The Great Lakes Entomologist

Volume 25
Number 2 - Summer 1992 *Number 2 - Summer 1992*

Article 1

June 1992

Dytiscidae and Noteridae of Wisconsin (Coleoptera). I. Introduction, Key to Genera of Adults, and Distribution, Habitat, Life Cycle, and Identification of Species of Agabetinae, Laccophilinae and Noteridae

William L. Hilsenhoff
University of Wisconsin

DYTISCIDAE AND NOTERIDAE OF WISCONSIN (COLEOPTERA). I. INTRODUCTION, KEY TO GENERA OF ADULTS, AND DISTRIBUTION, HABITAT, LIFE CYCLE, AND IDENTIFICATION OF SPECIES OF AGABETINAE, LACCOPHILINAE AND NOTERIDAE[1]

William L. Hilsenhoff[2]

ABSTRACT

Collected from Wisconsin were 83,710 adult and 5,600 larval Dytiscidae representing 148 species, and 95 adult Noteridae representing two species. A key to genera is presented, which includes names of species in genera that are monotypic in Wisconsin. Information on distribution and abundance in Wisconsin, range, habitat, life cycles, and identification are included for species in the dytiscid subfamilies Agabetinae and Laccophilinae, and the family Noteridae. Also included are keys to species of adult and larval *Laccophilus* found in Wisconsin.

Since 1962 I accumulated a collection of 83,710 adults and 5,600 larvae of 148 species of Dytiscidae from throughout Wisconsin, along with 95 adults of two species of Noteridae. An effort was made to collect from all types of lentic habitats in all counties at different times of the year; lotic habitats were extensively sampled throughout the year in conjunction with other projects. Initially all collections were made with a D-frame aquatic net, but in 1976 I also began to use traps to collect water beetles, especially from McKenna Pond near Madison in Dane County (Hilsenhoff and Tracy 1985). Bryn Tracy continued the study of water beetles in this pond from 1978 to 1981, collecting more than 14,000 adults and larvae of 77 species of Dytiscidae. Beginning in 1984, bottle traps (Hilsenhoff 1987) were used instead of window-screen traps to extensively sample lentic habitats throughout Wisconsin at different seasons of the year. The three most abundant species, *Hygrotus sayi*, *Neoporus undulatus*, and *Laccophilus maculosus*, were collected from all counties and accounted for 41% of all adult Dytiscidae that were collected. More than 1,000 adults of ten additional very common species were collected, while 24 other species were represented by fewer than five specimens. Undoubtedly additional species that are very rare in Wisconsin will be discovered; those most likely to occur are included in the keys and discussion. All specimens are preserved in 70% ethanol and retained in the University of Wisconsin Aquatic Insect Collection.

Life cycles of Dytiscidae vary, but in most lentic species overwintering

---

[1]Research supported by the College of Agricultural and Life Sciences and the Graduate School at the University of Wisconsin-Madison.

[2]Department of Entomology, University of Wisconsin, Madison, WI 53706.

adults oviposit in spring, larvae complete development in late spring or early summer, and then crawl from their aquatic habitat to pupate on adjacent land. Adults emerge from the pupal cell after five to 14 days and usually return to the aquatic habitat for at least a few days. In dry summers, adult dytiscids are difficult to find, probably because they aestivate. In wet summers, they are usually plentiful. Most species overwinter as adults in ponds, lakes, or streams, while a few also overwinter as eggs or larvae. Overwintering habitats often differ from breeding habitats. In early spring when dytiscids are actively mating, especially when ponds are still partially covered with ice, large numbers can often be collected with bottle traps (mostly Colymbetinae and Dytiscinae). Adults of some dytiscids overwinter in terrestrial habitats and return to breeding sites in spring. Some species may have at least a partial second generation of larvae in late summer, while others may breed throughout the summer. Lotic species frequently overwinter as larvae as well as adults.

Because Dytiscidae is a very large family and revisions of *Agabus* and *Hydroporus* are in progress, this study will be published in parts. The purpose of the study is to document the distribution and abundance of species of Dytiscidae and Noteridae that occur in Wisconsin and to provide as much information as possible about their habitat, life cycle, and identification. The habitat of each species was determined from collection records, with special emphasis on habitats used by larvae and teneral specimens. Although teneral specimens frequently disperse widely, most probably re-enter their larval breeding site for at least a few days after emerging from the pupal cell. Adult beetles were considered to be teneral if their elytra were still soft in the discal area, a condition that lasts for about a week after eclosion. In species in which larvae cannot be identified, the occurrence of teneral adults was the most important clue to the life cycle and the period when larval development most likely occurred.

