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Dytiscidae and Noteridae of Wisconsin (Coleoptera). III. Distribution, Habitat, Life Cycle, and Identification of Species of Colymbetinae, Except Agabini

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University of Wisconsin

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DYTISCIDAE AND NOTERIDAE OF WISCONSIN (COLEOPTERA). III. DISTRIBUTION, HABITAT, LIFE CYCLE, AND IDENTIFICATION OF SPECIES OF COLYMBETINAE, EXCEPT AGABINI

William L. Hilsenhoff

ABSTRACT

Nineteen species of Colymbetinae, excluding Agabini, were collected in Wisconsin over the past 30 years. Included are three species of Colymbetes, two species of Copelatus, three species of Coptotomus, two species of Neoscutopterus, and seven species of Rhantus. Species keys are provided for adults, but larvae are poorly known and species keys are provided only for larvae of Matus and Neoscutopterus. Information on distribution and abundance in Wisconsin, habitat, life cycle, and identification is provided for each species based on a study of 9,857 adults and 834 larvae. Most species had univoltine life cycles, with adults overwintering and larvae developing mostly in spring and early summer. A partial late summer generation occurred occasionally in some species of Coptotomus, Matus, and Rhantus. Adults overwintered in aquatic habitats, except those of five species of Rhantus that overwintered in terrestrial sites. Both species of Neoscutopterus had semivoltine life cycles, with adults and larvae overwintering.

Eight genera and 53 species of Colymbetinae were collected in Wisconsin. The tribe Agabini, which contains 24 species of Agabus and 10 species of Ilybius from Wisconsin, will be discussed in part IV. Six genera and 19 species are treated here as the result of a study of 9,857 adults and 834 larvae (Table 1). Included separately in Table 1 are records of beetles collected from McKenna Pond (Hilsenhoff 1992) and 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 included in part I of this study (Hilsenhoff 1992). Part I also has a map of Wisconsin with numbered counties that are grouped into nine areas.

Adults and larvae of Copelatus, Coptotomus, and Matus differ greatly from each other and from those in remaining genera. These genera usually are placed in separate tribes (Copelatini, Coptotomini, and Matini), and Copelatus sometimes is placed in a separate subfamily, Copelatinae. The other three genera, Colymbetes, Neoscutopterus, and Rhantus are in the tribe Colymbetini. Colymbetinae larvae are poorly known because most species have not been associated with adults; species keys have not been developed for most genera, and published generic keys do not reliably identify larvae in some North American genera. In the most recent key (White et al. 1984), Neoscutop-
Table 1. Numbers of Colymbetinae adults (A) and larvae (L) from nine areas of Wisconsin (Map in part I), McKenna Pond (McK), and Leopold Memorial Reserve (LMR) collected between 1962 and 1992.

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*Only third instar larvae have lateral spiracles.

Key to Genera of Third Instar Larvae of Colymbetini*

16(15'). Tarsal claws with small spines on lower margin in basal half; labium truncate apically (Fig. 1). .................................17
16'. Tarsal claws without small spines on lower margin in basal half; labium distinctly emarginate apically (Fig. 2). .................................16a
16a(16'). Basal segment of labial palp much shorter than maxillary stipes; southern United States ..........................Hoperius
16a'. Basal segment of labial palp much longer than maxillary stipes; boreal North America .................................Neoscutopterus
17(16). Head capsule width < 2.6 mm; each urogomphus with one short, spine-like seta ventrolaterally in basal half, or with many such setae dorsally, laterally, and ventrolaterally ..........................Rhantis
17'. Head capsule width > 2.8 mm; urogomphi may have short setae, but none are spine-like .................................Colymbetes

terus is not included and the character that separates Rhantis from Colymbetes cannot be relied upon to separate larvae in North America (Hilsenhoff 1989). This key is modified below to include Neoscutopterus and to separate Rhantis and Colymbetes larvae that occur north of Mexico, except in coastal states from Texas to New York and states bordering on Mexico where Rhantis atricolor (Aubé, 1838) or R. calidus (Fabricius, 1792) occur. Adults of the latter two species are distinctly larger than those of the other eight species of North American Rhantis, and their larvae probably cannot be separated from those of Colymbetes by head capsule width in the key below.

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Below, under each genus, is a key to adults of species that occur or may occur in Wisconsin; a size-range for adults from Wisconsin is included for each species. A key to third instar larvae is also included for *Matus* and *Neoscutopterus*. Following the keys is information on distribution and abundance in Wisconsin, general range in North America, habitat, life cycle, and identification. County records are represented by numbers on the map in part I (Hilsenhoff 1992); records based only on larvae are marked with an asterisk.

**Colymbetes** Clairville, 1806

The genus in North America was revised by Zimmerman in 1981. Seven species were recognized, three of which occur in Wisconsin. It is unlikely any other species occurs in Wisconsin (Zimmerman 1981). While larvae of *C. paykulli* and *C. sculptilis* have been reared and described, those of *C. exaratus* remain unknown; they are probably very similar to larvae of *C. sculptilus*, so a larval key is not included. All species apparently have a similar univoltine life cycle, with adults overwintering in deeper lentic habitats and flying to breeding sites in early spring to oviposit. Larvae rapidly complete development; no larvae were collected after June.

