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Dytiscidae and Noteridae of Wisconsin (Coleoptera). V. Distribution, Habitat, Life Cycle, and Identification of Species of Hydroporinae, Except *Hydroporus* Clairville Sensu Lato

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DYTISCIDAE AND NOTERIDAE OF WISCONSIN (COLEOPTERA). V. DISTRIBUTION, HABITAT, LIFE CYCLE, AND IDENTIFICATION OF SPECIES OF HYDROPORINAE, EXCEPT *HYDROPORUS* CLAIRVILLE SENSU LATO[1]

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ABSTRACT

Thirty species in 11 genera of Hydroporinae were collected in Wisconsin over the past 32 years, excluding those in *Hydorporus* s.l. Fourteen species of *Hygrotus* were found; other genera were represented by one to four species. Species keys and notes on identification are provided for adults of all species that occur or may occur in Wisconsin. Information on distribution and abundance in Wisconsin, habitat, and life cycle is provided for each species based on a study of 34,628 adults. Life cycles were predominantly univoltine, with adults overwintering and larvae completing development from late spring to late summer, depending on the species. Most adults apparently overwinter in aquatic habitats, except those of *Laccornis* and *Hygrotus compar*, which probably overwinter in terrestrial habitats.

Adults of 66 species in 16 genera of Hydroporinae were collected in Wisconsin. Eleven genera and 30 species are treated here as the result of a study of 34,628 adults from Wisconsin (Table 1); larvae are too poorly known to be useful in this study. The remaining five genera, *Heterosternuta*, *Hydroporus*, *Hydroporus oblitus*-group, *Neoporus*, and *Sanfilippodytes*, which are often treated as subgenera of *Hydroporus*, will be discussed in part VI. Information on *Bidessonotus* and two species of *Hygrotus* that possibly could occur in Wisconsin, is also included. Listed separately in Table 1 are records of beetles from McKenna Pond (Hilsenhoff 1992) and ponds at the Leopold Memorial Reserve in Sauk County (Hilsenhoff 1993). A generic key to adults and information on collecting efforts, measurement of specimens, and general life cycles of Dytiscidae are found in part I of this study (Hilsenhoff 1992). Part I also has a map of Wisconsin with numbered counties grouped into nine areas; county records listed below for each species are represented by numbers on this map.

A key to adults of species that occur or may occur in Wisconsin is included below under genera with more than one species in Wisconsin; the size-range of adults from Wisconsin is included in the key if at least four specimens were available. Species are listed under each genus along with information on their distribution and abundance in Wisconsin, general range in North America, habitat, life cycle, and identification. Overwintering adults of most species became active later in the spring than most adults in the other subfamilies,

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Table 1. Numbers of Hydroporinae adults collected from 1962–1993 in nine areas of Wisconsin (Hilsenhoff 1992), McKenna Pond (McK) and Leopold Memorial Reserve (LMR).

	NW	NC	NE	WC	C	EC	SW	SC	SE	McK	LMR	Total
Celina hubbelli	0	0	2	1	0	2	11	28	4	4	2	54
Desmopachria convexa	162	236	89	190	152	83	129	152	330	819	75	2417
Hydrovatus pustulatus	5	5	2	28	9	16	89	319	43	371	47	934
Hygrotus acaroides	2	0	2	6	1	72	34	42	3	2	12	176
H. compar	2	7	474	0	0	0	0	0	0	0	0	483
H. dissimilis	10	0	1	32	5	1	197	65	15	164	29	519
H. falli	2	0	0	0	0	0	0	0	0	0	0	2
H. farctus	6	0	0	0	4	0	0	3	0	0	0	13
H. impressopunctatus	161	12	57	63	225	430	102	386	146	551	22	2155
H. laccophilinus	112	57	33	37	50	93	104	202	64	23	72	847
H. marklini	0	0	0	3	0	0	0	0	0	3	0	6
H. nubilus	2	4	23	13	10	21	13	138	15	18	10	267
H. patruelis	10	1	7	87	4	59	5	3	2	6	9	193
H. picatus	143	70	132	64	128	126	117	93	68	46	18	1005
H. sayi	1385	1581	1099	879	872	1147	1571	2686	1041	3936	1944	18141
H. sylvanus	2	0	0	0	2	0	0	0	0	0	0	4
H. turbidus	1	11	34	0	6	36	0	2	18	2	0	110
Laccornis conoideus	94	38	44	54	27	153	25	112	36	20	1	604
L. deltoides	0	0	0	0	0	0	0	0	13	0	0	13
L. latens	7	19	4	3	9	34	2	34	7	0	0	119
Liodessus affinis	791	714	583	318	487	322	293	344	415	1017	218	5502
L. cantralli	0	0	1	0	0	0	1	1	0	0	0	3
L. flavicollis	2	5	13	6	5	0	1	34	9	0	21	96
L. fuscatus	94	51	15	1	16	0	0	1	0	0	0	178
Lioporeus triangularis	0	0	0	1	0	0	0	3	0	0	0	4
Nebrioporus rotundatus	9	29	0	0	12	0	0	0	0	0	0	50
Oreodytes scitulus	3	0	0	0	0	0	0	0	0	0	0	3
Stictotarsus griseostriatus	8	17	5	42	14	3	2	12	4	24	22	153
Uvarus granarius	66	5	0	53	38	3	55	61	21	4	5	311
U. lacustris	2	0	22	10	35	2	34	40	39	22	60	266

which delayed oviposition and larval development. Adults of most species apparently overwinter in aquatic habitats; however, adults of *Laccornis* and *Hygrotus compar* probably overwinter in or adjacent to shallow terrestrial sites that may become flooded in the spring.

Bidessonotus Régimbart, 1895

Larson and Roughley (1991) reported *B. inconspicuus* (LeConte, 1955) from Ontario, Quebec, and Nova Scotia, and *B. pulicarius* (Aubé, 1838) from Ontario, but no member of this southern genus was collected in Wisconsin. Although *B. inconspicuus* was included in the generic key (Hilsenhoff 1992), I believe it is unlikely any species of *Bidessonotus* occurs in Wisconsin because winter temperatures are probably too cold. Young (1954) provided a key to adults of the three most northern species.

Celina Aubé 1836

Young (1979) published a key to species in North America and described four new species, including the only one occurring in the north-central United States. Other species have a southern or coastal distribution.

***Celina hubbelli* Young, 1979**

Distribution and Abundance: Uncommon in southern third, very rare farther north (Table 1). County records: 25, 48, 54–55, 57–61, 63–65, 68. Range: ON-PQ-MD-AL-KS.

Habitat: Most beetles were collected from shallow lentic habitats with cattails (*Typha*); Young (1979) commented on their association with cattails. In late September, two students in my class collected several *C. hubbelli* adults from an aggregation of "about a hundred" they found on roots of a cattail. I believe the spinose ends of the abdomen and elytra may be used to pierce cattails and obtain oxygen for respiration in a manner similar to that used by *Coquillettidia* and *Mansonia* mosquito larvae. Spangler (1973) suggested the recurved extensions of the lateral tracheal trunks of larvae were also used for that purpose. This would permit both adults and larvae to remain on cattails without having to surface for air.