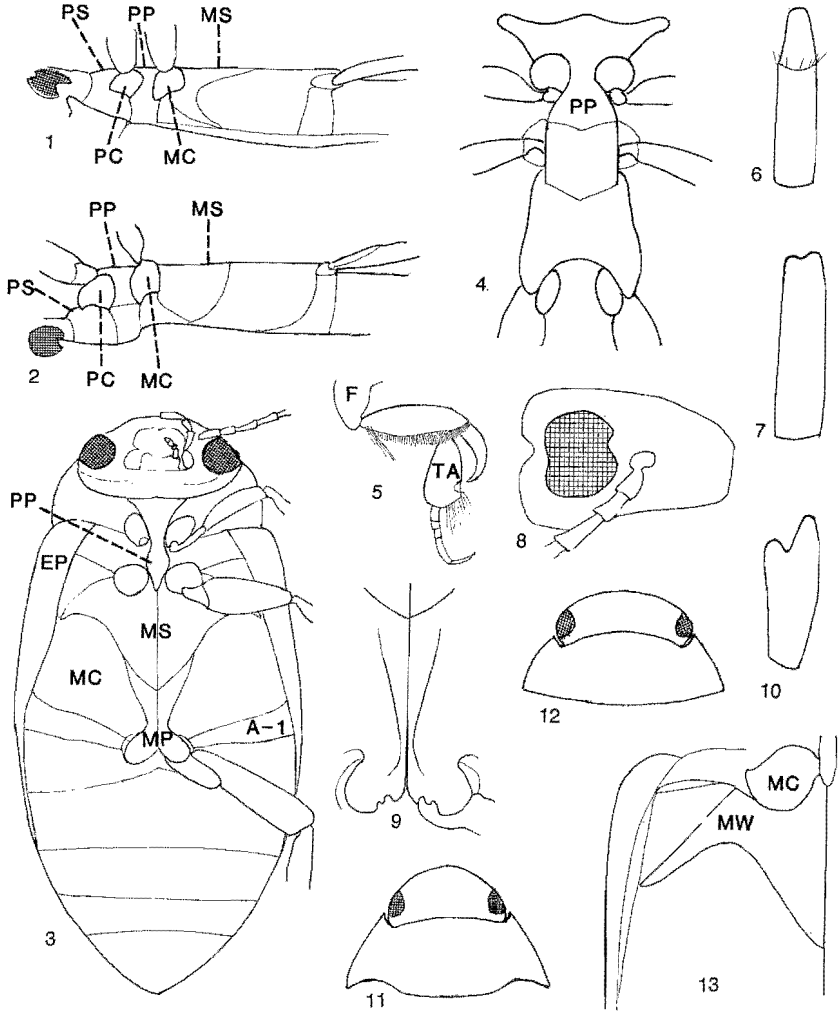
Keys to adults are provided as an aid to identification of species in this region. Because fewer species are involved, these keys are less complex than those that encompass the entire North American fauna. While most Dytiscidae can be readily identified by using the keys and notes on identification, differences between many species are slight and a reference collection of identified specimens is advantageous, if not a necessity, for accurate identifications in some genera. Keys to species of larvae will also be provided for some genera. Most of these larval keys must be considered provisional because larvae of all species within a genus have not been positively associated with adults by rearing; larval identification was often based on circumstantial association with adults. Larval keys identify third instar larvae, but usually the second instar also can be identified with these keys. Third instar larvae possess lateral spiracles on the mesothorax and abdominal segments 1–7, which first and second instar larvae lack. Third instar larvae of *Neoporus* and *Heterosternuta* also lack these spiracles (Alarie 1991).

Part I of this study contains a key to genera of adults found or possibly occurring in Wisconsin. Subgenera and species groups of *Hydroporus* s. lat. that were used by Alarie (1991) are given generic status in this key because this will likely result from the impending revision (Robert Roughley, University of Manitoba, personal communication). The *oblitus* group of species, which is distinct from *Sanfilippodytes* (*vilis* group), has not yet been assigned a generic name. Lengths reported in the generic key and in species keys are for Wisconsin specimens, which were measured on a line from the anterior of the head to the tip of the elytra. Fifty or more adults from 25 or more sites were measured for each species; all specimens were measured in species with less than 50 adults. Measurements were made with an ocular micrometer in a Leitz dissecting microscope.

Abundance of species in Agabetinae, Laccophilinae, and Noteridae in nine areas of Wisconsin and in McKenna Pond is compared in Table 1; collections from McKenna Pond are listed separately and not included in south-central (SC) totals. An unusually large number of some species in SC Wisconsin is often due to adults obtained from three years of summer bottle trap collections in the Horicon Marsh, Dodge, Co., by Kevin Kenow (see acknowledgements). The range of each species was obtained from the most recent generic revision; other studies were used when no revision was available. The recent publication by Larson and Roughley (1991) on the distribution of dytiscids in Canada and Alaska was especially helpful.

