Molluscs from Swift Creek, Wake and Johnston Counties, North Carolina

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Abstract: A molluscan survey of the Swift Creek basin in North Carolina was conducted during the summer of 1992. One hundred eighteen stations on Swift Creek and its tributaries were intensively explored for molluscan species. Thirty-six molluscan species, including 15 gastropods and 21 bivalve species, were collected.

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Little is known about the molluscan fauna of Swift Creek, an important Neuse River tributary in North Carolina. While researching the distribution of freshwater molluscs of the upper Neuse River basin, Walter (1954) reported on the molluscs, 8 gastropods, 5 unionids, and 3 sphaeriids, collected from 5 stations in the Swift Creek basin. In a more recent report on North Carolina mussels, Alderman (1991) listed 11 unionids from only 4 stations on Swift Creek. Other authors (Clarke 1981, 1985; Johnson 1970) have listed unionids from Swift Creek, but these reports are based on museum specimens collected by Walter (1954).

Many anthropogenic changes have occurred in the Neuse River basin since Walter's 1954 study. The rapid urbanization and industrialization of this area has destroyed or altered many aquatic environments. This change of habitat may have altered the structure of the molluscan fauna of Neuse River tributaries, including Swift Creek.

We present results of an extensive molluscan survey conducted in the summer of 1992 throughout the Swift Creek basin. Objectives of the survey were to determine the present molluscan fauna of Swift Creek and to identify locations supporting concentrations of the various molluscan species.

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Methods

Swift Creek begins as an intermittent stream in the city of Cary, Wake County, and empties into the Neuse River as a fourth order stream west of the city of Smithfield, Johnston County. This creek is approximately 74 km long (B. DeVane, pers. commun.) and drains a basin of 422 km^2 (Wiser 1981). The creek flows through Lake Wheeler and Lake Benson in Wake County. Tributaries emptying into Swift Creek include large streams such as Little Creek, White Oak Creek, Steephill Creek, and Williams Creek, and smaller streams like Mahlers Branch, Dutchmans Branch, and Lynn Branch.

Topographic maps (7.5 minute series) were used to select stations that were at approximately 1.6 km (1 mile) intervals on Swift Creek and its tributaries, excluding ponds, lakes, and intermittent streams. Also excluded from the study was Middle Creek, a third order stream that empties into Swift Creek approximately 1.6 km from the mouth of Swift Creek. A total of 118 stations were selected for study. Stream names, orders, topographic coordinates, and access points for each station were extrapolated from the topographic maps and are available upon request.

Stations, approximately 30 m in length, were explored for molluscs from May 1992 to August 1992. All accessible habitats at a station were explored until no further species were found. While most specimens were collected by hand, a dip net was used to sift the bottom substrate of deeper waters. Although only relict unionids were collected, beds of live unionids were noted. Short descriptions of the stations were recorded, including width of stream at mid-station, depth at mid-stream, flow, shade, and bottom substrates (data available upon request). Specimens were returned to the laboratory in jars of stream water. After sorting the specimens, approximately half the specimens of each species were anaesthetized with menthol crystals and preserved in 70% alcohol. The remainder of the specimens were killed, soft parts removed, and shells dried. A list of species collected at each station is available upon request. Common nomenclature follows that of Turgeon et al. (1988), while scientific nomenclature follows Adams et al. (1990). Specimens will be deposited in the North Carolina Museum of Natural History, Raleigh.

To simplify discussion, the following terms will be used:

(1) The "lower basin" is defined as the Swift Creek basin that includes all stations that occur within Johnston County. Also included in the lower basin are those stations that occur within Wake County but are located on a tributary that drains into Johnston County.

(2) The "upper basin" is defined as the Swift Creek basin that includes all stations that occur within Wake County excluding those stations of White Oak Creek and Station 87.

Table 1. Species of freshwater molluscs collected from the Swift Creek basin including indication (*x*) of new records for Swift Creek.