Life Cycle: Adults occurred 13 May to 29 September, most of them in June; teneral adults were found 24 and 29 September. Adults probably overwinter on roots of cattails and do not become active until mid-May, when the soil in which cattails grow finally warms. This leads to delayed mating and oviposition, with larvae not completing development until late summer. It is unlikely the teneral adults resulted from a second generation.

Identification: The spinose apicies of the abdomen and elytra in *Celina* are distinctive; the size and brown color, with the basal fourth of the elytra and pronotum paler, separate *C. hubbelli* from *C. angustata*, the most similar species. A larva of *Celina* from Maryland that was described by Spangler (1973) as *C. angustata* may have been *C. hubbelli*, which also occurs in Maryland and was not described until 1979.

***Desmopachria* Babington, 1841**

One species of this neotropical genus occurs in the northern United States and Canada. Young (1981) studied the *convexa-grana* group and provided a key to species of adults.

***Desmopachria convexa* (Aubé, 1838)**

Distribution and Abundance: Very common statewide (Table 1). County records: 1–27, 29–33, 35–61, 63–72. Range: NT-PE-GA-TX-WY.

Habitat: Most adults were collected from ponds, especially smaller ponds in open areas; they also were found in marshes, bogs, swamps, and ditches.

Life Cycle: Adults occurred 22 February to 14 November, with substantial numbers being collected in October. Teneral adults (88) were found 16 June to 30 September, all except three from 28 June to 3 September; most later collections were from northern counties. In the laboratory, Barman (1973) reared eggs to adults in about 25 days. Adults apparently overwinter in ponds, then mate and oviposit in late May or June; most larvae complete development in July and August. The life cycle is probably univoltine, but a partial second generation may occur in some years.

Identification: The very small size, almost round shape, and rather uniformly brown color make adults easy to recognize. In Wisconsin they most resemble adults of *Hygrotus farctus*, which are about the same size and nearly the same shape and color; however, adults of that species have much longer antennae and longer legs with basally narrowed and slightly arcuate tibiae. Barman (1973) described the larva.

Hydrovatus Motschulsky, 1853

Young (1956) provided a key to species in the eastern United States; only one species is likely to occur in Wisconsin. In 1963, Young changed the name of the species in Wisconsin from *H. cuspidatus pustulatus* to *H. pustulatus pustulatus.*

Hydrovatus pustulatus pustulatus Melscheimer, 1846

Distribution and Abundance: Common in southern third to uncommon in northern third (Table 1). County records: 4, 6, 12, 14, 16, 20, 23, 25, 28–29, 32, 35–40, 42–45, 47–66, 68–72. Range: ON-PQ-GA-LA-AR. *Hydrovatus pustulatus compressus* Sharp occurs coastally from NC-LA.

Habitat: Most adults were collected from open ponds; several also were collected from marshes, especially larger ones.

Life Cycle: Adults occurred 31 March to 1 November. Almost 97% were collected from May through September (65% in July and August). Teneral adults occurred 25 June to 19 October, 92% of them 18 July to 14 September. I believe adults overwinter in ponds because 14 were collected in October and November. Apparently oviposition is delayed until late spring and early summer, with peak oviposition occurring at different times in different years. The life cycle is probably univoltine because occurrence of the 74 teneral adults follows a normal curve that peaks in early August.

Identification: Adults are readily recognized by their small size, rounded shape, and slightly pointed elytral apex. Their fan-shaped prosternal process is unique among Wisconsin dytiscids. Four pale maculae, which become obscure in older beetles, are evident on elytra of many specimens. Spangler (1962) described the larva.

Hygrotus Stephens, 1828

A revision of *Hygrotus* in North America by Anderson (1971, 1976, 1883) included 42 species; 14 were found in Wisconsin. Two additional species that may occur here are included in the key. Adults of several species are frequently encountered; *H. sayi* is the most abundant dytiscid in Wisconsin. Females of some species have dense reticulate microsculpture on their elytra, which gives them a dull appearance. In most of these species females are dimorphic, with a few or many individuals having shiny elytra like the males. The percentage of females with dense, reticulate microsculpture in Wisconsin is given for each species based on inspection of 100 individuals from several collection, or all females when less than 100 were collected. Anderson (1971, 1976, 1983) illustrated the penis and parameres of all species, but did not illustrate female gonocoxae. Gonocoxae are very helpful in identifying some females, and are illustrated for eight species (Figs. 1–8). Identification of teneral specimens that lack pigmentation may be difficult.

Key to Species of Adult *Hygrotus* in Wisconsin

1. Ventral surface from mesothorax to tip of abdomen mostly testaceous to rufous, similar to color of elytra or lighter, sometimes with infuscate areas; small ≤ 3.30 mm long; shape oval to round with length/width (L/W) ratio < 1.75, except 1.79–1.89 in *H. sylvanus*. 2

   Ventral surface from mesothorax to tip of abdomen black and much darker than elytra, except in teneral specimens; mostly larger species, ≥ 3.35 mm long, except *H. turbidus*, most *H. sellatus*, and

most *H. suturalis*; shape elongate, usually about twice a long as wide (L/W > 1.75) 6

2(1). Length 2.15–2.75 mm; each elytron testaceous with four distinct black or fuscous maculae, which may coalesce ..... *acaroides*

Longer than 2.75 mm or elytra without distinct maculae 3

3(2). Very small, 2.00–2.40 mm long; prosternum with a distinct spine-like tubercle ..... *farctus*

Larger, 2.45 mm or longer; prosternum without a spine-like tubercle 4

4(3). Deeply convex; frontoclypeus margined anteriorly; 2.75–3.30 mm long ..... *sayi*

Not deeply convex; frontoclypeus not margined anteriorly 5

5(4). Metacoxal plate almost always infuscate; elytra shining in male, dull and reticulate in female; larger, 2.65–3.25 mm long. *laccophilinus*

Metacoxal plate not infuscate; elytra reticulate and shining in both sexes; smaller, 2.45–2.55 mm long ..... *sylvanus*

6(1). Very large, > 4.4 mm long; elytra with pronounced dual punctation and confluent large punctures that often form basal striae, except in 24–31% of females that have dull elytra with dense elytral microsculpture 7

Mostly smaller, < 4.4 mm long; if > 4.4 mm long, elytra lack distinct dual punctation and all females have shiny elytra 8

7(6). Basal piceous mark on pronotum extending laterally almost to margin; elytra uniformly dark rufous; elytral punctures on males and shiny females very large, almost confluent, and obscuring impressed discal striae; gonocoxae with elongate stylus (Fig. 1); 4.70–5.50 mm long ..... *picatus*

Basal piceous mark on pronotum only as wide as head; elytra with pale vittae, which may be indistinct; elytral punctures on males and shiny females smaller, impressed discal striae evident; gonocoxae with short, triangular stylus (Fig. 2); 4.40–5.30 mm long ..... *impressopunctatus*

8(6). Distinct dual punctation on elytra, with larger punctures more than twice as large as smaller punctures; elytral markings indistinct 9

Elytral punctures of nearly uniform size, rarely with a few larger punctures basally; elytra often with distinct markings 11

9(8). Small, 2.65–3.20 mm long ..... *turbidus*

Larger, > 3.35 mm long 10

10(9). Apex of last abdominal sternum with a glabrous longitudinal depression; 3.65–4.25 mm long ..... *dissimilis*

