

North American Negastrinae (Coleoptera, Elateridae): The Negastrinae of the Eastern United States and Adjacent Canada

Jeffrey N. L. Stibick
8407 Margo Road
Lanham, Maryland, U.S.A. 20607

Abstract

Eighteen species of Negastrinae (Coleoptera, Elateridae) from Eastern North America are keyed, with illustrations, diagnoses and maps for all species. Included are five new species: *Negastrius arnetti*, *Paradonus beckeri*, *P. illinoiensis*, *P. jerseyensis* and *P. oliverea*. One name, *Negastrius exiguus* (Randall) is restored from synonymy. Four species, *Negastrius extricatus* (Fall), *Neohypdonus aestivus* (Horn), *Neohypdonus restrictulus* (Mannerheim) and *Paradonus obliquatulus* (Melsheimer) represent new combinations. Illustrations of the male genitalia of all species and representative female genitalia of each genus are given.

Introduction

The purpose of this paper is to provide new names, new combinations and other data on the Negastrinae of Eastern North America.

The material used as the basis for this study came from the institutions listed in Acknowledgements. Abbreviations for the North American collections are as in Arnett and Samuelson (1969). Others are given under Acknowledgements.

Inasmuch as the species have been difficult to identify in the past, distribution records are limited to material actually sighted by the author. Previously published records contain many errors and (with a few exceptions) are not reliable.

The term apical distance (api.d) in this paper is the ratio of the distance between the

apex of the parameres and the centerpiece to the length of the aedeagus. This measurement is useful as a diagnostic character for some of the species covered herein. The term basimeral plate is employed in this paper to designate an aedeagal structure formed by the fusion of the ventral side of the basimeres into a prolonged flat plate useful at the specific level in *Paradonus*. Drawings of all male genitalia and reproductive female genitalia are included as an aid to studies of the Negastrinae generally. This is especially true for the male genitalia, since not enough detail has been put in previously published drawings. These older drawings obscure the fact that negastrine parameres are bifurcate, a characteristic they share with the Cardiophorinae.

Where label data is given, it is in a standard format to avoid confusion; for dates, the day is in Arabic numerals, the month is in Roman numerals and the year is in Arabic. Holotype and Allotype data are as cited on the labels.

Generic Key to the Negastrinae of Eastern North America

1. Elytra without striae . . . (5) *Paradonus*
Elytra completely or partly striate . . . 2
- 2(1). Pronotum with coarse granules, tubercles, or prominences, usually convex and more or less arcuate over head, but if flat and simply rugose or smooth, than usually with anterior 1/2 more rugose

- than posterior 1/2 (fig. 18); with excavate double prosternal sutures*
 (6) *Zorochrus*
 Pronotum without coarse granules or prominences, not protruding over head, more or less flat to convex, shiny, simply rugose or strigate; prosternal sutures single, not excavate 3
- 3(2). Claws simple or with basal tooth 4
 Claws with abrupt sharp flange from midpoint to base (fig. 11a)
 (4) *Oedostethus*
- 4(3). Pronotum usually shiny from base to apex, rarely microreticulate or feebly rugose; 2nd antennal segment is subequal to 3rd (figs. 7a-10a), body more or less depressed and rounded posteriorly (figs. 7-10) (3) *Neohypdonus*
 Pronotum rugose or strigate 5
- 5(4). Body depressed, rounded posteriorly (fig. 1); antennae reaching beyond pronotum, 2nd antennal segment shorter than 3rd (fig. 1a) (1) *Microhypnus*
 Body more or less convex and attenuate posteriorly (fig. 2-6); antennae shorter than pronotum, 2nd antennal segment subequal to 3rd (fig. 2a); pronotum usually deeply rugose and roughly strigate (2) *Negastrius*

*If the excavation is vague or absent and the prosternum is separate from the propleuron, there will still be a smooth wide line representing the suture. This line usually possesses short depressions or furrows along the middle. This represents the old division between the two carina of the suture.

1. Genus *Microhypnus* Kishii

Microhypnus Kishii, 1976

Diagnosis: Body depressed and more or less opaque; with simple, curved prosternal sutures; simple, rugose pronotum with short carina on the hind angles; simple tarsi and claws; antennae longer than pronotum, 2nd antennal segment shorter than 3rd.

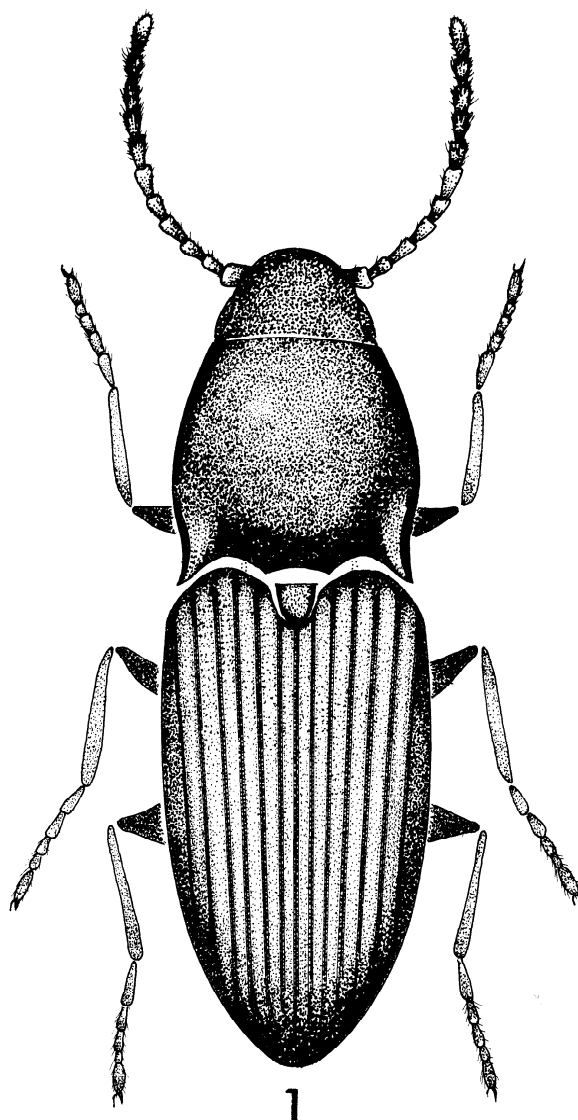


Fig. 1. *Microhypnus striatulus* (LeConte), dorsal view.

Type Species: *Cryptohypnus agilis* Lewis, 1894
 One species only for this region.

1. *Microhypnus striatulus* (LeConte)
 (Fig. 1a, b, c; Map 1)

Cryptohypnus striatulus LeConte, 1853

Diagnosis: Black to rarely dark brown depressed body (fig. 1): pronotum opaque and

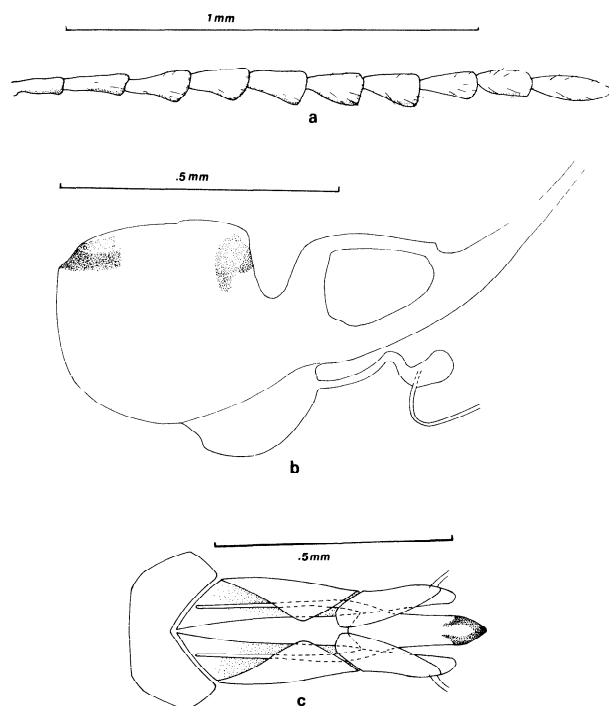


Fig. 1a-c. *Microhynpus striatulus* (LeConte). 1a. antennal segments; 1b. female genitalia; 1c. male genitalia.

densely punctured; basal segments of antennae lighter; femora piceous, tibiae and tarsi yellow, pubescence yellow and decumbent; hind angles with carina generally divergent from sides, sometimes widely so; elytra strongly striate, feebly convex; antennae simply serrate, with stout broad segments, especially 7th to 10th segments which are often densely pubescent (fig. 1a); claws simple.

Material Examined: 25 specimens, in ANSP, CASC, INHS, MCZC, MNMB, USNM, ZSMG, collected V to VII, from the following localities. MAINE: Paris, Weld. NEW HAMPSHIRE: Franconia. NEW YORK: Catskill Mts.; Olivera, Ulster Co. NOVA SCOTIA: Portaupique. OHIO: Cincinnati. QUEBEC: Huntington. VERMONT: Bengtn. Co. WISCONSIN: Skokomish River.

Range: Northeastern North America as far south as North Carolina, Kentucky (?) and West to Wisconsin (Map 1).

Biological Data: None, but probably inhabits waterside localities as implied by the Wisconsin data.

Comments: This species, rare in collections, but thought to range across the continent, now appears to be restricted to the East. A paucity of specimens from the Central and Southern States makes it impossible to determine the distributional limits. Records from the Northwest and California relate to several other undescribed species. The serrate and broad 7th to 10th antennal segments of *M. striatulus* (fig. 1a) and the male genitalia (fig. 1c) suffice to distinguish this species from the western forms, which have weakly biserrate, slender antennae, and straight parameres or shorter, more slender and pointed parameres.

2. Genus *Negastrius* Thomson

Negastrius Thomson, 1859

Diagnosis: Readily identified by the comparatively convex body, attenuate elytra, short antennae, curved and simple prosternal sutures, and rugose pronotum.

Type-Species: *Elater pulchellus* Linnaeus, 1758

Five species in the East, of which one is new. There has been some confusion in the literature over the identity of several species; consequently, only the records given herein for these species should be considered definite. Of particular importance is the proper identity of *N. exiguus* (Randall), which is a species in its own right and not a synonym of *N. pulchellus* (Linnaeus).

Specific identification should not be difficult, since the scutellum is remarkably different in several of these species and serves to separate species-groups within the genus.

Eastern *Negastrius* - Key to the Species

1. Pronotal sides with carina obsolete near apex (fig. 3b) *N. choris*
 Pronotal sides with carina complete to anterior border (fig. 2b) 2
- 2(1). Scutellum more or less abruptly perpendicular or apparently declivous due to expanded humeral area (figs. 4a, 6a) 3
 Scutellum flat to convex and more or less flush with humeral area (fig. 2c, 5a) 4
- 3(2). Body strongly arched (gibbous) in lateral view, generally yellow to reddish, sometimes patterned (fig. 4); scutellum abruptly perpendicular, caudal end convex and asperate (fig. 4a) . *N. delumbus*
 Body flatter in lateral view, generally dark colored with 2 pale spots on elytra (fig. 6), front of scutellum declivous, caudal end feebly convex, smooth and punctate (fig. 6a) *N. extricatus*
- 4(2). Scutellum flat, straight in front, surface smooth and somewhat sparsely punctate (fig. 5a) *N. exiguus*
 Scutellum variously convex, this evident by declivous sides and usually with scutellar knob on front edge, surface closely, almost coarsely punctate; pronotum posteriorly concave for reception of knob (fig. 2c) *N. arnetti*

1. *Negastrius arnetti* New Species
 (Fig. 2a,b,c,d; Map 2)

Diagnosis: Body convex but not strongly arched; ground color black to piceous with two variable orange patches on each elytron (fig. 2); pronotum rugose with sides carinate to apex (fig. 2b); scutellum convex on sides with scutellar knob on front edge and closely, almost coarsely punctate (fig. 2c); antennae shorter than pronotum, moderately serrate (fig. 2a); claws simple.

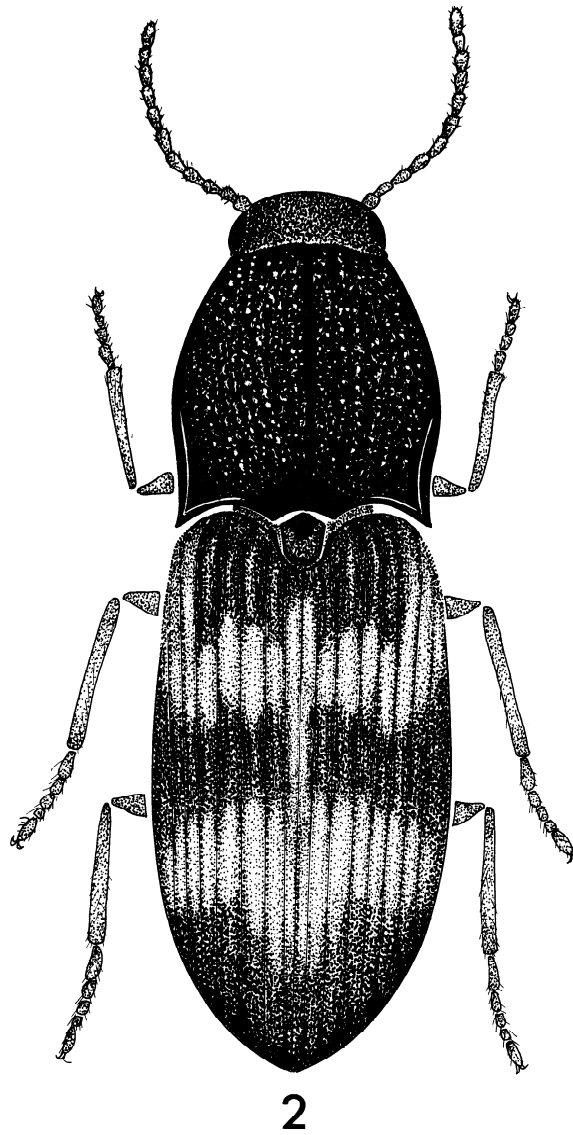


Fig. 2. *Negastrius arnetti* Stibick, dorsal view.

Description: Body 2.8 to 4.2 mm in length; ground color black to piceous with two variable orange to orange-yellow patches on each elytron (fig. 2), yellow tibia, tarsi and basal antennal segments; dorsally, coarsely rugose and strigate, closely, even coarsely punctate on ventral side.

Head: Closely, coarsely punctate, surface deeply rugose and strigate; antennae moderately serrate, 1st- to 3rd segments variably yellowish, others piceous, 1st segment (pedicel) expanded, cylindrate, 2nd and 3rd subequal in

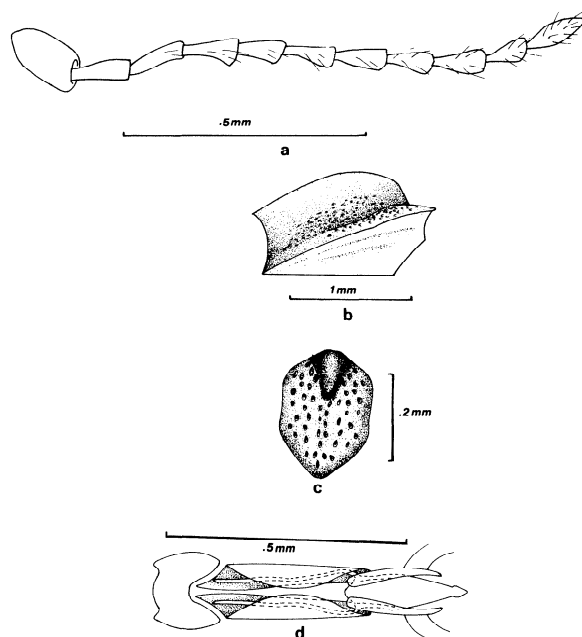


Fig. 2a-d. *Negastrius arnetti* Stibick. 2a. antennal segments; 2b. side view of pronotum, showing carination; 2c. dorsal view of scutellum; 2d. male genitalia.

size and cylindrate, 4th through 10th segments serrate and subequal, last segment oblong (fig. 2a).