**Key to Species of Adult Colymbetes in Wisconsin**

1. Legs entirely black; 15.3-18.5 mm long. .................... *paykulli*
   Legs testaceous or rufotestaceous with infuscations .......... 2

2(1). Metafemur rufotestaceous, usually with medial infuscation; penis > 5.00 mm long and evenly tapered to tip, which is barely recurved (Fig. 3); grooves of macrosculpture on pronotum of female shallow, dark in area of black discal spot; 14.7-17.5 mm long. ........ ....... *sculptilis*
   Metafemur entirely testaceous; penis < 4.75 mm long, very narrow proximad of tip, which is distinctly recurved (Fig. 4); grooves of macrosculpture on pronotum of female deep, pale in area of black discal spot; 14.4-16.4 mm long. .................... *exaratus exaratus*

*Colymbetes exaratus exaratus* LeConte, 1862

**Distribution and Abundance:** Uncommon in west-central, central, southwest, and south-central areas (Table 1). County records: 26–27, 29, 40, 52, 61. Range: YK-MB-IL-NE-MT-BC; *Colymbetes exaratus incognitus* Zimmerman, 1981 occurs farther to the southwest.

**Habitat:** Adults were collected from shallow cattail (*Typha*) ponds, sloughs, and a sedge (*Carex*) marsh.

**Life Cycle:** The only teneral adult was collected 2 June, indicating completion of larval development in May.

**Identification:** Larvae are unknown, but since adults are very similar to those of *C. sculptilis*, their larvae probably are also very similar. Adults are most readily separated from those of *C. sculptilis* by their completely testaceous metafemora. However, teneral and slightly teneral *C. sculptilis* often have pale metafemora that lack the normal infuscation. For this reason the pronotum of all females and genitalia of all males with pale metafemora should be checked. The shorter penis with a tip recurved at about a 45° angle (Fig. 4), and the bold macrosculpture on the pronotum of females, are diagnostic.

*Colymbetes paykulli* Erichson, 1837 = *C. longulus* LeConte, 1862

**Distribution and Abundance:** Common in northern third, uncommon in central third, rare in southern third (Table 1); County records: 1–3, 5, 8–21, 23, 27, 30–34, 38–39, 44, 48, 57. 61. Range: YK-NF-NH-MN-SK-BC+CO.

**Habitat:** Although adults apparently overwinter in a variety of ponds, after April most were collected from swamps or boggy areas that contained *Sphagnum*. Five larvae were also collected from such habitats; another was found in a sedge-cattail marsh.

**Life Cycle:** Larvae were collected 9–29 June, well after most larvae of *C. sculptilis* had pupated. Later development than in the other two species is probably due to their colder larval habitat.
Identification: Because they are completely black underneath, adults could be confused only with those of *C. dahuricus* Aubé, 1836, a more northern and western species that is unlikely to occur in Wisconsin (Zimmerman 1981). In *C. dahuricus* the black on the pronotum is confined to the disc and does not reach the anterior and posterior margins as it does in *C. paykulli*. Third instar larvae can be distinguished from those of *C. sculptilis* by their greater head capsule width (3.4 mm or more), 4 or 5 posteroventral spines on the protarsi instead of 2 or 3, and the presence of many extremely small, black, fine-tipped setae on mid-abdominal sterna (Hilsenhoff 1989).

*Colymbetes sculptilis* Harris, 1829

**Distribution and Abundance:** Very common statewide (Table 1). County records: 1-27, 29-68, 70-72. Range: AK-NF-DC-NE-CO-UT-BC.

**Habitat:** Almost all larvae were collected from shallow, open ponds with cattails and sedges along their margins. Rarely, they were collected from other habitats. Most adults also were found in such habitats.

**Life Cycle:** Adults apparently overwinter in ponds, which also may serve as breeding habitats. They oviposit extremely early in spring, with most larvae completing development by mid-May. Third instar larvae were collected as early as 13 April. Very few larvae were found in June; the latest collection was from a pond in Brown County in late June.

**Identification:** Teneral adults can be confused with *C. exaratus*, as discussed under that species. It is possible one or more of the 183 larvae identified as *C. sculptilis* (Table 1) are really *C. exaratus*, but since adults of *C. sculptilis* were 139 times more abundant than those of *C. exaratus*, it is likely most or all larval identifications are correct. Separation of larvae from those of *C. paykulli* is discussed under that species.

*Copelatus* Erichson, 1832

*Copelatus* is primarily tropical, with two species occurring as far north as Wisconsin. Adults of Nearctic species were studied by Young (1963), who provided a key and information on the distribution and identification of eight species and three subspecies. The larva of *C. glyphicus* was described by Spangler (1962); larvae of other species remain undescribed.

