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Lentic Beetles of the Missouri Prairie Region: Habitat and Regional Associations, with Keys to the Hydradephaga

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ABSTRACT

Approximately 12,000 specimens of adult aquatic Coleoptera representing 9 families and over 100 species were collected from 105 anthropogenic ponds within the Missouri Prairie Region in August-September 1998, March-April 1999, and June 1999. Within ponds, habitats comprising monospecific stands of aquatic macrophytes, including emergent vegetation, were identified, from which the coleopteran fauna was collected. Taxonomic keys and annotated lists for 55 species of Hydradephaga collected from ponds, including likely pond inhabitants, are presented. Within the Hydradephaga, 20 species were new Missouri state records. Inter-pond and inter-habitat analyses were performed to elucidate aquatic coleopteran community structure and habitat associations. Species richness of aquatic Coleoptera differed significantly among habitats in August-September 1998 and June 1999, but not in March-April 1999. Generally, emergent vegetation supported beetle communities with higher richness than did submerged vegetation. Results from analyses of large-scale factors indicated that beetle species richness in most ecoregionalization schemes did not differ among subregions.

INTRODUCTION

Comprising over 400,000 described species, the beetles (Coleoptera) represent the most species-rich taxon on the planet. Three of the four suborders of Coleoptera contain members that are aquatic, although most of the ~5,000 aquatic species are members of Adepaga and Polyphaga. The suborder Adepaga is represented by eight families in North America, five of which are aquatic. The members of this suborder that have invaded freshwater habitats are commonly placed in Hydradephaga (*sensu* Crowson 1955, 1981), which includes Amphizoidae, Haliplidae, Dytiscidae, Noteridae, and Gyrinidae. In the Hydradephaga, both adults and larvae of all species normally are aquatic. The monophyly of this taxon has been equivocal, although recent molecular analyses support the monophyly of Hydradephaga (Shull et al. 2001), thereby supporting the classification proposed initially by Crowson (1955).

Many abiotic and biotic factors affect aquatic beetle distribution. Large-scale landscape features of a particular area are perhaps the most important variables shaping the biogeography of aquatic beetles (Young 1954). Because most aquatic beetles inhabit both aquatic (as eggs, larvae, and adults) and terrestrial (as pupae and adults) environments at some point in their life cycle, both situations influence their ability to inhabit a particular site. Therefore, the occurrence of aquatic beetles likely is correlated with the distribution of

landscape features such as vegetation, physiography, and soils (Young 1954). Many studies concerning a variety of factors affecting aquatic beetle distribution and community structure in relation to large-scale features have been reported, including in regional species distributions (Young 1954, Hilsenhoff 1975a, Testa and Lago 1994, Epler 1996), classification of aquatic coleopteran habitats in northeastern England (Eyre et al. 1986), and regional biogeographic studies (e.g., Larson 1975, 1993; Anderson 1985; Kholin and Nilsson 1998). Effects of limnological and local factors on aquatic coleopteran communities were investigated in studies of habitat affinities (Larson 1985, Aiken 1991, Richoux 1994), water-site duration on community structure (Eyre et al. 1992), phenology (Nilsson and Danell 1981, Valladres et al. 1994), co-occurrences of species within a habitat (Larson 1985, Alarie and Maire 1991, Larson 1997), and changes in structure and composition of species assemblages along a pH gradient (Juliano 1991). However, generally, a paucity of studies on aquatic beetle community structure persists, especially for certain families, such as Haliplidae (Brigham and Sanderson 1973).

Since the early work by Forbes (1925), it has been empirically established that the abundance, complexity, and distribution of aquatic macroinvertebrate communities, including beetles, are heavily influenced by vegetational characteristics (Krecker 1939, Rosine 1955, Barber and Kevern 1973, Dvorak and Best 1982, Scheffer et al. 1984, Hanson 1990, Hargeby 1990, Bergey et al. 1992). Nonetheless, attempts to unravel associations between species of aquatic beetles and plants have been few (e.g., Paquette and Alarie 1999).

A large set of criteria has been used to delineate ecological land classifications in Missouri. Ecological regions at the state level are used primarily as management tools to establish biological criteria, reference sites, and for setting reasonable water-quality goals and regulations (Bryce and Clarke 1996). Missouri has been regionally classified based on the lotic fish fauna (Pflieger 1989). In addition to aquatic regions, Missouri has been regionalized based on a suite of natural characteristics of the land. Specifically, soil regions have been delineated based upon the Missouri generalized soil map and soil association descriptions (Allgood and Persinger 1979). Unklesbay and Vineyard (1992) delimited five major geologic provinces. The Natural Divisions of Missouri were delineated by Thom and Wilson (1980), in which six major divisions were presented. Classifications of Missouri flora (Steyermark 1963), terrestrial natural communities (Nelson 1985), and physiographic regions (see Pflieger 1989) also have been compiled.

The objective of this study was to complete a thorough taxonomic inventory of the lentic beetles in the Missouri Prairie Region. In concert with that objective, an illustrated taxonomic key to the species of Hydradephaga was prepared. Additional goals of this study were the compilation of beetle-habitat association data and comparisons of beetle species richness and composition among described regions delimited by other authors.

MATERIALS AND METHODS

Selection of sampling sites

A total of 105 ponds (Appendix) was sampled to characterize the lentic Coleoptera fauna within the Missouri Prairie Region. When possible, ponds were sampled only once, however 12 ponds were sampled more often due to logistical limitations. Anthropogenic ponds without permanent incoming streams were chosen for this study. Ponds were defined as small bodies of shallow, stagnant water, well supplied with aquatic plants, and which were the result of anthropogenic activity (Clegg 1974). All but two of the selected ponds had earthen

spillways: the remaining two had metal culverts. Relatively small ponds were chosen primarily because, at least for the Dytiscidae, beetles tend to be much less abundant and diverse in large bodies of water than in smaller ones (Wilson 1923, Larson 1985, Ranta 1985). All ponds selected were within the boundaries of various conservation areas owned and operated by the Missouri Department of Conservation and the University of Missouri, and ranged in surface area from approximately to 90 to 15,000 m².

Area of study

The study area was within the Missouri Prairie Region (Steyermark 1963). Within this region, we attempted to sample the aquatic beetle faunas from various subregions demarcated by several natural and physical regionalization schemes. These delimitations, which dictated sampling sites, were based upon aquatic faunal regions (Pflieger 1989), physiographic regions (see Pflieger 1989), ecological regions (Omernik 1987), floral regions (Steyermark 1963), soil regions (Allgood and Persinger 1979) and natural divisions (1996, Missouri Natural Areas Committee). When possible, at least five ponds within each of the subregions were sampled for their aquatic Coleoptera faunas on each of three occasions (August-October 1998, March-April 1999, and June 1999). These criteria were used to maximize the number of different habitat types within which ponds were located, and therefore to maximize the likelihood of collecting all lentic species present in the region.

Sampling methodology

Because samples obtained in this study were qualitative, the amount of time and exact sampling procedures were dictated largely by the characteristics of the individual vegetative zones of each pond. A pond-specific sampling strategy was necessary to ensure that adequate representation of each vegetative zone and associated beetle fauna was obtained. Nonetheless, a general sampling regime was followed. Habitats were identified in each pond (Table 1). The vegetation, subtending substrate, and roots (if present) were vigorously kicked or swept with the D-net for several minutes. This was performed at depths ranging from the substrate to the surface of water, and from the deepest edge of the habitat to the

Table 1. Aquatic plant habitats sampled.

<i>Alisma</i>	<i>Najas</i>
<i>Ammania</i>	<i>Nelumbo</i>
<i>Brasenia</i>	<i>Nuphar</i>
<i>Cabomba</i>	Poaceae
<i>Ceratophyllum</i>	<i>Polygonum</i>
<i>Chara</i>	<i>Potamogeton</i>
Cyperaceae	<i>Sagittaria</i>
<i>Juncus</i>	<i>Salix</i>
<i>Lespedeza</i>	<i>Typha</i>
<i>Ludwigia</i>	<i>Utricularia</i>

shoreline, and repeated until no new insect morphospecies were observed in a sample. After either the entire habitat was sampled or no new morphospecies were collected, at least two additional samples were taken. If a particular habitat was widely distributed within a pond, representative portions of the habitat from diverse areas were sampled. All easily visible insects were sorted from debris and placed in 80% ethyl alcohol. The remaining net contents were placed into pint

containers containing 95% ethyl alcohol and brought to the laboratory for sorting and identification.

Collection localities are given in the annotated list for all species collected in this study (collectors: B. H. P. Landwer and N. K. Whiteman). Diagnoses, ranges in North America and in Missouri, county records from the Missouri Prairie Region, and detailed habitat associations are reported for each species. Because the geographic range of this study was restricted to the Prairie Region, detailed records for the entire state are not presented.

Length was measured with an ocular micrometer, from the clypeal apex to the elytral apices. The term 'disc' is defined as that region of the elytron that is visible when viewed from above, not including the lateral margins.

Richness analyses

Habitat- and regional- aquatic beetle affinities were evaluated by analyzing aquatic beetle species richness for each of three time periods (August-September 1998, March-April 1999, and June 1999).

One-way analysis of variance (ANOVA) and subsequent least-significant differences (LSD) tests were used to test for significant differences in mean species richness of beetle communities among habitats and regions, at both the familial and ordinal levels. Specifically, tests for differences in mean beetle richness among habitats were performed for Chrysomelidae, Curculionidae, Dytiscidae, Gyrinidae, Haliplidae, Hydrophilidae *sensu lato* [*Helophorus* and *Hydrochus* were not elevated to family status, after Downie and Arnett (1996)], and Noteridae. Tests for differences in mean overall beetle richness of ponds among Omernik regions, Pflieger regions, physiographic regions, Steyermark regions, and among size classes were performed to elucidate patterns among ponds in beetle species richness. In addition, tests for differences in mean overall beetle richness within each habitat among the soil regions, Omernik regions, Pflieger regions, physiographic regions, Steyermark regions, and among size classes were performed. Tests for differences in mean richness pooled for each habitat also were performed on the 19 habitats in which beetles were collected.

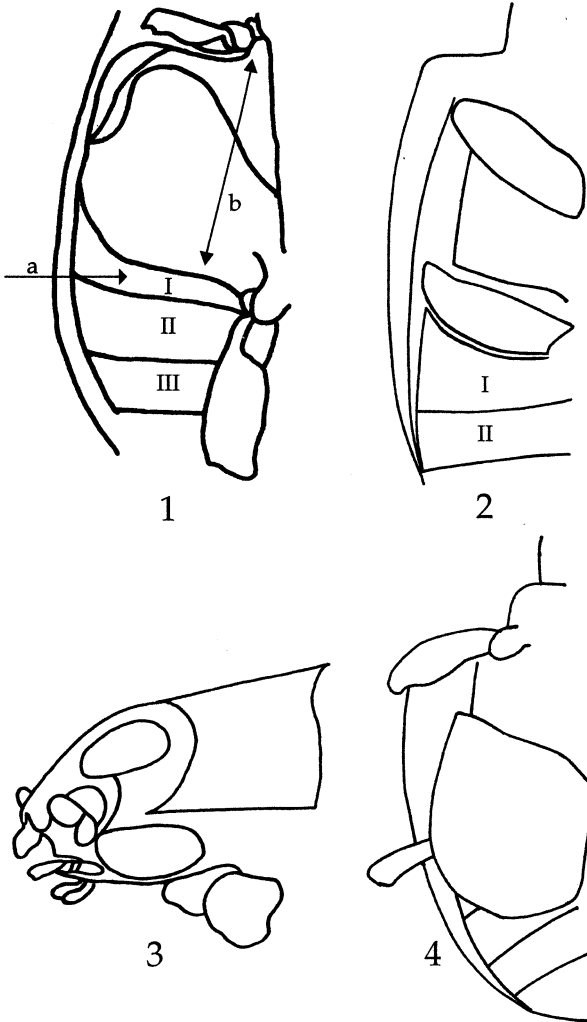
Compositional analyses

Similarities in taxonomic composition among habitats were quantified using Jaccard's index (Sneath and Sokal 1973, Magurran 1988) based on a presence/absence matrix for the insect fauna of each habitat. Data from the resultant matrix were used in a multivariate ordination technique, cluster analysis (unweighted pair group method average) to graphically evaluate similarity among habitats based on the beetle species composition among each habitat sampled. All statistical analyses were conducted using SPSS-X (SPSS Inc., 1990). Voucher specimens were deposited in the Enns Entomology Museum, University of Missouri-Columbia.

Key to Adults of the Families of Lentic Hydradephaga of the Missouri Prairie Region

- 1 Abdominal sternite I completely divided by hind coxae into two or three separate sclerites (Fig. 1a) **suborder Adephaga** . . 2
- Abdominal segment I not completely divided by hind coxae, although hind coxae may be expanded laterally (may superficially resemble two divided sternites) (Fig. 2) **suborder Polyphaga**
- 2 Head apparently with two pairs of compound eyes, one pair dorsolateral, one pair ventrolateral (Fig. 3) **Gyrinidae**
- Head with one pair of compound eyes, each eye undivided 3

- 3 Large plate-like coxal process covering base of hind femur and at least abdominal sternites I-II (Fig. 4) **Haliplidae**
- Without large plate-like coxal process, base of hind femur and anterior abdominal segments exposed **4**
- 4 Apex of protibia with elongate, curved spur; prosternal process truncate **Noteridae**
- Apex of protibia without elongate, curved spur; prosternal process lanceolate (the prosternal process in *Hydrovatus pustulatus* is broad posteriorly, but a spur is absent from the protibia) **Dytiscidae**



Figs. 1-4. 1, *Graphoderus liberus*, abdominal sternite I completely divided by metacoxa. 2, *Tropisternus lateralis*, abdominal sternite I not divided by metacoxa. 3, *Dineutus assimilis*, head with two pairs of compound eyes. 4, Haliplidae, ventral view of large plate-like coxal process.

The Lentic Haliplidae of the Missouri Prairie Region

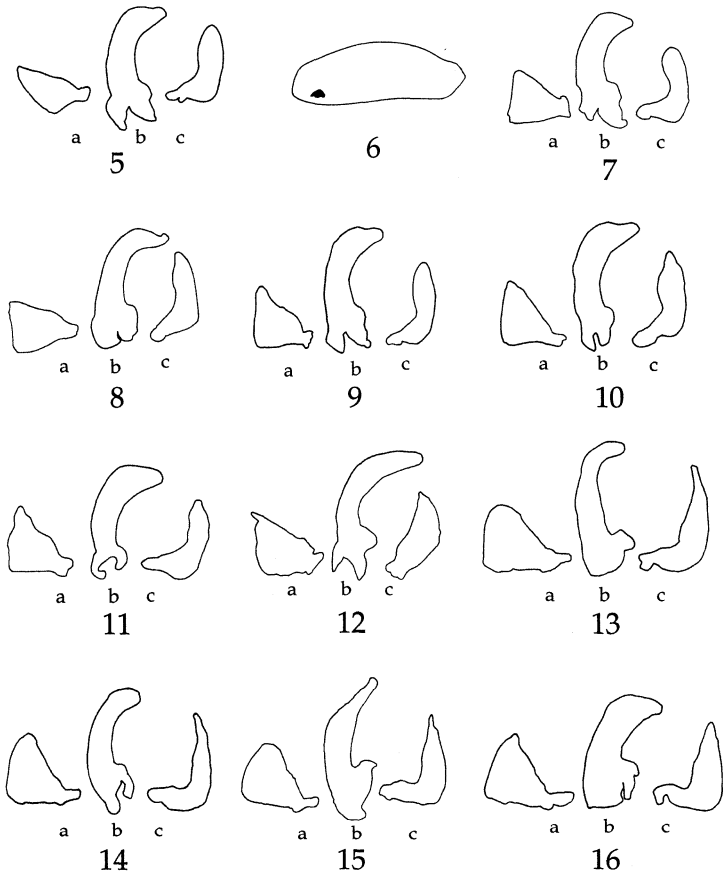
Habitat Associations. Although haliplids, crawling water beetles, can swim quite well, members of this family most often crawl on submerged vegetation in slow streams, lakes, ponds, ditches, and marshes (Hilsenhoff and Brigham 1978). Aquatic macrophytes play an important role in the life histories of at least some Haliplidae. White and Brigham (1996) reported that females of *Haliplus* cut a hole in the side of filaments of *Ceratophyllum* and *Nitella*, and oviposit within this excavation. They also reported that eggs of *Peltodytes* are deposited on the leaves and stems of aquatic macrophytes, hatching one to two weeks thereafter. All haliplid larvae pass through three instars and pupation occurs terrestrially, in dry soil (White and Brigham 1996). Numerous authors have noted that adults are algophagous (Matheson 1912, Pearce 1921, Wilson 1923, Hickman 1931, Matta 1976, and Hilsenhoff and Brigham 1978). Specifically, haliplids feed on *Chara*, *Nitella*, *Spirogyra*, and among other algae (Matheson 1912, Pearce 1921, Wilson 1923, Hickman 1931).

Taxonomy. The Haliplidae is a ubiquitous family with approximately 70 species representing four genera in the Nearctic region (White and Brigham 1996). Several systematic and faunistic treatments of the Haliplidae have been published over the last 90 years (Matheson 1912, Roberts 1913, Wallis 1933, Young 1954, Matta 1976, Hilsenhoff and Brigham 1978, Gunderson and Otremba 1988). Recently, two new species of *Haliplus* were described from Illinois (Brigham and Sanderson 1972, 1973). Fagan (1966) listed 10 species of haliplids from Missouri.

Two genera are represented in Missouri, *Haliplus* and *Peltodytes*. The following annotated list and taxonomic key includes all 12 species found in ponds in the Missouri Prairie Region.

Key to the Lentic Haliplidae of the Missouri Prairie Region

- 1 Pronotum with paired, subcircular black spots on posterior margin on surface; ultimate segment of maxillary palp as long as or longer than penultimate segment; metacoxal plate large, covering all but posterior most one or two abdominal sternites; *Peltodytes* Régimbart 2
- Pronotum usually with single, anteromesal black area or pronotum immaculate (two black cuticular structures of the elytra might be visible inside the pronotum posteriorly, although these are not superficial); ultimate segment of maxillary palp shorter than penultimate segment; metacoxal plate small, leaving at least the last three abdominal sternites exposed *Haliplus* Latreille... 8
- 2 Exposed metafemur distally uniform black or pale yellow 3
- Exposed metafemur distally black with pale subapical band 6
- 3 Exposed metafemur distally uniformly pale yellow; aedeagus as in Fig. 5. *Peltodytes litoralis* Matheson
- Exposed metafemur distally uniformly black 4
- 4 Each elytron with subhumeral black spot (Fig. 6); black sutural stripe widening from base to midpoint of elytron, contacting first discal stria, then narrowing apically *Peltodytes pedunculatus* (Blatchley)
- Each elytron without subhumeral black spot; black sutural stripe either narrower basally than apically or subequal in width 5
- 5 Each medial black elytral blotch confluent with sutural stripe; transverse, dark, basal elytral stripe weakly developed, not extending laterally beyond fifth stria; aedeagus evenly rounded on distal margin (Fig. 7) *Peltodytes muticus* (LeConte)



Figs. 5-16. Haliplid male genitalia [right paramere (a), aedeagus (b), left paramere (c)] and elytron. 5, *Peltodytes litoralis* genitalia; 6, *Peltodytes pedunculatus*, lateral view of left elytron with subhumeral spot; 7, *Peltodytes muticus*, genitalia; 8, *Peltodytes sexmaculatus*, genitalia; 9, *Peltodytes edentulus*, genitalia; 10, *Peltodytes duodecimpunctatus*, genitalia; 11, *Peltodytes lengi*, genitalia; 12, *Halipilus borealis*, genitalia; 13, *Halipilus triopsis*, genitalia; 14, *Halipilus variomaculatus*, genitalia; 15, *Halipilus tortilipenis*, genitalia; 16, *Halipilus fasciatus*, genitalia.

- Each medial elytral blotch distinct and entire; basal elytral stripe well-developed, extending laterally to at least sixth stria; aedeagus with distinct subapical notch on distal margin (Fig. 8) *Peltodytes sexmaculatus* Roberts
- 6 Vertex of head with wide, dark arcuate band behind eyes; aedeagus as in Fig. 9 *Peltodytes edentulus* (LeConte)
- Vertex of head concolorous, without dark arcuate band behind eyes 7
- 7 Each elytron with black subhumeral longitudinal dash in addition to black punctation (dash may be poorly developed); aedeagus with distal margin slightly concave, narrowest near middle (Fig. 10) *Peltodytes duodecimpunctatus* (Say)

- Each elytron without black subhumeral longitudinal dash although black punctation present; aedeagus with apical margin straight or slightly convex, narrowest at base (Fig. 11) *Peltodytes lengi* Roberts
- 8 Vertex of head behind compound eyes with wide dark arcuate band; aedeagus as in Fig. 12; length 2.3-2.9 mm *Haliplus borealis* LeConte
- Vertex of head immaculate; length 3.0-4.0 mm 9
- 9 Pronotum with anteromedial pronotal blotch; ground color pale yellow 10
- Pronotum immaculate; ground color reddish yellow 11
- 10 Aedeagus with apical 1/5 nearly at right angle to basal 4/5 (Fig. 13)
..... *Haliplus triopsis* Say
- Aedeagus evenly curved from base to apex (Fig. 14)
..... *Haliplus variomaculatus* Brigham and Sanderson
- 11 Sutural stripe narrow, reaching only first discal stria in basal 1/2 of elytra; aedeagus approximately five times longer than wide, distal margin with distinct sub-apical notch (Fig. 15)
..... *Haliplus tortilipenis* Brigham and Sanderson
- Sutural stripe wide, reaching second discal stria in basal 1/2 of elytra; aedeagus less than 4 times as long as wide, distal margin evenly rounded (Fig. 16) *Haliplus fasciatus* Aubé

Genus **HALIPLUS** Latreille

Haliplus borealis LeConte (Figs. 12a-c)

Haliplus borealis LeConte, 1850: General remarks upon Coleoptera of Lake Superior, *In* Agassiz, Lake Superior: Its physical character, vegetation and animals: 212.

Diagnosis.— The genus *Haliplus* in Missouri is characterized by the following combination of characters: 1) pronotum immaculate or with an anteromesal maculation, 2) coxal plates are smaller those of *Peltodytes*, thus leaving at least the last three abdominal sternites exposed, and 3) ultimate segment of maxillary palp shorter than penultimate segment. This species is the smallest *Haliplus* in Missouri (length 2.3-2.9 mm) and can be distinguished from all other congeners by the presence of a brown to black arcuate band on the vertex. The elytral apices in this species are markedly sinuate.

Range.— This species occurs from Quebec to Minnesota, and south to Indiana and Missouri. *H. borealis* is limited to the northern portion of the Missouri Prairie Region and rarely occurs south of the Missouri River.

Habitat Associations.— *Haliplus borealis* has been recorded from both large and small lotic and lentic habitats (Hilsenhoff and Brigham 1978). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Chara*, *Ceratophyllum*, *Juncus*, *Potamogeton*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18, *Typha* (1), *Chara* (13), *Juncus* (32). BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40, Poaceae (1). BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (2), *Salix* root mats (3). BUCHANAN CO.: Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (1). CALDWELL CO.: Bonanza C.A., 10-IX-1999, Pond 68: Cyperaceae (1), Poaceae (1). CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Ceratophyllum* (34). HARRISON CO.: Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Cyperaceae (9), Poaceae (36), *Salix* root mats (15); same data, 23-VI-1999, Pond 111: Poaceae (3). HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: *Salix* root mats (1). LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: Unknown plant (2), *Typha* (1). NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (4); same data, 20-III-1999, Pond 47: Poaceae (3). PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (18), *Typha* (20). SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Potamogeton* (1), *Typha* (3), University of Texas Insect Collection; same data, 2-VII-1999, Pond 115: Poaceae (1).

