

The Insects of Virginia No. 10

THE HALIPLIDAE OF VIRGINIA (COLEOPTERA: ADEPHAGA)

by

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PUBLICATIONS in this series are intended to serve as scientific contributions for a better understanding of the living environment in Virginia.

Recognizing the basic economic importance of faunistic studies, our goal is to survey methodically the local insect fauna through preparation of inventories designed to show the geographic and seasonal occurrence of insects in the Commonwealth, and to provide keys, descriptions, and illustrations to facilitate their recognition.

Insofar as possible, these studies will include data on biology and life cycles to aid in the formulation of control recommendations and information on ecological interactions—including host relationships, parasites, and predators—and the potential of various species as possible biological control agents. Knowledge gained from such studies will be used to evaluate the impact of future changes in our environment.

**A CALL FOR HELP TO OUR READERS
REQUESTING INSECT MATERIAL ON LOAN
OR AS A DONATION**

Our next issues in this series, now in preparation, will include the following insect groups from Virginia:

1. A revision and updating of our No. 3 (44) bulletin on the genus *Culicoides* (Diptera: Ceratopogonidae), by E. Craig Turner, Jr.;
2. The Longhorned Beetles (Coleoptera: Cerambycidae), by Robert H. Perry;
3. The Blow Flies (Diptera: Calliphoridae), by Robert D. Hall, Lee H. Townsend, and E. Craig Turner, Jr.;
4. The Dragonflies (Odonata: Anisoptera), by Frank Carle and E. Craig Turner, Jr.;
5. The Lygaeid Bugs (Hemiptera: Lygaeoidea), by Richard L. Hoffman;
6. The Armored Scale Insects (Homoptera: Diaspididae), by Michael Kosztarab;
7. The Flower Flies (Diptera: Syrphidae), by F. Christian Thompson;
8. The Ticks of Virginia, with notes on their biology and ecology (Acari: Metastigmata), by Daniel E. Sonenshine;
9. The Trichoptera of Virginia, by Oliver S. Flint.

Each of the authors listed above could fully utilize more material from Virginia for their studies. There are definite gaps in the geographical distribution of most insect species, usually because of lack of collecting in certain areas of the state. The Board of Review and the authors encourage our readers to intensify their collecting efforts for these groups and lend or donate available insects (in their personal possession, or in the public collection under their supervision) to the Department of Entomology at Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, (Dr. Michael Kosztarab, Curator). If donated, the commercial value of the collections will be appraised and acknowledged by letter to the donors for use in claiming possible tax deductions. In each bulletin we also acknowledge the loans and/or donations for that project. The donated or loaned material will be forwarded to authors of future bulletins for processing and for inclusion of new distribution records in manuscripts they are preparing. Only with such joint effort in the inventorying of our insect fauna can we achieve our goal of a better understanding of the living environment in Virginia.

COMPOSITION AND PRESSWORK BY
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
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ABSTRACT

Eighteen species of Haliplidae, reported as occurring in Virginia, and six additional species which may occur in the state are discussed. A key to the *Peltodytes* of the Atlantic Coastal States is presented and the male genitalia of each *Peltodytes* species discussed are illustrated. A key to the *Haliplus* of southeastern United States is presented, and the male genitalia of most species discussed are illustrated. Original citations, diagnostic characters, range, Virginia records, and habitat preference are presented for each species.

ACKNOWLEDGMENTS

I wish to take this opportunity to thank my colleagues and students at Old Dominion University for their aid, both in obtaining specimens and in reviewing the manuscript. Also, I wish to thank Dr. Michael Kosztarab for making specimens available from the Virginia Polytechnic Institute and State University collection and Dr. Richard L. Hoffman for permission to examine material in the Radford College collection. Dr. Paul J. Spangler has extended many kindnesses to me during my visits to the National Museum of Natural History, and his help and encouragement have made this work much easier. In addition, I wish to thank Dr. Spangler and Dr. Warren U. Brigham of the Illinois Natural History Survey in Urbana for reviewing this manuscript and making several helpful suggestions. To Dr. Frank N. Young of Indiana University in Bloomington, I am grateful for verifying the identification of several *Peltodytes* species.

Finally, I wish to express my deep appreciation to my wife Linda. Without her understanding and forbearance during numerous collecting trips and her aid in making many of the drawings, this work would not have been possible.

INTRODUCTION

A brief introduction to the aquatic Coleoptera of Virginia and a key to the aquatic families of Coleoptera are presented in the *Insects of Virginia* No. 8 (Matta, 1974b). In that work, the first in a series dealing with the aquatic Coleoptera of Virginia, the hydrophilid fauna of the state was reviewed. The work reported here deals with the family Haliplidae — the crawling water beetles — a small group of adepagous coleopterans which is found, often abundantly, in many aquatic habitats.

The Haliplidae are small, compact aquatic beetles that are usually marked with a variegated pattern of yellow and black. The hind coxal plates are greatly expanded, covering the trochanter, about half of the femur and part of the abdomen. The form of the coxal plate and the general body form and coloration make the task of separating haliplids from other aquatic coleopterans an easy one.

The family appears to be poorly adapted to locomotion in the aquatic environment. The body shows little evidence of streamlining, and the legs are ill-adapted to swimming, being neither flattened nor well equipped with swimming hairs, although some hairs are always present.

The expanded coxal plates provide a large air storage area but seriously restrict freedom of movement of the hind legs. Observation of haliplids in the field and laboratory indicates that they are able to swim but are poor swimmers when compared to dytiscids. Most species are found crawling over the bottom of their aquatic habitat or on submerged vegetation.

The most recent discussion of the biology of the Haliplidae appears in Leech and Chandler (1956); however, more detailed discussions are presented by Matheson (1912) and Hickman (1931). Both larvae and adults use aquatic vegetation, usually algae, as a primary food source, but according to Balfour-Browne (1940), they will also take a variety of animal food. Hickman (1931) observed that several species have distinct habitat preferences. *Haliplus cribrarius* and *H. triopsis* were observed feeding only on algae, *Nitella* and *Chara*. The larvae of *Peltodytes edentulus*, *P. sexmaculatus*, *P. lengi*, and *Haliplus immaculicollis* were observed to feed only on filamentous algae and had the prolegs modified for handling the algal strands.

Many haliplid species apparently over-winter as adults, and several species have been collected during the winter months in southeastern Virginia. Hickman (1931) reported that he had collected haliplids "under 22 inches of ice which had been on the lake for 3 months."

Previous work on Haliplidae in Virginia has been limited. Mathe-son (1912) and Roberts (1913) in their reviews of the Haliplidae of America, north of Mexico, do not record a single species as having been collected in Virginia. Wallis (1933) in his revision of the *Haliphus* of North America also does not record any species from Virginia; however, the ranges given for several species do include Virginia even though the state is not specifically mentioned. Young (1961), in a paper describing four new species of *Peltodytes*, lists one species, *Peltodytes dunavani* from the Dismal Swamp, Nansemond Co. and Norfolk Co., Va. Cross (1972) reports *Haliphus confluentus* Roberts for the first time from Virginia. Matta (1974a) in a review of the aquatic Coleoptera of the Dismal Swamp lists five species of Haliplidae from the swamp.

It is obvious from the preceding account that the haliplid fauna of Virginia is very poorly known. Published distribution records are rare, and museum records from most areas of the state are equally poor.

The author has relied on his own collections for most of the records contained in this work; however, museum records are included whenever available. In order to insure completeness, species recorded from adjacent states are included, even though they are not recorded from Virginia.

Since there is no recent revision of the genus *Peltodytes*, all species from the Atlantic Coastal states are discussed and illustrated, and a key to the eastern species is presented.

METHODS AND MATERIALS

Dissection

Positive identification of most haliplids requires examination of the male genitalia. Dissection is relatively easy if done before the specimens are mounted, but specimens which have been previously mounted must be thoroughly softened before dissection. To soften specimens the author prefers placing the specimen in water in an

ultrasonic cleaner and sonicating for about 5 minutes. The sonication hastens the softening process. A small amount of liquid detergent added to the water provides the additional advantage of cleaning and degreasing the material.