Apex of last abdominal sternum evenly punctate and without a longitudinal depression; 3.35–4.25 mm long ..... *compar*

11(8). With two or more dark vittae on elytra; larger, > 3.9 mm long ... 12

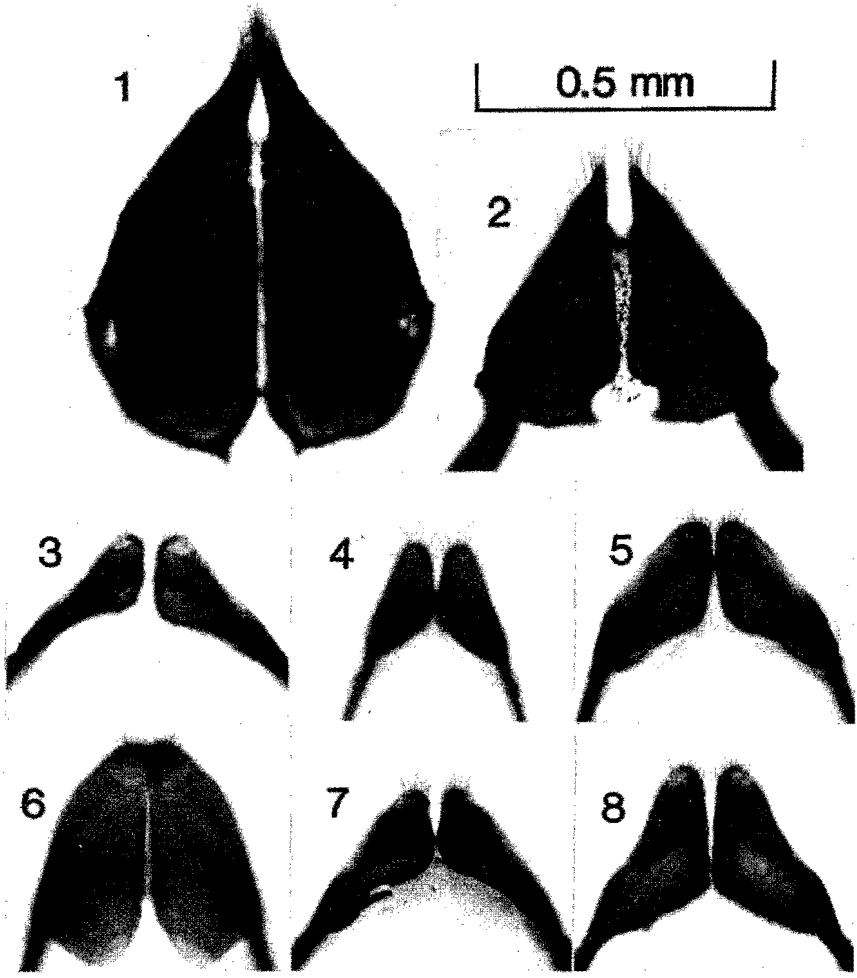
Elytra without dark vittae; smaller, < 4.3 mm long 13

12(11). Sutural dark vitta and 4 piceous vittae on each elytron, the lateral one interrupted; 4.2–4.6 mm long (Anderson 1983) ..... *falli*

Each elytron with 2 subsutural vittae that coalesce with posterior blotches and with other blotches subhumerally and laterally; 3.95–4.80 mm long ..... *nubilus*

13(11). Second protarsal segment of male widest, subequal to apical width of tibia; elytra of 74% of females with dense elytral microsculpture; gonocoxae short, widened laterally, and dorsally concave (Fig. 3); 3.45–4.25 mm long ..... *patruelis*

Second protarsal segment of male not widened, much narrower than apical width of tibia; elytra of females without microsculpture; if > 3.45 mm long, gonocoxae are elongate (Fig. 4) 14



Figures 1-8. Gonocoxae of species of *Hygrotus*: 1. *H. picatus*. 2. *H. impressopunctatus*. 3. *H. patruelis*. 4. *H. marklini*. 5. *H. compar*. 6. *H. dissimilis*. 7. *H. falli*. 8. *H. nubilus*.

14(13). Elytra with dark blotches covering most or all of elytra; larger, 3.50–4.05 mm long ..... *marklini*
Elytra testaceous with a fuscous longitudinal subhumeral spot and a larger apical blotch; smaller, usually less than 3.5 mm long 15

15(14). Scattered larger punctures basally on elytra; protarsal claws of male similar in shape and size; abdominal sterna of female devoid of microsculpture; 3.0–3.6 mm long (Anderson 1983) ..... *suturalis*
All basal punctures on elytra similar in size; anterior protarsal claw of male broader and strongly arcuate basally; middle of abdominal

sterna of female with laterally stretched microsculpture; 2.9–3.5 mm long (Anderson 1983) ..... *sellatus*

***Hygrotus acaroides* (Leconte, 1855)**

Distribution and Abundance: Fairly common in southern third to rare in northern third (Table 1). County records: 5–6, 20, 29, 34, 42, 47, 52–54, 57, 60–62, 65, 72. Range: MB-OH-AL-TX-SD

Habitat: All adults were collected from permanent ponds in open areas.

Life Cycle: Adults occurred 13 April to 27 October, with 70 being collected on the latter date; 76% were collected in September and October. Adults undoubtedly overwinter in permanent ponds. Four teneral adults were found 7 June to 30 July, suggesting a univoltine life cycle, with larvae developing in late spring and early summer. Four additional teneral adults on 20 September indicate at least a partial second generation in some years.

Identification: Adults are easily recognized by their very small size, round convex shape, and elytral pattern consisting of a black sutural stripe and eight black maculae, which may coalesce.

***Hygrotus compar* (Fall, 1919)**

Distribution and Abundance: Uncommon in northern third (Table 1). County records: 4–5, 9, 13, 17, 19–20. Range: AK-LB-NJ-CO-AB.

Habitat: Almost all adults (98.8%) were found in ponds, especially vernal ponds; 94% were in 11 collections from a large vernal marsh and pond in Forest County that is vegetated mostly with *Carex stricta*. Five adults were collected from vegetated margins of streams. Three teneral adults were collected from permanent ponds; others were from a slough and the margin of a stream.

Life Cycle: Teneral adults occurred 9 July to 9 September; none of the 88 adults collected from the vernal pond in Forest County on 13 July or those found there on earlier dates were teneral. Only five adults occurred after 13 July, and four of them were teneral. I suspect adults overwinter in terrestrial sites, which are likely dry marshy areas of vernal ponds. They invade these vernal ponds when they becomed flooded in the spring and leave them as they begin to dry, flying to more permanent ponds where they breed. Larvae apparently develop from June to August, and adults fly to overwintering sites shortly after emergence.

Identification: The pronotum has a distinctive tricolored pattern, being dark rufous across the posterior half, narrowly rufous along the anterior margin, and narrowly testaceous in between. Males have modified protarsi, with the second segment widest and about as wide as the apex of the tibia; the anterior claw is greatly widened and bent at a right angle near its base. The shape of the gonocoxae (Fig. 5) is also distinctive. Elytra of 91% of the females had a dense, dull, alutaceous microsculpture.