KEY TO GENERA OF ADULT DYTISCIDAE AND NOTERIDAE IN WISCONSIN

1. Ventral surface of body in lateral aspect with anterior of prosternum, its postcoxal process (prosternal process), and meso- and metasternum in same plane (Fig. 1); pro- and mesotarsi distinctly 5-segmented, segment 4 as long as segment 3 2
   Ventral surface of body in lateral aspect with anterior of prosternum greatly depressed and much more dorsal than its postcoxal process and meso- and metasternum (Fig. 2); pro- and mesotarsi appear to be 4-segmented because segment 4 is very small, concealed between lobes of segment 3, and much shorter than segments 3 or 5 (except *Bidessonotus*, which probably occurs only south and east of Wisconsin) . . . . . .DYTISCIDAE, HYDROPORINAE 19
2(1). Prosternal process spear-shaped, usually pointed apically (Fig. 3); protibia without a large, curved, apical spur; > 4.0 mm long . . . . . .DYTISCIDAE (in part) 4
   Prosternal process greatly widened apically and nearly truncate (Fig. 4); protibia with a large, curved spur at apex (Fig. 5); < 5.5 mm long . . . . . .NOTERIDAE 3
3(2). Elytra with a transverse pale fascia; small, 2.9–3.3 mm long . . . . . .*Suphisellus puncticollis* Crotch
   Elytra without a transverse fascia; larger, 4.9–5.3 mm long. . . . . .*Hydrocanthus iricolor* Say
4(2). Very large, 23–42 mm long. . . . . .DYTISCINAE (in part) 5
   Smaller, 4–18 mm long. 6
5(4). Large spurs at apex of metatibia subequal in width; beetle widest near middle; 23.0–41.6 mm long. . . . . .*Dytiscus* Linnaeus
   One large spur at apex of metatibia twice as broad as other; beetle widest at posterior third; 27.733.4 mm long. . . . . .*Cybister fimbriolatus* (Say)
6(4). Scutellum not visible; metatarsus with a single stout claw; smaller, 3.9–5.5 mm long. . . . . .LACCOPHILINAE, *Laccophilus* Leach
   Scutellum fully visible; metatarsus with 2 claws; larger, except *Copelatus*, which has 8–10 impressed striae on each elytron 7
7(6). Elytra densely sculptured with short, deep, irregular, longitudinal aciculations; apex of palpi conical (Fig. 6); 6.4–7.4 mm long. . . . . .AGABETINAE, *Agabetes acuductus* Crotch
   Elytra without longitudinal aciculations; if aciculations are present, they are transverse apically and palpi are truncate and notched apically (Fig.7) 8



Figures 1–13. 1. *Agabus* and 2. *Hydroporus*—lateral view (ventral side up) showing prosternum (PS), postcoxal process (PP), mesosternum (MS), procoxae (PC), and mesocoxae (MC). 3. *Agabus*—ventral view showing prosternal process (PP), epipleuron (EP), metasternum (MS), metacoxa (MC), metacoxal process (MP), and first visible abdominal segment (A-1). 4. *Hydrocanthus*—ventral view showing prosternal process (PP). 5. *Hydrocanthus*—profemur (F), tibia (TI), and tarsus (TA). 6. *Agabetes*—terminal segment maxillary palp. 7. *Agabus*—terminal segment maxillary palp. 8. *Agabus*—lateral view of head. 9. *Copelatus*—metacoxal process. 10. *Coptotomus*—terminal segment maxillary palp. 11. *Rhantus sinuatus*—pronotum and head. 12. *Ilybius*—pronotum and head. 13. *Hydaticus*—ventral view showing metasternal wing (MW) and mesocoxa (MC).

https://scholar.valpo.edu/tgle/vol25/iss2/1
DOI: 10.22543/0090-0222.1770

8(7). Anterior margin of eye emarginate above base of antenna (Fig. 8)..... COLYMBETINAE 9
Anterior margin of eye not emarginate above base of antenna..... DYTISCINAE (in part) 16

9(8). Elytra uniformly brown, with 8–10 impressed longitudinal striae on each elytron; mesal margins of metacoxae coming so close together posteriorly as almost to touch median line of metacoxal process (Fig. 9); 4.5–5.5 mm long..... *Copelatus* Erichson
Elytra not having 8–10 impressed longitudinal striae; metacoxal lines not converging so close to median line; > 5.6 mm long ..10

10(9). Prosternum with a median longitudinal furrow from near front margin to apex of prosternal process; 7.5–9.4 mm long. *Matus* Aubé
Prosternum without a longitudinal furrow 11

11(10). Metatarsal claws subequal in length 12
Metatarsal claws distinctly unequal in length..... 13

12(11). Last segment of palpi distinctly widened and emarginate apically (Fig. 10); elytra patterned with dark blotches and irrorations on a pale background; thoracic sterna pale; 6.8–8.6 mm long ..... *Coptotomus* Say
Last segment of maxillary palp not widened apically, only truncate to very slightly emarginate (Fig. 7); elytra usually dark, if pale with stripes, thoracic sterna are black; 5.8–13.4 mm long ..... *Agabus* Leach

13(11). Larger, > 13.5 mm long..... 14
Smaller, < 13.0 mm long..... 15

14(13). Elytra sculptured with numerous, parallel, transverse grooves; with yellow markings, especially on pronotum; 14.1–18.1 mm long..... *Colymbetes* Clairville
Elytra without parallel, transverse grooves; black, without dorsal pale markings; 13.7–16.7 mm long ..... *Neoscutopterus* Balfour-Browne