Species	New Record
Bivalvia	
Uniondae	
Alasmidonta heterodon (Lea 1829)	
Alasmidonta undulata (Say 1817)	
Anodonta cataracta (Say 1817)	*x*
Anodonta imbecillis (Say 1829)	
Elliptio complanata (Lightfoot 1786)	
Elliptio icterina (Conrad 1834)	
Elliptio lanceolata (Lea 1828)	
Elliptio roanokensis (Lea 1838)	
Fusconaia masoni (Conrad 1834)	
Lampsilis radiata (Gmelin 1791)	
Strophitus undulatus (Say 1817)	
Uniomerous obesus (Lea 1831)	*x*
Unidentified unionid No. 1	
Corbiculidae	
Corbicula fluminea (Muller 1774)	*x*
Sphaeriidae	
Musculium partumeium (Say 1822)	
Musculium securis (Prime 1852)	*x*
Pisidium adamsi (Stimpson 1851)	*x*
Pisidium casertanum (Poli 1791)	*x*
Pisidium compressum (Prime 1852)	*x*
Pisidium supinum (Schmidt 1850)	*x*
Pisidium variabile (Prime 1851)	*x*
Sphaerium striatinum (Lamarck 1818)	
Gastropoda	
Viviparidae	
Campeloma decisum (Say 1817)	
Hydrobiidae	
Amnicola limosa (Say 1817)	*x*
Pleuroceridae	
Goniobasis c. dislocata (Reeve 1861)	
Leptoxis (M.) carinata (Bruguiere 1792)	*x*
Lymnaeidae	
Fossaria humilis (Say 1822)	*x*
Pseudosuccinea columella (Say 1817)	
Physidae	
Physella heterostropha (Say 1817)	
Planorbidae	
Helisoma anceps (Menke 1830)	
Menetus alabamensis (Pilsbry 1895)	*x*
Menetus dilatatus (Gould 1841)	*x*
Gyraulus deflectus (Say 1824)	*x*
Planorbella trivolvis (Say 1817)	*x*
Ancylidae	
Laevapex fuscus (Adams 1841)	*x*
Ferrissia fragilis (Tyron 1863)	*x*
Ferrissia hendersoni (Walker 1908)	

Results

A total of 36 molluscan species were collected from Swift Creek and its tributaries. Fifteen gastropod species were collected representing 7 families and 13 genera. The class Bivalvia was represented by species belonging to the families Unionidae, Sphaeriidae and Corbiculidae. The unionids were represented by 12 species, including 1 unknown species. Seven species in 3 genera represented the native freshwater clams, while the Asian clam (*Corbicula fluminea*) and the humpback peaclam (*Pisidium supinum*) represented introduced bivalves. Table 1 lists the molluscan species collected.

Gastropods

The pointed campeloma (*Campeloma decisum*) was common throughout the basin, occurring at 45 stations in the main stream and tributaries. The mud amnicola (*Amnicola limosa*) was found at 23 stations, only 1 of which was located on a tributary. The Pleurocerids, the lapped elimia (*Goniobasis c. dislocata*) and the crested mudalia (*Leptoxis carinata*) occurred together within an 11-km stretch of the lower Swift Creek basin. The crested mudalia was also found among cobble stones at 2 stations in the upper Swift Creek basin. The marsh fossaria (*Fossaria*

