ecologic significance of the fauna, are in publications that can be obtained readily, but most of them are in reports of limited distribution.

In order to remove this information from the status of "semi-publication," as well as to assemble the scattered records, I have combined these various lists into this single report. For greater stratigraphic completeness in this review, I have added data for a few fossil localities previously unreported. None of the lists given in Baker (1920) for the Pleistocene of Indiana is reproduced here because doubt exists regarding the correct stratigraphic placement of some of the fossiliferous deposits. Later, when more samples have been studied, I intend to bring out a more complete report on the stratigraphic distribution and the ecology of the land and fresh water mollusks in the Pleistocene sediments of Indiana. Thus, this paper is a preliminary check list of the Pleistocene land snails of Indiana with notes regarding stratigraphic occurrences and the ecologic significance of the faunas.

STRATIGRAPHY

Dust blown from the outwash gravels that were deposited along the Wabash and Ohio Valleys by meltwater streams during each glacial stage in the Pleistocene Epoch accumulated on the bluffs adjacent to these sluiceways as thick layers of loess. Some of this dust settled farther away, though, where it formed a discontinuous cover that is a few millimeters to more than a half-meter thick. Most of the fossil land snails that have been recovered from Pleistocene sediments in central and southern Indiana have come from the accumulations of wind-carried silt where the snail remains were buried quickly enough to prevent corrosion of the shell material through weathering.

Some of the fossiliferous silt deposits were later buried beneath the advancing glacier, whereas others were never reached by the ice. Fossil-rich silt beds have been found beneath the sediments of each of the glacial stages known in Indiana. Fossiliferous sediments of Wisconsin age are well represented south of the boundary of that glaciation in the loess deposits along the Wabash and Ohio Rivers, but few exposures of fossiliferous silt of greater age are known except those buried below glacial drift.

1 Published with the permission of the Acting State Geologist, Indiana Department of Conservation, Geological Survey.
The ice margin fluctuated through a zone a few tens of kilometers wide during the several thousand years involved in the maximum advance of each glacial stage. Some of these fluctuations had minor significance, but at least once in Indiana during each glacial age, the Kansan, Illinoian, and Wisconsin, a fluctuation of about 100 kilometers permitted a first wave of vegetation and animal life to migrate into the newly deglaciated land before it was again destroyed by readvancing ice. A thin, fossil-rich silt embedded between two layers of conglomeratic mudstone (till) is the stratigraphic record of the most significant of these fluctuations.

Table 1 shows the stratigraphic positions of all fossiliferous silt beds discovered so far in the Pleistocene sediments of Indiana. Some of these can be traced beyond the borders of this state, but precise correlation and identification of drift units from the deposits of one glacial lobe to the next is still difficult.

Table 1. Stratigraphic position, representative species, and environmental interpretation of fossiliferous Pleistocene sediments in Indiana.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>TYPE OF SEDIMENTS</th>
<th>TYPICAL SPECIES</th>
<th>MAJOR CHARACTERISTICS OF ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent</td>
<td>River alluvium</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marl Lakes</td>
<td>Succinea gelida,</td>
<td>Warm, humic climate, deciduous forest.</td>
</tr>
<tr>
<td></td>
<td>Lakes and sloughs</td>
<td>Columella alticola,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vertigo alpestris</td>
<td>Cool climate, coniferous forest</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Slits and sands between</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>till beds</td>
<td>Hendersonia occulta,</td>
<td>Cool to cold, moist, treeless or open park.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stenotrema leasi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Peaty silts below till</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and/or lake sediments; Loess</td>
<td>Succinea gelida var.,</td>
<td>Cool to cold, moist; spruce, willow, birch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hendersonia occulta</td>
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</tr>
<tr>
<td>Sangamon</td>
<td>Loess; river alluvium</td>
<td>Anguispira kochi</td>
<td>Warm-humid</td>
</tr>
<tr>
<td></td>
<td>Marl (postglacial</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>lakes, ponds)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Intertill silts</td>
<td>Succinea gelida,</td>
<td>Cool to cold, moist, open park (subarctic?)</td>
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<tr>
<td></td>
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<td>Illinoian</td>
<td>Peaty layers below till</td>
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<td>Cool to cold; spruce</td>
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<td></td>
<td>and lake sediments</td>
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<td>Yarmouth</td>
<td>River alluvium</td>
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<td>Punctum minutissimum</td>
<td>Subarctic-boreal</td>
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<td>Loess below till</td>
<td>Hendersonia occulta-</td>
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<td></td>
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<td>Boreal</td>
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<td>Afronian</td>
<td>Colluvium-alluvium</td>
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<td>(none known)</td>
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True interglacial sediments are rare in Indiana. Wherever active sedimentation takes place in a fluviatial environment, erosional processes are also active. For example, most rivers ordinarily completely rework the deposits of their floodplains every few thousand years. Thus, except for the sediments of large lakes, most of the sedimentational records of interglacial stages, along with their flora and fauna, were likely re-eroded before they became buried permanently. What we actually recover from this stratigraphic position is the material dropped by a stream sometime during the last few thousand years before its valley was buried beneath glacial ice or fluviatile sediments such as gravel, sand, and silt that were laid down because of the influence of the approaching ice sheet. A cool climate at the close of the interglacial stage rather than a warm part of the interglacial interval is interpreted from ecological requirements of the fossil snails in most "interglacial" sediments. Some exceptions may be the "Old Forest Bed" at Lawrenceburg (Billups, 1909) which Baker (1920, p. 302-303) regarded as Sangamon in age, and a bed penetrated by a coal shaft near Evansville that contained aquatic mollusks (Baker, 1920, p. 373). Both of these beds contained fossil mollusks whose environmental requirements are about the same as prevail now in the same area.