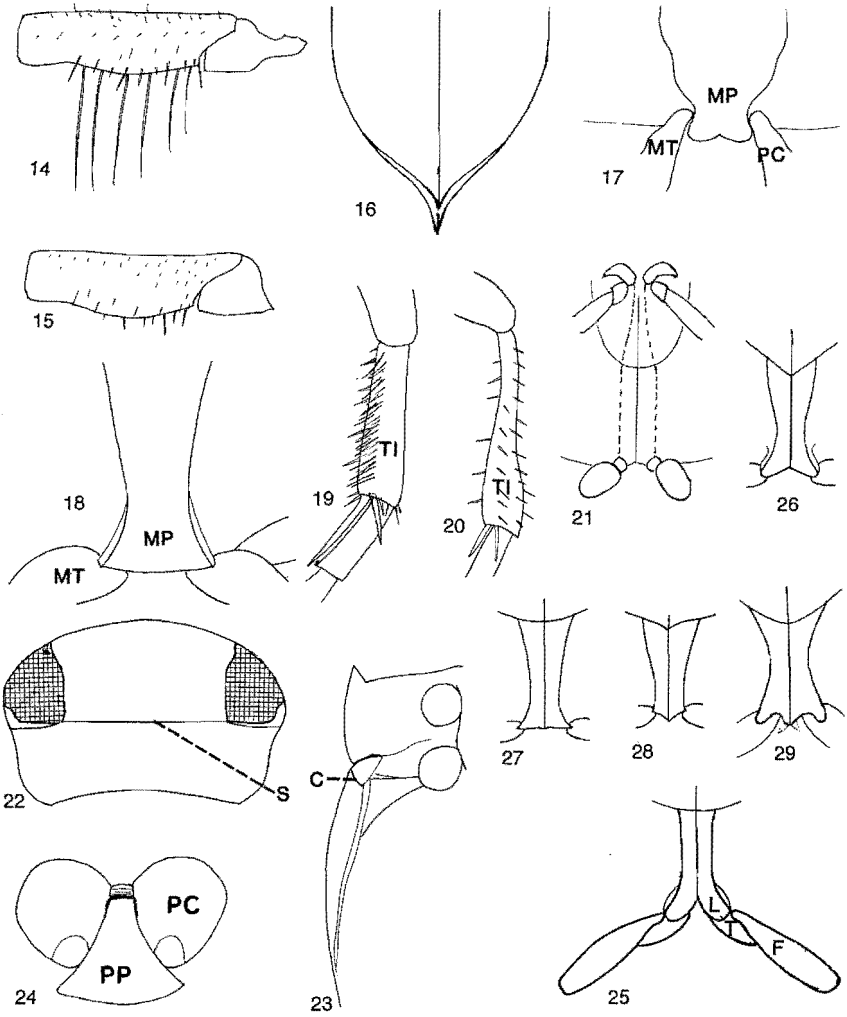
15(13). Yellow dorsally, with black markings, or entirely black with basal margin of pronotum deeply sinuate (Fig. 11); 9.5-11.9 mm long ..... *Rhantus* Dejean
Black dorsally, usually with subapical and sublateral yellow spots on elytra and 2 posterior rufous spots on head; basal margin of pronotum never sinuate (Fig. 12); 7.5–12.9 mm long ..... *Ilybius* Erichson

16(8). Outer margin of metasternal wing straight (Fig. 13); outer spur at apex of metatibia acute; 10.815.2 mm long..... *Hydaticus* Leach
Outer margin of metasternal wing arcuate (Fig. 3); outer spur at apex of metatibia blunt, more of less emarginate 17

17(16). Elytra densely punctate throughout, usually fluted and hairy in females; 10.6–16.6 mm long ..... *Acilius* Leach
Elytra not densely punctate throughout, never fluted in females .. 18

18(17). Posterior margin of mesofemur with stiff setae that are as long as or longer than width of femur (Fig. 14); 9.4–14.4 mm long..... *Thermonectus* Dejean
Setae on posterior margin of mesofemur only about half as long as width of femur (Fig. 15); 10.4–16.0 mm long ..... *Graphoderus* Dejean

19(1). Apices of elytra and last abdominal sternum produced into a sharp point (Fig. 16); scutellum fully visible; 3.8–4.6 mm long ..... *Celina hubbelli* Young



Figures 14-29. 14. *Thermonectus*—mesofemur. 15. *Graphoderus*—mesofemur. 16. *Celina*—apex of elytra and abdomen. 17. *Desmopachria* and 18. *Hydroporus*—ventral view showing metacoxal process (MP) and metatrochanter (MT). 19. *Desmopachria* and 20. *Liodessus*—metatibia (TI). 21. *Bidessonotus*—metasternum. 22. *Liodessus*—dorsal view of head showing transverse suture (S). 23. *Hygrotus*—pro-, meso- and metasternum showing carina (C) on epipleuron. 24. *Hydrovatus*—procoxae (PC) and prosternal process (PP). 25. *Laccornis*—metacoxal lobes (L), metatrochanter (T), and metafemur (F). 26. *Potamonectes*, 27. *Hydroporus*, 28. *Neoporus*, and 29. *Sanfilippodytes*—metacoxal process.

https://scholar.valpo.edu/tgle/vol25/iss2/1
DOI: 10.22543/0090-0222.1770

Apex of abdomen not produced into a sharp point; scutellum covered by elytra 20

20(19). Metacoxal process not produced laterally, base of trochanter entirely visible in ventral view (Fig. 17); less than 2.2 mm long 21

Metacoxal process produced laterally, obscuring base of trochanter in ventral view (Fig. 18); more than 2.3 mm long (except *Hygrotus farctus*, which has a spine-like tubercle on prosternum) 24

21(20). Metatibia straight, almost uniform in width (Fig. 19); metatarsal claws unequal in length; 1.72.0 mm long ..... *Desmopachria convexa* (Aubé)

Metatibia arcuate, narrowed at base (Fig. 20); metatarsal claws equal in length 22

