

The Great Lakes Entomologist

Volume 23

Number 2 - Summer 1990 *Number 2 - Summer 1990*

Article 3

June 1990

Gyrinidae of Wisconsin, With a Key to Adults of Both Sexes and Notes on Distribution and Habitat

William L. Hilsenhoff

University of Wisconsin

Follow this and additional works at: <http://scholar.valpo.edu/tgle>



Part of the [Entomology Commons](#)

Recommended Citation

Hilsenhoff, William L. (1990) "Gyrinidae of Wisconsin, With a Key to Adults of Both Sexes and Notes on Distribution and Habitat," *The Great Lakes Entomologist*: Vol. 23 : No. 2 , Article 3.

Available at: <http://scholar.valpo.edu/tgle/vol23/iss2/3>

This Peer-Review Article is brought to you for free and open access by the Department of Biology at ValpoScholar. It has been accepted for inclusion in The Great Lakes Entomologist by an authorized administrator of ValpoScholar. For more information, please contact a ValpoScholar staff member at scholar@valpo.edu.

**GYRINIDAE OF WISCONSIN, WITH A KEY TO
ADULTS OF BOTH SEXES AND NOTES ON
DISTRIBUTION AND HABITAT¹**

William L. Hilsenhoff²

ABSTRACT

More than 25,000 adult gyrids that include 24 species were studied from all areas of Wisconsin. *Dineutus discolor*, *Gyrinus aeneolus*, *G. analis*, *G. bifarius*, and *G. marginellus* are lotic; *D. assimilis*, *G. aquiris*, *G. confinis*, and *G. dichrous* apparently breed in both lotic and lentic habitats; and the remaining species probably breed primarily in deep ponds or littoral areas of lakes and impoundments. Most collections were from streams in late summer and autumn because adults of almost all lentic species fly to streams to overwinter and these overwintering aggregations were easily collected. A key to adults of Wisconsin species was developed, and by using the gonocoxae and secondary sexual characters, females can be identified as accurately as males.

I became interested in Gyrinidae after finding 17 species in the Pine-Popple River of northeastern Wisconsin (Hilsenhoff 1972), 13 of them in a single school in late-August. Subsequently I made an effort to collect adult gyrids from all areas of Wisconsin and collected 25,661 individuals of 24 species. They are common statewide, except in unglaciated counties of western and southwestern Wisconsin and counties bordering on central Lake Michigan, where suitable breeding habitats for lentic species are uncommon. Summer collection records indicate that five species are lotic, and at least four others probably breed in both lotic and lentic habitats. Most species, however, apparently breed primarily in lentic habitats, and adults of all except three of these lentic species often fly to larger streams in mid-October (as early as late August in dry years) to overwinter.

Unlike other aquatic beetles, which mostly inhabit shallow, vegetated water, Gyrinidae breed in deeper water and were infrequently found in shallow habitats. Adults of lotic species inhabited the larger, deeper streams, and lentic species inhabited deep ponds and littoral zones of lakes and impoundments. Adults of lentic species were difficult to collect from deep lentic habitats, but occasionally they were found in shallow water where substantial numbers were captured. However, after lentic adults flew to streams in autumn to overwinter, large numbers of adults of both lentic and lotic species were often collected when they congregated beneath undercut mud banks. They were numerous among roots of trees, shrubs, and grasses, at depths greater than 0.5 m, and where there was a moderate current. Late-autumn collections, which were usually aggregations of several species, provided most of the material used for this study. Once streams began to freeze, the beetles disappeared and could no longer be collected, even from areas where large numbers

¹Research supported by the College of Agricultural and Life Sciences, University of Wisconsin-Madison.

²Department of Entomology, University of Wisconsin, Madison, WI 53706

had been collected two weeks earlier. I suspect that they congregate below the frost line in burrows made by muskrats, crayfish, and other riparian animals. Adults of lentic species began to return to breeding sites in late March or early April, as soon as ice had melted and temperatures had warmed sufficiently to permit flight. At this time of the year they frequently were found as transients in shallow ponds. Adults of *Gyrinus impressicollis*, *G. sp. nr. minutus*, and *G. pectoralis* apparently do not fly to streams, causing them to be under-represented in this study. This was apparent from a comparison with numbers examined by Ferkinhoff and Gundersen (1983) from Minnesota.

The North American literature on Gyrinidae is scant. Two genera, *Dineutus* and *Gyrinus*, occur in the western Great Lakes region. Roberts (1895) provided a key to adults of *Dineutus* and Hatch (1930) improved the key. Wood (1962) further improved keys and provided notes on distribution, and in 1968 synonymized *D. analis* Regimbart, 1882, with *D. serrulatus* LeConte, 1868. Fall revised *Gyrinus* in North America in 1922; before his revision identification of species was almost impossible. Subsequent to his revision, adults of five additional species were described (Wallis 1926a, Chamberlain 1929, Fall 1931, and Leech 1938) and the status of another species was clarified (Wallis 1926b). Recently Oygur (1988) revised *Gyrinus*, synonymized 10 species, updated keys, and provided distribution records for American species north of Mexico. An unpublished manuscript by J. B. Wallis on "The Haliplidae, Dytiscidae and Gyrinidae of Minnesota and Manitoba," Larson's (1973) synopsis of that manuscript, and a recent study by Ferkinhoff and Gundersen (1983), added to our knowledge of species in the western Great Lakes region. A record of *Gyrinus wallisi* and tentative record of *G. hatchi* Wallis from Wisconsin (Ferkinhoff and Gundersen 1983) were misidentified females, and neither species has been collected in Wisconsin.

Gyrinus borealis, *G. piceolus*, *G. pleuralis*, *G. wallisi*, and *Dineutus emarginatus*, were not collected in Wisconsin, but possibly may occur here. Wood (1962) reported *D. emarginatus* from southern Michigan. Ferkinhoff and Gundersen (1983) reported *G. piceolus* from three locations in lower Michigan and also from Indiana, and *G. wallisi* from four locations in Minnesota. Oygur (1988) reported *G. borealis* from Indiana and eastern Michigan, and the western *G. pleuralis* from Ontario, Quebec, and Michigan.

Identification of adults of *Gyrinus* species has relied mostly on male genitalia, and both Fall (1922) and Ferkinhoff and Gundersen (1983) stated that identification of females is risky and in many species impossible. I found, however, that by using the gonocoxae (Burmeister 1976), two paddle-shaped sclerites of the ninth abdominal sternum, and secondary sexual characters (apex of last visible abdominal sternum and elytral microreticulation), along with species characters shared with males, females can be identified as easily and accurately as males. Below is a key to adults of Wisconsin species that employs these characters and uses ventral coloration and length to separate groups of species. Male and female genitalia for all Wisconsin species, and the sternal apex of female *Gyrinus* are described in the key and illustrated. Among individuals of the same species there is some variation in the sternal apex of females and shape of the tip of the parameres of males. The gonocoxae and penis, however, show remarkably little variation. While adults of most species can be readily identified by using the key, genitalia of males and females should be compared with figures for verification.

