

Historical Contributions

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Arnold Ortmann's Little-known 1925-26 Mollusk Collecting Trips to Virginia

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ABSTRACT

Arnold Ortmann, Curator of Invertebrate Zoology at Carnegie Museum of Natural History in Pittsburgh, Pennsylvania during the early 20th century, and the foremost American freshwater malacologist of his time, made important contributions to the study of mollusks in Virginia, especially freshwater mussels. His final collecting trips to the Commonwealth occurred during the fall of 1925 and 1926, but he died in January 1927 and never published the results of these surveys. This paper includes a reconstruction of Ortmann's itinerary based on voucher specimen records and a summary of his collecting results for all mollusks obtained during these trips to eastern and southcentral Virginia. Several of the freshwater mussel species collected by Ortmann are now rare and declining, and no longer inhabit the areas where he documented them.

Key words: freshwater mussels, malacology, snails, unionids.

INTRODUCTION

Arnold Edward Ortmann (1863-1927; Fig. 1) is an important figure in the history of malacology in North America, including Virginia. He was widely recognized as the leading American authority of his time on the classification and morphology of freshwater mussels (Pilsbry, 1927). He can be regarded as the father of modern freshwater mussel ecology because of his extensive field surveys and detailed studies of their anatomy (especially gill structure) and reproduction (Haig, 2012).

A native of Prussia (Germany), Ortmann obtained his Ph.D. in 1885 from the University of Jena. Nine years later he immigrated to the United States and subsequently became a naturalized citizen in 1900. Starting in 1894, Ortmann served as Curator of Invertebrate Paleontology at Princeton University. In 1903, he accepted the position of Curator of Invertebrate Zoology at Carnegie Museum of Natural History in Pittsburgh, Pennsylvania, less than a decade after the museum's founding in 1895. He remained in this position until his sudden death on 3 January 1927 at

the age of 64 (Holland, 1927). Ortmann was also on the faculty of the University of Pittsburgh, which conferred the honorary degree of Sc.D. upon him in 1911. According to Holland (1927), "As a field investigator [Ortmann] was scrupulously exact and untiring. As a student in the laboratory he was painstakingly industrious and most scrupulous in keeping his records above reproach." Pilsbry (1927) stated "His enthusiasm for natural history was contagious, and contributed largely to his success as a teacher. He possessed the ability in an unusual degree of concentrating all of his powers on the subject in hand. In the field he was indefatigable, never sparing himself, deterred by neither exposure or fatigue in the quest of specimens for his researches."

During his tenure at Carnegie Museum of Natural History (hereafter CM), Arnold Ortmann conducted extensive field studies of crayfish and freshwater mussels (unionids), and was particularly interested in the biogeography of the fauna of eastern United States (Ortmann, 1902, 1912, 1913). He produced several major papers on the crayfishes of Pennsylvania (Ortmann, 1905, 1906) before shifting his research

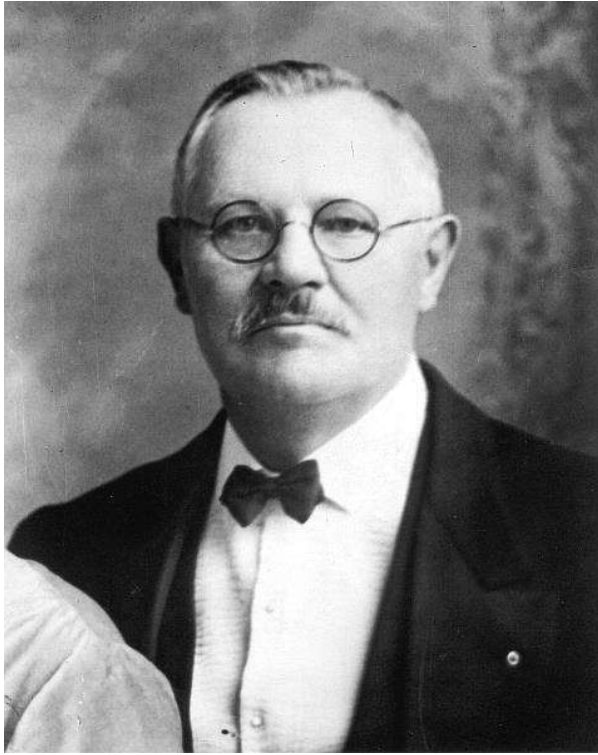


Fig. 1. Portrait of Arnold Edward Ortmann (photographer and date unknown but probably ca. 1920).

focus to freshwater mussels. He published extensively on the latter group, including a major monograph on the Pennsylvania fauna (Ortmann, 1911, 1919), distributional studies of mussels in various river drainages in eastern United States (e.g., Ortmann, 1918, 1924a, 1925, 1926), and numerous studies on the systematics, morphology, reproductive biology, and ecology of unionids (e.g., Ortmann, 1909a, 1920, 1923). He also published on mussels obtained by members of a collecting expedition to the Amazon basin in South America (Ortmann, 1921). Ortmann was one of the first biologists to discuss the effects of pollution on unionid populations (Ortmann, 1909b). He also lamented the loss of diverse riverine mussel communities to impoundment for hydroelectric dams (Ortmann, 1924b).

ARNOLD ORTMANN'S VIRGINIA FIELD WORK PRIOR TO 1925

During the last two decades of his life, Arnold Ortmann conducted field surveys for freshwater mussels throughout eastern United States, ranging from New England to Mississippi and west to the Ohio River drainage (Holland, 1927). He stressed the importance of gathering extensive amounts of distributional data

before formulating biogeographic hypotheses (van der Schalie, 1951a, b; Haig, 2012). His classic review of the diverse unionid fauna of the Tennessee River system included 20 sites in southwestern Virginia that he personally sampled between 1912 and 1915, as well as material collected by others (Ortmann, 1918). These data serve as the oldest baseline for comparison to more recent surveys of a currently impoverished and imperiled fauna (e.g., Ahlstedt, 1991; Wolcott & Neves, 1994; Henley et al., 1999; Jones et al., 2014).

