

aid of Dr. A. E. Ortman. Since the Meramec is in great danger of depopulation of its Naiades through ravages of pearl hunters, etc., it is thought worth while to publish the following list:—

- Family Unioniade (Swainson)
1. *Fusconia undata* trigona (Lea)
 2. *Amblyema (plicata) costata* (Raf.)
 3. *Megalomais heros* (Say)
 4. *Quadrula pustulosa* schoolecraftensis (Lea)
 5. *Quadrula verrucosa* (Raf.)
 6. *Quadrula metanevra* (Raf.)
 7. *Rotundaria tuberculata* (Raf.)
 8. *Pleurobema abopys* (Green)
 9. *Pleurobema obliquum* plenum (Lea)
 10. *Pleurobema obliquum* pyramidatum (Lea)
 11. *Elliptio nigra* (Raf.)
 12. *Elliptio dilatata* (Raf.)
 13. *Strophlitis edentulus* (Say)
 14. *Obliquaria reflexa* (Raf.)
 15. *Nephronais ligamentina* (Lane)
 16. *Amygdalonais donaciformis* (Lea)
 17. *Amygdalonais truncata* (Raf.)
 18. *Plagiola securis* (Lea)
 19. *Lampsilis anodontoides* (Lea)
- Contrib. High School, St. Louis, Mo.*

PARASITISM AMONG MISSOURI NAIADES.

BY W. I. UTTERBACK.

This paper would consider only the subject of parasitism in the sense of the *Naiades*, or Fresh-water Mussels, as hosts and not as parasites. As well known among students of *Naiades* nearly all the Species are parasitic in the glochidial, or larval, life on fish hosts, the two notable exceptions, so far known, being in case of *Strophlitis edentulus*¹ and *Lastena ohicensis*, (= *Anondota*

¹ Contribution, (in part), from U. S. Biological Station, Fairport, Iowa. Published by permission of the Commissioner of Fisheries.

² George Lefevre and W. C. Curtis, U. S. Bu. Fish. Doc. No. 756, XXX, pp. 171-174, 1912.

in-becillis). However, reference should be made to the author's descriptive and illustrated catalogue of *Missouri Naiades*¹ for detailed accounts of Mussels as parasites as well as that of the juvenile and adult life. In this present report the writer would employ the same revised nomenclature as used in his general catalogue. This revision is made necessary because of the recent *revelation of Rafinesque's Priority*² and also because of the well determined fact that the nutritive and reproductive *structures of the soft parts serve as far more satisfactory bases for classification* than shell characters. However, for the sake of clearness, synonyms for the revised names appear in the parentheses, as indicated in the case of *Lastena ohicensis* mentioned above.

Since it has been observed that the nucleus of the pearl, found in the Fresh-water Mussel, is that of the remains of some mite or worm it is concluded that these parasites so irritate the glandular mantle that an abnormal pearly excretion is laid over the irritant in regular, but usually, irregular, layers while these pearl glands endeavor to functionate normally in building the inner, or pearly, lining of the shell. Hence, the writer, while engaged in securing data for cataloguing the *Naiades of Missouri*, devoted much incidental attention to the study of Mussel parasites since the Pearl Mussel Investigation occupied the author's attention for most of the four years, (1911-1915), when the greater part of the State came under his actual personal survey. As it was his pleasure and profit to make studies of the *Naiades* at the U. S. Fisheries Biological Station, Fairport, Iowa, where both natural and artificial production of the fresh-water pearl is experimentally studied, some data have been secured under the auspices of this Station. For the identification of the following tabulated list the writer is indebted to Prof. H. Walton Clark, one of the personnel of the Fairport Station and a recognized authority on the natural production of the pearl.

In order that the delicate soft parts of these parasites, such as antennae, thoracic appendages, etc., may be preserved and kept pliable for future study Kraenke's Fluid is used, the receipt of which is submitted here:—

³ A. D. Howard, Science, N. S., XI, pp. 353-355, Sept. 4, 1914.