Lengths were measured from the anterior of the head to the tip of the elytra. Twenty-five individuals of each sex were measured and the size range and mean (in parentheses) are noted in the key. Only Wisconsin specimens were measured; sizes may be somewhat smaller farther south and somewhat larger farther north. Size ranges of rarer species are for all specimens collected (Table 1). Following the key is information on the distribution of species within Wisconsin (Table 1, Fig. 1), their habitat, elytral shape (*Dineutus*) or elytral microreticulation (*Gyrinus*), and notes on identification of species reported from neighboring states but not included in the

Table 1.—Number of collections of each species of Gyridae from nine areas of Wisconsin (Fig. 1) between 1963 and 1989, and total number of each species collected.

| | NW | NC | NE | WC | C | EC | SW | SC | SE | TOTAL |
|--------------------------------|----|----|----|----|----|----|----|----|----|-------|
| <i>Dineutus assimilis</i> | 9 | 20 | 8 | 18 | 34 | 17 | 56 | 91 | 22 | 2262 |
| <i>Dineutus discolor</i> | 23 | 12 | 4 | 5 | 18 | 4 | 16 | 22 | 5 | 2257 |
| <i>Dineutus hornii</i> | 14 | 12 | 8 | 1 | 9 | 8 | 1 | 8 | 3 | 470 |
| <i>Dineutus nigror</i> | 36 | 19 | 29 | 5 | 17 | 5 | 3 | 3 | 0 | 648 |
| <i>Gyrinus aeneolus</i> | 23 | 19 | 26 | 4 | 7 | 5 | 0 | 1 | 3 | 2308 |
| <i>Gyrinus affinis</i> | 11 | 38 | 39 | 1 | 15 | 2 | 1 | 4 | 2 | 1361 |
| <i>Gyrinus analis</i> | 3 | 1 | 0 | 1 | 6 | 1 | 12 | 23 | 4 | 3362 |
| <i>Gyrinus aquiris</i> | 1 | 11 | 7 | 1 | 25 | 8 | 4 | 15 | 6 | 1053 |
| <i>Gyrinus bifarius</i> | 16 | 23 | 23 | 2 | 16 | 5 | 1 | 27 | 7 | 4242 |
| <i>Gyrinus confinis</i> | 1 | 10 | 2 | 1 | 2 | 3 | 2 | 0 | 0 | 344 |
| <i>Gyrinus dichrous</i> | 5 | 14 | 7 | 1 | 3 | 1 | 0 | 0 | 1 | 445 |
| <i>Gyrinus frosti</i> | 3 | 9 | 3 | 0 | 7 | 0 | 1 | 7 | 0 | 613 |
| <i>Gyrinus gehringi</i> | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| <i>Gyrinus impressicollis</i> | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| <i>Gyrinus latilimbus</i> | 20 | 35 | 38 | 2 | 10 | 1 | 0 | 0 | 1 | 627 |
| <i>Gyrinus lecontei</i> | 41 | 51 | 71 | 19 | 48 | 21 | 18 | 44 | 27 | 1449 |
| <i>Gyrinus maculiventris</i> | 29 | 44 | 19 | 31 | 24 | 10 | 40 | 58 | 18 | 2361 |
| <i>Gyrinus marginellus</i> | 5 | 9 | 12 | 5 | 6 | 1 | 11 | 13 | 9 | 407 |
| <i>Gyrinus sp. nr. minutus</i> | 9 | 4 | 3 | 2 | 2 | 2 | 2 | 5 | 0 | 104 |
| <i>Gyrinus parvus</i> | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| <i>Gyrinus pectoralis</i> | 1 | 1 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 15 |
| <i>Gyrinus pugionis</i> | 25 | 22 | 13 | 2 | 9 | 0 | 0 | 0 | 0 | 209 |
| <i>Gyrinus sayi</i> | 4 | 18 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 142 |
| <i>Gyrinus ventralis</i> | 12 | 30 | 18 | 1 | 11 | 6 | 3 | 7 | 1 | 961 |

key. Females of all species were distinctly larger than males, except those of *Dineutus discolor* and *Gyrinus impressicollis*. In the latter species males were distinctly larger than females.

The key is arranged to facilitate sorting and identification. This is most easily accomplished if the gyrids have been preserved in 70% ethanol so that genitalia can be easily extruded for viewing. *Dineutus*, which are distinctly larger, are removed and keyed first. Next, easily recognized *Gyrinus* such as *G. maculiventris*, *G. affinis*, and *G. sp. nr. minutus* are identified and removed. Remaining species are then sorted into groups by ventral color and size and identified with the key. Rarely, small adults of *G. ventralis* or large adults of *G. aeneolus* and *G. marginellus* may not fall within the proper group at couplet 10. Male and female genitalia should be extruded to verify identifications of all individuals that fall near extremes of size ranges and also for representative specimens of all species. Teneral specimens, which may be recognized by their soft and slightly paler elytra, may be difficult to identify because ventral sclerites are not yet pigmented. Identification is possible, however, by using length, elytral microreticulation, punctation, and the genitalia. A very small percentage of females and males of several species may have extremely dull elytra. This condition is most noticeable in species that have little or no microreticulation and normally are glabrous. It is due to random microsculpture and may be a rare form of dimorphism.

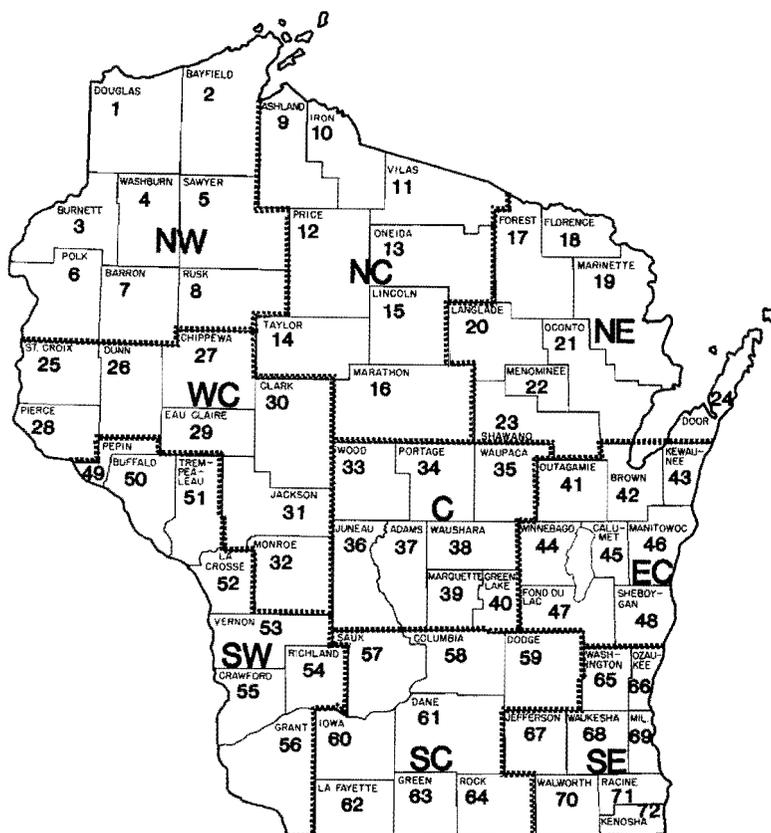


Figure 1. Location of nine 8-county areas of Wisconsin and number assigned to each county.