Snail faunas alone can be used to determine stratigraphic position only with difficulty because similar ecologic conditions existed in central Indiana during each of the three glacial stages recognized in the state. Relative abundance of species in each faunule is useful in a study of the environments in which the snails lived, but so far, data are inadequate to determine whether this method of study may show them to have any stratigraphic significance. Few species underwent evolutionary variation during the brief span of Pleistocene time recorded in Indiana. Only one, Succinea gelida, is known at this time to have stratigraphic application in Indiana.

KANSAN STAGE. — The oldest Pleistocene mollusk assemblages found in Indiana are Kansan in age. One silt at the base of Kansan Stage sediments has been studied and the results published (Wayne, 1958). The snail faunule recovered from a sample of a fossiliferous silt bed between two conglomeratic mudstones (tills), both of which are correlated with the Kansan Stage, is listed in table 2, column B. This fossiliferous bed seems to represent the sediment that accumulated during a brief ice-free interval between two subages of the Kansan Age. The most abundant species in this sample is Punctum minutissimum, which generally prefers a moist to dry deciduous woodland environment (Archer, 1939). It is found as far north as Fort Severn, Ontario (Oughton, 1948).

Although 24 species are listed for the faunules in the Kansan Stage, only Succinea gelida var. seems to have any stratigraphic significance. The older variety of this species is found only in sediments older than early Illinoian in age. The modern form of the species probably first appeared during the Illinoian Stage, but is not found in association with the older form.

No faunal assemblages from the Yarmouth Stage have yet been found in Indiana. Thus, the only knowledge we have of the species that lived in the state during Yarmouth time comes from the remnants of the interglacial fauna that survived cooling at the beginning of the Illinoian Stage of glaciation. Proglacial sediments of late Yarmouth or early Illinoian age are relatively rare in Indiana, and the snails in most of the deposits known have been badly crushed. One assemblage that was never buried beneath ice was found beneath proglacial lake sediments of Illinoian age near Bloomington, Indiana, however. A list of species in this bed is included in table 2, column C. A list of the identifiable species from a proglacial silt in Parke County that was buried beneath Illinoian glacial ice is in column D of table 2.
ILLINOIAN STAGE. — At least two distinct advances of ice took place in central Indiana during the Illinoian glaciation. A thin fossiliferous silt bed separates the conglomeratic mudstones that were deposited during two advances of ice during the Illinoian glaciation. The fauna recovered from the few known exposures of this interstadial silt bed differs materially from faunal assemblages found in interstadial silts of Kansan age. In particular, this bed is the oldest unit from which the modern form of Succinea gelida has been recovered. The faunal assemblage does not seem to be noticeably distinctive, however, when compared with the snails found in interstadial silt beds of Wisconsin age. At present, it is not possible to tell the two apart on the basis of a faunal study alone. So far, silt in this stratigraphic position has been found at four localities in Indiana; the fauna of one is presented here (table 2, column E).

WISCONSIN STAGE. — Fossiliferous sediments of Wisconsin age are far more commonly encountered in Indiana than are older Pleistocene fossil beds. A forest bed, which in many exposures contains snail remains, is frequently observed beneath Wisconsin deposits and capping a buried soil profile on Illinoian glacial drift. This stratum has been sampled at several places in central Indiana. Typically it contains Hendersonia occulta, Stenotrema leali, and Succinea gelida, but Cionella lubrica, Gastrocopta armifera, and Succinea ovalis are present in many samples. Loessal silts south of the Wisconsin glacial boundary contain similar assemblages, but include the species Angulospira alternata and Stenotrema fraternum that have not yet been found in preglacial sediments north of the Wisconsin glacial boundary.

Central Indiana was covered by ice at least twice during the maximum advance of the Wisconsin glacial age. These glaciations and the intervening brief deglaciation are recorded by two layers of conglomeratic mudstone (till) which are separated by a thin (0 to 30 centimeters thick) fossiliferous silt bed (Wayne, 1956; 1957) in many exposures. Succinea gelida ordinarily is the most abundant species in this bed and commonly makes up over half the total individuals in the sample. Stenotrema leali is the only other moderately large snail found in this bed; the remainder are mostly small pupilids. Columella alticola and Vertigo alpestris oughtoni are present in nearly all samples of this bed. This fauna seems to represent the initial migrants into a recently deglaciated plain into which coniferous forest vegetation had not yet deployed and resembles closely the fauna now inhabiting the park-like area near the northern limit of trees in Ontario or Manitoba (Wayne, 1959).