humilis) Say 1822) was collected from only the upper basin at 5 stations, only 1 of which occurred on the main stream. The marsh fossaria was found at 4 stations with the other more common lymnaeid, the mimic lymnaea, (*Pseudosuccinea columella*). The mimic lymnaea was collected from a total of 48 stations. The most common and abundant mollusc of the study was the pewter physa, (*Physella heterostropha*). This physid was collected from all but 14 stations. The gastropod family Planorbidae was the most diversely represented with 5 species. The 2-ridged rams-horn, (*Helisoma anceps*), a common planorbid, was collected at 23 stations. The small planorbids of the genus *Menetus* were represented in this study by the marsh sprite (*Menetus alabamensis*) and the bugle sprite (*M. dilatatus*). The marsh sprite was found at 12 stations, whereas the more common bugle sprite was collected from 61 stations. A mixed population of both these species were found at 5 stations. The flexed gyro (*Gyraulus deflectus*), a small uncommon planorbid, was found at only 3 stations, all of which occurred in the upper basin. The largest of the planorbids found, the marsh rams-horn (*Planorbella trivolvis*) was collected from only 1 station, located upstream of Austin Pond on White Oak Creek, Johnston County. The limpet snails were represented by 3 species. The dusky ancylid (*Laevapex fuscus*) Adams 1841) was collected from 24 stations on Swift Creek and 1 station on Little Creek. Two species of the genus *Ferrissia* were collected during this study. One species listed as "special concern" by the Scientific Council on Freshwater and Terrestrial Molluscs (Adams et al. 1990), the blackwater ancylid (*Ferrissia hendersoni*) was found at 22 stations. A more common limpet snail, the fragile ancylid (*F. fragilis*) was collected from 41 stations. Mixed populations of these 2 species were found at 5 stations.

Unionids

Four shells of the dwarf wedgemussel (*Alasmidonta heterodon*) were noted from only 2 stations in the lower basin on Swift Creek, while the triangle floater (*A. undulata*) was encountered at 3 stations and along a 8.1-km stretch of the main stream. Large specimens of the eastern floater (*Anodonta cataracta*) were found several meters below the Lake Benson dam. The paper pondshell (*A. imbecillis*) was identified from only 2 stations, 1 in the upper basin and the other approximately 32.2 km away in the lower basin. Shells of 2 threatened species (Adams et al. 1990), the squawfoot (*Strophitus undulatus*) and the Atlantic pigtoe (*Fusconaia masoni*) were encountered at 1 and 8 stations, respectively. The genus *Elliptio* was represented by 4 species in this study. The yellow lance (*Elliptio lanceolata*) was only found in the main stream of Swift Creek while the Roanoke slabshell (*E. roanokensis*) not only occurred in the main stream but also in the tributaries, Williams Creek and Steephill Creek. The more common species of *Elliptio*, the variable spike (*E. icterina*) and the eastern elliptio (*E. complanata*) were also found in both the main stream and several tributaries. Other unionids encountered during the study include the eastern lampmussel (*Lampsilis radiata*) and the southern pondhorn (*Uniomerus obesus*). An unknown unionid species, which was encountered along a 3-mile stretch of the lower Swift Creek basin, was also found.

Sphaeriids

The relatively large fingernailclam, the striated fingernailclam (*Sphaerium striatinum*), was found at 5 stations, 4 of which were upstream of Lake Wheeler in the upper basin. The swamp fingernailclam (*Musculium partumeium*) was collected at only 2 stations on Little Creek tributary while the pond fingernailclam (*M. securis*) was more widely distributed at 9 stations. The peaclams (*Pisidium*) were represented in this study by 5 species. The Adam peaclam (*Pisidium adamsi*) was collected along with the swamp fingernailclam at Station 72 on Little Creek. The ridged-beak peaclam (*P. compressum*) was encountered at 2 stations in the lower basin and was found with the triangular peaclam (*P. variabile*) at Station 19. The ubiquitous peaclam (*P. casertanum*) was the most widespread peaclam, occurring at 7 stations. The humpback peaclam (*P. supinum*) was collected from 2 stations. This peaclam, a synonym for the Henslow peaclam (*P. henslowanum*) is an introduced species from Europe (Herrington 1962).

Corbiculids

The introduced Asian clam (*Corbicula fluminea*) was found from the mouth of Swift Creek and throughout nearly 90% of the main stream's length. The only tributary to be invaded by this clam was Little Creek.

