Journal of the Arkansas Academy of Science

Volume 49 Article 17

1995

Dytiscidae (Coleoptera) of Jackson County, Arkansas

Anthony Holt
Arkansas State University

George L. Harp
Arkansas State University

Dytiscidae (Coleoptera) of Jackson County, Arkansas

Anthony Holt and George L. Harp
Department of Biological Sciences
Arkansas State University
State University, AR 72467

Abstract

Dytiscid beetles were surveyed to establish a baseline list for this county, which lies primarily in the Mississippi Alluvial Plain. This list was then compared with that for an Ozark county, which had been surveyed in a previous study. Eighteen sites were surveyed by Turtox Indestructible ™ dip net and funnel traps. Museum holdings and literature records were also searched. Twenty-one taxa were collected, with temporary ponds and oxbow/cypress swamps supporting the greatest diversity. These are the least disturbed sites in Jackson County. Most species collected are generally widely distributed and prefer either shaded ponds/pools with some leaf litter, or shallow areas of ponds, lakes and slow streams. To the contrary, Randolph County, on the Ozark Plateau, has more taxa (31), with many typifying Ozark streams. More specifically, *Hydroporus* was represented by seven species in Jackson County, but 13 species were found in Randolph County. The difference was the presence in Randolph County of the subgenus *Heterosternuta*, found invariably along the gravelly margins of clear streams.

Introduction

A survey of Jackson County was conducted to establish a record of the dytiscids. Jackson County lies almost exclusively within the Mississippi Alluvial Plain in northeastern Arkansas with the exception of approximately 10 square kilometers that are within the Ozark Plateau. A secondary purpose was to compare this record with that of Pippenger and Harp (1985) in Randolph County, which lies primarily on the Ozark Plateau.

Materials and Methods

Eighteen sites were sampled to represent the major habitat types within the study area. Organisms in this study were collected by two principle methods. Most of the specimens were collected with a Turtox Indestructible™ dip net. Funnel traps were also utilized. One trap was constructed with the design by Hilsenhoff (1987), using a wide-mouth 0.95 l jar and a funnel made from the top of a 2.0 l soda bottle. Another trap was a variation of the above with the funnel having a diameter approximately twice that of the 2.0 l trap. A plastic minnow trap was also used to obtain some samples. All samples were preserved in 70% ethanol. A search of the Arkansas State University Museum of Zoology (ASUMZ) Aquatic Macroinvertebrate Collection provided specimens from five additional sites, which were also presumably collected by Turtox Indestructible™ dip net. Final identification of most organisms was made by G. William Wolfe at Reinhardt College, Waleska, GA. Paul Spangler of the Smithsonian Institution identified *Dytiscus carolinus*. Voucher specimens are housed in the ASUMZ Aquatic Macroinvertebrate Collection.

Site locations and a brief description of each are as follows:

1. Tupelo Brake. T12N R1W S7 & R2W S12.
   Tupelo/Cypress swamp adjacent to Village Creek.
2. Village Creek. T12N R2W S8&9.
   Road crossing at a disturbed site, somewhat lotic in nature due to a narrowing of the stream width by approximately two-thirds.
3. T13N R2W S7.
   Permanent water in a large woodlot (approximately 12 ha) with sandy soil.
4. Strait Lake. T14N R2W S16.
   Oxbow/scar lake of Black River. Cypress trees numerous on the shores with water very turbid.
5. T14N R2W S16.
   Temporary pool (puddle) adjacent to #4.
6. T14N R2W S22.
   Rice field.
7. T14N R2W S23.
   Effluent of a rice field being drained. Samples collected in traps 4 days.
8. T14N R2W S14.
   Roadside ditch which retains water almost continually.
9. T14N R2W S4.
   Rice field.
10. T14N R2W S28.
    Temporary pond approximately 1 ha in surface area.
11. T11N R3W S30.

Borrow ditch along the Jackson/Independence County Line. No dytiscids collected.

12. Oats Creek. T10N R5W S35.
    A 2nd order Ozark stream.
13. Glaise Creek (Hurricane Branch). T10N R5W S28.
    A 1st order Ozark stream. No Coleoptera collected.
14. Pickett Lake. T10N R3W S12.
    Cypress Swamp.
15. Village Creek. St. Hwy. 226 crossing. T13N R1W S4.
    Deltaic stream/cypress swamp.
16. T14N R2W S15.
    Temporary pool in recently bulldozed right-of-way.
17. T14N R2W S15.
    Top of a 209 l (55-gallon) steel drum (water approx. 1 cm deep) under a mercury-switch controlled light.
18. T14N R1W S30.
    Temporary pond.
19. Hout Ditch. T13N R3W S25.*
    A 2nd order Deltaic stream.
20. Temporary pond in a woodlot. Location unknown.
21. Village Creek. T11N R2W S7. St. Hwy. 14 crossing.
22. T14N R2W S22.
    Permanent fish pond. Approximately 8 ha in surface area.
23. T14N R1W S17. Temporary pond in a woodlot adj. to U.S. Hwy. 67.