In 1911-1912, Ortmann surveyed for unionids at three sites in the upper part of the Roanoke River system in Virginia: Mason Creek, Salem, 13 August 1911; Tinker Creek, Roanoke and Roanoke River, Salem, both 10 June 1912 (CM collection data). His surveys disclosed a depauperate fauna consisting of only three species – *Elliptio complanata* (Eastern Elliptio), *Strophitus undulatus* (Creeper), and *Villosa constricta* (Notched Rainbow) (Ortmann, 1913). Of these species, Ortmann collected more *V. constricta* than the other two (CM collection data). During these same two years, especially 1912 when he sampled at 22 additional sites over 19 days between May and September (CM collection data), Ortmann surveyed for unionids throughout Virginia, including sites in the Potomac (Shenandoah), Rappahannock, James (upper), New, and Tennessee River drainages. His findings are included in two major faunal papers (Ortmann, 1918, 1919). Like the Tennessee River system, the mussel faunas of these other drainages have declined since Ortmann's time, especially that of the Shenandoah River (Chazal & Roble, 2011).

During the fall of 1925 and 1926, the final two field seasons of his life, Arnold Ortmann returned to Virginia to survey for freshwater mussels in eastern and southcentral areas of the Commonwealth. The details of these surveys were not published due to his untimely death and thus are not widely known. The purpose of this paper is to summarize the results of Ortmann's final surveys for mollusks, especially unionids, in Virginia based on existing voucher specimens. Apparently neither Johnson (1970) nor Clarke (1981, 1985) examined Ortmann's 1925-26 CM material as part of their reviews, although both cited his faunal survey papers. However, Johnson did report several unionids from three of the same localities visited by Ortmann on the basis of earlier work by others, plus one unattributed Ortmann record (see below).

MATERIALS AND METHODS

The data presented in this paper are based primarily on CM voucher material collected by Arnold Ortmann in Virginia during 1925-26, consisting of 197 unionids

(187 bivalves and 10 single valves; Figs. 2-3) and 634 snails (gastropods). The latter portion includes 535 specimens of freshwater snails, 98 land snails, and one slug. I only examined the unionid portion (the primary focus of Ortmann's surveys) of his Virginia collections from both years, and relied on the CM database for all gastropod records. Additional material from Ortmann's collecting trips to Virginia during 1925-26 is deposited in the University of Michigan Museum of Zoology in Ann Arbor, Michigan (UMMZ: 7 unionids, 120 freshwater snails). I did not examine any material in the University of Michigan collection, but that institution has made its voucher specimen data available online (UMMZ, 2016), from which I extracted Ortmann's Virginia records.

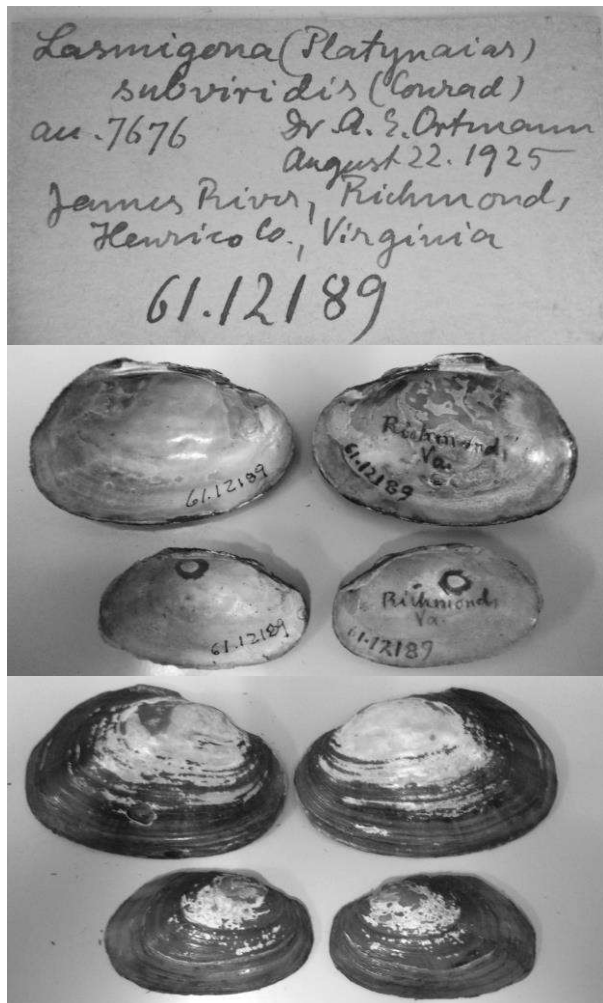


Fig. 2. Arnold Ortmann's original label and corresponding specimens (CM 61.12189) of *Lasmigona subviridis* collected on 22 August 1925 from the James River, Richmond, Virginia. Photos by the author.



Fig. 3. Representative specimens of *Fusconaia masoni* (= *Lexingtonia subplana*) collected by Arnold Ortmann in Virginia (top: CM 61.12344, ♀, 15 August 1926, James River, Manchester, City of Richmond; bottom: CM 61.12345, ♂, 18 August 1926, Swift Creek, Swift Creek Factory, Chesterfield Co.). Photos by Anne C. Chazal.

The database records of both CM and UMMZ had some missing or erroneous data that was reconcilable by comparing it with data associated with the records of other species from the same localities and dates, data from the other museum, or my personal knowledge of Virginia geography. I also searched the online databases of the Academy of Natural Sciences at Drexel University (ANSP, 2016), Illinois Natural History Survey (INHS, 2016), Museum of Comparative Zoology, Harvard University (MCZ, 2016), and the United States National Museum of Natural History (USNM, 2016) for relevant Ortmann records (i.e., 1925-26 only), but found none. Common names used in the text follow Turgeon et al. (1998).