⁴ American Midland Naturalist, IV, Nos. 3-10, 1913-1916.

⁵ L. S. Frierson, Nautilus, XXVIII, pp. 6-8; also E. G. Vanatta, Acad. Nat. Sci. Phil., pp. 549-559, Dec. 8, 1915.

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MISSILE PARASITE.	KIND.	MISSILE HOST.	PARTS AFFECTED.	LOCALITY.
1. <i>Alix (Naiadicola) ingens</i> Koenike	Mite	<i>Nephronides ligamentina</i> (Lam.) (= <i>Lamp. ligamentina</i>)	Gills	White R., Hollister.
2. <i>Alix tumidus</i> Wolcott.	Mite	<i>Lastigona costata</i> (Raf.) (= <i>Symphynota costata</i> (Raf.))	Gills and Palps.	White R., Hollister.
3. <i>Alix stricta</i> Wolcott.	Mite	<i>Propleura alata</i> (Say) (= <i>Lamp. stilis alata</i>)	Branchial Papillae	Platte R., Agency Ford.
4. <i>Alix ypsilophorus</i> (Bonz)	Mite	<i>Lastena suborbiculata</i> (Say) (= <i>Anodonta suborbiculata</i> (Say)).	Gills and Papillae	L. Contrary, St. Joseph.
5. <i>Aspidogaster conchicola</i> Von Pluke (Final Form) Baer	(Final Pluke Form)	<i>Lasmonos fragilis</i> (Raf.) (= <i>Lamp. gracilis</i> (Bar.) (Final Host))	Pericardium and Nephridium	Osage R., Warsaw.
6. <i>Calyptopsis insignis</i> Ledy	Pluke (Final Form)	<i>Anodonta grandis</i> Say. (Final Host)	Gills	Mud Lake, Kenmoor.
7. <i>Marginal-Cyst Distomid</i> of Kelly	Trematode	<i>Lampisilis cardia</i> (Raf.) (= <i>Lampisilis ventricosa</i> (Barnes))	Mantle Margin	Black R., Williamsville.
8. <i>Distomid</i> of Osborn	Trematode	<i>Strophitus edentulus</i> (Say)	Mantle Margin	Osage R., Osceola.

Glycerine..... 2 parts by volume
 Distilled Water..... 3 " "
 Glacial Acetic Acid..... 2 " "
 Absolute Alcohol..... 1 " "

The author has noted a common teratologic, if not pathologic, condition in the shell, usually that of *Quadrula quadrula* Raf. (= *Q. ichrymusa* (Lea)) and also of *Anodonta grandis* Say, that is, an extremely emarginated postventral portion, due no doubt to the attacks of ecto-parasites along the mantle margins at this point. Why the attacks should be mostly made at this point is a question. Other results of this parasitism is a splitting of the gills from this post-ventral point to the dorsal side. From the fact that this dividing of the gills and the "tucking in" of the shell take place equally on both sides we would ascribe the cause to that of sympathetic nervous reaction. Probably many of the so-called new species or varieties that have crept into our catalogues on *Naiades* are only these pathologic or teratologic individuals and as a result "confusion has been made more confused."

Although the lacustrine forms of *Naiades* are more greatly parasitized than those of the fluviatile due to more favorable ecologic conditions for the parasites, yet the formation of free pearls are more rare in the former since these are usually the thin-shelled forms that do not need to secrete such a limy or naereous supply from the mantle glands. The thick-shelled forms of the lake or sluggish stream, however, are, as a rule, good pearl producers since the greater abundance of parasites under such conditions insure greater occasion for pearl formation.

THE BIRD LOVER.

BY BROTHER ALPHONSUS, O. S. C.

The lover of birds is an enthusiast. If he were not, he would not be a lover of birds. Only those whose interest in any subject is intense and unabating can in truth be said to have enthusiasm in its pursuit. What, it may be asked, will lead a person to spend his precious time upon some matter apparently unworthy of such a sacrifice? There is in the thing something that awakens a