

Proceedings of the Iowa Academy of Science

Volume 8 | Annual Issue

Article 11

1900

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Recommended Citation

Kelly, H. M. (1900) "Notes on the Time of Sexual Maturity in Certain Unios," *Proceedings of the Iowa Academy of Science*, 8(1), 81-84.

Available at: <https://scholarworks.uni.edu/pias/vol8/iss1/11>

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NOTE ON THE TIME OF SEXUAL MATURITY IN CERTAIN UNIOS.

BY H. M. KELLY.

In the course of a recent study* of the parasites of the Unionidæ, the following data in regard to the time of sexual maturity in certain species, and their method of carrying their glochidia, were obtained. This primary inquiry involved the microscopical examination of the sexual glands of each individual. And in females whose gills were found swollen with the sexual product, the portion of these organs forming the marsupium and the stage of development of its contents, were also noted.

The examinations were made at three seasonal periods: (1) in the latter part of April and through the month of May; (2) through July and the first half of August; (3) through October and in early November. It is unfortunate that the two gaps thus made—the month of June, and the latter part of August and all of September—occur well within the limits of the times of sexual activity. This, with the comparative scantiness of material in certain species, at the critical period, has reduced the value of the observations. Where, however, blanks occur in the following tabulation, it is often not difficult to infer the condition from either the state of the other sex at that time, or from the result of later examinations of the same sex.

With the exceptions noted below, the Unios examined are from the vicinity of Havana, Illinois, and Mount Vernon, Iowa, and of species common to the two regions. Data from *Unio-complanatus*,† *Alasmodonta marginata*,

* H. M. Kelly, '09. Bull. Ill. State Lab. Nat. Hist., Vol. V., Art. VIII. "A Statistical Study of the Parasites of the Unionidæ."

† Those who are not acquainted with Simpson's recent classification of the Unionidæ used herein, will find no difficulty in connecting these names with those previously in common use. The specific names with proper inflectional endings remain the same, except that *Unio cornutus* becomes *Obliquaria reflexa*. The genera *Quadrula*, *Unio*, *Obliquaria*, *Plagiola* and *Lampsilis* are divisions of the former genus *Unio*. *Alasmodonta* is synonymous with former *Marginata*, and *Strophitus* has been removed from *Anodonta*.

undulata, and *tappaniana*, and *Lampsilis nasutus* and *ochraceus* from Pennsylvania waters are included. Two of these examinations, as indicated in the accompanying tables, occurred in September.

Table I. shows the distribution of the material examined by species, sex, and time of observation. In addition to the fourteen hundred and ninety-eight included, thirty-one were excluded because the determination of sex was impossible through infestation of the sexual organs by parasitic cercaria to the utter atrophy of the germinal tissue. A single individual of *Q. trigona* was hermaphrodite.

Table II. exhibiting the findings, is largely self-explanatory. The similarity of the closely related forms, in their time of maturity and method of carrying the young, is apparent. Because in certain species, the old glochidia are found still in the marsupium when examined in May, it is inferred that in these cases they have been carried through the preceding winter.

Furthermore, though this is not shown in the tabulations, for the reason that in most species throughout the time of sexual maturity a sufficient number of both sexes are in a condition plainly unripe, and because of the absence of the glochidia and swollen gills containing them in certain females, when others of their species are normally gravid, it is believed that the period of sexual maturity does not always recur every year.

TABLE I. SEASONAL AND SEXUAL DISTRIBUTION OF MATERIAL.

SPECIES	April		May		July		Aug.		Sept.		Oct.		Nov.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
<i>Quadrula multiplicata</i> Lea.....					10	8								
<i>Quadrula tuberculata</i> Bar.....			1	1	20	14	2							
<i>Quadrula metanevra</i> Raf.....			15	13		2					2	3		
<i>Quadrula lachrymosa</i> Lea.....					14	13								
<i>Quadrula asperrima</i> Lea.....					6	15								
<i>Quadrula pustulata</i> Lea.....					4	6	4	6						
<i>Quadrula pustulosa</i> Lea.....			14	9	39	17					2	3		
<i>Quadrula plicata</i> Say.....			7	11	10	32					4	8		
<i>Quadrula trigona</i> Lea.....					4	6	5	10						
<i>Quadrula rubiginosa</i> Lea.....			14	17	12						5	2		
<i>Quadrula ebena</i> Lea.....					3	6	10	12						
<i>Unio gibbosus</i> Bar.....					18	9	3	3						
<i>Unio complanatus</i> Sol.....					35	29	43	27						
<i>Alasmodonta confragosa</i> Say.....					13	9	4							
<i>Alasmodonta companata</i> Bar.....			13	12	6	7	2	3			5	6	3	4
<i>Alasmodonta rugosa</i> Bar.....			1			1					6	1	5	3
<i>Alasmodonta marginata</i> Say.....							16	20	6	6	1			
<i>Alasmodonta undulata</i> Say.....									2	1				
<i>Alasmodonta tappaniana</i> Lea.....						1								
<i>Strophitus edentulus</i> Lea.....			4	4	2	4	2	1			2	2	1	2
<i>Anodonta imbecilis</i> Say.....					3	37						3		
<i>Anodonta suborbiculata</i> Say.....					18	2								
<i>Anodonta grandis</i> Lea.....					2	1					2	2	1	1
<i>Anodonta corpulenta</i> Coop.....			6	2	18	11	6	3						
<i>Obliquaria reflexa</i> Raf.....			1	3	14	6					1			
<i>Plagiola securis</i> Lea.....					5									
<i>Plagiola elegans</i> Lea.....			8	12	14	8								
<i>Plagiola donaciformis</i> Lea.....			5	7	18	4								
<i>Lampsilis parvus</i> Bar.....					6		25							
<i>Lampsilis ellipsis</i> Lea.....			3	2	2	1					3	2	1	
<i>Lampsilis ligamentinus</i> Lam.....			4	5	6	3	8	4			24	21		
<i>Lampsilis luteolus</i> Lam.....					3	6	6	8					1	
<i>Lampsilis nasutus</i> Say.....							2	2						
<i>Lampsilis anodontoides</i> Lea.....			4	2	11	32					1	1	1	
<i>Lampsilis rectus</i> Lam.....			8	10	6	3	1				6	5	4	2
<i>Lampsilis ochraceus</i> Say.....							1							
<i>Lampsilis ventricosus</i> Bar.....	3	7	8	7	28	9	6	4			19	19		
<i>Lampsilis alatus</i> Say.....	1	2	4	4	23	9					3	3	1	
<i>Lampsilis laevis</i> Lea.....					3		1							
<i>Lampsilis gracilis</i> Bar.....			15	3	23	20	11	11			6	2	3	2

