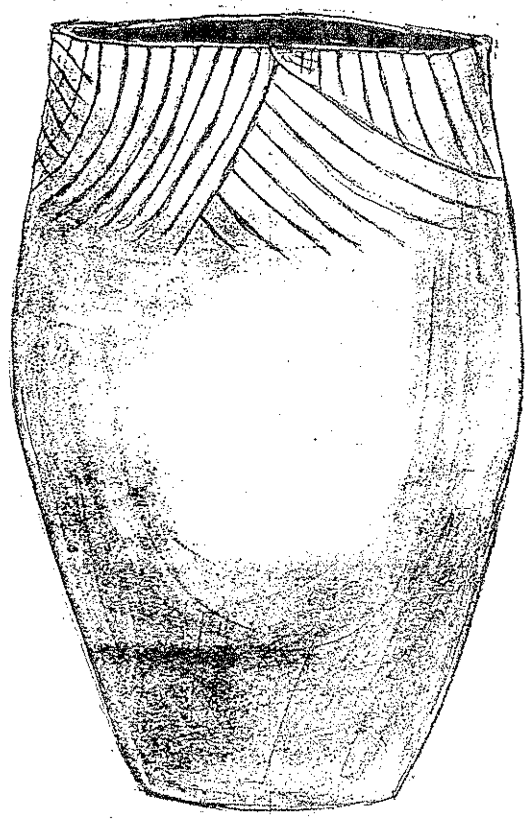
ARCHEOLOGY AT AQUILLA LAKE

David O. Brown

1978-1982 INVESTIGATIONS

VOLUME III



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VOLUME III

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APPENDIX III

ANALYSIS OF 1982 MOLLUSCAN FAUNA

Raymond Neck

The terrestrial environment surrounding Aquilla Lake, Hill County, Texas, is characterized by local variation due to the varied geological substrates. Blackland Prairie and Eastern Cross Timbers biotic zones occur along the margins of the lake; a short distance to the east is the oak-hickory woodland. To the west, the Lampasas Cut Plains are a complex mosaic of scrub woodlands and prairies. Terrestrial gastropods react to the mosaic of substrate and vegetation such that the environment of a point in time and space can be reconstructed from an analysis of the molluscan fauna.

The aquatic environment also varies along this geographical transect, although changes are more gradual and often subtle. However, Aquilla Lake occurs in the transition zone between the Coastal Plain to the east and the more upland piedmont zone to the west. Freshwater mussels and, to a lesser extent, snails also reflect these habitat differences, allowing similar opportunities for environmental reconstruction.

All molluscan samples reported herein were received sorted and in labeled bags. I wish to thank the anonymous (to me) workers who performed this arduous task. All samples of snails were from material which was retained by 1/4 inch screen. Such methods allow a multitude of smaller individuals to pass into the backdirt pile, forever lost to meaningful interpretation. Absence of these smaller specimens reduces the diversity of the recovered fauna and precludes detailed analysis of the habitats present in the surrounding environment. However, some significant local habitat reconstruction can be accomplished from the available samples.

Scientific names utilized in this report will differ, to some extent, from names used by previous workers involved in studies of freshwater mussels of the Aquilla Lake study area. Below is a list of equivalent names; on the left side are names utilized in this report; the list on the right consists of names for the same taxa used by previous workers.

APPENDIX III

Amblema plicata	*Amblema plicata perlplicata*
Lampsilis hydiana	*Lampsilis radiata siliquoidea*
Lampsilis teres	*Lampsilis anodontoides*
Potamilus purpuratus	*Proptera purpurata*
Quadrula apiculata	*Quadrula quadrula* and *Quadrula quadrula forsheyi*
Toxolasma texasensis	*Carunculina texasensis*

These name changes reflect current thinking by taxonomic workers, including this author who is currently researching a survey of the freshwater mussels of Texas.

Molluscan shells were available from two sites: 41HI105 (McDonald Site) and 41HI115 (McKenzie Site). Analysis of these two sites will be made in sequence. Following these two sections, a summary of the significance of the recovered molluscan samples will be provided.