**Key to Species of Adult *Copelatus* in Wisconsin**

1. Each elytron with 10 impressed discal striae, alternate striae more or less abbreviated apically; first stria twice as far from elytral suture as from second stria; smaller, 4.5-5.1 mm long .................. *glyphicus*

2. Each elytron with 8 impressed discal striae of about equal length; first stria five times as far from elytral suture as from second stria; larger, 5.5-5.8 mm long .................. *chevrolati chevrolati*

*Copelatus chevrolati chevrolati* Aubé, 1838

**Distribution and Abundance:** Very rare in south-central area (Table 1). County records: 57, 61. Range: WI-ON-FL-AL; *Copelatus chevrolati renovatus* Guignot, 1952 occurs in the southwestern United States.

**Habitat:** The breeding habitat is unknown; one adult was collected 20 August with a black-light and another 3 October from a spring-pond, which was likely an overwintering site.

**Life Cycle:** The life cycle is probably similar to that of *C. glyphicus*. The
adult collected 3 October was teneral, which suggests adults overwinter in ponds and larvae develop in late summer.

**Identification:** Characters in the key readily separate adults from those of *C. glyphicus*. It is the only Nearctic species with eight impressed discal striae and a submarginal stria on each elytron.

*Copelatus glyphicus* (Say, 1823)

**Distribution and Abundance:** Probably uncommon statewide (Table 1). Collection records: 2, 33, 49–50, 54, 56–57, 61–64, 67, 72. Range: MN-ON-NF-FL-TX.

**Habitat:** Overwintering adults were collected in early April from a variety of aquatic habitats, but summer collections were predominantly from shallow temporary habitats that often were associated with streams. I suspect larvae develop in shallow habitats flooded in summer by rain or overflow from streams. One larva that fit Spangler's (1962) description was collected September 21 from a temporary cattail-sedge-grass marsh on the University of Wisconsin-Madison campus.

**Life Cycle:** Six teneral adults were collected 31 July through 3 October, half of them in light traps. All 29 adults collected 3 April through 14 July were fully sclerotized; most were collected by bottle traps in early April. Adults apparently overwinter in lentic habitats and fly to recently flooded shallow habitats in summer to oviposit. Larvae then develop in these habitats, pupate on land, and subsequently newly-emerged adults fly back to overwintering sites to complete the univoltine life cycle.

**Identification:** No other small dytiscid in Wisconsin has 10 impressed discal striae and a submarginal stria on each elytron.

*Coptotomus* Say, 1834

Prior to 1980, only *C. longulus*, a western species, and *C. interrogatus* (Fabricius, 1801) were thought to occur in the north-central United States and Canada. My study of this genus (Hilsenhoff 1980) revealed *C. interrogatus* was a southern and east coast species that was usually misidentified as *C. obscurus* Sharp, 1882, and adult *Coptotomus* from north-central North America that had been identified as *C. interrogatus* were two undescribed species, which I named *C. lenticus* and *C. loticus*. Adults of the three species that occur in Wisconsin can be readily identified by differences in dorsal color patterns (Figs. 5–7), although there is considerable variation between darkly and lightly pigmented specimens. The metasternal wing is always distinctly narrower in *C. loticus* than in the other two species, and almost always wider in *C. longulus* than in *C. lenticus*.

Without explanation, Larson and Roughley (1991) treated *C. lenticus* as a junior synonym of *C. longulus*. These species are sympatric in Wisconsin and Manitoba, but I have never found an intermediate specimen in Wisconsin and none were present in the University of Manitoba collection, which I examined. To aid future identifications, variations in dorsal color and structural characters are discussed at length under each species.

Larvae of this genus are unique among Dytiscidae because they have long lateral filaments on the first six abdominal segments. I was unable to find characters to separate the 162 larvae that were collected. Bottle traps were more effective than a net for collecting larvae, while adults were just as readily collected with a net as with traps (Hilsenhoff 1991).

All three Wisconsin species are normally univoltine, with overwintering adults mating and ovipositing in the spring. Most larvae develop in late spring and early summer, with adults emerging in early and mid-summer.

With one exception, all larvae were collected in June and July, and all teneral adults were collected between late June and early September. The notable exception, which will not be repeated below, was the collection of one second instar and 10 third instar larvae along with two very teneral adult *C. lenticus* and one teneral adult *C. loticus* on 7 March 1990. These specimens were collected at the Leopold Memorial Reserve from a vernal pond, which when flooded in the spring, is connected by a ditch to a large, permanent, cattail marsh adjacent to the Wisconsin River. The larvae probably developed in this marsh and overwintered there during an unusually mild winter. Exceptionally warm, late winter temperatures apparently induced some larvae to pupate and emerge.