Thorax: Pronotum about as long as wide (0.938), sides sinuate in front of hind angles, widest at middle and feebly convergent to apex, strong carina from apex of hind angle to apex of front angle (fig. 2b), hind angles feebly deflexed, somewhat short, stubby and not embracing humeral angle, with strong carina running from apex to less than 1/4 length of pronotum; surface very closely, very coarsely to confluent punctate and consequently rugose and strigate, smooth median carina from prominent basal concavity to anterior border. Pleural region densely, shallowly punctate, punctures radiate anteriorly, interspaces smooth and shiny. Prosternal lobe prominent, sides more or less rectangulate, generally paler than the rest of prosternum, coarsely and confluent punctate; prosternum darker, with finer, more scattered punctation, this coarse and confluent in middle, radiate anteriorly, surface shiny; prosternal sutures feebly arcuate, single, simple; prosternal mucro straight, slender and acutely pointed,

feebly concave at base, palely colored at apex. Mesosternal fossa feebly raised along sides, with a strong carina along posterior side. Metasternum with coarse punctation, sometimes confluent, radiate posteriorly; surface feebly strigate at times. Scutellum shield shaped, elongate (width/length = 0.706), feebly inclined (about 30°) in the same plane as elytral shoulders, with sides increasingly depressed towards front edge and consequently with a prominent ridge in the middle, this terminating in a prominent, projecting, smooth scutellar knob; surface otherwise feebly rugose with close, almost coarse punctation and pubescence (fig. 2c). Elytra completely, strongly striate, striae strongly punctate, punctures elongate, rarely confluent, intervals smooth, feebly convex in humeral area, with two rows of fine setose punctures; with two primary yellowish spots on each elytron, one on 5th to 6th intervals near base and extending inwards variously to 2nd and 3rd or 1st intervals to suture; sutural and apical margins may also be generally pale or even yellowish and extend along sides and even link the elytral spots. Legs generally fulvous to piceous, femur piceous, even black to light brown, tibia lighter, rarely piceous to normally bright yellow, tarsae the same as tibia, claws simple.

Abdomen: Densely to closely punctate, especially towards middle, punctures coarse, radiate posteriorly, often confluent, surface smooth and shiny along sides to slightly strigose towards middle. **Male genitalia:** Parameres bifurcate, feebly attenuate towards apex; telomere slender, separated dorsally as a movable condylite articulate to median strut of centerpiece, and with two widely separated major setae; basimere free, but almost rigid, dorsal side broadly curved, covering most of ventral side. Lateral struts of centerpiece slightly arcuate at base, otherwise straight, length to paramere length (0.569), apex of centerpiece saggittate, otherwise broadly tapering, exceeding apex of parameres by 1/10 of adcaal length (0.100). Basal piece very convex, with acute posterior angles (fig. 2d). **Female genitalia:** Typical for the genus. Completely membranous with partly divided bursa copulatrix, this with

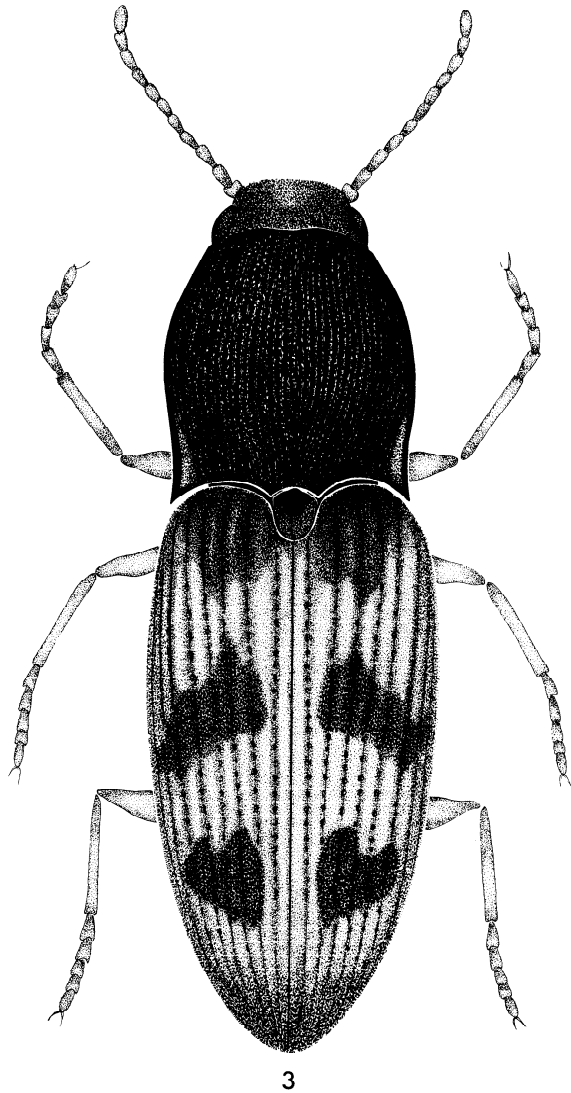


Fig. 3. *Negastrius choris* (Say), dorsal view.

poorly defined colleterial glands running along entire top of posterior section, anterior section well separated and normally at right angles to posterior section but straightening out upon lodgement of spermatophore, accessory gland connected by thick diverticulum to base of anterior section and from which in turn arises the diverticulum of the spermathecal duct (ie., see fig. 6b).

Material Examined: 77 specimens, in ANSP, BMNH, INHS, ISUI, JNLS, MCZC, MNMB, PSUC, SEMC, UASM, UMIC, UMMZ, USNM,

VMKC, collected IV to VIII from the following localities. **HOLOTYPE MALE:** First label, "Fairfax Co., VA., VI-22-23", second label, "Shoemaker-tion, 1956"; (USNM). **ALLOTYPE FEMALE;** First label, "Washington, 8.5, D.C."; second label, "Coll. Hubbard & Schwarz"; (USNM). **PARATYPES;** AMERICAN BOREAL: No Data. CANADA: No Data; (?)Acceme. ALBERTA: Medicine Hat. ARKANSAS: Washington Co. DISTRICT OF COLUMBIA: No Data; Washington. INDIANA: Athens; Tippecanoe Co. IOWA: Ames; Granger; Iowa City; Ledges State Park, Boone Co MAINE: Lewiston; Paris. MANITOBA: Aweme. MARYLAND: No Data; Plummer's Island. MASSACHUSETTS: No Data; Framingham. MICHIGAN: Balding; Berrien Springs, St. Joseph River; Cheboygan Co.; McConnell; Monroe; Port Huron. MINNESOTA: Itasca Co.; Lakeland; Milasco; Wadena Co. NEW HAMPSHIRE: Franconia. NEW JERSEY: Westville. NEW YORK: Riverhead. NORTH DAKOTA: Devil's Lake. ONTARIO: Prince Edward Co.; Toronto. SOUTH DAKOTA: Brookings.

Range: Widespread in the Northern U.S.A. and Southern Canada, South to Arkansas and Virginia (Map 2).

Biological Data: Found on sand bars in rivers or along banks. Also found in alfalfa fields.

Comments: This species is named in honor of Professor Ross H. Arnett, Jr., for whom a widespread and comparatively common species in the type genus from North America is appropriate as a tribute to his immense energies and tremendous contributions to our knowledge of the Coleoptera and of Insects in general.

2. *Negastrius choris* (Say) (Fig. 3,a,b; Map 3)

Elater choris Say, 1839 (1836)

Diagnosis: Body convex, but not strongly arched; ground color black to piceous with three variable, sometimes confluent orange patches

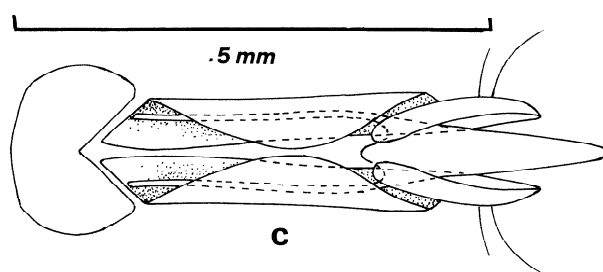
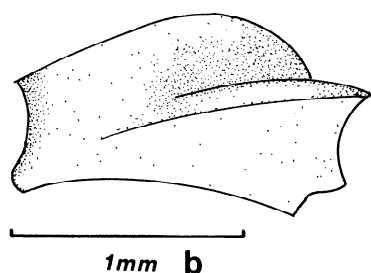


Fig. 3a-b. *Negastrius choris* (Say). 3a. side view of pronotum, showing carination; 3b. male genitalia.

covering most of elytron (fig. 3, 3a); pronotum rugose, carina along sides obsolete near anterior border (fig. 3b); scutellum variously convex with declivous sides and scutellar knob on front edge; antennae shorter than pronotum, serrate; claws simple.

Material Examined: 52 specimens, in CASC, ISUI, MCZC, PSUC, SEMC, UICU, UMMZ, USNM, collected IV to VII, from the following localities. DISTRICT OF COLUMBIA: Washington. KANSAS: Lawrence. MARYLAND: Chesapeake Bay; Difficult; Odenton; Plummer's Island. MISSOURI: New Hartford. NEW JERSEY: Gloucester; South Camden; Westville. PENNSYLVANIA: N. Wales. VIRGINIA: Great Falls, Fairfax Co.

Range: Middle Eastern States (Map 3). Probably includes Kentucky and almost certainly Illinois, Indiana, and Ohio.

Biological Data: Waterside habitats seem to be inferred from the data above.

Comments: This species is, next to *N. delumbis* (Horn), one of the more distinctive negastrids. In spite of this, specimens have been occasionally misidentified as *N. exiguus* Randall or even *N. delumbis*. It is readily distinguished from the other Eastern species by the absence of the pronotal carina near the anterior border. In combination with the presence of the scutellar knob, it is distinguished from all other American *Negastrius*.

3. *Negastrius delumbis* (Horn) (Fig. 4,a,b: Map 4)

Cryptohypnus delumbis Horn, 1891

Diagnosis: Body strongly arched (gibbous) in lateral view; ground color yellow, frequently tending to piceous, especially on abdomen; if elytron patterned, with a yellow outer humeral patch, a smaller one just more than midway to apex, and with an ill-defined apical area last (fig. 4); pronotum nodose and strigose, carina along sides complete to apex; scutellum abruptly perpendicular in front, caudal end convex and asperate (fig. 4a); antennae shorter than pronotum, serrate, claws simple.

Material Examined: 39 specimens, in ANSP, CASC, INHS, ISUI, JNLS, MCZC, SEMC, UICM, UMMZ, USNM, VMKC, WSUC, collected V to VII, from the following localities. MASSACHUSETTS: Cape Cod; Chatham; Lincoln; Nantucket Island; Provincetown; Truro. NEW YORK: Fire Island; Riverhead.

Range: Coastal areas only, from New York to New Brunswick (Map 4).

Biological Data: Becker (1977, p. 15) cited *N. delumbis* as a coastal, sand dune species; incapable of flight and found at night crawling on the sand. Cited collection data included the following: "ex sand dunes at base of marram-

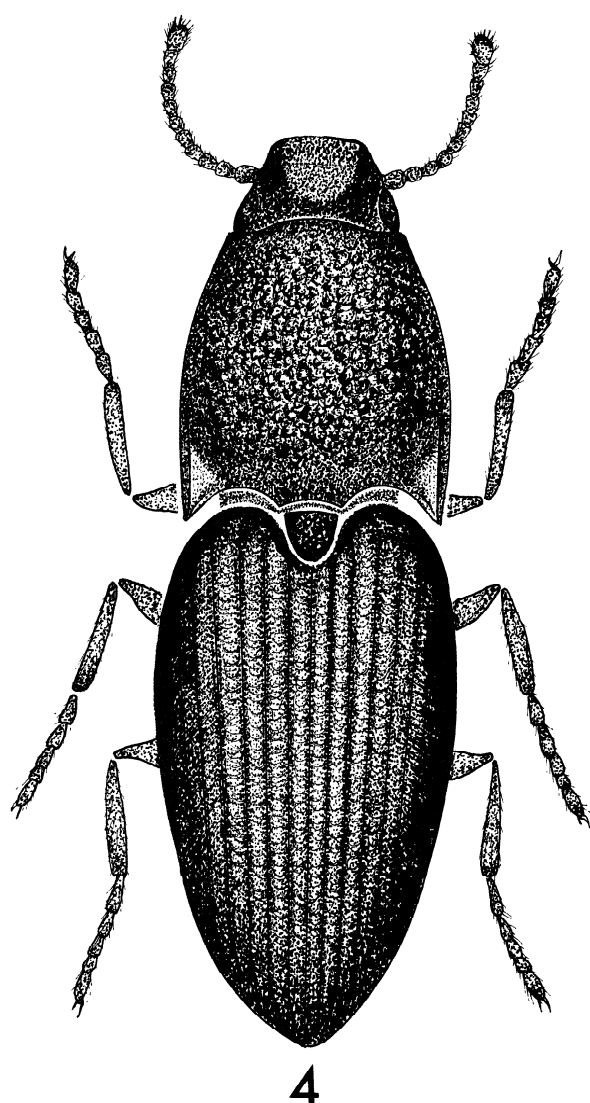


Fig. 4. *Negastrius delumbis* (Horn), dorsal view.

grass (*Ammophila breviliqulata*) and under *Cakila edentula* at top of beach".

Comments: *Negastrius delumbis* is very distinct from any of the other American negastrines and either the gibbous body or the anteriorly perpendicular asperate scutellum will distinguish this species.

Since *N. delumbis* is easily identified and is one of the few species unlikely to be confused with other negastrines, the following are added from records given by Becker (1977, p.15):

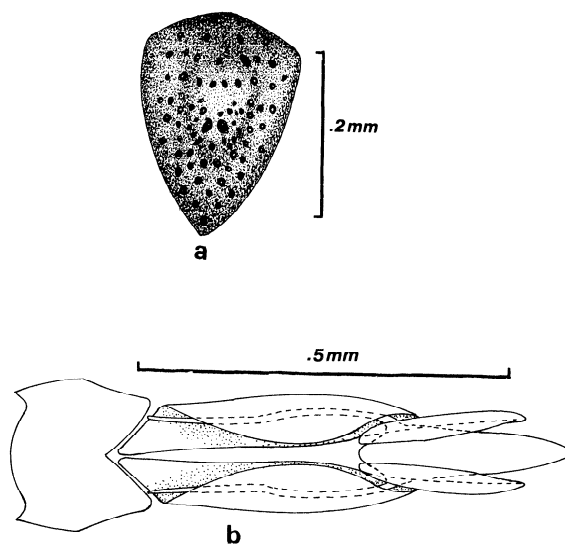


Fig. 4a-b. *Negastrius delumbis* (Horn). 4a. dorsal view of scutellum; 4b. male genitalia.

NEW BRUNSWICK: Kouchibouguac National Park (1 specimen). NOVA SCOTIA: Sable Island (183 specimens).

All specimens are apparently in the CNCI.

4. *Negastrius exiguus* (Randall)

Restored Name
(Fig. 5,a,b; Map 5)

Cryptohypnus exiguus Randall, 1838
Cryptohypnus guttatulus Melsheimer, 1845,
Synonym

Diagnosis: Body convex, but not strongly arched; ground color black to piceous with two variable yellow patches on elytron, one L-shaped in humeral area, the other a smaller patch beyond middle (fig. 5); pronotum rugose, carina along sides complete to apex; scutellum flat, front edge sharply defined and straight, surface shiny, smooth and somewhat sparsely punctate (fig. 5a); antennae shorter than pronotum, moderately serrate; claws simple.

Material Examined: 20 specimens, in CASC, CISC, INHS, UICM, USNM, WSUC, collected III to IX, from the following localities. DIS-

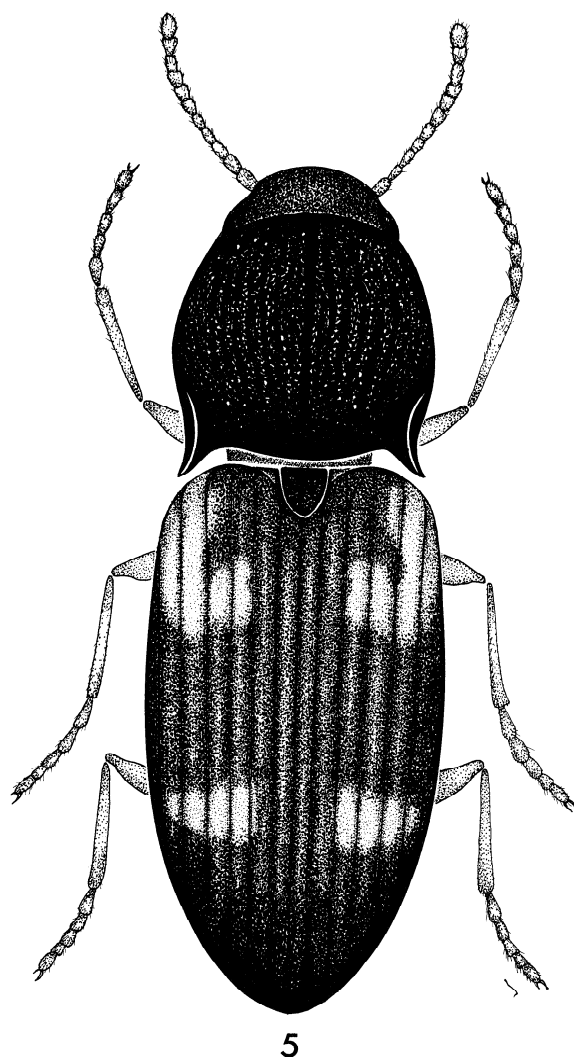


Fig. 5. *Negastrius exiguus* (Randall), dorsal view.