22(21). Pro- and mesotarsi distinctly 5-segmented, segment 3 linear; metasternum slightly depressed with metacoxal lines converging anteriorly across mid-metasternum to nearly meet at mesocoxae (Fig. 21); 1.9–2.2 mm long (Georgia specimens) ..... *Bidessonotus inconspicuus* (LeConte)

Pro- and mesotarsi apparently 4-segmented, segment 3 bilobed; metasternum not depressed and metacoxal lines not continuing onto mid-metasternum 23

23(22). Head with transverse suture between posterior margin of eyes (Fig. 22); 1.6–2.2 mm long ..... *Liodessus* Guignot

Head without transverse suture between posterior margin of eyes; 1.6–2.0 mm long ..... *Uvarus* Guignot

24(20). A diagonal carina crossing epipleuron near base (Fig. 23) 25

No carina crossing epipleuron 26

25(24). Prosternal process spear-shaped (Fig. 3), pointed at apex, and much narrower than procoxae; 2.0–5.5 mm long ..... *Hygrotus* Stephens

Apex of prosternal process fan-shaped, broadly rounded at apex, and as wide as procoxae (Fig. 24); 2.5–2.9 mm long ..... *Hydrovatus pustulatus* (Melsheimer)

26(24). Base of metafemur reaching metacoxal lobe (Fig. 25); 4.5–7.2 mm long ..... *Laccornis* des Gozis

Metafemur separated from metacoxal lobe by part of trochanter 27

27(26). Posterior margin of metacoxal process incised at middle, with lateral lobes rounded (Fig. 26) 28

Posterior margin of metacoxal process truncate (Fig. 27) or angularly prominent at middle (Fig. 28), sometimes sinuate laterad of middle (Fig. 29) 29

28(27). Metacoxal plate densely micropunctate, without larger punctures; pronotum without lateral sulci; 4.3–5.5 mm long ..... *Potamonectes* Zimmermann

Metacoxal plate micropunctate with scattered larger punctures; pronotum with distinct sulci laterally; 3.3–4.9 mm long ..... *Oreodytes* Seidlitz

29(27). Apex of metacoxal process truncate, or nearly so (Fig. 27); dorsum rufous to black and without distinct maculae or vittae; lentic; 2.6–6.2 mm long ..... *Hydroporus* Clairville

Apex of metacoxal process angulate at middle (Fig. 28), sometimes sinuate laterad of middle (Fig. 29); dorsum often maculate or vittate; lentic or lotic 30

30(29). Apex of metacoxal process angulate at middle, but not distinctly sinuate laterad of middle (Fig. 28) 31

Table 1. Numbers of Dytiscidae and Noteridae from nine areas of Wisconsin (Fig. 1) and from McKenna Pond (McK) collected between 1962 and 1991, and total number of each species. A = adults, L = larvae.

	NW	NC	NE	WC	C	EC	SW	SC	SE	McK	TOTAL
DYTISCIDAE–AGABETINAE											
Agabetes acuductus A	2	0	5	0	0	1	14	10	0	0	32
DYTISCIDAE–LACCOPHILINAE											
Laccophilus biguttatus A	22	154	324	7	3	83	0	0	0	0	593
L. biguttatus L	1	9	3	0	0	3	0	0	0	0	16
L. maculosus A	624	303	494	592	494	684	1106	2062	967	1106	8432
L. maculosus L	133	69	95	123	150	118	83	160	83	228	1252
L. proximus A	17	1	4	31	19	1	40	98	26	98	335
L. proximus L	1	0	0	11	0	2	1	5	6	12	38
L. undatus A	0	0	0	0	0	0	1	14	0	0	15
L. undatus L	0	0	0	0	0	0	0	1	0	0	1
NOTERIDAE											
Hydrocanthus iricolor A	0	0	0	0	0	0	0	2	0	0	2
Suphisellus puncticollis A	0	0	1	0	0	0	1	67	8	18	93

Apex of metacoxal process angulate at middle and distinctly sinuate laterad of middle (Fig. 29) ..... .32

31(30). Elongate, at least twice as long as wide or nearly so, or with black venter; penis bifid; elytra usually distinctly fasciate: lotic; 3.0–4.1 mm long ..... .*Heterosternuta* Strand

Ovate, distinctly less than twice as long as wide; penis not bifid; elytra with dark stripes or pale maculae; lentic or lotic; 2.4–4.5 mm long ..... .*Neoporus* Guignot

32(30). Elytra widest in basal third, tapering to a pointed apex; each elytron with 2 large, square, pale areas and a pale apex; lotic; 3.5–4.4 mm long ..... .*Lioporeus triangularis* (Fall)

Elytra usually widest at or past middle; elytra without large, square pale areas; lotic or lentic ..... .33

33(32). Metatrochanter relatively short and stout, length of posterior margin not much greater than half distance from its distal apex to apex of femur; lentic; 2.8–4.0 mm long ..... .*oblitus* group

Metatrochanter relatively long, length of posterior margin not much shorter than distance from its distal apex to apex of femur; lotic; 2.7–3.5 mm long ..... .*Sanfilippodytes* Franciscolo

AGABETINAE
Agabetes Crotch, 1873

A single Nearctic species, *Agabetes acuductus*, has long been placed in the subfamily Colymbetinae, but recent studies by Burmeister (1976, 1990) and Nilsson (1989) show *Agabetes* to be more closely related to Laccophilinae. I follow Burmeister (1990) by placing it in a separate subfamily.