KEY TO SPECIES OF ADULT GYRINIDAE IN WISCONSIN

1. Scutellum not visible; elytral punctures scattered and indistinct; 10–13 mm long *Dineutus* 2
- 1'. Scutellum visible; elytra with distinct rows of sharp punctures; 3–8 mm long *Gyrinus* 5
- 2(1). *Dineutus*—Venter testaceous; elytral apices not produced in either sex; penis with rounded apex (Fig. 2a); gonocoxae elongate, widest near base (Fig. 2b); males 11.5–13.1 (12.2) mm long, females 11.4–12.9 (12.1) mm long *discolor*
- 2'. Venter black or piceous; elytral apices produced, except in male *D. hornii* 3
- 3(2'). Epipleura testaceous with numerous black spots laterally; penis narrow, tapered to acute apex (Fig. 3a); gonocoxae relatively short, almost as wide basally as apically (Fig. 3b); males 10.0–11.0 (10.5) mm long, females 10.6–11.8 (11.2) mm long *hornii*
- 3'. Epipleura same color as venter 4

- 4(3'). Protibiae light brown; penis abruptly narrowed before apex (Fig. 4a); gonocoxae short and truncate apically (Fig 4b); males 10.1-11.6 (10.9) mm long, females 10.7-11.9 (11.3) mm long *assimilis*
- 4'. Protibiae infuscate; penis broad, evenly tapered to point in apical fourth (Fig. 5a); gonocoxae elongate, widened laterally at middle (Fig.5b); males 10.6-12.2 (11.6) mm long, females 11.1-12.4 (12.0)mm long. *nigrior*
- 5(1'). *Gyrinus*—First 5 visible abdominal sterna black with broad, sharply contrasting rufotestaceous margins; penis tapered to an infuscate, laterally-compressed apex (Fig. 6a); gonocoxae infuscate, concave mesally, convex laterally (Fig. 6b); sternal apex of female broadly truncate to slightly convex Fig. 6c; males 5.4-6.2 (5.8) mm long, females 5.7-6.8 (6.3) mm long *maculiventris*
- 5'. Visible abdominal sterna 1-5 entirely black, rufous, or testaceous, sometimes infuscate mesally, but never as above 6
- 6(5'). Visible abdominal sterna 1-5 dark rufous, broadly infuscate mesally; elytra of both sexes completely covered with fine, transverse, microreticulations; penis needle-like in apical third (Fig. 7a); gonocoxae broad, convex laterally, straight mesally (Fig. 7b); sternal apex of female broadly rounded, mesally truncate (Fig. 7c); males 5.6-6.2 (5.9) mm long, females 6.0-6.8 (6.4) mm long *pugionis*
- 6'. Visible abdominal sterna 1-5 entirely black, or testaceous and sometimes infuscate mesally; if rufous and infuscate mesally, elytra lack microreticulations in at least basal half7
- 7(6'). Visible abdominal sterna 1-5 black or uniformly piceous..... 8
- 7'. Visible abdominal sterna 1-5 testaceous to rufous, often with mesal infuscations. 9
- 8(7). Epipleura testaceous to rufous, contrasting with venter; elytra ensely covered with short, oblique scratches; penis with apical fourth very narrow and piceous (Fig. 8a); elongate gonocoxae narrowed to truncate apex (Fig. 8b); sternal apex of female broadly truncate to slightly concave (Fig. 8c); males 6.1-6.8 (6.5) mm long, females 6.6-7.3 (6.9) mm long..... *affinis*
- 8'. Epipleura same color as venter; elytra without short, oblique scratches. 19
- 9(7'). Very small, males 3.4-3.9 (3.7) mm long, females 3.7-4.3 (4.0) mm long; elytra with very coarse microreticulations causing beetles to appear very dull; scutellum carinate; penis rather broad, slightly widened before rounded apex (Fig. 9a); gonocoxae very short and broad (Fig. 9b); sternal apex of female truncate to convex (Fig. 9c).... sp. nr. *minutus*
- 9'. Larger; if less than 4.4 mm long elytra are without dense microreticulations; scutellum not carinate 10
- 10(9'). Small, males rarely longer than 4.7 mm, females rarely longer than 5.1 mm..... 11
- 10'. Larger, males at least 4.8 mm long, rarely shorter, females at least 5.2 mm long, rarely shorter 14
- 11(10). Rows of punctures at anterior of pronotum bowed away from margin laterally and well-separated from it; elytra of female with distinct microreticulations, male without microreticulations; apical fourth of penis about as wide as parameres, narrowed to obtusely pointed apex (Fig. 10a); gonocoxae short and broad, convex laterally (Fig. 10b); sternal apex of female narrowly truncate (Fig. 10c); males 4.1-4.5 (4.4) mm long, females 4.5-4.9 (4.8) mm long. *latilimbus*
- 11'. Rows of punctures at anterior of pronotum uniformly close to margin; elytra of both sexes without microreticulation except near apex.... 12
- 12(11'). Visible abdominal sterna 2-5 usually infuscate; penis very narrow in apical