**Key to Species of Adult *Coptotomus* in Wisconsin**

1. Metasternal wing narrow, < 0.29 mm at narrowest point adjacent to mesocoxa (not including bead); elongate pale marks at base of elytra broad in relation to their length (Fig. 5); 6.8–8.1 mm long. . . . *loticus*

2. Metasternal wing wide, > 0.32 mm at narrowest point adjacent to mesocoxa; elongate pale marks at base of elytra narrow, except for a short, lateral, posterior-projecting extension at base (Figs. 6–7) . . . . . . . . . . 2

2(1). Irrorate area of elytra with solid black areas laterally and basally (Fig. 6); a solidly-pigmented, submarginal, black or brown dash near middle
of each elytron (Fig. 6), which rarely may extend to near the apex; 7.2–8.5 mm long. ........................................... \textit{Coptotomus lenticus}

Iroration of elytra uniform, with a darker area at base and at most some darkening at edges (Fig. 7); submarginal dash absent (Fig. 7), or narrow and containing several pale spots 7.3–8.6 mm long. ........................................... \textit{Coptotomus longulus}

\textbf{Coptotomus lenticus} Hilsenhoff, 1980


\textbf{Habitat:} Almost all adults were collected from permanent ponds or deep permanent marshes. Larvae were also collected from such habitats and assumed to be this species or \textit{Coptotomus longulus}. Adults of \textit{Coptotomus lenticus} and \textit{Coptotomus longulus} frequently occurred together in the same habitat; sometimes all three species were found in ponds near rivers.

\textbf{Life Cycle:} Adults were collected from February to November, being somewhat more abundant from June to October. All larvae from lentic habitats, most of which were probably this species, were collected between 5 June and 21 July; teneral adults occurred between 16 July and 10 September, mostly in late July. This suggests adults overwinter in permanent ponds and marshes, and the life cycle is normally univoltine as described for the genus.

\textbf{Identification:} Adults (Fig. 6) are characterized by: (1) an uneven density of irrorations on the elytra, with basal and lateral maculae often solid black or nearly so; (2) a wide black sutural stripe in the middle third of the elytra; (3) a pair of elongate pale stripes at the base of the elytra with a short, posterior-projecting lateral extension; (4) a solid black or brown submarginal dash near the middle of each elytron; and (5) the lack of a distinct tooth on the posterior protarsal claws of males. In \textit{Coptotomus longulus} irrorations on the elytra are always very uniform throughout and the sublateral dash is absent or, occasionally, narrow and containing several pale spots. In both \textit{Coptotomus longulus} and \textit{Coptotomus lenticus} the sutural stripe is always uniformly very narrow in the middle third of the elytra. In some specimens of \textit{Coptotomus lenticus} the black sutural stripe may be narrowed near the middle, but it is never uniformly very narrow in the middle third. The basal pale stripes are much narrower and usually longer than in \textit{Coptotomus longulus}. The posterior protarsal claw of males is only somewhat ridged, but never distinctly toothed as in \textit{Coptotomus longulus}. The narrowest width of the metasternal wing adjacent to the mesocoxae (not including the bead) in 50 specimens from throughout Wisconsin ranged from 0.325–0.413 mm (mean = 0.366 mm), and was almost always narrower than that of \textit{Coptotomus longulus} (range 0.400–0.500 mm, mean = 0.448 mm). It was always wider than in \textit{Coptotomus longulus} (range 0.200–0.288 mm, mean = 0.256 mm). The ratio (WC/WS) of the narrowest width of the metasternal wing (WS), to the width of the metacoxal plate (WC) along the same line was always greater in \textit{Coptotomus lenticus} (5.13–6.00) than in \textit{Coptotomus longulus} (3.89–4.81). Black anterior and posterior marks on the pronotum are usually wider than in \textit{Coptotomus longulus} and narrower than in \textit{Coptotomus lenticus}, but in many individuals they are similar to these species.

\textbf{Coptotomus longulus} LeConte, 1951

\textbf{Distribution and Abundance:} Uncommon in north and east, fairly common in south and west (Table 1). County records: 1, 3, 6, 14, 25, 27–30, 33, 35–37, 44, 48–51, 53–54, 56–62, 69–70, 72. Range: BC-MB-IN-MO-SD-OR.

\textbf{Habitat:} Adults were collected from margins of permanent ponds and other permanent lentic habitats.

\textbf{Life Cycle:} Adults were found from March to November; teneral adults occurred from 27 June to 2 August. This suggests a univoltine life cycle as
described for the genus, with adults overwintering in permanent ponds and marshes.

**Identification:** Adults (Fig. 7) are characterized by: (1) their very uniform elytral irrorations; (2) a uniformly very narrow black sutural stripe in the middle third of the elytra; (3) broad metasternal wings; (4) a pair of narrow, elongate pale stripes at the base of the elytra that usually lack a posterior-projecting lateral extension at the base; (5) the lack of a solid submarginal dash; and (6) narrow anterior and posterior black bars on the pronotum that are separated by at least twice the width of the posterior bar. Elytral irrorations are uneven in the other two species, especially in *C. lenticus*, which has a much broader black sutural stripe. The pale stripes at the base of the elytra are much narrower than in *C. loticus* and the black bars on the pronotum are always much more widely separated than in that species. While the solid submarginal dash is absent, in about 15% of specimens there is a narrower dash that contains pale spots and is usually connected to a posterior series of dark spots that tend to coalesce.