41HI105 - MCDONALD SITE

The McDonald Site occurs on modern alluvial deposits of Hackberry Creek above its confluence with Aquilla Creek. Molluscan samples from the site included terrestrial snails as well as freshwater snails and bivalves from a column of 35 levels which included a major midden deposit. In addition, freshwater mussels from a single surface (Surface II) were collected in a grid pattern. Figures III.1 and III.2 illustrate the distribution of molluscan remains across this occupation surface.

Large amounts of snails and clam shell were present in the column taken from this site (tables III.1 - III.3). Snails were recovered from all layers; clams were present in all but the top five levels.

Clam shells from the lowest level (35) appear to be water worn, which indicates deposition of flood debris. Above this level, the lower levels of this column were vastly dominated by *Amblema plicata* with moderate amounts of *Lampsilis hydiana*. Minor amounts of *Quadrula petrina*, *Cyrtonaias tampiconensis*, *Lampsilis teres*, *Quadrula aurea* and *Potamilus purpuratus* were also present. Greater numbers of individuals and species are present in levels 6 through 14. Clam shell weight peaks in levels 8 to 11, which coincides with a peak in amount of debitage (David Brown, personal communication). Above this peak, clam shell weight declines rapidly.

Table III.1. Terrestrial and Aquatic Snails and Fingernial Clams from Column in 41HI105 N520/W543.

Level	Helicina orbiculata	Mesodon roemeri	Polygyra texasiana	Praticolella berlandierana	Rabdotus morreanus	Physella virgata	Planorbella anceps	Sphaerium transversum	Sphaerium striatimum
1	77	5	3	1	17				
2	73	6	2	1	13				
3	38	12	6	1	27	2	2	1	
4	28	18	3		22		1		
5	3	1			4		1		1
6	3	22			2				
7	18	15		2	5				
8	60	22	27	22	212		2		
9	7	9	7	12	155				
10	1	4	1	3	119				
11		1	1		178				
12			1		223				
13			3		27		1		
14			1	1	8				
15		1	4	4	19				
16			2	1	22		1		
17				4	24				
18			2	3	8				
19				3	38				
20			2	1	55				
21			2	2	38				
22			4	3	57		2		
23			3	2	54				
24			4		26				
25			2	1	32				
26		1			45		1		
27				4	219				
28		1	3	3	16				
29			1	4	24				
30		2	7	5	42				
31		1	7		23		1		
32			1		21				
33			3		20				
34			1		21				
		1			20		2	1	

APPENDIX III

Fig. III.1 Distribution of Freshwater Mussels, Surface II, 41HI105

	W544	W543	W542	W541
N526			2 Amblema plicata 1 Potamilus purpuratus	
N525			5 Amblema plicata	
N524	1 Amblema plicata 1 Lampsilis hydiana 1 Lampsilis teres	2 Amblema plicata 1 Lampsilis hydiana 1 Lampsilis teres	1 Lampsilis hydiana 1 Quadrula apiculata	
N523	2 Lampsilis hydiana 1 Lampsilis teres	2 Amblema plicata 3 Lampsilis hydiana 1 Potamilus purpuratus	5 Amblema plicata 3 Lampsilis hydiana 1 Lampsilis teres 1 Potamilus purpuratus 1 Leptodea fragilis	1 Amblema plicata 1 Lampsilis teres
N522	7 Amblema plicata 5 Lampsilis hydiana 2 Lampsilis teres 1 Potamilus purpuratus	5 Amblema plicata 2 Lampsilis hydiana 2 Lampsilis teres 1 Potamilus purpuratus	9 Amblema plicata 3 Lampsilis hydiana 1 Lampsilis teres 1 Potamilus purpuratus 1 Quadrula apiculata 1 Cyrtonaias tampicoensis	4 Amblema plicata 1 Lampsilis teres
N521			12 Amblema plicata 5 Lampsilis hydiana 1 Megalonaias gigantea	3 Amblema plicata 1 Lampsilis hydiana 1 Lampsilis teres 1 Potamilus purpuratus
N520			7 Amblema plicata 1 Lampsilis teres 1 Potamilus purpuratus 1 Toxolasma texasensis	1 Megalonaias gigantea

Fig. III.2 Distribution of Terrestrial and Aquatic Snails, Surface II.