With the samples available for study so far, I am unable to distinguish this interstadial fauna of Wisconsin age on the basis of species content from one in a similar stratigraphic position in sediments of Illinoian age. Distinction may become possible, however, when additional exposures of the older unit become available and can be studied.

Few mollusks have been found in sediments of glacial origin that are younger than the interstadial silt bed that has been found near the Wisconsin glacial boundary. A single exposure of a thin lens of sandy marl overlying till and beneath glacial lake clay was found in southeastern Noble County (Wayne and Thornbury, 1955, p. 9). This unit contained but three species, none of which has diagnostic stratigraphic significance (table 2, column O).

Postglacial sediments, particularly marls, in lake basins in central and northern Indiana contain rich faunas composed dominantly of fresh-water snails and clams. Several such deposits have been sampled, but so far little study has been done on them. Only one such faunule is included in this report (table 2, column P).
Methods of Sampling and Preparation

Nearly all the fossiliferous strata that are interbedded with ice-laid conglomeratic mudstones (tills) in the Pleistocene sediments of Indiana are thin, generally about 10 to 30 centimeters in thickness. These silt beds vary in fossil content from place to place along any given outcrop, and some are virtually barren of snails except for a concentrate at or near the top of the bed. Because of the nature and thickness of these beds, no attempt was made to subdivide them in sampling. In contrast, many of the exposures of wind-deposited silt along the Wabash and Ohio Valleys, as well as the marls of fresh-water lakes, are much thicker and can readily be sampled in two or more zones.

Whenever possible, I have tried to obtain at least 200 individual specimens from a bulk sample. The addition of more individuals generally increases the total number of species found, but changes only slightly the percentage figures that indicate relative abundance of the dominant species of the faunule. Large samples are desirable especially in order to have enough specimens of the rarer species so that identification can be based on more than one or two individuals, but, unfortunately, large samples are not always obtainable. A sample of at least 2,250 cubic centimeters (228 cubic inches) of moderately fossiliferous sediment is generally necessary in order to obtain 200 or more individuals. Samples from beds that appear sparsely fossiliferous on outcrop may require as much as double this quantity of bulk material, however, to secure 200 or more snails.

The silt samples are soaked in water in half-gallon fruit jars, are agitated gently to disaggregate them, and then are washed through a 25-mesh screen. Material retained on this screen is rinsed thoroughly and oven-dried. Individual snails then are picked out of this concentrate with a small, moistened brush. After they have been picked, the snails in the sample are boiled for a few minutes in a nonfoaming detergent in order to clean the mud out of the apertures of most of the pupillids and then the snails are dried again and are stored in glass vials until they can be studied.

Locations and Descriptions of Sections.

A. Cagles Mill Reservoir Section: SE 1/4 NW 1/4 sec. 13, T. 12 N., R. 5 E., Putnam County, Indiana (Poland Quadrangle), emergency spillway for Cataract Lake, a flood control reservoir on Mill Creek (Thornbury and Wayne, 1957, p. 13-15; Wayne, 1958, p. 10). A highly fossiliferous, massive silt about a meter thick lies at the base of a Pleistocene section that includes tills of Kansan age and of Illinoian age. The silt bed is named the Cagle Silt and is a proglacial loess of Kansan age (591 specimens).

B. Happy Hollow Section: NE 1/4 SE 1/4 sec. 2, T. 14 N., R. 7 W., Parke County, Indiana (Catlin Quadrangle), 3 miles northeast of Bridgeton along a small creek. Pebby calcareous gray silt with humus stains at top, containing wood fragments and snail shells 0.30 meter thick, overlies 1.0 meter or more of very hard sandy gray till and is overlain by more than 2 meters of calcareous gray till. Entire section is considered to be of Kansan age on the basis of adjacent exposures (189 specimens).

C. Bean Blossom Reservoir Section: center of south edge NE 1/4 sec. 28, T. 10 N., R. 1 E., Monroe County, Indiana (Hindustan Quadrangle), along the outlet trench below the spillway for a water supply reservoir on Bean Blossom Creek. A fossiliferous layer - or "forest bed" - caps a massive silt and floodplain sediments of Yarmouth age and underlies proglacial laminated (or varved?) clayey silts of Illinoian age. (Thornbury and Wayne, 1957, p. 18-20; Wayne, 1958, p. 10-13) (361 specimens).
D. Raccoon Creek Section: center SW 1/4 NW 1/4 sec. 18, T. 14 N., R. 6 W., Parke County, Indiana (Mansfield Quadrangle) about 1.5 miles southwest of Mansfield, along the south bank of Raccoon Creek (Thornbury and Wayne, 1957, p. 11-12). Mollusks, many of which have been crushed beyond recognition, are in the top few centimeters of a group of nonglacial sediments that are rich in organic matter. The base of the section is weathered gravel, perhaps of glacial origin, and the peaty sediments are overlain by about 75 feet of glacial sediments, mostly sand and gravel but capped by till of Illinoian age (66 specimens, mostly fragmentary).