**Coptotomus loticus** Hilsenhoff, 1980

**Distribution and Abundance:** Uncommon in northern third, common in southern two-thirds (Table 1). County records: 3, 6-7, 14, 20-21, 26, 30-32, 35-39, 41, 44, 49-58, 60-64, 67-68, 70. Range: ON-PQ-FL-TX-AR-WI.

**Habitat:** Most adults were collected from streams, or sloughs and ponds associated with streams, but 31 were also collected from permanent ponds that were not associated with streams and 11 were found in lakes. Eleven teneral adults were collected in a light trap; all other teneral specimens (20), except one, were collected in association with lotic habitats. Three *Coptotomus* larvae, which were probably this species, were collected from margins of streams. Larvae probably develop along margins of streams and in side-channels, sloughs, and ponds that are associated with streams.

**Life Cycle:** Teneral adults were collected between 23 June and 29 August, which suggests a univoltine life cycle as described for the genus. Numerous adults were collected from October through March in streams and sloughs, which were their principal overwintering sites.

**Identification:** Adults (Fig. 5) are characterized by: (1) a narrow metasternal wing; (2) wide, and usually short pale stripes at the base of the elytra with a prominent posterior-projecting lateral extension; (3) wide anterior and posterior dark marks on the pronotum that are narrowly separated and usually more fuscous than black; (4) uneven and often sparse irrorations on the elytra; (5) a very narrow black sutural stripe in the middle third of the elytra; and (6) a dark submarginal dash near the middle of the elytra. The anterior and posterior dark marks on the pronotum are never separated by more than the width of the basal mark, as in *C. longulus* and many *C. lenticus*. The posterior protarsal claws of the male are weakly toothed.

**Matus Aubé, 1936**

The most recent key to adults of the four North American species appears in Young (1953). Wisconsin is at the northern edge of the range of two species; the other two occur farther south. Almost all adults were collected with bottle traps, and most larvae were collected with a net. Larvae of both Wisconsin species were described and can be identified by comparisons in Wolfe and Roughley (1985); two of these comparisons are used in the key below.
Key to Species of Adult *Matus* in Wisconsin

1. Metacoxal plate with at most a hint of reticulate microsculpture; elongate oval, attenuate behind; 7.9–9.3 mm long. ................... *bicarinatus*
   Metacoxal plate with distinct reticulate microsculpture; ovate, not very attenuate behind; 8.9–9.4 mm long. .................. *ovatus ovatus*

Key to Species of Third Instar Larvae of *Matus* in Wisconsin

1. Eleven or fewer posteroventral spines on metatarsus; 20 or fewer spines on inner ventral surface of procoxa. ....................... *bicarinatus*
   Fifteen or more posteroventral spines on metatarsus; at least 23 spines on inner ventral surface of procoxa .................. *ovatus ovatus*

*Matus bicarinatus* (Say, 1823)

Distribution and Abundance: Fairly common in southern third, rare in central third (Table 1). County records: 36, 46, 50–51, 54–57, 59–61, 70*, 71. Range: WI-ON-MA-VA-TX.

Habitat: Adults were collected from permanent ponds and marshes that were almost always near or associated with large streams. Water levels in these habitats often were influenced by the water level of the stream. Ten collections of larvae were also from ponds or marshes associated with large streams; one was from a small, deep pond that was not near a stream.

Life Cycle: Adults overwinter in areas that are likely their breeding sites, since many were trapped from such areas very early in the spring. All second and third instar larvae were collected 31 May to 15 June. Teneral adults were collected at light traps 16 and 23 July, and another was collected from a permanent pond 17 September. This suggests most larvae develop in late spring and early summer and occasionally there is a second or delayed generation in late summer.

Identification: Adults of the two species are very similar, but in *M. ovatus* the elytra are more rounded in the apical third and the metacoxal plate has a distinct alutaceous microsculpture that is easily seen at 72X. Larvae can be identified by differences noted by Wolfe and Roughley (1985).

*Matus ovatus ovatus* Leech 1941

Distribution and Abundance: Very rare in southeast area (Table 1). County records: 71–72. Range: WI-PQ-VA-IL; *Matus ovatus blatchleyi* Leech, 1941 occurs farther south.

Habitat: Two adults were collected from ponds closely associated with the Fox River in Racine County, which suggests their habitat is similar to that of *M. bicarinatus*.

Life Cycle: Adults were collected in early April, early June, and early October. The life cycle is probably similar to that of *M. bicarinatus*. No larvae or teneral adults were found.

Identification: Differences are discussed under *M. bicarinatus*.

*Neoscutopterus* J. Balfour-Browne, 1943

Both species are restricted to boreal North America. Larson (1975) provided descriptions of adults, a key to species, and notes on distribution and natural history. He also noted an association of adults with cold water and *Sphagnum*. Larvae were unknown before 1989, when I described third-instar larvae and compared them with larvae of other Colymbetini (Hilsenhoff 1989).
Because most larvae and adults inhabit *Sphagnum*, they are very difficult to capture with a net; almost all specimens were collected with traps.