- third (Fig. 11a); gonocoxae narrow and broadly rounded apically (Fig. 11b); sternal apex of female narrow and slightly concave (Fig. 11c); males 3.7–4.5 (4.1) mm long, females 4.1–4.7 (4.4) mm long *dichrous*
- 12'. Abdominal sterna never infuscate; penis rounded or tapered; sternal apex of female truncate (Figs. 12c, 13c); gonocoxae broad or tapered . . . 13
- 13(12'). Row of punctures on anterior of pronotum extending mesally to inner margin of eye; penis gradually narrowed, very narrow apical sixth (Fig. 12a); gonocoxae narrowed apically and divergent (Fig. 12b); males 4.2–4.7 (4.5) mm long, females 4.5–5.1 (4.8) mm long *aeneolus*
- 13'. Rows of punctures on anterior of pronotum extending mesally to middle of eye; penis wider than parameres and rounded apically (Fig. 13a); gonocoxae broad, slightly widened and rounded laterally before nearly truncate apex (Fig. 13b); males 4.3–4.7 (4.5) mm long, females 4.7–5.2 (4.9) mm long *marginellus*
- 14(10'). Conspicuous microreticulations present on at least apical third of male elytra and most or all of female elytra 15
- 14'. Conspicuous microreticulations absent from elytra, although fine, inconspicuous, transverse microreticulations may be present in apical half of some males and on all but the disc in some females. 16
- 15(14). Smaller, males 5.0–5.7 (5.3) mm long, females 5.2–6.1 (5.6) mm long; penis constricted before apex (Fig. 14a); gonocoxae shorter, convex laterally, nearly straight mesally (Fig. 14b); sternal apex of female narrowed and distinctly concave *bifarius*
- 15'. Larger, males 5.5–6.0 (5.8) mm long, females 6.0–6.9 (6.4) mm long; penis only slightly narrower than parameres in apical fourth, rounded apically (Fig. 15a); gonocoxae longer, convex laterally, concave mesally (Fig. 15b); sternal apex of female broadly truncate (Fig. 15c) *confinis*
- 16(14'). Ventral surface uniformly testaceous, often with a black mark on metasternum 17
- 16'. Ventral surface rufotestaceous to rufous and usually infuscate mesally 18
- 17(16). Smaller, males 4.8–5.3 (5.1) mm long, females 5.0–5.7 (5.5) mm long; apex of penis wider than parameres and broadly angulate at tip (Fig. 16a); gonocoxae parallel-sided with outer angle of truncate apex acute (Fig. 16b); sternal apex of female narrowly truncate to slightly convex (Fig. 16c) *ventralis*
- 17'. Larger, male usually > 5.3 mm long, females 5.7–6.5 (6.1) mm long; penis tapered to a pointed apex (Fig. 17a); gonocoxae broadly rounded at outer apical angle (Fig. 17b); sternal apex of female convex (Fig. 17c) *gehringi*
- 18(17'). Penis rather narrow in apical fourth with a rounded testaceous tip (Fig. 18a); gonocoxae slightly convex laterally, slightly concave mesally, with evenly rounded apex (Fig. 18b); sternal apex of female narrowly truncate (Fig. 18c); males 5.0–5.7 (5.3) mm long, females 5.4–6.0 (5.7) mm long *aquiris*
- 18'. Penis tapered to a very narrow piceous tip (Fig. 19a); gonocoxae convex laterally, outer apical angle obtusely rounded, inner angle nearly acute (Fig. 19b); sternal apex of female broad, slightly convex (Fig. 19c); males 5.1–5.9 (5.5) mm long, females 5.7–6.2 (6.0) mm long *lecontei*
- 19(8'). Very large, at least 6.8 mm long; penis and parameres massive, heavily sclerotized and curved dorsally (Fig. 20a); gonocoxae parallel-sided and obtusely pointed apically (Fig. 20b); sternal apex of female truncate (Fig. 20c); males 7.3–8.2 (7.7) mm long, females 6.8–7.7 (7.3) mm long *impressicollis*
- 19'. Smaller, less than 6.8 mm long; genitalia not as above 20
- 20(19'). Anterior of mesosternum sulcate laterad of middle and with several coarse

- punctures; elytra densely micropunctate on disc; last abdominal sternum black; penis narrowed in apical fourth to a blunt, rufotestaceous point (Fig. 21a); gonocoxae slightly concave mesally, convex laterally, with outer apical angle rounded (Fig. 21b); sternal apex of female slightly convex (Fig. 21c); males 4.8-5.3 (5.1) mm long, females 5.5-5.7 (5.6) mm long *pectoralis*
- 20'. Mesosternum not depressed or sulcate anteriorly; elytra without noticeable micropunctuation or last fully visible abdominal sternum distinctly paler than rest of venter 21
- 21(20'). Last elytral stria in lateral fold; penis rounded apically and narrower than parameres in apical fourth (Fig. 22a); gonocoxae rounded apically and concave mesally (Fig. 22b); sternal apex of female rounded; males 4.4-4.7 (4.5) mm long, females longer *parcus*
- 21'. Last elytral stria separated from lateral fold by at least width of a puncture. 22
- 22(21'). Pronotal punctures small and uniformly close to margin; penis very narrow and rufous in apical third (Fig. 23a); gonocoxae narrow, twisted laterally, truncate apically (Fig. 23b); sternal apex of female slightly convex Fig. 24c); smaller, males 4.5-5.0 (4.8) mm long, females 5.0-5.5 (5.2) mm long *analis*
- 22'. Pronotal punctures coarse, more widely separated from margin laterally than mesally; larger, males 5.3 mm long, or longer, females 5.6 mm long, or longer; genitalia not as above. 23
- 23(22'). Gula and genae piceous; penis widened, rounded, and piceous in apical fourth (Fig. 24a); gonocoxae short and broad, pale, slightly tapered toward apex (Fig. 24b); sternal apex of female concave, sinuate laterally (Fig. 24c); males 5.3-5.9 (5.5) mm long, females 5.5-6.3 (6.0) mm long *frosti*
- 23'. Gula and genae rufous; penis narrowed to a laterally compressed point (Fig. 25a); gonocoxae narrow, dark, mesally concave, laterally convex (Fig. 25b); sternal apex of female narrowly truncate, not sinuate laterally (Fig. 25c); male 5.5-6.2 (5.7) mm long, females 6.1-6.7 (6.4) mm long *savi*

Distribution, County Records, Habitat, and Identification

(See Table 1, Fig. 1)

Dineutus assimilis Kirby, 1837

Distribution: common southern third, less common farther north, apparently absent extreme northeastern counties. County records: 1-3, 6-8, 10-16, 23-34, 36-37, 39-42, 44, 46-65, 67-68, 70-72.

Habitat: undoubtedly breeds in both lotic and lentic habitats.

Elytral apices: dihiscent, distinctly produced in female, very slightly produced in male.

Dineutus discolor Aube, 1838

Distribution: common, except uncommon in eastern third. County records: 3-5, 8, 10-13, 15-16, 19, 23, 29-31, 35-37, 39-41, 44, 49-52, 54-58, 60-61, 67.

