

ramus not shown in his figure. This seta is, however, so delicate, that it was almost overlooked in the Florida specimen, and it is quite possible that the same may be true in the case of those from Columbia.

Occurrence.—Three miles north of Fort Meyers (flowing wayside ditch, Aug. 17).

Distribution.—This species otherwise is known only from the United States of Columbia (South America).

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The Naiad Fauna of the St. Joseph River Drainage in Southwestern Michigan

Henry van der Schalie

In view of the decided changes which have occurred in the Naiad fauna of the St. Joseph River drainage due to domestic sewage, industrial wastes, water-power development, and the depletion of the fauna as a result of extensive clamming operations, it seems advisable to summarize the data contributed by other workers, notably Call (1900), Wenninger (1921), and Dolley (1933), and to add data available from my own records. It is unfortunate that no careful survey was made of the fauna before the drainage was subjected to so many detrimental influences. However, though much valuable data will of necessity be lacking, we may still piece together the available information in an attempt to formulate a better knowledge of the fauna.

The first distributional list of the Naiades of the St. Joseph River was given by Call in 1900. The species reported by him are included in Table I. Though this list includes the largest number of species in that table, it contains obvious inaccuracies. This may be due to several reasons of which perhaps the most probable are that Call may have received specimens erroneously labelled, or he may have listed species for this drainage which were really from the St. Joseph of the Maumee. I am inclined to think that the latter reason is the more logical since an examination of his list indicates that the six species at the bottom of that list, starting with *Obovata cubotunda* and continuing through *Ligula nodata*, are all species common to the Maumee drainage, and drainages of Lake Erie in southeastern Michigan, but none of them are found in the St. Joseph River (Lake Michigan drainage). Wenninger (1921) published a preliminary report of the *Unionidae* based on collections probably made in the lower part of the St. Joseph drainage, because all the species represented are typical of large-river conditions, and the species missing from his list are mainly those common to creek and headwater conditions. Dolley (1933) added a few up-stream species to those reported by Wenninger. This is clear from the fact that *Elliptio dilatatus*, *Strophitus rugosus* and *Ancodontoides ferrussacianus* are common headwater forms. On the other hand, none of the lists, except Wenninger's, include *Proptera alata*, *Leptodea fragilis* and *Truncella donaciformis*. These three species are known only from Lake Michigan or the mouth of the river itself where they occur as casual migrants from the lake.

TABLE I

Comparative table to show species recorded from St. Joseph drainage.

	Weninger, 1921	Schäfer, 1930	van der Schatte, 1933	Dolley, 1933	Call, 1900
<i>Lampsilis ventricosa</i> -----	x	x	x	x	x
<i>Lampsilis siliquidea</i> -----	x	x	x	x	x
<i>Actinonates carinata</i> -----	x	x	x	x	x
<i>Ligumia recta latissima</i> -----	x	x	x	x	x
<i>Micromya iris</i> -----	x	x	x	x	x
<i>Proptera alata</i> -----	x	x	x	x	x
<i>Leptodea fragilis</i> -----	x	x	x	x	x
<i>Truncella donaciformis</i> -----	x	x	x	x	x
<i>Anodonta grandis</i> -----	x	x	x	x	x
<i>Lasmigona costata</i> -----	x	x	x	x	x
<i>Alasmidonta marginata</i> -----	x	x	x	x	x
<i>Ambleria costata</i> -----	x	x	x	x	x
<i>Fusconia flava</i> -----	x	x	x	x	x
<i>Pleurobema cordatum coccineum</i> -----	x	x	x	x	x
<i>Cyclonaias tuberculata</i> -----	x	x	x	x	x
<i>Elliptio dilatatus</i> -----	x	x	x	x	x
<i>Lasmigona compressa</i> -----	x	x	x	x	x
<i>Strophitus rugosus</i> -----	x	x	x	x	x
<i>Actinonates ellipsiformis</i> -----	x	x	x	x	x
<i>Alasmidonta caelecolis</i> -----	x	x	x	x	x
<i>Anodontobolus fernsacianus</i> -----	x	x	x	x	x
<i>Truncella truncata</i> -----	x	x	x	x	x
<i>Dynomia triquetra</i> -----	x	x	x	x	x
<i>Obovaria subrotunda</i> -----	x	x	x	x	x
<i>Pleurobema elava</i> -----	x	x	x	x	x
<i>Obovaria elivaria</i> -----	x	x	x	x	x
<i>Micromya fabilis</i> -----	x	x	x	x	x
<i>Lampsilis fasciata</i> -----	x	x	x	x	x
<i>Ligumia nasuta</i> -----	x	x	x	x	x

From the data at hand we may list the following twenty-three species as definitely established in the St. Joseph drainage:

1. *Cyclonaias tuberculata* (Raf.)
2. *Ambleria costata* (Raf.)*
3. *Fusconia flava* (Raf.)
4. *Pleurobema cordatum coccineum* (Conrad)
5. *Elliptio dilatatus* (Raf.)