***Haliplus fasciatus* Aubé (Figs. 16a-c)**

Haliplus fasciatus Aubé, 1838: Species Général des Coléoptères, Tome Sixième: 30.

Diagnosis.— The combination of the following characters will distinguish *H. fasciatus* from all congeners in the Prairie Region: 1) ground color reddish-yellow, 2) immaculate pronotum and vertex, 3) wide sutural stripe reaching second discal stria in basal 1/2 of elytra, and 4) aedeagus less than 4 times as long as wide, with distal margin evenly rounded. Length: 3.6-4.0 mm.

Range.— *Haliplus fasciatus* was reported from Quebec to South Carolina, and west to Kansas. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— *Haliplus fasciatus* has been recorded from permanent pools and the margins of slow flowing streams (Matta 1976). In the present study, it was collected from species of *Ludwigia*, *Polygonum*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: BARTON CO.: Dorris Creek Prairie C.A., 27-IX-1998, Pond 39: *Polygonum* (1), Poaceae (1); same data, *Ludwigia* (1); same data, 23-III-1999, Pond 57: *Polygonum* (1), Poaceae (1); same data, 9-VI-1999, Pond 90: *Ludwigia* (5), *Polygonum* (4). BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (2); Peabody C.A., 20-IX-1998, Pond 30: Poaceae (56). CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (3), Poaceae (1). CALLAWAY CO.: Reform C.A., 17-IV-1999, Pond 75: Cyperaceae (5). CEDAR CO.: Monegaw Prairie C.A., 3-IV-1999, Pond 61: Poaceae (5).

***Haliplus tortilipenis* Brigham and Sanderson (Figs. 15a-c)**

Haliplus tortilipenis Brigham and Sanderson, 1972: Transactions of the Illinois Academy of Science 65: 17-22.

Diagnosis.— The combination of the following characters will distinguish *H. tortilipenis* from all congeners of this genus in the Prairie Region: 1) ground color reddish-yellow, immaculate pronotum and vertex, 2) narrow sutural stripe not reaching beyond first discal stria in basal 1/2 of elytra, and 3) aedeagus approximately five times longer than wide, distal margin with distinct subapical notch. Length: 3.6-4 mm.

Range.— *Haliplus tortilipenis* was previously reported only from Illinois, South Dakota, and Wisconsin. **New State Record and Range Extension.** The two localities in Missouri in which this species was collected were highly disjunct. Two specimens were collected in the extreme northwestern part of the state and one specimen was collected in the southwestern portion of the state (the southern limit of the Prairie Region).

Habitat Associations.— The type series was reported from a small, semi-permanent, clay-bottomed pond with a diverse emergent flora in northeastern Illinois (Brigham and Sanderson 1972). In southeastern Wisconsin, it was collected from a pond habitat (Hilsenhoff and Brigham 1978). In the present study, three individuals were collected from among three habitats: *Chara* sp., *Juncus* sp., and *Ludwigia* sp. All specimens were collected in Fall 1998. One pond (Tarkio Prairie Conservation Area), was surrounded by 90% prairie and 10% woodland, whereas the other pond from which this species was collected (Pa Sole Prairie) was surrounded by 50% prairie and 50% row crops.

Material Collected.— MISSOURI: ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Chara* (1), *Juncus* (1). BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: *Ludwigia* (1).

***Haliplus triopsis* Say (Figs. 13a-c)**

Haliplus triopsis Say, 1823a: Transactions of the American Philosophical Society 2:106.

Diagnosis.— This species resembles *H. variomaculatus* Brigham and Sanderson, from which it differs by having an aedeagus with the apical 1/5 nearly at a right angle to the basal 4/5. Length: 3.1-3.7 mm.

Range.— *Haliplus triopsis* is widespread, ranging from Wisconsin to New England, and south to South Carolina and New Mexico. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— In Michigan, *Haliplus triopsis* occurs among *Chara* and *Elodea* algal beds and was reared on *Nitella* (Hickman 1931). In Virginia, it was recorded from ditches (Matta 1976). In Wisconsin, this species is almost exclusively found in lentic habitats (Hilsenhoff and Brigham 1978). In the present study, *H. triopsis* was collected in association with a wide range of submerged macrophytes and emergent vegetation including species of

Alisma, *Chara*, *Juncus*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Salix* root mats, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: Poaceae (1). ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: *Chara* (1). ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (8); same data, Pond 18: *Chara* (28), *Juncus* (40). BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: *Ludwigia* (2). BATES CO.: Peabody C.A., 20-IX-1998, Pond 30: *Potamogeton* (2), Poaceae (3); Pa Sole Prairie C.A., 23-III-1999, Pond 58: Poaceae (2); Shawnee Trail C.A., 8-VI-1999, Pond 86: *Salix* root mats (1), *Typha* (1); Treaty-Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (1); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (1), *Polygonum* (1); Clear Creek Prairie C.A., 9-VI-1999, Pond 91: *Juncus* (16), *Polygonum* (31). BUCHANAN CO.: Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (1). CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (11), Poaceae (7). CALLAWAY CO.: Reform C.A., 17-IV-1999, Pond 75: Cyperaceae (2), 19-VI-1999, Pond 104: *Potamogeton* (1), Cyperaceae (1), Cyperaceae (6). CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (4). CEDAR CO.: Monegaw Prairie C.A., 3-IV-1999, Pond 61: *Juncus* (4), *Polygonum* (5), Poaceae (1). COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (9), *Salix* root mats (1), *Typha* (5). DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: *Typha* (5). HARRISON CO.: Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (2), 20-III-1999; same data, Pond 46: Cyperaceae (1), Poaceae (5). HENRY CO.: Connor O. Fewel Wildlife Ar., 20-IX-1998, Pond 31: *Ludwigia* (1), Cyperaceae (3). HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 98: Poaceae (1). JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (1). LAFAYETTE CO.: Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (1). LINCOLN CO.: Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (5). LINN CO.: Linn Co., Mussel Fork C.A., 11-IX-1998, Pond 13: *Chara* (2). PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (1), *Typha* (2). RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (2). SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: *Typha* (1), Poaceae (1), 5-IX-1998, Pond 4: *Typha* (1). SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (1). VERNON CO.: Osage Prairie C.A., 7-VI-1999, Pond 85: Poaceae (2).

Haliphus variomaculatus Brigham and Sanderson (Figs. 14a-c)

Haliphus variomaculatus Brigham and Sanderson, 1973: The Coleopterists Bulletin 27(4):157-163.

Diagnosis.— This species resembles *H. triopsis* Say, from which it differs by having an evenly curved aedeagus. Length: 3.1-3.6 mm.

Range.— *Haliphus variomaculatus* was previously reported only from east-central Illinois. **New state record and range extension.** In Missouri, this species has been collected only from Lincoln, St. Charles (both near St. Louis) and Morgan Counties (Ozark Uplift).

Habitat Associations.— The type specimens were taken from two strip mine ponds containing *Nitella*, *Potamogeton*, *Veronica* and emergent grasses in east central Illinois (Brigham and Sanderson 1973). In this present study, this species was collected from *Ludwigia* sp. and a species of Poaceae.

Material Collected.— MISSOURI: LINCOLN CO.: Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (1). ST. CHARLES CO.: Busch Mem. Wildlife Mgt. Ar., 7-IX-1998, Pond 9: *Ludwigia* (1).

Genus **PELTODYTES** Régimbart

Peltodytes duodecimpunctatus (Say) (Figs. 10a-c)

Haliphus duodecimpunctatus Say, 1823a: Transactions of the American Philosophical Society 2:106 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859).

Peltodytes duodecimpunctatus: Matheson, 1912: Journal of the New York Entomological Society 20:175.

Diagnosis.— This genus in Missouri is characterized by the presence of two black spots on the posterior margin of the pronotum, whereas *Haliphus*, the only other genus reported from Missouri, does not have these markings. Species of *Peltodytes* have large expanded metacoxal plates, which usually cover all abdominal sternites except the posteriormost one or two, and the ultimate segment of maxillary palp is as long or longer than the penultimate

segment. This species differs from all congeners in Missouri by the presence of the black distal portion of the metafemur with a pale subapical band and the subhumeral elytral spots. The pale subapical band of the metafemur is narrower than the basal black band, whereas in *P. lengi*, which this species superficially resembles, the pale subapical band is wider, although the width of the bands can vary. The metacoxal plates are also distinctly angulate, whereas in *P. lengi*, they are subangulate, although sometimes the difference is quite subtle. The aedeagus (Fig. 11b) is narrowest near the middle, whereas in *P. lengi*, the aedeagus is narrowest basally (Fig. 12b). The right paramere is highly acuminate (Fig. 11a), whereas in *P. lengi*, the apex of the right paramere is more rounded (Fig. 12a). Length: 3.3-4.0 mm.

Range.— *Peltodytes duodecimpunctatus* is widely distributed in eastern North America, and was previously reported from Ontario to Quebec, and south to North Carolina and Illinois. In the Missouri Prairie Region, this species was collected only in a few counties in the center of the state that border the Missouri River, and in the Osage Prairie in the southwest.

Habitat Associations.— In Virginia, this species is frequently found in farm ponds (Matta 1976). In Wisconsin, all specimens were collected along the margins of streams (Hilsenhoff and Brigham 1978). In the present study, this species was collected from among species of *Leerzia*, *Salix* root mats, and Cyperaceae.

Material Collected.— MISSOURI: BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (1). COOPER CO.: Prairie Home C.A., 5-X-1999, Pond 45: *Salix* root mats (1). HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (2).

***Peltodytes edentulus* (LeConte) (Figs. 9a-c)**

Cnemidotus edentulus LeConte, 1863: Smithsonian Miscellaneous Collections, 6(167):21-122.

Peltodytes edentulus: Matheson, 1912: Journal of the New York Entomological Society 20:174-175.

Diagnosis.— The presence of a dark arcuate band on the vertex of head, together with the black metafemur with pale subapical band distinguishes this species from all congeners in Missouri. Length: 3.1-3.9 mm.

Range.— LeConte (1863) originally reported that this species was collected in "Kansas [sic], near the Rocky Mountains." *Peltodytes edentulus* is widespread throughout eastern North America ranging from Quebec to New York, west to Minnesota, and south to Kansas and Texas. This species is widespread and common in the Missouri Prairie Region.

Habitat Associations.— This species is common in lentic habitats (Matta 1976, Hilsenhoff and Brigham 1978), but can be found at the margins of streams (Hilsenhoff and Brigham 1978). This species feeds on *Chara* and *Nitella* (Wilson 1923) and has been reared on *Spirogyra* (Hickman 1931). In the present study, *Peltodytes edentulus* was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Alisma*, *Ceratophyllum*, *Chara*, *Juncus*, *Ludwigia*, *Potamogeton*, *Salix* root mats, *Polygonum*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Big Creek C.A., 5-IX-1998, Pond 2: *Ceratophyllum* (1); Union Ridge C.A., 11-XI-1999, Pond 71: Cyperaceae (6), Poaceae (13), *Typha* (3), *Chara* (6). ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: *Chara* (3), *Typha* (1). ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (16), *Typha* (2); same data, Pond 18: *Typha* (2), (113, UMC; 3, University of Texas Insect Collection), *Juncus* (85). AUDRAIN CO.: Robert M. White II C.A., 9-IX-1998, Pond 12: *Potamogeton* (1); same data, 1-VII-1999, Pond 112: Poaceae (15). BOONE CO.: Columbia, UMC S. Farms, 18-XI-1999, Pond 77: Poaceae (2), *Salix* root mats (7). BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (2); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (25), 14-VI-1999, Pond 96: Cyperaceae (14), 14-VI-1999, Pond 96: *Potamogeton* (1). Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (3); Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (2). CALDWELL CO.: Bonanza C.A., 10-XI-1999, Pond 68: Poaceae (1), 22-VI-1999, Pond 107: *Potamogeton* (3), Poaceae (9), 10-XI-1999, Pond 68: Cyperaceae (51), *Chara* (7), *Typha* (2). CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Ceratophyllum* (3); Little Dixie Lake C.A., 18-VI-1999, Pond 103: *Typha* (1). CARROLL CO.: Bunch Hollow C.A., 13-IX-1998, Pond 21: Moss (1); Schifferdecker Mem. C.A., 16-VI-1999, Pond 101: *Ceratophyllum* (2). CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Typha* (1). CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (1); James P. Harter C.A., 22-III-1999, Pond 53: *Typha* (7). COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (1), Poaceae (2). DAVIESS CO.: Gallatin

C.A., 11-XI-1999, Pond 69: Cyperaceae (4), *Typha* (7). DE KALB CO.: Pony Express C.A., 13-IX-1998, Pond 20: Cyperaceae (3), Poaceae (1). HARRISON CO.: Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (1); Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Cyperaceae (17), Poaceae (13), *Salix* root mats (10); same data, 23-VI-1999, Pond 111: Poaceae (2). HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (10); same data, Pond 98: *Polygonum* (2). HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (4). KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Ludwigia* (1). LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: Unknown plant (5). LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Potamogeton* (1), *Ceratophyllum* (2), *Chara* (5). LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: *Salix* root mats (3). MACON CO.: Little Dixie Lake C.A., 17-XI-1999, Pond 74: Cyperaceae (1). NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (9); same data, 20-III-1999, Pond 47: Poaceae (22). PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (46), *Typha* (3). RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (3). SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (3), *Ludwigia* (2). SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Potamogeton* (8), Cyperaceae (9), *Typha* (32); same data, 2-VII-1999, Pond 115: *Typha* (4), Poaceae (5). WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: Poaceae (9).

***Peltodytes lengi* Roberts (Figs. 11a-c)**

Peltodytes lengi Roberts, 1913: Journal of the New York Entomological Society 21(2): 119-120.

Diagnosis.— The lack of a subhumeral spot on the elytron is the most consistent feature that distinguishes this species from *P. duodecimpunctatus*. The presence of a pale subapical band on the metafemur that is as wide or wider than the basal black band, and the subangulate apices of the metacoxal plates are other characters that can vary but aid in distinguishing these beetles from *P. duodecimpunctatus*. The aedeagus is narrowest at the base in this species, whereas in *P. duodecimpunctatus*, it is narrowest at mid-length. Length: 3.3-3.9 mm.

Range.— *Peltodytes lengi* was reported from New York to Florida, west to Missouri, and is widespread in the Missouri Prairie Region.

Habitat Associations.— In Virginia, *P. lengi* is common at the margins of shallow ponds (Matta 1976). It was collected from the Huron River and reared on *Spirogyra* (Hickman 1931). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Alisma*, *Ceratophyllum*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: BARTON CO.: Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (1); same data, 23-III-1999, Pond 57: Poaceae (1); same data, 27-IX-1998, Pond 39: Poaceae (1); Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (1); same data, 8-VI-1999, Pond 89: *Ludwigia* (1), Poaceae (5); same data, 23-III-1999, Pond 58: *Polygonum* (2); Shawnee Trail Cons. Ar, 26-IX-1998, Pond 37: *Salix* root mats (1); Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Polygonum* (3), *Ludwigia* (6); same data, 8-VI-1999, Pond 88: *Ludwigia* (1), *Polygonum* (1). BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: *Salix* root mats (3). BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (1); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (10); same data, 14-VI-1999, Pond 96: *Potamogeton* (9). CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (3, University of Texas Insect Collection), *Ceratophyllum* spp., (1). CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (1). CEDAR CO.: Mo-Ko Prairie C.A., 7-VI-1999, Pond 84: Cyperaceae (1). HENRY CO.: Connor O. Fewel W.A., 20-IX-1998, Pond 31: Cyperaceae (2). HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (97); same data, 15-VI-1999, Pond 98: *Polygonum* (4), Poaceae (5). LINCOLN CO.: Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (1). MACON CO.: Little Dixie Lake C.A., 17-IV-1999, Pond 74: *Typha* (1), Cyperaceae (20). PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (98), *Typha* (1). RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (1). RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (2).

***Peltodytes litoralis* Matheson (Figs. 5a-c)**

Peltodytes litoralis Matheson, 1912: Journal of the New York Entomological Society 20:178.

Diagnosis.— The uniformly pale yellow exposed part of the metafemur will readily distinguish this species from all congeners in the Missouri Prairie Region. Length: 3.3-3.7 mm.

Range.— *Peltodytes litoralis* occurs from Texas to Kansas, east to Illinois, and is wide-

spread in the Missouri Prairie Region.

Habitat Associations.— This species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Alisma*, *Chara*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Salix* root mats, *Typha*, and Cyperaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: Cyperaceae (1), Poaceae (8), *Typha* (1), *Chara* (3). ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (1). ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Typha* (1). BARTON CO.: Shawnee Trail C.A., 26-IX-1998, Pond 37: *Salix* root mats (1); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (1); same data, 27-IX-1998, Pond 39: *Polygonum* (8), Poaceae (10), *Ludwigia* (12); same data, 23-III-1999, Pond 57: *Polygonum* (2); Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (14), *Ludwigia* (27); same data, 8-VI-1999, Pond 89: *Ludwigia* (1); Pa Sole Prairie C.A., 23-III-1999, Pond 58: Poaceae (8), *Polygonum* (6); Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Polygonum* (2), *Ludwigia* (4); same data, 23-III-1999, Pond 59: *Polygonum* (4); E. B. & M. O. Risch C.A., 4-IV-1999, Pond 63: Poaceae (1). BATES CO.: Peabody C.A., 20-IX-1998, Pond 30: Poaceae (24). BUCHANAN CO.: Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (3). CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: *Potamogeton* (1); same data, 10-IV-1999, Pond 68: Cyperaceae (7), *Chara* (1); CASS CO.: James P. Harter C.A., 22-III-1999, Pond 53: *Typha* (1); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (1); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: *Typha* (15), *Salix* root mats (5), Poaceae (1). HARRISON CO.: Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Cyperaceae (2), Poaceae (2). HENRY CO.: Connor O. Fewel Wildlife Ar., 2-IX-1998, Pond 31: *Ludwigia* (4), Cyperaceae (11). HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (2), *Typha* (1). LAFAYETTE CO.: Baltimore Bend C.A., 3-X-1998, Pond 43: *Typha* (2); same data, 4-IV-1999, Pond 66: Poaceae (3). LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Chara* (9), Cyperaceae (1). LIVINGSTON CO.: Poosey C.A., 16-VI-1999, Pond 99: Poaceae. MACON CO.: Little Dixie Lake C.A., 17-IV-1999, Pond 74: Cyperaceae (2), *Typha* (2), Cyperaceae (2). NODAWAY CO.: Bilby Ranch Lake C.A., 20-III-1999, Pond 47: Poaceae (1). PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (21). SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: (1); Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1). SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: Poaceae (1).

***Peltodytes muticus* (LeConte) (Figs. 7a-c)**

Cnemidotus muticus LeConte, 1863: Smithsonian Miscellaneous Collection 6(167):21.

Peltodytes muticus: Matheson, 1912: Journal of the New York Entomological Society 20:176-177.

Diagnosis.— The uniformly black exposed part of the metafemur, lack of a subhumeral elytral spot, confluence of each medial black elytral blotch with the sutural stripe, weak basal elytral strip, not extending beyond fifth stria, and the sutural stripe being narrower basally than apically will distinguish this species from all congeners in Missouri. The aedeagus in this species is uniform in width, whereas in *P. sexmaculatus*, which this species can superficially resemble, the apex of the aedeagus is distinctively curved dorsad. Length: 3.1-3.7 mm.

Range.— *Peltodytes muticus* occurs from Ontario and Quebec, south to Florida, and west to Missouri. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— *Peltodytes muticus* has been recorded from swamp streams in Florida and almost always associated with *Spirogyra* or other algae (Young 1954). This species occurs throughout a broad range of lentic habitats (Matta 1976). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ceratophyllum*, *Lespedeza*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (1); Big Creek C.A., 5-IX-1998, Pond 2: *Ceratophyllum* (1). AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (15). BARTON CO.: Treaty Line Prairie C.A., 23-III-1999, Pond 59: *Ludwigia* (1), *Polygonum* (2); same data, 27-IX-1998, Pond 41: *Polygonum* (2); same data, 8-VI-1999, Pond 88: *Polygonum* (4); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Polygonum* (1); same data, 23-III-1999, Pond 57: Poaceae (1); same data, 27-IX-1998, Pond 39: *Polygonum* (1). BOONE CO.: Columbia; UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (4); Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Lespedeza* (1), *Salix* root mats (1). BUCHANAN CO.: Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (2); same data, 14-VI-1999, Pond

96: *Potamogeton* (1); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (9); Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (9). CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: Poaceae (1). CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (1); Reform C.A., 19-VI-1999, Pond 104: *Ludwigia* (4); same data, 17-IV-1999, Pond 75: Cyperaceae (3). CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 101: *Ceratophyllum* (2). CASS CO.: James P. Harter C.A., 22-III-1999, Pond 53: Poaceae (1). CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Sagittaria* (1). COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Poaceae (2). HARRISON CO.: Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (81), *Salix* root mats (1). HENRY CO.: Chapel View Prairie C.A., 3-IV-1999, Pond 60: Poaceae (1). HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (6). JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: Marginal roots (1), *Typha* (3). LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (8). PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (25). RANDOLPH CO.: Vonaventure C.A. 25-IV-1999, Pond 81: Poaceae (1); Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (4), *Salix* root mats (3); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (2); SCOTLAND CO.: Indian Hills C.A., 5 IX-1998, Pond 4: *Potamogeton* (9), *Typha* (12), Cyperaceae (5); same data, 2-VII-1999 Pond 115: *Typha* (1).

Peltodytes pedunculatus (Blatchley) (Fig. 6)

Cnemidotus pedunculatus Blatchley, 1910: Indiana Department of Geology and Natural Resources, Bulletin No. 1:204.

Peltodytes pedunculatus: Matheson, 1912: Journal of the New York Entomological Society 20:175-176.

Diagnosis.— The uniformly black exposed part of the metafemur; subhumeral spot on the elytra; and the widening of the sutural stripe from the base to the midpoint of elytra, contacting first discal stria, then narrowing apically will distinguish this species from all congeners in Missouri. The distinctive aedeagus is narrowed abruptly before the expanded apex. Length: 2.9-3.5 mm.

Range.— *Peltodytes pedunculatus* occurs from Minnesota east to Ohio, south to Mississippi and Texas. **New state record.** This species is widespread in the Missouri Prairie Region.

Habitat Associations.— This species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Potamogeton*, *Salix* root mats, *Sagittaria*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: Cyperaceae (1), Poaceae (1); Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (1); BOONE CO.: Columbia; UMC S. Farms, 18-IV-1999, Pond 77: *Salix* root mats (2, University of Texas Insect Collection); CARROLL CO.: Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (3); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Sagittaria* (3); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (1); HARRISON CO.: Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Cyperaceae (2); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (4), *Salix* root mats (68), *Typha* (1), Cyperaceae (2); LINN CO.: Mussel Fork C.A., 11-X-1998, Pond 13: Cyperaceae (1), *Typha* (1), *Potamogeton* (1); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (1); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Potamogeton* (1), *Typha* (25), Cyperaceae (10); same data, 2-VII-1999, Pond 115: *Typha* (3).