E. Centerville Section: NE 1/4 sec. 33, T. 16 N., R. 14 E., Wayne County, Indiana, 2 miles southeast of Centerville (Wayne and Thornbury, 1955, p. 30-31; Gamble 1958, p. 12-18). The fossiliferous silt separates two till beds, both of which are interpreted to be of Illinoian age because of their relationship to a distinctive paleosol developed on a gravelly sand higher in the section (305 specimens).

F. Martinsville Section: NE 1/4 SE 1/4 sec. 31, T. 12 N., R. 14 E., Morgan County, Indiana (Martinsville Quadrangle), southwest wall of a small pit used for borrow in highway construction 1.5 miles northwest of Martinsville. Fossiliferous laminated silt and sand about 2 meters thick is overlain by nonfossiliferous sand; stratification resembles that of floodplain sedimentation. Base of the unit overlies alluvial bedrock and is about 8 meters above the present floodplain of White River. The entire unit is probably correlative with terrace sediments of Wisconsin age elsewhere along the valley (150 specimens).

G. Thompson Branch Section: NE 1/4 NW 1/4 sec. 36, T. 12 N., R. 9 W., Vigo County, Indiana (Seelyville Quadrangle), road cut at Terre Haute. (Thornbury and Wayne, 1953, p. 88). Fossiliferous loess of Wisconsin age which is poorly exposed along the east side of the Wabash Valley (150 specimens).

H. Watson Farm Section: SE 1/4 NW 1/4 NE 1/4 sec. 27, T. 11 N., R. 3 E., Johnson County, Indiana (Fruitdale Quadrangle), road cut at Terre Haute. (Thornbury and Wayne, 1957, p. 24-25). A single bed of fossiliferous massive gray silt about 30 centimeters thick is part of a set of stratified sediments that separates two till beds of Wisconsin age (722 specimens).

I. Lick Creek Section: SE 1/4 NE 1/4 NE 1/4 sec. 23, T. 11 N., R. 3 E., Johnson County, Indiana (Trafalgar Quadrangle), 2 1/4 miles south of Trafalgar along the bank of Lick Creek (Thornbury and Wayne, 1957, p. 24-25). Two beds containing organic debris are present between a single till of Wisconsin age and an underlying paleosol on till of Illinoian age. The upper of these two zones contains leaves of Picea, Salix (?), and Arctostaphylos (?), as well as snails (555 specimens).

J. Clayton Section: NE 1/4 NW 1/4 sec. 26, T. 15 N., R. 1 W., Hendricks County, Indiana (Plainfield Quadrangle), 2 miles northeast of Clayton, along southwest bank of the West Fork of White Lick Creek (Thornbury and Wayne, 1957, p. 4-5). A single bed of fossiliferous massive gray silt about 30 centimeters thick is part of a set of stratified sediments that separates two till beds of Wisconsin age (480 specimens).
K. Buckhart Creek Section: SE 1/4 NE 1/4 sec. 8, T. 11 N., R. 4 E., Johnson County, Indiana (Franklin Quadrangle), stream cut about 500 feet north of Indiana Highway 252 and 1.5 miles east of Trafalgar (Thornbury and Wayne, 1957, p. 26-27). A fossiliferous silt separates two till beds of Wisconsin age in this section, as well as in several other similar sections nearby. Wood at the base of the exposure is embedded in weathered till of Illinoian age (467 specimens).

L. Flat Rock River Section: NE 1/4 NW 1/4 sec. 4, T. 12 N., R. 9 E., Rush County, Indiana, stream cut 3 miles northwest of Milroy (Wayne and Thornbury, 1955, p. 25-26). A fossiliferous silt about 5 centimeters thick separates two till beds of Wisconsin age, the basal one of which overlies a paleosol on till of Illinoian age.

M. Cave Stone Company Quarry: NE 1/4 NW 1/4 sec. 32, T. 11 N., R. 7 E., Shelby County, Indiana (Hope Quadrangle), near the west edge of the village of Norristown (Murray and others, 1955, p. 35-36). In the thin overburden on the limestone in this quarry, a fossiliferous silt about 20 centimeters thick lies between two till beds of Wisconsin age (218 specimens).

N. NE 1/4 sec. 14, T. 13 N., R. 2 W., Wayne County, Indiana, exposure along a creek bank 2.5 miles southeast of Centerville (Wayne and Thornbury, 1955, p. 33; Gamble 1958, p. 29-31). The fossiliferous silt in this section separates two till beds, both of which are presumed to be of Wisconsin age, although Gamble (1958, p. 31) suggests that they may be older (225 specimens).

