CHANGES IN THE GASTROPOD POPULATIONS IN THE SALT FORK OF THE BIG VERMILION RIVER IN ILLINOIS, 1918 - 1959[1]

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I. INTRODUCTION

Between 1918 and 1920 Frank Collins Baker made a survey of the mollusks in the Big Vermilion River in east-central Illinois (Baker, 1922). His study was made largely in the Salt Fork of that river. He collected from 30 stations located from the headwaters north of Urbana to the junction of the Salt Fork with the Middle Fork just west of Danville. It is at this point that the Big Vermilion is formed from its tributaries. Baker was especially interested in the bivalves, but he collected all mollusks over a stream distance of 45 miles. He worked by hand — collecting to the depth of about two feet. Habitats included mud, sand, and gravel, with occasional piles of rubble and boulders. The drainage area is an upland plain which was glaciated by the early Wisconsin Glacier. Between 1908 and 1912, the channelway of the Salt Fork between Urbana and St. Joseph (Stations 4 - 12) was dredged, destroying all bottom vegetation and fauna.

This drainage system receives the effluent from the Urbana-Champaign Sewage Disposal Plant. In 1918 this plant discharged 1.5-2.0 million gallons per day with about 20 percent purification. In 1958 the plant discharged up to 8 - 10 million gallons per day with about 85 percent purification. As the volume of effluent increased, the degree of purification also increased, so that the actual amount of pollution has remained at about the same level. (Information from E. S. Beatty, Engineer-Manager, Urbana-Champaign Sewage Treatment Plant.)

Between 1934 and 1953 the writer collected gastropods in the five drainage systems of Champaign County, including three of Baker's original stations, plus nine others in the watershed of the Salt Fork (Dexter, 1956). Between 1956 and 1959 the writer repeated Baker's survey of the Salt Fork, except for four stations which lie outside of the main channel of this drainage. Gastropods only were collected, and the time spent at each station was approximately one-half the time Baker spent in his collection of all mollusks. Comparative results are given in Table I.

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TABLE 1.— COMPARISON OF GASTROPOD POPULATIONS IN THE SALT FORK OF THE BIG VERMILION RIVER, ILLINOIS, 1918-1959.

SPECIES	STATION NUMBERS												
	1	2	3	4	5	6	7	8	9	12	13	14	15
Physa spp.	0-C	A-C	A-A	A-C	0-C	0-A	O-A	0-C	0-C	4-C	C-C	C-12	0-C
Ferrissia rivularis;													
Ferrissia tarda	0-C	0-C	S-0	0-A	0-5	0-1	0-4	0-10	0-10	3-3	0-8	0-A	0-C
Helisoma trivolvis		S-2	A-A	0-9	0-1	0-11	0-1			0-S	C-0	C-0	0-1
Lymnaea humilis		S-0	0-8	C-C		0-1	0-1			0-2			
Goniobasis livescens													
Pleurocera acutum													
Amnicola limosa													
Promenetus exacuous			0-1										
Deroceras sp.			0-1										

	16	17	18	19	20	21	22	23	24	25	26	28	30
Physa spp.	0-14	0-14	C-C	3-0	C-1		0-2			A-1		0-2	C-3
Ferrissia rivularis;													
Ferrissia tarda	A-4	S-C	1-C	A-C	A-2	0-C	C-C	0-17	0-7	O-A	0-C	0-2	0-6
Helisoma trivolvis		S-1	S-0										
Lymnaea humilis				2-0									
Goniobasis livescens			S-0							A-C	A-A	0-6—A-C	
Pleurocera acutum										0-A			
Amnicola limosa			S-0	C-0	S-0								
Promenetus exacuous													
Deroceras sp.													
Campeloma rufum			1-0	1-0						A-0			

First symbol is number collected by P. C. Baker, 1918-20; second symbol is number collected by R. W. Dexter, 1956-59. A = abundant; C = common; S = scarce.

II. CHANGES IN THE GASTROPOD FAUNA: 1918-20 (Baker) — 1956-59 (Dexter)

A. Discussion by Species

Physa spp. Baker (1922) listed P. gyrina and P. crandalli. Specimens collected by the writer were identified by Dr. W. J. Clench as P. gyrina and P. integra. Specimens sent to Dr. C. B. Wurtz were identified as P. integra and P. heterostropha. Brown (1935) reported P. anatina from from the sewage disposal plant and in the nearby drainage ditch. Her specimens had been identified by Dr. W. J. Clench. Because of the uncertain specific determination in this group and the mixed nature of the population, all records are grouped together under the genus for the purposes of this study. In the first study (Baker) Physa spp. were more abundant at four stations, while in the second survey (Dexter) Physa spp. were more abundant at ten stations. (All differences in abundance reported in this study are based upon obvious differences noted in the field data. See Table I for complete field data.) In the first survey Physa was found to a greater extent downstream, while in the second survey this group was found to a greater extent upstream. Baker found this group at 11 stations, while the writer found it at 21 stations.