I used ArcGIS10 software (© Esri, Redlands, CA) and georeferenced 1:24,000 scale U.S. Geological Survey topographic maps and recent aerial photographs to plot the actual or approximate locations of Ortmann's sampling sites by determining the proximity of his site names and descriptions, streams or rivers, and historic or extant railroad grades. Some of Ortmann's labels contained more detailed locality information than others, thus requiring variable amounts of effort on my part to determine their actual or approximate locations. I was unable to locate one site name that appears on his labels ("Elk Creek, Bells" in Bedford County, which possibly refers to the village of Bellevue), so estimated its possible location along Elk Creek.

ARNOLD ORTMANN'S FIELD
ITINERARY DURING 1925-1926

Arnold Ortmann presumably traveled via train from Pittsburgh, Pennsylvania to Virginia, and again primarily by train while in the latter state. Nearly all of his collecting sites appear to correspond to railroad crossings of rivers and streams, sometimes at a considerable distance from the nearest human settlement, perhaps suggesting that he disembarked

from the train almost directly at the collecting site. Alternatively, Hoffman (1996) postulated that Ortmann hired a wagon for transport from local railroad depots to his rural collecting sites.

More than half of Ortmann's survey sites lie in a north-south orientation along extant or historic railroad grades extending from Fredericksburg south to Emporia (Fig. 4). Most of his remaining sampling sites follow other railroad routes in a roughly east-west orientation, with southward extensions to Danville and Martins-

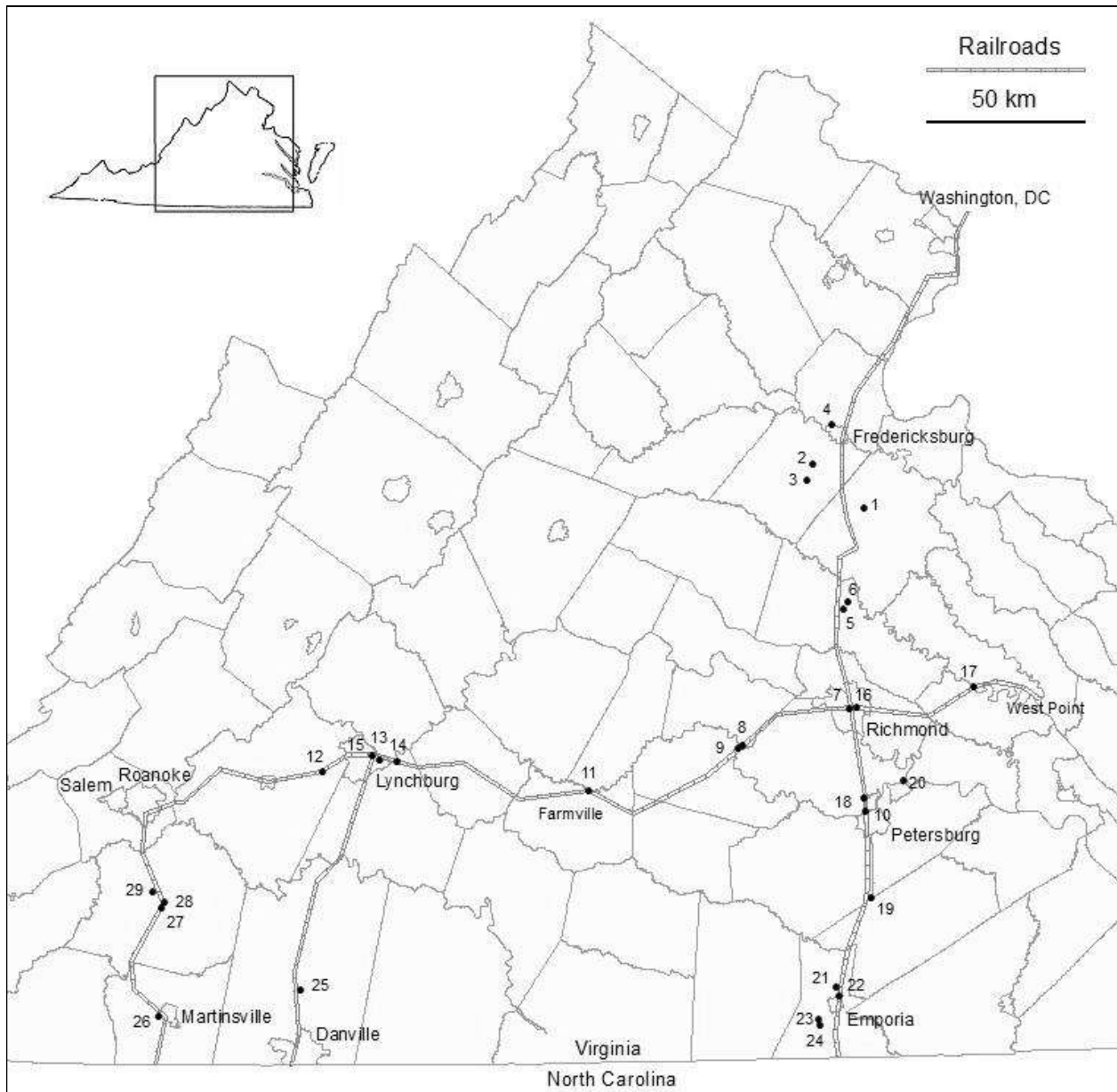


Fig. 4. Map of Arnold Ortmann's mollusk sampling sites in Virginia during 1925-26. Numbered dots correspond to locality descriptions in Table 1. Sites 1-15 were surveyed in 1925 and sites 13, 15-29 in 1926.

Table 1. Itinerary of Arnold Ortmann's mollusk collecting trips to Virginia in the fall of 1925 and 1926 as reconstructed from Carnegie Museum of Natural History (CM) voucher specimen data. The exact order of multiple surveys on a given day is unknown. County names in brackets appear on Ortmann's original labels and in the CM database, but they are not currently applicable to the respective independent cities. A total of 31 collections was made at 29 sites (26 aquatic, 3 terrestrial).