The specimen to be dissected is held between the thumb and forefinger of the left hand, while a small hook made from a minuten pin glued to an applicator stick is inserted under the last visible abdominal sternum. The hook is twisted to engage the genital capsule, and the entire capsule — consisting of the aedeagus, parameres, and reduced eighth abdominal sclerite — is pulled out. This is transferred to a drop of glycerine in a microvial and attached to the same pin as the specimen.

Collecting

A brief review of general collecting techniques for aquatic beetles is presented in a previous number in this series (Matta, 1974b) and need not be repeated here. Collecting Haliplidae requires few special techniques. In general, deeper water should be examined more thoroughly than when looking for most other aquatic beetles. Areas with sparse vegetation usually prove unproductive, and large populations composed of a variety of species are usually encountered only in areas with good algal growths.

EXTERNAL MORPHOLOGY

For a general discussion of the morphology of the Coleoptera the reader is referred to any introductory text in entomology, or if a more detailed discussion is desired, to Matheson (1912) or to Arnett (1963). Figure 1 is included as a reference to most external characters used in the keys.

KEY TO THE GENERA OF HALIPLIDAE OF THE EASTERN UNITED STATES

1. Pronotum with sides of basal two-thirds parallel (slightly sinuate in western species) ; epipleura broad, extending almost to the tip of the elytra (in eastern U. S. recorded only from Michigan) ----- *Brychius*, p. 4
Pronotum with sides converging anteriorly, not parallel sided at base; epipleura evenly narrowed, normally end-

ing near the base of the last abdominal segment, not extending to the tip of the elytra ----- 2

2. Hind coxal plates margined, covering much of the abdomen only the last abdominal sternum exposed; last segment of palpi as long as or longer than the penultimate segment; pronotum with 2 black spots on the posterior margin ----- *Peltodytes*, p. 4
- Hind coxal plates not margined, smaller, exposing the last 3 abdominal sterna; last segment of the palpi shorter than the penultimate segment; pronotum without 2 black spots on the basal margin ----- *Haliplus*, p 16

Genus *BRYCHIUS* Thomson

This genus, as presently interpreted, consists of four North American species, three from western United States and one, *B. hungerfordi*, which was described from Michigan by Spangler (1954). This single eastern species appears to be quite local in distribution and probably does not occur in Virginia. According to Dr. Warren U. Brigham (personal communication) an additional undescribed *Brychius* occurs in Duparquet, Quebec.

Genus *PELTODYTES* Regimbart

All Virginia species of this genus are characterized by the presence of two black spots on the posterior margin of the pronotum. Species of *Haliplus*, the only other genus recorded from Virginia, have the pronotum either unmarked or with one black spot on the anterior margin. Members of the genus *Peltodytes* present a difficult taxonomic problem. The color patterns which appear to make the species distinct are in fact quite variable (Young, 1961), and unless the fauna of an area is very well known, identification of the members of this genus requires reference to the male genitalia.

In the following key and discussions, all species occurring in the Atlantic Coastal states are treated. Of these species, two, *P. edentulus* and *P. tortulosus* are not yet recorded from Virginia and may not occur here. They are included because there is no key available which treats all eastern species. The key is designed to work best for Virginia specimens, but it must be emphasized that positive identification of the members of this genus is difficult and often impossible without referring to the male genitalia. With

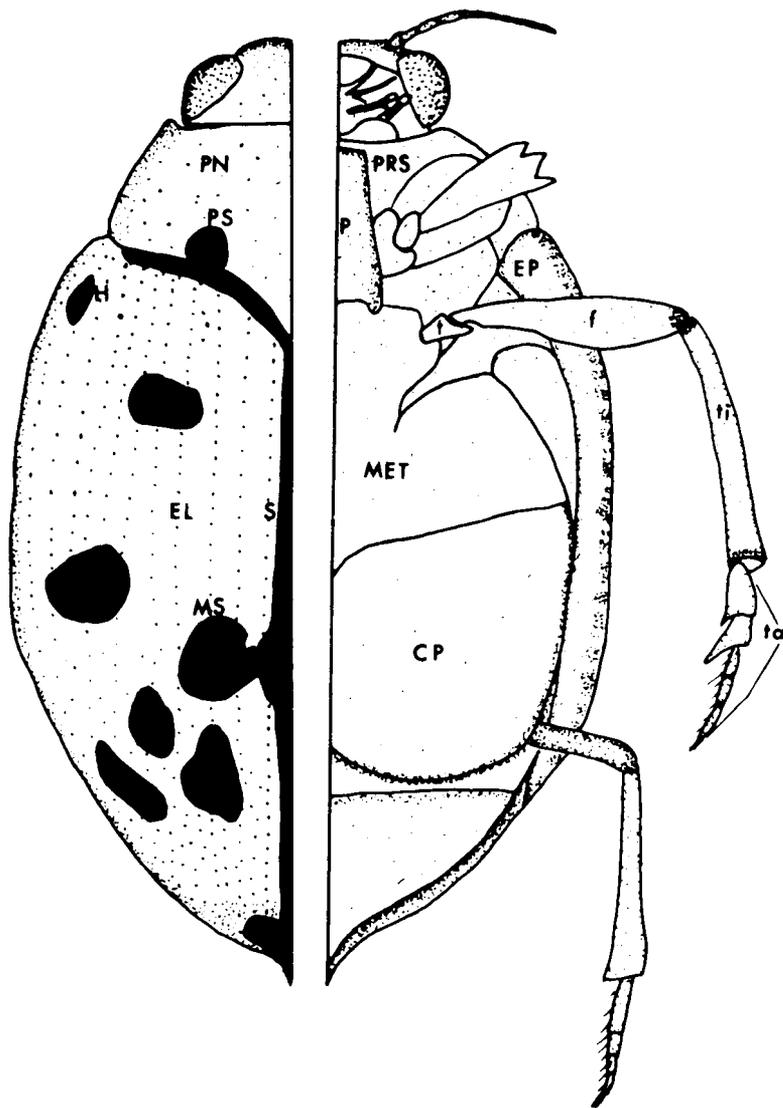


Figure 1. Dorsal (left) and ventral (right) views of *Peltodytes shermani*, illustrating the principal morphological characters of the Halipilidae. CP—coxal plate; EL—elytron; EP—epipleuron; H—humeral spot; MET—metasternum; MS—median spot; P—prosternal ridge; PN—pronotum PRS—prosternum; PS—pronotal spot; S—sutural stripe; f—femur; t—trochanter; ta—tarsus; ti—tibia.

the exception of a few distinctive species, such as *P. edentulus* or *P. shermani*, no identification should be considered as confirmed without examination of the male genitalia.

**KEY TO THE SPECIES OF *PELTODYTES* OCCURRING
IN THE ATLANTIC COASTAL STATES**

- | | | |
|----|--|---|
| 1. | Hind femur brown or black ----- | 2 |
| | Hind femur with a pale ring near the apex or entirely pale_ | 9 |
| 2. | Elytra without a humeral spot, except occasionally a
spot as in figure 5E in <i>sexmaculatus</i> ----- | 3 |
| | Elytra with a humeral spot sometimes reduced or par-
tially obliterated ----- | 4 |
| 3. | Median spot of elytron confluent with sutural stripe;
sutural stripe usually narrowed basally; male genitalia
as in figure 4G, H, I; elytral punctures confused pos-
terior to the median spot ----- <i>muticus</i> | |
| | Median spot of elytron not touching the sutural stripe;
sutural stripe not narrowed basally; male genitalia as
in figure 5A, B, C; elytral punctures in continuous
rows well beyond the median spot ----- <i>sexmaculatus</i> | |
| 4. | Last abdominal sternum longitudinally rugose; middle
leg of male with 1st and 2nd tarsal segments greatly
produced beneath, male genitalia as in figure 5F, G,
H ----- <i>shermani</i> | |
| | Last abdominal sternum not rugose (except in <i>opposi-
tus</i>); male tarsal segments not as distinctly produced -- | 5 |
| 5. | Sutural stripe generally broad at base, reaching the first
discal stria ----- | 6 |
| | Sutural stripe generally narrower at base, not reaching
discal stria ----- | 7 |
| 6. | Outer margin of aedeagus undulate (Fig. 2D); found
in southeastern states ----- <i>bradleyi</i> | |
| | Outer margin of aedeagus not undulate (Fig. 4L); found
in the northcentral states ----- <i>pedunculatus</i> | |
| 7. | Elytra with 3-5 punctures between the 1st and 2nd dis-
cal stria in front of the medium dark spot; aedeagus
as in figure 3I, parameres with a fringe of hairs (Fig.
3K) ----- <i>floridensis</i> | |
| | Elytra usually with 1 or 2 punctures between the 1st
and 2nd discal stria in front of the median dark spot;
if aedeagus as in figure 3I, then parameres without
a fringe of hairs ----- | 8 |