***Hygrotus dissimilis* Gemminger and Harold, 1868 = *H. dispar* (LeConte, 1850)**

Distribution and Abundance: Common west and south, rare in northeastern two-thirds (Table 1). County records: 3, 6, 8, 21, 25–27, 29, 32, 36–37, 41, 49–64, 67–72. Range: BC-PQ-MA-NJ-KS-WY-OR

Habitat: Adults were found in a variety of shallow ponds and marshes, many of which were temporary.

Life Cycle: Adults occurred 13 March to 5 November, with 25% being found in March and April and 7% after 15 September. This suggests they overwinter in aquatic habitats. Most adults were collected in June (47%).

Sixteen of 23 teneral adults were found 4 June to 1 August; the remainder occurred 21 September to 5 November. Apparently most larvae develop in the spring and emerge in early summer, and in some years there is a significant second generation that emerges in autumn.

Identification: The glabrous sulcus near the apex of the last abdominal sternum is distinctive. The testaceous pronotum, which contrasts sharply with the dark rufous elytra, has a small, dark, discal spot. The protarsi of males are not modified and females lack alutaceous elytral microsculpture. The penis is elongate and differs from similar species by being distinctly recurved apically. The elongate gonocoxae (Fig. 6) are distinctive.

Hygrotus falli **(Wallis, 1924)**

Distribution and Abundance: Very rare in extreme north (Table 1). County record: 1. Range: ON-PQ-MI-WI

Habitat: Two females were collected 20 July 1976 from the shallow sand and gravel shoreline of Deer Print Lake in Douglas County.

Identification: Elytra are densely punctate with moderately large punctures. It is the only species likely to occur in Wisconsin with a black sutural vitta and four discal vittae on each elytron. The second protarsal segment of males is distinctly wider than segments one and three, and the anterior protarsal claw is widened and semicircularly curved. The gonocoxae are very short (Fig. 7). The two females were 4.03 and 4.13 mm long, slightly shorter than measurements reported by Anderson (1983).

Hygrotus farctus **(LeConte, 1855)**

Distribution and Abundance: Rare statewide (Table 1). County records: 1, 3, 33, 36, 38, 61. Range: AB-NB-NJ-IN-WI

Habitat: Adults were collected from permanent ponds and a marsh.

Life Cycle: Eight adults were found 5–11 May and five more 9–22 July. None were teneral, but those collected 20 and 22 July were almost entirely testaceous, indicating they had emerged recently. Adults obviously overwinter, but the overwintering site is unknown. Larvae probably complete development in late spring or early summer.

Identification: The elytra are dark rufous-brown. The head and pronotum are testaceous, with the latter having rufotestaceous bands along the anterior and posterior margins. Adults resemble *Desmopachria convexa* and *Uvarus granarius* because of their small size and shape, but are slightly larger than those species. The spine-like tubercle on the prosternum is diagnostic.

Hygrotus impressopunctatus **(Schaller, 1783)**

Distribution and Abundance: Very common statewide (Table 1). County records: 1–4, 6–7, 9, 12–18, 20–30, 32–72. Range: AK-NF-MD-KS-NM-WA.

Habitat: All teneral adults and most other adults were found in shallow, vegetated ponds and marshes; adults were also collected from a variety of other lentic habitats and occasionally from margins of streams.

Life Cycle: Adults occurred 22 February to 21 November, with 43% occurring before June and 35% during June. Many adults were found after mid-September and before mid-March, indicating they overwinter in permanent ponds. Most of the 127 teneral adults occurred 1 June to 10 August, 83% of them in June. Eggs probably are laid in early spring and most larvae complete development in late May and June, with delayed development of some individuals. The occurrence of nine teneral adults in late September and early October indicates a partial second generation in some years.

Identification: In occasional specimens the basal mark on the pronotum is indistinct and/or pale elytral vittae are absent, making separation from *H. picatus* more difficult. *Hygrotus picatus* is usually larger, always more rufous, and has larger elytral punctures than *H. impressopunctatus*, except in females with dense elytral microsculpture. Females can always be identified by their distinctive gonocoxae (Fig. 2). The mesal portion of the third visible abdominal sternum of male *H. impressopunctatus* lacks alutaceous microsculpture, which in *H. picatus* is present in at least the apical fourth. Only 24% of the females had dense elytral microsculpture.

***Hygrotus laccophilinus* (LeConte, 1878)**

Distribution and Abundance: Common statewide (Table 1). County records: 1–18, 20–21, 23–27, 29–33, 35–61, 63–72. Range: NT-NS-NJ-IL

Habitat: While adults were collected from a variety of aquatic habitats, most were found in marshes and shallow ponds, including all teneral specimens.

Life Cycle: Adults occurred 31 March to 17 November, 59% of them before July and 26% in July; the remaining 15% were collected with decreasing frequency after July. Teneral adults (27) occurred 3 July to 14 September, all except one of them before 23 August. I suspect adults overwinter in deeper ponds, and throughout the spring fly to shallow ponds and marshes where they breed. I believe the life cycle is univoltine, with larvae developing in late spring and summer.

Identification: Adults are the same size and general shape as those of the abundant *H. sayi*, but are much less convex and have an almost unicolorous pronotum and elytra. All females have dense reticulate microsculpture dorsally, giving them a dull appearance. Adults of the rare *H. sylvanus* are similar, but are smaller, more elongate, lack dense, dull, microsculpture on elytra of females, lack lateral infuscations on the metacoxal plates, and instead are usually infuscate mesally on the venter.

***Hygrotus marklini* (Gyllenhal, 1813) = *H. canadensis* (Fall, 1919)**

Distribution and Abundance: Very rare statewide (Table 1). County records: 27, 29, 61. Range: AK-PQ-MI-CO-MT+UT+NM+NF

Habitat: The six Wisconsin adults were all collected from permanent cattail ponds.

Life Cycle: Adults were collected 6–28 April. 16 June, and 8 July. None were teneral.

Identification: The only other *Hygrotus* adults of similar size that lack dual elytral punctation and distinctive elytral markings are those of *H. patruelis*, but *H. patruelis* males have dilated protarsal segments and most females have dense, reticulate, elytral microsculpture. Gonocoxae of the two species differ (Figs. 3 and 4), and the area next to the apical bead on the last abdominal sternum is glabrous in *H. marklini*, while in *H. patruelis* many large punctures extend to the apical bead.

***Hygrotus nubilus* (LeConte, 1855)**

Distribution and Abundance: Common statewide, except uncommon in northwest quarter (Table 1). County records: 6–7, 15–18, 24–25, 27, 29, 31–32, 35, 37, 39–40, 42–43, 45–47, 50–64, 66, 70–72. Range: ON-NS-AZ-MT.

Habitat: The 13 teneral adults and most other adults were collected from permanent ponds.

Life Cycle: Adults occurred 27 March to 8 December, with 15% being

collected after September and 14% before June. Ten teneral adults were found 2 June to 4 August, six of them in June; three more occurred 21 September to 19 October. Adults probably overwinter in ponds and mate and oviposit in early spring; larvae complete development in late spring and early summer. Teneral adults in early autumn probably resulted from a partial second generation.

Identification: Adults are distinctive because of their relatively large size, elongate shape, uniform medium-sized punctures on the elytra, and elytral stripes and blotches as described in the key. Anterior protarsal claws of males are distinctly widened and bent at a right angle. Females have weak elytral microsculpture, but are still shiny; their gonocoxae are distinctive (Fig. 8).