Site ¹	1925	
	August	
1	17	Mattaponi River, Woodford, Caroline Co.
2	18	Ni River, Spotsylvania, Spotsylvania Co.
3	18	Po River, Spotsylvania, Spotsylvania Co.
4	19	Rappahannock River, 4 miles upstream of Fredericksburg, Spotsylvania Co.
5	21	South Anna River, Ashland Mill, Hanover Co.
6	21	Little River, Taylorsville, Hanover Co.
7	22	James River, Richmond (city) [Henrico Co.]
8	24 ²	Pilkinton, Powhatan Co.
9	24	Appomattox River, Mattoax, Amelia Co.
10	26	Appomattox River, Petersburg (city) [Dinwiddie Co.]
11	27	Appomattox River, Farmville, Prince Edward Co.
12	29 ³	Elk Creek, Bells, Bedford Co.
13	30-31	James River opposite Lynchburg, Amherst Co.
14	31 ³	James River, Six-Mile Bridge, Campbell Co.
	September	
15	2 ²	Lynchburg (city) [Campbell Co.]
Site	1926	
	August	
16	15	James River (branch), Manchester, Richmond (city) [Chesterfield Co.]
17	16	Pamunkey River, White House, New Kent Co. (tidal)
18	18	Swift Creek, Swift Creek Factory, Chesterfield Co.
19	19	Rowanty Creek, Malone Bridge, Dinwiddie Co.
20	20	James River, City Point, Hopewell (city) [Prince George Co.] (Appomattox River confluence; tidal)
21	22	Three Creek, Slagle's Mill, Greensville Co.
22	22	Three Creek, North Emporia, Greensville Co.
23	22	Fontaine Creek, Round Hill Church near Emporia, Greensville Co.
24	22	Fontaine Creek, Rockbridge School near Emporia, Greensville Co.
25	31 ⁴	Dry Fork, Banister River, Pittsylvania Co.
	September	
26	2 ³	Smith River, Martinsville (city) [Henry Co.]
27	3 ³	Pigg River, Rocky Mount, Franklin Co.
28	3 ²	Rocky Mount, Grassy Hill, Franklin Co.
29	3 ³	Blackwater River, Gogginsville, Franklin Co.
13	5 ³	James River [probably opposite Lynchburg], Amherst Co.
15	6 ²	Lynchburg (city) [Campbell Co.]

¹Site numbers correspond to the points in Figure 4.

²Terrestrial sampling site (only land snails were collected).

³Aquatic mollusk collections were limited to snails.

⁴No collector is recorded for the lone mollusk specimen (CM 70897, *Elliptio complanata*) obtained at Dry Fork, but Ortmann is the probable candidate.

ville, but all but one (Lynchburg-Danville) of these lines are now used exclusively by freight trains, passenger service to cities and towns such as Farmville, Rocky Mount, and Martinsville having been discontinued decades ago. Modern passenger rail service to Lynchburg is via a different route (north-south) than that presumably used by Ortmann (east-west).

At least two of the localities mentioned on Ortmann's collecting labels no longer exist (i.e., Rockbridge School and Swift Creek Factory). This is also true of at least one of the railroad lines, namely the Seaboard Air Line Railroad that crossed Swift Creek at Swift Creek Factory (Chesterfield County, 1926) in southeastern Chesterfield County, approximately 10 km upstream of the confluence with the Appomattox River. This line was discontinued and removed long ago, but remnants of the railroad bridge (N37.2711 W77.4199) remain immediately upstream of a small hydroelectric dam on (the lowermost) Swift Creek Lake and are clearly visible on recent aerial photographs. Ortmann's "Swift Creek Factory" probably refers to Mechanics Manufacturing Company or Union Manufacturing Company, which were established along Swift Creek in 1836 and 1837, respectively (O'Dell, 1983). The former factory was destroyed by a large fire in 1926 (Ortmann's survey was conducted on 18 August of that year) that also consumed the surrounding company town (Swift Creek Mill Village) inhabited by several dozen families (O'Dell, 1983). Some of Ortmann's Swift Creek labels provide more precise locality data, indicating his collection site was 0.5 miles below the factory at "Rolling Mills", which presumably refers to a metal rolling mill. This would apparently place his collection site approximately midway between the current hydroelectric dam and Swift Creek Mill Theatre, the latter now located on the site of a historic grist mill (ca. 1660; O'Dell, 1983) with an associated dam (extant) along U.S. Route 1 (historic Manchester-Petersburg Turnpike).

In the fall of 1925, Ortmann's field itinerary between 17 August and 2 September included 15 sampling sites (13 aquatic, 2 terrestrial) in the eastern portion of the state (Table 1). Half of the aquatic sites were along the Appomattox and James rivers. He returned to Virginia during August and September of the following year and sampled at 16 sites (14 aquatic, 2 terrestrial) ranging as far west as the Smith River at Martinsville (Table 1; Fig. 3). Ortmann extended his collecting efforts south into North Carolina and Tennessee during the last week of August 1926 before returning to Virginia to complete his work in the Commonwealth. In both years, he collected aquatic mollusks from the James River in Amherst County

("opposite Lynchburg" is specified on 1925 specimen records but not 1926, although it seems probable that he sampled at the same site in both years because of the location of a railroad crossing).

RESULTS

Arnold Ortmann's malacological collections made during his 1925-26 trips to Virginia include 13 species of unionids (Table 2), eight species of freshwater gastropods (Table 3), and 11 species of land snails and slugs (Table 4). He collected 0-8 species of mussels and 0-4 species of freshwater snails per aquatic sampling site. Swift Creek at Swift Creek Factory in Chesterfield County yielded the most species of unionids and the Appomattox River at Farmville had the highest freshwater snail diversity, as judged by voucher specimen material in CM and UMMZ.

Eastern *Elliptio* (*Elliptio complanata*) was both the most frequently encountered and most common unionid (46% of all specimens) during Ortmann's surveys, occurring at 15 of the 21 sites (71%) where he collected mussels (Table 2; Fig. 5). This species remains the most ubiquitous unionid in the Atlantic Slope drainage of Virginia (pers. obs.). Johnson (1970) stated that *E. complanata* is generally the most common mussel throughout its range, and it is sometimes the only species found at a given locality. Ortmann recorded three other unionids (*Elliptio producta* [Atlantic Spike], *Pyganodon cataracta* [Eastern Floater], and *Strophitus undulatus*) at six sites each, with the remaining nine species found at 1-5 sites (Table 2; Figs. 5-7).