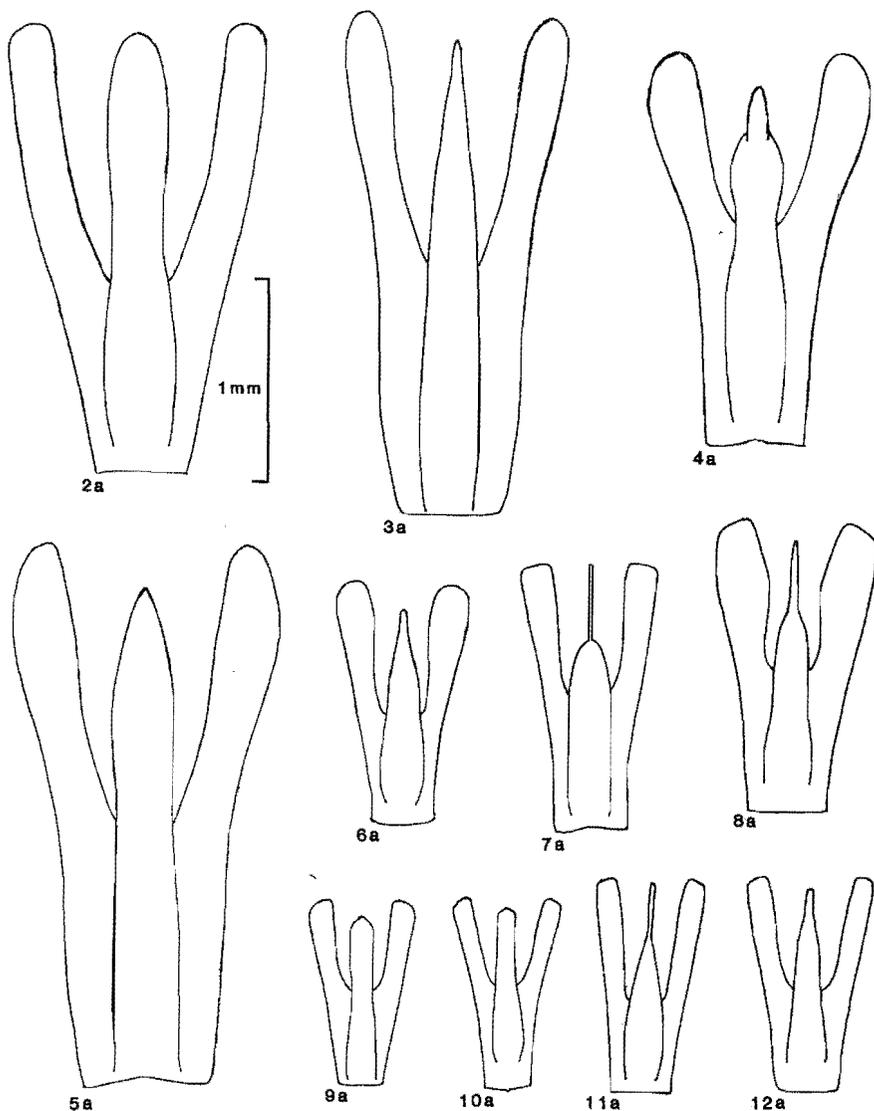
Habitat: strictly lotic, in larger streams.

Elytral apices: weakly dihiscent and slightly produced in both sexes.

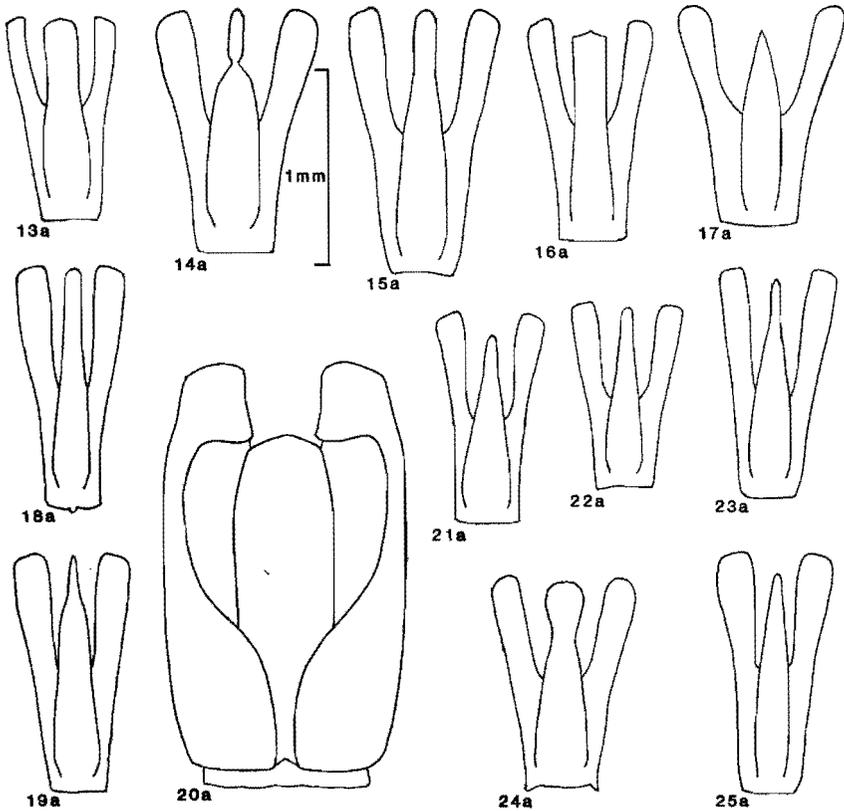
Dineutus emarginatus Say, 1825

Distribution: eastern U.S. west to southeast Michigan and Arkansas; not found in Wisconsin.

Identification: The broadly rounded elytral apices separate adults from all dark-ventered Wisconsin *Dineutus* except male *D. hornii*. The toothed ventral margin of



Figures 2a-12a. Outline (dorsal view) of penis and parameres (splayed outward). Fig. 2a. *Dineutus discolor*. Fig. 3a. *D. hornii*. Fig. 4a. *D. assimilis*. Fig. 5a. *D. nigrior*. Fig. 6a. *Gyrinus maculiventris*. Fig. 7a. *G. pugionis*. Fig. 8a. *G. affinis*. Fig. 9a. *G. sp. nr. minutus*. Fig. 10a. *G. latilimbus*. Fig. 11a. *G. dichrous*. Fig. 12a. *G. aeneolus*.



Figures 13a-25a. Outline (dorsal view) of penis and parameres (splayed outward). Fig. 13a. *G. marginellus*. Fig. 14a. *G. bifarius*. Fig. 15a. *G. confinis*. Fig. 16a. *G. ventralis*. Fig. 17a. *G. gehringi*. Fig. 18a. *G. aquiris*. Fig. 19a. *G. lecontei*. Fig. 20a. *G. impressicollis*. Fig. 21a. *G. pectoralis*. Fig. 22a. *G. parvus*. Fig. 23a. *G. analis*. Fig. 24a. *G. frosti*. Fig. 25a. *G. sayi*.

the profemora and short, apically constricted penis, which is similar to that of *D. assimilis*, distinguish males from *D. hornii*.

Dineutus hornii Roberts, 1895

Distribution: common northern third, less common elsewhere, rare or absent in unglaciated western and southwestern counties. County records: 1-2, 5-15, 17-18, 21, 24-25, 33-36, 40-41, 44, 48, 50, 57-58, 61, 67-68, 70.