O. Avilla Section: SW 1/4 NW 1/4 sec. 33, T. 34 N., R. 11 E., Noble County, Indiana (Ege Quadrangle), Baltimore and Ohio Railroad cut about 7 miles west of Garrett. Till is overlain by fossiliferous calcareous sandy marl about 15 centimeters thick, which in turn is overlain by about 2.5 meters of laminated silty clay, presumably a deposit of an ice marginal lake (Wayne and Thornbury, 1955, p. 9) (600 specimens).

P. Fremont Ditch Section: NE corner SE 1/4 sec. 2, T. 37 N., R. 14 E., Steuben County, Indiana (Angola East Quadrangle), 3 miles southeast of Fremont, ditch bank exposure beside culvert. Peat and marl overlying till have been buried beneath gravelly sand, presumably glacial outwash, that slumped when a buried ice block melted. Radiocarbon dates from both the Washington and Michigan laboratories indicate that the marl and peat were deposited about 13,000 years ago. (W-57, W-65, M-350).

Data on the present molluscan fauna of Indiana are based on Goodrich and van der Schalie (1944).

References Cited


TABLE 7. CHECK LIST OF MOLLUSKS FROM A BRUVEL WEDDING BEACH OF P. H. C. A. L.

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<th>P</th>
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PLANS FOR A CHECKLIST OF NORTH AMERICAN MOLLUSCA

AURÉLE LA ROCQUE

Department of Geology, The Ohio State University

Checklists of genera and species on a continent-wide basis are valuable reference works for the study of any phylum. So far, no such list has been compiled for the Mollusca due, apparently to three kinds of difficulties:

1) Disagreement on the validity of taxa and on the proper name to be applied to each one.
2) The volume of literature to be combed for records and the small number of accurate partial lists either for small areas or systematic groups.
3) The cost of printing such a checklist by standard methods and of making the checklist available to individual workers in the field, particularly the beginners, who need it most.

An attempt was made some years ago, before World War II, to prepare such a checklist by creating a checklist committee of the American Malacological Union. The checklist committee stimulated many worthy efforts, for example, the late Calvin Goodrich's numerous papers on the Pleuroceridae. Unfortunately, World War II broke out just as the committee began its work and it passed quietly out of existence, mainly because most of its members were engaged in more pressing activities. The writer's contribution to the project took the form of a Catalogue of the Recent Mollusca of Canada (1953, Nat. Mus. Canada, Bull. 129). Since World War II several local lists have appeared as well as monographic treatment of some groups, for example Pilsby's Land Mollusca of North America North of Mexico, F. C. Baker's Molluscan Family Planorbidae, and others.

The writer wonders if the time has come for a revival of the Checklist project, under AMU auspices or otherwise, and what chances of success such an undertaking would have. Certainly the need for it exists, as the writer knows through his work on Pleistocene Mollusca. Expressions of opinion on this matter would be welcome.

With regard to the difficulties outlined above, the following considerations may point to at least partial solution of some of them.

TAXONOMIC PROBLEMS. — In spite of apparent difficulty, this is probably the most easily overcome of the troubles facing a checklist compiler. The solution proposed is to design the format of the checklist in such a way as to show various alternatives under a most favored form, if there is one, and to present dissenting opinions succinctly and fairly within the framework of that form. For species and varieties, subspecies, or forms, the procedure would be to list under a particular genus all those claimed to be valid by specialists in the field and to indicate for each contested unit the reasons for acceptance or rejection followed by the initials of the authorities concerned. As an alternative, a series of numbered notes in appropriate places could be used to explain dissenting
In the writer's opinion there is considerable value in listing even trivial local forms of little taxonomic value as they are a measure of the variability of a species in isolated populations. This does not mean that they must be recognized as subspecies or varieties; they need be listed only as forms of a recognized species, following to a certain extent the practice of Pilsbry with respect to land snails.

For genera, the procedure might be more difficult. For example, many writers still use the generic classification of the Lymnaeidae proposed by Baker in his 1911 monograph and modified in his 1928 work on the freshwater Mollusca of Wisconsin, whereas others recognize only one genus in North America, i.e. Lymnaea, following Colton and Hubendick. Should it be impossible to reconcile these two schools of thought, might not some system be devised which would be satisfactory to both schools? For example, one of the two indicated in Table 1, depending on which plan can be justified on cogent arguments and number of adoptions.

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1 Considered as a synonym of Lymnaea s. s. by XYZ, LMN, and others, but treated as a distinct genus by FCB, DEF, etc.

VOLUME OF LITERATURE. — The difficulty here is not one of scientific decision or of personal opinion but of time and effort required for the orderly examination of the literature, the gathering of records from Museums and personal collections, and the labor of arranging them in readily available form for incorporation into a North American checklist. During the preparation of his Canadian Catalogue, the writer developed various methods to simplify the work which proved valuable in the preparation of his Pleistocene Mollusca of Ohio (nearing completion). It seems that widening the scope of these methods to include all of North America by adding to the records already available would be practicable. The writer also believes that the goodwill and co-operation of North American malacologists could be enlisted and that various museums would make their records available for such an undertaking.