TRICT OF COLUMBIA: Washington. ILLINOIS: Peoria. MICHIGAN: Cheboygan Co, Burt Lake Drift; Isabella Co. NEW HAMPSHIRE: Franconia. NORTH CAROLINA: Retreat. NEW YORK: Sylvan B. Oneida Lake. OHIO: Cincinnati. ONTARIO: Toronto. PENNSYLVANIA: Pody Mts.

Range: Northeastern U.S.A. South to North Carolina and probably Kentucky(?) (Map 5). In addition, there is a specimen questionably labeled, "S.D. (?)" in the USNM, well outside the range given above.

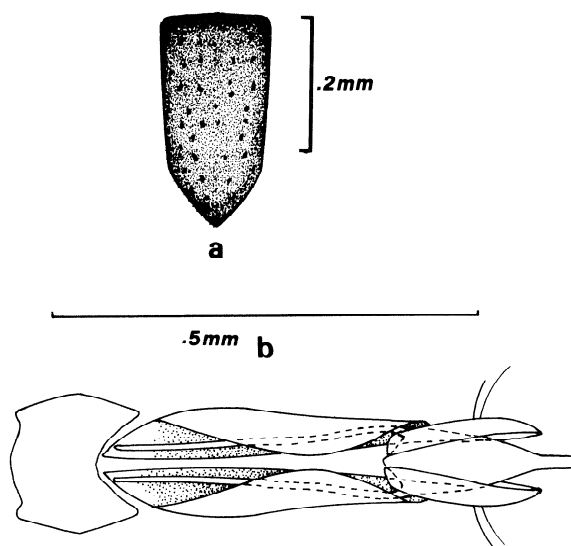


Fig. 5a-b. *Negastrius exiguus* (Randall). 5a. dorsal view of scutellum; 5b. male genitalia.

Biological Data: Taken from a farm creek, drift from a lake and on *Pteris* sp. (Brake). The last is a genus of ferns which grows in in the South and in California, but not in Michigan, where the specimen was collected.

Comments: The type locality, as given by Randall, is Massachusetts. None of his specimens are known to exist, and a neotype from Massachusetts will need to be designated, preferably from the collections of the Museum of Comparative Zoology.

This is the species thought to be *N. puchellus* (Linnaeus). However, the scutellum of *N. puchellus* is practically vertical, the front edge is concave, and the male genitalia possesses very long lateral struts and a muscular apex to the centerpiece (whilst *N. exiguus* has lateral struts ending at the base of the parameres and a papillate apex). Randall's old name must therefore be revived. The necessity for this action reflects the general lack of study of the negastrines in later work since Horn's study (1891), who correctly recognized the species, even if he did not employ the most useful char-

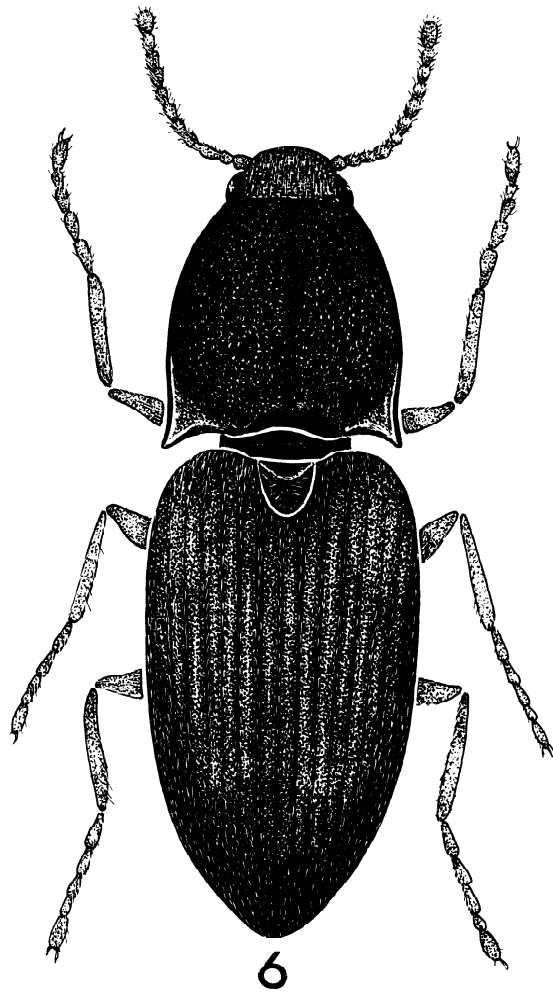


Fig. 6. *Negastrius extricatus* (Fall), dorsal view.

acters (which would have prevented later problems). *N. puchellus* is hence restricted to Eurasia.

The flat, horizontal, somewhat sparsely punctate scutellum with its straight leading edge (fig. 5a) serves to separate this species from the other American forms. Some Western species have a flat scutellum, but the leading edge is incised in front to a greater or lesser degree. It is most likely to be confused with those *N. arnetti* specimens that have a feebly convex scutellum and an obsolete scutellar knob. For such (rare) material, the scutellum is somewhat square and wider, the surface is closely (sometimes nearly confluent) almost coarsely punctate, the corresponding concavity

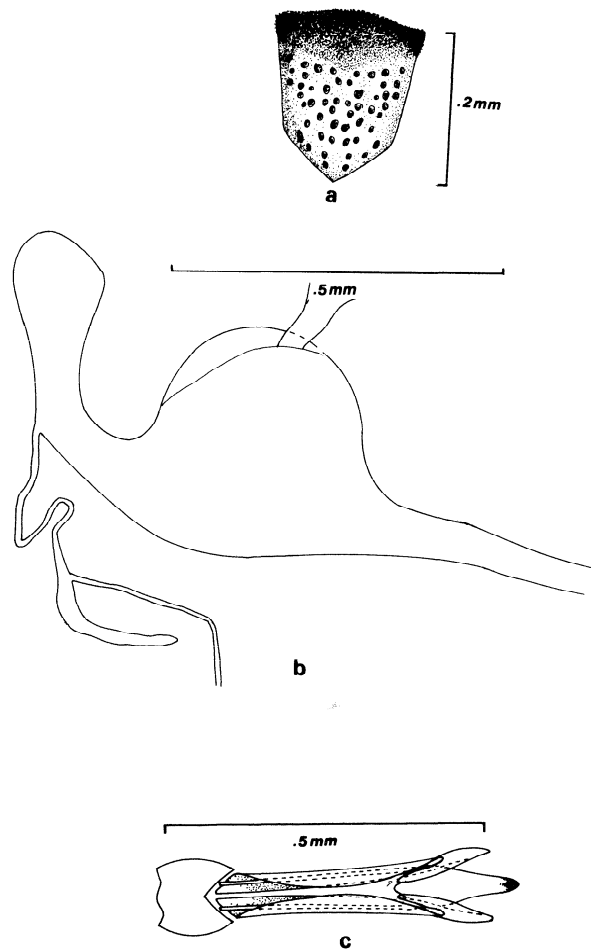


Fig. 6a-c. *Negastrius extricatus* (Fall). 6a. dorsal view of scutellum; 6b. female genitalia; 6c. male genitalia.

in the pronotum is still present, and the apex of the centerpiece of the male genitalia is papilla-shaped (fig. 5b) and not sagittate (ie., see fig. 2d), an easy feature to check in specimens if the genitalia are extended.

5. *Negastrius extricatus* (Fall) (New Combination) (Fig. 6,a,b,c; Map 6)

Hypnoidus extricatus Fall, 1926

Diagnosis: Body convex, but not strongly arched; ground color black to usually piceous,

with two variable yellow patches on elytron, one in outer humeral area, the other a small patch beyond middle, apical area also lighter and ill-defined (fig. 6); pronotum rugose, carina complete along sides to apex; scutellum declivous, caudal end rather feebly convex, smooth and punctate with broadly concave front edge (fig. 6a); humeral area raised; antennae shorter than pronotum, feebly serrate; claws simple.

Material Examined: 12 specimens, in CASC, ELMF, MCZC, MNHF, USNM, collected V to VI from the following localities. ALASKA: McKinley Park. MAINE: Augusta; Smithfield. MASSACHUSETTS: Lenox; Wilmington. MINNESOTA: Otter Trail Co. NEW HAMPSHIRE: Hampton; Three Mile Is.

Range: Across North America from Alaska to Maine and South to Massachusetts and Minnesota (Map 6).

Biological Data: One specimen was found on *Populus* sp. These are trees with such common species as Poplar, Aspen and Cottonwood. The catch was probably fortuitous.

Comments: This species is actually more closely related to the old world *N. puchellus* (Linnaeus) than is *N. exiguus*; for the scutellum in both species is very similar. However, the caudal end of the scutellum in *N. extricatus* (fig. 6a) is on more of a visible horizontal plane, while that of *N. puchellus* is more vertical and on a plane with the rest of the scutellum. The male genitalia differ, most strikingly so in the parameres, which are broad in *N. puchellus* and very thin and narrow in *N. extricatus* (fig. 6c).

3. Genus *Neohypdonus* Stibick

Neohypdonus Stibick, 1971

Diagnosis: The curved, simple prosternal sutures, elytral striae, short carina of the hind angles, subequal 2nd and 3rd antennal segments, and simple claws and tarsi serve to

distinguish this genus. General appearance is somewhat varied.

Type-Species: *Cryptohypnus gentilis* LeConte, 1866

The genus is quite diverse and has been divided into a number of groups (Stibick, 1971). Four species are known in the East.

Eastern *Neohypdonus* - Key to the Species

1. Elytron with a strong yellowish patch in outer humeral area and with a weaker but larger yellowish patch at apex, hind angles broad and thick with flat inner side (Gentilis Group), (fig. 7)
 *N. aestivus*
 Elytron plain or with yellowish patch on humeral area at most, hind angles short and sharp (fig. 8-9) or blunt and thick (obese), (fig. 10) 2
- 2(1). Hind angles short, sharp, elytron with or without yellowish patch, body elongate or robust (Perplexus Group) 3
 Hind angles blunt, thick and rounded (obese), elytron plain, body generally squat (Tumescens Group), (fig. 10)
 *N. tumescens*
- 3(2). Body elongate, pronotum longer than wide, humeral area of elytron ornate (fig. 8), 2nd & 3rd antennal segments subequal, (fig. 8a) *N. perplexus*
 Body robust, pronotum wider than long, elytra without ornamentation (fig. 9,9b), and antennal segment shorter than 3rd (fig. 9a) *N. restrictulus*

1. *Neohypdonus aestivus* (Horn)
 (New Combination)
 (Fig. 7,a,b,c; Map 7)

Cryptohypnus aestivus Horn, 1891

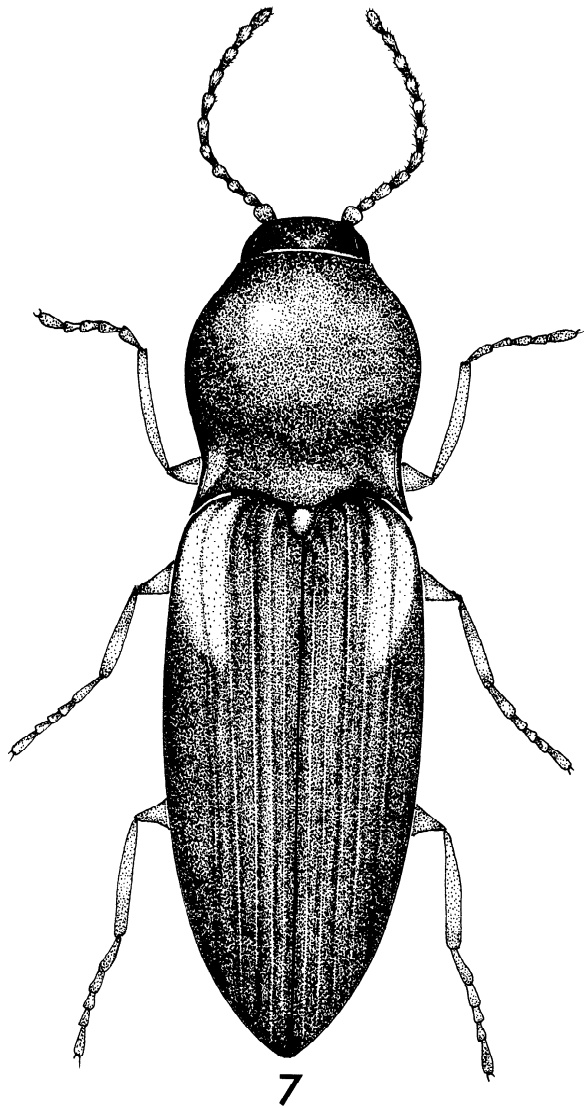


Fig. 7. *Neohypdonus aestivus* (Horn), dorsal view.

Diagnosis: Body normally convex, oblong; ground color brown to piceous, head and pronotum usually darker to blackish, with two yellow patches on elytron, one an elongate streak on 5th to 7th intervals in basal 1/3 from shoulder, the other a weaker and lighter but larger elongate oval patch from extreme apical area extending 1/3 way towards base (fig. 7); pronotum shiny, smooth, punctation rather fine but close, evenly spaced by about several times their diameters, hind angles rather sharply pointed, but otherwise broad and thick with flat inner

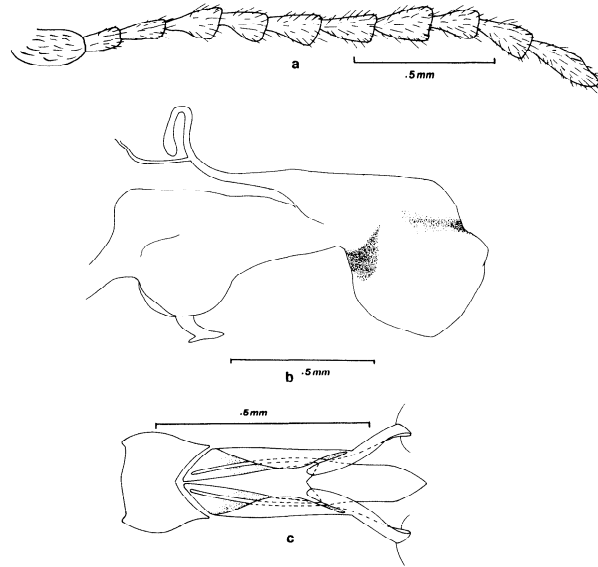


Fig. 7a-c. *Neohypdonus aestivus* (Horn) 7a. antennal segments; 7b. female genitalia; 7c. male genitalia.

side; antennae simply serrate and reaching beyond pronotum, 2nd and 3rd segments subequal (fig. 7a); claws simple.

Material Examined: 23 specimens, in ANSP, CASC, INHS, ISUI, JNLS, MCZC, USNM, collected IV to VIII from the following localities. ILLINOIS: No Data; Grafton; Kampsville; Meredosia; Mt. Carmel; Prophetstown; Pottstown. IOWA: Ames; Decorah; Iowa Experiment Station. MISSOURI: No Data; St Louis. OHIO: Cincinnati.

Range: Central States only. Unconfirmed records from Minnesota and Indiana (Map 7).

Biological Data: Several specimens have been collected along river banks and from weeds.

Comments: The apical elytral patches (fig. 7) are diagnostic within the genus. *N. aestivus* is the only representative of the *Gentilis* Group to intrude into the East. It is not closely related to other species of that group, which appears to be concentrated in the West.