Habitat: probably breeds in lentic habitats, occasionally flying to streams.

Elytral apices: strongly dihiscent, rounded in male and produced in female.

Dineutus nigrrior Roberts, 1895

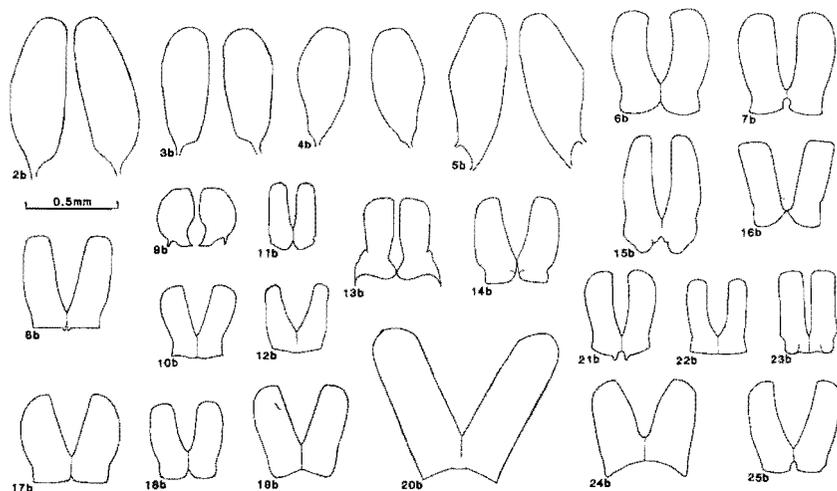
Distribution: common northern third, less common central third, rare southern third. County records: 1-13, 15-23, 27, 31-34, 36-40, 43, 47-49, 51, 58, 61.

Habitat: lentic, infrequently found in streams.

Elytral apices: at most weakly dihiscent, distinctly produced in both sexes.

Gyrinus aeneolus LeConte, 1868

Distribution: common northern third, much less common central third, absent



Figures 2b-25b. Outline (dorsal view) of gonocoxae of Wisconsin species. Fig. 2b. *Dineutus discolor*. Fig. 3b. *D. hornii*. Fig. 4b. *D. assimilis*. Fig. 5b. *D. nigrior*. Fig. 6b. *Gyrinus maculiventris*. Fig. 7b. *G. pugionis*. Fig. 8b. *G. affinis*. Fig. 9b. *G. sp. nr. minutus*. Fig. 10b. *G. latilimbus*. Fig. 11b. *G. dichrous*. Fig. 12b. *G. aeneolus*. Fig. 13b. *G. marginellus*. Fig. 14b. *G. bifarius*. Fig. 15b. *G. confinis*. Fig. 16b. *G. ventralis*. Fig. 17b. *G. gehringi*. Fig. 18b. *G. aquiris*. Fig. 19b. *G. lecontei*. Fig. 20b. *G. impressicollis*. Fig. 21b. *G. pectoralis*. Fig. 22b. *G. parvus*. Fig. 23b. *G. analis*. Fig. 24b. *G. frosti*. Fig. 25b. *G. sayi*.

southern third, except southeast. County records: 1, 3-6, 8, 10-21, 23, 27, 30, 35-36, 39, 44-46, 48, 64, 67-68, 70.

Habitat: strictly lotic.

Elytral microreticulation: absent in both sexes.

Gyrinus affinis Aube, 1838

Distribution: common northeastern third, less common farther south and west, uncommon southern third. County records: 1-5, 8-21, 23-24, 30, 33-34, 36-37, 39-40, 44, 46, 51, 58, 61, 71-72.

Habitat: probably lentic, flying to streams in autumn.

Elytral microreticulation: densely covered with short, oblique scratches in both sexes.

Gyrinus analis Say, 1823

Distribution: fairly common southern third, uncommon farther north, absent northern two tiers of counties. County records: 6, 8, 16, 28, 34, 36-37, 39, 44, 49, 51, 53-58, 60-61, 63-64, 67, 70-71.

Habitat: lotic, rarely in lakes.

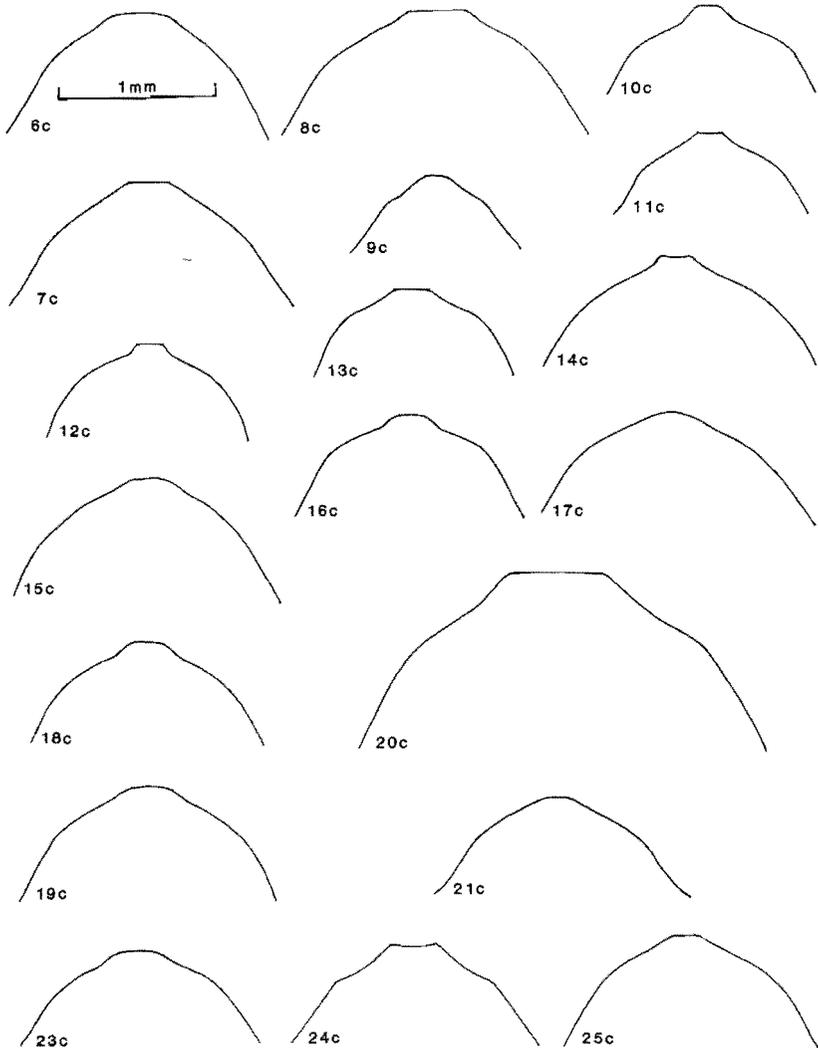
Elytral microreticulation: distinct in females and composed of small meshes; absent in males, but replaced by extremely fine transverse lines.