PRINTING COSTS. — Judging by the size and cost of the Canadian Catalogue, a North American checklist of similar scope would require a volume, or several volumes, totaling between 1,000 or 1,500 pages, at a total cost per set of about $20.00. Such an estimate, having regard to current printing costs, is probably conservative, both as to size and cost. This would probably mean that the checklist would be available only in large libraries and in the private library of individual workers with some means. Yet it is obvious that those who need such a checklist most are the beginners in the field who generally cannot afford such expenditures. The writer vividly remembers his indebtedness to the Library of the Geological Survey of Canada in the days when he began to study mollusks and the plight of his colleagues who were not fortunate enough to have access to such a fine library. Every effort should be made to render the checklist available to the beginners in our field by keeping its cost as low as possible. Such a powerful tool for the searching of literature...
and for the evaluation of current opinion on the classification, distribution, ecology, and anatomy
of the Mollusca should be easily available to every malacologist. Moreover, it will prove to be a
stimulus for continued work in malacology — how many promising malacologists have we lost because
they became disgusted with lack of organization in the field?

If some institution with ample funds could be induced to print the checklist and to sell it at cost,
or even at a slight loss, the problem of printing costs would disappear. The likelihood of this is very
slight and it should not be allowed to prevent us from making plans for publication of a checklist.
Other processes besides conventional printing can be used and a typewritten checklist could be as useful
as a handsomely printed volume. Once the copy is assembled for the checklist, it should be made
available, regardless of the method used. For this purpose, mimeographing or multilith printing
should be considered, in spite of the obvious disadvantage of less pleasing appearance.

SUGGESTED PROCEDURE. — Judging from previous experience with the Canadian Catalogue,
a North American Checklist could be most advantageously prepared in three steps:
1. Preparation of areal checklists (by states, provinces, territories, or smaller areas, e. g.
   well studied localities or islands, even counties) by a small committee aided by
   volunteer workers in special fields.
2. Circulation of areal checklists to persons or groups interested, with a request for criti-
cisms, suggested additions, and deletions.
3. Assembling of the North American Checklist from the areal checklists, first on dis-
   tribution maps for each species or form, then in written form.

This procedure appears to permit the greatest possible flexibility in preparation by providing
for co-operation on any scale and on the basis of interests. For example, a worker interested only
in Alaskan Mollusca would have special information at his disposal from the literature, his own
collections, and Museum collections, dealing with the species found in his own area. Such a per-
son would undoubtedly want to co-operate to the extent of checking the list for Alaska and perhaps
for adjoining areas but would have little interest in the checklist for, say, Mexico. On the other
hand, a specialist in Naiades, Sphaeridiae, or Pleuroceridae might be willing to review and com-
ment on the part of each areal check-list dealing with his special group. Still further, a Museum
curator would want to check each list for the species represented in his Museum, in particular the
types. Each of these co-workers might be too busy to serve on the committee for preparing areal
checklists, looking after their circulation, and assembling the data into a final North American
Checklist.

FORMAT OF AREAL CHECKLISTS. — Because of their preliminary nature, areal checklists
should be kept as simple as possible, should be prepared on a uniform plan, and should be so ar-
 ranged as to be readily consulted, without the aid of an index. Past experience suggests that they
should be divided into parts corresponding to major divisions of the Mollusca but not too numerous
as to defeat search for a particular item. In preparing the Canadian list, the following divisions
were found to be most practical:

1. Naiades
2. Sphaeridiae
3. Freshwater Pulmonates
4. Freshwater Operculates
5. Land Gastropoda
6. Amphineura
7. Marine Pelecypods
8. Scaphopoda
9. Marine Gastropoda
10. Cephalopoda
The preliminary areal checklists (see next paper in this number, pp. 23 et seq. for a sample) should consist simply of lists of species, alphabetically arranged under genera, the genera alphabetically arranged under the numbered divisions shown above. For each species, the generic, specific, and author's name, and date of description are given, followed by abbreviated reference to an authority. The abbreviations in each case are explained in the references cited for each list. Each item is numbered for convenience in reference and co-workers can then refer to items by area and number (e.g., Ohio 253). Policy for inclusion of species is as liberal as possible; doubtful records are included but with notations, "doubtful for the state," "implied by presence in neighboring areas," "a synonym of ----, fide ----" followed by an abbreviated reference to the authority cited.

WHERE TO BEGIN. — Several checklists or compendia of marine Mollusca have already appeared, all of them in need of revision and addition but none so seriously out of date as to require immediate attention. Likewise, the land snails of North America have been recently revised by Pilsbry, for species living north of Mexico, and by H. B. Baker, Pilsbry, and others for Mexico, Central America, and the West Indies. The field appearing to need most pressing attention seems to be that of freshwater Mollusca and it is proposed to begin work by preparing checklists of Naiaedes, Sphaeriidae, and freshwater Gastropoda. On the other hand, the literature of land snails is so closely related to that of freshwater groups that the land snails might as well be included in areal lists. The Ohio list is presented in the next paper as a sample of an areal checklist and others are now either completed or in preparation.