*Sites 19-23 are specimens from the museum collection - collection method unknown.

Results and Discussion

Twenty-one taxa represented by 402 individuals (361 from the present study and 41 from the ASUMZ) were collected in this study (Table 1). Sites one and 10 yielded the greatest number of species, while no dytiscids were collected at sites 11 and 13.

Eight different major habitat "types" were examined in this study (Table 2). Species richness was greatest in temporary ponds (13 taxa) and oxbows/cypress swamps (11 taxa). The habitat type with the fewest dytiscids present was that of Ozark streams with only one taxon, *Hydroporus Neoporus carolinus*, collected.

In Arkansas one would ordinarily expect the greatest diversity of aquatic insects, including some dytiscid groups (Matta and Wolfe, 1981; Harp, 1989), to be in an Ozark stream because of the diversity of habitats found with respect to water depth, current speed and substrate particle size. Buffering provided by the limestone substrate further contributes to species richness (Cather and Harp, 1975). Temporary pools would have little diversity because of the limitation imposed by periodic absence of water. The opposite was found to be the case in Jackson County for several reasons. Most of this county lies in the Mississippi Alluvial Plain and is intensely cultivated. As a consequence, surface waters are heavily impacted by pesticide and fertilizer applications, channeliziation of streams in the interest of flood control and other agriculturally related practices (Holt and Harp, 1993). A major hinderance to current agricultural practices in the Mississippi Alluvial Plain is the occurrence of scattered wetlands, particularly shallow depressions that retain water for a significant part of the growing season. These wetlands, often in the form of temporary pools or oxbow/cypress swamps, are today the least disturbed sites to be found, and they, therefore, support the greatest diversity of dytiscids.

The reversal of habitats with greatest/least diversity seen in Jackson County is accentuated in that the Ozark Plateau barely reaches into Jackson County. Thus the two Ozark streams sampled were very small (1st and 2nd order), subject to periodic drying, and with unusually homogenous substrates of gravel-pebble.

As a whole, those taxa of dytiscids collected in this study are generally widespread in distribution (Merritt and Cummins, 1984), and it is of no surprise that they were found in the habitat types covered by this study. In a similar study of Randolph County, also in northeastern Arkansas, Pippenger and Harp (1985) collected 31 taxa (Table 3). They sampled more sites (32 vs. 23) than were sampled in this study. More importantly, however, Randolph County encompasses parts of both the Ozark Plateau (80%) and Mississippi Alluvial Plain (20%). This provides that county with much more diversity of habitat types and thus a greater diversity of aquatic insects. Indeed, the greatest difference in the species lists for the two counties is the relative lack of *Hydroporus* spp. in Jackson County, 7 vs. 12. Most of those reported by Pippenger and Harp (1985) were of the *Heterosternuta* subgenus, invariably collected along gravelly stream margins or in bedrock substrate in fissures where gravel and algae have accumulated. *Agabus semivittatus* is apparently a form characteristic of springs (Pippenger and Harp, 1985). Conversely, those species collected by us, but not in Randolph County, are most often collected in shaded ponds and pools having some leaf litter (e.g., *Acilius fraternus*, Michael and Matta, 1977) or shallow areas of ponds, lakes, slow streams or longer-lasting temporary sloughs (e.g., *Dytiscus* spp., Larson, 1975). These habitats are similar to the temporary ponds and oxbow/cypress swamps sampled in the present study.

Table 1. Dytiscids of Jackson County, Arkansas.

	Sites										
Taxon	1	2	3	4	5	6	7	8	9	10	12
Acilius fraternus										3	
Agabus disintegratus										1	
Coptotomus loticus	9			4							
Coptotomus venustus	11		1	1							
Cybister fimbriolatus							3	2	1	1	
Dytiscus carolinus		1									
Hydaticus bimarginatus							1				
Hygrotus nubilus	1					4		47	1		
Hydroporus											
Hydroporus rufilabris	1										
Neoporus carolinus											2
Neoporus clypealis	3	2						11			
Neoporus hybridus											
Neoporus undulatus	11									5	
Neoporus venustus				2							
Neoporus vittatipennis				1							
Laccophilus fasciatus rufus					9					1	
Laccophilus proximus proximus	3		1		3	10	20	5	4	2	
Neobidessus pullus pullus						2		6			
Thermonectus basilaris	3						20	25	1	1	
Thermonectus ornaticollis							5	22		1	
Uvarus lacustris					4						
Total taxa	8	1	3	4	3	3	5	7	4	8	1
Total individuals	42	2	3	8	16	16	49	118	7	15	2