***Hygrotus patruelis* (LeConte, 1855)**

Distribution and Abundance: Fairly common statewide (Table 1). County records: 4, 6–7, 12, 21–22, 24–27, 29, 35, 40, 42–50, 53–54, 57, 59, 61, 66, 68. Range: AK-NF-WI-NM-CA.

Habitat: Adults were collected from a variety of ponds

Life Cycle: Adults occurred 1 April to 21 October. Because 35% were collected in April and 19% after 15 September, I believe adults overwinter in ponds. Teneral adults (9) were collected 7 June to 30 July, which indicates a univoltine life cycle with larval development in spring and early summer.

Identification: Elytra are piceous, except laterally in the basal half, where they are testaceous. There is a basal dark band on the testaceous pronotum that is usually widened at the middle by a dark spot. While 74% of females had dense microsculpture on the elytra, some were shiny like males. Separation from *H. marklini* is discussed under that species.

***Hygrotus picatus* (Kirby, 1837)**

Distribution and Abundance: Common statewide (Table 1). County records: 1–27, 29–68, 70–72. Range: AK-NF-NY-SD.

Habitat: Adults were collected from a wide variety of lentic habitats, but mostly from shallow ponds, marshes, and swamps.

Life Cycle: Adults occurred 20 February to 21 November, with almost 94% being collected from April through August. Thirty teneral adults were found 13 June to 10 September, 22 of them occurring between 25 June and 22 July. A univoltine life cycle is likely, with adults probably overwintering in ponds. Most larvae develop in late spring and early summer; a few apparently develop somewhat later.

Identification: Only adults of *H. impressopunctatus* are likely to be confused with those of *H. picatus*. Separation is discussed under that species. Only 31% of the females had dense elytral microscultpure.

***Hygrotus sayi* J. Balfour-Browne, 1944**

Distribution and Abundance: Abundant statewide (Table 1). County records: 1–72. Range: YK-NF-GA-NM-CA.

Habitat: Adults, including teneral specimens, were collected from a wide variety of habitats, but most were found in small ponds.

Life Cycle: Adults occurred 29 February to 4 December in lentic habitats; they apparently overwinter in deeper ponds. Less than 2% were collected after September and before April; 75% occurred from June through September. Teneral adults were found 27 May to 21 October, 80% of them 16 June to 15 August. This suggests a univoltine life cycle with most larvae developing in

spring and early summer; in some years a second generation apparently develops in late summer and early autumn.

Identification: The small size, rounded shape, and deep dorsal-ventral convexity make this species easy to recognize. In older specimens elytra are dark rufous to fuscous, and contrast with the paler pronotum and head. In many younger beetles, however, the elytra are not much darker than the pronotum and are marked with indistinct fuscous maculae. The underside is entirely testaceous, differing from adults of the similarly shaped but less convex *H. laccophilinus*, which normally have infuscate metacoxal plates.

***Hygrotus sellatus* (LeConte, 1866)**

Distribution and Abundance: Not yet found in Wisconsin. Range: NT-ON-MI-MN-KS-CO.

Habitat: Larson (1975) collected adults from fresh to partially saline prairie ponds.

Life Cycle: Larson (1975) collected teneral adults in Alberta on 11 July.

Identification: In addition to characters in the key, the apical elytral macula is smaller and usually more sharply defined than in *H. suturalis*, and it is never joined to the subhumeral mark as it may be in that species (Anderson 1983).

***Hygrotus suturalis* (LeConte, 1850)**

Distribution and Abundance: Not yet found in Wisconsin. Range: AK-NF-MI-CO.

Habitat: Larson (1975) reported finding adults in fresh water ponds, especially those in parkland and mixed forest areas of Alberta.

Identification: Separation from *H. sellatus* is discussed above. Elytral markings are often obscure, but adults can be readily separated from those of the larger *H. patruelis* and *H. marklini* by characters in the key.

***Hygrotus sylvanus* (Fall, 1917)**

Distribution and Abundance: Very rare (Table 1). County records: 3, 39. Range: ON-PQ-MA-MN.

Habitat: All four adults (2 collections) were found in sedge marshes.

Life Cycle: Adults occurred 24 April and 12 June. None were teneral.

Identification: Adults are distinctly more elongate than *H. farctus* and *H. acaroides*, the only other very small *Hygrotus*. Small, teneral adults of *H. turbidus* could be confused with those of this species, but they lack the fine elytral microsculpture that occurs in adults of *H. sylvanus*. Adults resemble those of the somewhat larger *H laccophilinus*; their separation is discussed under that species.

***Hygrotus turbidus* (LeConte, 1855)**

Distribution and Abundance: Fairly common in eastern third to rare in western third (Table 1). County records: 1, 10, 13, 17, 21-24, 38-43, 45-48, 57, 61, 66-67, 69-72. Range: AK-PE-NY-CO-OR.

Habitat: Most adults and all teneral adults were collected from shallow ponds.

Life Cycle: All adults occurred 1 April to 3 September, except two that were found 6 November in a pond in Jefferson County. Eight teneral adults were collected 12 July to 4 August. The life cycle is probably univoltine, with

adults overwintering in permanent ponds and larvae developing in spring and early summer.

Identification: The small size separates adults from those of all other species that are black ventrally, except *H. sellatus* and *H. suturalis*, which lack distinct dual punctation on the elytra. The dual elytral punctation, and elongate shape (L/W about 2.0) will separate teneral adults from those of other small species of *Hygrotus*.

Laccornis Gozis, 1914

The genus was revised by Wolfe and Roughley (1990), who found 10 species worldwide and 8 species in the United States. Three species were collected in Wisconsin. Four other species occur to the south and east, with *L. etnieri* Wolfe and Spangler, 1985, occurring as far northwest as central Indiana; no other species is likely to occur as far north as Wisconsin.

Key to Species of Adult *Laccornis* in Wisconsin

1. Elytra with distinct dual punctation, larger punctures at least twice diameter of smaller punctures; smaller, < 6.1 mm long 2
   Elytra with only inconspicuous small punctures and some larger strial punctures; larger, 6.30–6.95 mm long ..... *deltoides*
2(1). Elytra with about equal numbers of small and large punctures; smaller, 4.30–5.25 mm long ..... *conoideus*
   Elytra with large punctures at least twice as numerous as small punctures; larger, 5.15–6.05 mm long ..... *latens*

***Laccornis conoideus* (LeConte, 1850)**

Distribution and Abundance: Common statewide (Table 1). County records: 1–3, 6, 8, 11–12, 14–21, 23–24, 26–27, 29–35, 38–45, 47–52, 54, 57, 59–61, 63–68, 70–72. Range: YK-NF-NY-NB-CO.

Habitat: Adults were collected from a variety of shallow ponds and marshes, especially temporary vernal habitats.

Life Cycle: Adults occurred 21 March to 22 August, with 65% being found 27 March to 4 May, and 33% 30 May to 24 July, the period during which all teneral adults (32) were collected. Ninety percent of the teneral adults were collected 30 May to 30 June. The absence of adults in collections between 22 August and 21 March suggests adults overwinter in terrestrial habitats, return to breeding sites to mate and oviposit in late March and April (83% females), and then die. Most larvae complete development in late May and June, with a few stragglers pupating in July. Adults apparently enter overwintering habitats in mid-to late summer to complete the univoltine life cycle. Collections after 30 May contained 70% males.