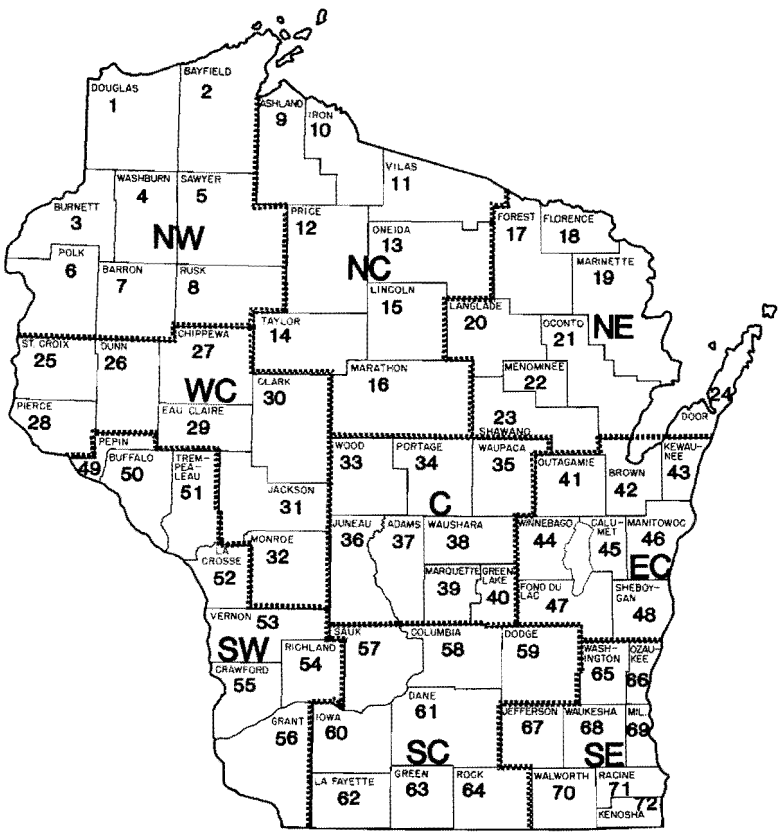
***Agabetes acuductus* (Harris, 1828)**

Distribution and abundance: Uncommon statewide (Table 1). County records (Map. 1): 2–3, 22–23, 46, 49, 51–52, 57, 60–61. Range: WI-PQ-FL-AR

Habitat: Adults were collected from small woodland ponds and wooded river sloughs, which often were temporary.

Life cycles: All except two adults were collected between late March and June, mostly with bottle traps. Single adults collected June 24 and July 16

https://scholar.valpo.edu/tgle/vol25/iss2/1
DOI: 10.22543/0090-0222.1770



Map 1. Location of nine 8-county areas of Wisconsin and number assigned to each county.

were teneral, which suggests larval development in late spring, with pupation and emergence in early summer. The absence of adults in late summer and autumn collections, except for one collected in early October, suggests that they may aestivate before moving into overwintering sites. No larvae were collected.

Identification: The dark color, oval shape, and deep, short, longitudinal aciculations on the elytra permit ready identification of adults of this species. The third-instar larva, which has a lightcolored head and extremely short urogomphi, was described by Spangler and Gordon (1973).

LACCOPHILINAE
Laccophilus Leach, 1817

Laccophilus is the only genus of Laccophilinae occurring north of Florida. Zimmerman (1970) revised the genus in North America, recording 27 species and several subspecies. Only four species have been collected in Wisconsin, but a fifth (*L. fasciatus*) may occur in southern counties. Larvae of Wisconsin's three most common species have been reared and described (Wilson 1923, Watts 1970, Barman 1972); a key is provided to larvae of these species and *L. undatus*. Larvae of *L. fasciatus* are unknown.

Key to Species of Adult *Laccophilus* in Wisconsin

1. Elytra markings mostly irrorate 2
   Elytra markings solid brown to black, never irrorate 4
2(1). Three or 4 large, boldly outlined maculae along lateral margins of elytra, separated by smaller pale areas; large, 4.8–6.0 mm long ..... *maculosus*
   Without boldly outlined lateral maculations; smaller, <5.0 mm long. . . 3
3(2). With a black subapical fascia across or partially across elytra; 4.5-4.9 mm long ..... *fasciatus*
   Without a subapical black fascia; 4.1–4.6 mm long ..... *proximus*
4(1). Elytra uniformly brownish-yellow or light brown; 3.9–4.6 mm long ..... *biguttatus*
   Elytra with a variegated yellow, brown, and black pattern; 3.8–4.3 mm long ..... *undatus*

Key to Species of Larval *Laccophilus* in Wisconsin

1. Head with 5–7 temporal spines, usually 6 and rarely 5; head with a prominent W-shaped mark that extends laterally to region of eyes ..... *maculosus*
   Head with 4 or fewer temporal spines, rarely 5; head without a prominent W-shaped mark 2
2(1). Head with 2 long temporal spines and one very short one; head with a dark arcuate stripe across anterior of frontoclypeus ..... *undatus*
   With 4 similar temporal spines, rarely 3 or 5; head with a diffuse darkened area at base of frontoclypeus 3
3(2). Longest spine on labium mesad of each palp almost as long as basal palpal segment ..... *proximus*
   Longest spine on labium mesad of each palp half as long as basal palpal segment ..... *biguttatus*

