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GROWTH OF *AMBLEMA PERPLICATA* CONRAD
(PELECYPODA) IN A TEXAS RIVER

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Growth studies of fresh-water clams under natural conditions in this country are rather scarce. Lefevre and Curtis (1912) recovered 3 *Lampsilis ventricosa* Barnes at LaCrosse, Wisconsin, where they were kept for 2 years (June, 1908-November, 1910) in a wire cage. Howard (1922) reported that 10 *Quadrula pustolosa* Lea, maintained in a concrete lined pond at Fairport, Iowa (1913-1916) grew an average 4.44-19.79 mm. Grier (1922) and Chamberlain (1931) recorded the age and growth (based on an analysis of rings) of several species of clams from different areas of the United States.

Our material was originally collected for a study in parasitology.

The data are presented here, nevertheless, to show the growth of a clam from a southwestern river, under natural conditions (excluding possible pollution), and to obtain some general idea of the existing population and its abundance.

MATERIALS AND METHODS

On April 7-8, 1966, a total 190 live clams were collected from an area in the Little Brazos River, approximately 5 miles from the mouth (Robertson County, Texas). The pool was 40 m in length, 5-7 m wide, with an average depth of 1 m. The bottom topography consisted of loose sand and hard, even mud. The clams were burrowed in the mud in clumps or occurred singly. The river itself flows slowly through a flat agricultural region, and undoubtedly contains varying amounts of insecticide residuals.

The unsexed mollusks were placed in pails of river water until they were marked, weighed and measured. The clams were dried with a towel and numbered on their disks with red fingernail polish. They were weighed to 0.1 g and measured (height and length) to the nearest mm, and returned to the same pool. No mollusk was out of the stream longer than 3 hours.

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Table 1. The species and records

Species
<i>Amblema perplicata</i>
<i>Proptera purpurata</i>
<i>Anodonta corallinea</i>
<i>Quadrula forneyi</i>
<i>Quadrula houstoniana</i>
<i>Lampsilis</i> sp. A
<i>Lampsilis</i> sp. B

*1 dead (not included)

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On September 16, clams were found. A were also found. (If they were new to the numbers.) One dead.

In Table 1 the 6 marked are compared. The washboard clam abundant species in comparison was made of length and height. Additionally, there was an increase in size, and increase in length. The

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Table 1. The species and number of clams (living) present and recovered from a pool in the Little Brazos River. (Robertson County, Texas)

Species	Number of clams marked April 7-8	Number recovered September 16
<u>Amblema perplicata</u>	110	44*
<u>Proptera purpurata</u>	32	2
<u>Anodonta corpulenta</u>	18	1
<u>Quadrula forsheyi</u>	16	
<u>Quadrula houstonensis</u>	5	
<u>Lamplailis</u> sp. A	5	
<u>Lamplailis</u> sp. B	4	
Total	190	46

*1 dead (not included in Fig. 2)

Chemical or physical data were not obtained. According to the U. S. Weather Bureau, rainfall was approximately 22 inches for the period under study; the river over-flowed on at least one occasion.

RESULTS

On September 16, 1966, after a careful search 45 living, marked clams were found. An undetermined number of unmarked clams were also found. (There were all similar in size, and it is assumed they were new to the pool and not marked clams with eroded numbers.) One dead marked clam was also located.

In Table 1 the total number of species initially found and marked are compared to the marked ones subsequently recovered. The washboard clam, *Amblema perplicata* Conrad, was the most abundant species in both collections. As noted in Table II, a comparison was made of individual growth rates, in terms of weight, length and height between April 7 and September 16. Occasionally, there was an increase in weight without a concomitant increase in size, and in a few cases there was actually a small decrease in length. The dead, marked *A. perplicata* had grown 9 mm

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Table 2. A comparison of the growth of *A. perplicata*, (Group I, the 6 smallest; Group II, 6 of intermediate range; Group III, the 6 largest) *P. purpurata* and *A. corpulenta*.