Ortmann collected freshwater snails at 20 of his 26 aquatic sampling sites in eastern and southcentral Virginia (Table 3), including all five sites where unionids were not collected (and thus presumably not found). *Leptoxis* (= *Anculosa*) *carinata* (Crested Mustalia, 12 sites) and *Elimia virginica* (Piedmont Elimia, 11 sites) were by far the most frequently encountered freshwater gastropods as judged by voucher specimen material in CM and UMMZ. The former species is the most commonly encountered snail in the Atlantic Slope drainage of Virginia (FGNA, 2016; pers. obs.). Ortmann (1913) noted that *E. virginica* is common and widespread in the mid-Atlantic region, being "found practically everywhere, possibly with the exception of the smallest streams in the headwaters." This statement remains largely true to this day.

Land snails were clearly not the focus of Ortmann's surveys. Nearly all of his specimens (91 of 99) were obtained during visits he made on 2 September 1925 and 6 September 1926 to one or more unspecific sites in the City of Lynchburg (Table 4). The remaining eight

Table 2. Summary of Arnold Ortmann's freshwater mussel collections in Virginia during 1925-26. Unbracketed figures are the number of specimens (whole or partial) deposited in Carnegie Museum of Natural History (CM) and bracketed figures are the corresponding number in the University of Michigan Museum of Zoology (UMMZ).

Watershed County/city	Locality	No. of unionid species	<i>Alasmidonta heterodon</i>	<i>Alasmidonta undulata</i>	<i>Elliptio complanata</i>	<i>Elliptio lanceolata</i>	<i>Elliptio producta</i>	<i>Fusconata masoni</i> ¹	<i>Lampsilis cariosa</i>	<i>Lampsilis radiata</i>	<i>Lasmigona subviridis</i>	<i>Leptodea ochracea</i>	<i>Pyganodon cataracta</i>	<i>Strophitus undulatus</i>	<i>Villosa constricta</i>
Rappahannock															
Spotsylvania	Rappahannock River, 4 miles upstream of Fredericksburg	4			10	1	1				1				
York															
Spotsylvania	Ni River, Spotsylvania	2	1		4										
Spotsylvania	Po River, Spotsylvania	3			4	3								1	
Caroline	Mattaponi River, Woodford	3			7					1			1		
Hanover	South Anna River, Ashland Mill	2			2	1									
Hanover	Little River, Taylorsville	1			4										
New Kent	Pamunkey River, White House (tidal)	3								11		2	1		
James															
Richmond (city)	James River, Richmond	5			5			1	1		2		1		
Richmond (city)	James River (branch), Manchester	3			4			1						4	
Hopewell (city)	James River, City Point (tidal)	2			2								8		
Campbell	James River, Six-Mile Bridge	0													
Amherst	James River opposite Lynchburg	5			16		4 [2]				4			2	4
Petersburg (city)	Appomattox River, Petersburg	4			21		4	1			12 [3]				
Amelia	Appomattox River, Mattoax	1			4										
Prince Edward	Appomattox River, Farmville	1			1										
Chesterfield	Swift Creek, Swift Creek Factory	8	1		7 [2]		1	4		2	1	2		1	
Bedford	Elk Creek, Bells	0													
Chowan															
Dinwiddie	Rowanty Creek, Malone Bridge	2					2								2
Greensville	Three Creek, Slagle's Mill	1											5		
Greensville	Three Creek, North Emporia	3					3						4	1	
Greensville	Fontaine Creek, Round Hill Church	1													1
Greensville	Fontaine Creek, Rockbridge School	1												1	
Roanoke															
Franklin	Pigg River, Rocky Mount	0													
Franklin	Blackwater River, Gogginsville	0													
Martinsville (city)	Smith River, Martinsville	0													
Pittsylvania	Dry Fork, Banister River	1			1										
Total sites (26)				1	1	15	3	6	4	1	3	5	2	6	3
Total specimens (204)				1	1	94	5	17	7	1	14	23	4	20	7

¹All specimens were identified by Ortmann (and are currently catalogued) as *Lexingtonia subplana*, which is regarded as a junior synonym of *Fusconia masoni* by most contemporary malacologists.

Table 3. Summary of Arnold Ortmann’s freshwater snail collections in Virginia during 1925-26 as based on Carnegie Museum of Natural History (CM) and University of Michigan Museum of Zoology (UMMZ) voucher specimens.

Watershed County/city	Locality	Number of snail species	<i>Campeloma decisium</i>	<i>Elimia catenaria</i> ¹	<i>Elimia virginica</i>	<i>Leptoxis carinata</i>	<i>Helisoma anceps</i>	<i>Planorbella trivolvis</i>	<i>Physa acuta</i>	<i>Physa gyrina</i>
Rappahannock										
Spotsylvania	Rappahannock River, 4 miles upstream of Fredericksburg	2			X	X				
York										
Spotsylvania	Ni River, Spotsylvania	0								
Spotsylvania	Po River, Spotsylvania	2	X				X			
Caroline	Mattaponi River, Woodford	1			X					
Hanover	South Anna River, Ashland Mill	1			X					
Hanover	Little River, Taylorsville	1			X					
New Kent	Pamunkey River, White House (tidal)	0								
James										
Richmond (city)	James River, Richmond	3			X	X			X	
Richmond (city)	James River (branch), Manchester	2			X	X				
Hopewell (city)	James River, City Point (tidal)	0								
Campbell	James River, Six-Mile Bridge	2			X	X				
Amherst	James River opposite Lynchburg	2			X	X				
Petersburg (city)	Appomattox River, Petersburg	3	X		X	X				
Amelia	Appomattox River, Mattoax	2				X				X
Prince Edward	Appomattox River, Farmville	4	X			X	X			X
Chesterfield	Swift Creek, Swift Creek Factory	1				X				
Bedford	Elk Creek, Bells	1							X	
Chowan										
Dinwiddie	Rowanty Creek, Malone Bridge	0								
Greensville	Three Creek, Slagle’s Mill	1						X		
Greensville	Three Creek, North Emporia	0								
Greensville	Fontaine Creek, Round Hill Church	2		X	X					
Greensville	Fontaine Creek, Rockbridge School	2		X	X					
Roanoke										
Franklin	Pigg River, Rocky Mount	1				X				
Franklin	Blackwater River, Gogginsville	1				X				
Martinsville (city)	Smith River, Martinsville	1				X				
Pittsylvania	Dry Fork, Banister River	0								
Total (26 sites)			3	2	11	12	2	1	2	2