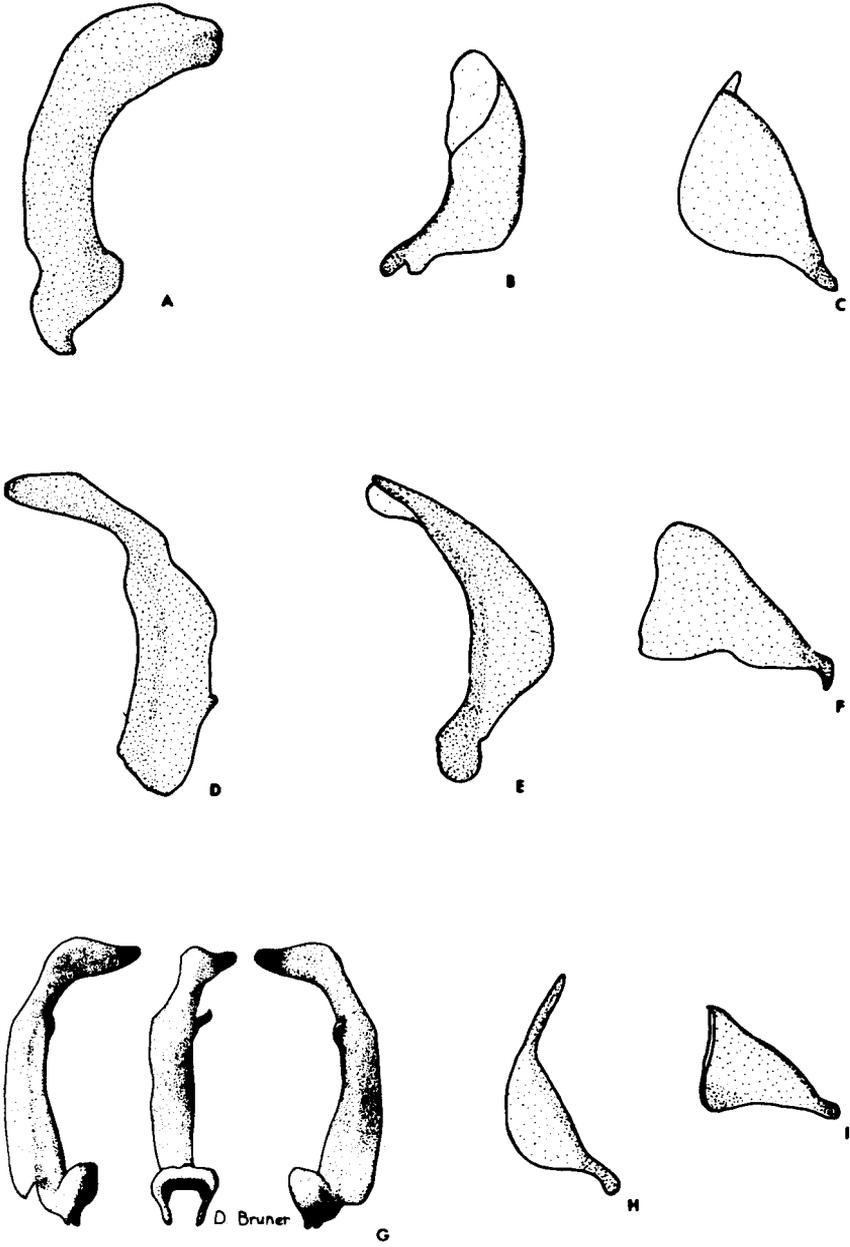


Figure 2. *Peltodytes dietrichi*: A, aedeagus B, left paramere; C, right paramere; *P. bradleyi*: D, aedeagus; E, left paramere; F, right paramere; *P. dunavani*: G, aedeagus; H, left paramere; I, right paramere.

- | | | |
|-----|---|--------------------------|
| 8. | Aedeagus toothed (Fig. 2G); last abdominal segment not longitudinally rugose posteriorly | <i>dunavani</i> |
| | Aedeagus not toothed (Fig. 4D); last abdominal segment longitudinally rugose posteriorly | <i>oppositus</i> |
| 9. | Hind femur, except knee, entirely pale | 10 |
| | Hind femur with a pale ring | 11 |
| 10. | Body convex dorsally; size 4.5-5 mm | <i>tortulosus</i> |
| | Body flattened or depressed; size 3-4 mm | <i>dietrichi</i> |
| 11. | Head with dark collar | <i>edentulus</i> |
| | Head without collar | 12 |
| 12. | Subhumeral spot usually present, sometimes vestigial; coxal plates distinctly angulate, figure 3G | |
| | | <i>duodecimpunctatus</i> |
| | Subhumeral spot absent; coxal plates only slightly angulate, figure 3H | <i>lengi</i> |

PELTODYTES BRADLEYI Young

Peltodytes bradleyi Young, 1961, Ann. Ent. Soc. Amer. 54: 218.

Diagnosis: Length 3.4 to 3.6 mm. Positive identification is possible only by examination of the male genitalia (Fig. 2D, E, F). The shape of the aedeagus is characteristic for this species, and while similar to that of *P. shermani*, it is more strongly bent at the end.

Range: Florida to Virginia.

Virginia Records: This species has been collected by the author several times in the Dismal Swamp (2 May-31 Aug.) and by A. G. Michael in the counties of Essex (13 Oct.), Middlesex (13 Oct.), and Stafford (23 July).

Habitat Preference: In Virginia it has been collected at the margins of slow-flowing streams on the coastal plain. Young (1961) indicates that in Florida and Georgia the species is found only in calcareous springs and spring runs. Chemical analysis of the water in the area in which the *P. bradleyi* were collected in the Dismal Swamp indicates a calcium content of 6.6 ppm and a magnesium content of 2.6 ppm. These values are much lower than would be expected in calcareous springs, and it must be concluded that the distribution of *P. bradleyi* is not limited to calcareous spring situations in the northern portion of the range.

Taxonomic Note: This species may be a coastal plain variant of *P. shermani*. It is closely related to *shermani* and there is some evidence of intergradation between the two forms in eastern Virginia. Breeding experiments may be necessary in order to establish the relationships between them.

***PELTODYTES DIETRICH* Young**

Peltodytes dietrichi Young, 1961, Ann. Ent. Soc. Amer. 54: 220.

Diagnosis: Length 3.0-4.0 mm. This species may be distinguished from the closely allied *P. lengi* by the completely pale hind femora and the depressed appearance of the dorsum. The genitalia are illustrated in figure 2A, B, C.

Range: New Jersey to Florida, west to Mississippi.

Virginia Records: City of Virginia Beach (Oct. 17, 1970 and Oct. 24, 1970).

Habitat Preference: Young (1961) indicates that this is a coastal species which is found in slow-flowing streams and lentic situations. The Virginia specimens have been collected from roadside ditches and canals in areas with dense growths of aquatic vegetation.

***PELTODYTES DUNAVANI* Young**

Peltodytes dunavani Young, 1961, Ann. Ent. Soc. Amer. 54: 215.

Diagnosis: Length 3.1 to 3.7 mm. Positive identification is possible only by examination of the male genitalia (Fig. 2G, H, I). The color pattern (Fig. 5E) and body form of *P. dunavani* are very similar to that of *P. floridensis* and *P. oppositus*. The form of the aedeagus will separate it from *oppositus*, and the parameres lack the fringe of hairs which are always present in *floridensis*.

Range: Florida to Virginia.