Peltodytes sexmaculatus Roberts (Figs. 8a-c)

Peltodytes sexmaculatus Roberts, 1913: Journal of the New York Entomological Society 21:117-118.

Diagnosis.— This species most closely resembles *P. muticus* from which it can be separated by the distinct and entire medial elytral blotches, extensive basal elytral stripe extending to at least sixth stria, and the sutural stripe is usually not markedly narrower basally than apically. The apex of the aedeagus has a distinct subapical notch on the distal margin. Length: 2.9-3.7 mm.

Range.— *Peltodytes sexmaculatus* is widespread, occurring from Maine to Wisconsin, and south to Florida and Texas. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— *Peltodytes sexmaculatus* can be found at the margins of lotic and lentic habitats (Matta 1976). In Wisconsin, all specimens were taken from streams and river-

bottom ponds (Hilsenhoff and Brigham 1978). This species was found in association with a variety of filamentous algae and reared on *Spirogyra* (Hickman 1931). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including *Alisma*, *Ammannia*, *Chara*, *Ceratophyllum*, *Juncus*, *Lespedeza*, *Ludwigia*, *Nelumbo*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.—MISSOURI: ADAIR CO.: Big Creek C.A., 5-IX-1998, Pond 2: *Juncus* (1); Union Ridge C.A., 11-IV-1999, Pond 71: Cyperaceae (4), Poaceae (33), *Typha* (26), *Chara* (8); ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (2), *Chara* (1), *Typha* (1); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (7); same data, Pond 18: *Typha* (3), *Chara* (28), *Juncus* (98); AUDRAIN CO.: Robert M. White II C.A., 9-IX-1998, Pond 12: *Juncus* (13), *Potamogeton* (6), Poaceae (4); same data, 1-VII-1999, Pond 112: Poaceae (4); BARTON CO.: Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Polygonum* (5), *Ludwigia* (4); same data, 8-VI-1999, Pond 88: *Ludwigia* (15), *Polygonum* (9); same data, 23-III-1999, Pond 59: *Polygonum* (3); Clear Creek Prairie C.A., 9-VI-1999, Pond 91: *Juncus* (13), *Polygonum* (16), Cyperaceae (4); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (28), *Polygonum* (7); same data, 23-III-1999, Pond 57: *Polygonum* (40), Poaceae (6), *Nelumbo* (11); same data, 27-IX-1998, Pond 39: *Polygonum* (17), Poaceae (22), *Ludwigia* (6); Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (61), *Ludwigia* (44); same data, 8-VI-1999, Pond 89: *Ludwigia* (30), Poaceae (106); same data, 23-III-1999, Pond 58: Poaceae (3), *Polygonum* (2); Shawnee Trail C.A., 26-IX-1998, Pond 37: Cyperaceae (1), *Ammannia* (1); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (2), Cyperaceae (2); Peabody C.A., 20-IX-1998, Pond 30: Poaceae (39); BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Lespedeza* (3); Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (1), *Salix* root mats (1); BUCHANAN CO.: Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (22); Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (2); Belcher Branch Lake C.A., 14-VI-1999, Pond 96: *Potamogeton* (8); CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (29), *Chara* (2), *Typha* (1), Poaceae (3); same data 22-VI-1999, Pond 107: *Potamogeton* (7), Poaceae (5); CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (27), *Ceratophyllum* (21); Reform C.A., 17-IV-1999, Pond 75: Cyperaceae (2); same data, 19-VI-1999, Pond, 104: Cyperaceae (1), Cyperaceae (11), *Salix* root mats (1), *Ludwigia* (2); same data, 16-IX-1998, Pond 24: *Ludwigia* (1); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (17); same data, Pond 101: *Ceratophyllum* (9); Bunch Hollow C.A., 13-IX-1998, Pond 21: Moss (3), *Potamogeton* (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (2); James P. Harter C.A., 22-III-1999, Pond 53: Poaceae (1), *Typha* (1); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (16), *Typha* (5); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (13), *Salix* root mats (4), Poaceae (1), *Typha* (6); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Sagittaria* (1), *Typha* (2); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (35), *Typha* (1); DE KALB CO.: Pony Express C.A., 13-IX-1998, Pond 20: Cyperaceae (6), Poaceae (3); HARRISON CO.: Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (66); Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (33), *Salix* root mats (2); same data, 20-III-1999, Pond 46: *Salix* root mats (2), Cyperaceae (12), Poaceae (59); HENRY CO.: Connor O. Fewel Wildlife Ar., 20-IX-1998, Pond 31: *Ludwigia* (6), *Salix* root mats (1), Cyperaceae (24); Chapel View Prairie C.A., 3-IV-1999, Pond 60: *Polygonum* (1), Poaceae (2); Chapel View Prairie C.A., 3-IV-1999, Pond 60: Poaceae (3); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (177); same data, Pond 98: *Polygonum* (1), Poaceae (4); HOWARD CO.: Daviddale C.A., 30-IX-1998, Pond 42: Cyperaceae (32), *Salix* root mats (12), *Typha* (5), Cyperaceae (4); KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Ludwigia* (1), *Juncus* (2); LAFAYETTE CO.: Baltimore Bend C.A., 3-X-1998, Pond 43: Poaceae (3); Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (5); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: Unknown plant (2); LINCOLN CO.: Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (4); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Chara* (4); LIVINGSTON CO.: Poosey C.A., 16-VI-1999, Pond 99: Poaceae (4); same data, 12-IX-1998, Pond 14: *Salix* root mats (1); MACON CO.: Redman C.A., 1-VII-1999, Pond 114: Cyperaceae (2); Little Dixie Lake C.A., 17-IV-1999, Pond 74: Cyperaceae (1); MONROE CO.: 0.5 mi. E Jct. Co Rds. 900 & 915; 1-VII-1999, Pond 113: *Juncus* (1); MONTGOMERY CO.: Danville C.A., 7-IX-1998, Pond 11: *Ceratophyllum* (1); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (3); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (17); PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (11), *Typha* (139); PUTNAM CO.: Rebel's Cove C.A., 5-IX-1998, Pond 3: Cyperaceae (4); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (1); RAY CO.: Crooked River C.A., 19-

IX-1998, Pond 26: Poaceae (13); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: (1); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: *Typha* (40), Poaceae (35); same data, 5-IX-1998, Pond 4: *Potamogeton* (5), *Typha* (81); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: *Typha* (1); VERNON CO.: Douglas Branch C.A., 22-III-1999, Pond 54: Poaceae (7); Osage Prairie C.A., 7-VI-1999, Pond 85: Poaceae (3); same data, Pond 85: *Juncus* (7); WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: Poaceae (28), *Salix* root mats (2).

The Lentic Dytiscidae of the Missouri Prairie Region

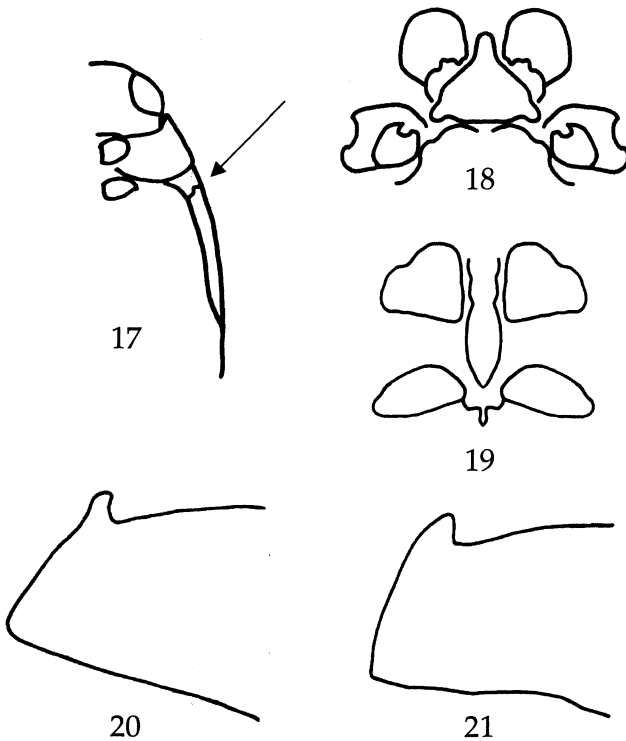
Habitat Associations.— Many species of Dytiscidae are totally dependent on the presence of aquatic vegetation to successfully reproduce in a given locale. Eggs of many species (e.g., species of *Agabus*, *Coptotomus*, *Cybister*, *Dytiscus*, *Hydaticus*, *Ilybius*, *Laccophilus*, and *Thermonectus*) are laid, with an ovipositor modified for cutting, in cavities cut into stems of emergent and submerged plants (Crowson 1981, White and Brigham 1996). Many hydroporine and colymbetine dytiscids oviposit on the stems or leaves of aquatic plants (Crowson 1981). Some dytiscines, such as species of *Acilius*, oviposit en masse (30-50 eggs) above the water line in moist areas (White and Brigham 1996). In temperate areas, the aquatic larvae complete development in summer and leave the water to pupate in earthen cells on land. Many species overwinter as adults in either lentic or lotic situations (Hilsenhoff 1992). However, in at least for four species of *Ilybius* in Newfoundland, larvae overwintered and adults occurred primarily during the summer (Hicks and Larson 1995).

Taxonomy.— The Dytiscidae is the most species-rich family of aquatic beetles, with over 4,000 species described worldwide, over 500 of which are Nearctic (Larson et al. 2000). Most of the genera present in North America are Holarctic in distribution. Unlike the Noteridae, many groups within the Dytiscidae reach their greatest diversity in temperate and boreal regions (Larson 1975). Numerous regional faunistic treatments for the Nearctic dytiscid fauna have been published recently, most of which may be pertinent to particular taxa of the Missouri fauna [Florida (Young 1954, Epler 1996), Minnesota and Manitoba (Wallis 1973), Alberta (Larson 1975), Virginia (Michael and Matta 1977), Wisconsin (Hilsenhoff 1992, 1993a, 1993b, 1993c, 1994, 1995), Canada and Alaska (Larson et al. 2000)]. In addition, taxonomic revisions for particular genera include information pertinent to the Missouri fauna [*Acilius* (Hilsenhoff 1975b), *Agabus* (Larson 1989, 1991), *Coptotomus* (Hilsenhoff 1980), *Graphoderus* (Wallis 1939), *Hydrovatus* (Young 1963a), *Hygrotus* (Anderson 1971, 1976), *Ilybius* (Larson 1987), *Laccophilus* (Zimmerman 1970), *Neoporus* (Larson et al. 2000), *Thermonectus* (McWilliams 1968)]. Nomenclature given here largely follows Larson et al. (2000), except in the case of *Laccophilus* where we follow Zimmerman (1970), and in the case of *Copelatus* where we follow Young (1963b).

Key to the Lentic Dytiscidae of the Missouri Prairie Region

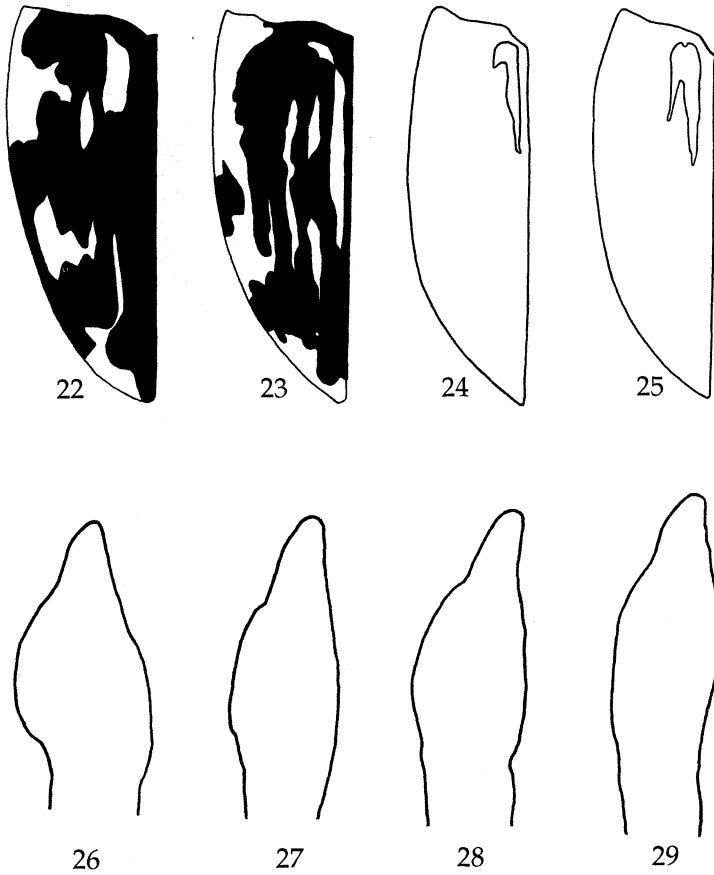
1. Pro- and mesotarsus five-segmented 2
- 1' Pro- and mesotarsus apparently or actually four-segmented (tarsomere four absent or covered by tarsomere three); Hydroporinae 6
- 2(1) Compound eye emarginate above insertion of antenna; metatarsal claw paired; Colymbetinae 20
- 2' Compound eye entire, or if emarginate, then metatarsal claw single 3
- 3(2') Scutellum hidden; metatarsal claw single and stout; males with protarsomeres 1-3 dilated and with adhesive hairs, but not forming a subcircular adhesive disc; length < 5.5 mm
..... Laccophilinae . . . *Laccophilus* Leach . . . 4

3'	Scutellum visible; metatarsus with two claws; males with protarsomeres 1-3 enlarged and flattened to form a sub-circular adhesive disc containing smaller discs within; length > 9.0 mm	Dytiscinae . . . 30
4(3)	Elytra with black fascia across apical half	<i>Laccophilus fasciatus rufus</i> Melsheimer
4'	Elytra without black fascia across apical half	5
5(4')	Lateral margins of each elytron with three to four large, distinctly outlined markings that usually merge with irrorate pattern mesally; length 4.4-5.3 mm	<i>Laccophilus maculosus maculosus</i> Say
5'	Lateral margins of each elytron without markings or if present, markings weakly developed; length 3.8-4.2 mm	<i>Laccophilus proximus</i> Say
6(1')	Scutellum visible; elytral and abdominal apices acuminate;	<i>Celina</i> Aubé. . . 7
6'	Scutellum hidden; elytral and abdominal apices usually not acuminate	9
7(6')	Elytra bicolored, mostly brown with basal 1/5 orange or yellowish-brown	<i>Celina hubbelli</i> Young
7'	Elytra nearly uniformly dark brown	8
8(7')	Length 4.5-5.5 mm	<i>Celina imitatrix</i> Young
8'	Length 3.0-4.0 mm	<i>Celina angustata</i> Aubé
9(6')	Length < 2.0 mm	10
9'	Length > 2.1 mm	13
10	Transverse interocular suture present	<i>Liodessus flavicollis</i> (LeConte)
10'	Transverse interocular suture absent	11
11(10')	Metatibia straight; pronotum concolorous with elytron; body rounded	<i>Desmopachria convexa</i> (Aubé)
11'	Metatibia arcuate; pronotum much lighter in color than elytra; body elongate	<i>Uvarus</i> Guignot . . . 12
12(11')	Metasternum and abdominal venter reddish-brown; metasternum and metacoxae with coarse punctations	<i>Uvarus granarius</i> (Aubé)
12'	Metasternum and abdominal venter uniformly black; metasternum and metacoxae with fine punctations	<i>Uvarus lacustris</i> (Say)
13(9')	Diagonal carina crossing base of epipleuron (shoulder) (Fig. 17)	14
13'	Base of epipleuron without carina	17
14(13)	Prosternal process with posterior margin broad (Fig. 18); elytral apices slightly acuminate (length 2.4-2.7 mm)	<i>Hydrovatus pustulatus</i> Melsheimer
14'	Prosternal process acuminate posteriorly (Fig. 19); elytral apices not acuminate	<i>Hygrotus</i> Stephens . . . 15
15(14')	Length < 3 mm; each elytron with 4 dark blotches (in some individuals, blotches may unite)	<i>Hygrotus acaroides</i> (LeConte)
15'	Length > 3 mm; each elytron without 4 dark blotches, although black stripes may be present	16
16(15')	Elytra with dark stripes and blotches	<i>Hygrotus nubilis</i> (LeConte)
16'	Elytra mostly brown, except at lateral margins; pronotum with small, dark median spot	<i>Hygrotus dissimilis</i> Gemminger and Harold
17(13')	Elytra mostly dark brown to black and without stripes or other maculation	<i>Hydroporus rufilabris</i> Sharp
17'	Elytra with distinct black stripes and/or other maculation	<i>Neoporus</i> Guignot . . . 18



Figs. 17-21. 17, *Hygrotus nubilus*, ventral aspect with diagonal carina crossing base of epipleuron (shoulder). 18, *Hydrovatus pustulatus*, ventral aspect with broad posterior margin of prosternal process. 19, *Hygrotus nubilus*, ventral aspect with acuminate posterior margin of prosternal process. 20, *Neoporus clypealis*, dorsal view of female pronotum with anterolateral portion sinuate laterally. 21, *Neoporus dimidiatus*, dorsal view of female pronotum with anterolateral portion evenly curved laterally.

- 18 (17') Anterior protarsal claw short, less than half the length of posterior claw (males), or anterolateral portion of pronotum sinuate anteriorly (females) (Fig. 20) *Neoporus clypealis* (Sharp)
- 18' Anterior protarsal claw 3/4 to subequal the length of posterior claw (males), or anterolateral portion of pronotum evenly curved anteriorly (females) (Fig. 21) 19
- 19(18') Elytra with pale marks originating in basal half not extending into apical half (Fig. 22); anterior margin of pronotum usually with a black median blotch *Neoporus undulatus* (Say)
- 19' Elytra with some pale marks originating in basal half extending into apical half (Fig. 23); anterior margin of pronotum without black median blotch, although entire margin dark
..... *Neoporus dimidiatus* (Gemminger and Harold)
- 20(2) Each elytron with 8 or 10 impressed, longitudinal discal striae that are approximately equally spaced except at elytral apices
Copelatus Erichson 21



Figs 22-29. 22, *Neoporus undulatus*, left elytron. 23, *Neoporus dimidiatus*, left elytron. 24, *Coptotomus lenticus*, left elytron. 25, *Coptotomus venustus*, left elytron. 26, *Coptotomus l. longulus*, aedeagus. 27, *Coptotomus longulus lenticus*, aedeagus. 28, *Coptotomus venustus*, aedeagus. 29, *Coptotomus loticus*, aedeagus.

- 20' Each elytron without 8 or 10 impressed, longitudinal discal striae, although unimpressed pigmented stripes might be present 22
- 21(20) Each elytron with 8 impressed, longitudinal, discal striae and one sub-marginal stria that is not entirely visible from above; length > 5 mm *Copelatus chevrolati chevrolati* Aubé
- 21' Each elytron with 10 impressed, longitudinal, discal striae and one sub-marginal stria that is not entirely visible from above; length < 5 mm *Copelatus glyphicus* (Say)
- 22(20') Posteromesal corner of metafemur with a distinct row of spines; elytra virtually concolorous, or with 3-5 parallel dark stripes, or 2-4 small orange spots 23
- 22' Posteromesal corner of metafemur impubis; elytra with dark irrorations or irregular dark markings; *Coptotomus* Say 24
- 23(22) Metatarsal claws subequal in length; *Agabus* Leach 27

- 23' Metatarsal claws clearly unequal in length; *Ilybius* Erichson 28
- 24 Pronotum with anterior and posterior dark blotches usually separated by a distance greater than the width of the posterior blotch when measured at the narrowest point between blotches; anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) less than half length of mesal portion of pale mark (Fig. 24) 25
- 24' Pronotum with anterior and posterior dark blotches usually separated by a distance subequal to or narrower than the width of the posterior blotch when measured at the narrowest point between blotches; anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) greater than half the length of mesal portion of pale mark (Fig. 25) 26
- 25 Each elytron without large dark blotch at mid-length of pale marginal band; dark markings on disc mostly irrorate; aedeagus with lateral margin of expansion evenly curved (Fig. 26)
..... *Coptotomus longulus longulus* LeConte
- 25' Each elytron with large dark blotch at mid-length of pale marginal band; dark markings on disc mostly solid; aedeagus with lateral margin of expansion straight for most of its length (Fig. 27)
..... *Coptotomus longulus lenticus* (Hilsenhoff)
- 26 Aedeagus with lateral expansion abruptly narrowing to apical 1/4 (Fig. 28) *Coptotomus venustus* (Say)
- 26' Aedeagus with lateral expansion gradually narrowing to apical 1/4 (Fig. 29) *Coptotomus loticus* Hilsenhoff
- 27(23) Each elytron yellow-brown with three to five dark longitudinal stripes on disc *Agabus disintegratus* (Crotch)
- 27' Each elytron variable, but without stripes ... *Agabus aeruginosus* Aubé
- 28(23') Metasternal groove that receives prosternal process short, usually not reaching hind margin of mesocoxal cavity; ratio of width of metacoxa/width of metasternum > 5 (Fig. 1b) *Ilybius oblitus* Sharp
- 28' Metasternal groove that receives prosternal process long, reaching at the least hind margin of mesocoxal cavity; ratio of width of metacoxa/width of metasternum < 5 29
- 29(28') Males with mid-ventral carina in apical 1/4 of last abdominal sternum; females with notch in last abdominal sternum obtuse when viewed from below *Ilybius biguttulus* (Germar)
- 29' Males without carina on last abdominal sternum; females with notch in last abdominal sternum nearly at right angle when viewed from below *Ilybius fraterculus* LeConte
- 30 (3') Length > 25 mm 31
- 30' Length < 25 mm 32
- 31 Body clearly widest at posterior 1/3; elytra dark brown and irrorate with numerous, minute green dots which imparts an overall greenish color, except at margins; width of shorter spur at apex of metatibia at least twice that of longer spur *Cybister fimbriolatus* (Say)
- 31' Body widest at mid-length; elytra uniformly dark brown except at margins and without green dots; width of shorter spur at apex of metatibia subequal to that of longer spur *Dytiscus hybridus* Aubé*
- 32(30') Sterna and elytra clearly punctate; females sometimes with elytra fluted; *Acilius* Leach 33
- 32' Sterna and elytra impunctate, but elytra sometimes appearing finely punctate; females never with elytra fluted 34
- 33(32) Length 13.4-15.8 mm; yellow transverse zig-zag band in posterior 1/3 of elytra not boldly contrasting with disc, posteriorly directed extensions

- mostly acuminate; males with setae on inner ventral aspect of proximal 3 mesotarsomeres more slender and numerous than on distal 2 tarsomeres; females with M-mark on vertex indistinct, of lighter color than dark transverse lines on pronotum, or with sulcate elytra
- *Acilius fraternus* (Harris)
- 33' Length 10.6-12.2 mm; yellow transverse zig-zag band in posterior 1/3 of elytra boldly contrasting with disc, posteriorly directed extensions mostly rounded; males with inner ventral aspect of proximal 3 tarsomeres glabrous; females with distinct M-mark on vertex, of same color as dark transverse lines on pronotum, without sulcate elytra ..
- *Acilius mediatu*s (Say)
- 34(32') Mesofemur with some setae as long as or longer than width of femur .
- *Thermonectus* Dejean . . . 35
- 34' Mesofemur with all setae shorter than width of femur
- *Graphoderus liberus* (Say)
- 35(34) Length 10.5 mm; elytra mostly black, yellowish blotches at base, black irrorations present laterally and apically; pronotum with one transverse yellow band
- *Thermonectus basillaris* (Harris)
- 35' Length 11 mm; elytra mostly yellowish-brown with black irrorations, black fascia in apical 1/3, sometimes reduced to median blotch; pronotum with 2 to 3 yellow bands, although some bands might be broken by black band
- *Thermonectus nigrofasciatus ornaticollis* (Aubé)

* Species not collected in the present study but likely to occur in ponds of the Missouri Prairie Region.