**Key to Species of Adult Neoscutopterus in Wisconsin**

1. Visible abdominal sternum 2 rufous mediolaterally; antenna and palpi entirely rufous, at most vaguely darker apically; 14.8-17.2 mm long
   - *hornii*
   Abdominal sterna entirely piceous to black; antenna and palpi infuscate on apical segments; 14.5-17.1 mm long
   - *angustus*

**Key to Species of Third Instar Larvae of Neoscutopterus in Wisconsin**

1. Urogomphus shorter, < 0.75 length of last abdominal segment; basal segment of labial palp about 1.30 times length of distal segment
   - *hornii*
   Urogomphus longer, > 0.80 length of last abdominal segment; basal segment of labial palp about 1.15 times length of distal segment
   - *angustus*

*Neoscutopterus angustus* (LeConte, 1850)

**Distribution and Abundance:** Uncommon in northern third (Table 1). County records: 1, 5, 11-13, 15, 18. Range: YK-NF-ME-WI-BC.

**Habitat:** Adults and larvae were found only in black spruce-tamarack (*Picea mariana-Larix laricina*) swamps containing *Sphagnum* and scattered trees.

**Life Cycle:** Adults were collected from late April to late August. Six teneral adults and one recently molted third-instar larva were collected in mid-August. I believe the life cycle is semivoltine. Adults emerge in August and perhaps early September, overwinter, and probably oviposit in spring when habitats become free of ice. Eggs hatch in May and larvae develop throughout the rest of the year to overwinter as immature third instar larvae. Larvae complete development the following spring and summer, and pupate in late July or August.

**Identification:** Characters in the key readily distinguish adults of the two species. The pronotum in lateral view abruptly curves downward to the rear just anterior to its base, while it is evenly curved or straight in *N. hornii*. Additional characters for identification of larvae appear in Hilsenhoff (1989).

*Neoscutopterus hornii* (Crotch, 1873)

**Distribution and Abundance:** Common in northern third, rare in central area (Table 1). County Records: 1-3, 5-6, 8-9, 11-12, 15-19, 20*, 23*, 34. Range: AK-LB-WI-BC.

**Habitat:** Almost all adults and larvae were collected from swamps or bogs containing *Sphagnum*. Two collections containing both larvae and adults were from ditches in sedge-grass areas in early April, but water in these ditches could have flowed out of swamps during the spring thaw.

**Life Cycle:** Bottle trap collections of adults (52) and large third instar larvae (88) in April show that both overwinter. No larvae were collected in May or June. One small third instar larva was collected 19 July, and two first and two second instar larvae were collected in mid-August along with several large third instar larvae that were almost as large as those collected in April. Teneral adults were collected at five different sites from 20-29 June. Collections of larvae and teneral adults suggest a semivoltine life cycle with over-
wintering third instar larvae pupating in late May or early June, and adults emerging, mating, and ovipositing in late June and early July. Larvae begin development in July or early August, probably spend the first winter as second instar larvae, continue development the following spring and summer, and spend a second winter as mature third instar larvae. Overwintering adults were individuals that perhaps did not mate the previous summer, but instead waited until the following spring to mate and oviposit. Their progeny would begin development in early summer as described above, and thus they would have a three-year life cycle.

Identification: Separation of adults and larvae from those of *N. angustus* is discussed under that species.

**Rhantus Dejean, 1833**

The genus in North America was revised by Zimmerman and Smith in 1975. Ten species occur in North America; seven of them occur in Wisconsin. Adults of six of the Wisconsin species are similar to each other, with a testaceous head that is mostly black in the posterior half, a mostly testaceous pronotum, and testaceous elytra covered with black irrorations. Adults of the seventh species, *R. sinuatus*, are very different, being entirely dark and having a basally sinuate pronotum; they superficially resemble *Agabus erichsoni* Gemminger and Harold, 1886 and some species of *Ilybius*.

The larva of *R. binotatus* was described by James (1969), that of *R. seri-cans* (as *notatus*) by Watts (1970), and that of *R. consimilis* by Barman (1972). These descriptions are too incomplete to permit identification of larvae of these species, but all were noted to have several spine-like setae on the urogomphi. I studied 357 third instar *Rhantus* larvae from Wisconsin, but efforts to find characters by which all species can be identified were fruitless. There are two types of larvae, those with 10 to 20 short, spine-like setae dorsally, laterally, or ventrolaterally on the urogomphi, and those with a single spine-like seta ventrolaterally between the basal third and basal half of each urogomphus. In the latter, the urogomphi are distinctly shorter than the last abdominal segment; I believe these are larvae of *R. wallisi* and *R. suturellus*. Among larvae with several spine-like setae on each urogomphus, most of those with urogomphi about equal in length to the last abdominal segment are probably *R. consimilis* as described by Barman (1972), and most of those with urogomphi distinctly longer than that segment are probably *R. binotatus* as described by James (1969), but some may be *R. gutticollis*. Since adults of *R. sinuatus* are very different and placed in the subgenus *Nartus*, I expect their larvae are also noticeably different, but I have not seen any larva that differs from those described above.