***Laccophilus biguttatus* Kirby, 1837**

Distribution and Abundance: Common north-central, northeast, and east-central areas, less common farther west, absent south (Table 1). County records (Map 1): 1–13, 15, 17–25, 27, 34, 39, 41–44, 47–48. Range: AK-LB-NH-WI-WY-BC+CA+CO+NM

Habitat: Adults were collected from a wide variety of ponds, marshes, and swamps. Most larvae were found in woodland and open ponds; a few occurred in marshes.

Life Cycle: Although adults were collected as late as early October, most were collected from late March to mid-July. Larvae were found from June 14 to August 22, suggesting a single generation that develops in mid-summer.

Identification: Adults are the only Wisconsin *Laccophilus* with uniformly colored elytra. Larvae are very similar to those of *L. proximus*, but can be separated by the key. In Wisconsin the range of *L. biguttatus* is north of the ranges of *L. undatus* and *L. fasciatus*.

https://scholar.valpo.edu/tgle/vol25/iss2/1
DOI: 10.22543/0090-0222.1770

***Laccophilus fasciatus rufus* Melsheimer, 1844**

Distribution and Abundance: Not yet collected in Wisconsin, but records from northern Illinois, Iowa, and southern Michigan suggest it may occur in southern counties. Range: SD-IA-MI-VTFL-TX-NB; two other subspecies west and southwest.

Identification: The broad, black fascia across the apical third of the elytra is distinctive.

***Laccophilus maculosus maculosus* Say, 1823**

Distribution and Abundance: Abundant throughout Wisconsin, especially southern third (Table 1). County Records (Map 1): 1–72. Range: MN-PE-SC-AL-TX-ND; two other subspecies west and southwest.

Habitat: Both larvae and adults were found in a wide variety of lentic habitats and along margins of streams.

Life Cycle: Many adults were collected from March to December; they were most numerous from August through October. Between May 19 and October 3, 1,252 third instar larvae were collected. Most (51%) were collected in June, but 32% were collected between July 16 and August 15. The decline in adults after mid-May indicates that overwintering populations had mostly died after mating and oviposition. The bimodal peaks in numbers of larvae, and weekly collections of adults and larvae from McKenna pond, both suggest that this species is largely bivoltine. It is the only species of dytiscid with numerous third instar larvae in spring and again in August.

Identification: Adults resemble those of *L. proximus*, but are distinctly larger and have black-bordered maculae that separate pale areas along margins of the elytra. In *L. proximus*, maculae between lateral pale areas are only irrorate. Larvae are readily identified by the bold W-shaped mark and many temporal spines on the head. They also have three or more spines on each side of the gular area, which are never in a row; in *L. biguttatus* and *L. proximus* larvae there are usually two spines on each side of the gular area, and if three are present, they are in a row.

***Laccophilus proximus* Say, 1823**

Distribution and abundance: Common southern third, less common northward, uncommon east-central and north (Table 1). County records (Map 1): 2–3, 6, 8, 14, 18, 20, 24–29, 31–33, 35–39, 47, 49, 51, 53–68, 70–72. Range: SD-NH-FL-TX-NM-CO.

Habitat: Adults were found mostly in open ponds, marshes, and flooded areas; they were uncommon along streams. Larvae occurred only in open ponds and marshes.

Life Cycle: Less than 5% of the adults were found before June; most were collected from August to October. Larvae were collected from June 30 through September 30, suggesting staggered oviposition.

Identification: Adults are near the size of *L. fasciatus*, but have at most a hint of a fascia in the apical third of the elytra. The "small, stout setae occurring between temporal spines" reported by Barman (1972) for larvae from New York could not be found on Wisconsin larvae at 144X magnification.

***Laccophilus undatus* Aubé, 1838**

Distribution and Abundance: Rare southwest (Table 1). County records (Map 1): 51, 57. Range: WI-ON-VT-VA-IL

Habitat: Adults and one larva were found in wooded river sloughs and ponds created by flooding.

Life Cycle: All adults were collected between mid-April and mid-June; none were teneral. A single third-instar larva was collected along with five

adults on June 14, which suggests that adults of this species overwinter and that larvae develop earlier in spring than those of the other species.

Identification: Adults, which have distinctly maculate elytra, lack irrorations found in *L. maculosus*, *L. proximus*, and *L. fasciatus*. The single larva that was collected is undoubtedly *L. undatus*; it differs in many respects from larvae of the other species collected in Wisconsin, all of which have been described. Dorsally, the center of the head is pale in the area where the other species have dark markings. Instead there is a narrow, brown band with a short posterior extension, which is anterior to the eyes and arches across the frontoclypeus from the margin of the head just anterior to the antennae. In addition, the head has a distinct, narrow stripe that extends from behind each eye almost to the posterior margin; broader, less prominent marks occur behind eyes of other species. There are two long temporal spines and one very small spine immediately posterior to them. The other species normally have at least four strong spines; rarely they have three. As in the other three species, there is a more dorsal spine posterior to the temporal spines. There is only a single spine on each side of the gular area; two or more occur in the other species.