	W544	W543	W542	W541
N526			6 Rabdotus mooreanus	
N525	1 Mesodon roemeri 12 Rabdotus mooreanus	1 Helicina orbiculata 1 Mesodon roemeri 1 Praticolella berlandieriana 1 Rabdotus mooreanus	1 Rabdotus mooreanus	
N524	1 Praticolella berlandieriana 40 Rabdotus mooreanus	1 Helicina orbiculata 1 Mesodon roemeri 2 Polygyra texasiana 2 Praticolella berlandieriana 4 Rabdotus mooreanus	1 Helicina orbiculata 1 Mesodon roemeri 1 Polygyra texasiana 1 Praticolella berlandieriana 3 Rabdotus mooreanus 1 Planorbella anceps	
N523	1 Helicina orbiculata 1 Praticolella berlandieriana 4 Rabdotus mooreanus	1 Helicina orbiculata 1 Mesodon roemeri 1 Polygyra texasiana 3 Praticolella berlandieriana 6 Rabdotus mooreanus	6 Helicina orbiculata 1 Mesodon roemeri 5 Praticolella berlandieriana 8 Rabdotus mooreanus	1 Praticolella berlandieriana 2 Rabdotus mooreanus 1 Planorbella anceps
N522	1 Helicina orbiculata 1 Mesodon roemeri 1 Polygyra texasiana 1 Praticolella berlandieriana 99 Rabdotus mooreanus 1 Polygyra mooreana	3 Helicina orbiculata 3 Mesodon roemeri 1 Praticolella berlandieriana 15 Rabdotus mooreanus	2 Mesodon roemeri 4 Polygyra texasiana 34 Rabdotus mooreanus	1 Praticolella berlandieriana 5 Rabdotus mooreanus
N521			2 Mesodon roemeri 1 Praticolella berlandieriana 33 Rabdotus mooreanus	3 Mesodon roemeri 1 Praticolella berlandieriana 7 Rabdotus mooreanus
N520			3 Rabdotus mooreanus	

Snail shell weight is generally low in the lower levels, except for a large total in level 27. Snail weight also peaks in levels 8 to 12, but snail shell occurs in all of the uppermost levels, in contrast to the absence of clam shell at the top of the column.

Analysis of the snail species present indicates an early (lower levels) occurrence of exposed or prairie environments (dominance of Rabdotus mooreanus) with some woodland present (presence of Mesodon roemeri), possibly marginal to the site. Upper levels (1 - 11) indicate a better developed woodland, possibly including trees at the site itself. Existence of these woodlands is indicated by the present surface.

Clam species present indicate a moderate size stream with calcareous waters. Substrate was soft (sand and/or mud) as opposed to rocky. Water current velocities were sufficient to result in rather clear water.

Several trends in the data indicate the occurrence of only marginal food supplies (for humans) at this site as well as the possibility of food resource depletion. Several strikingly small valves are present in the midden deposit. One Quadrula apiculata is less than 30 millimeters in length, while one shell of A. plicata, at 90 millimeters length, illustrated the presence of a few very large specimens. Either food was scarce or all shells encountered were retained. Perusal of the clam shells reveals a progressive decrease in the size of the largest clam in a particular level from the lower levels to the upper levels. Uppermost levels with clams contain only very small specimens. This trend is compatible with, but not sufficient to prove, a hypothesis of resource depletion.

41HI115 - MCKENZIE SITE

The McKenzie Site is in the cut bank of a gully off the main branch of Hackberry Creek in the upper part of the western arm of Aquilla Lake. The site is buried about 280 centimeters below the modern surface of an alluvial terrace. Shells of freshwater mussels and terrestrial snails comprise most of the culturally modified or utilized material as little lithic debitage was recovered.