Subfamily Laccophilinae
Genus LACCOPHILUS Leach

Laccophilus fasciatus rufus Melsheimer

Laccophilus rufus Melsheimer, 1844: Proceedings of the Academy of Natural Sciences of Philadelphia 2:28.

Laccophilus fasciatus Aubé, 1838: Species général des Coléoptères 6: 423.

Laccophilus fasciatus rufus: Melsheimer, Zimmerman 1970: Memoirs of the American Entomological Society 26:75.

Diagnosis.— The genus is the only member of the Laccophilinae occurring in the Missouri Prairie Region. Species of *Laccophilus* can be distinguished from all other dytiscids by a single metatarsal claw, produced lobes on the external aspect of the metatarsomeres, and absence of a visible scutellum. Member of this genus jump quite well when attempting to right themselves (Zimmerman 1970, pers. obs.), whereas few other small dytiscids exhibit this behavior. *Laccophilus fasciatus rufus* can be distinguished from all congeners in the Missouri Prairie Region by the presence of black fascia across the posterior half of the elytra. Length 4.1-5.0 mm.

Range.— This subspecies ranges from Vermont to South Dakota, south to northern Florida and Texas. This subspecies is widespread in ponds of the Missouri Prairie Region.

Habitat Associations.— This species has been reported from exposed muddy or silty bottomed ponds (Larson et al. 2000) and intermittent streams (Young 1954), and is considered a pioneer species (Zimmerman 1970). *Laccophilus fasciatus rufus* was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ceratophyllum*, *Juncus*, *Lespedeza*, *Ludwigia*, *Polygonum Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (43); AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (1); same data, 9-IX-1998, Pond 12: Poaceae (3); Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (42). BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Polygonum* (2); Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: *Ludwigia* (3); BOONE CO.: Baskett Wildlife Area, 18-IV-

1999, Pond 76: *Juncus* (7), Poaceae (42); same data, 14-IX-1998, Pond 22: *Lespedeza* (7), *Salix* root mats (1); BUCHANAN CO.: Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (34), *Typha* (4); same data, 21-III-1999, Pond 48: Poaceae (4), *Typha*, (1); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (32); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (5); same data, 14-VI-1999, Pond 96: Cyperaceae (2); Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae, (2); CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (1); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Salix* root mats (1); same data, 16-IX-1998, Pond 24: *Ludwigia* (31), *Salix* root mats (1), Cyperaceae (7); Little Dixie Lake C.A., 18-VI-1999, Pond 103: *Typha* (16); CARROLL CO.: Bunch Hollow C.A., 13-IX-1998, Pond 21: Moss (7), *Potamogeton* (2); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (5); Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (1); same data, Pond 101: *Ceratophyllum* (3); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (8); Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (24); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Typha* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (2), Poaceae (7); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Juncus* (3), *Polygonum* (6); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (7), Marg. grass (34), *Typha* (31); DE KALB CO.: Pony Express C.A., 13-IX-1998, Pond 20: Poaceae (1); HARRISON CO.: Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (8); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 98: Poaceae (4); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (1); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: Marginal roots (1), *Potamogeton* (2); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (2), *Salix* root mats (1), Poaceae (11); Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (9), Poaceae (159); LAFAYETTE CO.: Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (1); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Salix* root mats (1); same data, 25-IV-1999, Pond 82: Cyperaceae (36), *Polygonum* (14); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (7); LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: *Salix* root mats (24); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Sagittaria* (11), *Typha* (13); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae, (17); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (6), *Salix* root mats (7); RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (4); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (1), *Ludwigia* (2); Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: Cyperaceae (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (63), *Typha* (7); WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: Poaceae (1).

***Laccophilus maculosus maculosus* Say**

Laccophilus maculosus Say, 1823a: Transactions of the American Philosophical Society 2:100 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859, p. 514).

Laccophilus maculosus maculosus: Zimmerman, 1970: Memoirs of the American Entomological Society 26:33.

Diagnosis.— This subspecies is the largest *Laccophilus* in the Missouri Prairie Region (length > 5 mm) and the presence on the lateral elytral margins of three to four large, distinctly outlined maculae that usually merge with the irrorate pattern mesally will distinguish this species from the two congeners that occur in this region. Length 4.4–5.3 mm.

Range.— *Laccophilus m. maculosus* occurs from Nova Scotia to North Dakota, and south to Georgia and Kansas. In ponds of the Missouri Prairie Region, this subspecies is widespread.

Habitat Associations.— *Laccophilus maculosus* can be found in exposed shallows of permanent ponds or sites with a continuous cover of *Lemma* (Larson et al. 2000). Hilsenhoff (1992) reported that *L. m. maculosus* occurs in a variety of lentic and marginal lotic habitats. In the present study, this subspecies was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Brasenia*, *Ceratophyllum*, *Juncus*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (28); ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (1); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Typha* (2); same data, Pond 18: *Typha* (2), *Juncus* (22); AUDRAIN CO.: Robert M. White II C.A., 9-IX-1998, Pond 12: *Juncus* (2), Poaceae (1); AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1); BARTON CO.: Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: *Ludwigia* (3); BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Brasenia* (1); same data, 18-IV-1999, Pond 76: *Juncus* (1), Poaceae (2);

BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Cyperaceae (2); BUCHANAN CO.: Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (7); same data, 14-VI-1999, Pond 96: Cyperaceae (5); Bluffwoods C.A., 21-III-1999, Pond 48: Poaceae (1), *Typha* (2); same data, 19-IX-1998, Pond 27: Poaceae (72), *Typha* (25), Sediment (1); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (14); CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: Poaceae (3); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Potamogeton* (1), Cyperaceae (2), *Ludwigia* (1); same data, 16-IX-1998, Pond 24: *Ludwigia* (1); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Salix* root mats (1); same data, Pond 101: *Ceratophyllum* (2); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (6); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (22); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Typha* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Poaceae (4); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (11), Marg. grass (41), *Typha* (17); HARRISON CO.: Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (3); Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (40), *Salix* root mats (1); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (1); same data, Pond 98: *Polygonum* (7), Poaceae (3); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: Marginal root mats (1); JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (4); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Salix* root mats (5); same data, 25-IV-1999, Pond 82: Cyperaceae (6), *Polygonum* (2); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (10); LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: *Salix* root mats (6); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Sagittaria* (1), *Typha* (1); MONTGOMERY CO.: Danville C.A., 7-IX-1998, Pond 11: *Typha* (1); NODAWAY CO.: Bilby Ranch Lake C.A., 20-III-1999, Pond 47: Poaceae, (10); same data, 23-VI-1999, Pond 109: Poaceae, (18); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Salix* root mats (4); RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (2); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (10), unknown, (1); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Typha* (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (5), *Typha* (1); WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: *Salix* root mats (3).

Laccophilus proximus Say

Laccophilus proximus Say, 1823a: Transactions of the American Philosophical Society 2:101 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859, p. 514).

Diagnosis.— This species differs from *L. m. maculosus* by its smaller size (length 3.8-4.2 mm compared to > 5 mm in *L. m. maculosus*). Additionally, this species lacks the distinct, well-defined elytral maculation that is present on *L. m. maculosus*.

Range.— This is a widespread species in the Nearctic region, occurring from southeastern Canada to South Dakota, and south to Florida and New Mexico. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— *Laccophilus proximus* can be considered a pioneer species commonly occurring in temporary habitats (Young 1954, Zimmerman 1960). Hilsenhoff (1992) found larvae only in open ponds and marshes. It was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Brasenia*, *Juncus*, *Ludwigia*, *Nuphar*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* rootmats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (3); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Typha* (5); same data, Pond 18: *Juncus* (6); AUDRAIN CO.: Robert M. White II C.A., 24-IV-1999, Pond 78: Poaceae (1); same data, 9-IX-1998, Pond 12: *Juncus* (4), *Potamogeton* (1), Poaceae (20); Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (9); BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Polygonum* (4); Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: *Ludwigia* (6), Poaceae (1); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (1), *Nuphar* (1), *Polygonum* (1); Clear Creek Prairie C.A., 9-VI-1999, Pond 91: *Polygonum* (2); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (3), Cyperaceae (2); BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Brasenia* (2), *Salix* root mats (1); same data, 14-IX-1998, Pond 23: *Typha* (3); same data, 18-IV-1999, Pond 76: *Juncus* (1); Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Cyperaceae (2); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: Cyperaceae (1); same data, 19-IX-1998, Pond 27: Poaceae (15), *Typha* (3); Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (9); CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: Poaceae (1); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: *Ludwigia* (12), *Salix* root

mats (1), Cyperaceae (7); same data, 19-VI-1999, Pond 104: Cyperaceae (1); CARROLL CO.: Bunch Hollow C.A., 13-IX-1998, Pond 21: Moss (1), *Potamogeton* (1); Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (4); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1), *Ludwigia* (1); Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (3); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1); CEDAR CO.: Mo-Ko Prairie C.A., 7-VI-1999, Pond 84: Cyperaceae (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (1), *Typha* (5); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (87), Poaceae (3), *Typha* (1); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Polygonum* (4); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Marg. grass (1), *Typha* (2); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 98: Poaceae (1); HOWARD CO.: Daviddale C.A., 30-IX-1998, Pond 42: Cyperaceae (4); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: Marginal roots (1); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (3), Poaceae (15); Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (10); KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Salix* root mats (1); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Typha* (1), *Salix* root mats (10); same data, 25-IV-1999, Pond 82: Cyperaceae (5), *Polygonum* (2); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (1); White Mem. C.A., 7-IX-1998, Pond 8: *Salix* root mats (2); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: Cyperaceae (3); LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: *Salix* root mats (5); MACON CO.: Redman C.A., 11-IV-1999, Pond 73: *Salix* root mats (1); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Sagittaria* (2), *Typha* (5); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (2); PETTIS CO.: J. N. Turkey Kern C.A., 13-VI-1999, Pond 93: *Typha* (2); RANDOLPH CO.: Rudolph Bennet C.A., 4-IX-1998, Pond 44: *Typha* (8), *Salix* root mats (4); RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (2); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (5); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (3), *Ludwigia* (11); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: Cyperaceae (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (8); VERNON CO.: Little Osage Prairie Nat. Ar., 26-IX-1998, Pond 36: *Ludwigia* (1); Osage Prairie C.A., 7-VI-1999, Pond 85: Poaceae (2).

Subfamily Hydroporinae

Genus CELINA Aubé

Celina angustata Aubé

Hydroporus angustatus Dejean, C. P. F. M. A. 1833: Catalogue des Coléoptères de la Collections de M. le Comte Dejean. (3rd edition):65.

Celina angustata Aubé, 1838: Species Général des Coléoptères 6:447-448.

Diagnosis.— The following combination of characters will distinguish this genus from all other dytiscids in the Prairie Region: scutellum visible, pro- and mesotarsus apparently four segmented, and elytral and abdominal apices acuminate. The smaller size (length 3.0-4.0 mm) of *Celina angustata* will distinguish this species from *C. imitatrix* (length > 5.0 mm). The uniformly brown color of the elytra in *C. angustata* will distinguish this species from the similar-sized *C. hubbelli*, which has bicolored elytra.

Range.— *Celina angustata* was previously reported from Massachusetts to Florida and Texas. **New state record.** In ponds of the Missouri Prairie Region, this species was rarely collected and found only in the eastern portion of the Glaciated Prairie.

Habitat Associations.— Sherman (1913) considered *C. angustata* to be associated with iron. In the present study, this species was collected in association with *Juncus* sp. and an unidentified reed.

Material Collected.— MISSOURI: CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: Unid. reeds (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (1).

Celina hubbelli Young

Celina hubbelli Young, 1979: Journal of the Kansas Entomological Society 52(4):826.

Diagnosis.— The smaller size (length 3.6-4.2 mm) of *Celina hubbelli* will distinguish this species from *C. imitatrix* (length > 5.0 mm). The bicolored elytra in *C. hubbelli* distinguishes this species from the similarly sized *C. angustata*, which has uniformly brown elytra.

Range.— *Celina hubbelli* occurs from Ontario to Wisconsin, and south to Florida and Texas. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— In this study, *C. hubbelli* was collected most frequently with *Typha*,

which corroborates plant associations given by Young (1979), Hilsenhoff (1994), and Larson et al. (2000). In addition to *Typha*, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ceratophyllum*, *Juncus*, *Ludwigia*, *Polygonum*, *Salix* root mats, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (1); same data, 24-IV-1999, Pond 79: Poaceae (1); BATES CO.: Peabody C.A., 20-IX-1998, Pond 30: Cyperaceae (1), Poaceae (2); BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Polygonum* (1); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: *Salix* root mats (5), Cyperaceae (10), Unid. Reeds (1); same data, 19-VI-1999, Pond 104: Cyperaceae (4); CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: *Typha* (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Ceratophyllum* (1), *Juncus* (13); KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Juncus* (16); same data, 25-IV-1999, Pond 83: Poaceae (1); LINCOLN CO.: William R. Logan W. A., 2-VI-1999, Pond 117: Cyperaceae (5); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: Cyperaceae (1), *Typha* (1); MACON CO.: Little Dixie Lake C.A., 17-IV-1999, Pond 74: *Typha* (1); Redman C.A., 1-VII-1999, Pond 114: Cyperaceae (1); MONTGOMERY CO.: Danville C.A., 7-IX-1998, Pond 11: *Typha* (4); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (1); ST. CLAIR CO.: Dave Rock Natural Area, 25-IX-1998, Pond 33: *Juncus* (2); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (2), *Ludwigia* (2); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: Poaceae (1); VERNON CO.: Little Osage Prairie Nat. Ar., 26-IX-1998, Pond 36: *Ludwigia* (1); WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: Poaceae (2).

Celina imitatrix Young

Celina imitatrix Young, 1979: Journal of the Kansas Entomological Society 52(4):824.

Diagnosis.— This species is the largest *Celina* found in the Missouri Prairie Region (length 4.5–5.5 mm).

Range.— This species was previously reported from New Jersey south to Florida, and west to Texas and Indiana. **New state record and range extension.** This species is distributed throughout the Missouri Prairie Region, but it was not collected from the southern portion of the Osage Prairie.

Habitat Associations.— *Celina imitatrix* burrows into mucky bottomed lentic waters in Florida (Young 1979). In the present study, this species was collected almost exclusively in association with *Typha*. One other collection was among sedges (Cyperaceae).

Material Collected.— MISSOURI: CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: Cyperaceae (1); CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1, UMC; 1, Collection of Gil Challet); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: *Typha* (1); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: *Typha* (2, UMC; 1, Collection of Gil Challet); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Typha* (2); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (10); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (2); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: *Typha* (1).

Genus **DESMOPACHRIA** Babington

Desmopachria convexa (Aubé)

Hydroporus convexus Aubé, 1838: Species Général des Coléoptères 6:479.

Desmopachria convexa: Young, 1981: Occasional Papers of the Florida State Collection of Arthropods 2:3.

Diagnosis.— The uniform brown color, absence of a transverse interocular suture, straight metatibia, small size (length 1.6–1.9 mm) and round shape will distinguish this species from all other hydroporines in the Missouri Prairie Region.

Range.— *Desmopachria convexa* is widespread and occurs throughout most of Canada and the United States, but is absent from the southwestern states. **New state record.** In the Missouri Prairie Region, this species is widespread.

Habitat Associations.— This species has been recorded from saturated mosses at the edge of bog and fen pools, and from dense vegetation and debris at the margin of forest edge pools or pools in cleared land (Larson et al. 2000). In Wisconsin, it has been recorded from a variety of lentic habitats (Hilsenhoff 1994). In the present study, this species was collected in association with *Polygonum*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Cyperaceae (1); BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (2); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (16); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 98: *Polygonum* (1); HOWARD CO.: Hungry Mother C.A., 21-VI-1999, Pond 105: Cyperaceae (1); LEWIS CO.: Deer Ridge C.A., 25-IV-1999, Pond 82: Cyperaceae (1), *Polygonum* (5); same data, 2-VII-1999, Pond 116: Cyperaceae (1); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (1).

Genus **HYDROPORUS** Clairville

Hydroporus rufilabris Sharp

Hydroporus rufilabris Sharp, 1882a: Scientific Transactions of the Royal Dublin Society 2:479.

Diagnosis.— This genus is distinguished from the other hydroporines present in the Prairie Region by the following combination of characters: 1) lack of a diagonal carina crossing epipleural base, 2) length greater than 2.3 mm (range 3.6–4.8 mm), 3) uniformly dark brown to black elytra, and 4) truncate metacoxal process. *Hydroporus rufilabris* was the only species in this genus collected from ponds within the Missouri Prairie Region.

Range.— This species is widespread and was previously reported from Wisconsin, south to Georgia, Alabama, and Texas. **New state record**. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— *Hydroporus rufilabris* has been reported by Larson et al. (2000) to occur in detritus and emergent vegetation in shaded areas of ponds and pools. In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ceratophyllum*, *Juncus*, *Ludwigia*, *Polygonum*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: *Typha* (4, UMC: 2, Collection of Gil Challet); BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (1); same data, 8-VI-1999, Pond 89: *Ludwigia* (10); Mon-Shon Prairie C.A., 8-VI-1999, Pond 87: Cyperaceae (1); Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (1), *Polygonum* (2); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Polygonum* (4); BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (2); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: Cyperaceae (4); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (2); CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (7, UMC: 2, Collection of Gil Challet); Reform C.A., 16-IX-1998, Pond 24: *Ludwigia* (5); CARROLL CO.: Bunch Hollow C.A., 13-IX-1998, Pond 21: Moss (1); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (1); Schifferdecker Mem. C.A., 16-VI-1999, Pond 101: *Ceratophyllum* (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (17, UMC: 2, Collection of Gil Challet), *Ludwigia* (2); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (2, UMC: 3 Collection of Gil Challet); HARRISON CO.: Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (4); Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (2); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (1); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (1); LAFAYETTE CO.: Baltimore Bend C.A., 4-IV-1999, Pond 66: Marg. veg. (1); LEWIS CO.: Deer Ridge C.A., 25-IV-1999, Pond 82: Cyperaceae (2, Collection of Gil Challet); same data, 6-IX-1998, Pond 6: *Salix* root mats (5, Collection of Gil Challet); same data, 2-VII-1999, Pond 116: Cyperaceae (1); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (34, UMC: 3, Collection of Gil Challet); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Typha* (2); MONROE CO.: 0.5 mi. E Jct. Co Rds 900 & 915; 1-VII-1999, Pond 113: *Salix* root mats (1); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (3); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (2); ST. CLAIR CO.: Taberville Prairie C.A., 26-IX-1998, Pond 34: Cyperaceae (1); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (1); Blind Pony C.A., 21-VI-1999, Pond 106, (1, UMC: 3, Collection of Gil Challet); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: *Typha* (1); VERNON CO.: Osage Prairie C.A., 7-VI-1999, Pond 85: *Juncus* (2); Little Osage Prairie Nat. Ar., 26-IX-1998, Pond 36: Cyperaceae (1).

Genus **HYDROVATUS** Motschulsky**Hydrovatus pustulatus** Melsheimer (Fig. 18)

Hydroporus pustulatus Melsheimer, 1844: Proceedings of the Academy of Natural Sciences of Philadelphia 2:29.

Diagnosis.— This genus is characterized by acuminate elytral apices and by a fan-shaped prosternal process with a broad posterior margin. This species is the only member of the genus in the Missouri Prairie Region and thus, the generic characters will distinguish this species from all other dytiscids in this area. Four black maculae are present on the elytra in most specimens. Length: 2.4–2.7 mm.

Range.— This species is widespread throughout the eastern half of the United States and has been reported from Ontario south to Florida and Louisiana. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Hydrovatus pustulatus* has been collected among vegetation and debris in shallow areas of warm ponds (Larson et al. 2000). *Hydrovatus p. pustulatus* was collected from open ponds and marshes in Wisconsin (Hilsenhoff 1994). In the present study, this subspecies was collected in association with a wide range of submerged macrophytes and emergent vegetation, including *Chara*, *Juncus*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: *Typha* (1); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (84), *Typha* (1); AUDRAIN CO.: Robert M. White II C.A., 24-IV-1999, Pond 78: Poaceae (5); BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (6), *Polygonum* (1); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (3), *Polygonum* (9); Mon-Shon C.A., 27-IX-1998, Pond 38: *Polygonum* (2); Pa Sole Prairie C.A., 27-IX-1998, Pond 40: *Ludwigia* (2); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (4); BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (2); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: *Potamogeton* (3); same data, 21-III-1999, Pond 50: Poaceae (1); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: *Salix* root mats (13); same data, 16-IX-1998, Pond 24: Cyperaceae (1); same data, 19-VI-1999, Pond 104: Cyperaceae (19), *Salix* root mats (40), *Ludwigia* (12); Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (7); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Salix* root mats (4), *Potamogeton* (1); CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1); CEDAR CO.: Mo-Ko Prairie C.A., 7-VI-1999, Pond 84: Cyperaceae (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (8); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Marg. grass (1), *Typha* (2); HENRY CO.: Connor O. Fewel Wildlife Ar., 20-IX-1998, Pond 31: *Ludwigia* (1); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: *Salix* root mats (4), *Typha* (1); LAFAYETTE CO.: Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (2), *Salix* root mats (7); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Salix* root mats (9); same data, 2-VII-1999, Pond 116: *Typha* (1), *Salix* root mats (4); LINCOLN CO.: Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (1); MACON CO.: Redman C.A., 1-VII-1999, Pond 114: *Salix* root mats (2); MONROE CO.: 0.5 mi. E Jct. Co Rds 900 & 915; 1-VII-1999, Pond 113: Poaceae (2); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (1), *Polygonum* (5); PUTNAM CO.: Rebel's Cove C.A., 5-IX-1998, Pond 3: Cyperaceae (8); ST. CLAIR CO.: Dave Rock Natural Area, 25-IX-1998, Pond 33: *Juncus* (1); Taberville Prairie C.A., 26-IX-1998, Pond 34: *Salix* root mats (1); Wah-Kan-Tah Prairie C.A., 26-IX-1998, Pond 35: *Salix* root mats (1); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: *Typha* (2); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (4), *Ludwigia* (15); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Potamogeton* (1), *Typha* (15), Cyperaceae (1); same data, 2-VII-1999, Pond 115: *Typha* (1).

Genus **HYGROTUS** Stephens**Hygrotus acaroides** (LeConte)

Hydroporus acaroides LeConte, 1855: Proceedings of the Academy of Natural Sciences of Philadelphia 7:294.

Hygrotus acaroides: Zimmermann, 1920: Dytiscidae, Haliplidae, Hygrobiidae, Amphizoidea, In Coleoptorum Catalogus (eds. W. Junk and S. Schenklng), IV, Pars 71:75.

Diagnosis.— Members of this genus are longer than 2.2 mm, have a diagonal carina crossing the epipleural base, and have an acuminate prosternal process unlike species of

Hydrovatus, which some members superficially resemble. This species is differentiated from other small, round hydroporines by the generic characters, and by the presence on the elytra of eight black markings and a black sutural stripe. Length 2.2-2.6 mm.