Galewski (1964) reported all *Rhantus* adults in Europe overwinter in terrestrial habitats. Collection records indicate adults of Wisconsin species, except *R. binotatus* and *R. gutticollis*, also overwinter in terrestrial habitats. Temperatures sufficiently warm to permit flight to terrestrial sites are infrequently encountered after October. Twenty-four percent of *R. binotatus* adults and 32% of *R. gutticollis* adults were collected from aquatic habitats in October and November, with collections as late as 21 and 14 November, respectively. These late autumn collections were from permanent ponds and margins of streams, sites typically used by other species of Dytiscidae for overwintering. The latest collection date for adults of other species of *Rhantus* was for a specimen of *R. wallisi* on 1 October. Adults of *R. binotatus* and *R. gutticollis* were also numerous in September, when the other species were rare or absent.
Key to Species of Adult *Rhantus* in Wisconsin

1. Mostly black, with rufous areas laterally on pronotum and elytra; base of pronotum sinuate; 9.4–10.4 mm long ................... *sinuatus*

   Yellow marks on head, thorax, and elytra; base of pronotum not sinuate .......................................................... 2

2(1). Posterior half of head black dorsally, without yellow marks; meso- and metasternum testaceous; 9.6–11.0 mm long ................... *consimilis*

   Posterior half of head dorsally with transverse yellow marks between eyes; meso- and metasternum black ........................................... 3

3(2). Pronotum with distinct posterior and often anterior black markings; no black marks on disc of pronotum ............................................ 4

   Anterior and posterior margins of pronotum testaceous; one or two dark spots on pronotal disc ........................................... 5

   Anterior black mark on pronotum indistinct, not widened mesally, posterior mark less than half as wide at middle as testaceous area that separates it from anterior mark; 9.6–10.8 mm long ............ *wallisi*

   Anterior black mark on pronotum distinct, widened mesally, posterior mark as wide at middle as testaceous area that separates it from anterior mark; 9.7–10.8 mm long .................... *suturellus*

5(3). A single, laterally-elongate, dark spot on pronotal disc; 9.8–10.1 mm long ............................................. *sericans*

   Paired dark spots on pronotal disc ........................................... 6

6(5). Black marking along anterior margin of eye absent or very narrow; elytra densely irrorate, obscuring rows of black spots on disc, except in teneral specimens; visible abdominal sterna 2–5 usually paler posteriorly; 10.4–11.8 mm long ................... *binotatus*

   Black marking along anterior margin of eye broad to margin, as wide as testaceous band between eyes; 3 longitudinal rows of black spots clearly visible on each elytron; abdominal sterna 2–5 usually black, except for a broad testaceous band along lateral margin; 10.2–11.7 mm long .................. *gutticollis*

*Rhantus binotatus* (Harris, 1828)

**Distribution and Abundance:** Common, except in east-central and southeast areas (Table 1). County records: 2–21, 23–34, 36–37, 39–40, 44, 48–52, 54, 57–61, 64–65, 68, 70. Range: AK-NF-NJ-MO-TX-CA.

**Habitat:** Teneral adults were collected mostly from permanent ponds and marshes, and occasionally from temporary ponds and marshes; these habitats probably represent the breeding habitat. In spring and fall adults were collected from a wide variety of habitats, including margins of streams.

**Life Cycle:** Adults apparently overwinter in deep ponds and margins of streams. Teneral adults (25 collections) were found 1 June–7 November. None were collected between 13 August and 17 September, but nine collections were made after 17 September. This suggests most larvae develop in late spring and early summer and there is a partial second generation in late summer and early autumn. Collections of larvae that I believe to be *R. binotatus* corroborate this primarily univoltine, partially bivoltine life cycle.

**Identification:** The key will readily separate adults from those of *R. gutticollis*, the only species it resembles. The two spots on the pronotum are usually elongated laterally; in *R. gutticollis* these spots are smaller and not laterally elongate. Protarsal claws of male adults are elongate and sinuate; those of *R. gutticollis* are short and not sinuate. Visible abdominal sterna 2–5 usually are distinctly paler or testaceous posteriorly; rarely they are mostly black.
Rhantus consimilis Motschulsky, 1859


Habitat: Almost all adults were found in permanent ponds; a few were collected from marshes.

Life Cycle: Half of the collections of adults were made before 15 May; two adults were found as early as 26 March. No adults were found after September, and only three percent were collected after 15 August. Twenty-eight collections containing teneral adults were made between 26 June and 7 September, 22 of them in July. Adults apparently overwinter in terrestrial habitats and fly to lentic habitats from late March to early May. There they mate, oviposit, and probably die shortly thereafter. Larvae develop in late spring and early summer, and pupate and emerge mostly in July. After emergence, adults probably spend a limited time feeding in aquatic habitats before flying to terrestrial overwintering sites. The life cycle is probably univoltine; the 7 September teneral adult likely resulted from delayed hatching and development in a northern Bayfield County site.