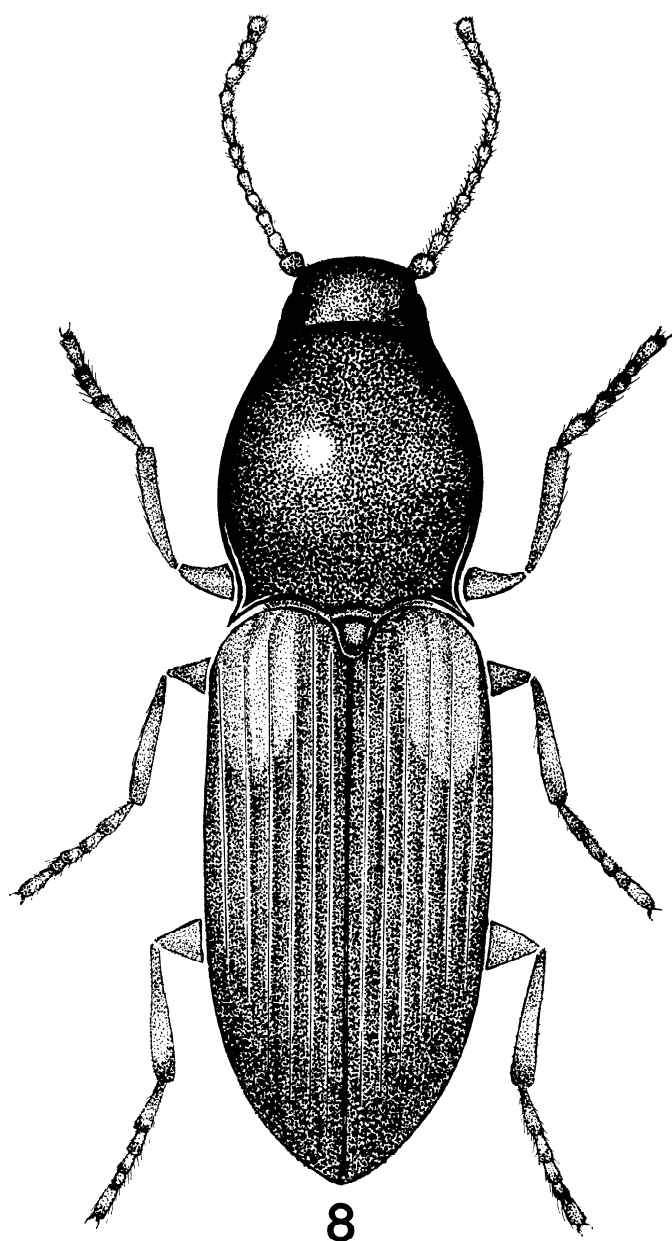


Fig. 8. *Neohypdonus perplexus* (Horn), dorsal view.

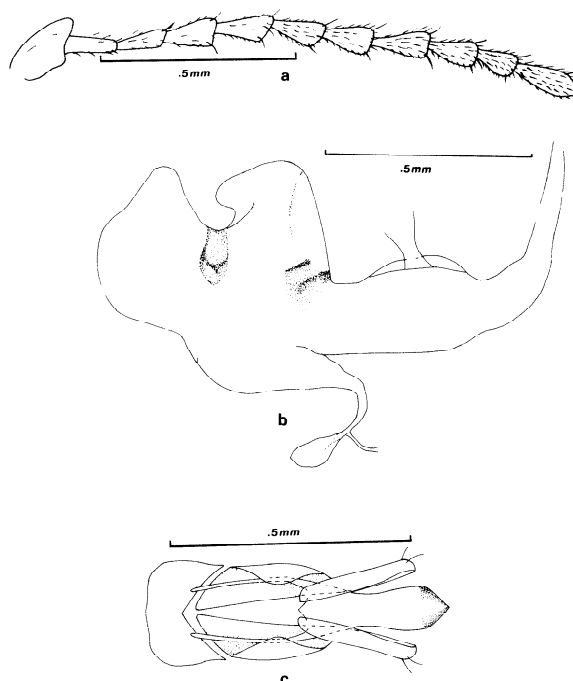


Fig. 8a-c. *Neohypdonus perplexus* (Horn) 8a. antennal segments; 8b. female genitalia; 8c. male genitalia.

2. *Neohypdonus perplexus* (Horn) (Fig. 8,a,b,c; Map 8)

Cryptohypnus perplexus Horn, 1891

Diagnosis: Body normally convex, elongate; ground color light brown to piceous, with a yellow patch on outer elytral shoulder only (fig. 8); pronotum shiny, smooth, punctation moderately fine, scattered by 3-4 times their diameters, hind angles short, very sharply pointed; antennae feebly serrate, scarcely reaching one segment behind hind angles, 2nd and 3rd antennal segments subequal (fig. 8a).

Material Examined: 66 specimens, in ANSP, CASC, JNLS, MCZC, PSUC, SEMC, USNM, VMKC, ZSMG, collected IV to XII from the following localities. AMERICAN BOREAL: No Data. DISTRICT OF COLUMBIA: No Data. MARYLAND: No Data; Montgomery Co.; Plummer's Island; Williamsport. NEW JERSEY: No Data. OHIO: Cincinnati. PENNSYLVANIA: Harrisburg; Hummelstown; New Cumberland.

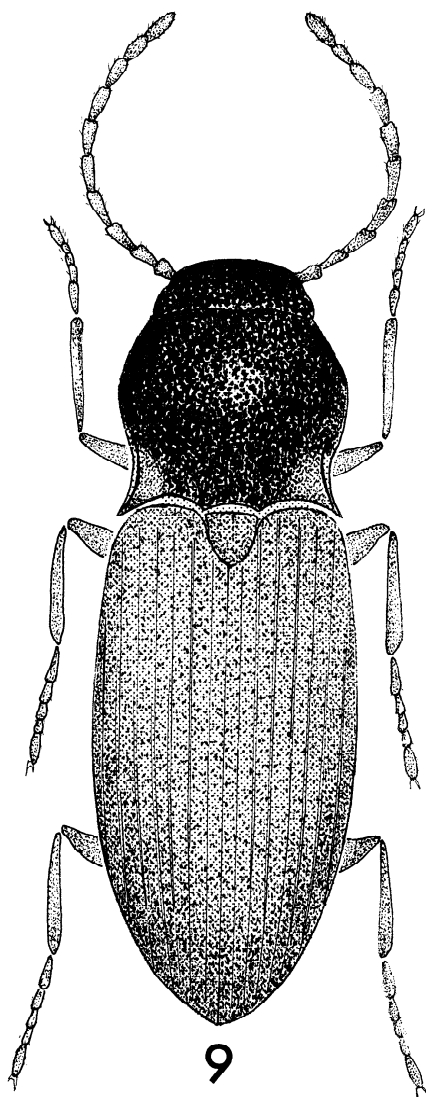


Fig. 9. *Neohypdonus restrictulus* (Mannerheim), dorsal view of male.

TENNESSEE: No Data. VIRGINIA: Alexandria; Fairfax Co.; Great Falls, Fairfax Co. WEST VIRGINIA: Williamsport.

Range: Middle Eastern to Southern States (Map 8).

Biological Data: None.

Comments: The presence of the single elytral shoulder patch is diagnostic; as is the elongate

shape of this species (fig. 8). One of only two species of the *Perplexus* Group, the other being the species immediately following.

**3. *Neohypdonus restrictulus* (Mannerheim)
(New Combination)
(Fig. 9,a,b,c,d: Map 9)**

Cryptohypnus restrictulus Mannerheim, 1853

Diagnosis: Body generally robust, pronotum wider than long; color uniformly brown to piceous, although basal joints of antennae and ends of leg segments may be paler (fig. 9,9b); pronotum shiny, smooth, punctation moderately fine, scattered by 3-4 times their diameters, hind angles short, sharp, antennae large, feebly serrate, reaching 3 segments behind hind angles, 2nd segment noticeably smaller than 3rd (fig. 9a); claws simple.

Material Examined: 7 specimens, in ANSP, CASC, SEMC, USNM, ZSMG, collected VII to VIII from the following localities. NEW HAMPSHIRE: White Mountains; Mt. Washington.

Range: Restricted to the White Mountains of New Hampshire and to the Kenai Peninsula of Alaska (Type Locality) (Map 9).

Biological Data: Has been collected at 5,700 feet on Mt. WASHINGTON. No other data available.

Comments: The male has a bisinuate truncate last ventral segment which is prominently toothed. The female is only feebly so shaped at best. This feature is unique to the species.

I have not seen Alaskan material and am unable to verify the conspecific status of this species. Horn (1891), leaves little doubt that the Alaskan form has all the unique features given here, which indicates that populations from these widely separate localities are closely related if not conspecific.

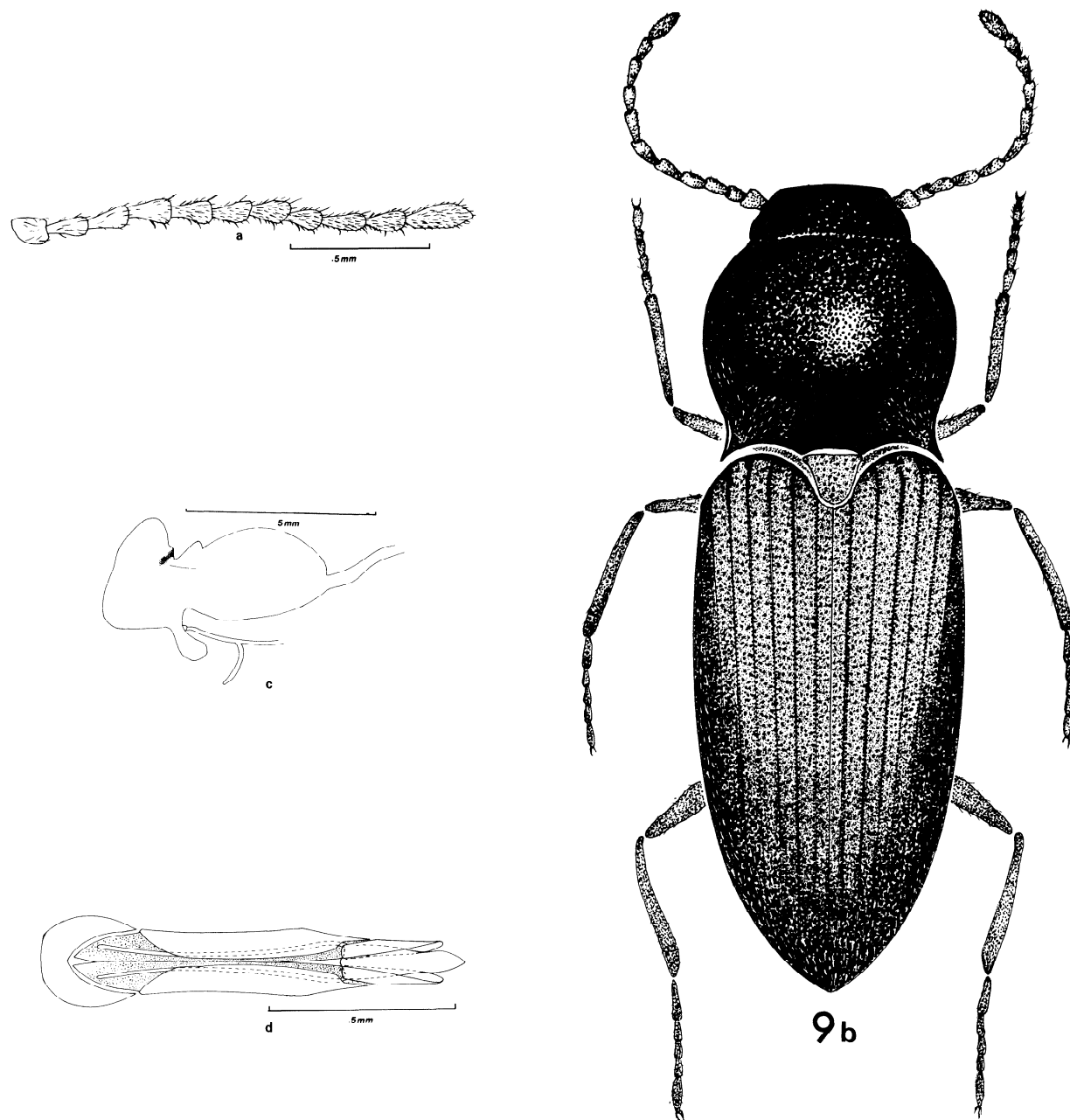


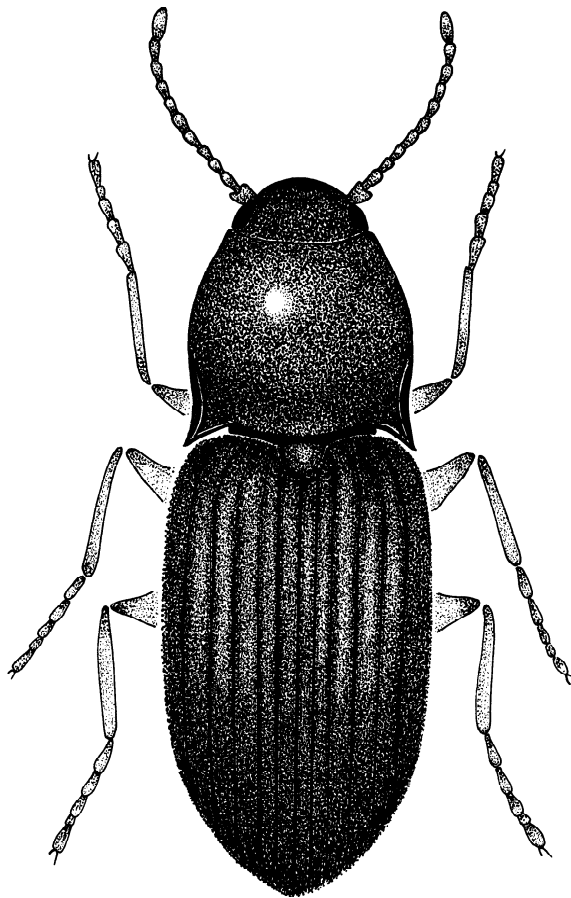
Fig. 9a-d. *Neohypdonus restrictulus* (Mannerheim) 9a. antennal segments; 9b. dorsal view of female; 9c. female genitalia; 9d. male genitalia.

4. *Neohypdonus tumescens* (LeConte)
(Fig. 10,a,b,c; Map 10)

Cryptohypnus tumescens LeConte, 1853

Diagnosis: Body generally squat, ground color uniformly brown to piceous, basal joints of

antennae and ends of leg segments paler (fig. 10); pronotum moderately strongly, closely punctate, punctures separated by 2 to 3 times their own diameters, surface smooth, shiny, hind angles blunt, thick and rounded (obese), carina of hind angles often divergent from side on angle and running about halfway up pronotum; antennae serrate, scarcely reaching one



10

Fig. 10. *Neohypdonus tumescens* (LeConte), dorsal view. segment behind hind angles (fig. 10a); claws simple.

Material Examined: 54 specimens, in ANSP, CASC, ELMF, JNLS, MCZC, MNHF, SEMC, UASM, UMMZ, USNM, collected V to VIII from the following localities. ALBERTA: Banff Springs; Baniff; Cardston; Edmonton; Jasper Park, Lake Maligne; Jasper Park, Maligne River; Lake Minnewanua; Puichu Creek; Waterton; Waterton Lake. BRITISH COLUMBIA: Golden. COLORADO: Berthoud Pass. MAINE: Grafton; New Gloucester; Orland; St. Francis. MICHIGAN: Cheboygan Co.; Grand Ledge; Lake Superior, Sault; Lake Superior, Whitefish Point. ONTARIO: Prince Edward Co.; Sudbury. QUEBEC: Duparquet; Montreal; Roberval. WISCONSIN: Dane Co.

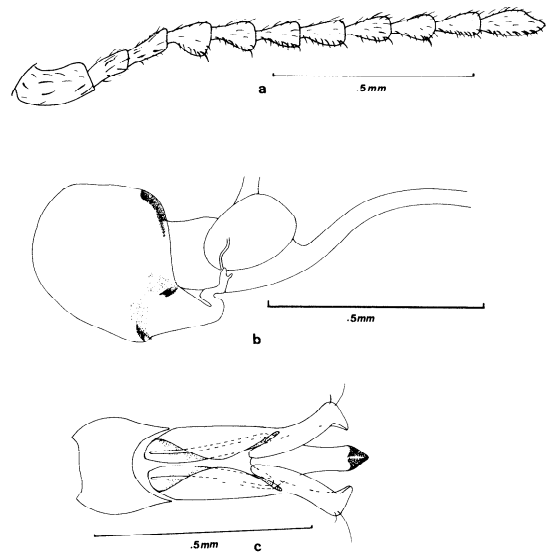


Fig. 10a-c. *Neohypdonus tumescens* (LeConte) 10a. antennal segments; 10b. female genitalia; 10c. male genitalia.

Range: Northern States and Provinces with a Southward extension into Colorado. Unconfirmed but likely records are from Minnesota, New York, New Hampshire and Idaho (Map 10).

Biological Data: Collected from damp streamside or lakeside situations and at recorded elevations of 3,444 to 5000 feet.

Comments: This is the only species of the *Tumescens* Group to reach the East, the others being known only from Northwestern states and provinces. *N. tumescens* has a rather obese shape, dark color, moderate pronotal punctation and blunt obese pronotal hind angles (fig. 10) which separates the species from other *Neohypdonus* spp. in North America.