NOTERIDAE

Hydrocanthus Say, 1823

***Hydrocanthus iricolor* Say, 1823**

Distribution and Abundance: Very rare south (Table 1); four adults collected September 17, 1984 from Gibraltar Bog in Columbia Co. (58 on Map 1), two by me and two by students who retained them for their collections. Range: WI-PQ-ME-NC-IN.

Habitat: Adults were collected from cattails (*Typha*) and bur-reed (*Sparganium*) surrounding an open leatherleaf (*Chamaedaphne*) bog.

Life Cycle: The life cycle is unknown because no larvae or teneral adults were collected.

Identification: No other large noterid occurs as far north as Wisconsin. Young (1985) provides a key to American species.

Suphisellus Crotch, 1873

***Suphisellus puncticollis* Crotch, 1873**

Distribution and Abundance: Uncommon southern third, one record northeast (Table 1). County records (Map 1): 21, 56, 58–59, 61, 70, 72. Range: WI-ON-MA-FL-IN.

Habitat: Adults were found only in cattail and bur-reed marshes and ponds.

Life Cycle: Adults were collected from early June to November. All adults that were collected in June and July were darkly pigmented and had undoubtedly overwintered. Twelve of 14 teneral adults were collected in September; the other two were collected August 6 and November 1. This suggests oviposition in June or July, larval development in summer, and peak emergence of adults in September.

Identification: The small size of adults readily separates them from *Hydrocanthus iricolor*, and the pale fascia across the elytra distinguishes them from other *Suphisellus* (Young 1979) or *Pronoterus*, none of which are likely to occur in Wisconsin. This fascia is less prominent in overwintering adults, but still is readily visible.

ACKNOWLEDGMENTS

For their contributions to the U.W.-Madison Aquatic Insect Collection, I thank Kevin Kenow, U.S. Fish and Wildlife Service, LaCrosse, WI, for a large collection of adult beetles that he trapped from the Horicon Marsh, Kurt Schmude, a graduate student in Entomology, for many interesting Dytiscidae he collected from various areas of Wisconsin, and Bryn Tracy, Carolina Power and Light, New Hill, NC, for his extensive collection of adult and larval Dytiscidae from McKenna Pond, which added much to our knowledge of life cycles. I also wish to thank Dr. David Larson, Memorial University, St. John's, Newfoundland, for his help and advice, and for the many specimens that he provided me.

LITERATURE CITED

Alarie, Y. 1991. Description of larvae of 17 Nearctic species of *Hydroporus* Clairville (Coleoptera: Dytiscidae: Hydroporinae) with an analysis of their phylogenetic relationships. Can. Entomol. 123:627–704.

Barman, E. H., Jr. 1972. The biology and immature stages of selected species of Dytiscidae (Coleoptera) of central New York State. Ph.D. Diss., Cornell Univ. v + 207 pp.

Burmeister, E. G. 1976. Der Ovipositor der Hydradephaga Coleoptera und seine phylogenetische Bedeutung unter besonderer Berrücksichtigung der Dytiscidae. Zoomorphologie 85:165–267.

_____. 1990. The systematic position of the genus *Agabetes* Crotch within Dytiscidae (Coleoptera: Adephaga). Quaest. Entomol. 26:221–238.

Hilsenhoff, W. L. 1987. Effectiveness of bottle traps for collecting Dytiscidae (Coleoptera). Coleopt. Bull. 41:377–380.

_____, and B.H. Tracy. 1985. Techniques for collecting water beetles from lentic habitats. Proc. Acad. Nat. Sci. Philadelphia 137:8–11.

Larson, D. J., and R. E. Roughley. 1991. Family Dytiscidae predaceous diving beetles. p. 62–72. *In:* Y. Bousquet, ed., Checklist of beetles of Canada and Alaska. Pub. 1861/E, Res. Br. Agr. Canada.

Nilsson, A. N. 1989. On the genus *Agabetes* Crotch (Coleoptera, Dytiscidae), with a new species from Iran. Ann. Entomol. Fennici 55:67–109.

Spangler, P. J., and R. D. Gordon. 1973. Descriptions of the larvae of some predacious water beetles (Coleoptera: Dytiscidae). Proc. Entomol. Soc. Wash. 86:261–278.

Watts, C. H. S. 1970. The larvae of some Dytiscidae (Coleoptera) from Delta, Manitoba. Can. Entomol. 102:716–728.

Wilson, C. B. 1923. Water beetles in relation to pondfish culture, with life history of those found in fishponds at Fairport, Iowa. Bull. Bur. Fish., Wash. 39:231–245.

Young, F. N. 1979. Water beetles of the genus *Suphisellus* Crotch in the Americas north of Columbia (Coleoptera: Noteridae). Southwestern Nat. 24:409–429

_____. 1985. A key to the American species of *Hydrocanthus* Say, with descriptions of new taxa (Coleoptera: Noteridae). Proc. Acad. Nat. Sci. Philadelphia 137:90–98.

Zimmerman, J. R. 1970. A taxonomic revision of the aquatic beetle genus *Laccophilus* (Dytiscidae) of North America. Mem. Amer. Entomol. Soc. No. 26. 275 pp.