Identification: This is the only North American Rhantus in which adults are entirely testaceous ventrally.

Rhantus gutticollis (Say, 1834)


Habitat: Almost all adults were collected from permanent lentic habitats. Three teneral adults were collected from McKenna Pond, a large cattail and bur-reed (Sparganium) pond, which probably represents a typical breeding site.

Life Cycle: Most adults were collected in early spring or autumn; teneral adults were found between 18 October and 5 November. I suspect the life cycle is similar to that reported for R. binotatus.

Identification: Separation of adults from those of R. binotatus is discussed under that species. Rarely, posterior margins of abdominal sterna 2–5 are narrowly pale.

Rhantus sericans Sharp, 1882 = R. frontalis (Marsham, 1802) in part (Balke 1990)

Distribution and Abundance: Very rare in northwest area (Table 1). County records: 2, 4, 6. Range: AK-PQ-MO-NM-CA.

Habitat: Adults were collected from a river slough and two permanent ponds.

Life Cycle: Adults are most similar to those of R. consimilis. I suspect the life cycle is like that of R. consimilis, but too few specimens were collected to predict a life cycle.

Identification: While some R. consimilis adults may have a single discal spot on the pronotum, that species is entirely testaceous ventrally.

Rhantus sinuatus (LeConte, 1862)


Habitat: All except three adults were collected in bottle traps, which suggests they are nocturnal. Adults were found in a wide variety of lentic
habitats, but most were collected from shallow sedge or cattail marshes; often there was an association with *Sphagnum*. The only teneral adult was found in a sedge marsh.

**Life Cycle:** Most adults were collected from late May to early July, but several were also found in April. Two adults were collected in August, none after 20 August. A teneral adult was trapped 2 July. Adults apparently fly to terrestrial overwintering sites in late summer and re-enter lentic habitats in April to mate and oviposit. Larvae probably develop mostly in May and June.

**Identification:** The black color and sinuate base of the pronotum are distinctive.

*Rhantus suturellus* (Harris, 1828)

**Distribution and Abundance:** Uncommon in northern two-thirds, very rare in southern third (Table 1). County records: 1–4, 7, 9–11, 13–18, 20, 29–31, 33–34, 38–39, 47, 61. Range: AK-NF-NJ-IL-WY-WA.

**Habitat:** Adults were found mostly in ponds, bogs, and swamps. Teneral adults were collected from a ditch and two ponds. Larvae probably develop in permanent ponds and bogs.

**Life Cycle:** Adults were not found after 16 August, apparently having entered terrestrial overwintering sites by late summer. Two-thirds of collections containing adults were made in April, which indicates adults return to breeding sites early in spring to mate and oviposit. No adults were collected between 5 May and 16 June, corroborating the demise of most adults after mating and oviposition. Many adults were collected during the last half of June, including the three collections containing teneral specimens; this indicates larval development is mostly completed in June.

**Identification:** Adults are similar to those of *R. wallisi*, but the posterior and anterior black marks on the pronotum are much wider than in adults of *R. wallisi*, whose anterior pronotal mark is often obscure. The protarsal claws of males are subequal and not clearly sinuate; in *R. wallisi* the anterior protarsal claw is 1/6–1/7 longer than the posterior claw and both claws are distinctly sinuate. The anterior black mark that projects mesally from the eye is wider than in *R. wallisi* and extends farther forward around the eye. The metafemora are dark, being about the same color as the metasternum, while in *R. wallisi* they are usually distinctly lighter than the metasternum.

*Rhantus wallisi* (Hatch, 1953)

**Distribution and Abundance:** Fairly common in northern two-thirds, uncommon in southern third (Table 1). County records: 1–4, 6, 10–13, 15–20, 22–23, 27, 29, 31–39, 57–58, 61, 64–65, 68, 70, 72. Range: AK-NF-MA-IA-CO-CA.

**Habitat:** Almost all adults were found in permanent ponds; a few were collected from marshes or bogs. All teneral specimens were collected from permanent ponds, which are probably the normal larval habitat.

**Life Cycle:** Forty-five percent of collections containing adults were made before mid-May; only seven percent of collections were made after July, with one adult being collected as late as 1 October. Another adult was found hibernating in the margin of a dried-up pond 2 October. Thirty-seven third instar larvae that are probably this species or *R. suturellus* were collected between 12 May and 14 July; five were collected in May and only one in July. Three teneral adults were found between 21 June and 19 July. This suggests overwintering of adults in terrestrial habitats, their return to breeding sites to mate and oviposit in April and early May, and completion of larval development in late June and early July. Four larvae, which were likely this species,
were collected from McKenna Pond between 8 October and 5 November, 1981. This suggests a partial second generation with the November larva probably being unable to complete development.

**Identification:** Separation of adults from those of *R. suturellus* is discussed under that species.

**LITERATURE CITED**