Range.— *Hygrotus acaroides* is widespread, occurring from Manitoba south to Texas, Alabama, and through most of the Mississippi River drainage. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Hygrotus acaroides* has been recorded from muddy-bottomed ponds or quiet pools in small streams, usually among sedges and algae (Larson et al. 2000). In the present study, this species was collected in association with species of *Salix* root mats, *Typha*, and Poaceae

Material Collected.— MISSOURI: CASS CO.: Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (1); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (2); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (6); same data, 20-III-1999, Pond 47: Poaceae (1); RANDOLPH CO.: Rudolph Bennet C.A., 4-IX-1998, Pond 44: *Salix* root mats (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (5).

***Hygrotus dissimilis* Gemminger and Harold**

Hygrotus dissimilis Gemminger and Harold, 1868: *Catalogus Coleopterorum Hucusque Synonymicus et Systematicus*, Volume 2:432.

Coelambus dispar LeConte, 1850: General Remarks Upon Coleoptera of Lake Superior, *In* Agassiz, L. Lake Superior: Its Physical Character, Vegetation and Animals. 216.

Hydroporus dissimilis: Sharp, 1882a: *Transactions of the Royal Dublin Society* 2:403.

Diagnosis.— The brown elytra; small, dark discal spot on the pronotum; and smooth sulcus at the apex of the last abdominal sternite will distinguish this species from all other hydroporines in the Missouri Prairie Region. Length: 3.6-4.3 mm.

Range.— *Hygrotus dissimilis* is widespread across southern Canada and the northern U. S. Specifically, it was reported from Quebec south to New Jersey, and west to Oregon and to British Columbia. **New state record**. In ponds of the Missouri Prairie Region, this species is quite uncommon and was collected only in the northern Glaciated Prairie.

Habitat Associations.— This species was collected only from stands of emergent grasses (Poaceae). In addition, it has been recorded from shallow, often temporary ponds and marshes (Hilsenhoff 1994) and from emergent sedges and grasses in British Columbia (Larson et al. 2000).

Material Collected.— MISSOURI: SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (1).

***Hygrotus nubilus* (LeConte) (Figs. 17, 19)**

Hydroporus nubilus LeConte, 1855: *Proceedings of the Academy of Natural Sciences of Philadelphia* 7:298-299.

Hygrotus nubilus: Wallis, 1973: *Questiones Entomologicae* 9:102.

Diagnosis.— The presence on each elytron of 2 black stripes parallel to the suture and numerous posterior black blotches will distinguish this species from all other hydroporines in the Missouri Prairie Region. Length: 3.8-4.5 mm.

Range.— This species is widespread across the Nearctic region, and has been recorded from Nova Scotia west to Ontario and Montana, and south to Arizona and Florida. In the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Hygrotus nubilus* has been collected from permanent ponds in Wisconsin (Hilsenhoff 1994) and from dense emergent grasses and rushes in small open ponds (Larson et al. 2000). In the present study, this species was collected in association with species of Cyperaceae and Poaceae.

Material Collected.— MISSOURI: BUCHANAN CO.: Bluffwoods C.A., 21-III-1999, Pond 48: Poaceae (1); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (1); LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: (1); NODAWAY CO.: Bilby Ranch Lake C.A., 20-III-1999, Pond 47: Poaceae (2).

Genus **LIODESSUS** Guignot**Liodessus flavicollis** (LeConte)

Hydroporus flavicollis LeConte, 1855: Proceedings of the Academy of Natural Sciences of Philadelphia 7:291, 295.

Liodessus flavicollis: Young, 1969: Smithsonian Contributions to Zoology 33:3.

Diagnosis.— The transverse interocular suture will distinguish this genus from all other dytiscids in the Missouri Prairie Region. This species is the only member of the genus that occurs in the Missouri Prairie Region and its checkerboard elytral pattern is characteristic. Length: 1.4–1.7 mm.

Range.— *Liodessus flavicollis* is widespread and was previously reported from Manitoba and Quebec south to Texas and Florida. **New state record**. In ponds of the Missouri Prairie Region, this species is widespread, but uncommon.

Habitat Associations.— An algal association had been noted previously (Hatch 1925, Young 1954, Lillie 1991) and *L. flavicollis* has been recorded from sandy-bottomed, clear-water ponds (Larson et al. 2000). In the present study, this species was collected in association with species of *Ludwigia*, *Nelumbo*, *Polygonum*, Poaceae, and filamentous algae.

Material Collected.— MISSOURI: BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Algae (63), Poaceae (34); same data, 23-III-1999, Pond 58: Poaceae (6), *Polygonum* (2, UMC; 1, Collection of Gil Challet); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (1); same data, 23-III-1999, Pond 57: *Polygonum* (1, Collection of Gil Challet), Poaceae (5); ST. CHARLES CO.: Busch Mem. Wildlife Mgt. Ar., 7-IX-1998, Pond 10: *Nelumbo lutea* (1).

Genus **NEOPORUS** Guignot**Neoporus clypealis** (Sharp) (Fig. 20)

Hydroporus clypealis Sharp, 1882a: Scientific Transactions of the Royal Dublin Society 2 (II):441.

Neoporus clypealis: Hilsenhoff, 1995: The Great Lakes Entomologist 28(1):18.

Diagnosis.— This genus is distinguished from the other hydroporines in the Prairie Region by the following combination of characters: 1) lack of a diagonal carina crossing epipleural base, 2) length greater than 2.3 mm, 3) elytra with black stripes and/or maculae on a pale background (usually orange), and 4) the metacoxal processes are angulate at the middle. This species is distinguished from congeners in the Prairie Region by the following characters: 1) anterior male protarsal claw short (less than half the length of posterior claw) and 2) anterolateral portion of female pronotum sinuate before apex. Length: 3.9–4.4 mm.

Range.— *Neoporus clypealis* was previously reported from Newfoundland south to Florida, and west to Wisconsin, Kansas, and Texas. **New state record**. This species is widespread in the Missouri Prairie Region.

Habitat Associations.— Hilsenhoff (1995) reported that this species occurs in streams, backwaters, spring ponds and ponds associated with streams. Thus, this species has been considered primarily lotic or at least associated with moving water (Larson et al. 2000). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ludwigia*, *Polygonum*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (2, Collection of Gil Challet); BARTON CO.: Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (1, Collection of Gil Challet); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (8), *Polygonum* (17); Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Polygonum* (2); Shawnee Trail C.A., 26-IX-1998, Pond 37: Cyperaceae (1); BOONE CO.: Columbia; UMC S. Farms, 18-IV-1999, Pond 77: *Salix* root mats (1); CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Poaceae (1); CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (1, Collection of Gil Challet); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1); LAFAYETTE CO.: Baltimore Bend C.A., 3-IX-1998, Pond 43: *Typha* (7), *Salix* root mats (1), Poaceae (4, UMC; 4, Collection of Gil Challet); LIVINGSTON CO.: Poosey C.A., 12-IX-1998, Pond 14: *Salix* root mats (25), *Salix* root mats (26, UMC; 1, Collection of Gil Challet); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); VERNON CO.: Little Osage Prairie Nat. Ar., 26-IX-1998, Pond 36: *Ludwigia* (1).

Neoporus dimidiatus (Gemminger and Harold) (Figs. 21, 23)

Hydroporus semirufus LeConte, 1855: Proceedings of the Academy of Natural Sciences of Philadelphia 7:296.

Hydroporus dimidiatus: Gemminger and Harold, 1868: Catalogus Coleopterorum Hucusque Synonymicus et Systematicus, Volume 2:432.

Neoporus dimidiatus: Larson, Alarie, and Roughley 2000: Predaceous diving beetles (Coleoptera, Dytiscidae) of the Nearctic region, with emphasis on the fauna of Canada and Alaska, 266.

Diagnosis.— This species can be distinguished from its congeners by the following combination of characters: 1) anterior male protarsal claw 3/4 to subequal the length of posterior claw, 2) anterolateral portion of female pronotum evenly curved before apex, 3) most or all pale marks on elytra are longitudinal (as compared to transverse stripes in *Neoporus undulatus*), and 4) some pale marks originate in basal half of the elytra reach the apical half (whereas in *Neoporus undulatus*, no pale marks that originate in the basal half of the elytra reach the apical half). Length: 3.8-4.4 mm.

Range.— *Neoporus dimidiatus* was previously reported from throughout southern Canada and extending southward through the Appalachian and Rocky Mountain states. **New state record.** In ponds of the Missouri Prairie Region, this species was widespread and common.

Habitat Associations.— *Neoporus dimidiatus* has been recorded from springfed pools, beaver ponds, and protected shorelines of lakes and rivers among open stands of emergent sedges and rushes (Larson et al. 2000). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Chara*, *Juncus*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: Cyperaceae (11), Poaceae (7); ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (6), *Typha* (1); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (19), *Typha* (17, UMC; 1, Collection of Gil Challet); same data, Pond 18: *Typha* (29), *Chara* (133), *Juncus* (212); AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (1); BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (1), *Polygonum* (9); same data, 27-IX-1998, Pond 41: *Polygonum* (13), *Ludwigia* (2); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (2), *Polygonum* (11); same data, 27-IX-1998, Pond 39: Poaceae (1); same data, 23-III-1999, Pond 57: Poaceae (2); Pa Sole Prairie C.A., 23-III-1999, Pond 58: Poaceae (7), *Polygonum* (3, UMC; 1, Collection of Gil Challet); same data, 8-VI-1999, Pond 89: *Ludwigia* (22), Poaceae (20, UMC; 1, Collection of Gil Challet); same data, 27-IX-1998, Pond 40: Algae (5), Poaceae (10), *Ludwigia* (1); BOONE CO.: Columbia, UMC S. Farms, 18-IV-1999, Pond 77: Poaceae (16), *Salix* root mats (11, UMC; 1, Collection of Gil Challet); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: *Potamogeton* (2), Cyperaceae (20); same data, 21-III-1999, Pond 50: Poaceae (1); Bluffwoods C.A., 19-IX-1998, Pond 27: *Typha* (1); CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (3), Poaceae (2); CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (3); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Sagittaria* (2), *Typha* (3); HARRISON CO.: Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (6); Wayne Helton Mem. W. A., 23-VI-1999, 111: Poaceae (1), *Salix* root mats (24); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (3, Collection of Gil Challet); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (2), *Salix* root mats (25), Cyperaceae (14); KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Ludwigia* (1), *Salix* root mats (1); LAFAYETTE CO.: Baltimore Bend C.A., 3-X-1998, Pond 43: *Typha* (24, UMC; 1, Collection of Gil Challet), *Salix* root mats (10), Poaceae (1), Poaceae (31); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Chara* (1), *Salix* root mats (1); LIVINGSTON CO.: Posey C.A., 12-IX-1998, Pond 14: *Salix* root mats (35, UMC; 1, Collection of Gil Challet), Sediment (14); RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (23), *Salix* root mats (1); PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae, (2), *Typha* (2); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: *Typha* (9), Poaceae (36, UMC; 1, Collection of Gil Challet); VERNON CO.: Little Osage Prairie Nat. Ar., 26-IX-1998, Pond 36: Cyperaceae (1); WORTH CO.: Seat Mem. C.A., 12-IX-1998, Pond 16: *Salix* root mats (48).

Neoporus undulatus (Say) (Fig. 22)

Hydroporus undulatus Say, 1823a: Transactions of the American Philosophical Society 2:154 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859, p. 515).

Neoporus undulatus: Hilsenhoff, 1995: The Great Lakes Entomologist 28(1):20.

Diagnosis.— This species can be distinguished from its congeners by the following combination of characters: 1) anterior male protarsal claw 3/4 to subequal the length of posterior claw, 2) anterolateral portion of female pronotum evenly curved before apex, 3) most or all pale marks on each elytron transverse (marks are longitudinal in *Neoporus dimidiatus*), and 4) pale marks originating in basal half of elytra not reaching apical half (marks reach apical half in *Neoporus dimidiatus*). Length: 3.4–4.2 mm.

Range.— *Neoporus undulatus* occurs throughout much of Canada, the eastern half of the United States and the Pacific Northwest. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Neoporus undulatus* has been recorded from permanent habitats with some water movement (Larson et al. 2000). Hilsenhoff (1995) suggested that this species is primarily lentic but uses lotic habitats as overwintering sites. In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Alisma*, *Juncus*, *Ludwigia*, *Nuphar*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Union Ridge C.A., 11-IV-1999, Pond 71: Poaceae (3); Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (5); ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (2), *Typha* (2); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Juncus* (1); AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (8), *Salix* root mats (2); Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (4, UMC; 4, Collection of Gil Challet); BARTON CO.: Shawnee Trail C.A., 26-IX-1998, Pond 37: *Salix* root mats (1); Dorris Creek Prairie C.A., 27-IX-1998, Pond 39: *Nuphar* (1); Pa Sole Prairie C.A., 27-IX-1998, Pond 40: Poaceae (1); same data, 23-III-1999, Pond 57: *Polygonum* (3); same data, Pond 58: Poaceae (1); same data, 8-VI-1999, Pond 89: *Ludwigia* (2); same data, Pond 89: Poaceae (1); Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Ludwigia* (5); same data, 8-VI-1999, Pond 88: *Ludwigia* (16), *Polygonum* (23, UMC; 1, Collection of Gil Challet); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (11), *Polygonum* (22); Shawnee Trail C.A., 8-VI-1999, Pond 86: *Potamogeton* (1); Mon-Shon Prairie C.A., 8-VI-1999, Pond 87: *Ludwigia* (1); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (1); BOONE CO.: Basket Wildlife Area, 18-IV-1999, Pond 76: Poaceae (3); same data, Pond 77: Poaceae (3), *Salix* root mats (2); BUCHANAN CO.: Bluffwoods C.A., 21-III-1999, Pond 48: Poaceae (1); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (6); Belcher Branch Lake C.A., 14-VI-1999, Pond 96: Cyperaceae (2); CALDWELL CO.: Bonanza C.A., 10-IV-1999, Pond 68: Cyperaceae (3), Poaceae (3); CALLAWAY CO.: Whetstone Creek C.A., 18-VI-1999, Pond 102: *Polygonum* (26, UMC; 2, Collection of Gil Challet); Reform C.A., 19-VI-1999, Pond 104: *Potamogeton* (3), *Salix* root mats (5); CARROLL CO.: Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (7); Bunch Hollow C.A., 13-IX-1998, Pond 21: Algae (9), *Potamogeton* (9); Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (3); CASS CO.: James P. Harter C.A., 22-III-1999, Pond 53: Poaceae (7), *Typha* (2); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Alisma* (1); Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (34), *Ludwigia* (2); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Sagittaria* (1); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Juncus* (1), *Polygonum* (4); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Marg. grass (1), *Typha* (1); HARRISON CO.: Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Poaceae (2); Pawnee Prairie C.A., 23-VI-1999, Pond 110: Poaceae (7); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (5); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: *Typha* (1), *Potamogeton* (1); JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (1), Poaceae (5); KNOX CO.: Sever Lake C.A., 6-IX-1998, Pond 7: *Ludwigia* (1); LAFAYETTE CO.: Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (6), *Salix* root mats (2); Baltimore Bend C.A., 3-X-1998, Pond 43: Poaceae (4); LEWIS CO.: Deer Ridge C.A., 2-VII-1999, Pond 116: Cyperaceae (2); same data, 25-IV-1999, Pond 82: *Polygonum* (3); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (26); Vonaventure C.A., 25-IV-1999, Pond 81: Poaceae (1); MACON CO.: Redman C.A., 1-VII-1999, Pond 114: *Salix* root mats (1); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Sagittaria* (1); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (2); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (5); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond

44: *Salix* root mats (2); ST. CLAIR CO.: Dave Rock Natural Area, 25-IX-1998, Pond 33: *Juncus* (1); Taberville Prairie C.A., 26-IX-1998, Pond 34: *Salix* root mats (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (3), (6); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Typha* (7), Cyperaceae (1); same data, 2-VII-1999, Pond 115: *Typha* (5); Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (4), *Typha* (2); VERNON CO.: Osage Prairie C.A., 7-VI-1999, Pond 85: Poaceae (1).

Genus **UVARUS** Guignot

Uvarus granarius (Aubé)

Hydroporus granarius Aubé, 1838: *Species Général des Coléoptères* 6:501.

Uvarus granarius: Young, 1969: *Smithsonian Contributions to Zoology* 33:4.

Diagnosis.— This genus is characterized by its small size (less than 2.2 mm), lack of an inter-ocular suture (present in *Liodesus*), and arcuate metatibia (straight in *Desmopachria*). This species is distinguished from *Uvarus lacustris* by coarsely punctate metasternum and metacoxae, reddish-brown metasternum and abdominal venter, and broadly ovate form. Length: 1.5-2.0 mm.

Range.— This species has a wide distribution and has been recorded from Quebec to Manitoba and south to Florida and Texas. **New state record.** In ponds of the Missouri Prairie Region, this species was collected only in two counties in the center of the state and one county in the northeast.

Habitat Associations.— *Uvarus granarius* has been recorded from mats of vegetation along margins of small pools (Larson et al. 2000). In the present study, this species was collected in association with species of *Polygonum* and Cyperaceae.

Material Collected.— MISSOURI: BOONE CO.: Columbia; UMC S. Farms, 18-IV-1999, Pond 77: Cyperaceae (1, UMC; 1, Collection of Gil Challet); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (6); LEWIS CO.: Deer Ridge C.A., 25-IV-1999, Pond 82: Cyperaceae (1); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1, UMC; 1, Collection of Gil Challet).

Uvarus lacustris (Say)

Hydroporus lacustris Say, 1823a: *Transactions of the American Philosophical Society* 2: 103 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859, p. 516).

Uvarus lacustris: Young, 1969: *Smithsonian Contributions to Zoology* 33:4.

Diagnosis.— This species is distinguished from *Uvarus granarius* by the fine punctures on the metasternum and metacoxae, black metasternum and abdominal venter, and an elongate-oval form. Length: 1.5-2.0 mm.

Range.— *Uvarus lacustris* is widespread and occurs throughout the eastern half of the United States west to Texas and Colorado. **New state record.** In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Uvarus lacustris* has been recorded from a wide variety of shallow lentic habitats and stream margins (Hilsenhoff 1994, Larson et al. 2000). In the present study, this species was collected in association with species of *Polygonum*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1, UMC; 1, Collection of Gil Challet); MACON CO.: Little Dixie Lake C.A., 17-IV-1999, Pond 74: *Typha* (1); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (4); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (1, UMC; 1, Gil Challet Collection).

Subfamily Colymbetinae

Genus **AGABUS** Leach**Agabus aeruginosus** Aubé

Agabus aeruginosus Aubé, 1838: Iconographie et Histoire Naturelle des Coléoptères d'Europe. 289-299.

Diagnosis.— This genus is distinguished from the other hydroprolines of the Prairie Region by the following combination of characters: 1) compound eye emarginate above insertion of antenna, 2) posteromesal aspect of hind femora with a distinct row of spines, 3) elytra unicolorous or with 3-5 parallel dark, uniform stripes and metatarsal claws of equal length. This species may be distinguished from its only known congener of the region by the lack of longitudinal stripes on the elytra. Length 6.8-7.1 mm.

Range.— *Agabus aeruginosus* occurs from the east coast from Massachusetts to Virginia and west to Kansas. **New state record.** In ponds of the Missouri Prairie Region, this species was collected only in a single locality, from a very small, shallow pond.

Habitat Associations.— This species was characterized by Larson et al. (2000) as occurring in vernal pools. *A. aeruginosus* has been recorded from a marsh in Virginia (Michael and Matta 1977), flatwoods in Florida, and upland ponds in Indiana (Young 1954). Hilsenhoff (1993c) recorded this species from shallow ponds and marshes in Wisconsin. In the present study, it was collected from a stand of *Polygonum*.

Material Collected.— MISSOURI: LEWIS CO.: Deer Ridge C.A., 25-IV-1999, pond 82, *Polygonum* (2, UMC; 1, R. Roughley collection).

Agabus disintegratus (Crotch)

Gaurodytes disintegratus Crotch, 1873: Transactions of the American Entomological Society 4:416.

Agabus disintegratus: Sharp, 1882a: Scientific Transactions of the Royal Dublin Society 2:510.

Diagnosis.— This species is distinguished from all other colymbetines of the Missouri Prairie Region by the presence on the elytral disc of three to five black longitudinal stripes on a yellowish-brown to light brown background. Length: 6.9-8.2 mm.

Range.— *Agabus disintegratus* is widespread and occurs from Ontario to South Carolina, and west to Washington and California. In ponds of the Missouri Prairie Region, this species is widespread, although uncommonly collected.

Habitat Associations.— Ecological aspects of *A. disintegratus* were studied in temporary ponds in California by Garcia and Hagen (1985, 1987) and Garcia (1990). This species is considered an inhabitant of temporary ponds (Larson et al. 2000) and has been collected in a sedge marsh in Wisconsin (Hilsenhoff 1993c). In contrast, Michael and Matta (1977) noted that *A. disintegratus* apparently prefers permanent pools and ponds in Virginia. In the present study, it was collected in permanent, albeit anthropogenic, ponds in association with species of Cyperaceae and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80, Poaceae (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45, Cyperaceae (1); JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64, Poaceae (2); NODAWAY CO.: Bilby Ranch Lake C.A., 20-III-1999, Pond 47, Poaceae (1).

Genus **COPELATUS** Erichson**Copelatus chevrolati chevrolati** Aubé

Copelatus chevrolati chevrolati Aubé, 1838: Species Général des Coléoptères 6:389.

Diagnosis.— This genus is distinguished from the other hydroprolines in the Prairie Region by the following combination of characters: 1) compound eye emarginated above the insertion of the antenna, 2) each elytron with 8 or 10 impressed, longitudinal, discal striae that are approximately equally spaced except at elytral apices, and 3) one submarginal stria. This subspecies is characterized by having on each elytron 8 impressed, longitudinal discal striae and one submarginal stria, whereas *Copelatus glyphicus* has 10 discal striae. This subspecies is also larger than *C. glyphicus*. Length 5.8-7.0 mm.

Range.— *Copelatus c. chevrolati* occurs in the southeastern United States from Florida to

North Carolina, west to Texas, and northward along the Mississippi River valley to Wisconsin and Michigan. **New state record.** This subspecies is widespread in the Missouri Prairie Region.

Habitat Associations.— In Florida, *C. chevrolati* occurs among organic debris accumulations in lentic habitats (Young 1954). This species typically occurs in temporary ponds, although it has been collected also in permanent water (Michael and Matta 1977). In the present study, this subspecies was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Juncus*, *Ludwigia*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Juncus* (1); BUCHANAN CO.: Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (4); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: *Ludwigia* (1), Cyperaceae (2); CASS CO.: Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (1); DE KALB CO.: Pony Express C.A., 13-IX-1998, Pond 20: Poaceae (1); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: *Typha* (1); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (1), Poaceae (1); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Typha* (1); RAY CO.: Crooked River C.A., 19-IX-1998, Pond 26: Poaceae (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (1).

Copelatus glyphicus (Say)

Colymbetes glyphicus Say, 1823a: Transactions of the American Philosophical Society 2:99 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859, p. 512-513).

Copelatus glyphicus: LeConte, 1859: Smithsonian Contributions to Knowledge 11:36.