Gyrinus aquiris LeConte, 1868

Distribution: fairly common, except quite rare western third. County records: 3, 10-16, 18-19, 21, 23-24, 28, 33, 36-40, 44, 47-49, 51, 55, 58, 61, 63, 65, 68, 70-72.

Habitat: may breed in both lotic and lentic habitats; mostly found in streams at all times of the year.

Elytral microreticulation: extremely fine and transverse in apical two-thirds of female, absent in basal third; absent in male, except for a hint near apex.



Figures 6c-21c, 23c-25c. Outline of last abdominal sternum of females posterior to basolateral notch. Fig. 6c. *Gyrinus maculiventris*. Fig. 7c. *G. pugionis*. Fig. 8c. *G. affinis*. Fig. 9c. *G. sp. nr. minutus*. Fig. 10c. *G. latilimbus*. Fig. 11c. *G. dichrous*. Fig. 12c. *G. aeneotus*. Fig. 13c. *G. marginellus*. Fig. 14c. *G. bifarius*. Fig. 15c. *G. confinis*. Fig. 16c. *G. ventralis*. Fig. 17c. *G. gehringi*. Fig. 18c. *G. aquiris*. Fig. 19c. *G. lecontei*. Fig. 20c. *G. impressicollis*. Fig. 21c. *G. pectoralis*. Fig. 23c. *G. analis*. Fig. 24c. *G. frosti*. Fig. 25c. *G. sayi*.

Gyrinus bifarius Fall, 1922

Distribution: common throughout state, except in unglaciated southwest. County records: 1, 3-7, 10-15, 17-19, 23-24, 28, 30, 35-39, 44-46, 48-49, 57-61, 64-65, 67, 70.

Habitat: lotic, rarely found in lentic habitats.

Elytral Microreticulation: distinct small-meshes on all except disc in females; also laterally in apical half in males, weak and transverse in basal half.

Gyrinus borealis Aube, 1838

Distribution: Maine to Virginia, west to Michigan and Indiana.

Identification: The epipleura are usually paler than the abdominal sterna, causing adults to key to *G. affinis*, but they are smaller and the elytra lack the distinct oblique scratches of that species. Adults are most similar to those of *G. pugionis* in size and elytral microreticulation, but the abdominal sterna are black and not rufous laterally, and elytral striae 8-10 have larger and more deeply impressed punctures than striae 1-7. Some individuals may key to couplet 22, but the impressed lateral striae on the elytra separate them from black-ventered species with black epipleura.

Gyrinus confinis LeConte, 1868

Distribution: uncommon northern third, absent southern third. County records: 5, 10-11, 13, 15, 18, 27, 37, 40, 44, 49-50.

Habitat: uncertain, but probably breeds in both lotic and lentic habitats, flying to lotic habitats in late summer.

Elytral microreticulation: small-meshes distinct in female, except weak on disc; transverse and distinct in apical half of males, weak in basal half.

Gyrinus dichrous LeConte, 1868

Distribution: fairly common northern third, uncommon central third, rare southern third. County records: 2, 6-9, 12-13, 15-18, 21, 23, 31, 33-35, 44, 68.

Habitat: probably breeds in both lotic and lentic habitats; found in both throughout year.

Elytral microreticulation: absent in both sexes.

Gyrinus frosti Fall, 1922

Distribution: fairly common northern third and farther south in counties on Wisconsin River, absent elsewhere. County records: 2, 7-13, 15, 18-19, 22, 34, 36-37, 54, 57-58, 60.

Habitat: probably breeds in lentic habitats, with many flying to streams in autumn.

Elytral microreticulation: small-meshes in females; transverse meshes in males that are weaker in basal half.

Gyrinus gehringi Chamberlain, 1929

Distribution: only 3 females in 2 collections from Florence County.

Habitat: one collected from a river and 2 from a pond.

Elytral microreticulation: very fine, small, transverse meshes that are difficult to see in females; similar in apical half of males, barely perceptible in basal half.

Gyrinus impressicollis Kirby, 1837

Distribution: uncommon extreme north, apparently absent northeast and farther south; under-represented because it usually does not fly to streams. County records: 2, 5, 7-9, 13.

Habitat: larger lentic habitats, rarely flying into streams.

Elytral microreticulation: very small, coarse meshes in female; absent from disc of males and transverse and obscure elsewhere.

Gyrinus latilimbus Fall, 1922

Distribution: common northern third, uncommon central third, very rare southern third. County records: 1-6, 8-21, 23-24, 29-30, 33, 35-40, 47, 68.

Habitat: breeds in lentic habitats; flies to streams in late summer and autumn.

Elytral microreticulation: small meshes distinct in females; absent in males.

Gyrinus lecontei Fall, 1922

Distribution: very common statewide. County records: 1-31, 33-48, 50-61, 63-68, 70-72.

Habitat: breeds in lentic habitats; flies to streams in late summer and autumn.

Elytral microreticulation: absent basal half of female, obscure and transverse in apical half; absent in male.

Gyrinus maculiventris LeConte, 1868

Distribution: very common statewide. County records: 1-18, 20-33, 35-41, 43-58, 60-72.

Habitat: breeds in lentic habitats; flies to streams in late summer and autumn.

Elytral microreticulation: absent in both sexes.

Gyrinus marginellus Fall, 1922

Distribution: common statewide, except rare in Lake Michigan watershed. County records: 3-5, 9, 12-19, 28-30, 36-39, 46, 51, 53-57, 60-63, 67-68, 70.

Habitat: strictly lotic.

Elytral microreticulation: absent in both sexes.

Gyrinus sp. nr. minutus

Adults, which are very similar to those of *G. minutus* Fabricius, 1798, are being described by F. M. Atton. This species occurs across the northern part of the United States and throughout most of Canada; until now it has been identified as *G. minutus*. *Gyrinus minutus* is a Holarctic species whose range in North America is restricted to Alaska and northern Canada where it is broadly sympatric with the species being described by Atton (in press).

Distribution: fairly common, except apparently absent southeast; under-represented because it usually does not fly to streams; probably the most abundant species in Minnesota (Ferkinhoff and Gundersen 1983). County records: 2-3, 5-8, 12, 15, 18, 20, 25, 31, 36-37, 47, 53, 56, 58, 61.

Habitat: lentic, rarely flying into streams.

Elytral microreticulation: small-meshes pronounced in both sexes.

Gyrinus parvus Say, 1834

Distribution: three males were collected, one each from Monroe, Sauk, and Grant counties in southwestern Wisconsin.

Habitat: one collected from a marsh in May, two from streams in October.