Identification: Adults are readily recognized by their dark venter and attenuate elytra with distinct dual punctation. The large elytral punctures are about the same size as those of the discal striae, which they obscure; they are much more widely spaced than in *L. latens*. Because of their size and color, adults superficially resemble large *Hydroporus paugus* Fall, but adults of that species lack dual elytral punctation.

***Laccornis deltoides* (Fall, 1923)**

Distribution and Abundance: Rare in southeast area (Table 1). County records: 66, 70, 72. Range: ON-OH-IL-WI.

Habitat: All adults were collected from small ponds that were in, or adjacent to, wooded areas. All except one, were collected from vernal ponds, which I believe to be their breeding habitat.

Life Cycle: Ten adults were found in four sites 31 March to 5 April; three more, including the only teneral specimen, were collected at three sites on 9 June. I believe a univoltine life cycle similar to that described for *L. conoideus* is likely. As in *L. conoideus*, mostly females overwintered (90%), and two of the three June specimens were males.

Identification: The large size, rather uniform brown color, and tear-drop shape immediately separate adults from those of other Hydroporinae.

***Laccornis latens* (Fall, 1937)**

Distribution and Abundance: Fairly common statewide (Table 1). County records: 2, 5–9, 12–14, 23, 27, 30, 33–35, 39, 42–43, 45, 47–48, 52, 54, 57, 59–60, 64–65, 67. Range: ON-NB-NJ-WI.

Habitat: Almost all adults were collected either from sloughs and marshes adjacent to streams or from swamps and boggy areas with at least some *Sphagnum*; the latter probably is their breeding habitat. Collections from the former sites predominated in early spring. The only teneral adult was collected from a small pond adjacent to a large wooded area that floods in the spring.

Life Cycle: As with *L. conoideus*, 65% of the adults were found before May, but *L. latens* occurred earlier (27 February to 24 April), with 30% being collected before April. These overwintering adults were mostly females (75%). The remaining adults (83% males) were found from 30 May to 20 August, except one female that was collected from a river backwater on 7 October. I believe this species also overwinters in terrestrial sites and has a life cycle similar to that described for *L. conoideus*. The occurrence of adults in flooded areas in late winter was likely due to flooding of overwintering sites by water from melting snow. The only teneral adult was found 30 June, suggesting larval development occurs later than in other *Laccornis* because of the colder, boggy habitat of larvae.

Identification: The size, attenuate shape, and red color at the base of the elytra make it possible to recognize this species in the field. The rufous base of the elytra is evident in adults preserved in ethanol, and contrasts with the pronotum and remainder of the elytra, which are fuscous.

Liodessus Guignot, 1939

Larson and Roughley (1990) reviewed the six species known from North America north of Mexico, and provided a key to adults of all species along with detailed descriptions and notes on habitat and distribution. Four species occurred in Wisconsin; the other two species are found in Florida or from South Dakota to New Mexico. Characters in the key below that use color may not apply to very teneral specimens that are almost entirely testaceous. Identification sections under each species should be consulted when identifying teneral specimens.

Key to Adult *Liodessus* in Wisconsin

1. Elytra with bold checkerboard pattern, rarely completely fuscous and much darker than pronotum; metatibia and metacoxal plate testaceous; metacoxal plate with dense, coarse punctures mostly separated by less than their diameters; 1.72–1.93 mm long ..... *flavicollis*
   Elytra unicolorous or with inconspicuous dark striae and maculae; metatibia or metacoxal plate infuscate; metacoxal plate rugose with inconspicuous punctures or sparsely covered with coarse punctures 2
2(1). Pronotum pale, with a large, fuscous, mesal spot on disc that extends almost to anterior margin; metacoxal plate usually infuscate, and rugose with inconspicuous punctures; metatibia flavous, occasionally infuscate in apical third; 1.92–2.23 mm long ..... *affinis*
   Pronotum without a large, fuscous, mesal spot on disc; metacoxal plate not infuscate, and either with distinct coarse punctures, or rugose with inconspicuous punctures; metatibia infuscate, except in basal fourth 3
3(2). Metacoxal plate and mid-metasternum with distinct, coarse punctures 1.87–2.15 mm long ..... *fuscatus*
   Metacoxal plate rugose with inconspicuous punctures and mid-metasternum with inconspicuous fine punctures; 1.73–1.96 mm long (Larson and Roughley 1990) ..... *cantralli*

***Liodessus affinis* (Say, 1823)**

Distribution and Abundance: Abundant statewide (Table 1). County records: 1–72. Range: AK-NF-FL-CA.

Habitat: Adults were collected from a variety of lentic habitats, but the vast majority, including teneral specimens, were found in ponds. In autumn, and occasionally at other times, adults also occurred along banks of streams, which many apparently entered to overwinter.

Life Cycle: Adults occurred 27 March to 8 December, 97% from April through October and 61% from July through September. Teneral adults occurred from 19 May to 19 October, with 67% being found in June and July and 27% 13 August to 28 September. Adults overwinter in deeper water and enter breeding sites mostly in April. Larvae apparently develop throughout much of the spring and summer, with those emerging in late summer and autumn probably representing a partial second generation in some years.

Identification: The discal infuscation on the pronotum can be readily seen on all except very teneral specimens; no other very small (< 3 mm long) Wisconsin dytiscid has such a mark. Teneral specimens may resemble *L. cantralli* as discussed under that species, but in almost all teneral specimens the elytral pattern and discal pronotal infuscation are evident.

***Liodessus cantralli* (Young, 1953)**

Distribution and Abundance: Very rare (Table 1). Country records: 23, 53, 59. Range: AB-MB-MI-WI.

Habitat: An adult was collected by Kevin Kenow from the Horicon Marsh and identified by Kurt Schmude and me, but subsequently the specimen was lost. Other adults were found in a small pond and under the bank of a river. The latter was apparently an overwintering site since the beetle was collected on 15 November. Young (1953) indicated adults occurred among *Sphagnum* in neutral bogs, and not in acid bogs. Larson and Roughley (1990) found them in

Drepanocladus mats and stated "It is more characteristic of fen than bog habitats."

Life Cycle: Larson and Roughley (1990) indicated adults overwinter in aquatic habitats, which is supported by my collection from the Kickapoo River on 15 November.

Identification: The color of adults is similar to that found in *L. fuscatus*, but usually somewhat lighter. The Horicon Marsh specimen was paler, but the Shawano county specimen was as dark as most *L. fuscatus*. The lack of distinct coarse punctures on the metacoxae and metasternum, the finer punctures on the elytra, the gradual narrowing of the pronotum from base to apex, the longer basal elytral plicae, and the impressed sutural striae that extend nearly to the apex of the elytra will separate all specimens from *L. fuscatus*. Morphological characteristics are most similar to those of *L. affinis*, and teneral specimens could be confused with that species. The Kickapoo River specimen was pale and probably had emerged recently, but the above characters were evident, even the infuscate apical three-fourths of the metatibia. Wisconsin specimens that were measured were 1.87 and 2.03 mm long.