Virginia Records: Dismal Swamp; the cities of Chesapeake, Portsmouth, Richmond, and Virginia Beach; and the counties of Caroline and New Kent. Collections range from May 11 to December 31.

Habitat Preference: This species is frequently encountered in the Dismal Swamp where it is found at the margins of permanent, unshaded pools, and infrequently, in very protected areas in the ditches. Collections from other portions of Virginia appear to be from areas of a similar nature.

Remarks: In Virginia, *P. dunavani* appears to be restricted to the Coastal Plain.

PELTODYTES DUODECIMPUNCTATUS (Say)

Haliphus duodecimpunctatus Say, 1823, Trans. Amer. Phil. Soc. 2: 106.

Diagnosis: Length 3.1 to 3.7 mm. The subhumeral black spot, ringed hind femora and the angulate hind margin of the coxal plates (Fig. 3G) will separate this species from all other Virginia *Peltodytes*. Male genitalia are illustrated in figure 3A, B, C.

Range: Maine to North Carolina.

Virginia Records: The counties of Culpeper, Fairfax, Fauquier, Halifax, Montgomery, Page, Prince William, Shenandoah, Stafford, Tazewell, and Warren, from April 22 to Oct. 18.

Habitat Preference: A frequently encountered farm pond species. In Virginia, *P. duodecimpunctatus* is apparently restricted to the Piedmont and mountainous regions.

PELTODYTES EDENTULUS (LeConte)

Cnemidotus edentulus LeConte, 1863, Smiths. Misc. Coll. 6: 21.

Diagnosis: Length 3.4 to 3.9 mm. The black collar at the base of the head makes this species unmistakable. The male genitalia are illustrated in figure 3D, E, F.

Range: Canada to Pennsylvania.

Virginia Records: None.

Habitat Preference: This species is most frequently encountered at the margins of permanent standing water. The author has collected it in farm ponds and at lake margins in New York.

PELTODYTES FLORIDENSIS Matheson

Peltodytes floridensis Matheson, 1912, J. New York Ent. Soc. 20: 177.

Diagnosis: Length 3.2 to 3.6 mm. The well developed row of punctures between the first and second discal striae will aid in separating this species from the closely allied *P. dunavani*; however, positive identification must be based on an examination of the male genitalia (Fig. 3I, J, K). The aedeagus is similar to that of *dunavani*, but the parameres are fringed with hairs while the parameres of *dunavani* are bare.

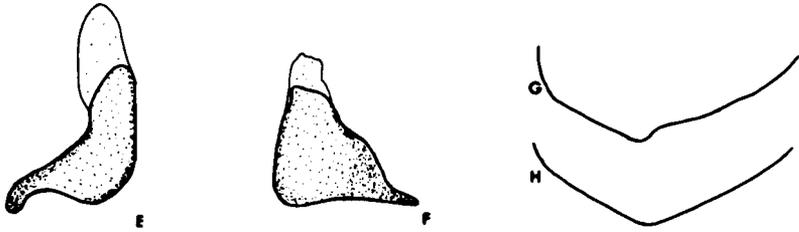
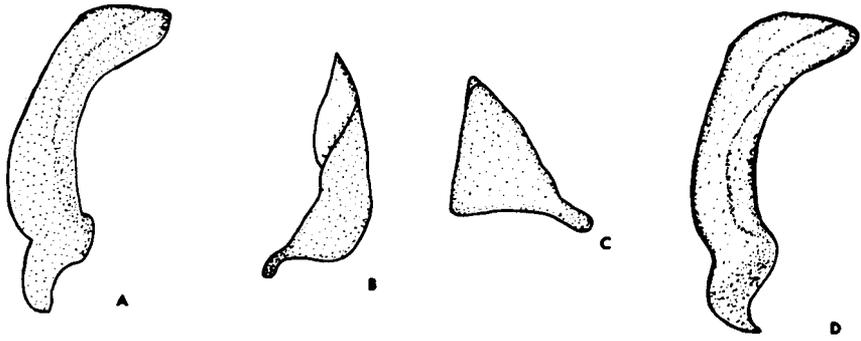


Figure 3. *Peltodytes duodecimpunctatus*: A, aedeagus; B, left paramere; C, right paramere; *P. edentulus*: D, aedeagus; E, left paramere; F, right paramere; *P. duodecimpunctatus*: G, rear margin of coxal plate; *P. lengi*: H, rear margin of coxal plate; *P. floridensis*: I, aedeagus; J, left paramere; K, right paramere.

Range: Florida to Virginia.

Virginia Records: James City County and on several different occasions from the cities of Chesapeake and Virginia Beach. Collections range from May 10 to November 20.

Habitat Preference: In Virginia this species has been collected only in open marshy areas. Young (1954) indicates that it is found in a variety of situations in Florida.

PELTODYTES LENGI Roberts

Peltodytes lengi Roberts, 1913, J. New York Ent. Soc. 21: 119.

Diagnosis: Length 3.2 to 3.9 mm. The pale ring on the hind femur distinguishes this species from most Virginia *Peltodytes*. The femur is distinctly ringed rather than being completely pale as in *P. tortulosus* or *P. dietrichi*. It may be separated from *P. duodecimpunctatus* by the absence of a humeral spot and by the form of the coxal plate (Fig. 3H). The male genitalia are illustrated in figure 4A, B, C.

Range: New York to Florida.

Virginia Records: *P. lengi* has been collected several times in Montgomery county and has also been collected in Augusta, Pulaski, Tazewell, and Warren counties. Collections range from April 6 to August 11.

Habitat Preference: In Virginia this species is most frequently encountered at the margins of shallow ponds. Hickman (1931) describes the life history of this species and indicates that the larva is modified for the consumption of filamentous algae.

PELTODYTES MUTICUS (LeConte)

Cnemidotus muticus LeConte 1863, Smiths. Misc. Coll. 6: 21.

Diagnosis: Length 3.5 to 3.8 mm. The dark hind femur, lack of a subhumeral spot, "confused" elytral punctures, and the basally narrowing sutural stripe should separate this species from all other *Peltodytes* except specimens of *P. sexmaculatus*. These may be easily separated by an examination of the male genitalia. The genitalia are illustrated in figure 4G, H, I.

Range: Canada to Florida.

Virginia Records: Dismal Swamp, counties of Augusta, Bath, Campbell, Caroline, Culpeper, Essex, Fairfax, Fauquier, Lancaster,