4. Genus *Oedostethus* LeConte

Oedostethus LeConte, 1853

Diagnosis: The curved and simple prosternal sutures, hind angles with short carina, subequal 2nd and 3rd antennal segments, simply punc-

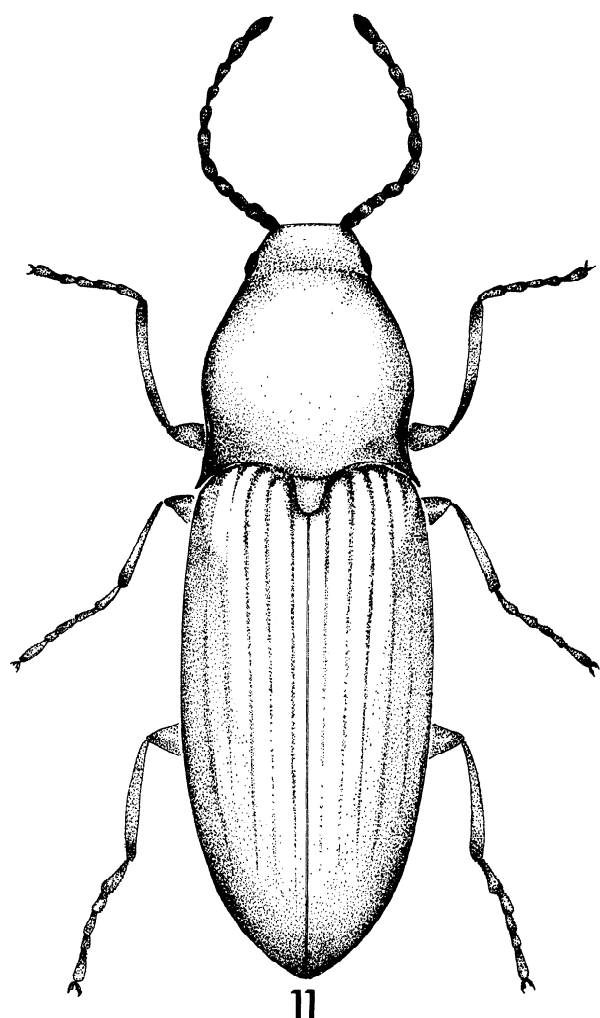


Fig. 11. *Oedostethus femoralis* LeConte, dorsal view.

tured pronotum, and claws with a basal flange will separate this genus.

Type-Species: *Oedostethus femoralis* LeConte, 1853

One species only for North America. There are three other known species in *Oedostethus* from Europe and Asia.

1. *Oedostethus femoralis* LeConte (Fig. 11,a,b,c; Map 11)

Oedostethus femoralis LeConte, 1853

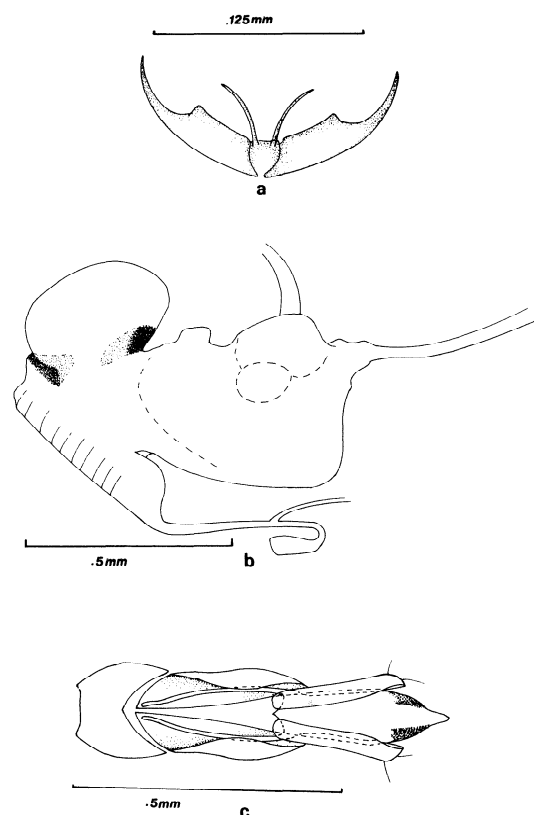


Fig. 11a-c. *Oedostethus femoralis* LeConte 11a. detail of claw; 11b. female genitalia; 11c. male genitalia.

Diagnosis: Piceous to dark brown and elongate body (fig. 11); smooth, shiny surface with moderate punctation at most; hind angles acute; antennae feebly serrate, segments 2 and 3 subequal; claws with basal flange (fig. 11a).

Material Examined: 119 specimens, in ANSP, CASC, CISC, ELMF, ICCM, INHS, ISUI, JNLS, LEMC, MCZC, NRSS, SEMC, UICU, UMMZ, USNM, VMKC, WSUC, ZSMG, collected IV to VIII from the following localities. ALBERTA: Medicine Hat. CANADA: No Data. COLORADO: No Data; Livermore. ILLINOIS: Algonquin; Northern Illinois. IOWA: 1 mi South Amana. KANSAS: No Data. MAINE: Monmouth. MARYLAND: Deer Park. MASSACHUSETTS: No Data; Agawam; Amherst; Chicopee. MONTANA: Rainy R. Dist NEBRASKA: Whitney. NEW HAMPSHIRE: Hampton; White Mts.

NEW YORK: Lancaster; Lancaster, Timberlake. OHIO: No Data; Cincinnati; Cleveland; Columbus. ONTARIO: Emo; Muskoka; Toronto. OREGON: No Data; Corvallis, Benton Co.; Dayton; Linn Co.; Huntington. PENNSYLVANIA: No Data; Alleghany; Harmarville, Alleghany Co.; Jeanette; Pittsburg. QUEBEC: Joliette. SOUTH DAKOTA: Brookings. WASHINGTON: Columbia, Lewis and Clark Park; Washington Territory. WISCONSIN: No Data.

Range: The width of North America between latitudes 30° and 52° (Map 11). A record from Kentucky requires confirmation, but the species should occur there as well as in Virginia and West Virginia.

Biological Data: There is no information on this species. It has been collected at light in one instance and from a valley meadow at 900 feet altitude in another case.

Comments: Our only native species of an old world genus, this species is present in most collections. The shape helps to distinguish it, but the flange on the tarsal claws is immediately diagnostic. Unfortunately, the flange must be ascertained with the aid of a good scope and care taken not to overlook this feature in worn specimens.

5. Genus *Paradonus* Stibick

Paradonus Stibick, 1971

Diagnosis: The general facies is characteristic; body somewhat flattened, hind angles typically short, stubby, with short carina, pro- sternal sutures curved and simple, elytra without striae, claws simple.

Type-Species: *Elater pectoralis* Say, 1839 (1836)

There are six species which occur in Eastern North America, and except for *Paradonus obliquatululus* (Melsheimer), they have been hopelessly confused with each under *P. pectora-*

lis (Say). The 4 forms hitherto so grouped under this name are described here.

Identification of these species should not be difficult, but it must be realized that color patterns cited in the key, while constant, are not always present in a particular specimen and may vary from pronounced to vague or absent.

Eastern *Paradonus* - Key to the Species

1. Hind angles short and blunt, inner side straight or comparatively so, carina relatively straight and running to apex of angle in dorsal view; head piceous; pronotum yellowish, microreticulate and closely punctate; elytra yellowish and often with faintly darker areas about scutellum and near middle or very rarely entirely piceous (fig. 17)
 *P. pectoralis*
 Hind angles pointed at apex at least, inner side concave, carina may be curved or straight, but running to (or apparently to) inside of apex in dorsal view; without above combination of characters for head, pronotum or elytra (figs. 12-16) 2
- 2(1). Elytron with transverse yellow band at middle, often with apical spot (fig. 15) *P. obliquatululus*
 Elytron without transverse band, variously plain or ornate (figs. 12-14, 16) . . . 3
- 3(2). Body yellowish to light brown, usually with piceous areas along suture and behind middle of elytra; hind angles straight, with strong, straight carina near border (fig. 13); Illinois
 *P. illinoiensis*
 Body piceous to light brown (pronotum only very rarely lightly colored in individuals); elytron usually with a yellow spot (rarely faint or absent) in humeral area and another at apex (figs. 12, 14, 16) 4
- 4(3). Carina of hind angles broadly arcuate and widely separate from sides, hind angles

comparatively slender; often with 2 or 4 variable spots on elytra; body comparatively more oblong, convex and elytra more acuminate towards apex; smaller, about 2 1/2 to less than 3 mm in length (figs. 12, 14) 5
 Carina of hind angles feebly arcuate and moderately divergent from sides, hind angles with broad base; with variable yellowish humeral patch and smaller apical patch on elytron; body comparatively broader, more flattened and elytra blunter at apex, larger, from 3 to 3.5 mm in length (fig. 16) . . . *P. oliverea*

- 5(4). Hind angles very sharp and comparatively elongate; body piceous (fig. 14); New Jersey *P. jerseyensis*
 Hind angles comparatively blunt, shorter; body usually with a humeral spot on each elytron, sometimes a faint apical spot, spots rarely completely absent (fig. 12) *P. beckeri*

1. *Paradonus beckeri* New Species (Fig. 12a; Map 12)

Diagnosis: Body 2.5-3mm in length, piceous to light brown, comparatively elongate and convex; elytra comparatively acuminate towards apex, with humeral spot and sometimes a faint apical spot on each elytron (fig. 12); pronotum occasionally pale at base, closely, moderately punctate, surface smooth, hind angles bluntly pointed at apex, slender but not elongate, inner side concave, carina broadly arcuate and widely separate from side, running to inside of apex; claws simple.

Description: Body 2.5 to 3mm in length; ground color piceous to light brown with a yellowish humeral spot and sometimes a faint apical spot on each elytron (fig. 12), legs and antennae light yellow with an occasional brownish tinge on basal antennal segments; dorsally with moderately fine, moderately closely spaced punctures on head and pronotum, with finer, equally spaced punctation on elytra, ventrally

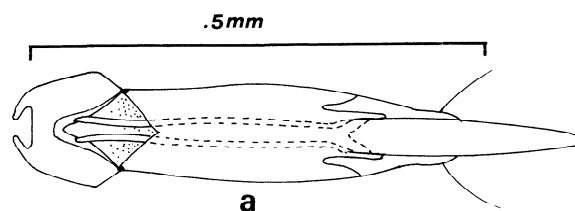
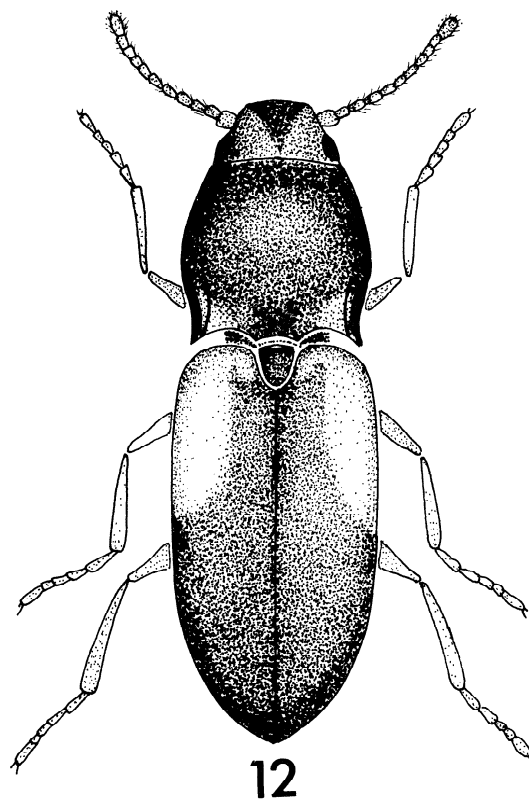


Fig. 12. *Paradonus beckeri* Stibick, dorsal view; 12a. male genitalia.

with more or less closely spaced fine punctation, slightly finer and denser on abdomen.

Head: Piceous to dark brown, moderately, closely punctate, surface faintly microreticulate; antennae moderately serrate, usually yellowish, but first five segments may have brownish tinge at bases, 1st segment (pedicel) expanded, cylindrical, 2nd and 3rd cylindrical, 3rd smaller than 2nd, 4th through 10th segments serrate and feebly decreasing in length, last segment with excavate sensorial pits on both sides of apex, creating a sharp apical angle.

Thorax: Pronotum wider than long (0.789), sides moderately sinuate in front of hind angles,

widest in middle and moderately convergent to apex; hind angles feebly concave on outer side, concave on inner side, with comparatively blunt, short, divergent apex and narrow base, embracing slightly produced basal margin of elytra but not humeral angle, strong and broadly arcuate carina running from inside apex and diverging from sides to about 1/5.5 length of pronotal length; surface piceous to light brown especially at base, moderately fine, moderately close punctation, punctures separate by 1 to 2 times their own diameters, interspaces smooth. Pleural region somewhat finely, shallowly punctate, punctures moderately scattered, interspaces shiny, feebly microreticulate. Prosternal lobe prominent, rectangulate, punctation shallow, fine, moderately spaced, closer near anterior edge, interspaces smooth to feebly microreticulate; prosternum with somewhat stronger, denser punctation, especially towards sutures, surface feebly microreticulate at best, prosternal sutures moderately curved, single, simple; prosternal mucro straight, slender and acutely pointed, narrowly concave at base, sharply convex from procoxae to apex, moderately punctate, microreticulate; overall color of preceding ventral areas of prothorax light brown, tending to darken near pleural margins. Mesosternal fossa raised along sides, posterior side flat with fossa veering into ventrally expanded mesosternum. Metasternum with fine, moderately spaced punctures, surface smooth. Scutellum shield shaped, flat, feebly elongate (width/length = 0.857), feebly inclined; surface smooth, scarcely if at all punctate. Elytra without striae, finely, more or less evenly punctate, these separated by about 3 times their own diameters, surfaces very feebly microreticulate or smooth, ground color light brown to piceous with a prominent yellowish humeral patch and on occasion a fainter, smaller apical patch. Legs a bright yellow, claws simple.

Abdomen: Finely, shallowly, densely to almost confluent, evenly punctate, surface shiny and microreticulate. **Male Genitalia:** Parameres relatively straight on sides, bifurcate, attenuate towards apex; telomere slender, separated dorsally as a movable condylite, this dorsal condylite with a slender digitate base and articulate to median strut of centerpiece,

with one major subapical seta; basimeres fused to each other and to centerpiece, forming a rigid cylinder, dorsal side covering ventral side except over basimeral plate, this strongly attenuate basad and narrowly angulate at apex. Centerpiece narrow, lateral struts feebly arcuate at base, otherwise straight, length to paramere length (0.708), apex rather sharp and strongly acuminate, exceeding apex of parameres by (0.240) of aedeagal length. Basal piece convex, comparatively small (fig. 12a). **Female Genitalia:** Typical for the genus. Completely membranous with large bursa copulatrix and one equally large colleterial gland on each side; and a very small, completely separate rear chamber connecting to a small, sac-like accessory gland and separately to the spermathecal diverticulum (ie., see fig. 15a).

Material Examined: 238 specimens, in ANSP, INHS, ISUI, JNLS, NRSS, PSUC, PURC, SEMC, UASM, UICU, UMMZ, USNM, VMKC, collected I to XII from the following localities. **HOLOTYPE MALE:** First label, "Iowa City, Wickham, VI-11-98"; second label; "Wickham Collection, 1933"; (USNM). **ALLOTYPE FEMALE:** Same data as Holotype except for date, "V-4-99"; (USNM). **PARATYPES:** AMERICAN BOREAL: No Data. ILLINOIS: Central Illinois; Northern Illinois; Southern Illinois; Bellflower; Dekalb Co.; Jerseyville; Putnam Co.; Shenandoah; Urbana. INDIANA: Clark Co., State Forest; Millers; Tippecanoe Co. IOWA: Adams Co., Iowa Experiment Station; Cass Co., Iowa Experiment Station; Davis Co., Iowa Experiment Station; Decatur Co., Iowa Experiment Station; Des Moines Co., Iowa Experiment Station; Fremont Co., Iowa Experiment Station; Greene Co., Iowa Experiment Station; Guthrie Co., Iowa Experiment Station; Henry Co., Iowa Experiment Station; Jackson Co., Iowa Experiment Station; Keokuk Co., Iowa Experiment Station; Lee Co., Iowa Experiment Station; Mills Co., Iowa Experiment Station; Polk Co., Iowa Experiment Station; Pott Co., Iowa Experiment Station; Poweshiek Co., Iowa Experiment Station; Ringgold Co., Iowa Experiment Station; Union Co., Iowa Experiment Station; Van Buren Co., Iowa Experiment Station; Warren Co., Iowa

Experiment Station; Wash Co., Iowa Experiment Station; Wayne Co., Iowa Experiment Station; Ames; Iowa City. KENTUCKY: Henderson; Paducah. KANSAS: Douglas Co.; Franklin Co.; Iola; Morill; Reno Co.; Selma; Topeka; Wellington; Wichita. MARYLAND: Hagerstown. MICHIGAN: Michpctn River, Lake Superior. MISSOURI: Charleston; Peers; Valley Park; Willard, Green Co. MONTANA: Glendive. NEBRASKA: Lincoln. NEW JERSEY: No Data. OHIO: Adams Twp., Sec. 23, Lucas Co. OKLAHOMA: TonKawa. PENNSYLVANIA: Cornwells; Greencastle; Linglestown; New Cumberland. QUEBEC: Montreal. TEXAS: New Braunsfels.