Liodessus flavicollis **(LeConte, 1855)**

Distribution and Abundance: Uncommon statewide (Table 1). County records: 3, 7, 16–17, 19, 30, 39, 52, 57, 60–61, 63, 70–71. Range: MB-PQ-FL-MS-MN.

Habitat: All collections were from deeper habitats, including margins of lakes and deep ponds, pool areas of streams, a gravel pit, and a ditch.

Life Cycle: It is possible adults do not fly and do not have to come to the surface to renew their air supply (Larson and Roughley 1990). Adults occurred from early May to early October; eight teneral adults were found 24 June to 17 August. The life cycle is probably univoltine, with adults overwintering in their breeding sites and mating and ovipositing in the spring; larvae complete development from late spring to mid-summer.

Identification: The checkerboard elytral pattern, pale legs and venter, and numerous large punctures on the metacoxal plates are distinctive.

Liodessus fuscatus **(Crotch, 1873)**

Distribution and Abundance: Fairly common in northern third and central area, rare elsewhere (Table 1). County records: 1–4, 10–11, 13, 15, 17–18, 21, 31, 33, 36–37, 39, 58. Range: SK-LB-FL-TX.

Habitat: Almost all adults were collected from acidic habitats, which are most prevalent in the northern half of the state.

Life Cycle: Adults occurred 27 March to 27 August; single teneral adults were found 20 and 22 July. A lack of collections after August likely resulted from a lack of autumn samples from swamps and bogs and not from overwintering in terrestrial sites. The occurrence of teneral adults in late July indicates most larvae develop in late spring and early summer.

Identification: The uniformly rufous ventral surface and pronotum, infuscate apical two-thirds of the metatibiae, coarse elytral punctures, scattered coarse punctures on the metacoxae and metasternum, and the rounded lateral margins of the pronotum, which cause it to be as wide at the middle as at the base, are distinctive features that will identify adults.

Lioporeus Guignot, 1950

Only two species occur in North America. In 1981, Wolf and Matta placed them in a new genus, *Falloporus*, but Wolfe (1983) subsequently found they belonged in Guignot's genus *Lioporeus*. *Lioporeus triangularis* was described by Fall (as *Hydroporus*) based on a series of 4 males and 6 females from Sauk City, WI, which were collected by W. S. Marshall for J. D. Sherman (Wolfe and Matta 1981); 30 additional specimens collected by W. S. Marshall from Sauk City are presently in the Insect Research Collection and Aquatic Insect Collection at the University of Wisconsin-Madison. The second species, *L. pilatei* (Fall, 1917), occurs from North Carolina to Texas.

***Lioporeus triangularis* (Fall, 1917)**

Distribution and Abundance: Very rare in southern two-thirds. County records: 31, 57. Range: WI-PA-AL-MS-MO.

Habitat: Single adults were collected from under the banks of Hay Creek in Jackson County and the Wisconsin River in Sauk County. Wolfe and Matta (1981) described the habitat as "undercut banks of clearwater streams."

Life Cycle: Wisconsin adults were found 12 May and 16 June. Wolfe and Matta (1981) collected teneral adults in August, and believed specimens in the Marshall collection were collected 9 August.

Identification: The checkerboard elytral pattern, configuration of the apex of the metasternal process, and attenuate elytra make this species easy to recognize.

Oreodytes Seidlitz, 1887

Based on Zimmerman's 1985 revision, only one species is likely to occur in Wisconsin; most other species are confined to northwestern North America.

***Oreodytes scitulus scitulus* (LeConte, 1863)**

Distribution and Abundance: Very rare in extreme north (Table 1). County record: 1. Range: NT-NF-NY-MN-WY-CA+CO+NM. The other subspecies *O. scitulus bisulcatus* (Fall, 1923) occurs in northern California.

Habitat: Single adults were collected from the Siskiwit River, Sioux River, and South Fish Creek in Bayfield County.

Life Cycle: Adults were collected 25 May, 25 August, and 28 September; none were teneral.

Identification: In addition to characters in the generic key (Hilsenhoff 1992), the numerous, narrow, black vittae on the elytra along with anterior and posterior transverse marks on the pronotum are distinctive.

Potamonectes Zimmermann, 1921, junior synonym of *Nebrioporus* Régimbart, 1906 and *Stictotarsus* Zimmermann, 1919

Nilsson and Angus (1992) revised the *Deronectes*-group of genera, placing all North American species in *Nebrioporus* or *Stictotarsus*. Zimmerman and Smith (1975) surveyed the North American fauna (as *Deronectes*), and provided a key to species along with descriptions of each species and information about their distribution and habitat. They considered *Nebrioporus elegans* (Panzer, 1794) to be a synomym of *N. depressus* (Fabricius, 1775) because F. Balfour-Browne had shown they intergrade in the British Isles; however, Lar-

Table 2. Comparison of means and ranges (in parentheses) of three parameters of *Nebrioporus rotundatus* collected in Wisconsin with those of Shirt and Angus (1992) for *N. rotundatus* and *N. macronychus*, and for *N. macronychus* males from southern British Columbia (SBC). APC = anterior protarsal claw. PPC = posterior protarsal claw.

Species	Total Length mm	APC μm	Ratio APC/PPC
Wisconsin males (25)	5.09 (4.99–5.33)	348 (298–368)	1.26 (1.17–1.37)
Wisconsin females (23)	5.07 (4.80–5.28)		
N. rotundatus males	4.89 (4.48–5.31)	292 (255–371)	1.15 (1.03–1.33)
N. rotundatus females	4.80 (4.46–5.20)		
N. macronychus males	5.23 (4.77–5.56)	413 (330–464)	1.33 (1.16–1.54)
N. macronychus females	5.06 (4.57–5.52)		
N. macronychus males SBC		347 (310–373)	1.25 (1.13–1.36)

son (1975) and Larson and Roughley (1991) concluded these species were distinct, with *N. depressus* occurring in the north and *N. elegans* in the south. Using morphological analysis, iso-electric focusing of proteins, and cross-breeding experiments, Shirt and Angus (1992) showed *N. depressus* (as *Potamonectes*) is a holarctic species that occurs in northern Manitoba, northern Alberta, and the Northwest Territories, while *N. elegans* occurs only in western Europe. They also concluded the *N. elegans* of Larson and Roughley and the more southern forms of what Zimmerman and Smith identified as *N. depressus* were two different species, whose predicted ranges they defined on a map. For one species, *N. rotundatus* (LeConte), they predicted a range from ON-NF-NJ-WI, and for the other, a new species that they named *Potamonectes macronychus* (now *Nebrioporus*), they predicted a range from BC-ON-MN-CO-NV-WA. They did not examine specimens from the area between Manitoba and Michigan, but reported three males of *N. macronychus* from Winnipeg, MB and two males of *N. rotundatus* from Mountain Lake, MI were intergrades. All Wisconsin specimens are obviously intermediate between *N. rotundatus* and *N. macronychus*; I believe the latter should be considered a subspecies of *N. rotundatus*. In Table 2, three parameters of Wisconsin specimens are compared to those published by Shirt and Angus.