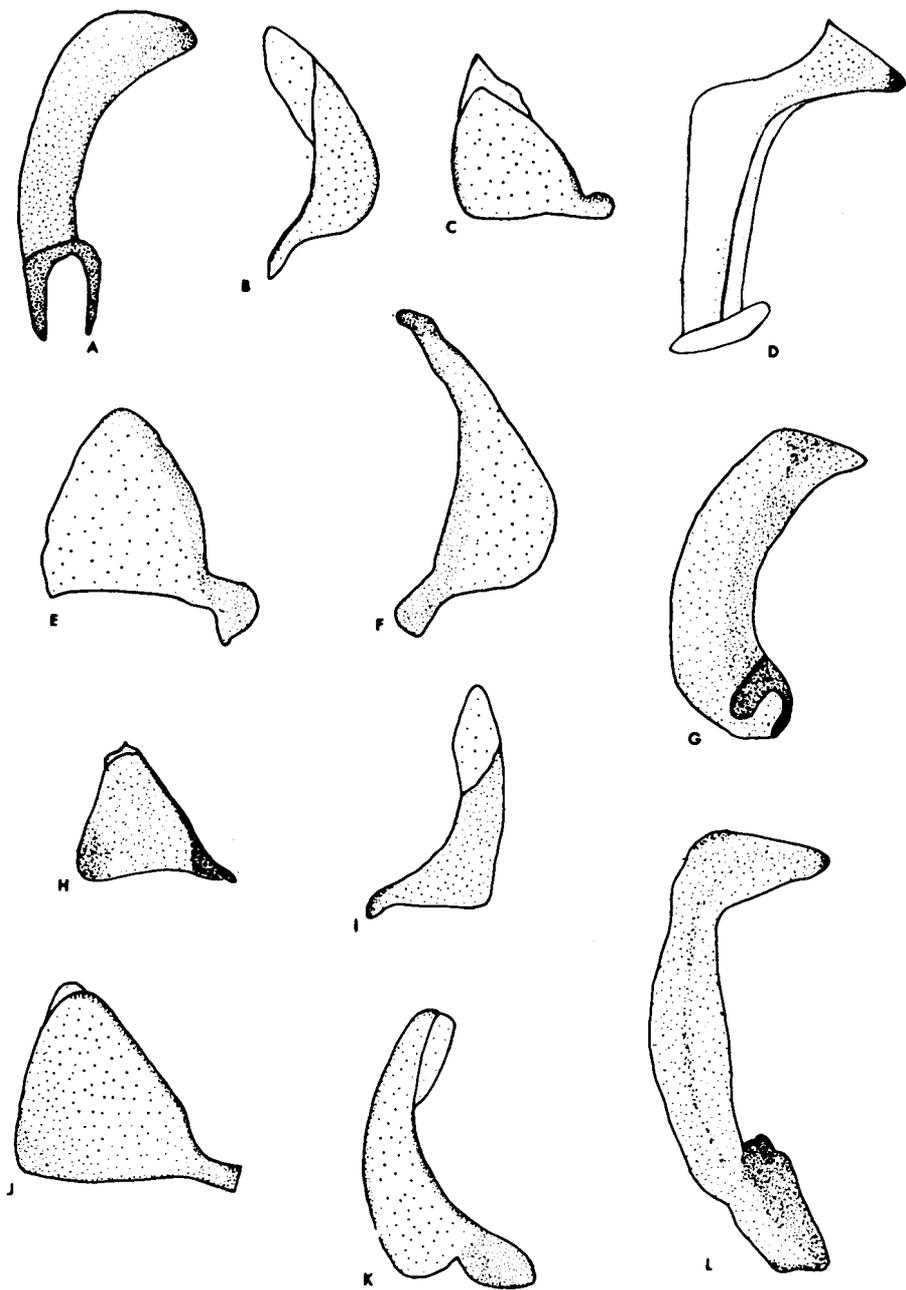


Figure 4. *Peltodytes lengi*: A, aedeagus; B, left paramere; C, right paramere; *P. oppositus*: D, aedeagus; E, right paramere; F, left paramere; *P. pedunculatus*: J, right paramere; K, left paramere; L, aedeagus.

Montgomery, Nelson, Patrick, Prince William, Pulaski, Richmond, Smyth, Southampton, Spotsylvania, Stafford, Tazewell, Warren, and Westmoreland, and the cities of Chesapeake, Portsmouth, Richmond, and Virginia Beach.

Habitat Preference: This species is found most often in lentic situations, however it is extremely broad in its environmental tolerance and is likely to be encountered in almost any standing water. It occurs in great numbers in farm ponds.

***PELTODYTES OPPOSITUS* Roberts**

Peltodytes oppositus Roberts, 1913, J. New York Ent. Soc. 21: 115.

Diagnosis: Length 3.3 to 3.6 mm. Positive identification of this species must be based on an examination of the male genitalia (Figure 4D, E, F).

Range: Virginia to Florida, west to Alabama.

Virginia Records: Dismal Swamp, 8-13-34 Dunavan (USNM) and Matta (1974a).

Habitat Preference: This species apparently prefers lentic situations where filamentous algae occurs.

Remarks: The Dismal Swamp apparently represents the northern limit of the range of this species. Despite intensive collecting in other parts of the Tidewater area, this species has not been found outside of the swamp.

***PELTODYTES PEDUNCULATUS* (Blatchley)**

Cnemidotus pedunculatus Blatchley, 1910, The Coleoptera of Indiana p. 204.

Diagnosis: Length 3.0 mm. The humeral spot, dark hind femora and narrowing sutural stripe will separate this species from most *Peltodytes*. The male genitalia of a specimen from Detroit Michigan (USNM) are illustrated in figure 4J, K, L.

Range: Central states; Minesota south to Texas, east to Ohio and Kentucky.

Virginia Records: It is not recorded from Virginia but may occur in the extreme western counties.

Habitat Preferences: No specific information on the habitat preferences of this species is available.

PELTODYTES SEXMACULATUS Roberts

Peltodytes sexmaculatus Roberts, 1913, J. New York Ent. Soc. 21: 117.

Diagnosis: Length 3.4 to 3.7 mm. A variable species, usually without a humeral spot. When a humeral spot is present it is shaped as in figure 5D, rather than as in figure 5E. The author has seen Virginia specimens with a humeral spot only from the coastal plain area. It may be separated from *P. muticus* by the narrowing of the sutural stripe basally and the form of the aedeagus in the male. The male genitalia are distinctive (Fig. 5A, B, C).

Range: Florida to Maine.

Virginia Records: Dismal Swamp, the cities of Chesapeake and Virginia Beach and the counties of Campbell, Culpeper, Essex, Fairfax, Fauquier, James City, Middlesex, Montgomery, Nelson, and Warren. Collections range from 12 May to 20 November.

Habitat Preference: This species is frequently found at the shallow margins of unshaded ponds and lakes, and is occasionally encountered in protected areas at the margins of slow-flowing streams.

PELTODYTES SHERMANI Roberts

Peltodytes shermani Roberts, 1913, J. New York Ent. Soc. 21: 116.

Diagnosis: Length 3.2 to 3.6 mm. The dark hind femora, broadly rounded coxal plates, subhumeral spot and the enlarged joints of the middle tarsi of the male make this species quite distinctive. The aedeagus is also unique. The male genitalia are illustrated in figure 5F, G, H.

Range: New York to South Carolina.

Virginia Records: The cities of Norfolk and Richmond and the counties of Campbell, Fairfax, and Fauquier. Collections range from May 12 to October 18.

Habitat Preference: *P. shermani* is frequently found in farm ponds and occasionally in backwater areas of streams. It is the most frequently encountered species of *Peltodytes* (of those with a subhumeral spot and dark hind femora) in all areas west of the fall line.

Remarks: This species is quite rare in southeastern Virginia and is only encountered with any frequency in the Appalachian highlands.

PELTODYTES TORTULOSUS Roberts

Pelodytes tortulosus Roberts, 1913, J. New York Ent. Soc. 21: 118.

Diagnosis: Length 4.5 to 5.0 mm. The large size and pale hind femora should serve to distinguish this species. The male genitalia are illustrated in figure 5I, J, K.

Range: Canada, Maine, New York.

Virginia Records: None.

Habitat Preference: The author has no information concerning the habitat preference of this species.

Genus HALIPLUS Latreille

The genus *Haliplus* may be separated from *Pelodytes*, the only other haliplid genus found in Virginia, by the characters presented in the key. In addition, all Virginia *Haliplus* (except *confluentus* which may have two vague spots) have the pronotum immaculate or with one large spot on the anterior margin, never with 2 small spots on the posterior margin as in *Pelodytes*. The genus in North America has been reviewed by Wallis (1933) and he presented keys to the species and illustrated the male genitalia of most species of *Haliplus*.

The author has seen only six species of *Haliplus* from Virginia; however for completeness, five other species — which may occur here or in neighboring states — are included in the key and discussions. All species presently recorded from the southeastern United States are thus treated.