Diagnosis.— This species is characterized by having on each elytron 10 impressed, longitudinal, discal striae and one submarginal stria, whereas *Copelatus c. chevrolati* has 8 discal striae. This species is also smaller (4.1-4.7 mm) than *Copelatus c. chevrolati*.

Range.— *Copelatus glyphicus* occurs from southeastern Canada south to Florida and west to Texas and Nebraska. Disjunct populations occur in California and Oregon. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Copelatus glyphicus* has been recorded from a wide variety of habitats, including tire ruts in peaty soils in Nova Scotia and New Brunswick, and saline barachois ponds in Newfoundland (Larson et al. 2000). In Wisconsin, this species was collected from shallow temporary habitats near streams (Hilsenhoff 1993b). In the present study, it was collected in association with species of *Ludwigia*, *Nelumbo*, *Polygonum*, *Potamogeton*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: BARTON CO.: Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: Poaceae (2); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Polygonum* (1); Clear Creek Prairie C.A., 9-VI-1999, Pond 91: *Polygonum* (1); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (2); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (18), *Ludwigia* (4); LINCOLN CO.: William R. Logan W. A., 2-VII-1999, Pond 117: Cyperaceae (1); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (1); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (1), *Ludwigia* (1); SCOTLAND CO.: Indian Hills C.A., 2-VII-1999, Pond 115: Poaceae (1); VERNON CO.: Osage Prairie C.A., 7-VI-1999, Pond 85: *Nelumbo* & *Lotus* (2), Poaceae (1).

Genus **COPTOTOMUS** Say

Coptotomus longulus lenticus (Hilsenhoff) (Fig. 27)

Coptotomus lenticus Hilsenhoff, 1980: Transactions of the American Entomological Society 105:465-466.

Coptotomus longulus lenticus: Larson, Alarie, and Roughley, 2000: Predaceous Diving Beetles (Coleoptera, Dytiscidae) of the Nearctic region, with Emphasis on the Fauna of Canada and Alaska, 734.

Diagnosis.— This genus is distinguished from the other lentic dytiscids in the Prairie Region by the following combination of characters: 1) compound eye emarginate above insertion of antenna, 2) each elytron without 8 or 10 impressed longitudinal, discal striae, 3) posteromesal aspect of hind femora impubis, and 4) elytra with irrorate and solid patches on a light background. This subspecies is distinguished from its three congeners in the Prairie

Region by the following combination of characters: 1) pronotum with anterior and posterior dark blotches usually separated by a distance greater than the width of the posterior blotch when measured at the narrowest point between blotches, 2) anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) less than half the length of mesal portion of pale mark, 3) elytra with large dark blotch at mid-length of pale marginal band (lacking in *C. l. longulus*), 4) dark markings of disc mostly solid, and 5) aedeagus with lateral margin of expansion straight for most of its length. Length 7.2- 8.3 mm.

Range.— *Coptotomus longulus lenticus* was previously reported from Manitoba east to Nova Scotia, and south to Illinois and Florida. **New state record**. This species is uncommon in the Missouri Prairie Region where only one specimen was collected.

Habitat Associations.— The type series was collected in a drainage ditch in Wisconsin (Hilsenhoff 1980). Subsequently, Hilsenhoff (1993b) collected most individuals from permanent ponds or deep permanent marshes. In the present study, this subspecies was collected in association with a species of sedge (Cyperaceae).

Material Collected.— MISSOURI: COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (1).

***Coptotomus longulus longulus* LeConte (Fig. 26)**

Coptotomus longulus LeConte, 1852: Annals of the Lyceum of Natural History of New York 5:205.

Coptotomus longulus longulus: Larson, Alarie, and Roughley, 2000: Predaceous Diving Beetles (Coleoptera, Dytiscidae) of the Nearctic region, with Emphasis on the Fauna of Canada and Alaska. 734.

Diagnosis.— This subspecies is distinguished from its congeners of the Prairie Region by the following combination of characters: 1) pronotum with anterior and posterior dark blotches usually separated by a distance greater than the width of the posterior blotch when measured at the narrowest point between blotches, 2) anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) less than half the length of mesal portion of pale mark, 3) elytra without large dark blotch at mid-length of pale marginal band (present in *C. lenticus*), 4) dark markings of disc mostly irrorate, and 5) lateral margin of aedeagal expansion evenly curved. Length: 7.4-8.20 mm.

Range.— *Coptotomus l. longulus* occurs from British Columbia to California, east to Missouri and Manitoba. This subspecies is uncommon in the Missouri Prairie Region and was collected from only one pond in the northwestern part of the state.

Habitat Associations.— *Coptotomus l. longulus* has been recorded previously from permanent lentic habitats (Hilsenhoff 1980, 1993b). In the present study, this subspecies was collected in association with rushes of the genus *Juncus*.

Material Collected.— MISSOURI: ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Juncus* (1).

***Coptotomus loticus* Hilsenhoff (Fig. 29)**

Coptotomus loticus Hilsenhoff, 1980: Transactions of the American Entomological Society 105:467-468.

Diagnosis.— This species is distinguished from other species of *Coptotomus* by the following combination of characters: 1) pronotum with anterior and posterior dark blotches usually separated by a distance subequal to or narrower than the width of the posterior blotch when measured at the narrowest point between blotches, 2) anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) greater than half the length of mesal portion of pale mark, and 3) lateral expansion of aedeagus gradually narrowing in apical 1/4. Length: 6.9-7.7 mm.

Range.— *Coptotomus loticus* ranges from southeastern Canada south to Texas and Florida. In ponds of the Missouri Prairie Region, this species has been collected only from locations north of the Missouri River.

Habitat Associations.— The type series was collected from a backwater from the Wolf River in Wisconsin (Hilsenhoff 1980). Subsequently, most adults were found in streams or sloughs or permanent lentic situations (Hilsenhoff 1993b). Larson et al. (2000) also reported this species from weedy stream margin. In the present study, this species was collected in association with species of *Salix* root mats, *Typha*, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Robert M. White II C.A., 1-VII-1999, Pond 112: Poaceae (1); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Salix* root mats (1); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Typha* (1); PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: *Typha* (1).

Coptotomus venustus (Say) (Fig. 28)

Colymbetes venustus Say, 1823b: Journal of the Academy of Natural Sciences of Philadelphia 3.

Coptotomus venustus: Hilsenhoff, 1980: Transactions of the American Entomological Society 105:469.

Diagnosis.— This species is distinguished from other species of *Coptotomus* by the following combination of characters: 1) pronotum with anterior and posterior dark blotches usually separated by a distance subequal to, or narrower than, the width of the posterior blotch when measured at the narrowest point between blotches, 2) anteromedial corner of each elytron with lateral portion of longitudinal pale mark(s) greater than half the length of mesal portion of pale mark, and 3) lateral expansion of aedeagus abruptly narrowing in apical 1/4. Length: 6.1-8.2 mm.

Range.— *Coptotomus venustus* occurs from Texas east to Florida, and north to Virginia and Illinois. In the Missouri Prairie Region, this species is the most widespread species of *Coptotomus*.

Habitat Associations.— Many specimens of *C. venustus* were collected by Say (1823b) from a pond near Bowyer Creek, Missouri (Hilsenhoff 1980). In the present study, this species was collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Ceratophyllum*, *Ludwigia*, *Sagittaria*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: Poaceae (1); AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1); Robert M. White II C.A., 9-IX-1998, Pond 12: Poaceae (2); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Typha* (1); BOONE CO.: Baskett Wildlife Area, 18-IV-1999, Pond 76: Poaceae (1); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Ludwigia* (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Ceratophyllum* (2), *Sagittaria* (2); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (6), Poaceae (2); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: *Typha* (2); DE KALB CO.: Pony Express C.A., 13-IX-1998, Pond 20: Poaceae (1); HOWARD CO.: Davisdale C.A., 30-IX-1998, Pond 42: Cyperaceae (1), *Salix* root mats (6); KNOX CO.: Sever Lake C.A., 25-IV-1999, Pond 83: Poaceae (1); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Salix* root mats (1); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Typha* (1), *Ceratophyllum* (1); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: Cyperaceae (1); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (4); SCOTLAND CO.: Indian Hills C.A., 5-IX-1998, Pond 4: *Typha* (1); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (1).

Genus **ILYBIUS** Erichson

Ilybius biguttulus (Germar)

Dytiscus biguttulus Germar, 1824: Insectorum Species Novae aut Minus Cognitae, Descriptionibus Illustrate: 29.

Ilybius biguttulus: Sharp, 1882a: Scientific Transactions of the Royal Dublin Society 2:558.

Diagnosis.— This genus is distinguished from the other dytiscids of the Prairie Region by the following combination of characters: 1) compound eye emarginate above insertion of antenna, 2) posteromesal corner of hind femur with a distinct row of spines, and 3) almost uniformly colored elytra or with 2-4 orange spots. This species is distinguished from its two congeners in the Prairie Region by the following combination of characters: 1) metasternal groove that receives prosternal process long, reaching at least the hind margin of mesocoxal cavity, 2) ratio of width of metacoxa / width of metasternum less than 5, 3) males with a mid-ventral carina on apical 1/4 of last abdominal segment, and 4) females with notch in last abdominal segment at an obtuse angle when viewed from below. Length: 8.4-11.4 mm.

Range.— *Ilybius biguttulus* is widely distributed and occurs throughout southeastern Canada, along the Appalachians, the north central states, and the intermountain West. This species was collected only from one locality in Johnson County in the Missouri Prairie Region.

Habitat Associations.— *Ilybius biguttulus* has been recorded from dense vegetation in permanent lentic habitats (Michael and Matta 1977, Larson et al. 2000), although larvae have been collected from stream margins (Michael and Matta 1977, Hilsenhoff 1993c). In the present study, this species was collected in association with emergent grasses (Poaceae).

Material Collected.—MISSOURI: JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (1).

Ilybius fraterculus LeConte

Ilybius fraterculus LeConte, 1862: Proceedings of the Academy of Natural Sciences of Philadelphia 14:521.

Diagnosis.— This species is distinguished from its three congeners in the Prairie Region by the following combination of characters: 1) metasternal groove that receives prosternal process long, reaching at least the hind margin of mesocoxal cavity, 2) ratio of width of metacoxa/width of metasternum less than 5, 3) males without a mid-ventral carina on apical 1/4 of last abdominal segment, and 4) females with notch in last abdominal segment nearly at a right angle when viewed from below. Length: 9.4-11.0 mm.

Range.— *Ilybius fraterculus* is widespread and occurs from British Columbia south to California, east through the intermountain West, to New York. **New state record.** In ponds of the Missouri Prairie Region, this species is widespread, but absent from the southern Osage Prairie.

Habitat Associations.— *Ilybius fraterculus* has been recorded from grassland ponds among abundant emergent vegetation (Larson et al. 2000). In Wisconsin, most individuals were collected in permanent ponds with emergent marginal vegetation (Hilsenhoff 1993c). In the present study, this species was collected in association with *Juncus*, *Ludwigia*, *Polygonum*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.—MISSOURI: ANDREW CO.: Christie & Davis Mem. C.A., 22-VI-1999, Pond 108: *Typha* (1); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: Cyperaceae (1); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: *Ludwigia* (2, UMC; 1, Collection of Gil Challet); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (4); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: *Potamogeton* (2); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Salix* root mats (1); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Salix* root mats (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (6, UMC; 2, Collection of Gil Challet).

Ilybius oblitus Sharp

Ilybius oblitus Sharp, 1882a: Scientific Transactions of the Royal Dublin Society 2:560.

Diagnosis.— This species is distinguished from its three congeners in the Prairie Region by the following combination of characters: 1) metasternal groove that receives prosternal process short, usually not reaching hind margin of mesocoxal cavity, and 2) ratio of width of metacoxa/width of metasternum > 5 (Fig. 1b). Length: 9.6-10.5 mm.

Range.— This species occurs from New York west to Kansas and south to Louisiana. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— *Ilybius oblitus* has been recorded from emergent grasses and rushes in a flooded borrow pit in New Jersey (Larson 1987). This species is thought to prefer ponds or pools without detritus (Michael and Matta 1977). In the present study, this species was collected in association with species of *Juncus*, *Ludwigia*, *Polygonum*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Examined.—MISSOURI: ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Juncus* (1); BARTON CO.: Treaty Line Prairie C.A., 27-IX-1998, Pond 41: *Ludwigia* (1); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Polygonum* (1); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Polygonum* (1, UMC; 1, Collection of Gil Challet), Cyperaceae (2); BUCHANAN CO.: Belcher Branch Lake C.A., 14-VI-1999, Pond 96: Cyperaceae (17, UMC; 1, Collection of Gil Challet); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (1), Poaceae (2); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Salix* root mats (8); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (6), *Salix* root mats (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (20, UMC; 8, Collection of Gil Challet).

Subfamily Dytiscinae

Genus **ACILIUS** Leach**Acilius fraternus** (Harris)*Dytiscus fraternus* Harris, 1828: New England Farmer 7(20):156.*Acilius fraternus*: Crotch, 1873: Transactions of the American Entomological Society 4:402.

Diagnosis.— This genus is distinguished from the other dytiscids present in the Prairie Region by the following combination of characters: 1) compound eye entire, 2) scutellum visible, 3) metatarsus with two claws, 4) length <25 mm 5) sterna and elytra coarsely punctate, and 6) females sometimes with elytra fluted. This species is distinguished from *Acilius mediatius* by the following combination of characters: 1) large (length 13.4-15.8 mm), 2) males with setae on inner ventral aspect of basal 3 mesotarsomeres, more slender and numerous than on distal 2 tarsomeres, and 3) females with M-mark on vertex indistinct, or lighter color than dark transverse lines on pronotum, or with sulcate elytra.

Range.— This species ranges from Massachusetts to Iowa, and south to Florida and Texas. In the Missouri Prairie Region, this species is widespread.

Habitat Associations.— The habitat of *A. fraternus* has been characterized as shaded woodland pools (Young 1954, Michael and Matta 1977), and larvae were collected in a temporary woodland pool with a primarily sphagnum substrate (Wolfe 1980). In the present study, *A. fraternus* was collected in association with species of *Ceratophyllum*, *Chara*, *Polygonum*, *Sagittaria*, *Typha*, and Cyperaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (2); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (2); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 101: *Ceratophyllum* (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (16); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: *Typha* (1); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Sagittaria* (1), *Typha* (2); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (1).

Acilius mediatius (Say)

Dytiscus mediatius Say, 1823a: Transactions of the American Philosophical Society 2: 93 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859).

Acilius mediatius: Crotch, 1873: Transactions of the American Entomological Society 4:402.

Diagnosis.— This species is distinguished from *A. fraternus* by the following combination of characters: 1) smaller (length 10.6-11.3 mm), 2) males with inner ventral aspect of three basal tarsomeres glabrous and, 3) females with distinct M-mark on vertex same color as dark transverse lines on pronotum and without sulcate elytra.

Range.— This species occurs from New Brunswick to Minnesota, and south to North Florida and Mississippi. In ponds of the Missouri Prairie Region, this species was rarely collected.

Habitat Associations.— *Acilius mediatius* has been recorded from small forest pools, usually with bare peaty bottoms (Larson et al. 2000) or decaying leaves (Young 1954, Michael and Matta 1977). In the present study, this species was collected in association with emergent grasses (Poaceae).

Material Collected.— MISSOURI: AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1, Collection of Gil Challet); BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (1).

Genus **CYBISTER** Curtis**Cybister fimbriolatus** (Say)

Dytiscus fimbriolatus Say, 1823a: Transactions of the American Philosophical Society 2: 91 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859).

Cybister fimbriolatus: LeConte, 1859: The Complete Writings of Thomas Say: 506.

Diagnosis.— This species is distinguished from the other dytiscids in the Prairie Region by the following combination of characters: 1) body widest at posterior 1/3, 2) elytra dark brown and irrorated with numerous, minute green dots which impart an overall greenish

color, except at margins, and 3) large size (length 27.9-32.5 mm).

Range.— *Cybister fimbriolatus* occurs from southeastern Canada south to Florida and west to Texas and North Dakota. In ponds of the Missouri Prairie Region, collections of this species were restricted to two localities in the western part of the Glaciated Prairie. Evidence from the literature (Young 1954) and personal observations suggests that this species prefers deeper waters.

Habitat Associations.— *Cybister fimbriolatus* has been collected from deep water of ponds and ditches in Florida (Young 1954) and from the outer margin of fishless quarry ponds in Texas (Larson et al. 2000). However, Michael and Matta (1977) reported many specimens from a shallow pool in Virginia. In the present study, this species was collected from emergent grasses (Poaceae).

Material Collected.— MISSOURI: BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (1); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (1).

Genus GRAPHODERUS Dejean

Graphoderus liberus (Say) (Fig. 1)

Dytiscus liberus Say, 1825: Journal of the Academy of Natural Sciences of Philadelphia 5:160.

Graphoderus liberus: Wallis, 1939: The Canadian Entomologist 71:128.

Diagnosis.— This species is distinguished from the other dytiscids present in the Prairie Region by the following combination of characters: 1) 10.9-11.3 mm in length, 2) elytra glabrous or nearly so, not fluted in females, 3) mesofemur with all setae shorter than width of femur, and 4) head and pronotum without distinct black markings.

Range.— *Graphoderus liberus* is extremely widespread, and occurs throughout much of Canada, south through the Appalachians, the north central states, and the Pacific Northwest. In ponds of the Missouri Prairie Region, this species is widespread. Larson et al. (2000) indicated that local distributions were patchy.

Habitat Associations.— *Graphoderus liberus* has been recorded from the edge of boggy ponds and lakes (Larson et al. 2000) and woodland pools (Young 1954, Michael and Matta 1977). In the present study, this species was collected in association with four emergent plant taxa: species of *Polygonum*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (7); AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (22); BUCHANAN CO.: Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (22), *Typha* (4); same data, 21-III-1999, Pond 48: Poaceae (2); Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (2); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (1); CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: Poaceae (1); CALLAWAY CO.: Little Dixie Lake C.A., 18-VI-1999, Pond 103: *Typha* (2); Reform C.A., 17-IV-1999, Pond 75: Cyperaceae (4); CARROLL CO.: Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (28); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Poaceae (1); CASS CO.: Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (4); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: *Typha* (8); HARRISON CO.: Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (1); JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (1), Poaceae (1); LEWIS CO.: Deer Ridge C.A., 25-IV-1999, Pond 82: *Polygonum* (2); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Typha* (10); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (10), *Typha* (1).

Genus THERMONECTUS Dejean

Thermonectus basillaris (Harris)

Dytiscus basillaris Harris, 1829: New England Farmer 8:1.

Thermonectus basillaris: Crotch, 1873: Transactions of the American Entomological Society 4:402.

Diagnosis.— This genus is distinguished from the other dytiscids in the Prairie Region by the following combination of characters: 1) 9.1-10.0 mm in length, 2) elytra glabrous or nearly so, not fluted in females and 3) mesofemur with some setae as long or longer than width of femur. This species is distinguished from *Thermonectus nigrofasciatus ornaticollis* by the following combination of characters: 1) smaller (length 9.4-10.7 mm), 2) each elytron mostly black, yellowish blotches at base, black irrorations laterally and apically, and 3) pronotum

with one transverse yellow band.

Range.— This species occurs throughout most of the eastern United States. In ponds of the Missouri Prairie Region, this species is widespread.

Habitat Associations.— Young (1954) noted that *T. basillaris* is a pioneer species common in many clear, vernal ponds. This species has been reported to not be found in ponds after vegetation begins to grow (Young 1954, McWilliams 1968). In Virginia, this species was reported to occur in woodland pools (Michael and Matta 1977). In the present study, *T. basillaris* was collected in association with species of *Potamogeton*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1); BARTON CO.: Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: Poaceae (1); BUCHANAN CO.: Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (2); CALLAWAY CO.: Reform C.A., 16-IX-1998, Pond 24: Cyperaceae (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Poaceae (2); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: Marginal root mats (1), *Potamogeton* (1); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (1); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Typha* (1); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (1).

***Thermonectus nigrofasciatus ornaticollis* (Aubé)**

Acilius (*Thermonectus*) *ornaticollis* Aubé, 1838: Species Général des Coléoptères 6:140.

Thermonectus nigrofasciatus ornaticollis McWilliams, 1968: A Taxonomic Revision of the North American Species of the Genus *Thermonectus* Dejean (Coleoptera: Dytiscidae). 64.

Diagnosis.— This species is distinguished from *Thermonectus basillaris* by the following combination of characters: 1) length 11.6-13.6 mm, 2) elytra mostly yellowish-brown with black irroration throughout, and black fascia in apical 1/3, and 3) pronotum with 2 to 3 yellow bands, although some bands might be closed in by black.

Range.— This species occurs throughout most of the United States. In the Missouri Prairie Region, this species is widespread.

Habitat Associations.— The habitat of *Thermonectus nigrofasciatus ornaticollis* was characterized by Young (1954) as upland ponds or pools with grassy margins. Hilsenhoff (1993) considered the adults to overwinter in terrestrial habitats in Wisconsin and then fly to newly inundated lentic habitats to oviposit in spring or summer. McWilliams (1968) reported this species from grassy, clear ponds in plains habitats. In the present study, this species was collected in association with species of *Juncus*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1); BUCHANAN CO.: Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (2); Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (4), *Typha* (1); CASS CO.: Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (3), Poaceae (1), *Typha* (1); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Juncus* (1); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Marg. grass (2), *Typha* (2).

The Lentic Noteridae of the Missouri Prairie Region

Biology.— Although little is known regarding life histories of the New World fauna, the biology of the Palearctic species *Noterus capricornis* Herbst has been well studied. This species, unlike Nearctic taxa, possesses spinose abdominal apices which are used to obtain air from plant roots. Pupation occurs underwater, but pupae are not strictly aquatic. The cocoon is attached to submerged roots and constructed of plant tissue, detritus, and soil. At the plant-cocoon interface, the larva chews into the plant tissue and air escaping from the plant fills the cocoon. It is not known if Nearctic species behave in a similar way (White and Brigham 1996).

In the Nearctic region, species of *Hydrocanthus* usually can be found in association with filamentous algae and ponds containing *Typha* (Young 1985). Species of *Suphisellus* are scavenger-herbivores (Young 1979), and may be of great importance in nutrient recycling in the tropics (Young 1967).

Taxonomy.— This family is allied closely with the Dytiscidae and was first

considered to be a subfamily of the Dytiscidae by Régimbart (1878) and Meinert (1901). Later, those genera whose larvae were known were given familial status by Bertrand (1927) and Böving and Craighead (1931).

Two genera of Noteridae occur in ponds of the Missouri Prairie Region: *Hydrocanthus* and *Suphisellus*. Recent taxonomic reviews of Nearctic and New World *Hydrocanthus* and *Suphisellus* were given by Young (1985 and 1979, respectively). Species of *Hydrocanthus* exhibit a Gondwanan faunal distribution, with members of the genus occurring in Africa, the Indo-Malayan region, Australia, and the Americas (Young 1985). No faunistic treatments have heretofore specifically studied the noterid fauna of Missouri.

Key to the Lentic Noteridae of the Missouri Prairie Region

- 1 Length > 4 mm; ultimate maxillary palpal segment truncate apically
..... *Hydrocanthus iricolor* Say
- Length < 3.5 mm; ultimate maxillary palpal segment bifid apically
..... *Suphisellus* Crotch . . . 2
- 2 Elytra with orange fascia which may be reduced to several elongate orange blotches *Suphisellus puncticollis* Crotch
- Elytra uniform in color *Suphisellus bicolor* (Say)

Genus HYDROCANTHUS Say

Hydrocanthus iricolor Say

Hydrocanthus iricolor Say, 1823a: Transactions of the American Philosophical Society 2:105 (taken from J. L. LeConte's editing of the complete writings of Thomas Say, 1859).