¹ CM specimens are catalogued as *Elimia catenaria* and UMMZ specimens as *E. cancellata dislocata*. Goodrich (1942) first reported the Greensville County, Virginia populations under the name *Goniobasis catenaria dislocata*. Turgeon et al. (1998) elevated *E. dislocata* to full species status (common name Lapped Elimia) but without supporting justification.

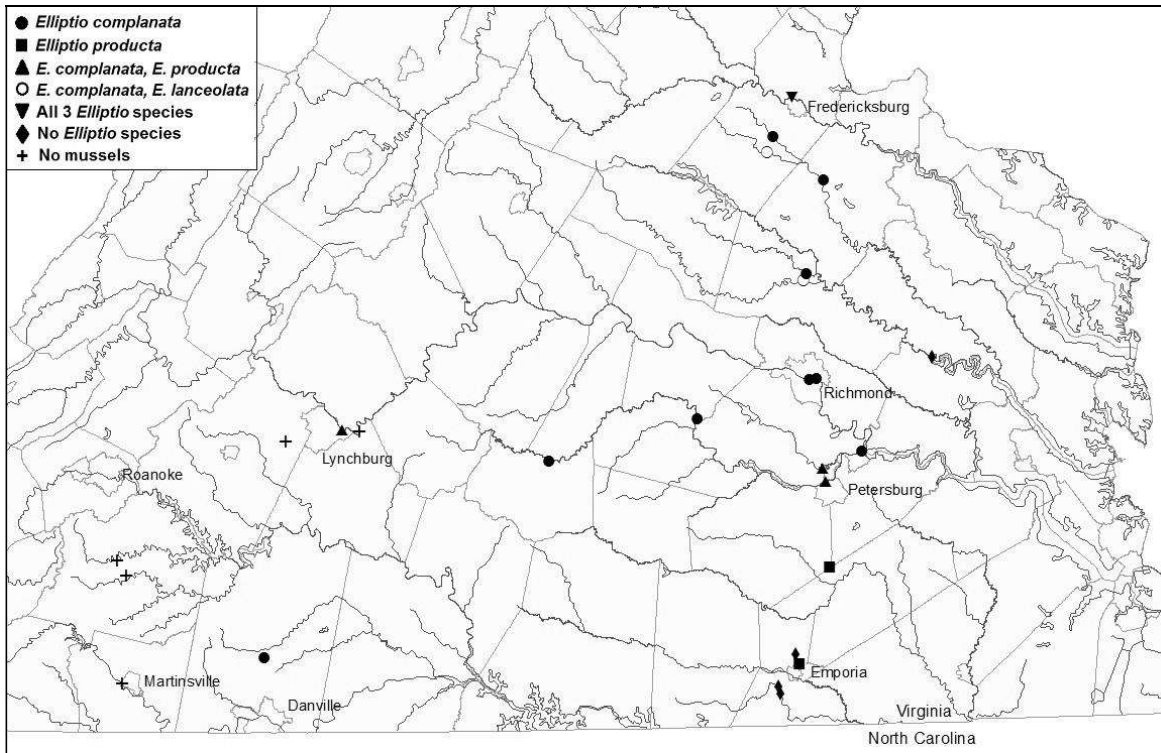


Fig. 5. Sampling locations where Arnold Ortmann collected *Elliptio* species in Virginia during 1925-26. The reservoirs shown on this and the following maps did not exist at that time.