KEY TO THE SPECIES OF HALIPLUS OF VIRGINIA

- 1. Pronotal plicae (folds) present ----- 2
Pronotal plicae (folds) absent ----- 3
- 2. Elytral apex sinuate; left paramere fringed with
hairs to tip; aedeagus pointed ----- *blanchardi*
Elytral apex not sinuate; left paramere almost bare
at tip (Fig. 7C); aedeagus broadly rounded (Fig.
7A) ----- *immaculicollis*
- 3(1). Length less than 3 mm. ----- 4
Length greater than 3 mm. ----- 5
- 4. Length less than 2.6 mm; pronotum with a basal
transverse impression; color usually light ---- *annulatus*

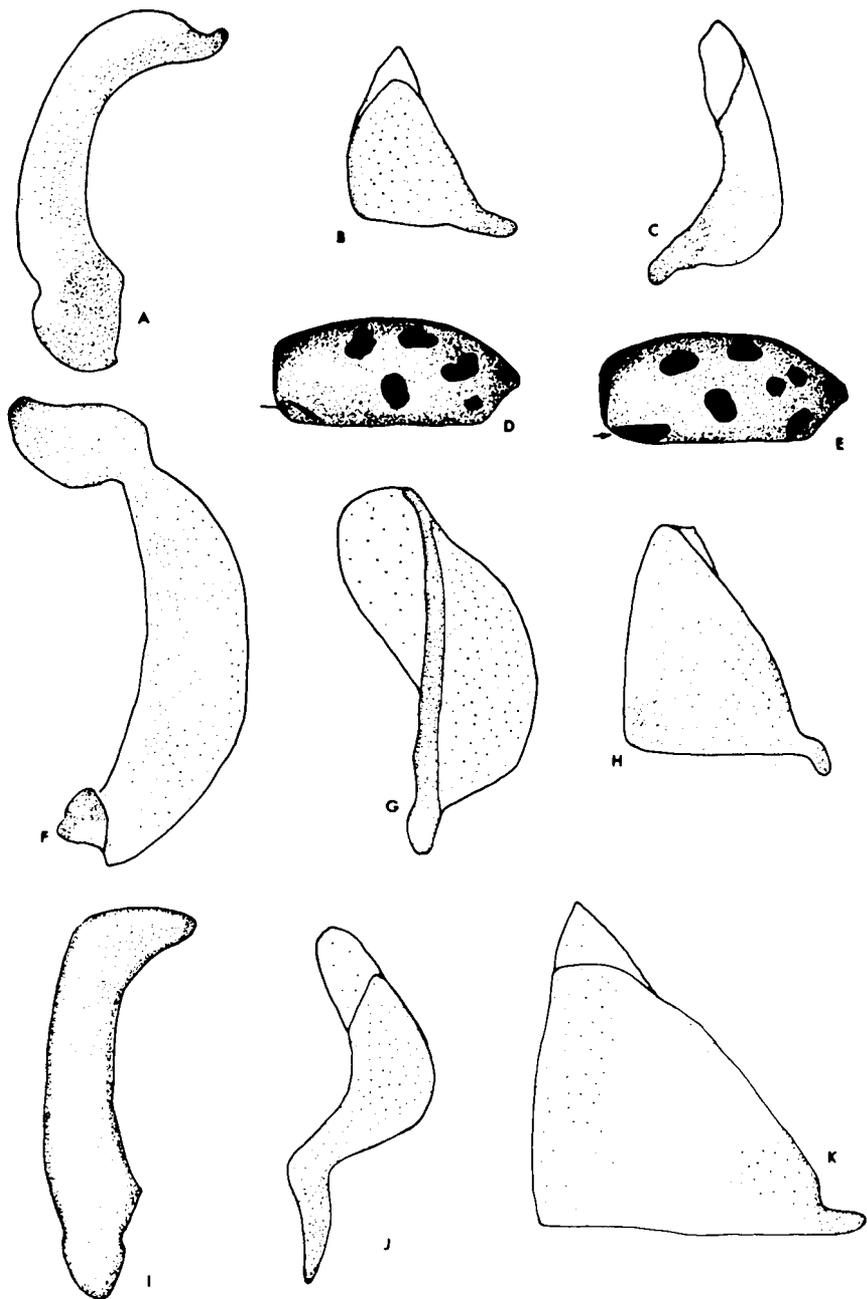


Figure 5. *Peltodytes scymaculatus*: A, aedeagus; B, right paramere; C, left paramere; D, left elytron (side view) showing humeral spot; *P. dunavani*: E, left elytron (side view) showing humeral spot; *P. shermani*: F, aedeagus; G, left paramere; H, right paramere; *P. tortulosus*: I, aedeagus; J, left paramere; K, right paramere.

- Length greater than 2.6 mm; pronotum without a basal transverse impression; color usually darker, ferruginous ----- *confluentus*
5. Anterior margin of pronotum without a black spot --- 6
 Anterior margin of pronotum with a black spot ----- 7
6. Prosternal ridge with apex wider than base; prosternal ridge evenly divergent from base to apex; hind tibia without a row of setigerous punctures on the inner face ----- *pseudofasciatus*
 Prosternal ridge with apex nearly the same width as the base; prosternal ridges slightly constricted between the middle coxae; hind tibia with a row of setigerous punctures on the inner face ---- *fasciatus*
- 7(5). Mesotrochanters with several deep punctures; male with left paramere densely fringed to tip (Fig. 6H) ----- *leopardus*
 Mesotrochanters without deep punctures; male with left paramere not densely fringed to tip (Fig. 7K) --- 8
8. Color testaceous or fulvous ----- 9
 Color ferruginous ----- 10
9. Tarsal claws short, one-half the length of the last tarsal segment; aedeagus abruptly bent downward in apical fifth (Fig. 7J) ----- *triopsis*
 Tarsal claws longer, two-thirds the length of the last tarsal segment; aedeagus smoothly curved (Fig. 7D) ----- *pantherinus*
10. Prosternal ridge very broad, anterior end two-thirds as wide as the anterior width of the pronotum; male protarsal claws less than one-half the length of the last tarsal segment ----- *punctatus*
 Prosternal ridge narrower, anterior end less than two-thirds as wide as the width of the pronotum at its anterior margin; male protarsal claws greater than one-half the length of the last tarsal segment ----- *mitchleri*

HALIPLUS ANNULATUS Roberts

Haliplus annulatus Roberts, 1913, J. New York Ent. Soc. 21: 107.

Diagnosis: Length 2.0 to 2.5 mm. The distinct basal impression of the pronotum and the small size readily separate this species from all other haliplids.

Range: South Carolina to Florida (Wallis, 1933).

Virginia Records: None.

Habitat Preference: The author has collected this species in large woodland pools in association with *Agabus johnsoni* Fall and *Hydroporus cimoïdes* Sharp, in Florida. Young (1954) indicates that it is also found in swamp streams in Florida.

***HALIPLUS BLANCHARDI* Roberts**

Haliphus blanchardi Roberts, 1913, J. New York Ent. Soc. 21: 108.

Diagnosis: Length 3.0 mm. The pronotal plica and strongly sinuate elytral apices will identify this species.

Range: New York to Minnesota, and northern Illinois.

Virginia Records: None.

Habitat Preference: No information on the habitat preference of this species is available to the author.

***HALIPLUS CONFLUENTUS* Roberts**

Haliphus confluentus Roberts, 1913, J. New York Ent. Soc. 21: 106.

Diagnosis: Length 2.7 to 3 mm. The absence of a pronotal plica, small size and extensive dark markings of the dorsum serve to separate this species from other Virginia *Haliphus*. The male genitalia are illustrated in figure 6A, B, C.

Range: Virginia to Florida.

Virginia Records: Chincoteague National Wildlife Refuge Northampton Co., (Cross, 1972) and the Back Bay National Wildlife Refuge, City of Virginia Beach (Matta, July 16 and Oct. 14). In addition, the author has seen a single specimen from Dale Co. North Carolina.

Habitat Preference: Cross (1972) indicates that his specimens came from salt marsh impoundments. My specimens were taken from freshwater impoundments. Young (1954) records the species from ditches, large springs and brackish pools.

***HAPLIPLUS FASCIATUS* Aube**

Haliphus fasciatus Aube, 1838, Species General des Coleopteres VI: 30.

Diagnosis: Length 4.0 to 4.5 mm. The key characters will separate this species from other Virginia *Haliphus*. Careful examination is necessary to detect the setigerous punctures on the inner face of the hind tibia. The male genitalia are illustrated in figure 6D, E, F.

Range: Maine to South Carolina west to Kansas.

Virginia Records: Dismal Swamp; counties of Caroline, Essex, Hanover, Henrico, Middlesex, Shenandoah, Warren and Westmoreland, and the cities of Chesapeake, Norfolk, and Virginia Beach.

Habitat Preference: Our most wide spread *Haliphus*; it is commonly found in permanent pools and at the margins of slow-flowing streams.

HALIPLUS IMMACULICOLLIS Harris

Haliphus immaculicollis Harris, 1928, New England Farmer 7: 64.