Readers of STERKIANA are asked to communicate with the writer concerning this particular list and to offer comments on additions and deletions. Volunteer collaborators for other states or areas are asked to communicate with the writer; all contributions to the preparation of the areal checklists will be acknowledged as the lists appear in STERKIANA and in the final checklist if and when it is published.
NOTE. The following list of Ohio Mollusca is as complete as the writer has been able to make it, but it is presented in the hope that corrections and additions will be brought to his attention. A supplementary list, including such changes, will appear in STERKIANA at a later date. References have been reduced to a minimum, using Sterki's (1907, 1914) lists as a basis together with lists of fossil occurrences by Sterki, Baker (1920), and later records by others. Parentheses around a name indicate that the species or form is erroneously recorded for Ohio; a question mark preceding a species or form indicates that it is doubtfully present in Ohio or that its systematic status is in doubt. Synonymy is not given here but can be reconstructed from the references cited. References are given by author, date, and page in the text. When a date alone is given, it is to be assumed to refer to the author of the preceding reference.

1. **NAIADAE**


9. **?AMBLEMA RARIPLICATA** (Lamarck) 1819. Walker 1918: 168, Ohio River, but apparently not as far upstream as Ohio.
10. ANODONTA sp., Baker 1920: 446; Rush Lake marl.


17. (Anodonta grandis salmonea Lea 1838). Sterki 1907: 394, a synonym of A. grandis plana, which in turn is considered a synonym of A. grandis gigantea by Simpson.


21. ?ANODONTA MARGINATA Say 1817. Sterki 1907: 394. Baker 1928: 165. This may be a synonym of A. grandis according to van der Schalie, cited by Robertson and Blakeslee 1948: 100.

22. ?ANODONTA PEPINIANA Lea 1838. Sterki 1907: 396, had seen no specimens. Simpson 1914: 436, "Upper and Middle St. Lawrence; Lake Winnipeg." The type locality is in Ohio so the species is listed here although it is probably a synonym of some earlier species.


56. (Lampsilis fatua Lea 1840). Sterki 1907: 400, "probably or possibly to be found in Ohio." Simpson 1914: 116, "Tennessee system, Beaver River, Pennsylvania. (?)"

57. (Lampsilis higginsii (Lea) 1857). Sterki 1907: 389, not seen from Ohio.

58. ?Lampsilis Obscura (Lea) 1839. Sterki 1907: 400, "probably or possibly to be found in Ohio." Simpson 1914: 107, "Tennessee and Cumberland River systems; Lower Ohio and its tributaries."


65. Lampsilis Ventricosa Canadensis (Lea) 1857. Ortmann 1919: 301. Relationships with the type form and other varieties are not clear.


101. PROPTERA ALATA MEGAPTERA Rafinesque, 1820. Baker 1928: 244.


2. Sphaeriidae


127. PISIDIUM ADAMSI form AFFINE Sterki, 1901. Sterki 1907; 397; 1920; 175, Tinkers Creek marl. Herrington 1954: 136.


136. **Pisidium Dubium** (Say) 1816. As *P. virginicum* (Gmelin); Sterki 1907: 396. Pilsbry 1946: 86, considers the two forms separate. Herrington 1954: 136.


142. **Pisidium Fraudulentum** Sterki 1912. According to Herrington, 1954: 137, a doubtful species, either represented by too few specimens or too badly mixed for any decision.

143. **Pisidium Fraudulentum** Peraltum Sterki. Sterki 1916: 451; same remark as for *P. fraudulentum*.

144. **Pisidium Lilljebergii** Clessin 1886. As *P. acutatum* Sterki; Sterki 1920: 175, Tinkers Creek marl. Herrington 1954: 134.


164. Sphaerium (musculium) lacustre ryckholtii (Normand) 1844. Cornejo (in press), Souder Farm deposit.
165. SPHERIUM (MUSCULIUM) NITIDUM Clessin 1876. Recorded as S. (M.) PRIME for Indiana, Michigan, and Ontario, therefore possible for Ohio. Herrington 1958: 15.


172. SPHERIUM (MUSCULIUM) SECURIS (Prime) 1851. Sterki 1907: 396; 1920: 176, Tinkers Creek marl.


175. SPHERIUM (MUSCULIUM) SPAERICUM SUCCINEUM Sterki 1916. Sterki 1916: 444.


190. SPHAERIUM WALKERI Sterki 1901. Sterki 1907: 400, "probably or possibly to be found in Ohio;" 1916: 439, implied: Mich., Ind. Brooks and Herrington 1944: 94. La Rocque 1953: 117, also Ohio, Ont., Que.