Ferrissia tarda. Baker listed his collection of limpets as *F. rivularis,* but Hoff (1940) identified Salt Fork limpets which he studied as *F. tarda,* and Dr. Paul Basch identified collections of the writer also as *F. tarda.* (In a recent private communication Dr. Basch stated that he is not certain whether these two species can be distinguished. If they prove to be identical, *F. rivularis* will have priority). In the first survey it was more abundant at 13 stations. It was found at only eight stations during the first survey, but at 25 stations during the second survey (in all stations studied, except the oxbow pond at station 3). *Ferrissia* has undergone a tremendous increase in abundance and distribution.

Helisoma trivolvis. Baker recorded this species, including *H. t. pseudotrivolvis* Baker, at six stations, while the writer collected this species from nine stations. It was more abundant at five stations in the original survey, but more abundant at three others during the last survey. Baker found the species farther downstream, while the writer collected it farther upstream.

Lymnaea humilis. Baker placed this species in the genus *Galba* while other writers have often placed it in the genus *Fossaria.* For the present, it seems best to assign it to *Lymnaea.* Baker found this species in three stations, whereas the writer found it at five stations. It was more abundant at one place in the original survey, and more abundant at one station in the later survey. Altogether there is no indication of much change between the two periods of time.

Goniobasis livescens. In both surveys the species was found at four stations. Baker found it more abundant in one of these, and the writer found it more abundant in another one. In the early years it was found somewhat farther upstream, but otherwise there was no important difference in the abundance and distribution of this species.

Pleurocera acutum. Baker referred to this as *P. elevatum,* but there is no question that his specimens were what we now regard as *P. acutum.* Baker found only a single empty shell, while the writer found an abundance of this snail living at station 25.

Campeloma rufum. Baker found this species at three stations, and it was abundant at station 25. It was not collected at all between 1956-59. This matter will be discussed further below.

Amnicola limosa. This is a pond species which Baker found in three places among vegetation growing in the stream. The writer did not encounter this type of habitat except in the oxbow at station 3 and did not collect this species.

Promenetus exacuous and *Deroceras* sp. These two were found among the vegetation of the oxbow at station 3 and, like the preceding species, are found in pond habitats. These two were not collected by Baker.

B. Discussion by Stations

Baker found 11 stations without gastropods (Stations 1, 5-9, 15, 21, 23, 24, and 28 had no population). In the recent survey there was no station without gastropods. One to four species are now found where Baker collected none. In six stations one species replaced another between the two periods of collecting. These changes involved seven species.

At station 25 the writer collected one specimen of *Physa* sp. on Feb. 16, 1935. It was rare at that time, as it was later in 1959. Baker, however, found abundant *Physa* at that station in 1918-20. The writer collected 168 *Goniobasis livescens* on March 28, 1935. There has been a noticeable decrease in abundance of this species at this location since that time. While Baker

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found no living Pleurocera acutum in the Salt Fork system, the writer collected several near Oakwood, a short distance below station 25, on Oct. 20, 1934. Six were collected in March of 1935 at station 25, and the species was common there between 1956-58. This has undergone a tremendous increase in abundance in recent years. On the other hand, Baker found an abundance of Campeloma at station 25. While the writer collected a number of specimens at that locality in the fall of 1934 and the spring of 1935, none was found in the survey of 1956-59.

C. General Comparison and Conclusions

The recent snail populations show an increase in abundance for 20 station records (34.6%) involving five species. On the other hand, the recent populations show a notable decrease in abundance for 18 station records (22.2%) involving seven species. A total of 23 station records (28.4%) show about the same abundance at the end of 40 years.

There has been a general increase in abundance for Physa and Ferrissia. It has recently been shown that F. tarda, formerly found attached to the nacre of shells of river mussels, has now in the absence of mussel shells taken over attachment to the fresh surface of bottles and cans dumped into the river (Dexter, 1959). The accumulation of such trash has perhaps been responsible for much of the increase of this species.

There has been in recent times a wider distribution of Physa, Ferrissia, and Helisoma, and no species has shown a contraction of distribution.

Two species were not found in the recent survey (Campeloma rufum and Amnicola limosa), but only the former is a typical stream species. On the other hand, Pleurocera acutum has been added to the stream fauna. Physa and Ferrissia remain as the most abundant and widely distributed species.

In general gastropods are somewhat more abundant and widely distributed in this stream after a period of 40 years.

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