Diagnosis.— This genus is represented in ponds of the Missouri Prairie Region by one species, *H. iricolor*. The other genus in this family that occurs in this area, *Suphisellus* Crotch (length < 3 mm), is markedly smaller than *Hydrocanthus*. Length: 4.3-5.5 mm.

Range.— *Hydrocanthus iricolor* has been reported from New England to Wisconsin, and south to North Carolina. **New state record.** In ponds of the Missouri Prairie Region, this species is widespread and relatively common.

Habitat Associations.— Adults have been reported from *Typha* and *Sparganium* by Hilsenhoff (1992). These beetles usually are associated with filamentous algae and, in North America, are common in ponds with *Typha* (Young 1985). In the present study, specimens were collected in association with a wide range of submerged macrophytes and emergent vegetation, including species of *Brasneia*, *Chara*, *Juncus*, *Lespedeza*, *Ludwigia*, *Polygonum*, *Salix* root mats, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (4); ATCHISON CO.: Tarkio Prairie C.A., 12-IX-1998, Pond 17: *Chara* (10), *Typha* (3); Tarkio Prairie C.A., 12-IX-1998, Pond 18: *Juncus* (1); AUDRAIN CO.: Robert M. White II C.A., 9-IX-1998, Pond 12: Poaceae (2); BARTON CO.: Mon-Shon Prairie C.A., 8-VI-1999, Pond 87: Cyperaceae (1); Shawnee Trail C.A., 26-IX-1998, Pond 37: *Typha* (2); Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (7), *Polygonum* (3); Pa-Sole Prairie C.A., 8-VI-1999, Pond 89: *Ludwigia* (4); Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Polygonum* (3); Clear Creek Prairie C.A., 9-VI-1999, Pond 91: *Juncus* (1); BATES CO.: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: *Typha* (1), *Polygonum* (16), Cyperaceae (9); BOONE CO.: Baskett Wildlife Area, 18-IV-1999, Pond 76: Poaceae (1); same data, 14-IX-1998, Pond 22: *Brasneia* (1), *Lespedeza* (1), *Salix* root mats (74); same data, Pond 23: *Typha* (1); BUCHANAN CO.: Pigeon Hills C.A., 21-III-1999, Pond 49: Poaceae (40); Belcher Branch Lake C.A., 21-III-1999, Pond 50: Poaceae (6); same data, 14-VI-1999, Pond 96: Cyperaceae (31); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: Cyperaceae (7), *Ludwigia* (6); same data, 16-IX-1998, Pond 24: Cyperaceae (1); same data, 17-IV-1999, Pond 75: Cyperaceae (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Polygonum* (1); Amarugia Highlands C.A., 19-IX-1998, Pond 29: *Typha* (4); James P. Harter C.A., 22-III-1999, Pond 53: *Salix* root mats (1), *Typha* (24); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Juncus* (1); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: *Typha* (2); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: *Typha* (5); DE KALB CO.: Pony Express

C.A., 13-IX-1998, Pond 20: Poaceae (1); HARRISON CO.: Wayne Helton Mem. W.A., 20-III-1999, Pond 46: Poaceae (2); Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (3); HENRY CO.: Connor O. Fewel Wildlife Ar., 20-IX-1998, Pond 31: *Salix* root mats (2), *Polygonum* (1); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 98: Poaceae (1); JACKSON CO.: Burr Oak Woods C.A., 19-IX-1998, Pond 28: *Lespedeza* (1), *Typha* (10); JOHNSON CO.: Perry Memorial C.A., 20-IX-1998, Pond 32: Poaceae (14), *Salix* root mats (8), Poaceae (7); KNOX CO.: Sever Lake C.A., 25-IV-1999, Pond 83: Poaceae (4); LAFAYETTE CO.: Baltimore Bend C.A., 3-X-1998, Pond 43: *Typha* (1); Maple Leaf Lake C.A., 18-IX-1998, Pond 25: Poaceae (2); LEWIS CO.: Deer Ridge C.A., 6-IX-1998, Pond 6: *Salix* root mats (17); same data, 25-IV-1999, Pond 82: *Polygonum* (1); LINCOLN CO.: White Mem. C.A., 7-IX-1998, Pond 8: *Typha* (1), spp. roots (6); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: *Typha* (2), *Salix* root mats (4), Cyperaceae (1); MACON CO.: Redman C.A., 1-VII-1999, Pond 114: Poaceae (1); MONTGOMERY CO.: Danville C.A., 7-IX-1998, Pond 11: *Typha* (2); RANDOLPH CO.: Rudolph Bennet C.A., 4-X-1998, Pond 44: *Typha* (3); PETTIS CO.: J. N. Turkey Kearn C.A., 13-VI-1999, Pond 93: *Typha* (2); SALINE CO.: Marshall Junction C.A., 4-IV-1999, Pond 65: Cyperaceae (7); Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (13), *Ludwigia* (78); Blind Pony C.A., 21-VI-1999, Pond 106: (8); VERNON CO.: Osage Prairie C.A., 7-VI-1999, Pond 85: *Juncus* (1).

Genus SUPHISELLUS Crotch

Suphisellus bicolor (Say)

Noterus bicolor Say, 1834: Transactions of the American Philosophical Society 4:446.

Suphisellus bicolor: Crotch, 1873: Transactions of the American Entomological Society 4:397.

Diagnosis.— This genus is superficially similar to *Hydrocanthus*, but its small size (length: 2.66-2.99 mm), compared to *Hydrocanthus* (length > 4 mm) will readily distinguish the two genera. *Suphisellus bicolor* is similar to *S. puncticollis*, but *S. bicolor* has concolorous elytra, whereas orange fascia or blotches are present on the elytra of *S. puncticollis*. Length: 2.6-3.0 mm

Range.— This species was previously reported from Texas through the Gulf Coastal states, north to Indiana and Illinois. **New state record**. In the Missouri Prairie Region, this species, although uncommon, is widespread in the southern portion.

Habitat Associations.— Members of the genus feed largely in masses of decaying vegetation or submerged roots (Young 1979). In the present study, *S. bicolor* was collected in association with *Juncus*, *Ludwigia*, *Polygonum*, and Cyperaceae.

Material Collected.— MISSOURI: BARTON CO.: Treaty Line Prairie C.A., 8-VI-1999, Pond 88: *Ludwigia* (2), *Polygonum* (3); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Ludwigia* (5); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Cyperaceae (1); HENRY CO.: Chapel View Prairie C.A., 3-IV-1999, Pond 60: *Juncus* (1); HOWARD CO.: D avidsdale C.A., 30-IX-1998, Pond 42: Cyperaceae (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (8).

Suphisellus puncticollis Crotch

Suphis (*Suphisellus*) *puncticollis* Crotch, 1873: Transactions of the American Entomological Society 4:397.

Suphisellus puncticollis: Crotch, Young, 1954: University of Florida Studies, Biological Science Series V(1):131.

Diagnosis.— The orange fascia or blotches on the elytra readily distinguish this species from *Suphisellus bicolor*, which has concolorous elytra.

Range.— *Suphisellus puncticollis* was previously reported from New England south to Florida. **New state record**. In the Missouri Prairie Region this species is widespread.

Habitat Associations.— Adults have been recorded from cattails and bur-reed marshes and ponds in Wisconsin (Hilsenhoff 1992). In the present study, this species was collected in association with *Ludwigia*, *Potamogeton*, *Typha*, and Cyperaceae.

Material Collected.— MISSOURI: CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Potamogeton* (1); CASS CO.: James P. Harter C.A., 22-III-1999, Pond 53: *Typha* (2); CLARK CO.: Fox Valley Lake C.A., 6-IX-1998, Pond 5: *Typha* (1); LINCOLN CO.: White Mem.

C.A., 7-IX-1998, Pond 8: *Typha* (1); LINN CO.: Mussel Fork C.A., 11-IX-1998, Pond 13: Cyperaceae (1), *Potamogeton* (1); MONTGOMERY CO.: Danville C.A., 7-IX-1998, Pond 11: *Typha* (1); PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: *Typha* (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Typha* (9), *Ludwigia* (5).

The Lentic Gyrinidae of the Missouri Prairie Region

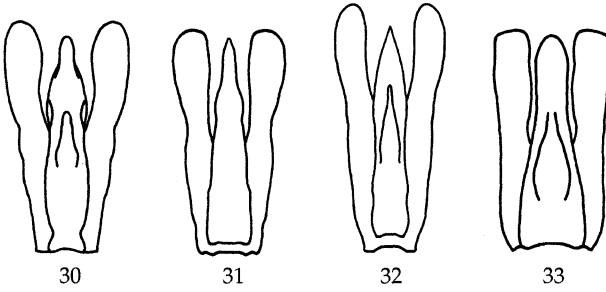
Habitat Associations.— These beetles are known to congregate intra- and interspecifically (Wood 1962) and aggregations of both *Dineutus* and *Gyrinus* have been observed (Hatch 1925, Oygur and Wolfe 1991, personal observation). The larvae are totally aquatic. The pupae are found terrestrially on vertical surfaces, usually emergent plants, and form a cocoon constructed of various materials (Leech and Chandler 1956). The adults are generalist consumers, feeding primarily on both living and dead animal matter on the water surface (Oygur and Wolfe 1991). Habitat preferences (lotic or lentic) are unclear for most species, and authors disagree on the published habitat associations of many species. Habitat information on 1,000 *Gyrinus* specimens from North America revealed that slightly more individuals were collected in lentic habitats (56%) than in lotic habitats (Oygur and Wolfe 1991), as was speculated by other authors (Hatch 1925, Leech and Chandler 1956). Most species of Gyrinidae in Wisconsin breed primarily in lentic habitats and the adults fly to larger streams in mid-October to overwinter (Hilsenhoff 1990). As with many aquatic invertebrates, habitats are an important part of gyrid life history: adults remain close to the shore or aquatic vegetation (Hatch 1925).

Taxonomy.— A paucity of literature exists for the North American Gyrinidae (Hilsenhoff 1990). Systematic and faunistic treatments of the Nearctic fauna include works by LeConte (1868), Roberts (1895), Fall (1922), Hatch (1930), Wood (1962), Oygur (1988), Hilsenhoff (1990), and Oygur and Wolfe (1991). No taxonomic treatments have heretofore specifically studied the gyrid fauna of Missouri.

Three genera are represented in Missouri: *Dineutus*, *Gyretes*, and *Gyrinus*, of which, *Dineutus* and *Gyrinus* occur in the Prairie Region. The following annotated list and taxonomic key include all 4 species that were collected in ponds within the Missouri Prairie Region. Only one species of *Gyrinus*, *G. parvus* Say, was collected from 11 sites. Additionally, only one species of *Dineutus*, *D. assimilis*, was collected from 26 ponds, and two congeners were collected with *D. assimilis* from a single pond. Also included in the key are three other species not collected in this study, but which have been collected from this region or in west-central Illinois, southern Iowa or eastern Kansas.

Key to the Lentic Gyrinidae of the Missouri Prairie Region

- 1 Scutellum concealed; length > 8.5 mm; each elytron with 9 weakly developed striae; *Dineutus* Macleay 2
- 1' Scutellum visible; length < 7.0 mm; each elytron with 11 impressed striae, comprising rows of punctures *Gyrinus* Müller ... 6
- 2(1) Length > 13 mm (13.4-15.4 mm) *Dineutus ciliatus* (Forsberg)*
- 2' Length < 13 mm 3
- 3(2) Abdominal venter brownish-yellow *Dineutus discolor* Aubé*
- 3' Abdominal venter brown to black 4
- 4(3') Protibia yellow-brown to light brown; males with aedeagus abruptly constricted before apex (Fig. 30) *Dineutus assimilis* (Kirby)



Figs. 30-33. Aedeagus and parameres of male Gyrinidae. 30, *Dineutus assimilis*; 31, *Dineutus hornii*; 32, *Dineutus nigrior*; 33, *Gyrinus parvus*.

- 4' Protibia medium brown to black; aedeagus without abrupt constriction before apex (Figs. 31, 32) 5
 - 5(4') Epipleuron usually brownish-yellow and with black dots, but sometimes brown to black; males with apices of elytra rounded; aedeagus lanceolate, uniformly narrowed toward apex (Fig. 31) *Dineutus hornii* Roberts
 - 5' Epipleuron brown to black; males with aedeagus slightly dilated 2/3 from base to apex (Fig. 32) *Dineutus nigrior* Roberts
 - 6(1') First five visible abdominal sternites entirely black; 11th stria (nearest to costal margin) of elytron located in or nearly in marginal inflection for entire length; aedeagus as in Fig. 33; length 4.4-5.5 mm *Gyrinus parvus* Say
 - 6' First five visible abdominal sternites black medially with lateral 1/4 sharply contrasting orange; 11th stria of elytron mesad to marginal inflection in apical half; length 5.4-6.9 mm *Gyrinus maculiventris* LeConte*
- * Species not collected in this study but likely to occur in the Missouri Prairie Region.

Genus **DINEUTUS** Macleay (Fig. 3)

Dineutus assimilis (Kirby) (Fig. 30)

Cyclinus assimilis Kirby, 1837: Fauna Boreali-Americana 4:78.
Dineutus assimilis: Ochs, 1927: Koleopterlogische Rutschau 13:36.

Diagnosis.— This genus is the larger of the two that occurs in ponds of the Missouri Prairie Region. Additionally, *Dineutus* has 9 weakly developed striae on each elytron, whereas *Gyrinus* has 11 striae comprising rows of punctures. The scutellum is concealed in *Dineutus* whereas in *Gyrinus* it is visible. *Dineutus assimilis* is the most commonly collected species in the genus in North America (Wood 1962). The aedeagus is abruptly constricted immediately before the apex, which readily distinguishes males of *D. assimilis* from those of its congeners. In addition, the protibia is yellow to light brown whereas the protibiae are black to medium brown in *D. hornii* and *D. nigrior*. Length: 9.0-10.7 mm.

Range.— This is the widest ranging species of *Dineutus* in the Nearctic region. It occurs from New Brunswick to North Dakota, and south to Georgia and Arizona. In the Missouri Prairie Region, this species is widespread and was the most frequently encountered gyrenid.

Habitat Associations.— This species is thought to breed in both lotic and lentic habitats (Hilsenhoff 1990). Due to the highly mobile nature of these beetles, habitat associations of the present study are not necessarily based on biological requirements and simply denote that the beetles were collected with these plant taxa: species of *Brasenia*, *Ceratophyllum*, *Juncus*, *Lespedeza*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Sagittaria*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: ADAIR CO.: Sugar Creek C.A., 11-IV-1999, Pond 72: Cyperaceae (1); AUDRAIN CO.: Marshall Digs C.A., 24-IV-1999, Pond 80: Poaceae (6);

BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Brasneia* (7), *Lespedeza* (1); same data, Pond 23: *Sagittaria* (2); BUCHANAN: Bluffwoods C.A., 19-IX-1998, Pond 27: Poaceae (8); Monkey Mountain C.A., 13-IX-1998, Pond 19: Poaceae (301); CALDWELL CO.: Bonanza C.A., 22-VI-1999, Pond 107: *Potamogeton* (24); same data, 10-IV-1999, Pond 68: Cyperaceae (1); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Potamogeton* (9); CARROLL CO.: Schifferdecker Mem. C.A., 16-VI-1999, Pond 100: *Salix* root mats (16); same data, Pond 101: *Ceratophyllum* (16); Little Compton Lake C.A., 10-IV-1999, Pond 67: Poaceae (73); CASS CO.: Settle's Ford C.A., 14-IV-1999, Pond 94: *Polygonum* (6), *Ludwigia* (12); Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (23); COOPER CO.: Prairie Home C.A., 5-X-1998, Pond 45: Poaceae (17), *Typha* (5); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Juncus* (1), *Polygonum* (2); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: Cyperaceae (1), *Typha* (14); HARRISON CO.: Wayne Helton Mem. W. A., 23-VI-1999, Pond 111: Poaceae (6); HOLT CO.: Riverbreaks C.A., 15-VI-1999, Pond 97: Marg. Veg. (1); same data, Pond 98: Poaceae (19); JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (6); LEWIS CO.: Deer Ridge C.A., 25-IV-1999, Pond 82: *Polygonum* (4); MERCER CO.: Lake Paho C.A., 12-IX-1998, Pond 15: *Typha* (15); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (23); PLATTE CO.: Guy B. Park C.A., 21-III-1999, Pond 51: Poaceae (1); SALINE CO.: Blind Pony C.A., 21-VI-1999, Pond 106: *Ludwigia* (2); SULLIVAN CO.: Locust Creek C.A., 11-IV-1999, Pond 70: Poaceae (1), *Typha* (5).

***Dineutus hornii* Roberts (Fig. 31)**

Dineutus hornii Roberts, 1895: Transactions of the American Entomological Society 22:282, 284.

Diagnosis.— The aedeagus is uniformly narrowed toward the apex (lanceolate), and the epipleura of both sexes are usually yellowish-brown, whereas in *D. assimilis* and *D. nigrrior*, the epipleura and abdominal venter are concolorous. In females, the gonocoxa of *D. hornii* gradually widens to the widest point at mid-length, whereas in *D. nigrrior*, the gonocoxa is widely and abruptly dilated at mid-length. Length: 9.3-11.0 mm.

Range.— This species occurs from Nova Scotia to Manitoba, and south to North Carolina and Kansas. In the Missouri Prairie Region, of this species was collected only in Boone County.

Habitat Associations.— This species breeds in lentic habitats and may occasionally fly to streams (Hilsenhoff 1990). In the present study, although this species was collected in the *Brasneia* habitat, these beetles are highly vagile, and this habitat association is not necessarily of specific biological importance.

Material Collected.— MISSOURI: BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Brasneia* (1).

***Dineutus nigrrior* Roberts (Fig. 32)**

Dineutus nigrrior Roberts, 1895: Transactions of the American Entomological Society 22:280, 282, 284, 285.

Diagnosis.— The aedeagus is slightly dilated 2/3 from the base towards the apex. In addition, the protibiae are black or dark brown, whereas in *D. assimilis*, the protibiae are yellow brown to light brown and the epipleuron is black or dark brown, whereas in most specimens of *D. hornii*, the epipleuron is brownish-yellow with black dots. In females, the gonocoxa of *D. hornii* gradually widens to the widest point at mid-length, whereas in *D. nigrrior*, the gonocoxa is widely and abruptly dilated at mid-length. Length: 10.6-12.4 mm.

Range.— Museum collection data (UMC) indicate that *D. nigrrior* has been collected from Dent and Maries Counties, both in the Ozarks. This species was collected only in Boone County in the Missouri Prairie Region.

Habitat Associations.— This species is considered lentic and may be found in streams occasionally (Roberts 1895). Habitats associated with these beetles were *Brasneia* and *Lespedeza*.

Material Collected.— MISSOURI: BOONE CO.: Baskett Wildlife C.A., 14-IX-1998, Pond 22: *Brasneia* (1), *Lespedeza* (1).

Genus *GYRINUS* Müller*Gyrinus parvus* Say (Fig. 33)

Gyrinus parvus Say, 1834: Transactions of the American Philosophical Society 4:448.

Diagnosis.— This genus is characterized by its relatively small size (length: 4.4-5.5 mm) and the 11 impressed striae on each elytron. This species can be separated from all other species of *Gyrinus* in North America by the position of the 11th stria, which is positioned in or almost in the elytral marginal inflection from base to apex. The first five abdominal sternites are entirely black, whereas in *Gyrinus maculiventris*, which could occur in the Prairie Region, these sternites are black medially with the lateral 1/4 sharply contrasting orange.

Range.— This is the widest ranging species of *Gyrinus* in the Nearctic region (Oygar and Wolfe 1991), and occurs from North Dakota to Illinois, and south to Texas. In the Missouri Prairie Region, this species is widespread.

Habitat Associations.— From label information of 14 museum specimens, most were collected from lentic habitats (Oygar and Wolfe 1991). In the present study, habitats associated with these beetles included species of *Juncus*, *Ludwigia*, *Polygonum*, *Potamogeton*, *Typha*, Cyperaceae, and Poaceae.

Material Collected.— MISSOURI: AUDRAIN CO.: Marshall Diggs C.A., 24-IV-1999, Pond 80: Poaceae (1); BARTON CO.: Dorris Creek Prairie C.A., 9-VI-1999, Pond 90: *Ludwigia* (2) Mon-Shon C.A., 23-III-1999, Pond 56: Cyperaceae (1); BATES: Harmony Mission Lake C.A., 9-VI-1999, Pond 92: Cyperaceae (1); CALLAWAY CO.: Reform C.A., 19-VI-1999, Pond 104: *Potamogeton* (1); CASS CO.: Settle's Ford C.A., 14-VI-1999, Pond 94: *Ludwigia* (1); Dorsett Hill C.A., 14-VI-1999, Pond 95: *Typha* (14); DADE CO.: Stoney Point Prairie C.A., 3-IV-1999, Pond 62: *Juncus* (2), *Polygonum* (1); DAVIESS CO.: Gallatin C.A., 11-IV-1999, Pond 69: *Typha*; JOHNSON CO.: Hazel Hill Lake C.A., 4-IV-1999, Pond 64: Poaceae (2); NODAWAY CO.: Bilby Ranch Lake C.A., 23-VI-1999, Pond 109: Poaceae (3).

HABITAT AND REGIONAL ASSOCIATIONS

RESULTS

Over 100 species of aquatic Coleoptera were collected (Table 2), representing 51 genera and 9 families [Haliplidae, Dytiscidae, Noteridae, Gyrinidae, Dryopidae, Elmidae, Hydrophilidae (*sensu lato*), Chrysomelidae, and Curculionidae]. Within the Adephaga, 20 species were new Missouri state records [see Whiteman and Sites (2001) for new Polyphaga records]. Twenty different habitats (Table 2) were identified and sampled for their coleopteran fauna, although beetles were collected from only 19 of the habitats.

Compositional similarity

The cluster dendrogram for each period revealed few clearly defined groups, suggesting that a particular habitat was not consistent in Coleoptera community composition among ponds.

General patterns in species richness among habitats

Aquatic beetle species richness differed significantly among habitats in only two of three sampling periods. Specifically, in August-September 1998, Poaceae supported significantly more beetle species than did *Potamogeton* and *Ceratophyllum* ($p=0.025$; $df=8, 81$). In June 1999, *Ludwigia*, *Polygonum*, Poaceae and *Typha* had the highest mean species richness, although *Typha* was not significantly different than four other habitats. Species richness was lowest in root mats of *Salix* ($p<0.001$; $df=8, 69$). In August-September 1998, Poaceae supported the greatest number of beetle species (48), whereas *Najas* did not support any species.

Species richness among pond size classes

Species richness differed among pond size classes only in March-April 1999. Small ponds (89-250 m²) supported significantly higher mean species richness, than did medium sized (251-1,200 m²) and large ponds (1,200-15,000 m²) ($p=0.03$; $df=2, 37$).

When each habitat was examined separately for differences among pond size classes, only the Cyperaceae habitat was significant in March-April 1999. Specifically, small ponds (size class 1) supported the highest mean species richness, followed by medium (size class 2), and large ponds (size class 3) ($p=0.03$; $df=2, 10$).