Unionidae:

Anodontinae:

6. *Strophitus rugosus* (Swainson)
7. *Anodonta grandis* Say
8. *Anodontobolus fernsacianus* (Lea)
9. *Lasmigona compressa* (Lea)
10. *Lasmigona costata* (Raf.)
11. *Alasmidonta caelecolis* (Lea)
12. *Alasmidonta marginata* (Say)

Lampsilinae:

13. *Proptera alata* (Say)
14. *Leptodea fragilis* (Raf.)
15. *Actinonates carinata* (Barnes)
16. *Actinonates ellipsiformis* (Conrad)
17. *Micromya iris* (Lea)
18. *Ligumia recta latissima* (Raf.)
19. *Lampsilis siliquidea* (Barnes)
20. *Lampsilis ventricosa* (Barnes)
21. *Truncella donaciformis* (Lea)
22. *Truncella truncata* Raf.
23. *Dynomia triquetra* (Raf.)

To the above two doubtful ones may be added:

Lasmigona complanata (Barnes) and *Quadrula pustulosa* (Lea), for which there is inconclusive evidence since these were only seen in an accumulation of mussels at a commercial plant at Three Rivers, St. Joseph County. *Ambleria costata* is reported in only one of the lists represented in Table I, and there are no records in the Museum of Zoology at Ann Arbor to indicate that it occurs in the St. Joseph. Yet, it may occur there since there are records of its occurrence in the Grand River in western Michigan. Additional information is desirable.

The species and localities visited in the St. Joseph River are charted in Table 2. Though not nearly sufficient data are available, we may provisionally group the species on a distributional basis, using information regarding the ecology and distribution of species from other drainages as a guide. The species in the St. Joseph drainage then roughly group themselves as follows:

I. Species limited to the mouth of the river:

- Leptodea fragilis*
- Proptera alata*
- Truncella donaciformis*

II. Species common to large-river conditions:

- Cyclonaias tuberculata*
- Pleurobema cordatum coccineum*
- Ambleria costata*
- Lampsilis ventricosa*
- Actinonates carinata*
- Fusconia flava*
- Truncella truncata*
- Lasmigona costata*
- (Alasmidonta marginata)?*
- (Ligumia recta latissima)*
- (Anodonta grandis)*
- (Lampsilis siliquidea)*
- (Micromya iris)*

* Parentheses indicate the species may be present, but is not common.

TABLE 2

Survey of the Naiades of the St. Joseph River.

	St. Joseph R., 1 mi. s. of Litchfield, Hillsdale Co.	St. Joseph R., 6 mi. ne. of Tekonsha, Calhoun Co.	St. Joseph R., 2 mi. se. of Union City, Branch Co.	St. Joseph R., 2 mi. s. of Leonidas, St. Joseph Co.	Nottawa Cr., 2 mi. w. of Leonidas, St. Joseph Co.	St. Joseph, 3 mi. nw. of Three Rivers, St. Joseph Co.	Portage River, 4 mi. ne. of Three Rivers, St. Joseph Co.	Patric River, 2 m. se. of Three Rivers, St. Joseph Co.	White Pigeon River, at White Pigeon, St. Joseph Co.	St. Joseph River, at Mottville, St. Joseph Co.	Spring Run, 3 mi. w. of Mottville, Cass Co.	Dowagiac Cr., at Niles, Berrien Co.	St. Joseph River, at St. Joseph, Berrien Co.
<i>Cyclonaias tuberculata</i>													
<i>Fusconota flava</i>	2	1	4			1		1					
<i>Pleurohema cordatum coccineum</i>				1									
<i>Flitiplo dilobatus</i>	1	8	20	2	8	2	1	5	2	8	2	4	
<i>Strophilota rugosus</i>	3	2	10	3	6	1							
<i>Anodonta grandis</i>	1												
<i>Anodontoides ferrussacianus</i>				1									
<i>Lasmigona compressa</i>	1												
<i>Lasmigona costata</i>	8	2	1										
<i>Alasmidonta celsicola</i>	4	3											
<i>Alasmidonta marginala</i>	1	1	1	3	1	1	2	2	2	2			
<i>Actinonaias carinata</i>													
<i>Actinonaias elliptiformis</i>		1	16	2	11	2		12	2	16			
<i>Microanya iris</i>		7	9	1	15	1	23	6	3	7			
<i>Lampisilis siliquoides</i>		10	2	2	13		14	3	3	1	5	2	
<i>Lampisilis ventricosa</i>						2							
<i>Dysnomia triquetra</i>		4	19	1	3	4							

III. Species common to medium-sized river conditions:

- Anodonta grandis*
- Lampisilis siliquoides*
- Flitiplo dilobatus*
- Strophilota rugosus*
- Alasmidonta marginala*
- Lasmigona costata*
- Dysnomia triquetra*
- Actinonaias elliptiformis* (*Microanya iris*)
- Fusconota flava*
- Ligumia recta latissima*
- Lampisilis ventricosa*

IV. Species common to headwaters:

- Strophilota rugosus*
- Microanya iris*
- Actinonaias elliptiformis*
- Fusconota flava*
- Alasmidonta marginala*
- Anodonta grandis*
- Alasmidonta celsicola*
- Anodontoides ferrussacianus*
- Lasmigona compressa*

V. Species common to creeks:

- Alasmidonta celsicola*
- Lasmigona compressa*
- Anodontoides ferrussacianus*
- Strophilota rugosus*

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