Range: Widespread throughout Central and Eastern North America, excluding the Deep South.

Biological Data: The ecological data on *P. beckeri*, all of whose specimens were separated from material identified as *P. pectoralis* (Say), show a strong tendency to indict Blue Grass as a host plant. Most of these records relate to the efforts of the Iowa Experiment Station. It should be noted that the available data now eliminates *P. pectoralis* as a pest of Blue Grass. *P. beckeri*, then, is the only known negastine pest of Blue Grass, although one specimen of *P. obliquatulus* (Melsheimer) was found on Blue Grass.

Other records relate to occasional finds in Corn and Timothy. In addition, there have been single finds, probably fortuitous, on Oak, Osage orange and a grass (*Spartina* spp.),

Comment: Named in honor of Dr. E. C. Becker, of Ottawa, Canada, for his notable contributions to the study of the Elateridae.

This species forms a close complex with *P. jerseyensis*; known only from New Jersey at present. The two species share similar carination of the hind angles and convex body shape (figs. 12, 14), but differ in the shape of the hind angles themselves and in the elytral ornamentation. The male genitalia is also diagnostic.

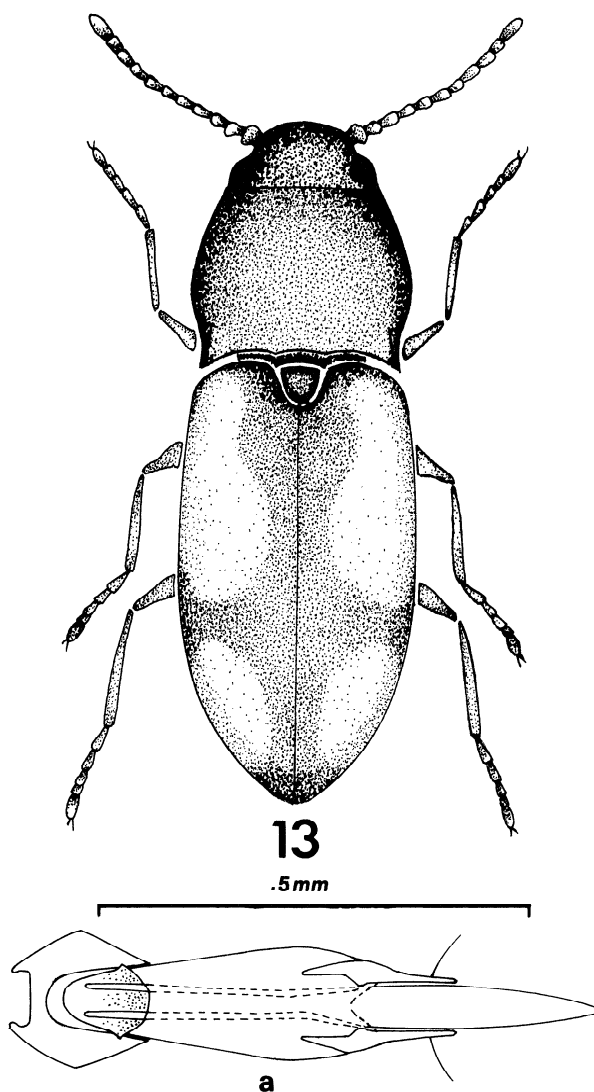


Fig. 13. *Paradonus illinoiensis* Stibick, dorsal view; 13a. male genitalia.

2. *Paradonus illinoiensis* New Species (Fig. 13,a; Map 13)

Diagnosis: Body 2.75-2.95mm in length; yellowish to light brown, usually with piceous areas along suture and behind middle of elytra; comparatively broad and flattened with blunt elytral apex (fig. 13); pronotum moderately closely, moderately finely punctate, surface faintly microreticulate, hind angles straight,

feebly concave on inner side, with strong straight carina near border running to side of apex; claws simple.

Description: Body 2.75-2.95mm in length, ground color yellow to light brown with piceous areas along suture and middle of elytra (fig. 13), legs and antennae light yellow; dorsally with moderately fine, closely spaced punctures on head and pronotum, with more scattered fine punctation on elytra, ventrally with more or less closely spaced fine punctation, slightly finer and denser on abdomen.

Head: Light brown, moderately, closely punctate, surface feebly microreticulate; antennae moderately serrate, yellowish, 1st segment (pedicel) expanded, cylindrate, 2nd and 3rd cylindrate, 3rd smaller than 2nd, 4th through 10th segments serrate and gradually decreasing in length, last segment with excavate sensoral pit on upper side of apex, creating a blunt apical angle.

Thorax: Pronotum wider than long (0.750), sides sinuate in front of hind angles, widest in middle and moderately convergent to apex; hind angles straight on outer side, feebly concave on inner side, short and stubby, embracing slightly produced basal margin of elytra but not humeral angle, strong straight carina running from just inside apex to about 1/5 length of pronotal length; surface yellow, moderately closely, moderately finely punctate, punctures separate by about 2 times their own diameters, interspaces faintly microreticulate. Pleural region somewhat finely, shallowly punctate, punctures somewhat scattered, absent from basal third, interspaces shiny, microreticulate. Prosternal lobe prominent, rectangulate, punctation moderately impressed, but closely, evenly confluent spaced, interspaces feebly shiny, microreticulate and slightly rugose; prosternum with moderately impressed, crowded but not confluent punctation, surface shiny, smooth, prosternal sutures moderately curved, single, simple; prosternal mucro straight, slender and acutely pointed, concave at base, sharply convex from procoxae to apex, moderately punctate, feebly microreticulate; overall color of preceding ventral areas of prothorax yellowish, darker along sutures and

margins. Mesosternal fossa sharply raised along sides, posterior side flat with fossa veering into ventrally expanded mesosternum. Metasternum with fine, shallow, moderately spaced punctures, surface shiny, feebly microreticulate. Scutellum shield shaped, flat, elongate (width/length = 0.813), feebly inclined; surface smooth, scarcely if at all punctate. Elytra without striae, finely, more or less evenly punctate, these spaced about 2-3 times their own diameters, surface smooth, ground color yellowish with light brown to piceous areas along suture, at base and humeral angle and transversely behind middle. Legs completely light yellow, claws simple.

Abdomen: Finely, closely and evenly punctate, surface smooth and shiny. **Male Genitalia:** Parameres angulate on sides towards the middle, bifurcate, attenuate towards apex; telomere slender, separated dorsally as a movable condylite, this dorsal condylite with very slender digitate base and articulate to median strut of centerpiece, with one major subapical seta; basimeres fused to each other and to centerpiece, forming a rigid cylinder, dorsal side covering ventral side except over basimeral plate, this scarcely attenuate basad, apex broadly rounded. Centerpiece slender, lateral struts straight, length to paramere length (0.771), apex strongly acuminate and acutely pointed, exceeding apex of parameres by 0.2388 of aedeagal length. Basal piece convex, slender (fig. 13a). **Female:** Unknown.

Material Examined: 2 specimens only, in the INHS, as follows: **HOLOTYPE MALE:** First label, "Grand Tower, Ill., Jul 12, '09"; second label, "At light, river shore"; (INHS). **PARATYPE (Male):** ILLINOIS: Oakwood, coll. Frison and Ross, March 27, 1934, In moss on knoll.

Range: Illinois. Probably extends further West (Map 13) into Missouri and Arkansas, but the specimens available will in turn need to be compared with other material from Texas and other Western localities, a matter better left at present.

Biological Data: As with other negastrines, watery and damp habitats appear to be preferred.

Comments: The name is based on the state. This species forms a close complex with *P. oliverea* Stibick (see comments under that species).

3. *Paradonus jerseyensis* New Species (Fig. 14a; Map 14)

Diagnosis: Body 2.5-3mm in length; piceous to light brown, comparatively elongate and convex, elytra comparatively acuminate towards apex with no ornamentation (fig. 14); pronotum closely, moderately punctate, surface smooth, hind angles very sharp and comparatively elongate, inner side concave, carina broadly arcuate and widely separate from side and running to inside of apex; claws simple.

Description: Body 2.5-3mm in length, ground color piceous to light brown (fig. 14), legs and antennae light yellow with occasional brownish tinge on basal antennal segments; dorsally with moderately fine, moderately closely spaced punctures on head and pronotum, with finer, scarcely more scattered punctation on elytra, ventrally with more or less closely spaced fine punctation, slightly finer and dense on abdomen.

Head: Piceous, moderately, closely punctate, surface faintly microreticulate; antennae moderately serrate, usually yellowish but first 5-6 segments may have brownish tinge at bases, 1st segment (pedicel) expanded, cylindrate, 2nd and third cylindrate, 3rd smaller than 2nd, 4th through 10th segments serrate and gradually decreasing in length (8th, 9th and 10th subequal), last segment with excavate sensoral pit on upper side of apex creating a blunt apical angle.

Thorax: Pronotum wider than long (0.789), sides moderately sinuate in front of hind angles, widest in middle and very moderately convergent to apex; hind angles feebly concave on outer side, inner side concave, with compara-

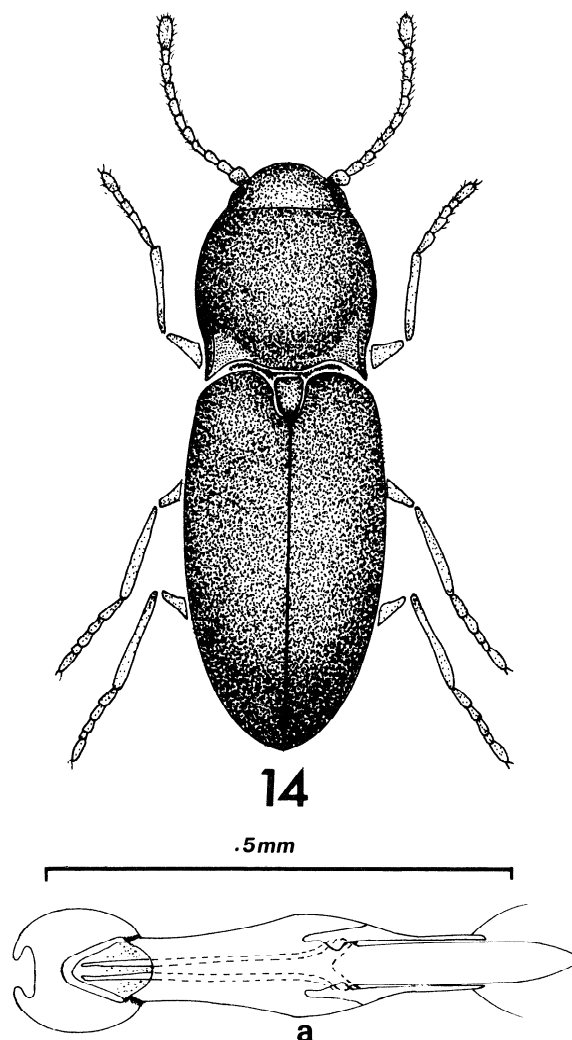


Fig. 14. *Paradonus jerseyensis* Stibick, dorsal view; 14a. male genitalia.

tively long, sharp divergent apex and narrow base, embracing slightly produced basal margin of elytra but not humeral angle, strong, broadly arcuate carina running from inside apex and widely divergent from sides to about 0.263 length of pronotal length; surface piceous, moderately punctate, punctures separate by about 2-2 1/2 times their own diameters, interspaces smooth to feebly microreticulate. Pleural region somewhat finely, shallowly punctate, punctures moderately close, interspaces shiny but strongly microreticulate. Prosternal lobe prominent, rectangulate, punctation shallow, fine and close, interspaces feebly microretic-

ulate; prosternum with somewhat stronger, denser punctation, especially towards sutures, surface microreticulate, prosternal sutures moderately curved, single, simple; prosternal micro straight, slender and acutely pointed, narrowly concave at base, sharply convex from procoxae to apex, moderately punctate, microreticulate; overall color of preceding ventral areas of prothorax light brown, tending to darken near pleural margins. Mesosternal fossa raised along sides, posterior side flat (with fossa veering into ventrally expanded mesosternum. Metasternum with fine, moderately spaced punctures, surface microreticulate. Scutellum shield shaped, flat, feebly elongate (width/length = 0.800), feebly inclined; surface smooth, scarcely if at all punctate. Elytra without striae, finely, more or less evenly punctate, these spaced about 2-3 times their own diameters, surface shiny, smooth, ground color uniformly piceous. Legs light yellow; claws simple.

Abdomen: Finely, shallowly, closely and evenly punctate, surface shiny and feebly microreticulate. **Male Genitalia:** Parameres somewhat expanded in middle, bifurcate, attenuate towards apex; telomere slender, separated dorsally as a movable condylite, this dorsal condylite with slender rhamphotate base and articulate to median strut of centerpiece, with one major apical seta; basimeres fused to each other and to centerpiece, forming a rigid cylinder, dorsal side covering ventral side except over basimeral plate, this broadly attenuate basad, apex moderately blunt. Centerpiece broad, lateral struts scarcely arcuate at base, otherwise straight, length to paramere length (0.618), apex rather sharp and acute, exceeding apex of parameres by 0.1633 of aedeagal length. Basal piece convex, rounded on sides and somewhat delicate in appearance (fig. 14a). **Female Genitalia:** Typical for the genus. Description as under *P. beckeri*.

Material Examined: 5 specimens only, in the USNM and the MCZC, collected IV (only date) from the following localities. **HOLOTYPE MALE:** First label, "Anglesea, N.J."; second label, "Coll. Hubbard & Schwarz"; (USNM). **ALLOTYPE FEMALE:** Same data as Holotype

(USNM). **PARATYPES:** NEW JERSEY: Anglesea; Sattelhurst.

Range: New Jersey (Map 14).

Biological Data: Not available.

Comments: The name is based on the State.

This species is closely related to *P. beckeri* Stibick (see comments under that species). It is probably rare and limited in distribution (although selected collecting may prove otherwise). It is possible that habitat destruction could have had adverse effects on its chances of survival.

4. *Paradonus obliquatulus* (Melsheimer) (New Combination) (Fig. 15,a,b; Map 15)

Cryptohypnus obliquatulus Melsheimer, 1845
Hypnoidus felti Notman, 1921

Diagnosis; Body elongate; piceous to light brown, with a broad transverse light yellow streak in middle of elytron, slightly narrowing towards middle and failing to reach suture and with an oval yellowish patch in apical area, this fading to obsolete (fig. 15); pronotum shiny, smooth, punctation moderately close and deep; separated by 2-3 times their diameters, hind angles pointed, inner side concave, carina arcuate, veering inwards and attaining apex on inside of angle; claws simple.

Material Examined: 105 specimens, in ANSP, ELMF, ICCM, INHS, ISNB, ISUI, JNLS, MCZC, NRSS, SEMC, USNM, UMMZ, WSUC, collected I to X from the following localities. **AMERICAN BOREAL:** No Data. **DISTRICT OF COLUMBIA:** Washington. **ILLINOIS:** Chicago; Edgebrook; Edwards Co.; Evanston; Quincy; Springfield; Urbana. **INDIANA:** Lafayette. **IOWA:** Ames; Iowa Experiment Station, Appanoose Co.; Sioux Co. **KANSAS:** No Data. **MAINE:** Rockwood. **MICHIGAN:** Detroit; East Lansing; Gull Lake Biological Station, Kalamazoo Co.; Monroe Co. **NEW JERSEY:** Boonton;

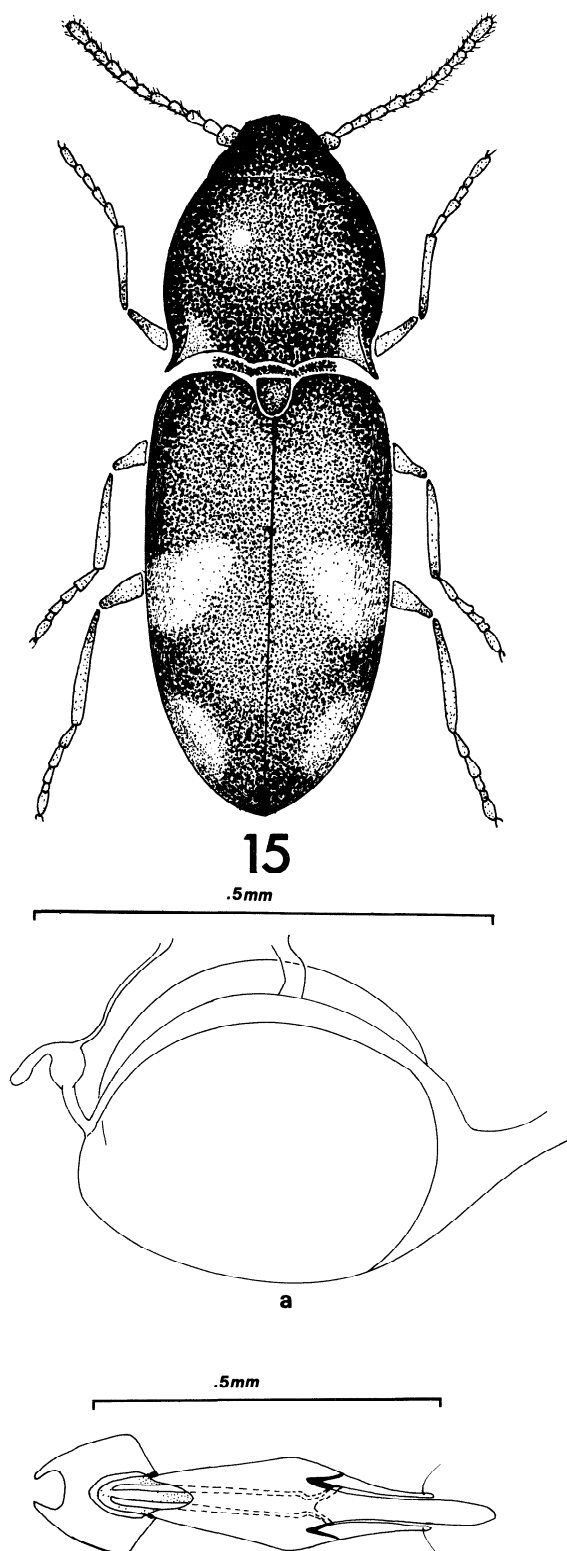


Fig. 15. *Paradonus obliquatulus* (Melsheimer), dorsal view. 15a. female genitalia; 15b. male genitalia.