Molluscan material was collected from a trench dug along the side of a shell midden (tables III.4 and III.5). Also available was shell material from a surface which was mapped into a grid. Terrestrial gastropods recovered from this site were almost entirely Rabdotus

Table III.2. Freshwater Mussels from Column in 41HI105 N520/W543.

Level	Amblema plicata	Arcidens confragosus	Cyrtonaias tampicoensis	Lampsilis hydiana	Lampsilis teres	Megalonaias gigantea	Potamilus purpuratus	Quadrula apiculata	Quadrula aurea	Quadrula houstonensis	Quadrula petrina	Toxolasma texasensis
1												
2												
3												
4												
5												
6												
7												
8	16		1	4	1			1	2			
9	9		3	2	4			1	14	2		1
10	26		2	4	13	1		1	1		2	
11	42	1	2	5	2			3	6		2	
12	11			2	1		2		4			
13	16			4	3	1	1		2			
14	31			4	2			1	1			
15	6						2					
16	7											
17	8											
18	5											
19	4			1	1							
20	8			2					1			
21	7		1									
22	14			2	4							
23	4											
24	15											
25	4											
26	7			1								
27	7			9								
23	2			4								
29	14		1	9								
30	10			8								
31	6			12							1	
32	4			2								
33	1											
34	2											
35	29				(9*)							

*Lampsilis sp.

Table III.3. Shell Weights from Column in 41HI105 N520/W543.

Level	Snail Weight	Clam Weight	Snail/Clam
1	31.5		
2	21		
3	36		
4	38		
5	2.5		
6	25.5	0.5	51
7	23	0.5	46
8	240	879	0.27
9	152.5	608.5	0.25
10	107	1022	0.10
11		725.5	
12	408.5	392	1.04
13	32.5	149	0.22
14	7	264	0.03
15	22.5	45	0.50
16	25.5	293	0.09
17	17	56	0.30
18	7	31.5	0.22
19	35	62	0.56
20	50	189	0.26
21	34.5	77	0.45
22	54	188	0.29
23	40.5	91.5	0.44
24	19	107	0.18
25	32.5	56.5	0.58
26	40	91.5	0.44
27	438	102	4.29
28	13.5	50.5	0.27
29	12	248	0.05
30	28	127.3	0.22
31	23	206.5	0.11
32	9	76	0.12
33	8	20	0.40
34	16	30	0.53
35	5.5	117.5	0.05

Table III.4. Occurrence of Terrestrial Snails and Freshwater Mussels in Trench in 41HI115.

Quadrant/Level	Mesodon roemeri	Polygyra texasiana	Rabdotus mooreanus	Amblema plicata	Lampsilis hydiana	Quadrula apiculata	Megalonaias gigantea
N48/W50							
2			14				
3	1	2	27	14	7		
4			16	7	1		
5			5	2	1		
6			1	2			
N49/W50							
2			12	7	2		
3		2	12	18	5		1
4		1	2	6	2		
5			4				
6			3				
N50/W50							
1			27	1			
2			29	5			
3			8	29			
4				4	6		
5				9	1		
6				8	2		
N51/W50							
1		1	42	1			
2		6	37	11	9		
3			11	27	11	1	
4			2	12	5		
5			1	2	3		
6			1	1			
7				1	1		

Figure III.3
Distribution of Freshwater Mussels, 41HI115.