Discussion

Identifications

Blackwater Ancylid—Walker (1908) described the blackwater ancylid from Lake Waccamaw, North Carolina. His description stated that the apical striae were strong and regular, originating from the circumference of the apical pit and projecting down towards the upper surface of the shell (Walker 1908). Basch (1963) considered *F. hendersoni* to be a variation of *F. fragilis*. The *F. hendersoni* variety is distinguished from other *F. fragilis* forms by a dome-like evenly rounded obtuse apex which is clearly marked with radial striae (Basch 1963). We noted 2 discrepancies between these descriptions and the specimens collected from Swift Creek. The radial or surface striations that extended down the length of the shell were not continuations of the apical striae, but began a few microns ventrad to the apex. Second, apical striae were not restricted to *F. hendersoni* as suggested by Basch (1963). After some cleaning, apical striae were also found on almost all the shells of *F. fragilis*. We considered the apical striae, which represents "the portion of the shell present within the egg capsule . . ." (Basch 1963), as one of the contrasting characteristics between the genera *Ferrissia* and *Laevapex*, while the presence of *surface* striae was considered to distinguish *F. hendersoni* from *F. fragilis*.

Pewter Physa.—The identification of the pewter physa (*P. heterostropha*) is uncertain. As communicated to us by W. F. Adams (pers. commun.), *Physella* species have variable characteristics and are hard to accurately identify. Burch (1982) also indicated that identification of the physid species by shell characteris-

tics alone was difficult, and only provided photographs of the different species. We concluded that the physid specimens collected in this study were the pewter physa based on 2 characteristics. The shells were robust with relatively inflated body whorls and exhibited marbled coloration. Unfortunately, these are very weak taxonomic characters and identifications may be changed by future studies.

Changes in Molluscan Fauna

New Records.— Except for the 2 introduced bivalves, the Asian clam and the humpback peaclam, all the species reported in this study were natives of North Carolina and probably occurred within the Swift Creek basin prior to this study. Only 9 stations in the basin had been explored previously. Five of the stations occurred in the upper basin (Walter 1954) and 4 in the lower basin (Alderman 1991). This study reports 18 new molluscan species for the Swift Creek basin. These new records include: 9 gastropod species, 2 unionid species, 6 sphaeriid species, and 1 corbiculid species, the Asian clam. These species, occurring within other drainages in North Carolina, are not unique to Swift Creek (Alderman 1991, Walter 1954, Adams et al. 1990). However, this study is unique in its systematic exploration of a single creek and may become the basis for comparative studies of molluscs from other North Carolina drainages of similar size.

Loss of Species. Five species previously collected from Swift Creek were not found in the present study. Two gastropod species, the golden fossaria (*Fossaria obrussa*, Say 1825) and the cymbal ancylid (*Laevapex diaphanus*, Haldeman 1841) were not found in the Swift Creek basin. However, the marsh fossaria and the dusky ancylid were found at the locations believed to be sites where Walter (1954) collected the 2 former species. Taxonomic confusion may also have contributed to the lack of identification of these 2 gastropods in this study, especially in the case of the golden fossaria. The absence of 2 unionid (the green floater, *Lasmigona subviridus*, Conrad 1835 and the notched rainbow, *Villosa constricta*, Conrad 1838) and 1 sphaeriid species (the great eastern peaclam, *Pisidium dubium*, Say 1817) are probably a result of the collection methods used in this study being more appropriate for gastropods than bivalves.

Since bivalves were not extensively searched for and only empty unionid shells were collected, this study does not give an indication of bivalve densities in the Swift Creek basin. Also, as relict shells may stay intact for many years, this study may only be reporting historic unionid species that had been extirpated from Swift Creek several years earlier. However, this study may give a small indication of past and/or present bivalve diversity and distribution for future investigators. Because this study concentrated on the collection of gastropods, there may be more molluscs, especially bivalves, yet to be discovered from the Swift Creek basin.

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