	Sites										
Taxon	14	15	16	17	18	19	20	21	22	23	Total
Acilius fraternus										1	4
Agabus disintegratus	1										2
Coptotomus loticus	9										22
Coptotomus venustus	4										17
Cybister fimbriolatus		1					1				9
Dytiscus carolinus											1
Hydaticus bimarginatus			3								4
Hygrotus nubilus			10								63
Hydroporus											
Hydroporus rufilabris											1
Neoporus carolinus											2
Neoporus clypealis	1							1	1		23
Neoporus hybridus								1			1
Neoporus undulatus	1			1				2	1		21
Neoporus venustus											2
Neoporus vittatipennis								10			11
Laccophilus fasciatus rufus			1		3	8		8			30
Laccophilus proximus proximus			21							9	78
Neobidessus pullus pullus			1	6		1					16
Thermonectus basilaris	4		1								59
Thermonectus ornaticollis		2									29
Uvarus lacustris						2					6
Total taxa	6	1	7	2	1	3	1	5	2	3	
Total individuals	20	1	39	7	3	11	1	26	2	14	402

Table 2. Major habitat types.

Habitat Type	Sites	No. Taxa
Temporary pond (including ricefields)	5,6,7,9,10 16,18,20,23	13
Deltaic stream (3-5th order)	2,15,21	6
Deltaic stream (1st order)	19	3
Ozark stream (1-2nd order)	12,13	1
Artificial container	17	2
Permanent road ditch	8	7
Oxbow/cypress swamp	1,4,14	11
Permanent pond	3,11,22	2

Table 3. A comparison of dytisci species reported for Jackson and Randolph Counties, Arkansas. Randolph Co. data modified from Pippenger and Harp (1985).

Species	Jackson	Randolph
Acilius fraternus	x	
Agabus confusus		x
A. disintegratus	x	x
A. semivittatus		x
Birdessonotus inconspicuous		x
Celina hubelli		x
Coptotomus lenticus		x
C. loticus	x	
C. venustus	x	x
Cybister fimbriolatus	x	x
Dytiscus carolinus	x	
Graphoderus perplexus		x
Hydaticus bimarginatus	x	
Hydroporus carolinus	x	
H. clypealis	x	x
*H. demidiatus**		x
H. hybridus	x	
*H. lynceus**		x
*H. oblitus**		x
H. ouachitus		x
H. pulcher		x
H. rufilabris	x	x
H. shermani		x
H. somnus		x
H. undulatus	x	x
H. venustus	x	
H. vittatipennis	x	x
H. wickhami		x
Hydrovatus pustulatus		x
Hygrotus nubilus	x	x
Ilybius oblitus		x
Laccophilus fasciatus rufus	x	x
L. maculosus maculosus		x
L. proximus proximus	x	x
Neobidessus pullus pullus	x	x
Thermonectus basillaris	x	x
T. ornaticollis	x	x
Uvarus lacustris	x	x
Total species	21	31

**H. lobatus* should be assigned to the *lynceus* complex, *H. solitarius* was *H. demidiatus*, and *H. tigrinus* was *H. oblitus* (Matta, pers. comm.).

Literature Cited

Cather, M.R. and **G.L. Harp.** 1975. The aquatic macroinvertebrate fauna of an Ozark and a Deltaic stream. Proc. Arkansas Acad. Sci. 29:30-35.

Harp, G.L. 1989. Some biological aspects of *Hydroporus ouachitus* Matta and Wolfe (Coleoptera: Dytiscidae). Project report for the Arkansas Natural Heritage Commission, Little Rock. 6 pp. Unpub.

Hilsenhoff, W.L. 1987. Effectiveness of bottle traps for collecting Dytiscidae (Coleoptera). Coleopterists Bulletin 41:377-380.

Holt, A. and **G.L. Harp.** 1993. Ichthyofauna of the Village Creek System. Proc. Arkansas Acad. Sci. 47:54-60.

Larson, D.J. 1975. The predaceous water beetles (Coleoptera: Dytiscidae) of Alberta: Sytematics, natural history and distribution. Quaestiones Entomologicae 11:245-298.

Matta, J.F. and G.W. Wolfe. 1981. A revision of the subgenus *Heterosternuta* Strand of *Hydroporus* Clairville (Coleoptera: Dytiscidae). Pan-Pacific Entomol. 57:176-219.

Merritt, R.W. and **K.W. Cummins.** 1984. An introduction to the aquatic insects of North America. Kendall/Hunt, Dubuque, Iowa. pp. 722.

Michael, A.C. and **J.F. Matta.** 1977. The Dytiscidae of Virginia (Coleoptera: Adephaga) (Subfamilies: Laccophilinae, Colymbetinae, Dytiscinae, Hydaticinae and Cybistrinae). The insects of Virginia: No. 12 Virginia Poly. Inst. State Univ. Res. Div. Bull. 124. vi + 53 pp.

Pippenger, M.A. and **G.L. Harp.** 1985. Dytiscidae from Randolph County, Arkansas. Proc. Arkansas Acad. Sci. 39:146-147.