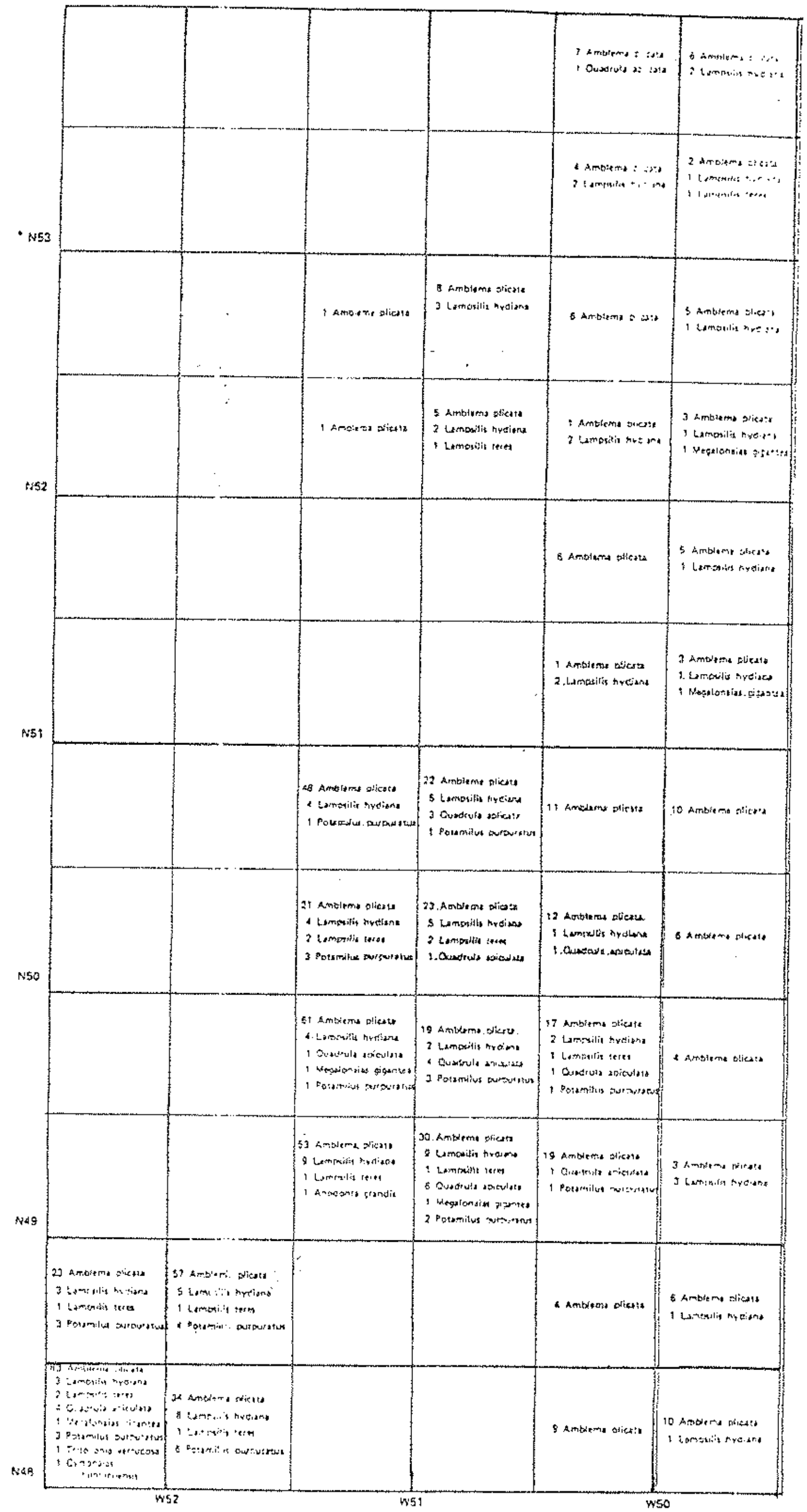

Table III.5. Shell Weights from Trench in 41HI115.

Quadrant/Level	Snail Weight	Clam Weight	Snail/Clam
N48/W50			
2	8	6	1.33
3	16	381	0.04
4	10.5	85.5	0.12
5	2.5	19.5	0.13
6	0.5	21	0.02
N49/W50			
2	8.5	62	0.14
3	11.5	523	0.02
4	2.5	115.5	0.02
5	2.5		
6	2.5		
N50/W50			
1	16.5	2.5	6.6
2	28	66	0.42
3	12	710	0.02
4		149	
5		112	
6		156	
N51/W50			
1	19	5	3.8
2	23	166	0.14
3	9	682	0.01
4	2.5	326	0.01
5	2.5	82.5	0.03
6		15	
7	2.5	11.5	0.22

mooreanus. This species is indicative of prairie conditions. No suggestion of woodland is given by the snails recovered. Numbers of R. mooreanus are greatest in the upper levels of this trench, at and above the level of the peak number of clam shells.