Key to species of adult *Potamonectes* (*Nebrioporus* and *Stictotarsus*)

1. Outline of pronotum and elytra forming a relatively uniform arc; lateral margin of elytron without a subapical tooth; 3.98–5.00 mm long. . . . . *Stictotarsus griseostriatus*

   Outline of pronotum and elytra not forming a uniform arc, posterior angles of pronotum rounded; lateral margin of elytron with a small, acute, subapical tooth; 4.80–5.33 mm long. . . . . *Nebrioporus rotundatus*

***Nebrioporus rotundatus* (LeConte, 1863)**

Distribution and Abundance: Uncommon in northwest, north-central, and central areas (Table 1). County records: 1, 7, 9, 12, 15, 37. Range: BC-NF-NJ-CO-NV-WA.

Habitat: Adults were collected from nine different streams and a small impoundment.

Life Cycle: Twenty-six percent of the adults occurred 28 April to 22 June; the remaining 74% occurred 26 August to 10 November. Four teneral adults were found 26 August to 16 October. Apparently adults overwinter, mate and oviposit in late spring, and die. None were collected 23 June to 25 August.

Larvae develop in streams during the summer and pupate and emerge in late summer and early autumn.

Identification: Like *S. griseostriatus*, the dorsal color pattern of adults is distinctive; it is similar only to that found in the smaller *Hydroporus superiorus*. Adults are mostly testaceous, with three narrow black vittae on each elytron and with partial vittae and maculae laterally and mesally. The pronotum has a narrow anterior black band and a broader posterior band mesally; the head is testaceous.

There is significant overlap in the 11 mensural characters used by Shirt and Angus (1992) to separate *N. rotundatus* from *N. macronychus*. Three of these characters were measured on 25 males and 23 females from Wisconsin and are compared in Table 2 with measurements published by Shirt and Angus. Wisconsin specimens are closer to *N. macronychus* than *N. rotundatus* in size, but the anterior protarsal claws of males are very much shorter than those of *N. macronychus*, with the longest (368μm) being well short of the average for *N. macronychus* (413μm). Interestingly, the APC length and APC/PPC ratio that Shirt and Angus reported for a race of *N. macronychus* from southern British Columbia are almost identical to those parameters in Wisconsin males (Table 2).

***Stictotarsus griseostriatus* (DeGeer, 1774)**

Distribution and Abundance: Fairly common statewide (Table 1). County records: 3–4, 6, 15–18, 21, 23, 25, 27, 29–30, 35, 37–39, 47–48, 50, 53, 57–58, 60–61, 63, 67–68. Range: AK-NF-NC-CA

Habitat: Eighty percent of the adults were collected from lentic habitats between late March and mid-July; the remainder were found in lotic or semilotic habitats from late June to late March. Adults were found only in ponds after 22 March and before 23 June. They occurred only in streams, a spring pond, and a lake from mid-July to mid-March.

Life Cycle: Twenty-nine teneral adults occurred 19 May to 19 June in a variety of ponds and a ditch. Adults obviously overwinter in streams, spring ponds, or lakes, entering these habitats within a month after emergence in the spring. In March and April they fly back to ponds where they mate, oviposit, and eventually die. Larvae complete development in these ponds from mid-May to mid-June, and adults emerge from their pupal cells shortly thereafter.

Identification: The dorsal color pattern is unique among small dytiscids in Wisconsin. The elytra are dark (almost completely so in some specimens) with narrow pale vittae; the pronotum is testaceous laterally and black in the middle two-thirds, with a longitudinal testaceous mark on the disc; the head is black with mesal testaceous marks that may be connected.

Uvarus Guignot, 1939

This genus has not been revised in North America, but Young (1969) provided a checklist of species with notes on their distribution; he listed three species from the northeastern United State, two of which occur in Wisconsin. The third species, *U. suburbanus*, was described by Fall (1917) from New York and Pennsylvania. He noted "Although closely related to *granarius*, it is abundantly distinct by its less broadly ovate form, less pointed behind, and finer sparser punctuation both above and beneath." Elytra were described as "ochreous, clouded with fuscous at base, narrowly so along the elytral suture, and with some more or less evident transverse discal clouds behind the middle," and unlike *U. lacustris*, the metasternum and abdomen are "brownish

ochreous." No adults that fit Fall's description of *U. suburbanus* were found in Wisconsin, and I believe they do not occur here.

Key to Species of Adult *Uvarus* in Wisconsin

1. Broadly ovate; elytra, metacoxal plates, and venter a rather uniform dark rufous; metasternum and metacoxae coarsely punctate; elytra coarsely punctate; 1.58–1.90 mm long. . . . . *granarius*
   Elongate oval; metacoxal plates and sometimes venter infuscate or black, darker than elytra; metasternum and metacoxae with inconspicuous fine punctures; elytra finely punctate; 1.66–1.96 mm long . . . *lacustris*

***Uvarus granarius* (Aubé, 1838)**

Distribution and Abundance: Common statewide, except in northeast, north-central, and east-central areas (Table 1). County records: 1, 3, 5–6, 12, 16, 25, 28–29, 31–32, 36–39, 41, 47, 49–52, 54, 57–58, 61, 65, 68, 71–72. Range: MB-NS-FL-AL-WI.

Habitat: Although adults were found in a variety of lentic habitats, most occurred in ponds, including all teneral specimens.

Life Cycle: Adults were collected 7 April to 27 October, with 86% found in May, June, and July. The collection of 16 adults after 15 September, all of them from deeper ponds and sloughs, suggests they overwinter in such sites. The small number of adults found before May (< 0.5%) and large number collected in May (27%) indicate most adults become active in mid-spring. Teneral adults (12) were found from 29 June to 20 July, showing larval development in this univoltine species is completed early in the summer.

Identification: Adults are readily separated from those of *U. lacustris* by the key. They resemble adults of the slightly larger *Liodessus fuscatus*, but are relatively broader, have a continuous elytral-pronotal outline, and lack a transverse carina on the head.

***Uvarus lacustris* (Say, 1823)**

Distribution and Abundance: Common in southern third to uncommon in northern third (Table 1). County records: 1, 19, 21, 23–24, 26–27, 30, 32, 36–37, 39–40, 43–44, 49, 53–58, 60–68, 70–72. Range: ON-MA-FL-AL-WI.

Habitat: While most adults occurred in ponds, they were also found in marshes, bogs, sloughs, ditches, spring ponds, and along margins of streams. Teneral adults were collected from a similar variety of habitats.

Life Cycle: Adults were numerous two months later than those of *U. granarius*, with 86% of them being collected from July through September. Only 3% of the adults were collected before June, but 18% were collected 15 September to 23 October, which indicates they overwinter in aquatic habitats. Teneral adults (57) were found 6 July to 19 October, 88% of them before 26 August. Adults apparently do not mate and oviposit until late spring, which delays completion of larval development until early and mid-summer. Three teneral adults collected in mid-September probably resulted from delayed oviposition, but four that occurred in mid-October may have resulted from a partial second generation.

Identification: Because of their small size, shape, and color, adults most resemble those of *Liodessus affinis*, but that species is slightly larger, has a fuscous spot on the pronotal disc, and also has a transverse carina between the posterior margins of the eyes. Teneral specimens have a more elongate

shape than those of *U. granarius*, and lack the distinct, large punctures on the metasternum and metacoxal plates.

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