195. ARMIGER CRISTA (Linnaeus) 1758. Sterki 1907: 400 "probably or possibly to be found in Ohio;" 1920: 174, Tinkers Creek marl; p. 182, Castalia marl. Baker 1928: 385.


220. GUNDLACHIA? sp., Sterki 1907: 384; 1920: 175, Tinkers Creek marl; p. 183, Castalia marl.


244. **(Physa ancillaria magnalaucnistris** Walker 1901). Sterki 1920: 174. If valid, a variety of *P. heterostropha*.


246. **(Physa ancillaria (Say) 1825). Sterki 1907: 381. If valid, a variety of *P. heterostropha*.


262. (Rhodacmea elatior (Anthony) 1855). Sterki 1907: 400, "probably or possibly to be found in Ohio." Probably not Ohio.


266. STAGNICOLA LANCEATA (Say) 1821. Baker 1911: 322; 1928: 228. La Rocque 1952: 12, Orleton deposit.


278. STAGNICOLA UMBROSA (Say) 1832. Baker 1911: 327; 1928: 220.

4. FRESHWATER OPERCULATES

282. AMNICOLA sp., "smaller and rather different, may be distinct, t. Walker," Sterki 1920: 175, Tinkers Creek marl.
304. (Goniobasis depygis (Say) 1829). Sterki 1907: 401, Middletown deposit. Eq. Lithasia obovata depygis, q.v.
323. LITHASIA PENNSYLVANICA Pilsbry 1916, Naut. 30: 4-5. Walker 1918: 159.
324. LITHASIA VERRUCOSA (Rafinesque) 1819. Goodrich 1940: 5.
325. (Lyogyrus granum (Say). Sterki 1920: 175, Tinkers Creek marl. See Amnicola walkeri Pilsbry 1898, fide Berry 1943: 29.
326. **LYOGYRUS PUPOIDEUS** (Gould) 1840. Sterki 1907; 387.
331. (**PLEUROCERA conicum** (Say) 1821). Sterki 1907; 385. Eq. **P. canaliculatum**.
332. (**PLEUROCERA elevatum** (Say) 1821). Sterki 1907; 385. Eq. **P. canaliculatum**.
334. (**PLEUROCERA labiatum** (Lea) 1862). Sterki 1907; 385, a variety of **P. neglectum** (?).
336. (**PLEUROCERA pallidum** (Lea) 1862). Sterki 1907; 385, "listed from Ohio." Eq. **P. acutum**.
337. (**PLEUROCERA simplex** (Lea) 1862). Sterki 1907; 385, "listed from Ohio." Eq. **P. canaliculatum**.
338. (**PLEUROCERA troostii** (Lea) 1862). Sterki 1907; 385, "listed from Ohio." Eq. **P. canaliculatum**.
340. **POMATIOPSIS LAPIDARIA** (Say) 1817. Sterki 1907; 386; 401, Middletown deposit; 402, Defiance loess; 1920; 183, Castalia marl. Berry 1943: 58.
342. **SOMATOGYRUS INTEGER** (Say) 1829. Sterki 1907; 386. Walker 1918: 144.
344. **SOMATOGYRUS SUBGLOBOSUS ISOGONUS** (Say) 1829. Baker 1928: 159 (Birgella).
346. ?**VALVATA BICARINATA** Lea 1841. Sterki 1907; 387, has seen no specimens of the typical form from Ohio. Baker 1928: 18.
349. **VALVATA PERDEPRESSA WALKERI** Baker 1930. La Rocque 1953: 264.

5. LAND GASTROPODA

Dexter 1953: 30, 31.


376. ?**DISCUS CRONKHITEI CATSKILLENSIS** (Pilsbry) 1898. Pilsbry 1948: 605, implied; N. Y., N. J. to Minn., and S. D.


382. **EU CONULUS?** sp., La Rocque and Forsyth 1957: 85, ff., Sidney Cut.


Pilsbry 1948: 886.


396. HELICODISCUS sp., La Rocque and Forsyth 1957: 85, Sidney Cut.


401. LIMAX FLAVUS Linnaeus 1758. Sterki 1907: 375; has seen no specimens, but "probably in greenhouses and nurseries." Pilsbry 1948: 528.


425. PALUFERA HEMPHILLI (Binney) 1885. Pilsbry 1948: 765, implied.

426. PALUFERA MUTABILIS Hubrich 1951, Naut. 65: 57, implied.


439. RETINELLA sp. (fragments), La Rocque and Conley 1956; 326, Hunters Run deposit.


448. STENOTREMA LEAII ALICIAE (Pilsbry) 1893. Pilsbry 1940: 679, possibly implied: Iowa, Ill., Ind., Ky., Md.


471. TRIODOPSIS OBSTRICTA (Say) 1821. Sterki 1907: 376, has seen no specimens. Pilsbry 1940: 827, doubtful.


474. TRIODOPSIS TRIDENTATA JUXTIDENS (Pilsbry) 1894. Pilsbry 1940: 798.


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