Diagnosis: Length 2.5 to 3.0 mm. The key characters are adequate for the identification of this species. Elytral pattern varies from almost immaculate to a very distinct pattern of black dots which are rarely confluent. The male genitalia are illustrated in figure 7A, B, C.

Range: Wallis (1933) states that this species ranges from coast to coast and from Canada as far south as Texas. However, in eastern United States there are no records for *immaculicollis* south of Virginia, and it is the author's belief that northwestern Virginia may be the southern limit of the range of this species in the East.

Virginia Records: Frederick Co., June 8, 1973, Matta; Warren Co., July 2, 1973, J. F. Matta & A. G. Michael.

Habitat Preference: The Virginia specimens of *immaculicollis* were collected from a stream-fed pond in Frederick Co. and from the margins of a large lake.

HALIPLUS LEOPARDUS Roberts

Haliphus leopardus Roberts, 1913, J. New York Ent. Soc. 21: 98.

Diagnosis: Length 4.0 to 4.3 mm. The pits on the trochanter of the middle leg are distinctive. The male genitalia are also distinctive and are illustrated in figure 6G, H, I.

Range: New York to South Carolina.

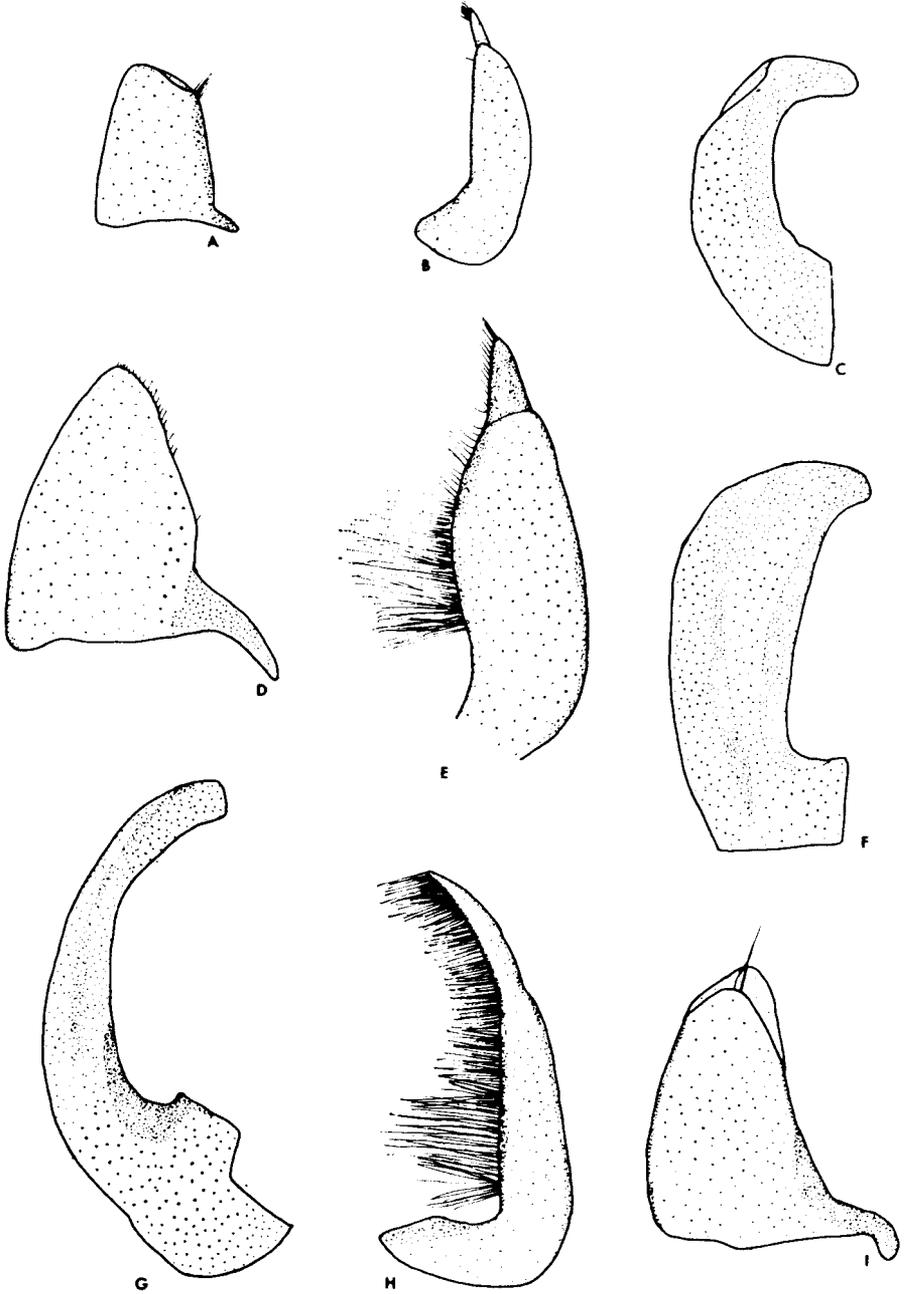


Figure 6. *Haliplus confluentus*: A, right paramere; B, left paramere; C, aedeagus; *H. fasciatus*: D, right paramere; E, left paramere; F, aedeagus; *H. leopardus*: G, aedeagus; H, left paramere; I, right paramere.

Virginia Records: Dismal Swamp (May 11, 1972, Matta; June 11, 1970, Matta; August 31, 1973, A. G. Michael); Lancaster Co. (Oct. 14, 1973, A. G. Michael); Westmoreland Co. (Oct. 14, 1973, A. G. Michael) and city of Charlottesville (July 25, 1970, D. E. Delzell).

Habitat Preference: This species has been collected from a variety of situations including ditch margins, woodland pools, willow swamps and farm ponds.

HALIPLUS MUTCHLERI Wallis

Haliphus mutchleri Wallis, 1933, Trans. Royal Canad. Inst. 19: 38.

Diagnosis: Length 3.2 to 3.8 mm. Additional characters for separating *mutchleri* from *punctatus* are given in the diagnosis of *punctatus*.

Range: Peninsular Florida.

Virginia Records: None.

Habitat Preference: Young (1954) records *mutchleri* from a large pond, a canal and a rock-pit pool.

Taxonomic Note: *Haliphus mutchleri* may be a southern subspecies of *H. punctatus*. The author has seen a single specimen from Canton, North Carolina which appears to be intermediate between the two species. A final assessment of the relationship between these two species must await a study of material from Georgia and the Carolinas.

HALIPLUS PANTHERINUS Aube

Haliphus pantherinus Aube, 1838, Species General des Coleopteres VI: 29.

Diagnosis: Length 3.5 to 4.0 mm. This species can be definitely separated from the closely allied *triopsis* only by an examination of the male genitalia which are illustrated in figure 7D, E, F. In general, the elytral markings are not as confluent as in *triopsis*, and the protarsal claw is longer; however, these characters are difficult to use. The form of the pronotal spot, a characteristic used to separate *pantherinus* from the western species *H. deceptus* and *H. variomaculatus*, is variable in the Virginia material. Specimens from Bath County had the spot rounded or slightly tapering, while those from Blacksburg had the spot strongly tapering at the margins. Both groups had typical *pantherinus* male genitalia.