A very large number of clam shells were recovered from the mapped midden level (Figure III.3 and Table III.6). Of a total of 770 clam valves, 613 (79.6%) were Amblema plicata. This species, along with four others (Lampsilis hydiana, Potamilus purpuratus, Quadrula apiculata and Lampsilis teres) form 99.0% of the total number of clam valves. Significant rare species were Megalonaias gigantea, which is usually found in 8 to 15 feet of water, and Anodonta grandis, which is rarely found in archeological sites, at least partly due to fragile valves.

This area was probably an impacted area in or along the edge of a prairie with few large snail species. The clam and snail fauna are both of less diversity than samples recovered from the McDonald Site. Cultural evidence does not indicate whether the clams in this shell midden were deposited over a matter of days or years. The paucity of snails in the midden may indicate that the clam shells were accumulated very rapidly, allowing for little development of snail populations.

DISCUSSION

Both of the above sites contain large clam middens that contain many (41HI105B) or a few (41HI115) shells of Rabdotus mooreanus. Much debate has centered on the origin of these Rabdotus shells in various archeological sites in Central and South Texas. Possible origins which have been hypothesized include the following: 1) Rabdotus shells indicate a food source for Amerindian populations in this geographical area; 2) Rabdotus populations develop in midden remains which contain organic and shell debris; 3) "natural" occurrence of Rabdotus shells due to acts of predators or normal death processes; and 4) use of shells for ornamental or ceremonial purposes. Review of the literature and analysis of several sites by this author has convinced me that the origin of Rabdotus shells in archeological sites can be due to any of the above processes.

At the two sites examined in this study, the origin of the Rabdotus shells appears to be due to reproductive populations that developed in fresh midden material. Clam shell provides a source of calcium for the shell of the snail while remnant clam meat and other organic remains provided sustenance for the living snails.

Selection of method 2 for these two sites is due to a pattern of peak Rabdotus occurrence at and above levels of peak clam shell occurrence. A number of Rabdotus not of adult size but large enough to be retained by 1/4 inch mesh screen indicate that some immature Rabdotus were present. Interestingly, those layers that contain the woodland snail, Mesodon roemeri, contain very few immature specimens

Table III. Summary Count of Freshwater Mussels from Mapped Floor, 41HI115.

Species	Number of Valves	Percent	Running Percent
Amblema plicata	613	79.6	79.6
Lampsilis hydiana	83	10.8	90.4
Potamilus purpuratus	29	3.8	94.2
Quadrula apiculata	23	3.0	97.2
Lampsilis teres	14	1.8	99.0
Megalonaias gigantea	4	0.5	99.5
Anodonta grandis	2	0.3	99.8
Tritogonia verrucosa	1	0.1	99.9
Cyrtonaias tampicoensis	1	0.1	100.0

of *M. roemeri*. Although *M. roemeri* were attracted to the fresh midden debris (at 41HI105), little or no reproduction occurred.

Only a small portion of the clam shells showed evidence of burning. Undoubtedly, the burned portion was originally larger than that revealed in these samples. Burned shell disintegrates much faster than non-burned shell. An assumption can be made that the people who left behind this midden debris either ate most of the clams raw, cooked them without charring the shell, or cooked them following removal of the meat from the shell. Most of the clams were broken at the posterior, a characteristic of human opened shells. A few large shells showed no evidence of breakage, but unbroken shells tended to be small valves.

The recovered freshwater mussel fauna is much more diverse than the present day fauna (see Fullington 1979). Reasons for the paucity of the modern fauna may be partially due to human impact (increased sediment load due to farming activities), but change in runoff patterns due to climatic variations may also be significant. The clam fauna from these archeological sites indicates a larger amount of water in Hackberry Creek than existed at the time of impoundment of Aquilla Lake. Determination of the relative roles of climatic change and human impact is not possible at this time.