Irvington; Woodbury. NEW YORK: Long Island; Pearl River. OHIO: Adams Two, Sec. 23, Lucas Co.; Centi; Cincinnatti; Holgate; Marietta. PENNSYLVANIA: Pittsburg. SOUTH DAKOTA: Elk Point. WISCONSIN: Muskego.

Range: Middle states to the central plains. Probably occurs in the Southern Border states and lower Ontario as well (Map 15).

Biological Data: This species has been collected from corn roots, blue stem grass and from trash and under boards.

Comments: *P. obliquatulus* is the only species in this genus which has been reliably identified in the past, a fact due entirely to the transverse yellow band on the elytron.

5. *Paradonus oliverea* New Species (Fig. 16,a; Map 16)

Diagnosis: Body 3 to 3.5mm in length, piceous to light brown, comparatively broad and flattened with blunt elytral apex, with variable yellowish humeral patch and smaller apical patch on each elytron (fig. 16); pronotum moderately closely, moderately finely punctate, surface faintly to moderately microreticulate, rarely smooth, hind angles straight, feebly concave on inner side with broad base, carina straight to feebly arcuate at best, moderately divergent from sides and running to inside of apex; claws simple.

Description: Body 3 to 3.5mm in length, ground color piceous to light brown with a variable yellowish humeral patch and smaller apical patch on each elytron (fig. 16) legs and antennae brunneous to yellowish especially towards apices; dorsally with moderately fine, closely spaced punctures on head and pronotum, with more scattered fine punctation on elytra, ventrally with more or less closely spaced fine punctation, slightly finer and denser on abdomen.

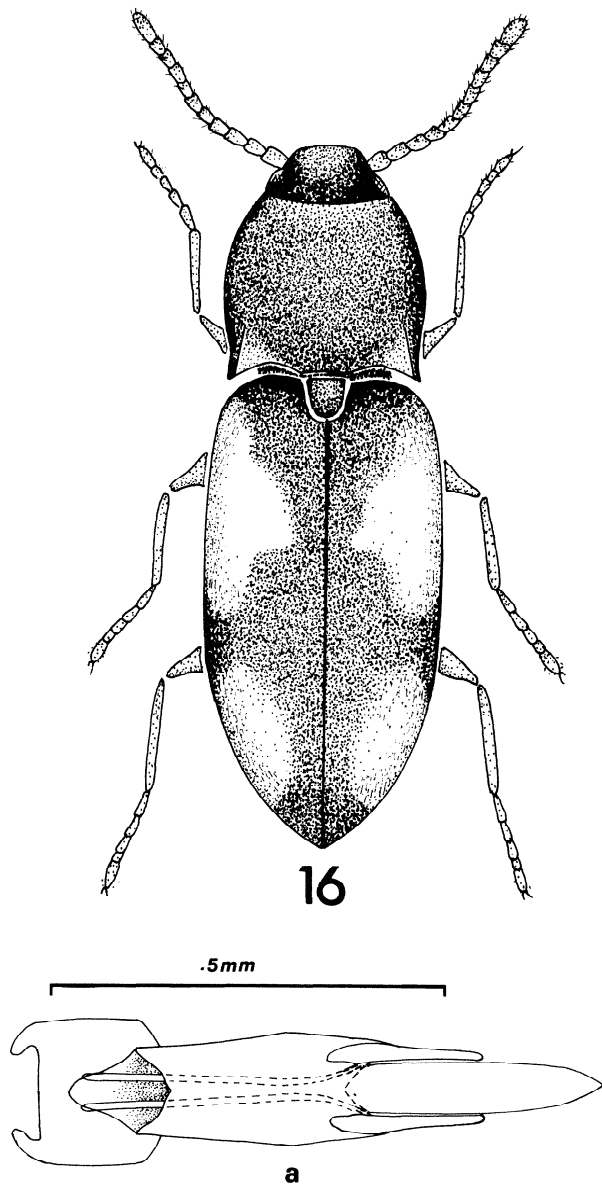


Fig. 16. *Paradonus oliverea* Stibick, dorsal view; 16a. male genitalia.

Head: Piceous to light brown, moderately, closely punctate, surface microreticulate; antennae moderately serrate, brunneous to yellowish especially towards apices, 1st segment (pedicel) expanded, cylindrate, 2nd and 3rd cylindrate, 3rd smaller than 2nd, 4th through 10th segments serrate and gradually decreasing in length, last segment with excavate sensoral pit on upper side of apex, creating a blunt apical angle.

Thorax: Pronotum wider than long (0.759), sides sinuate in front of hind angles, widest in middle and only very moderately convergent to apex; hind angles straight on outer side (rarely feebly concave), slightly concave on inner side, with broad base but well produced apically, embracing slightly produced basal margin of elytra but not humeral angle, strong straight carina running from just inside apex to about 0.222 length of pronotal length; surface piceous to light brown, moderately closely, moderately finely punctate, punctures separate by about 2-3 times their own diameters, interspaces faintly to moderately microreticulate. Pleural region somewhat finely, shallowly punctate, moderately scattered, interspaces shiny, feebly microreticulate. Prosternal lobe prominent, rectangulate, punctation shallow, fine, somewhat close, interspaces weakly shining, microreticulate; prosternum with stronger, crowded but not confluent punctation, surface shiny, feebly microreticulate, prosternal sutures moderately curved, single, simple; prosternal mucro straight, slender and acutely pointed, concave at base, sharply convex from procoxae to apex, moderately punctate, feebly microreticulate; overall color of preceding ventral areas of prothorax yellowish, darker along sutures and margins. Mesosternal fossa sharply raised along sides, posterior side flat with fossa veering into ventrally expanded mesosternum. Metasternum with fine shallow, dense (but not confluent) punctation, surface feebly shiny, microreticulate. Scutellum shield shaped, flat, slightly elongate or subquadrate (width/length = 0.938), feebly inclined; surface smooth, scarcely if at all punctate. Elytra without striae; finely, more or less evenly punctate, these spaced about 2-3 times their own diameters, surface smooth, ground color light brown to piceous with variable yellow humeral patch and smaller apical patch. Legs usually brunneous at base of femur and tibia, otherwise yellowish; claws simple.

Abdomen: Finely, densely to almost confluent and evenly punctate, surface smooth and shiny. **Male Genitalia:** Parameres at best feebly wider towards middle, bifurcate, attenuate towards apex; telomere slender, separated dorsally as a movable condylite, this dorsal

condylite with digitate base and articulate to median strut of centerpiece, with one major subapical seta; basimeres fused to each other and to centerpiece, forming a rigid cylinder, dorsal side covering ventral side except over basimeral plate, this gradually attenuate basad, apex moderately rounded to subacute. Centerpiece broad, lateral struts slightly arcuate at base, otherwise straight, length to paramere length = 0.477, apex moderately acuminate, exceeding apex of parameres by 0.1934 of aedeagal length. Basal piece convex, broad (fig. 16a). **Female Genitalia:** Typical for the genus: Description as under *P. beckeri*.

Material Examined: 67 specimens, in CASC, JNLS, LEMC, MNHF, USNM, ZSMG, collected IV to VII from the following localities. **HOLOTYPE MALE:** First label, "Oliverea, Ulster Co., N.Y., VII.9"; second label, "Shoemaker -tion, 1956"; (USNM). **ALLOTYPE FEMALE:** Same labels as Holotype (USNM). **PARATYPES:** CANADA: No Data. DISTRICT OF COLUMBIA: Washington. MICHIGAN: Ann Arbor; Eagle Harbor, Lake Superior; Marquette, M.A.C. 3. NEW JERSEY: Boonton. NEW YORK: Catskill Mts.; Central New York; Ithaca, six mile creek; Olivera, Ulster Co., Olivera, Catskill Mts. NOVA SCOTIA: Portaupique. PENNSYLVANIA: Easton. QUEBEC: Montreal. VERMONT: Bennington Co. VIRGINIA: Great Falls, Alexandria Co.

Range: Northeastern U.S.A., Southern Canada and South to Virginia (Map 16).

Biological Data: Several localities along a creek, a lake and a falls suggest waterside habitats.

Comments: The name is based on the type locality. This species forms a close complex with *P. illinoiensis* Stibick, with which it shares strong hind angles, a comparatively straight and strong carina and a comparatively broad, flattened body (figs. 13,16), but differs in body size, coloration and male genitalia. Probably more common than indicated by the specimens available for study.

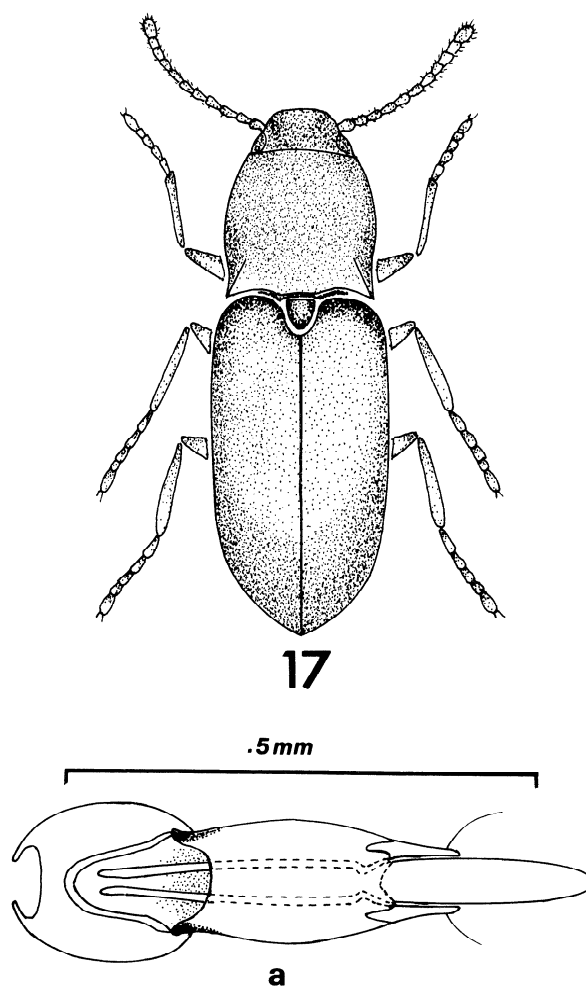


Fig. 17. *Paradonus pectoralis* (Say), dorsal view; 17a. male genitalia.

6. *Paradonus pectoralis* (Say) (Fig. 17,a; Map 17)

Elater pectoralis Say, 1839 (1836)

Diagnosis: Body elongate; head piceous, otherwise uniformly light yellow except along anterior edge of pronotum and where elytra may have faintly darker area around scutellum and in middle of elytra (fig. 17); pronotal punctation close but not contiguous; surface smooth but microreticulate, hind angles short and blunt, inner side straight or comparatively so, carina

relatively straight and running to apex of angle; claws simple.

Material Examined: 29 specimens, in ANSP, CASC, IEMS, INHS, NRSS, SEMC, UICU, USNM, VMCK, collected IV to IX from the following localities. AMERICAN BOREAL: No Data. ARKANSAS: Fayetteville. ILLINOIS: No Data. KANSAS: Wellington. MAINE: Paris, Little Andrescoggin River. MARYLAND: No Data. NEW HAMPSHIRE: Sambornville; Walpole. NEW JERSEY: Springfield. NEW YORK: West Point. NORTH CAROLINA: Raleigh. PENNSYLVANIA: Neshammy; New Cumberland. ONTARIO: Lake Superior; Michipicoten. QUEBEC: Montreal; St. Augustine, Portneuf. VERMONT: Bennington Co.

Range: At present, this species is restricted to the Eastern States and Provinces of North America, as far West as Kansas and South to Arkansas and North Carolina (Map 17).

Biological Data: The only known habitat is a stony beach next to the Little Andrescoggin River in Maine.

Comments: *P. pectoralis* (Say) emerges from this study as being relatively rare in collections, but with a wide distribution. It is the only Eastern member of a diverse species group in which the carina runs straight to the apex of the hind angles, all other species being found in the West and South as far as the Tierra del Fuego, Argentina.

6. Genus *Zorochrus* Thomson

Zorochrus Thomson, 1859

Diagnosis: The usually excavate and double prosternal sutures, often granulate, generally convex and arched pronotum, simple propleuron and tarsi serve to distinguish this genus.

Type-Species: *Elater dermestoides* Herbst, 1806

Zorochrus is a large and widespread taxon with representatives in many countries throughout the World. Yet only one species has ever been found in the East, as given below.

1. *Zorochrus melscheimeri* (Horn) (Fig. 18,a,b; Map 18)

Cryptohypnus melscheimeri Horn, 1891

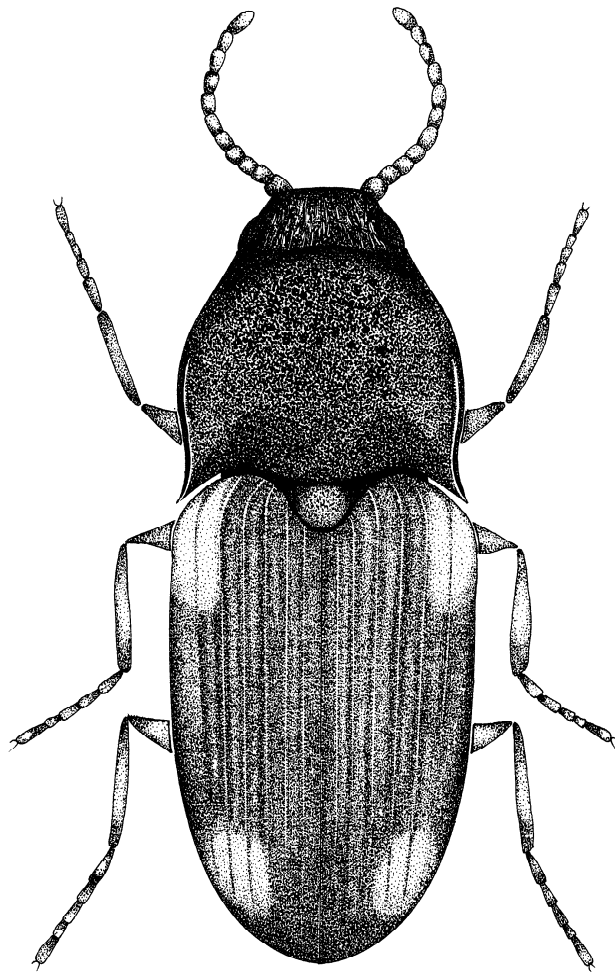
Diagnosis: Pronotum convex, especially in middle towards head, scarcely, if at all, expanded over head (fig. 18), punctures coarse, surface strigose towards middle and anteriorly, finer double punctation evident posteriorly and towards sides; carina of hind angles prominent and extending more than 1/2 to 3/4 way up sides of pronotum; prosternal sutures grooved; elytron with one yellow humeral spot and one subapical spot.

Material Examined: 41 specimens, in ANSP, MCZC, MNHU, SEMC, USNM, ZSMG, collected V to X from the following localities. AMERICAN SEPT: No Data. DISTRICT OF COLUMBIA: Washington. MAINE: Paris. MARYLAND: No Data. MASSACHUSETTS: Charlemont. NEW BRUNSWICK: Penobsquis. NEW HAMPSHIRE: Walpole. NEW JERSEY: Springfield. NEW YORK: Central New York; Newport. PENNSYLVANIA: Abington. QUEBEC: Brome; St Augustine, Portneuf. VERMONT: Bennington. VIRGINIA: Glencarlyn.