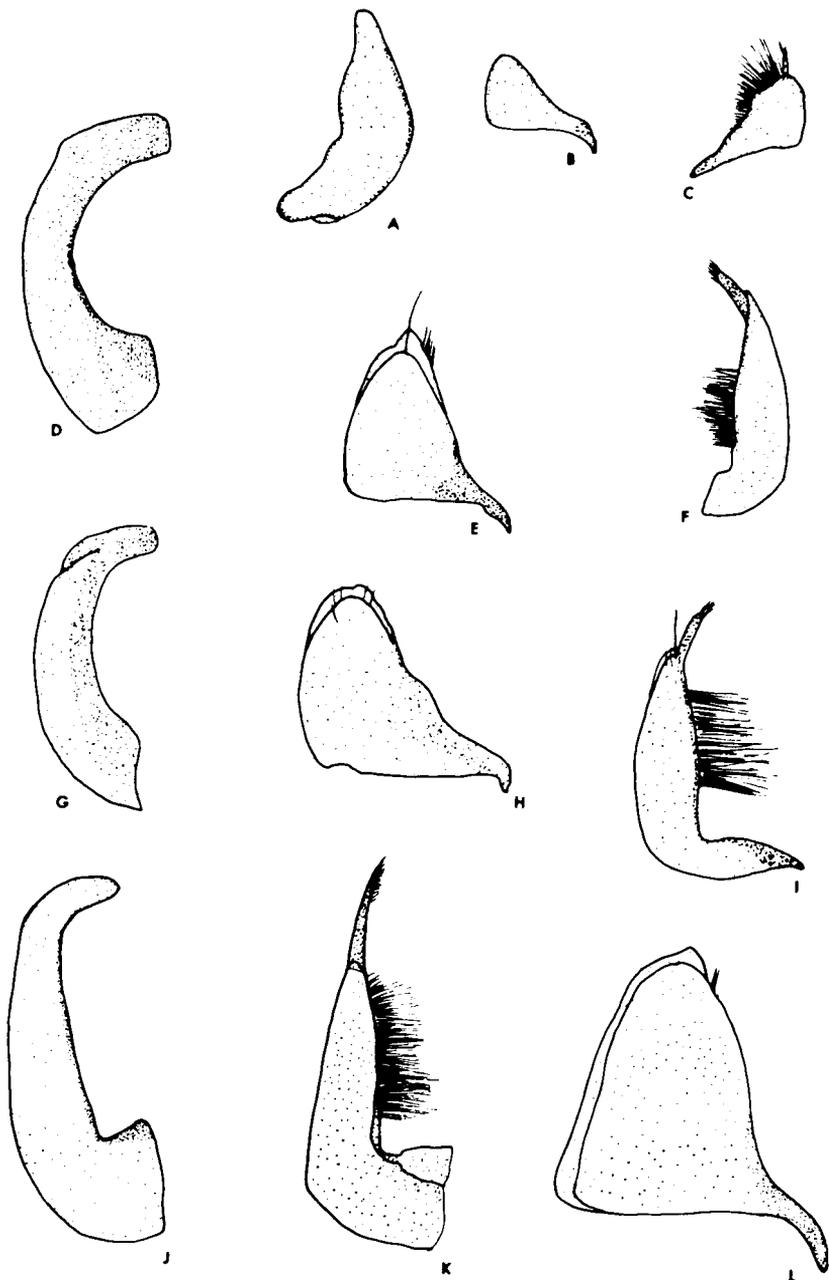


Figure 7. *Haliplus immaculicollis*: A, aedeagus; B, right paramere; C, left paramere; *H. pantherinus*: D, aedeagus; E, right paramere; F, left paramere; *H. punctatus*: G, aedeagus; H, right paramere; I, left paramere; *H. triopsis*: J, aedeagus; K, left paramere; L, right paramere.

Range: Canada to Louisiana.

Virginia Records: Bath Co., Douthat State Park, June 13, 1973, J. F. Matta; Montgomery Co., Blacksburg, June 12, 1973, J. F. Matta.

Habitat Preference: The Virginia material was taken from a slough beside Douthat Lake which contained rooted aquatic vegetation, algae, and a great deal of bottom debris, and from the margin of a small debris choked pond.

HALIPLUS PUNCTATUS Aube

Haliphus punctatus Aube, 1838 Species General des Coleopteres VI: 32.

Diagnosis: Length 3.8 to 4.0 mm. *H. punctatus* usually has the elytral spots confluent and the dark spot at the front of the pronotum black and well defined. *H. mutchleri*, a species most closely allied to *punctatus*, usually has the elytral spots separate and the pronotal spot a reddish brown with suffuse margins. The male genitalia are illustrated in figure 7G, H, I.

Range: New Jersey to Florida, west to Texas.

Virginia Records: Dismal Swamp (July 7, 1971, J. F. Matta).

Habitat Preference: Young (1954) indicates that *punctatus* occurs in a variety of situations: marshes, sinkhole ponds, streams, canals, and ditches. The Dismal Swamp material was taken from a roadside ditch.

HALIPLUS PSEUDOFASCIATUS Wallis

Haliphus pseudofasciatus Wallis, 1933 Trans. Royal Canad. Inst. 19: 41.

Diagnosis: 3.5 mm. The smaller size, evenly diverging prosternum and lack of a row of setigerous punctures on the inner face of the hind tibia should separate this species from *fasciatus*, the only other Virginia *Haliphus* with which it may be confused.

Range: Virginia to South Carolina.

Virginia Records: A single specimen which I believe to be *H. pseudofasciatus* was taken from the Dismal Swamp on August 31, 1972, by G. S. Grant.

HALIPLUS TRIOPSIS Say

Haliphus triopsis Say, 1823, Trans. Am. Phil. Soc. 2: 106.

Diagnosis: Length 3 to 4 mm. This species may be separated from *pantherinus* by the form of the male genitalia which are illustrated in figure 7J, K, L.

Range: New England to South Carolina.

Virginia Records: Campbell, Frederick, Montgomery, Nelson, and Warren counties and the City of Virginia Beach. Collection dates range from May 8 to October 10.

Habitat Preference: Hickman (1931) states that this species is found only in *Chara* and *Nitella* algal beds. The species has been collected many times in the ditches on the Back Bay National Wildlife Refuge in Virginia.

LITERATURE CITED

- Arnett, R. H. 1963. The beetles of the United States. Catholic University of America Press, Washington. 1112 p.
- Aubé, C. 1838. Species general des Coleopteres de la collection de M. le Conte Dejean Vol. 6, 184 p.
- Balfour-Browne, F. 1940. British Water Beetles, Vol. 1, Ray Society, London. 375 p.
- Blatchley, W. S. 1910. An illustrated descriptive catalogue of the Coleoptera or beetles (exclusive of the Rhynchophora) known to occur in Indiana. Indiana Dept. of Geol. and Nat. Res., Bul. No. 1: 1326 p.
- Cross, J. L. 1972. New state records of aquatic insects from Virginia. Proc. Ent. Soc. Wash. 74: 476.
- Harris, T. W. 1928. Contributions to Entomology, No. V, Dytiscidae. New England Farmer. 7: 156, 164.
- Hickman, J. R. 1931. Contribution to the biology of the Haliplidae. Ann. Ent. Soc. Amer. 24: 129-142.
- LeConte, J. L. 1863. New species of North American Coleoptera, Part 1. Smith., Mis. Coll. 6(167): 1-86.
- Leech, H. B. and H. P. Chandler. 1956. Aquatic Coleoptera. p. 293-371, in: R. L. Usinger, Aquatic insects of California with keys to North American genera and California species. University of California Press, Berkeley, and Los Angeles.
- Matheson, R. 1912. The Haliplidae of North America, North of Mexico. J. New York Ent. Soc. 20: 156-193.
- Matta, J. F. 1974a. The aquatic Coleoptera of the Dismal Swamp. Va. J. Sci. 24: 199-205.
- 1974b. The aquatic Hydrophilidae of Virginia (Coleoptera: Polyphaga). The Insects of Virginia: No. 8, Va. Polytech. Inst. & State Univ. Res. Div. Bull. 94: 1-44.
- Roberts, C. H. 1913. Critical notes on the species of Haliplidae of America North of Mexico with descriptions of new species. J. New York Ent. Soc. 21: 91-123.
- Say, T. 1823. Descriptions of insects of the families Carabici and Hydrocanthari of Latreille, inhabiting North America. Trans. Amer. Phil. Soc., n.s., 2: 1-109.
- Spangler, P. J. 1954. A new species of water beetle from Michigan (Coleoptera, Haliplidae). Ent. News. 65: 113-117.
- Wallis, J. B. 1933. Revision of the North American species (North of Mexico), of the genus *Haliphus*, Latreille. Trans. Royal. Canad. Inst. 19: 1-76.
- Young, F. N. 1954. The water beetles of Florida, Univ. Florida Stud., Biol. Sci. Ser. 4: 1-238.
- 1961. Pseudosibling species in the genus *Peltodytes* (Coleoptera: Haliplidae). Ann. Ent. Soc. Amer. 54: 214-222.