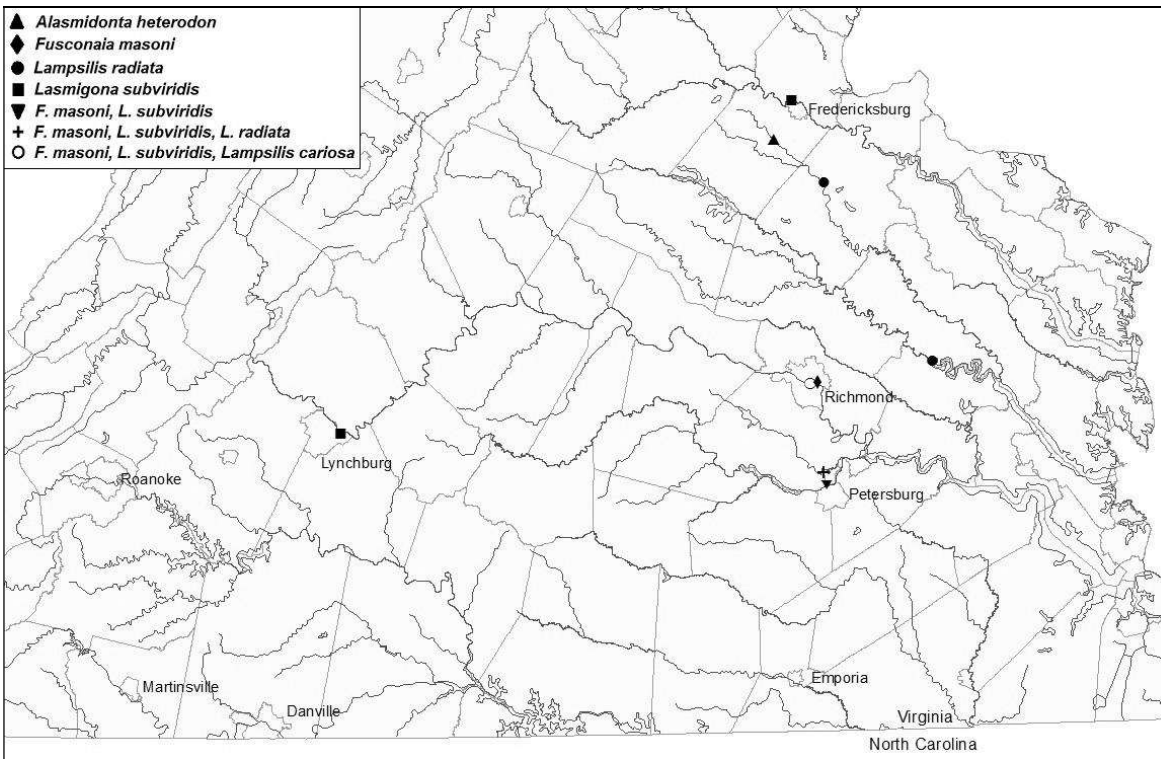


Fig. 6. Sampling locations where Arnold Ortmann collected *Alasmidonta heterodon*, *Fusconaia masoni* (= *Lexingtonia subplana*), *Lampsilis cariosa*, *Lampsilis radiata*, and *Lasmigona subviridis* in Virginia during 1925-26.

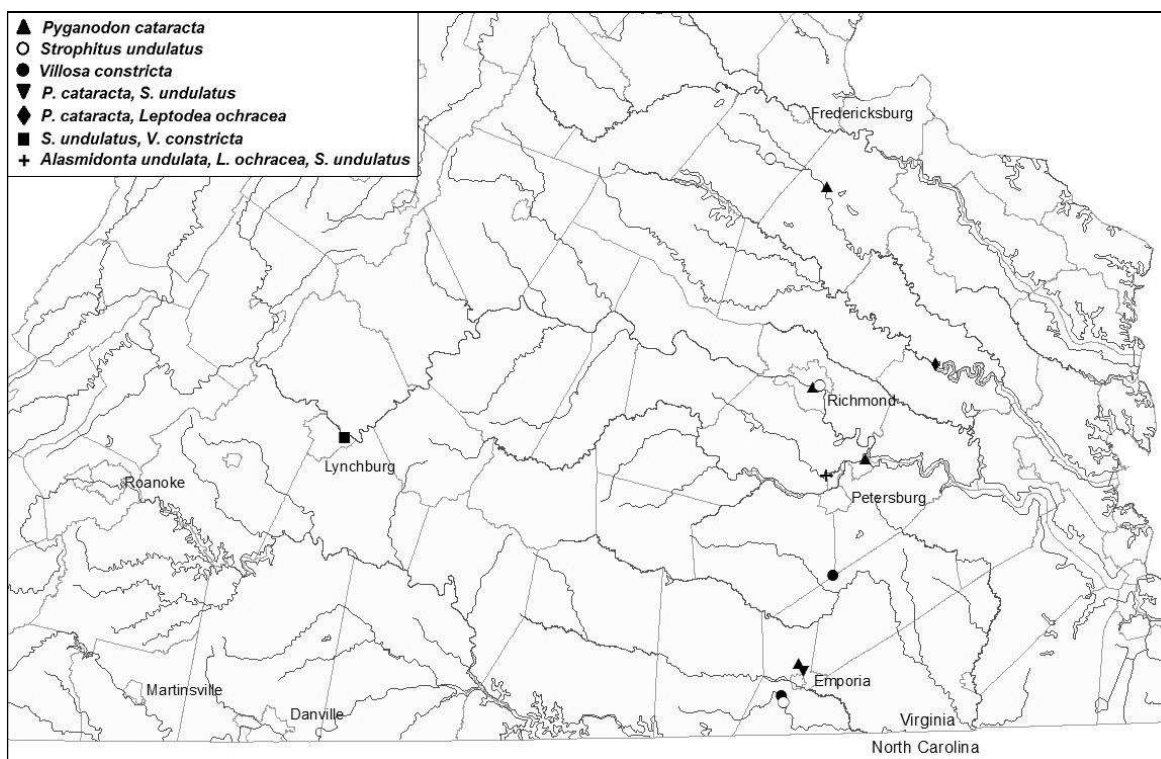


Fig. 7. Sampling locations where Arnold Ortmann collected *Alasmidonta undulata*, *Leptodea ochracea*, *Pyganodon cataracta*, *Strophitus undulatus*, and *Villosa constricta* in Virginia during 1925-26.

land snails, including three taken at primarily aquatic sampling sites, likely were obtained incidentally. Ortmann collected a total of only five land snails at two of the three sites (Pilkinton and Grassy Hill) that I categorized as terrestrial sampling sites in Table 1.

DISCUSSION

Arnold Ortmann’s 1925-26 collections from eastern and southcentral Virginia were among the first made in this region and thus provide some degree of baseline data for comparison to subsequent surveys. Several of the unionid species documented by Ortmann are now of high conservation concern, including *Alasmidonta heterodon* (Dwarf Wedgemussel; federal and state endangered), *Fusconaia masoni* (= *Lexingtonia subplana*) (Atlantic Pigtoe; state threatened), and *Lasmigona subviridis* (Green Floater; state threatened). In addition, populations of *Elliptio lanceolata* (Yellow Lance), *Lampsilis cariosa* (Yellow Lampmussel), and *L. radiata* (Eastern Lampmussel) are declining and all are now rare to uncommon in the state. Both the Atlantic Pigtoe and Yellow Lance are currently under review by the U.S. Fish and Wildlife Service for possible federal listing.

Table 4. Summary of Arnold Ortmann’s terrestrial snail collections in Virginia during 1925-26 as based on Carnegie Museum of Natural History voucher specimens.