Intrafamilial richness among habitats

Curculionidae. Curculionid species richness differed significantly among habitats in all sampling periods. In August-September 1998, *Polygonum* and Poaceae supported the highest mean curculionid species richness, although Poaceae was indistinguishable from Cyperaceae ($p=0.004$; $df=9, 101$). In March-April 1999, *Polygonum* supported the highest mean richness ($p=0.002$; $df=7, 71$). In June 1999, *Polygonum*, *Ludwigia*, and *Juncus* supported the highest mean curculionid richness, although the latter two did not differ significantly from Poaceae and Cyperaceae ($p=0.002$; $df=8, 69$).

Dytiscidae. Dytiscid species richness differed significantly among habitats in two sampling periods. In August-September 1998, Poaceae and *Typha* supported significantly higher mean dytiscid species richness than *Potamogeton*, *Polygonum*, and *Ceratophyllum* ($p=0.0015$; $df=9, 101$). In June 1999, *Polygonum*, *Ludwigia*, *Typha*, Poaceae, and Cyperaceae supported the highest mean dytiscid species richness ($p=0.009$; $df=8, 69$).

Haliplidae. Haliplid species richness differed significantly among habitats in June 1999 but not in August-September 1998 nor in March-April 1999. In June 1999, Poaceae and six other habitats supported the highest mean haliplid richness, although it was statistically higher than only Cyperaceae and *Salix* root mats ($p=0.020$; $df=8, 69$).

Hydrophilidae. Hydrophilid species richness differed significantly among habitats in August-September 1998 and June 1999, but not in March-April 1999. In August-September 1998, *Juncus* supported higher mean hydrophilid richness than *Salix* root mats, *Polygonum*, and *Ceratophyllum* ($p=0.046$; $df=9, 101$). In June 1999, Poaceae supported higher mean hydrophilid richness than Cyperaceae, *Ceratophyllum*, *Potamogeton*, and *Salix* root mats ($p<0.001$; $df=8, 69$).

Noteridae. Noterid species richness differed significantly among habitats in two sampling periods. In August-September 1998, *Typha* supported the highest mean noterid richness, ($p=0.027$; $df=9, 101$) and in June 1999, *Ludwigia*, *Polygonum*, *Juncus*, and *Typha* supported the highest mean noterid richness, although the latter three were not significantly different than all other habitats tested ($p=0.027$; $df=8, 69$).

Richness of Chrysomelidae and Gyrinidae did not differ significantly among habitats in any of the sampling periods.

Regional differences in species richness

No salient differences in species richness were found among subregions within each regionalization nor within habitats among subregions within regionalizations.

DISCUSSION

Hierarchical analyses of organismal distribution in both space and time continues to be a central focus in contemporary ecology and systematics. In this

Table 2. Checklist of taxa of aquatic Coleoptera collected from 105 ponds in the Missouri Prairie Region. Single asterisks indicate new Missouri state records. Double asterisk indicates new Missouri state record and an adventitious lotic taxon represented by only a single specimen and not considered hereafter.

ADEPHAGA

HALIPLIDAE

Haliplus borealis LeConte
Haliplus fasciatus Aubé
Haliplus tortilipenis Brigham & Sanderson*
Haliplus triopsis Say
Haliplus variomaculatus Brig. & Sanderson*
Peltodytes duodecimpunctatus (Say)
Peltodytes edentulus LeConte
Peltodytes lengi (LeConte)
Peltodytes litoralis Matheson
Peltodytes muticus (LeConte)
Peltodytes pedunculatus (Blatchley)*
Peltodytes sexmaculatus Roberts

DYTISCIDAE

Acilius fraternus (Harris)
Acilius mediatus (Say)
Agabus aeruginosus Aubé*
Agabus disintegratus (Crotch)
Celina angustata Aubé*
Celina hubbelli Young
Celina imitatrix Young*
Copelatus chevrolati chevrolati Aubé*
Copelatus glyphicus (Say)
Coptotomus longulus lenticus (Hilsenhoff)
Coptotomus longulus longulus LeConte
Coptotomus loticus Hilsenhoff
Coptotomus venustus (Say)
Cybister fimbriolatus (Say)
Desmopachria convexa (Aubé)*
Graphoderus liberus (Say)
Hydroporus rufilabris Sharp*
Hydrovatus pustulatus Melsheimer
Hygrotus acaroides (LeConte)
Hygrotus dissimilis Gemminger and Harold*
Hygrotus nubilus (LeConte)
Ilybius biguttulus (Germar)
Ilybius fraterculus LeConte*
Ilybius oblitus Sharp
Laccophilus fasciatus rufus Melsheimer
Laccophilus maculosus maculosus Say
Laccophilus proximus Say
Liodessus flavicollis (LeConte)*
Neoporus blanchardi (Sherman)**
Neoporus clypealis (Sharp)*
Neoporus dimidiatus (Gem. and Harold)*
Neoporus undulatus (Say)
Thermonectus basillaris (Harris)
Thermonectus nigrofasciatus ornatocollis (Aubé)
Uvarus granarius (Aubé)*
Uvarus lacustris (Say)*

NOTERIDAE

Hydrocanthus iricolor Say*
Suphisellus bicolor (Say)*
Suphisellus puncticollis Crotch*

GYRINIDAE

Dineutus assimilis (Kirby)
Dineutus hornii Roberts
Dineutus nigrior Roberts
Gyrinus parvus Say

POLYPHAGA

HYDROPHILIDAE

Anacaena limbata (Fabricius)
Berosus exiguus (Say)
Berosus infuscatus LeConte
Berosus pantherinus LeConte
Berosus peregrinus (Herbst)
Berosus striatus (Say)
Deralthus altus (LeConte)
Enochrus cinctus (Say)
Enochrus consortus Green
Enochrus hamiltoni (Horn)
Enochrus ochraceus (Melsheimer)
Enochrus perplexus (LeConte)
Enochrus pygmaeus (Fabricius)
Enochrus sayi Gundersen
Helochares maculicollis Mulsant
Helocombus bifidus (LeConte)
Helophorus spp.
Hydrochara sora Smetana
Hydrochus spp.
Hydrophilus triangularis Say
Laccobius magnus Cheary
Paracymus subcupreus (Say)
Phaenonotum exstriatum (Say)
Tropisternus blatchleyi d'Orchymont
Tropisternus collaris (Fabricius)
Tropisternus lateralis nimbatus (Say)
Tropisternus natator d'Orchymont

DYROPIDAE

Helichus basalis LeConte

ELMIDAE

Dubiraphia sp.

CHRYSOMELIDAE

Donacia palmata Oliver
Donacia piscatrix Lacordaire
Donacia cincicornis Newman

CURCULIONIDAE

Apion sp.
Auleutes nebulosus (LeConte)
Barilepton quadricolle LeConte
Hypera compta (Say)
Lissorhoptrus simplex (Say)
Lixus terminalis LeConte
Onychylis nigrirostris (Boheman)
Pelenomus sp.
Perigaster cretura (Herbst)
Rhinoncus longulus LeConte
Sibariops confusa (Boheman)
Sphenophorus sp.
Tyloderma sphaerocarpace Wibmer

study, two spatial scales of aquatic beetle distribution were examined. At the habitat level, heterogeneity in overall aquatic beetle richness among 19 different habitats was observed for two periods. Overall, those habitats with the highest total and mean aquatic beetle species richness were emergent plants, rooted in shallow water from several centimeters to several meters from the pond margin. Those plants that were submerged and in deeper water (i.e., *Ceratophyllum* and *Potamogeton*), supported fewer beetle species. These results corroborate previous reports that shallow water and the presence of vegetation are important factors determining both species richness and abundance of aquatic beetles (Young 1954, Zimmerman 1960, Nilsson 1984, Juliano 1991, Larson 1997). As important determinants of aquatic beetle community structure and abundance, water depth and presence of plants are not mutually exclusive. In March-April 1999 (spring), habitats did not differ in their mean species richness probably because the quality and abundance of overwintered plants was low, which reduces species packing. That is, an individual plant might not be able to support as many species of beetles because of low food quality and simple structural complexity.

Most families of aquatic beetles were heterogeneous in species richness among habitats when analyzed individually for sampling periods in August-September 1998 and June 1999. Curculionid richness was greatest when collected in association with three plant genera, including *Polygonum*, which is an important host plant for *Hypera compta* (Say) and other weevils found in this study (Puttler et al. 1973).

Characterization of species assemblages associated with different habitats using Jaccard's similarity matrix and subsequent cluster analysis did not reveal any overall patterns. Potential confounding variables in this analysis were the large and disparate sample sizes for each habitat clustered, the large number of beetle species collected overall, and the presence of both common species and rare species. Similar results were found by Aiken (1991) and Larson (1985) who attributed poor resolution of beetle assemblages to the gradation of one habitat type into another and to the paucity of interspecific trophic dependencies. Indeed, a large body of literature exists indicating that many beetles are pioneer species able to colonize a wide array of aquatic habitats, from puddles to estuaries (e.g., Larson 1975, Young 1954, Nilsson and Danell 1981, Valladres et al. 1994). In temporary habitats, the Coleoptera are among the most dominant taxa (Larson 1985, Jeffries 1994). Thus, as generalists, associations with specific vegetation might have been maladaptive in their evolutionary history, which has allowed them to exploit a diverse array of habitats.

The weevils and donaciine chrysomelids, however, are an important exception to the rule that aquatic beetles are generalists in habitat associations. As

phytophagous insects, their life history strategies are dependent upon the presence of particular food plants, such as *Nuphar* or *Nelumbo* in the case of *Donacia*, and therefore their ability to colonize an aquatic system is dependent upon the presence of those plants. Thus, these taxa of Coleoptera are more specialized in their habitat requirements and would not be expected to act as pioneer species.

None of the analyses of ecoregions revealed consistent differences across seasons (all three periods) in either richness among habitats or among ponds. Due to their stochastic nature, those relationships that were significantly different were not particularly meaningful with respect to testing existing regionalizations or predicting new regions based on beetle species richness.

Upon closer examination, these equivocal results may not be surprising. Pflieger's (1989) regionalization was based on drainage basins of rivers and lotic fish communities. Ponds are not lotic and beetle communities do not mirror fish diversity or community structure, except when considering the intra-pond dynamics of fish predators and beetles, where the presence of fish is an extremely important determinant of both community structure and species richness (Kenk 1949, Ward 1992). Thus, based on richness of lentic aquatic beetles, this aquatic regionalization scheme is inadequate to explain the variation present in the beetle communities of the Prairie Region. Several other regionalizations, such as the Natural Divisions Scheme, are based on subjective criteria, including "differences in soils, river drainage and glacial history", but not fauna or flora (Thom and Wilson 1980). Although terrestrial plant communities may be highly correlated with soil type, geologic province, and other abiotic factors, it is clear that species richness of lentic water beetles of the Missouri Prairie Region is not.

Given the ambiguous nature of the results regarding habitat affinities and regional association in the present study, we recommend that future studies of beetle faunas among ecoregions examine relationships among disparate habitat types (e.g., Missouri Prairie region and Missouri Ozark region), where more distinct differences among regions are likely. Additionally, future studies of water beetle assemblages could focus on the beetle-plant relationship more meaningfully by utilizing quantitative sampling methods in a small number of experimental ponds where biotic and abiotic factors such as presence/absence of fish, soil type, season, plant species, and sample size can be controlled. Further, if field studies indicate that beetle-plant associations exist, laboratory studies involving plant preferences could be devised to determine what chemical or physical cues control these associations.

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APPENDIX. Specific localities and dates for all ponds sampled in the Prairie Region of Missouri.

Pond	Area name	County	Date Sampled	Twnshp rng., sect.	UTM X	UTM Y
1	Atlanta/ Long Branch C.A.	Macon	9/5/98	59N, 14W, 32	544150	4413150
2	Big Creek C.A.	Adair	9/5/98	62N, 15W, 19	532230	4446150
3	Rebel's Cove C.A.	Putnam	9/5/98	66N, 16W, 4	525300	4489400
4	Indian Hills C.A.	Scotland	9/5/98	64N, 12W, 20	562300	4465530
5	Fox Valley Lake C.A.	Clark	9/6/98	66N, 8W, 21	603150	4484400
6	Deer Ridge C.A.	Lewis	9/6/98	63N, 9W, 36	597500	4452330
7	Sever Lake C.A.	Knox	9/6/98	60N, 10W, 11	587200	4429840
8	William and White Mem. W.A.	Lincoln	9/7/98	Survey 1686	672485	4337110
9	August Busch Mem. Wildl. Mgt. Area	St. Charles	9/7/98	46N, 2E, 27	692610	4287200
10	August Busch Mem. Wildl. Mgt. Area	St. Charles	9/7/98	46N, 2E, 27	692850	4287250
11	Danville C.A.	Montgomery	9/7/98	47N, 6W, 1	627210	4303500
12	Robert M. White II C.A.	Audrain	9/9/98	53N, 9W, 36	597100	4353150
13	Muscle Fork C.A.	Linn	9/11/98	18W, 57N, 14	509950	4400660
14	Poosey C.A.	Livingston	9/12/98	59N, 25W, 14	442000	4420110
15	Lake Paho C.A.	Mercer	9/12/98	65N, 25W, 24	443470	4474300
16	Emmett and Leah Seat Mem. C.A.	Worth	9/12/98	65N, 30W, 36	396450	4471620
17	Tarkio Prairie	Atchison	9/12/98	66N, 38W, 28	312230	4486100
18	Tarkio Prairie	Atchison	9/12/98	66N, 38W, 28	313200	4485890
19	Monkey Mountain C.A.	Buchanan	9/13/98	59N, 37W, 23	327500	4420800
20	Pony Express C.A.	de Kalb	9/13/98	58N, 31W, 20	380210	4408600
21	Bunch Hollow	Carroll	9/13/98	55N, 24W, 16	449350	4380015
22	Baskett Wildlife Area	Boone	9/14/98	46N, 11W, 18	569600	4290220
23	Baskett Wildlife Area	Boone	9/14/98	46N, 11W, 19	569600	4290070
24	Reform C.A.	Callaway	9/16/98	46N, 8W, 10	604490	4292100
25	Maple Leaf Lake	Lafayette	9/18/98	48N, 26W, 33	431410	4316450
26	Crooked River C.A.	Ray	9/19/98	53N, 28W, 15	410650	4361450
27	Bluffwoods C.A.	Buchanan	9/19/98	56N, 36W, 33	333400	4387320
28	Burr Oak Woods C.A.	Jackson	9/19/98	49N, 31W, 24	388920	4323000
29	Amarugia Highlands C.A.	Cass	9/19/98	43N, 32W, 11	386800	4266400
30	Peabody C.A.	Bates	9/20/98	38N, 32W, 15	374760	4214570
31	Conor O. Fewel Wildlife Area	Henry	9/20/98	43N, 25W, 28	439600	4259650
32	Ralph and Martha Perry Mem. C.A.	Johnson	9/20/98	48N, 24W, 28	450420	4307800
33	Dave Rock Natural Area	St. Clair	9/25/98	39N, 26W, 25	436400	4219230
34	Taberville Prairie C.A.	St. Clair	9/26/98	38N, 28W, 23	414800	4211890

35	Wah-Kan-Tah Prairie	St. Clair	9/26/98	36N, 28W, 10	412200	4196300
36	Little Osage Prairie Natural Area	Vernon	9/26/98	35N, 31W, 34	381800	4180440
37	Shawnee Trail C.A.	Barton	9/26/98	31N, 33W, 20	359735	4143150
38	Mon-Shon Prairie	Barton	9/27/98	30N, 33W, 7	356900	4136360
39	Dorris Creek Prairie	Barton	9/27/98	31N, 30W, 33	390765	4137060
40	Pa Sole Prairie	Barton	9/27/98	31N, 30W, 28	393270	4141600
41	Treaty Line Prairie	Barton	9/27/98	31N, 30W, 3	393300	4147100
42	Davisdale C.A.	Howard	9/30/98	49N, 15W, 28	534025	4317500
43	Baltimore Bend C.A.	Lafayette	10/3/98	51N, 24W, 18	449410	4341280
44	Rudolph Bennet C.A.	Randolf	10/4/98	52N, 14W, 36	549150	4345715
45	Prairie Home C.A.	Cooper	10/5/98	46N, 15W, 5	535450	4291420
46	Wayne Helton Mem. W.A.	Harrison	3/20/99	63N, 26W, 21	429500	4454100
47	Bilby Ranch Lake C.A.	Nodaway	3/20/99	64N, 38W, 22	315300	4467450
48	Bluffwoods C.A.	Buchanan	3/21/99	56N, 36W, 33	333400	4387320
49	Pigeon Hills C.A.	Buchanan	3/21/99	56N, 35W, 13	347500	4329400
50	Belcher Branch Lake C.A.	Buchanan	3/21/99	55N, 34W, 17	350500	4383050
51	Guy B. Park C.A.	Platte	3/21/99	53N, 35W, 11	345150	4365040
52	James A. Reed W.A.	Jackson	3/22/99	47N, 31W, 22	384530	4302900
53	James P. Harter C.A.	Cass	3/22/99	44N, 30W, 20	390050	4272475
54	Douglas Branch C.A.	Vernon	3/22/99	36N, 31W, 5	379030	4198180
55	Shawnee Trail C.A.	Barton	3/23/99	31N, 33W, 20	359150	4143750
56	Mon-Shon Prairie	Barton	3/23/99	30N, 33W, 7	356900	4136360
57	Dorris Creek Prairie	Barton	3/23/99	31N, 30W, 33	390765	4137060
58	Pa Sole Prairie	Barton	3/23/99	31N, 30W, 28	393270	4141600
59	Treaty Line Prairie	Barton	3/23/99	31N, 30W, 3	393300	4147100
60	Chapel View Prairie	Henry	4/3/99	40N, 26W, 31	259000	4230050
61	Monegaw Prairie	Cedar	4/3/99	36N, 28W, 36	415500	4189760
62	Stoney Point Prairie	Dade	4/3/99	32N, 28W, 8	409570	4154200
63	E.B. and M.O. Risch C.A.	Barton	4/4/99	33N, 30W, 4	393450	4166600
64	Hazel Hill Lake C.A.	Johnson	4/4/99	47N, 26W, 21	432390	4300500
65	Marshall Junction C.A.	Saline	4/4/99	48N, 21W, 18	477360	4309485
66	Baltimore Bend C.A.	Lafayette	4/9/99	51N, 24W, 13	449410	4341050
67	Little Compton Lake C.A.	Carroll	4/10/99	55N, 21W, 29	476040	4377300
68	Bonanza C.A.	Caldwell	4/10/99	56N, 27W, 32	418010	4385720
69	Gallatin C.A.	Daviess	4/11/99	58N, 27W, 15	421470	4410340
70	Locust Creek C.A.	Sullivan	4/11/99	62N, 20W, 7	484230	4448095
71	Union Ridge C.A.	Adair	4/11/99	64N, 18W, 34	508800	4461500
72	Sugar Creek C.A.	Adair	4/11/99	61N, 16W, 1	530750	4441350
73	Redman C.A.	Macon	4/11/99	58N, 13W, 4	555800	4411500
74	Little Dixie Lake C.A.	Macon	4/17/99	48N, 11W, 23	576500	4309100
75	Reform C.A.	Callaway	4/17/99	46N, 8W, 11	606100	4292750
76	Baskett Wildlife Area	Boone	4/18/99	46N, 11W, 18	569585	4290300
77	South Farms Pond	Boone	4/18/99	48N, 12W, 28	562100	4306350
78	Robert M. White II C.A.	Audrain	4/24/99	52N, 9W, 1	597050	4353000
79	Robert M. White II C.A.	Audrain	4/24/99	53N, 9W, 35	596620	4353320
80	Marshall Diggs C.A.	Audrain	4/24/99	50N, 7W, 36	617500	4324910
81	Vonanventure C.A.	Lincoln	4/25/99	51N, 1W, 31	667380	4333790
82	Deer Ridge C.A.	Lewis	4/25/99	62N, 9W, 2	597500	4451520
83	Sever Lake C.A.	Knox	4/25/99	60N, 10W, 3	585300	4431230
84	Mo-Ko Prairie	Cedar	6/7/99	36N, 28W, 23	412800	4192900
85	Osage Prairie	Vernon	6/7/99	34N, 31W, 4	383050	4179000
86	Shawnee Trail C.A.	Barton	6/8/99	31N, 33W, 20	359735	4143150
87	Mon-Shon Prairie	Barton	6/8/99	30N, 33W, 7	356900	4136360
88	Treaty Line Prairie	Barton	6/8/99	31N, 30W, 3	393300	4147100
89	Pa Sole Prairie	Barton	6/8/99	31N, 30W, 28	393270	4141600
90	Dorris Creek Prairie	Barton	6/9/99	31N, 30W, 33	390765	4137060
91	Clear Creek C.A.	Barton	6/9/99	33N, 30W, 4	390900	4166300
92	Harmony Mission Lake C.A.	Bates	6/9/99	38N, 32W, 15	374275	4214950
93	J. N. Turkey Kern C.A.	Pettis	6/13/99	45N, 23W, 19	456900	4279625
94	Settles Ford C.A.	Cass	6/14/99	42N, 29W, 33	400580	4256650
95	Dorsett Hill	Cass	6/14/99	43N, 32W, 24	376450	4235180
96	Belcher Branch Lake C.A.	Buchanan	6/14/99	55N, 34W, 17	350525	4383020
97	Riverbreaks C.A.	Holt	6/15/99	59N, 37W, 19	321210	4420700
98	Riverbreaks C.A.	Holt	6/15/99	59N, 37W, 19	321125	4420540
99	Poosey C.A.	Livingston	6/16/99	59N, 25W, 14	442440	4419780
100	W. L. Schifferdecker Mem. C.A.	Carroll	6/16/99	53N, 25W, 14	442000	4358020
101	W. L. Schifferdecker Mem. C.A.	Carroll	6/16/99	53N, 25W, 14	441785	4358020

102	Whetstone Creek C.A.	Callaway	6/18/99	48N, 7W, 17	610290	4310720
103	Little Dixie Lake C.A.	Callaway	6/18/99	48N, 11W, 26	576230	4307075
104	Reform C.A.	Callaway	6/19/99	46N, 8W, 11	604225	4292125
105	Hungry Mother C.A.	Howard	6/21/99	50N, 15W, 1	538650	4343120
106	Blind Pony C.A.	Saline	6/21/99	49N, 22W, 18	468985	4320985
107	Bonanza C.A.	Caldwell	6/22/99	56N, 27W, 31	416630	4385675
108	Christie & Neely Davis Mem. C.A.	Andrew	6/22/99	61N, 35W, 25	346610	4426480
109	Bilby Ranch Lake C.A.	Nodaway	6/23/99	64N, 38W, 13	319630	4469820
110	Pawnee Prairie	Harrison	6/23/99	66N, 29W, 14	402360	4485590
111	Wayne Helton Mem. W.A.	Harrison	6/23/99	63N, 26W, 29	432000	445400
112	Robert M. White II C.A.	Audrain	7/1/99	53N, 8W, 31	599390	4354230
113	Brandy's House	Monroe	7/1/99	53N, 12W, 25	569220	4355200
114	Redman C.A.	Macon	7/1/99	58N, 31W, 4	555800	4411500
115	Indian Hills C.A.	Scotland	7/2/99	64N, 12W, 20	562295	4465550
116	Deer Ridge C.A.	Lewis	7/2/99	63N, 9W, 36	597300	4452175
117	William R. Logan W.A.	Lincoln	7/2/99	51N, 2W, 36	665945	4334540