Elytral microreticulation: small-meshes distinct in females; absent in males.

Gyrinus pectoralis LeConte, 1868

Distribution: uncommon northern half, absent farther south; under-represented because it does not fly to streams; probably one of the most abundant species in Minnesota (Ferkinhoff and Gundersen 1983). County records: 6, 15, 17, 19-20, 22, 34.

Habitat: apparently strictly lentic.

Elytral microreticulation: absent in both sexes, micropunctures numerous.

Gyrinus piceolus Blatchley, 1910

Distribution: Indiana and Michigan.

Identification: Because of the black venter and rufotestaceous epipleura, adults of this species will key to *G. affinis*, but they are much smaller (5.5 mm long) and have shiny elytra with no microreticulation.

Gyrinus pleuralis Fall, 1922

Distribution: Described from Wyoming, this species was recorded only from western states and provinces by Fall (1922) and Larson (1987). However, Oygur (1988) reported several collections from eastern Canada and also specimens from Maine, Michigan's Upper Peninsula, and Arkansas.

Identification: Adults have a black venter and pale epipleura and will key to *G. affinis*, which they resemble. The elytra are densely covered with micropunctures instead of short oblique scratches as in *G. affinis*, and the penis and gonocoxae are distinctly different.

Gyrinus pugionis Fall, 1922

Distribution: common northern third, fairly common central third, absent south-

ern third and from counties near Lake Michigan. County records: 1-13, 15-21, 27, 33, 36-39.

Habitat: breeds in lentic habitats; many fly to streams in late summer and autumn.

Elytral microreticulation: fine and somewhat transverse in females; more transverse in males.

Gyrinus sayi Aube, 1838 (= *Gyrinus lugens* LeConte, 1868)

Distribution: fairly common extreme north, absent elsewhere. County records: 2-3, 5, 9-13, 15, 17-19.

Habitat: breeds in lentic habitats; flies to streams in late summer and autumn.

Elytral microreticulation: distinct, small-mesh in females; fine and transverse in males, especially fine in basal half.

Gyrinus ventralis Kirby, 1837

Distribution: common northern third, less common farther south, rare in unglaciated areas of southwest and west, and in Lake Michigan watershed. County records: 1-3, 5-19, 21, 23, 27, 34-37, 39-41, 43-44, 48-49, 51, 57-58, 60-61, 67.

Habitat: probably breeds mostly in lentic habitats, but may also breed in lotic habitats; frequently flies to streams in late summer and autumn.

Elytral microreticulation: absent in basal half of females, extremely fine and transverse in apical half; absent in males.

Gyrinus wallisi Fall, 1922

Distribution: Ferkinhoff and Gundersen (1983) recorded it from four sites in Minnesota as well as North Dakota and Manitoba. Larson (1987) found it from Manitoba to British Columbia, and Oygur (1988) added records from eastern Ontario.

Identification: The black ventral surface and dense micropunctuation of the elytra would cause it to key to *G. pectoralis* at couplet 20, but the mesosternum is not modified, the stria punctures on the elytra are distinctly impressed, and the elytra of females have a distinct small-mesh microreticulation.

ACKNOWLEDGMENTS

I thank Mr. F. M. Atton, 412 Leslie Ave., Saskatoon, SASK for his comments on the status of *Gyrinus minutus* and for sending me specimens of *G. pleuralis*, and Dr. Sule Oygur, Cook College, Rutgers University for loaning me specimens of *Gyrinus* needed for the completion of this study.

LITERATURE CITED

- Atton, F. M. 1991. *Gyrinus (Gyrinulus) cavatus*, sp. nov. from North America described and compared with *Gyrinus (Gyrinulus) minutus* Fabricius (Coleoptera: Gyrinidae). Can. Entomol. (in press).
- Burmeister, E.G. 1976. Der Ovipositor der Hydradephaga (Coleoptera) und seine phylogenetische Bedeutung unter besonderer Berücksichtigung der Dytiscidae. Zoomorphologie 85:165-257.
- Chamberlain, K.F. 1929. New species of *Gyrinus* from northern New Hampshire. Bull. Brooklyn Entomol. Soc. 24:247-249.
- Fall, H.C. 1922. The North American species of *Gyrinus* (Coleoptera). Trans. Amer. Entomol. Soc. 47:269-307.
- Fall, H.C. 1931. A new *Gyrinus* from Alaska with reference to other recently described species (Coleoptera). Pan-Pac. Entomol. 7:154-156.
- Ferkinhoff, W.D. and R.W. Gundersen. 1983. A key to the whirligig beetles of Minnesota and adjacent states and Canadian provinces (Coleoptera: Gyrinidae). Scientific Pub. Science Mus. Minn. 5 (3). 53pp.

- Hatch, M.H. 1930. Records and new species of Coleoptera from Oklahoma and western Arkansas, with subsidiary studies. Pub. Univ. Oklahoma Biol. Survey 11:19-26.
- Hilsenhoff, W.L. 1972. Aquatic insects of the Pine-Popple River, Wisconsin. VIII. Aquatic Coleoptera - beetles. Tech. Bull. Wis. Dep. Nat. Resources 54:36-39.
- Larson, D.J. 1973. An annotated list of the Hydroadephaga (Coleoptera: Insecta) of Manitoba and Minnesota. Quaest. Entomol. 9:99-114.
- Larson, D.J. 1987. Aquatic Coleoptera of peatlands and marshes in Canada. pp. 99-132 In: Rosenberg, D.M and H.V. Danks eds. Aquatic insects of peatlands and marshes in Canada. Mem. Entomol. Soc. Can. No. 140. 174 pp.
- Leech, H.B. 1938. A new species of *Gyrinus* with a note on *Dineutus robertsi*. Can. Entomol. 70:59-61.
- Oygur, S. 1988. Taxonomy, distribution, and phylogeny of North American (north of Mexico) *Gyrinus* Goeffroy (Coleoptera: Gyrimidae). Ph.D. Dissertation, Rutgers Univ. xv + 296 pp.
- Roberts, C.H. 1895. The species of *Dineutus* of America north of Mexico. Trans. Amer. Entomol. Soc. 22:279-290.
- Wallis, J.B. 1926a. Some new Coleoptera. Canadian Entomol. 58:89-93.
- Wallis, J.B. 1926b. The status of *Gyrinus piceolus* Blatchley (Coleoptera). Canadian Entomol. 58:50.
- Wood, F.E. 1962. A synopsis of the genus *Dineutus* (Coleoptera: Gyrimidae) in the Western Hemisphere. M.S. Thesis, Univ. Missouri. 89 pp. + 8 plates.
- Wood, F.E. 1968. The taxonomic status of *Dineutus serrulatus* and *Dineutus analis* in North America (Gyrimidae: Coleoptera). Proc. U.S. Natl. Mus. 124. 9pp.