Species	Weight (grams)		Length (mm)		Height (mm)	
	April	Sept.	April	Sept.	April	Sept.
<i>A. perplicata</i>	15.9	33.0	39	48	32	40
	24.9	46.6	45	56	38	46
	34.2	dead	51	60	42	46
Group I	41.3	69.7	55	65	43	51
	42.5	65.6	63	64	44	55
	43.7	65.2	54	61	44	51
	170.0	191.7	86	90	69	70
	170.1	191.5	81	84	67	68
Group II	170.1	175.9	90	80	67	67
	180.2	188.6	87	88	67	67
	180.3	187.9	95	95	65	65
	182.4	193.7	83	85	68	68
	245.4	255.4	101	102	76	77
	249.0	260.0	96	97	73	73
Group III	255.1	264.0	104	104	73	73
	271.9	281.4	101	101	76	76
	272.0	280.8	97	95	70	70
	309.2	320.9	106	106	78	78
<i>P. purpurata</i>	57.2	78.5	65	73	47	51
	63.2	76.0	67	72	48	51
<i>A. corpulenta</i>	152.9	153.0	105	105	65	65

in length before drying. The April collection group contained the smallest population between 6 and 7 cm, but had a relatively large population below and above that length (Fig. 1). In September, the largest population consisted of clams that were over 8 cm in length with only one specimen falling below 6.5 cm.

In Figure 2 the relationship between weight and length is shown for the 110 *A. perplicata* from the April collection.

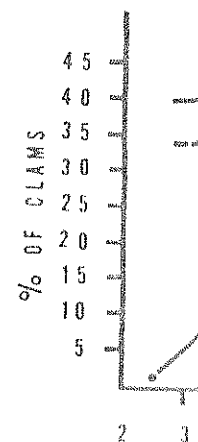


Figure 1. The length April collection as compared collection.

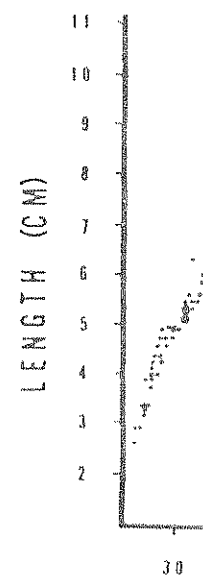


Figure 2. Scatter diag and total shell length in Little Brazos River. 110 clams of the same length.

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48	32	40
46	38	46
60	42	46
65	43	51
64	44	55
61	44	51

90	69	70
74	67	68
80	67	67
88	67	67
95	65	65
85	68	68

02	76	77
97	73	73
04	73	73
01	76	76
95	70	70
06	78	78

73	47	51
72	48	51

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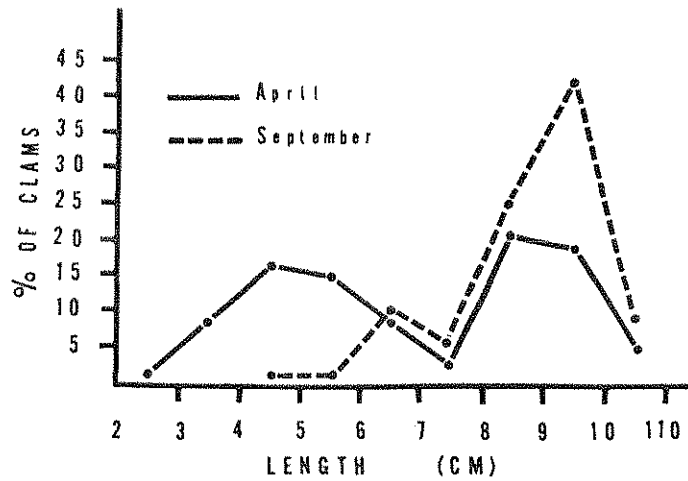


Figure 1. The length-frequency for 110 *Amblema perplicata* from the April collection as compared with 43 *Amblema perplicata* from the September collection.