TABLE II. SEXUAL CONDITION.

SPECIES	Sperm Ripe in	Ova Ripe in	Gills Filling in	Portion of Gills Occupied by Marsupium	Old Glochidia Found in
<i>Quadrula multiplicata</i>.....	.....	.....	.....	.....	.....
<i>Quadrula tuberculata</i>	July .....	.....	.....	.....	.....
<i>Quadrula metanevra</i>	May	May .....	.....	.....	.....
<i>Quadrula lachry-nosa</i>	July	July .....	.....	.....	.....
<i>Quadrula asperrima</i>	July	July .....	.....	.....	.....
<i>Quadrula pustulata</i>	July	July .....	.....	.....	.....
<i>Quadrula pustulosa</i>	{ May, July Oct	July .....	.....	.....	.....
<i>Quadrula plicata</i>	July	July	July	Whole, all four.....	.....
<i>Quadrula trigona</i>	July	July	July	Whole, all four.....	.....
<i>Quadrula rubiginosa</i>	May, July.....	May	May	Whole, all four.....	.....
<i>Quadrula ebena</i>	July	July	July, Aug.	Whole, all four.....	.....
<i>Unio gibbosus</i>	July	July	July, Aug.	Whole outer pair ..	.....
<i>Unio complanatus</i>	July, Aug.	July, Aug.	Aug	Whole outer pair ..	.....
<i>Alasmodonta confragosa</i>.....	.....	July .....	.....	.....	.....
<i>Alasmod'nta complanata</i>.....	.....	.....	.....	Whole outer pair ..	Nov., May
<i>Alasmodonta rugosa</i>.....	.....	.....	.....	Whole outer pair ..	Nov.
<i>Alasmodonta marginata</i>	Aug .....	.....	Aug	Whole outer pair ..	Sept.
<i>Alasmodonta undulata</i>.....	.....	.....	.....	Whole outer pair ..	Sept.
<i>Alasmodonta tappaniana</i>.....	.....	.....	July	Whole outer pair ..	.....
<i>Strophitus edentulus</i>.....	.....	.....	Aug	Whole outer pair ..	{ Oct., Nov.
<i>Anodonta imbecilis</i>.....	.....	July	July	Whole outer pair ..	} May
<i>Anodonta suborbiculata</i>.....	.....	.....	.....	.....	Oct.
<i>Anodonta grandis</i>.....	.....	.....	July	Whole outer pair ..	Oct., Nov.
<i>Anodonta corpulenta</i>.....	.....	.....	.....	Whole outer pair ..	May
<i>Obliquaria reflexa</i>	May, July.....	May, July.....	July	Post. part. outer pair	Nov.
<i>Plagiola securis</i>	July .....	.....	.....	.....	.....
<i>Plagiola elegans</i>	May	May	May, July.....	Post. part. outer pair	.....
<i>Plagiola donaciformis</i>	May, July.....	May, July.....	May, July.....	Post. part. outer pair	.....
<i>Lampsilis parvus</i>.....	.....	May, July.....	May, July.....	Post. part. outer pair	.....
<i>Lampsilis ellipsis</i>	July .....	.....	.....	Post. part. outer pair	Oct.
<i>Lampsilis ligamentinus</i>	July, Aug.	July, Aug.	Aug	Post. part. outer pair	Nov.
<i>Lampsilis luteolus</i>	July	July	July, Aug.	Post. part. outer pair	.....
<i>Lampsilis nasutus</i>	Aug .....	.....	Aug	Post. part. outer pair	.....
<i>Lampsilis anodontoides</i>	July .....	.....	July	Post. part. outer pair	.....
<i>Lampsilis rectus</i>	July .....	.....	.....	Post. part. outer pair	Oct., May
<i>Lampsilis ochraceus</i>.....	.....	.....	Aug	Post. part. outer pair	} Oct., Nov.
<i>Lampsilis ventricosus</i>	May- July.....	.....	May, July.....	Post. part. outer pair	} May
<i>Lampsilis alatus</i>	July	July .....	.....	Post. part. outer pair	Oct., Nov.
<i>Lampsilis laevisimus</i>	July-Aug. ....	.....	.....	Post. part. outer pair	Nov., May
<i>Lampsilis gracilis</i>	May- July.....	May, July.....	May, July.....	Post. part. outer pair	Oct.