Range: Eastern States and Provinces from Quebec in the North to Virginia in the South (Map 18).

Biological Data: No information is available.

Comments: *Zorochrus melscheimeri* (Horn) is relatively rare in collections. It represents an eastward extension of *Zorochrus* from the West and Southwest where the genus is more plentiful both in the number of species found and in the numbers of individuals collected. This species belongs to an ill-defined group distinguished by carinate hind angles but without an



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Fig. 18. *Zorochrus melscheimeri* (Horn), dorsal view.

elaborate expansion or ornamentation of the pronotum (fig. 18). It is otherwise distinguished from related species by the pattern of pronotal punctation and the very long carina of the hind angles given in the diagnosis.

Acknowledgements

The original material on which this study was based came from a study of a different subfamily, the Hypnoidinae (Stibick, 1976) with which the Negastrinae were confused, both in collections and in the literature. Rather than merely separate the Negastrinae and return them, a separate study was carried out, thus preserving a unique opportunity to study valu-

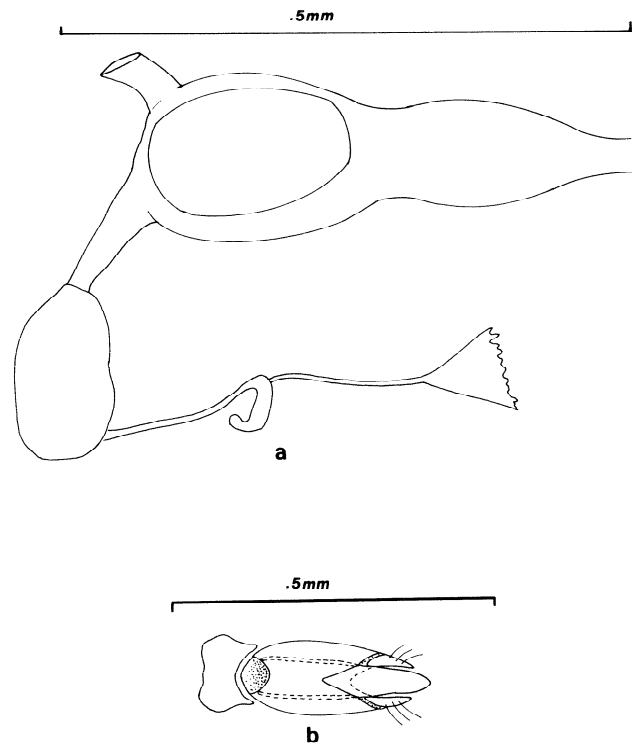
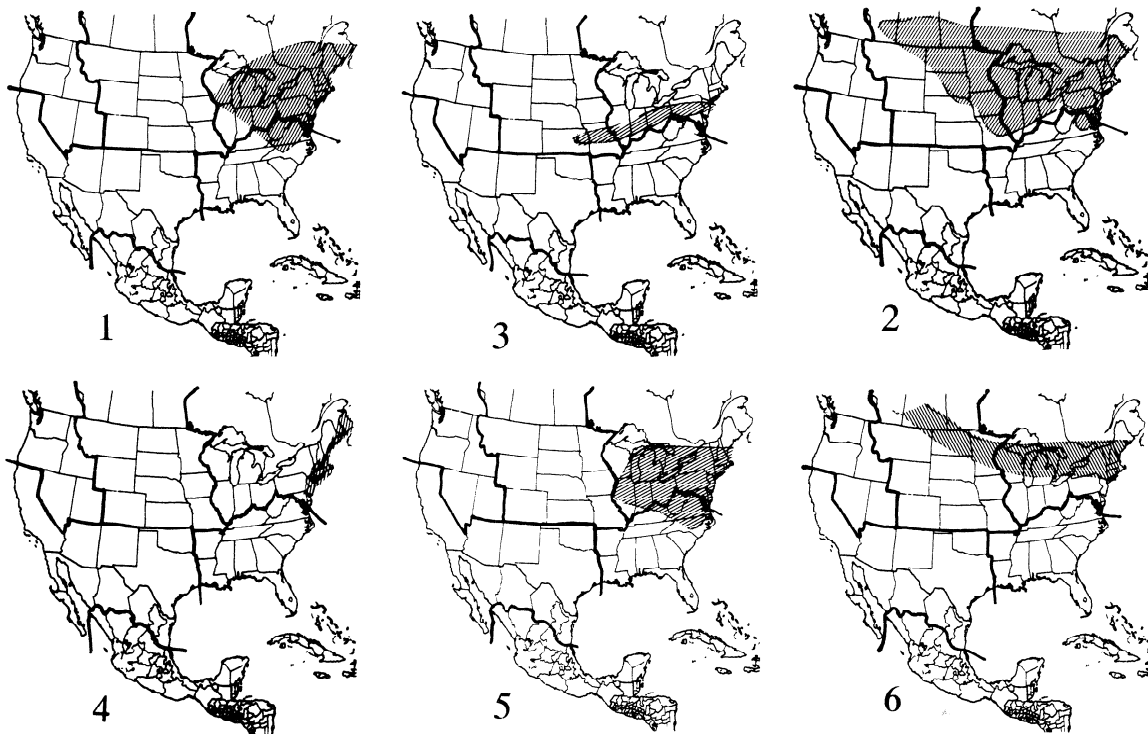


Fig. 18a-b. *Zorochrus melscheimeri* (Horn). 18a. female genitalia; 18b. male genitalia.

able types and other specimens while they were together. The larger size of the Negastrinae, the many undescribed species and the author's changes in location have made such studies more prolonged than usual, nevertheless it is felt that the results well justify the difficulties. A review of the Negastrinae was given in Stibick, 1971. The curators of the institutions listed below are those who originally contributed material towards the study in 1966-67.

Grateful acknowledgements are made to the following:

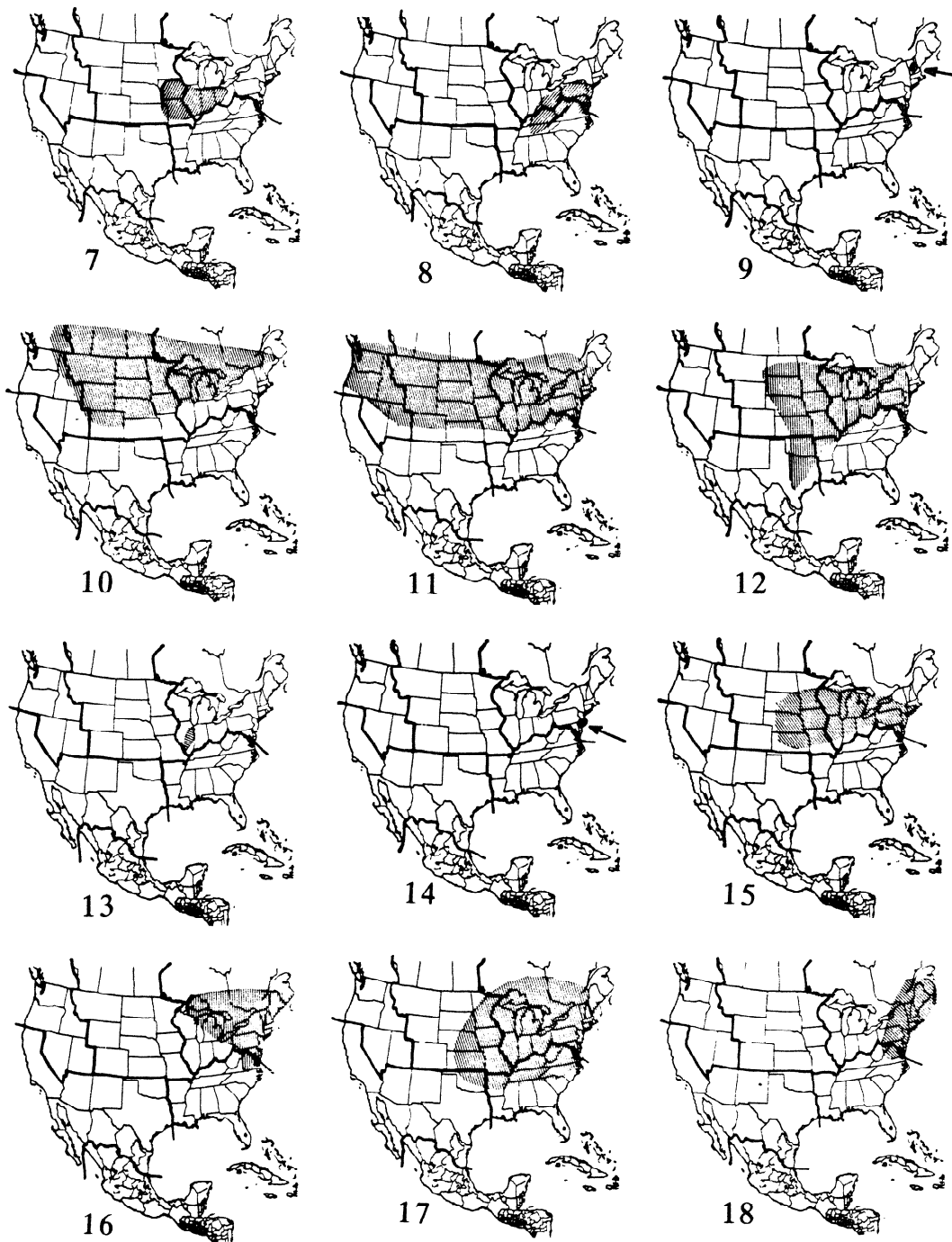
- ANSP - The Academy of Natural Sciences, Philadelphia, Pennsylvania, U.S.A., Dr. S.S. Roback.
- BMNH - British Museum (Natural History), London, England, Miss C.F.F. von Hayek.
- CASC - California Academy of Sciences, San Francisco, California, U.S.A., Mr. H.B. Leech.



Map 1-6. 1 - *Microhypnus striatulus* (LeConte). 2 - *Negastrius arnetti* Stibick. 3 - *Negastrius choris* (Say). 4 - *Negastrius delumbis* (Horn). 5 - *Negastrius exiguus* (Randall). 6 - *Negastrius extricatus* (Fall).

CISC - The University of California, Berkeley, California, U.S.A., Dr. J.A. Powell.
 ELMF - Maine Forest Service, Entomology Laboratory Collection, Augusta, Maine, U.S.A., Dr. A.E. Brower.
 ICCM - Carnegie Museum, Pittsburgh, Pennsylvania, U.S.A., Dr. G. Wallace.
 IEMS - Institute of Entomology, Madrid, Spain, Dr. M.G. de Viedma.
 INHS - Illinois Natural History Survey, Urbana, Illinois, U.S.A., Mrs. L.K. Gloyd.
 ISNB - Institute Royal des Science Natural de Belgium, Bruxelles, Belgium, Dr. R. Damoiseau.
 ISUI - Iowa State College, Ames, Iowa, U.S.A., Dr. J.L. Laffoon.
 LEMC - Lyman Entomological Museum, MacDonald College, Quebec, Canada, Dr. V.R. Vickery.

MCZC - The Museum of Comparative Zoology, Cambridge, Massachusetts, U.S.A., Dr. J.F. Lawrence.
 MNHF - Museum of Natural History, Paris, France, Dr. G. Colas.
 MNHU - Humboldt University, Berlin, East Germany, Dr. F. Hieke.
 MNMB - Magyar Nemzeti Museum, Budapest, Hungary, Dr. Z. Kaszab.
 NRSS - Naturhistoriska Riksmuseum, Stockholm, Sweden, Drs. S. Killander and G. Hallin.
 PSUC - Pennsylvania State University, University Park, Pennsylvania, U.S.A., Dr. W.W. Boyle.
 PURC - Purdue University, Lafayette, Indiana, U.S.A., Dr. R.H. Arnett, Jr.
 SEMC - Snow Entomology Museum, University of Kansas, Lawrence, Kansas, U.S.A., Dr. G.W. Byers.



Map 7-18. 7 - *Neohypdonus aestivus* (Horn). 8 - *Neohypdonus perplexus* (Horn). 9 - *Neohypdonus restrictus* (Mannerheim). 10 - *Neohypdonus tumescens* (LeConte). 11 - *Oedostethus femoralis* LeConte. 12 - *Paradonus beckeri* Stibick. 13 - *Paradonus illinoiensis* Stibick. 14 - *Paradonus jerseyensis* Stibick. 15 - *Paradonus obliquatus* (Melsheimer). 16 - *Paradonus oliverea* Stibick. 17 - *Paradonus pectoralis* (Say). 18 - *Zoroehrus melscheimeri* (Horn).

- UASM - University of Alberta, Edmonton, Alberta, Canada, Dr. F.J.D. McDonald.
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- UICU - University of Illinois, Urbana, Illinois, U.S.A., M. G. Eertmoed.
- UMMZ - Museum of Zoology, University of Michigan, East Lansing, Michigan, U.S.A., Dr. R.L. Fischer.
- USNM - United States National Museum, Washington, D.C., U.S.A., Mr. T.J. Spilman.
- WSUC - Washington State University, Pullman, Washington, U.S.A., Dr. M.T. James.
- ZSMG - Zoologische Sammlung des Bayerischen Staates, Munchen, West Germany, Dr. H. Freude.

The following private collections also contain specimens. In addition, the author's collection is a depository of some material (for reference purposes) taken from other collections in this study.

- JNLS - Author's collection.
- VMKC - Vernon M. Kirk Collection, USDA, Brookings, South Dakota, U.S.A.

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Literature Cited

- Arnett, R.H., Jr. and Samuelson, G.A.** 1969. Directory of Coleoptera Collections of North America. Cushing-Malloy, Inc., Ann Arbor, Michigan. 123 pp.
- Becker, E.C.** 1977. New or noteworthy records of Coleoptera in Canada (1). Ann. ent. Soc. Quebec, 22:14-17.
- Fall, H.C.** 1926. A List of the Coleoptera in Alaska and adjacent parts of the Yukon Territory in the summer of 1924. Pan-Pacific Entomol., 2(4):191-192.
- Herbst, J.F.W.** 1806. Natursystem aller bekannten in-auslandischen Insecten. Kafer, 10:285 pp. Berlin.
- Horn, G.H.** 1891. A monograph of the species of *Cryptohypnus* of Boreal America. Trans. Am. ent. Soc., 18:1-31.
- Kishii, T. and Baba, K.** 1957. Snappers of Niigata - Prefecture on the collection in 1956, with the description of some new forms. Akitu, Kyoto, 6:67-75.
- Kishii, T.** 1966. Elateridae of Kyoto and its Adjacent Regions. Biol. Lab. Heian High School, pp. 14-17.
- Kishii, T.** 1976. New Negastrinae with some notes. Some new forms of Elateridae in Japan (X). Bull. Heian High School, 20: 17-46.
- LeConte, J.L.** 1853. Revision of the Elateridae of the United States. Trans. Am. philos. Soc. (n.s.), 10:405-508.
- LeConte, J.L.** 1866. Additions to the coleopterous fauna of the United States. No. 1. Proc. Acad. Nat. Sci. Philadelphia, 18:361-394.
- Linnaeus,** 1758. Systema Naturae. Laurentii, Holmiae, ed 10(1), 824 pp.
- Mannerheim, G.C.G.** 1853. Dritten Nachtrag zur kafer-fauna der Nord-Amerikanischen Laender des Russischen Reiches. Bull. Soc. imp. Nat. Moscou, 26:95-273.
- Melsheimer, F.E.** 1845. Descriptions of new species of Coleoptera of the United States. Proc. Acad. Nat. Sci. Philadelphia, 2:213-223.

- Notman, H.** 1921. Some new Genera and Species of Coleoptera collected at Westfield Chautauqua Co., N.Y. J. New York Ent. Soc., 29:145-180.
- Randall, J.W.** 1838. Description of new species of Coleopterous insects inhabiting the State of Massachusetts. Boston Journ. Nat. Hist., 2:34-52.
- Say, T.** 1839 (not 1836). Description of new North American insects and observations on some already described. Trans. American Phil. Soc., Ser. 2, 6: 155-190.
- Stibick, J.N.L.** 1971. The Generic Classification of the Negastrinae. Pac. Ins., 13(2): 371-390.
- Stibick, J.N.L.** 1976. A Revision of the Hypnoidinae of the World. Part I. Introduction, Phylogeny, Biogeography. The Hypnoidinae of North and South America. The Genera *Berninelsonius* and *Ligmargus*. EOS, 51:143-223.
- Thomson, G.C.** 1859. Coleoptera Scandinaviae, 1:106.