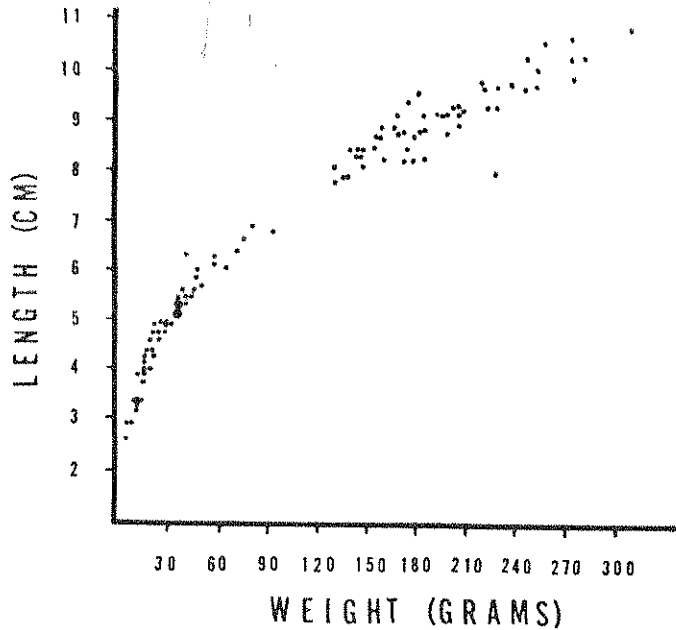


Figure 2. Scatter diagram of the relationship between weight (living) and total shell length for 110 *Amblema perplicata* from a single pool in the Little Brazos River, Robertson County, Texas. Large circles represent 2 to 4 clams of the same length and weight.

DISCUSSION

Amblema perplicata was clearly the most abundant clam (Table I). This substantiates the data of Gentner and Hopkins (1966) who reported similar findings. *Proptera purpurata* Lamarck, the second most prevalent species in this study, was not reported by the above workers after the 1950-1956 drought; the cause of this fluctuation is unknown.

The relatively fast growth of the younger clams as compared to older ones is similar to the growth pattern of most multicellular organisms. Okland (1963) found the same growth in a European clam, *Anodonta piscinalis* Nills. It appears that many of the larger clams reached a stationary phase in length and height; nevertheless, all clams except the *Anodonta corpulenta* Cooper gained several grams. Although all *A. perplicata* increased in weight, it seems certain that a few were approaching a plateau. For example, notice the clams weighing 245.4 and 309.2 grams respectively, from the April collection (Table II).

That these relatively large clams had reached a stationary phase in growth becomes more apparent when one considers the period of the study was made within a maximal growth period (Howard, 1922). Similarly, Rubbel (1912) observed relatively slower growth in larger *Margaritana margaritifera*.

The individual variation in growth is difficult to evaluate. For example, in April we found 3 *A. perplicata* that weighed 170.0 to 170.1 g, respectively (Table II). Two of these clams gained approximately 21 g in weight and 3-4 mm each in length. The 3rd bivalve gained less than 6 g in weight and did not grow lengthwise.

The relatively small 6 to 7.5 cm population (64 to 120 g in wt) of *A. perplicata* in the April group could reflect the ill effects of the 1950-1956 drought. The greatest percentage of *A. perplicata* in the September collection were the larger clams. This suggests that smaller mollusks (under 50 g) were unable to re-establish themselves after they were returned to the pool, or alternatively, were dislodged more readily during a flash flood.

Since all clams were recovered from the same pool in which they were originally found, there was a lack of migration for these specimens. Presumably, the unmarked clams (all were *A. perplicata*) moved in from other areas of the stream, as they were approximately all the same size. (It is unlikely the fingernail polish

dissolved since the prevalence of mark deterioration in length than the length obtained, growth was

We thank Professor [unclear] for the manuscript.

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ACKNOWLEDGEMENT

We thank Professor Harold Harry for reading and criticizing the manuscript.

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ALTERATIONS IN THE MOLLUSCAN FAUNA OF A MEROMICTIC, MARL LAKE

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ABSTRACT

Documented alterations of the physical characteristics in Green Lake, Onondaga County, New York, have correlated with changes in the species composition of the molluscan fauna. Data indicates that in the recent past rather extensive shallow littoral waters supported dense populations of the larger pulmonate gastropods. A reduction in lake level occurred that practically destroyed these warm shallow areas. At this time, the littoral zone consists of an