Family	Species	Pilkinton, Powhatan Co.	Lynchburg (city) ¹	Grassy Hill, Rocky Mount, Franklin Co.	James River (opposite Lynchburg), Amherst Co.	Rockbridge School near Emporia, Greensville Co.
Gastrodontidae	<i>Ventridens intertextus</i>				1	
Gastrodontidae	<i>Ventridens ligera</i>		31			
Gastrodontidae	<i>Zonitoides arboreus</i>	1				
Haplotrematidae	<i>Haplotrema concavum</i>			1		
Helicidae	<i>Cepaea nemoralis</i> ²		31			
Philomycidae	<i>Philomycus carolinianus</i>	1				
Polygyridae	<i>Euchemotrema fraternum</i>			1		
Polygyridae	<i>Mesodon thyroidus</i>		4			
Polygyridae	<i>Neohelix albolabris</i>		13		2	1
Polygyridae	<i>Patera appressa</i>		11			
Polygyridae	<i>Triodopsis juxtidentis</i>		1			
Total specimens		2	91	2	3	1

¹ Combined number of specimens collected on 2 September 1925 and 6 September 1926.

² Introduced species.

The Dwarf Wedgemussel was thought to have been extirpated from Virginia prior to 1990 but it was rediscovered at two sites in the Commonwealth that year (Neves, 1991). Several additional populations have since been found in eastern Virginia (Bruenderman & Stevenson, 1995; Michaelson & Neves, 1995; Strayer et al., 1996). Ortmann documented *A. heterodon* only in the Ni River during his 1925-26 surveys (Table 2). He had previously found this species in Mountain Run (Culpeper Co.) and Marsh Run (Fauquier Co.) (Ortmann, 1919), both in the Rappahannock River drainage, but these two populations are now believed to be extirpated.

Prior to this paper, the Green Floater was reported from three of the five sites where Ortmann found it, including Richmond (a lone specimen collected by Major John LeConte, presumably from the James River, was described by Isaac Lea [1845, 1853] as the new species *Unio hyalinus* [USNM 86131, holotype], now regarded as a junior synonym of *L. subviridis* [Johnson, 1970]), Fredericksburg (an unspecified number of specimens collected by a “Dr. Emmons,” presumably from the Rappahannock River, were reported by Lea [1874] under the name *Unio insolitus*, now regarded as a junior synonym of *Lasmigona decorata* [Carolina Heelsplitter], a close relative of *L. subviridis* restricted to the Carolinas [Clarke, 1985]), and the Appomattox River at Petersburg (Johnson, 1970; Clarke, 1985). In addition, W. J. Farrer, a mollusk collector in the early 20th century, collected three *L. subviridis* from the James River at Richmond (UMMZ 104150; collection date unknown) and two more from the Rappahannock River (UMMZ 104161; exact location and collection date unknown). Clarke (1985) previously listed Farrer’s UMMZ records but without citing the actual collector. Johnson (1970) and Clarke (1985) both noted the existence of UMMZ specimens of *L. subviridis* from the Appomattox River at Petersburg, but neither author provided further details. My online search of records in this collection revealed that three specimens (UMMZ 62309) were collected by Arnold Ortmann at this locality on 26 August 1925, along with a dozen more deposited in the Carnegie Museum (CM 61.12190, “abundant below dam along rocks”). Ortmann (1919) had previously recorded *L. subviridis* from the Rappahannock River at Remington (Fauquier Co.), which is more than 50 km upstream from his 19 August 1925 collecting site near Fredericksburg.

There are no recent records of *L. subviridis* or *F. masoni* from the lower Appomattox River or its tributary Swift Creek (Gerberich, 1991; Kitchel, 1991; VDCR, 2016), sites where Ortmann recorded both species during 1925-26. Furthermore, *F. masoni* was

apparently last documented in the Richmond section of the James River by Ortmann during these trips (VDCR, 2016). Although *L. subviridis* evidently no longer occurs at the sites where Ortmann documented it during his last surveys, this species has been found farther upstream in both the James and Rappahannock rivers during the past two decades (VDCR, 2016; pers. obs.).

Swift Creek, which spans approximately 65 km almost entirely within Chesterfield County, has changed much since Ortmann’s 1926 survey yielded eight species of unionids. Since the 1930s, three new impoundments (Swift Creek Lake [two with this name] and Swift Creek Reservoir [largest at 688 ha; formed in 1965]) have been created, the latter currently serving as a public water supply. The lowermost Swift Creek Lake (17 ha), alternately known as Lakeview Reservoir, originally served as a public water supply, but it is now used for recreation and hydroelectric power generation. In addition to the impacts of dam creation, the entire Swift Creek watershed has become significantly more urbanized, especially during the past half century, due to its proximity to the cities of Richmond and Petersburg. This has contributed to reduced water quality for unionids and other aquatic organisms. Portions of Swift Creek are currently included on the “impaired waters list” prepared biennially by the Virginia Department of Environmental Quality due to high counts of the bacterium *Escherichia coli* (VDEQ, 2016).

Given that the primary purpose of Ortmann’s surveys of 1925-26 was to document the unionid fauna of selected streams and rivers in eastern and southcentral Virginia, it is not surprising that his presumably incidental collections of freshwater and terrestrial gastropods consist mostly of rather conspicuous, medium to large, wide-ranging species. None of the freshwater snails collected during Ortmann’s surveys are currently of high conservation concern, although *Elimia catenaria* (Gravel *Elimia*) reaches its northern range limit in southeastern Virginia (Hoffman, 1996). Goodrich (1942) first reported this species (as *Goniobasis catenaria dislocata*) from Virginia from “Green[s]ville County,” but he did not provide further details. Hoffman (1996) clarified the original source of this record (Ortmann’s 1926 collections; Table 3) and added newer collection records for the Chowan and Roanoke River drainages of Virginia. He stated that *E. catenaria* “is widespread and often abundant in many streams of ‘Southside Virginia.’” Among Ortmann’s small collection of land snails, *Ventridens ligera* (Globose Dome) and the exotic *Cepaea nemoralis* (Grovesnail) each account for nearly one-third of the total specimens, with only two

other species represented by more than 10 specimens (Table 4).

The contributions of Arnold Ortmann to the study of malacology in Virginia are a valuable component of the history of natural history in the Commonwealth. The importance of natural history museums in preserving voucher specimens and associated data are borne out in this paper, which would not have been possible without these sources of information.

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